SIEMENS

SIMODRIVE POSMO SI
SIMODRIVE POSMO CD / CA

User Manual 05.2013 Edition

Distributed Servo Drive Technology

Manufacturer/Service Documentation

SIEMENS

Distributed Servo Drive Technology

SIMODRIVE POSMO SI
SIMODRIVE POSMO CD/CA

User Manual

Valid for

Drive	*Software version*
SIMODRIVE POSMO SI/CD/CA	3.6
SIMODRIVE POSMO SI/CD/CA	4.1
SIMODRIVE POSMO SI/CD/CA	5.x
SIMODRIVE POSMO SI/CD/CA	6.x
SIMODRIVE POSMO SI/CD/CA	7.x
SIMODRIVE POSMO SI/CD/CA	8.x
SIMODRIVE POSMO SI/CD/CA	**9.x**

05/2013 Edition

SIMODRIVE® documentation

Printing history
Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the ”Remarks” column.

The status is designated in the ”Remarks” column:

A . . . . . New documentation

B . . . . . Unrevised reprint with new Order No.

C . . . . . Revised edition with new status

If factual changes have been made on the page since the last edition, this is indicated by a new edition coding in the header on that page.

Edition	Order No.	Remarks
03.01	6SN2197–0AA20–0BP0	**A**
08.01	6SN2197–0AA20–0BP1	**C**
02.02	6SN2197–0AA20–0BP2	**C**
08.02	6SN2197–0AA20–0BP3	**C**
02.03	6SN2197–0AA20–0BP4	**C**
07.03	6SN2197–0AA20–0BP5	**C**
06.04	6SN2197–0AA20–0BP6	**C**
10.04	6SN2197–0AA20–0BP7	**C**
04.05	6SN2197–0AA20–0BP8	**C**
09.05	6SN2197–0AA20–1BP0	**C**
11.05	6SN2197–0AA20–1BP1	**C**
04.06	6SN2197–0AA20–1BP2	**C**
08.06	6SN2197–0AA20–1BP3	**C**
06.08	6SN2197–0AA20–1BP4	**C**
05.13	6SN2197–0AA20–1BP5	**C**

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Foreword

Instructions when reading

Structure of the documentation

This User Manual is part of the SIMODRIVE 611 documentation which is subdivided into 2 levels:

- General Documentation
- Manufacturer/Service Documentation

A list of documents, updated on a monthly basis, is available on the Internet for the available languages at:
http://www.siemens.com/motioncontrol
Select ”Support”, —> ”Technical documentation” —> ”Ordering documentation” —> ”Printed documentation”.

The Internet version of DOConCD (DOConWEB) is available at:
http://www.automation.siemens.com/doconweb

Information on the training offerings and on FAQs (frequently asked questions) can be found in the Internet under:
http://www.siemens.com/motioncontrol and menu item ”Support”.

Up-to-date information about our products can be found on the Internet at the following address:
http://www.siemens.com/motioncontrol

Target group

This document addresses engineers and technologists (employed with the machinery construction OEM), commissioning engineers (commissioning the system/machine), programmers

Benefits

This publication describes the functions so that the target group understands these functions and can appropriately select them. It provides the target group with the information required to implement the appropriate functions.

Should you wish for additional information or should exceptional problems arise that are not addressed in sufficient detail in this manual, you can request the required information from your local Siemens office.

Standard version

The scope of the functionality described in this document can differ from the scope of the functionality of the drive system that is actually supplied. Other functions not described in this documentation might be able to be executed in the drive system. This does not, however, represent an obligation to supply such functions with a new control or when servicing. Extensions or changes made by the machine tool manufacturer are documented by the machine tool manufacturer.

This document does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

The contents of this document are not part of an earlier or existing contract or agreement nor do they change this. The sales contract contains the entire obligation of Siemens. The warranty conditions specified in the contract between the parties is the sole warranty of Siemens. Any statements contained herein neither create new warranties nor modify the existing warranty.

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Questions regarding documentation

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Internet address SIMODRIVE

http://www.siemens.com/simodrive

Certificates

You will find the certificates for the products described in this documentation in the Internet: http://support.automation.siemens.com

under the Product/Order No. 15257461
or at the relevant branch office of the A&D MC group of Siemens AG.

Information for using this Manual

Please observe the following when using this User Manual:

1. Help: The following help is available for the reader:

- Overall table of contents
- Header line (as orientation):
  the main chapter is in the upper header line
  the sub-chapter is in the lower header line
- Chapter list of contents is provided at the beginning of each Chapter
- Appendix with
  - Abbreviations and List of References
  - Index

    If you require information regarding a specific term, then look for this in the Appendix under the Chapter ”Index”.
    The Chapter number as well as the page number is specified where information on this term can be found.

2. Parameter displays

   In this description, for the parameters, the following displays and significances are available:

- P0660 Parameter 0660 without sub-parameter
- P1451:8 Parameter 1451 with sub-parameter
  :8 Parameter set-dependent sub-parameter
- P1788:11 Parameter 1788 with sub-parameter
  :11 Process data-dependent sub-parameter
- P0080:64 Parameter 0080 with sub-parameter
  :64 Traversing block-dependent sub-parameter
- P1650.15 Parameter 1650 bit 15

Edition of the documentation?

There is a fixed relationship between the edition status of the documentation and software release of POSMO SI/CD/CA.

The first edition 03.01 describes the functionality of SW 3.6. There are no preliminary software releases for POSMO SI/CD/CA.

Software release

The software release starts with SW 3.6 and runs in synchronism with SIMODRIVE 611 universal.

08.01 Edition describes the functionality of SW 3.6 and SW 4.1.

What are the essential new functions for SW 4.1 in comparison to SW 3.6?

- Teach-in and incremental jogging
- Axis coupling
- Slave-to-slave communications PROFIBUS-DP
- Dynamic Servo Control (DSC)
- Armature short-circuit and pulsed resistor management POSMO CA

02.02 Edition describes the functionality of SW 3.6, SW 4.1 and SW 5.1.

What are the essential new functions that have been added for SW 5.1?

- Spindle positioning
- Expanded functionality of the ”SimoCom U” start-up tool
  - Support, motor data optimization
  - Bit masking for the ”Trace” function
- Passive referencing
- Filter parameterization (current, speed setpoint)

08.02 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x. and SW 6.1.

What are the essential new functions that have been added for SW 6.1?

- PROFIdrive conformance

02.03 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x and SW 7.1.

What are the essential new functions that have been added for SW 7.1?

- MDI (external block processing)

07.03 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x and SW 7.x.

06.04 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x and SW 8.1

What are the essential new functions that have been added for SW 8.1?

- Password protection
- Any gearbox ratio
- Direction-dependent fast-stop using a hardware switch

10.04 Edition describes the functionality of SW 3.6, SW 4.1, SW5.x, SW 6.x, SW 7.x and SW 8.x.

What are the essential new functions that have been added?

- Max. motor cable for POSMO CD 18 A/CA 9 A --> 15 m
- Max. motor cable for POSMO CD 9 A --> 6 m
- Charge limit of the SIMODRIVE line infeed modules

04.05 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x and SW 8.x.

What are the essential new functions that have been added?

- ECOFAST connection to the PROFIBUS unit
- Input signal ”ON/OFF 1” at a digital input terminal
- Reading the DC link voltage via PROFIBUS-DP
- Referencing with distance-coded measuring systems (being prepared):

11.05 (09.05) Edition describes the functionality of SW 3.6, SW 4.1, SW5.x, SW 6.x, SW 7.x, SW 8.x and SW 9.x.

What are the essential new functions that have been added?

- Additional torque/force limiting at zero setpoint (P1096/P1097)
- Supplement to activate the function generator and the measuring function for ”SimoCom U” with
  - PROFIBUS-control signal in the pos mode (PosStw.15)
  - Digital input terminal function No. 41
- Feedback signal – drive ready PROFIBUS bit MeldW.12

04.06 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x, SW 8.x and SW 9.x

What are the essential new functions that have been added for SW 9.2?

- Start-up Tool ”SimoCom U” can run under WIN Server 2003

08.06 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x, SW 8.x and SW 9.x

What are the essential new supplementary information that have been added for 08.06 edition?

- PROFIBUS-DP cycles >15 ms are not permissible.
- Up to three POSMO CA drives can be connected to each fuse line!
- Secure the PROFIBUS unit with screws only when it has been applied in parallel to the housing and inserted!

08.06 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x, SW 8.x and SW 9.x

What are the essential new supplementary information that have been added for 08.06 edition?

- Troubleshooting

08.13 edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x, SW 8.x and SW 9.x

This edition contains troubleshooting information.

Definition: Who are qualified personnel?

Startup and operation of the device/equipment/system in question must only be performed using this documentation. Only **qualified personnel** should be allowed to commission and operate the device/system. Qualified personnel as referred to in the safety instructions in this documentation are persons authorized to start up, ground, and label devices, systems, and circuits in accordance with the relevant safety standards.

Safety information/ instructions

This manual contains information that must be observed to ensure your personal safety and to prevent material damage. The instructions for your personal safety are marked by a warning triangle. Instructions relating solely to material damage are not marked by a warning triangle. The warnings appear in decreasing order of risk as given below.

Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.

Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.

Caution

With a warning triangle indicates that minor personal injury **can** result if proper precautions are not taken.

Caution

Without warning triangle indicates that material damage **can** result if proper precautions are not taken.

Notice

indicates that an undesirable result or state **may** arise if the relevant note is not observed.

Intended use

Note the following:

Warning

The unit may be used only for the applications described in the catalog and the technical description, and only in combination with the equipment, components and devices of other manufacturers where recommended or permitted by Siemens. To ensure trouble-free and safe operation of the product, it must be transported, stored and installed as intended and maintained and operated with care.

Other information

Note

This symbol indicates important information about the product or part of the document, where the reader should take special note.

Reader’s note

This symbol is shown, if it relates to important information which the reader must observe.

Technical information

Warning

When electrical equipment is operated, certain parts of this equipment are inevitably under dangerous voltage.

Incorrect handling of these units, i.e. not observing the warning information, can therefore lead to death, severe bodily injury or significant material damage.

Only qualified, trained personnel may carry-out any work relating to the transport, connection, commissioning and regular service/maintenance. The system must always be in a no-voltage condition and must be locked out so that it cannot be accidentally powered up again. This also applies to all of the auxiliary circuits (observe VDE 01 05; IEC 364).

This personnel must be completely knowledgeable about all of the warnings and service/maintenance measures according to this User Manual.

Hazardous axis motion can occur when working with the equipment.

POSMO SI/CD/CA has been designed for industrial and workshop systems. It is forbidden to use this product in hazardous zones and areas (explosion protection) unless they have been explicitly designed for this purpose (carefully observe additional additional information and instructions)

Danger

”Protective separation” (PELV/SELV) in the drive can only be guaranteed when the following points are taken into consideration:

- Certified components are used.
- The degree of protection for all components is ensured.
- With the exception of the DC link and motor terminals, all of the circuits (e.g. digital inputs) must fulfill the requirements of PELV or SELV circuits.
- The braking cable shield must be connected to PE through the largest possible surface area.
- For unlisted motors, ”protective separation” is required between the temperature sensor and motor winding.

Danger

Danger!Due to electrical, magnetic and electro–magnetic fields (EMF) during operations (EMF), there may be an imminent danger to people remaining in the immediate vicinity of the product – particularly in the case of people with cardiac pacers, implants etc.

Machine / plant operators as well as people remaining in the vicinity of the product must take note of the respective guidelines and standards! These are – for example in the European Economic Area – EMF guideline 2004/40/EC, the norms EN 12198–1 through –3 and – for example in the Federal Republic of Germany – the National Accident Prevention Regulation (Berufsgenossenschaftliche Unfallverhütungsvorschrift) BGV 11 with the associated rule BGR 11 “Electro–magnetic fields”.

According to this regulation, an analysis of the dangers must be carried out for each workplace, measures must be drawn up and applied to reduce the dangers and stresses on people, and danger zones and zones of exposure must be determined and taken note of.

Please also take note of the respective safety instructions in chapters Storage, Transport, Assembly, Commissioning, Operation, Maintenance, Disassembly and Disposal.

Note

Mounting and installation:

- Observe the degree of protection on the rating plate and check that it matches the mounting location!

Mounting:

When handling cables, observe the following:

- They are not damaged,
- they are not stressed,
- they may not come into contact with rotating components.

Warning

All of the SIMODRIVE unit connections must be withdrawn or disconnected when the electrical equipment on the machines is subject to a voltage test (EN 60204–1 (VDE 0113–1), Point 20.4).
This is necessary, as the SIMODRIVE insulation has already been tested, and should not be subject to a new test (additional voltage stressing).

Warning

Start-up/commissioning is absolutely prohibited until it has been ensured that the machine in which the components described here are to be installed, fulfills the regulations/specifications of the Directive 98/37/EC.

Warning

The information and instructions in all of the documentation supplied and any other instructions must always be observed to eliminate hazardous situations and damage.

- For special versions of the machines and equipment, the information in the associated catalogs and quotations applies.
- Furthermore, all of the relevant national, local land plant/system-specific regulations and specifications must be taken into account.
- All work should be undertaken with the system in a no-voltage condition!

Caution

When using mobile radios (e.g. cellular phones, mobile phones, 2-way radios) with a transmission power of > 1 W close to the SIMODRIVE POSMO SI/CD/CA (< 1.5 m) the function of the SIMODRIVE POSMO SI/CD/CA can be disturbed.

Warning

It is not permitted to open up the drive units!

The DC link coupling for POSMO SI/CD and the line supply coupling for POSMO CA are provided with a safety interlock as protection against residual voltages. This can only be opened by qualified personnel using a tool, e.g. screwdriver.

The DC link or line supply coupling at the drive unit may only be withdrawn at the very earliest 4 minutes after the power supply voltage has been disconnected!

Danger

It is not permissible to connect POSMO SI/CD to the three-phase line supply as this could destroy the units!

ESDS information and instructions

Electro**S**tatic **D**ischarge **S**ensitive Devices

Note

Some parts, such as individual components, integrated circuits or modules, could be damaged by electrostatic fields or electrostatic discharge during handling, testing or transport. These components are referred to as **ESDS** (**E**lectro**S**tatic **D**ischarge **S**ensitive Devices).

Handling ESDS modules:

- When handling devices which can be damaged by electrostatic discharge, personnel, workstations and packaging must be well grounded!
- Electronic components should only be touched when absolutely necessary.
- Personnel may only come into contact with the components, if
  - they are continuously grounded through ESDS wristlets,
  - they wear ESDS shoes, ESDS shoe grounding strips in conjunction with an ESDS floor surface.
- When connecting up and setting the PROFIBUS unit (setting the Profibus addresses) and memory module, ensure that the warranty conditions are not violated.
- Only touch memory modules at the front panel or at the edge of the PC boards.

Residual risks

When carrying out a risk assessment of the machine in accordance with the EU Machinery Directive, the machine manufacturer must con–sider the following residual risks associated with the control and drive components of a power drive system (PDS).

1. Unintentional movements of driven machine components during commissioning, operation, maintenance, and repairs caused by, for example:
   - Hardware defects and/or software errors in the sensors, control-lers,
   - actuators, and connection technology
   - Response times of the controller and drive
   - Operation outside the specification
   - Errors when parameterizing, programming and wiring
   - Use of radio devices/cellular phones in the immediate vicinity of the controller
   - External effects
2. Exceptional temperatures as well as emissions of light, noise, particles, or gas caused by, for example:
   - Component malfunctions
   - Software errors
   - Operation outside the specification
   - External effects
3. Hazardous shock voltages caused by, for example:
   - Component malfunctions
   - Static charges
   - Operation outside the specification
   - Condensation/conductive contamination
   - External effects
4. Electrical, magnetic, and electromagnetic fields that can pose a risk to people with a pacemaker and/or implants if they are too close.
5. Emission of pollutants if components or packaging are not disposed of properly.

An assessment of the residual risks (see points 1 to 5 above) establis-hed that these risks do not exceed the specified limit values (risk priori-ty number in accordance with EN 60812 RPZ = 100).
For additional information, refer to the relevant sections of the Function Manual.

At the present time, other known residual risks are:

- Beschleunigung der Spindel oder Achsen durch:
  - Encoder errors, e.g., errors in the absolute measuring system (CD track), loose contacts in encoder cables or unsuitable encoders.
  - Cyclically interchanged phases of the motor connections (V–W–U instead of U–V–W).
  - Interchanged control sense.
  - Electric faults (defective components, etc.).
  - Transfer of an incorrect, but plausible actual value in absolute measuring systems (encoder does not signal an error).
- For a 1-encoder system, encoder faults are detected by various HW and SW monitoring functions. It is not permissible that these monitoring functions are de-activated and they must be parameterized carefully.
- Stop function Category 0 according to EN 60204–1 means that the spindles/axes are not braked. Depending on the kinetic energy involved, they can coast-down for a long time.

  This must be integrated in the logic of the protective door interlokking.
- When a limit value is violated, higher speeds than have been set can briefly occur or the specified position position can be exceeded to some degree from between the error being detected and the system responding. This depends on the dynamic response of the drive and the parameter settings (MD).
- Parameterization and programming errors made by the machinery construction OEM cannot be identified. The required level of safety can only be assured by a thorough and careful acceptance testing.
- When replacing the drive unit or motor, the same type must always be used as otherwise the selected parameters may result in different responses.

  When an encoder is replaced, the axis involved must be re—calibrated.

■

Contents

1 Product Overview

1.1 Main features

1.1.1 Overview

General

The POSMO SI, POSMO CD and POSMO CA drives supplement the modular SIMODRIVE 611 universal packaging design by a distributed version which can be mounted outside the cabinet.

The three drives use identical software. Communications are exclusively realized via PROFIBUS-DP with the possibility of using the expanded standard PROFIBUS-DP with motion control.

The three drives use the same termination system.

The signal cables (encoder signals, bus communications) are not shown in the following diagram for reasons of transparency.

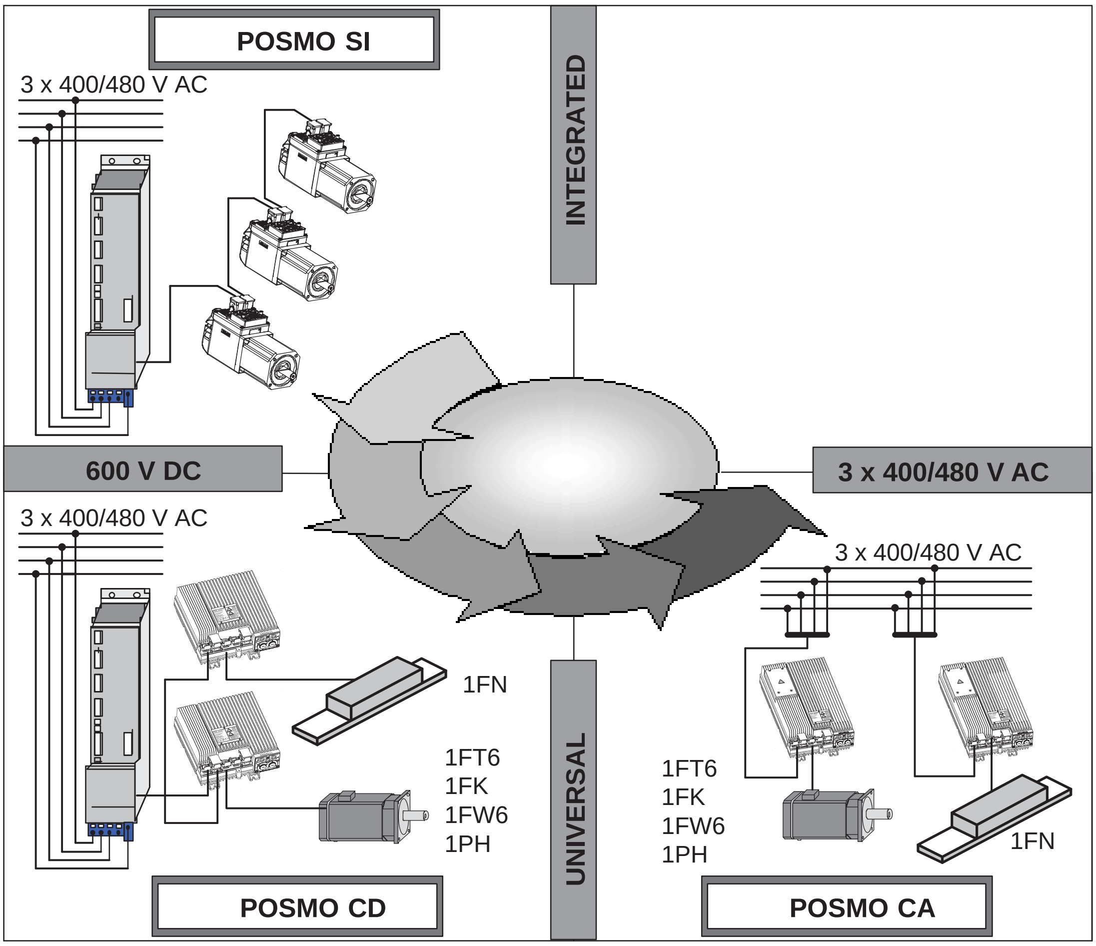


Fig. 1-1 Baukastensystem

Applications

POSMO SI, POSMO CD and POSMO CA drives can be flexibly used in many applications as a result of the inherent design.

These distributed drives can be used for all machines and plants, where a distributed configuration provides advantages when it comes to engineering/configuring, commissioning, operation and service.

The advantages when using distributed drive technology include:

- Lower cabinet costs by locating the drives in the field ”locally”
- Fast machine installation by mounting a complete drive unit
- Low installation costs by connecting the drive through a communications and power bus
- Fast installation using pre-assembled cables and connectors
- Simple commissioning and parameterization of all of the SIMODRIVE drives using the user-friendly ”SimoCom U” start-up tool
- The number of axes can be simply expanded without taking up any space in the cabinet

Standard POSMO SI applications, include:

- Handling axes
- Positioning axes
- Help axes for tool and production machines

High performance POSMO CD/CA applications, such as:

- Servo applications
- Main spindle applications

Features of distributed drive technology

- Complete drive units with integrated power and control module, positioning control, program memory and for POSMO SI, integrated motor
- High degree of protection
- High availability

  ⇒ Connection via connectors which cannot be incorrectly interchanged

  ⇒ PROFIBUS-DP connection with T functionality

  ⇒ Interchangeable memory modules for firmware/user data
- Electronics power supply is integrated in the unit

  ⇒ An external power supply is not required (can be optionally connected)
- Integrated brake control
- Positioning functionality with programmable motion sequence ”on board”
- Operation on PROFIBUS-DP with high-speed cyclic data transfer

Parameter assignment

The system is incorporated and adapted to the actual machine/system by appropriately parameterizing it. It can be commissioned and serviced as follows:

- ”SimoCom U” parameterizing and start-up tool
  (refer to Chapter 3.2)

Data save

The device has a memory module with non-volatile data memory (FE-PROM) to save the following data:

- Firmware (system software)
- User data

Most important overview of functions

The basis is the functionality of SIMODRIVE 611 universal.

- Operating modes
  - n-set (speed/torque setpoint)
    ⇒ closed-loop speed control
    ⇒ open-loop torque control
    ⇒ torque reduction
  - Positioning
    ⇒ HW/SW limit switches
    ⇒ 64 traversing blocks (max.)
    ⇒ position-related switching signals
    ⇒ rotary axis with modulo correction
    ⇒ jerk limiting
    ⇒ external block change
- Commissioning
  ⇒ SimoCom U parameterizing and start-up tool
- Motor holding brake sequence control
- Eight parameter sets
- Monitoring functions
- Uniform, integrated periphery
  ⇒ two digital inputs (can be freely parameterized)
  ⇒ up to SW 4.1, two digital outputs (can be freely parameterized)
  ⇒ from SW 4.1 onwards, either two digital outputs or one digital input and one digital output (can be freely parameterized)
  ⇒ two analog test outputs
  ⇒ ”Pulse enable” terminal (Term. IF)

Differentiating features

POSMO SI, POSMO CD and POSMO CA differ as follows:

Table 1-1 Differences between POSMO SI, POSMO CD and POSMO CA

Features	POSMO SI	POSMO CD	POSMO CA
Power infeed	From a centrally generated DC voltage link (600 $V_{typ.}$ DC)		From a three-phase line supply voltage; integration of rectifier, pulsed resistor and line filter
Integration of power and control electronics	In the motor	In a unit (distributed servodrive close to the motor)	
Degree of protection	• IP 64 (fan, IP 54), • Option IP 65 with IP 67 shaft gland (fan IP 54)	IP 65	
Cooling	Forced convection using an integrated fan	Free convection	
Cabling	As bus from PROFIBUS-DP and the power supply		
Electronics power supply	Is realized decentrally in the drive unit (when required, can also be externally supplied)		
”Pulse enable” terminal (terminal IF)	Via terminals at two additional conductors in the power cable		
Ambient temperature	0 °C to 45 °C (to 55 °C with power de-rating)		
Closed-loop control	SIMODRIVE 611 universal, modified platform with interchangeable memory board		
Inputs	2 digital inputs, of which input 1 is implemented as fast input		
Outputs	2 digital outputs, from SW 4.1, of which 1 output can be parameterized as input		
Measuring outputs	2 analog test outputs for commissioning and diagnostics		
Indirect measuring system (motor measuring system)	Fixed 32 pulses/revolution pulse multiplication 2048 traversing range 4096	Corresponding to the motor used (1 Vpp sin/cos signals; Absolute encoder with EnDat) Resolution 65,535 increments/revolution	
Direct measuring system	–	Optional (1 Vpp sin/cos signals; absolute encoder EnDat)	
Connections	Power, motor and measuring system connection with power connector, PROFIBUS-DP with M20 gland (copper cable), I/O signals with M12 connector system		
Motors	1FK6 060-□□□ 1FK6 063-□□□ 1FK6 080-□□□ 1FK6 083-□□□ 1FK6 100-□□□	1FT6; 1FK; 1PH; 1PM; 1FN; 1FW6 corresponding to the power limit acc. to Table 1-4 and data in the following reference: /PJLM/ Configur. Manual Linear Motors /PJM/ Configuration Manual AC Motors /PJTM/ Configuration Manual Built-in Torque Motors 1FW6	

Ordering overview

Table 1-2 POSMO SI/CD/CA, data medium

Cons. No.	Order No. (MLFB)	Description
SIMODRIVE POSMO SI		
1	6SN2 460-2CF□0-0G□□	with motor 1FK6 060-...
2	6SN2 463-2CF□0-0G□□	with motor 1FK6 063-...
3	6SN2 480-2CF□0-0G□□	with motor 1FK6 080-...
4	6SN2 483-2CF□0-0G□□	with motor 1FK6 083-...
5	6SN2 500-2CF□0-0G□□	with motor 1FK6 100-...
SIMODRIVE POSMO SI ECOFAST		
6	6SN2 460-2CF□0-1G□□	with motor 1FK6 060-...
7	6SN2 463-2CF□0-1G□□	with motor 1FK6 063-...
8	6SN2 480-2CF□0-1G□□	with motor 1FK6 080-...
9	6SN2 483-2CF□0-1G□□	with motor 1FK6 083-...
10	6SN2 500-2CF□0-1G□□	with motor 1FK6 100-...
SIMODRIVE POSMO CD		
1	6SN2 703-2AA0□-0BA1	600 V DC_{type}, POSMO CD 9 A
2	6SN2 703-2AA0□-0CA1	600 V DC_{type}, POSMO CD 18 A
SIMODRIVE POSMO CD ECOFAST		
3	6SN2 703-2AB0□-0BA1	600 V DC_{type}, POSMO CD 9 A
4	6SN2 703-2AB0□-0CA1	600 V DC_{type}, POSMO CD 18 A
SIMODRIVE POSMO CA		
1	6SN2 703-3AA1□-0BA1	3-ph. 400/480 V AC, POSMO CA 9 A
SIMODRIVE POSMO CA ECOFAST		
2	6SN2 703-3AB1□-0BA1	3-ph. 400/480 V AC, POSMO CD 9 A
Data medium		
1	6SN1153-□NX20-□AG0[1)] □ = 0 —> CD with the most current SW version The CD also contains previous SW versions	CD (SimoCom U, drive firmware, GSD file, readme file)

1) □: Space retainer for the software version

Reader's note

The information in the "readme.txt" file on the CD for "SIMODRIVE POSMO SI/CD/CA" should be observed.

1.1.2 POSMO SI

Packaging system

For POSMO SI, the power and information electronics are integrated in the motor.

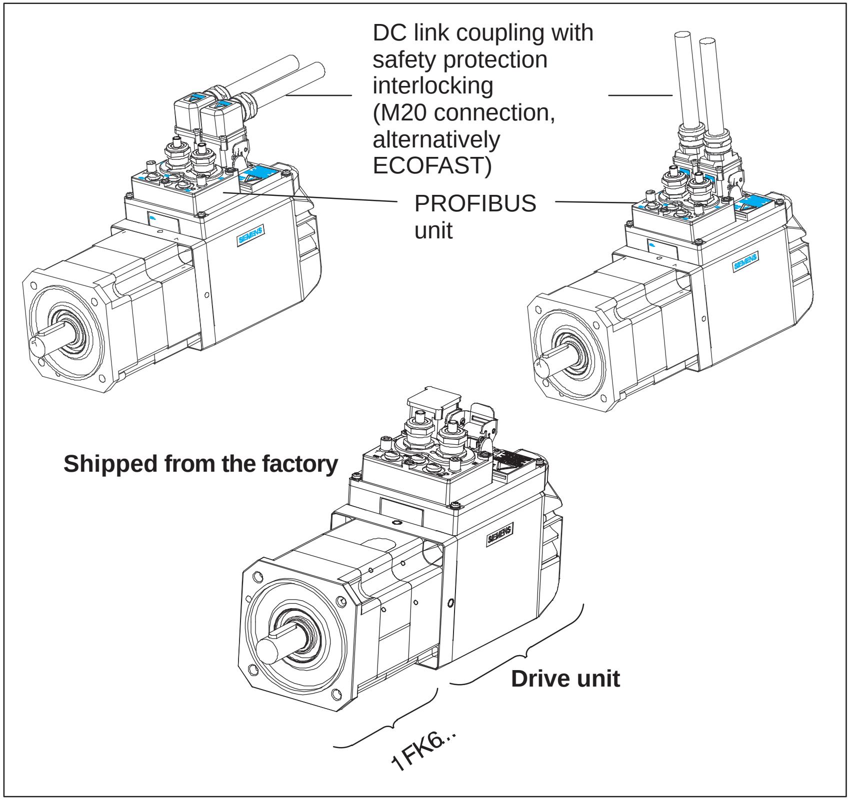


Fig. 1-2 POSMO SI

The power supply is taken from the DC link voltage (600 $V_{typ.}$), which must be generated from an external line supply.

- The drive comprises a 1FK6 motor, encoder and drive unit.
- The 600 V_{typ} power connection is established using a DC link coupling protected against reversed polarity and with safety interlocking.

  A second DC link coupling, which also cannot be interchanged, with safety interlocking is used to loop the supply through to the next POSMO SI/CD.
- Communications between the master and slave are realized via PROFIBUS-DP. PROFIBUS-DP function with Motion Control (clock cycle synchronous operation) is possible.

  The signal is connected through a removable PROFIBUS unit using cable gland and terminals.

  The bus connection (T functionality) to other nodes is retained even when the PROFIBUS unit is withdrawn.

1

- The following connection is made using the M12 connector system:
  - Digital inputs/outputs
  - Diagnostic signals
- Connectors are used to electrically connect the motor and drive unit. When service is required, the drive unit can be simply replaced (refer to Chapter 8.5).
- The PROFIBUS-DP cable is connected at the plug-in PROFIBUS unit using terminals.

Table 1-3 POSMO SI drive units

POSMO SI	n_N	$M_{0\ 100K}$	$I_{0\ 100K}$	M_N	I_N	M_{max}	I_{max}	J_{mot}	
								with brake	without brake
	[RPM]	[Nm]	[A]	[Nm]	[A]	[Nm]	[A]	[10^{-4} kgm^2]	
6SN2460-2CF□0-0G□□ 6SN2460-2CF□0-1G□□	3000	6.0	4.3	4.0	3.1	17	14	9.5	8.6
6SN2463-2CF□0-0G□□ 6SN2463-2CF□0-1G□□	3000	11.0	7.9	6.0	4.7	22	17	17.0	16.1
6SN2480-2CF□0-0G□□ 6SN2480-2CF□0-1G□□	3000	8.0	5.8	6.8	5.2	25	19	18.0	15.0
6SN2483-2CF□0-0G□□ 6SN2483-2CF□0-1G□□	3000	16.0	10.4	10.5	7.7	34	22	30.3	27.3
6SN2500-2CF□0-0G□□ 6SN2500-2CF□0-1G□□	3000	18.0	12.2	12.0	8.4	48	36	63.2	55.3

1.1.3 POSMO CD/CA

General information

For POSMO CD and POSMO CA, the power and data electronics are integrated for a single axis in a housing. This has degree of protection IP 65 and is mounted close to the motor (refer to Fig. 1-3).

The power supply is realized

- **for POSMO CD**

  via the DC link voltage (600 V_{type}), which must be generated from an external line supply.

- **for POSMO CA**

  using the line supply voltage.
  Line rectifier, pulsed resistor and line filter are integrated in the drive unit.

Packaging system

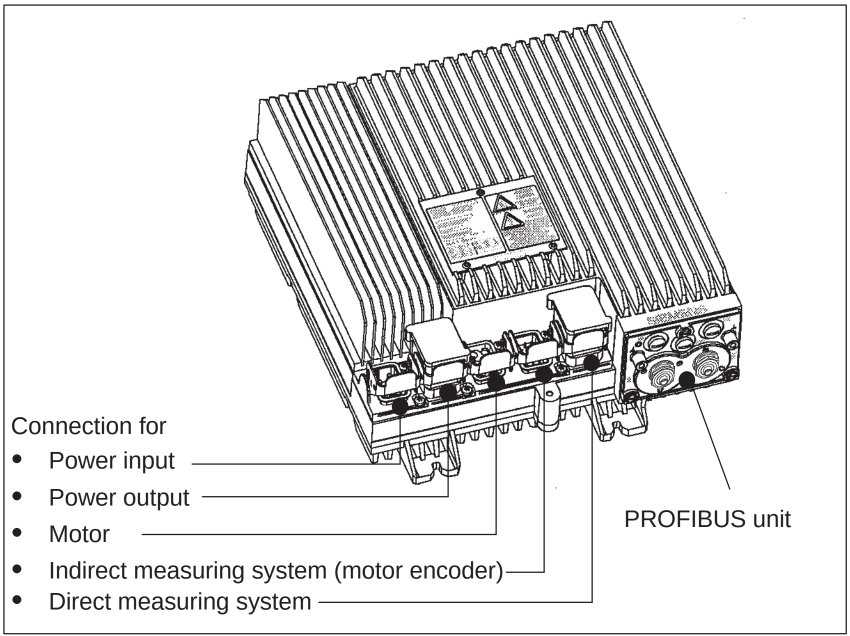


Fig. 1-3 Connection diagram, POSMO CD/CA (example POSMO CD 9A)

- The drive unit comprises a housing with cooling ribs, which accommodates the power and control board.
- The power feed and connection is realized,
  - for POSMO CD, using a DC link coupling, which cannot be interchanged, with safety interlocking.
  - for POSMO CA, using a line supply coupling, which cannot be interchanged, with safety interlocking.
- The motor is connected using power connectors which cannot be interchanged.

- Communications between the master and slave are realized via PROFIBUS-DP. PROFIBUS-DP function with Motion Control (clock cycle synchronous operation) is possible.

  The signal is connected through a removable PROFIBUS unit using cable gland and terminals (alternatively, ECOFAST).

  The bus connection (T functionality) to other nodes is retained even when the PROFIBUS unit is withdrawn.
- The following connection is made using the M12 connector system:
  – Digital inputs/outputs
  – Diagnostic signals
- The measuring system is connected to the position and speed sensing using connectors which cannot be interchanged. From the design, they are identical to the power connectors.

Table 1-4 POSMO CD/CA units

Device	**Power supply voltage**	I_N [A]	I_{max}[2] [A]	P_N [kW]
6SN2 703-2AA0□-0BA1 6SN2 703-2AB0□-0BA1 (POSMO CD 9 A)	600 V DC$_{typ}$	9.0	18.0	5.0
6SN2 703-2AA0□-0CA1 6SN2 703-2AB0□-0CA1 (POSMO CD 18 A	600 V DC$_{typ}$	18.0	36.0	10.0
6SN2 703-3AA1□-0BA1 6SN2 703-3AB1□-0BA1 (POSMO CA 9 A) ↑ without DM[1] 0 with DM[1] 3	3-ph. 400/480 V AC	9.0	18.0	5.0

1) DM: Direct measuring system
2) Continuous load duty cycle 10 s 25 %

1.2 System integration

Components

Additional components that are required and their functions:

Table 1-5 Components

Component	Function
Control electronics (Master) PROFIBUS-DP-capable e.g. SIMATIC components	e.g. S7-300 DP **References:** /S7H/, Manual
Line infeed module (SIMODRIVE NE module; MASTERDRIVES)	With the following functions: • Interface from/to the 3-phase network • Provides the DC link voltage
Connecting cables	Refer to Chapter 2.3. **Reference:** /Z/, Catalog NC Z
Fuses	Refer to Chapter 2.2.4
Terminals	**Reference:** /K/, Catalog NS K
Parameterizing and start-up tool (SimoCom U) for PG/PC with PROFIBUS interface	Is a software running under Windows 95/98/NT/2000/XP to parameterize, commission and test POSMO SI and POSMO CD/CA systems via PROFIBUS-DP. Furthermore, using this tool, the following functions are possible: • ”POSMO SI/CD/CA” can be parameterized • Axes traversed • Settings optimized • Firmware downloaded • Series startup- • Diagnostics (e.g. measuring function)

System integration

System integration is possible with the following control systems:

- PLC solution (positioning application)
- SINUMERIK 840Di (interpolating axes and positioning axes)
- SINUMERIK 840D (only PLC axes)
- SINUMERIK 802D
- SIMATIC multi-axis module FM 357-2 for servo and stepping drives

The following diagrams illustrate examples of how the control systems can be connected-up.

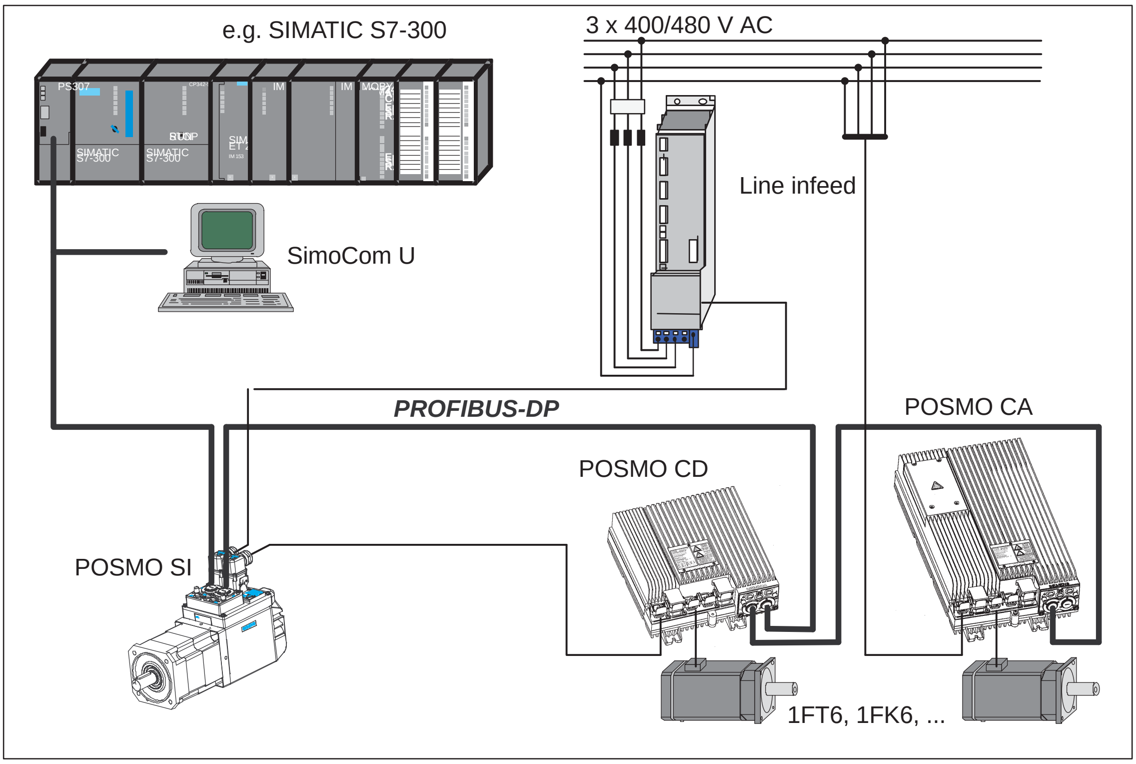


Fig. 1-4 SIMATIC as master system

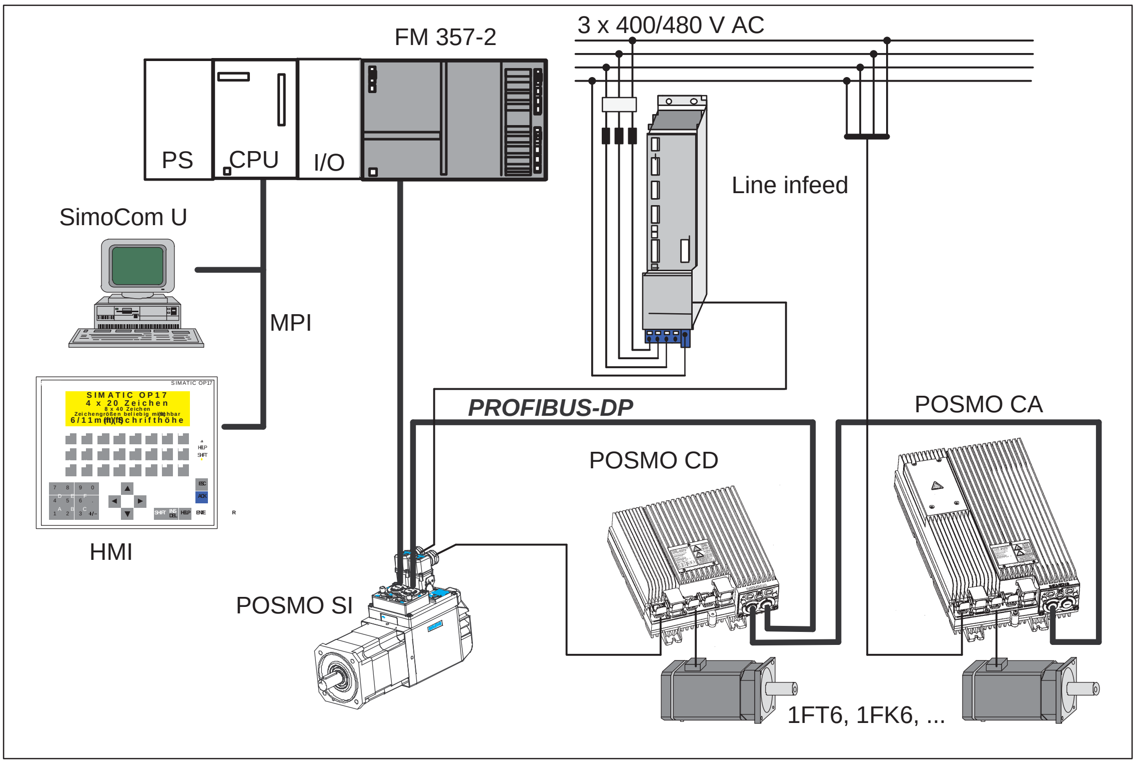


Fig. 1-5 SIMATIC with FM 357-2 as master system

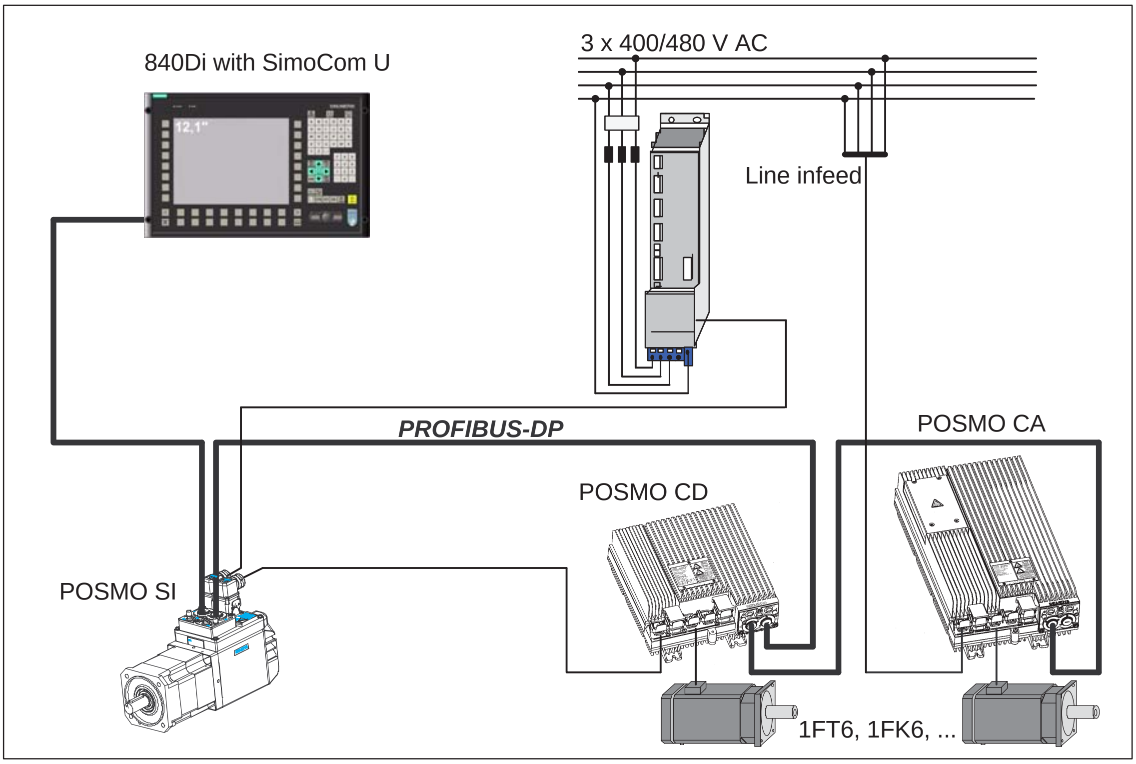


Fig. 1-6 SINUMERIK 840Di as master system

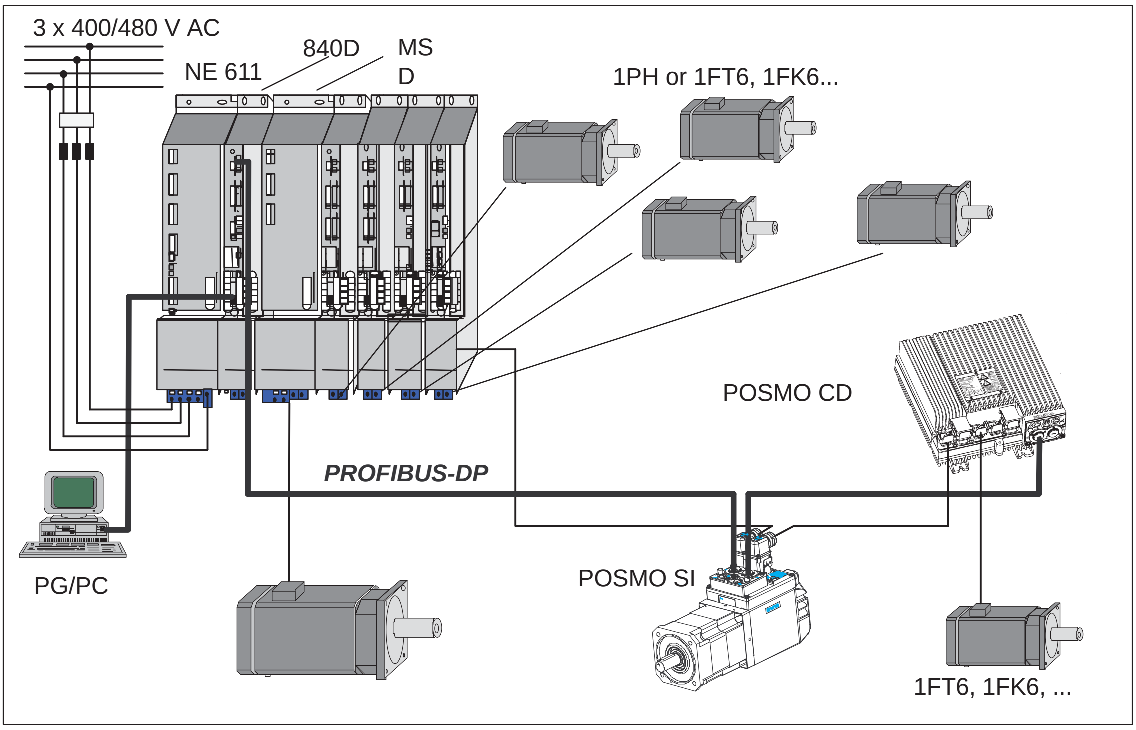


Fig. 1-7 Mixed operation with SINUMERIK 840D (only NCU 573.2, master) and SIMODRIVE 611 digital

Note

If third-party motors are connected to POSMO CD/CA, and if there is an integrated brake, then this must be electrically safely separated (protective separation). Also refer to the appropriate manufacturers data!

Note

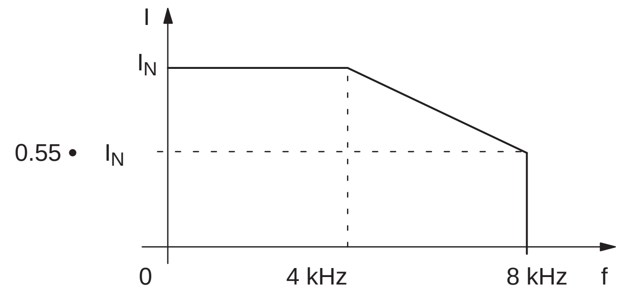
The following documentation, SW Tools and Catalogs are available when engineering the system:

- **Reference:** /PJU/, SIMODRIVE 611
  Configuration Manual, Drive Converters
- **Reference:** /PJM/, SIMODRIVE 611, Configuration Manual
  for AC and Main Spindle Motors
- **Reference:** /BU/, Catalog NC 60, Ordering Documentation
  /Z/, Catalog NC Z, Accessories and Equipment
- **CD:** Interactive Catalog CA01
- **CD:** /CD1/, DOC ON CD
  with all SINUMERIK 840D/810D/FM-NC and
  SIMODRIVE 611 digital documentation

1.3 Technical data

1.3.1 POSMO SI

Table 1-6 Technical data POSMO SI, general information

Designation		Description
Electrical data	Line supply types	TN: IT/TT: Please observe the limitations, refer to Chapter 2.2.4
	Supply voltages	400...750 V DC
	Current/power drain	600 V DC_{type} Values for S1 (100 K) and S3-25 % (100 K) 6SN2460: 2.7 A; 1.6 kW 6SN2463: 3.9 A; 2.3 kW 6SN2480: 4.5 A; 2.7 kW 6SN2483: 6.6 A; 4.0 kW 6SN2500: 7.3 A; 4.4 kW
	Electronics power supply	Voltage: 24 V DC ± 20 % Current drain: ≤600 mA
	Digital inputs	Voltage: 24 V DC ± 20 % Current drain, typical: 6 mA at 24 V
	Digital outputs	Maximum current/output: 100 mA
	Pulse frequency-dependent de-rating	
	Load duty cycle calculation I^2t	see ChapterA.2

Designation		Description					
Motor data with drive unit	Rated speed n_N	3000 [RPM]					
	Values for S1 (100 K)	P_N [kW]	M_N [Nm]	I_N [A]	M_0 [Nm]	I_0 [A]	M_{max} [Nm]
	6SN2460	1.3	4.0	3.1	6.0	4.3	17
	6SN2463	1.9	6.0	4.7	11.0	7.9	22
	6SN2480	2.1	6.8	5.2	8.0	5.8	25
	6SN2483	3.3	10.5	7.7	16.0	10.4	34
	6SN2500	3.8	12.0	8.4	18.0	12.2	48
	Moment of inertia J_{mot} (in [10^{-4} kgm^2])	with brake / without brake 6SN2460: 9.5 / 8.6 6SN2463: 17.0 / 16.1 6SN2480: 18.0 / 15.0 6SN2483: 30.3 / 27.3 6SN2500: 63.2 / 55.3					

Table 1-6 Technical data POSMO SI, general information, continued

<table>
<tr><th colspan="2">Designation</th><th>Description</th></tr>
<tr><td rowspan="4">Communica-tion</td><td>PROFIBUS-DP</td><td>Shielded data line + potential bonding conductor</td></tr>
<tr><td>Max. data transfer rate
Physical interface Cu</td><td>12 Mbaud
RS485, electrically isolated</td></tr>
<tr><td>Data transfer medium, copper (Cu)</td><td>M20 gland, terminal system</td></tr>
<tr><td>diagnostics</td><td>LED</td></tr>
<tr><td rowspan="4">Mechanical data</td><td>Dimensions
(W x H x L in mm)</td><td>6SN2460: 126 x 203 x 349
6SN2463: 126 x 203 x 399
6SN2480: 155 x 232 x 357
6SN2483: 155 x 232 x 395
6SN2500: 192 x 251 x 379</td></tr>
<tr><td>Weight</td><td>(with brake) (without brake)
6SN2460: 12.5 kg 12.0 kg
6SN2463: 16.8 kg 16.3 kg
6SN2480: 17.8 kg 16.3 kg
6SN2483: 22.5 kg 21.0 kg
6SN2500: 26.3 kg 23.9 kg</td></tr>
<tr><td>Cooling</td><td>Forced convection using an integrated fan</td></tr>
<tr><td>Mounting position</td><td>With type of construction IM B5 (V1, V3) anywhere in space</td></tr>
<tr><td>Degree of protection</td><td>Acc. to DIN EN 60034</td><td>IP 54/IP 64 (fan IP 54, enclosure IP 65, shaft gland IP 64)
IP 54/IP 65 (fan IP 54, enclosure IP 65, shaft gland IP 67)</td></tr>
<tr><td>Protective conductor connection</td><td></td><td>PE is routed in the power cable.
Due to the high discharge current (leakage current), an additional PE cable must always be connected to the PE screw connection at the equipment enclosure.</td></tr>
<tr><td>Grounding</td><td>DC power cable
Terminals/BERO</td><td>Shielded
Shielded and non-shielded possible</td></tr>
<tr><td rowspan="3">Electro-magnetic compatibility (EMV)</td><td colspan="2">• Basic Standard, noise emission, industrial environment EN 50081-2
Noise emission limit values according to EN55011 Class A, when using the recommended line infeeds with the appropriate line filters
—> refer to Chapter 2.2.4</td></tr>
<tr><td colspan="2">• Generic Standard, noise immunity, industrial environment EN 61000-6-2</td></tr>
<tr><td colspan="2">• EMC product standard EN 61800-3</td></tr>
</table>

Table 1-6 Technical data POSMO SI, general information, continued

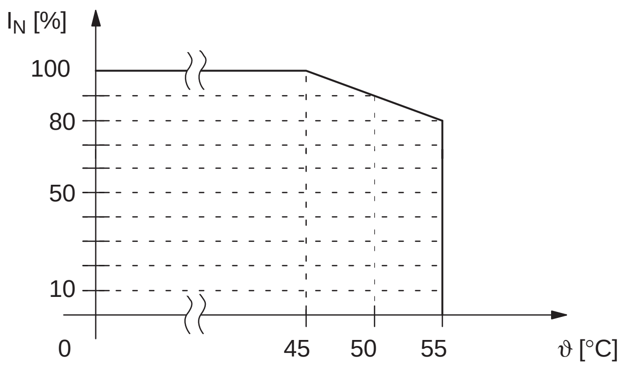
Designation		Description
Climatic conditions	Relevant Standards	IEC 68-2-1, IEC 68-2-2, IEC 68-2-14
	Operating temperature range	0...+45 °C (without de-rating)
	Extended operating temperature range	+45...+55 °C (with current de-rating); de-rating 2 %/K 
Climatic conditions	Transport and storage	–40...+70 °C
	Temp. change, in storage	Max. 20 K/h without moisture condensation
	Temp change, during transport (shock)	–40 °C/+30 °C
	Note: Data applies for components which have been packed ready for transport.	
Installation altitude and permissible power	Power limitation	All of the specific load currents and powers are rated for an installation altitude ≤1000 m in covered areas. These values must be reduced for installation altitudes >1000 m. Installation altitude above sea level in m — Permissible power as a % of rated power 1000 — 100 1500 — 97 2000 — 94 2500 — 90 3000 — 86 3500 — 82 4000 — 77
Mechanical ambient conditions	Relevant Standards	IEC 68-2-32

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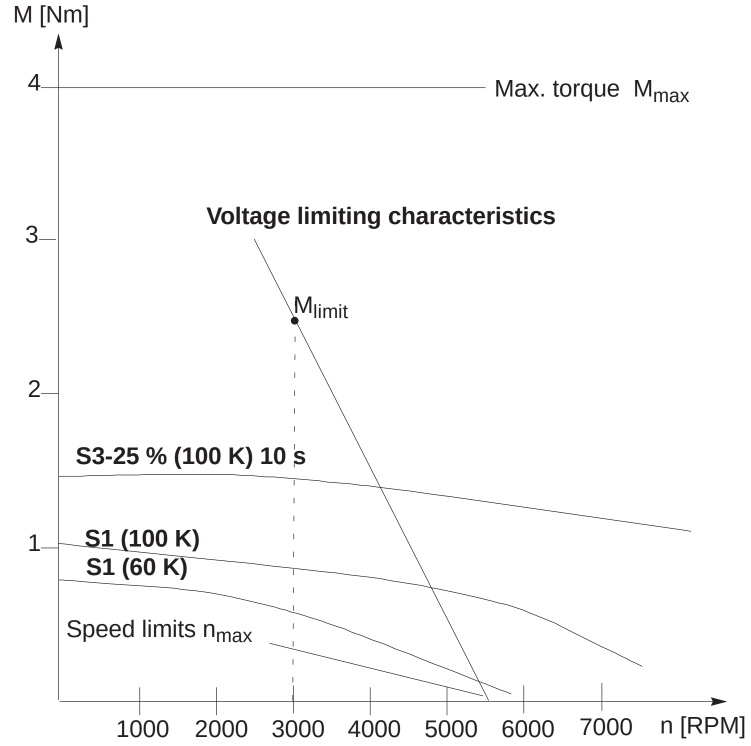
Table 1-6 Technical data POSMO SI, general information, continued

Designation		Description
Tested vibration and shock stressing in operation	• Vibration stressing in operation	
	Frequency range 2 ... 9 Hz	With constant deflection = 7 mm
	Frequency range 9 ... 200 Hz	With constant acceleration = 20 m/s^2 (2 g)
	Relevant Standards	IEC 68-2-6, DIN EN 60721 Part 3-0 and Part 3-3 Class 3M6
	• Shock stressing in operation	
	Peak acceleration	Max. 250 m/s^2 (25 g)
	Shock duration	6 ms
	Relevant Standards	DIN EN 60721 Part 3-0 and Part 3-3 Class 3M6
	Note: In order to ensure a long lifetime, the motor should be supported if it is subject to external vibration stressing (e.g. continuous operation at the resonant frequency) Three tapped holes are provided on the NDE bearing endshield to support the motor.	
Vibration and shock stressing during transport	Relevant Standards	DIN EN 60721 Part 3-3 Class 2M2
		Note: Data applies for components which have been packed ready for transport.
Pollutant stressing	Relevant Standards	IEC 68-2-60, Method 4
Gearbox data Planetary gear LP	Backlash	1-stage planetary gear: ≤12 ’ (angular minutes)
	Efficiency	1-stage planetary gear: >97 %
	Temperature	Max. permissible temperature: 90 °C
	Gear weight	LP 120-M01: approx. 9 kg LP 155-M01 approx. 17.5 kg
	Shaft load capability (referred to the center of the shaft at 100 RPM)	Axial load / Radial load LP 120-M01: F_{2Amax} = 4000 Nm / F_{2Rmax} = 4600 Nm LP 155-M01: F_{2Amax} = 6000 Nm / F_{2Rmax}= 7500 Nm
	Degree of protection	IP 64

Designation		Type	Holding torque M_4	Direct current	Opening time	Closing time	Highest switching work
Holding brake		EBD	[Nm]	[A]	[ms]	[ms]	[J]
	6SN2460/6SN2463	0.8B	10	0.7	55	15	318
	6SN2480/6SN2483	1.4BF	18	0.9	100	30	535
	6SN2500	2BY	20	0.9	100	30	1135
	Note: Limited EMERGENCY STOP operation is permissible. A minimum of 2000 braking operations can be executed with the specified highest switching work.						

Definition, characteristics



Thermal limiting characteristics for

- Continuous duty
  S1 (100 K) and S1 (60 K),
- Intermittent duty
  S3-25 % (100 K)
  for a 10 s load duty cycle

Fig. 1-8 Speed-torque diagram

100 K or 60 K is the average winding temperature rise.

105 K corresponds to a utilization according to temperature Class F.

60 K is utilized within temperature rise class B.
This means that the 60 K utilization should only be used if

- the housing temperature should lie below 90 °C for safety reasons,
- or the shaft temperature rise would have a negative impact on the mounted machine.

For all of the specified data, a permissible ambient temperature or cooling medium temperature of 45 °C apply.

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Torque characteristics

Warning

Under fault conditions, POSMO SI can accelerate up to n_{max} (refer to the rating plate data of the POSMO SI) and can also significantly exceed this value for higher line supply or DC link voltages.

Thermal limiting characteristic

The S1 (100 K) characteristic, specified in the diagrams, corresponds to the thermal limiting characteristic.

!

Important

Also in intermittent duty, it is not permissible that the S1 (100 K) characteristic is exceeded on the geometrical average.

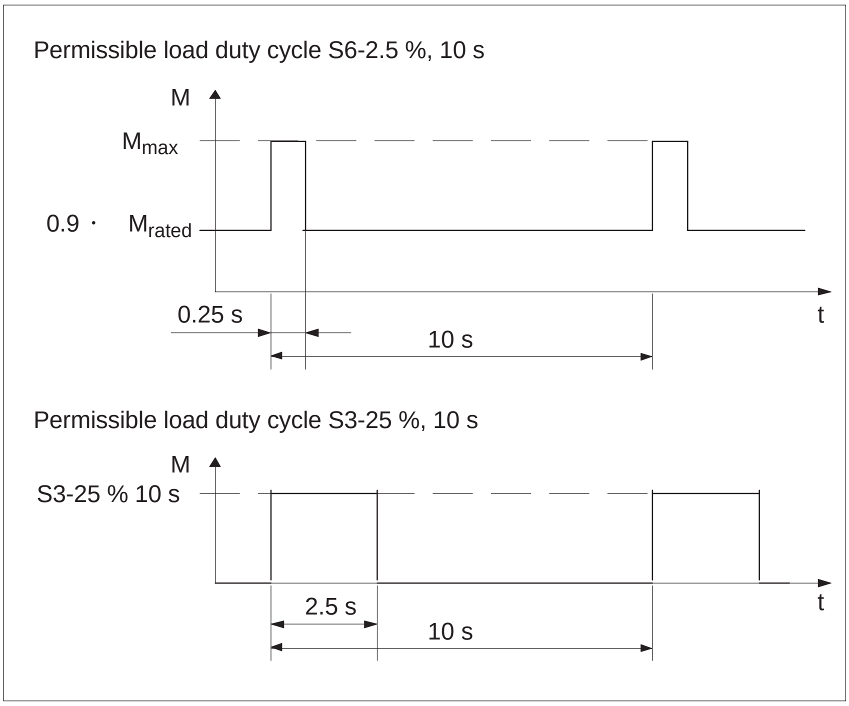


Fig. 1-9 Power-on duration for intermittent duty

Table 1-7 Technical data POSMO SI, torque/speed characteristic

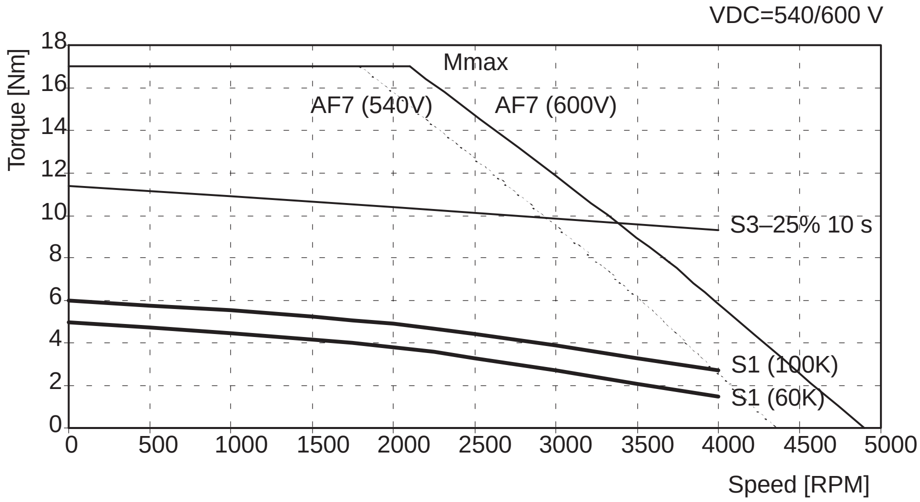
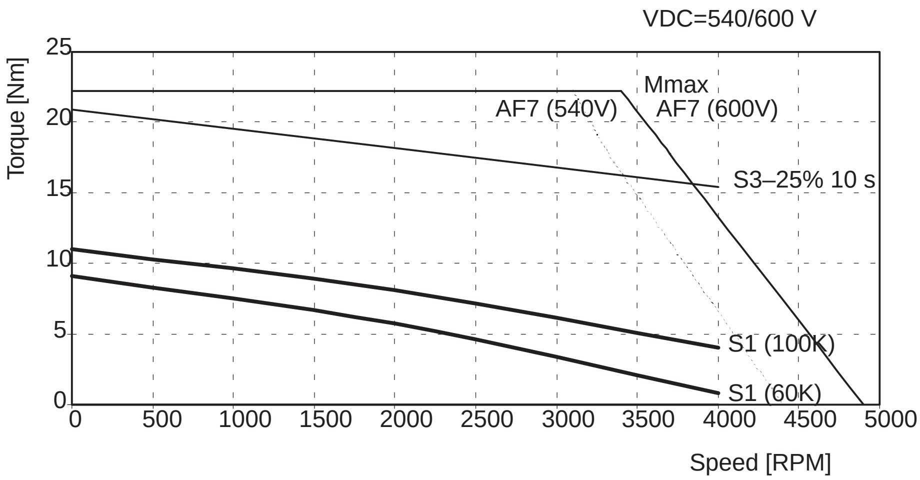
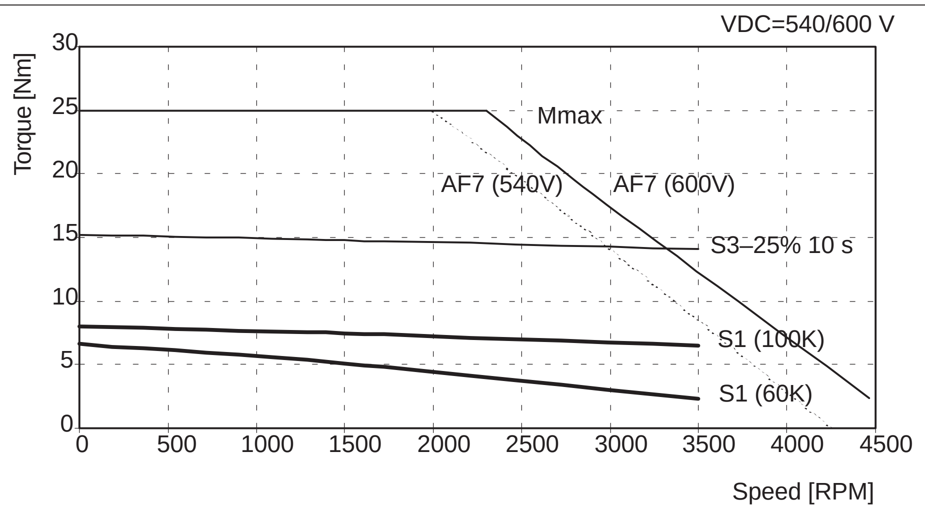
Designation	Description
Torque/speed characteristic 6SN2460 M/n characteristic	
Torque/speed characteristic 6SN2463 M/n characteristic	
Torque/speed characteristic 6SN2480 M/n characteristic	

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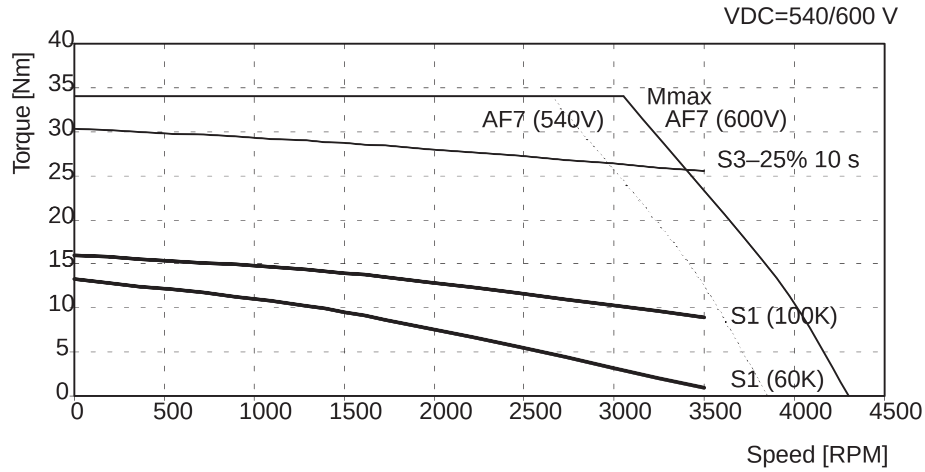
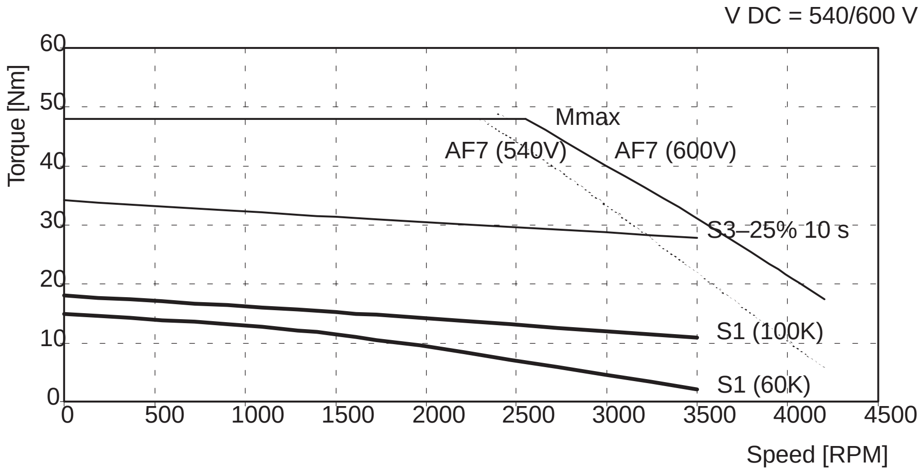
Table 1-7 Technical data POSMO SI, torque/speed characteristic, continued

Designation	Description
Torque/speed characteristic 6SN2483 M/n characteristic	
Torque/speed characteristic 6SN2500 M/n characteristic	

Voltage limiting characteristics

The motor EMF increases proportionally with the speed. Only the difference between the DC link voltage and the increasing motor countervoltage can be used to impress the current This limits the magnitude of the current which can be impressed at high speeds.

Warning

Continuous duty at the voltage limiting characteristic in the range above the S1 characteristic is thermally inadmissible for the motor.

Cantilever force stressing

The permissible cantilever forces for POSMO SI are shown Table 1-8.

- for average operating speeds
- for a nominal bearing lifetime of 20.000 h

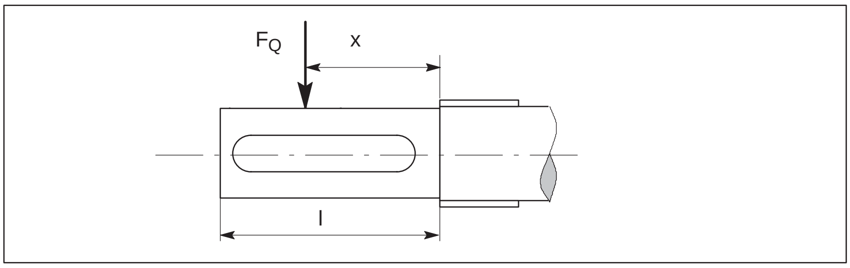


Fig. 1-10 Application point of cantilever forces at shaft ends

Dimension x: Distance between the points of application of force F_Q and the shaft shoulder in mm.

Dimension l: Length of the shaft stump in mm.

Calculating the belt pre-tension:

$F_R = 2 \cdot M_0 \cdot c/d_R$

F_R	[N]	Belt pre-tension
M_0	[Nm]	Motor standstill torque
d_R	[m]	Effective diameter of the belt pulley
c		Pre-tension factor for the accelerating torque Experience values for toothed belts c = 1.5 to 2.2 Experience values for flat belts c = 2.2 to 3.0

When using other configurations, the actual forces that generated from the torque being transferred must be taken into account.

$F_R \leq F_{qper}$

Axial force stressing

The permissible axial forces for POSMO SI are shown in Table 1-8.

The diagrams are valid for a motor bearing lifetime of 20000 h.

Caution

Motors with integrated holding brake cannot be subject to axial forces!

When using, e.g. helical gears as drive element, in addition to the radial force, the POSMO SI bearing system is also subject to an axial force. For axial forces, the spring-loading of the bearings can be overcome so that the rotor moves corresponding to the axial bearing play present (up to 0.2 mm).

The permissible axial force can be approximately calculated using the following formula:

$$F_A = 0.35 \cdot F_Q$$

More precise data can be taken from the diagrams, taking into account the mounting position.

Table 1-8 Technical data POSMO SI, cantilever/axial force stressing

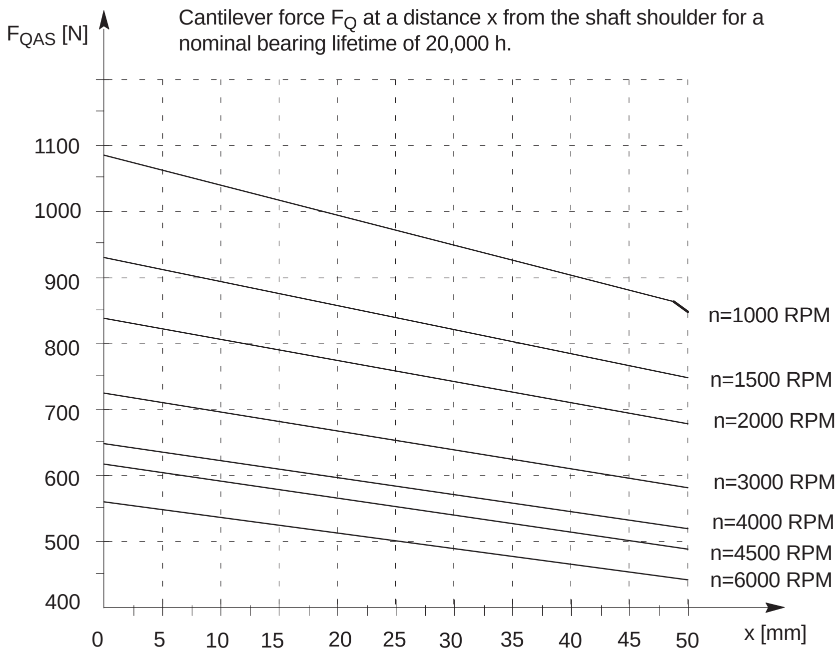
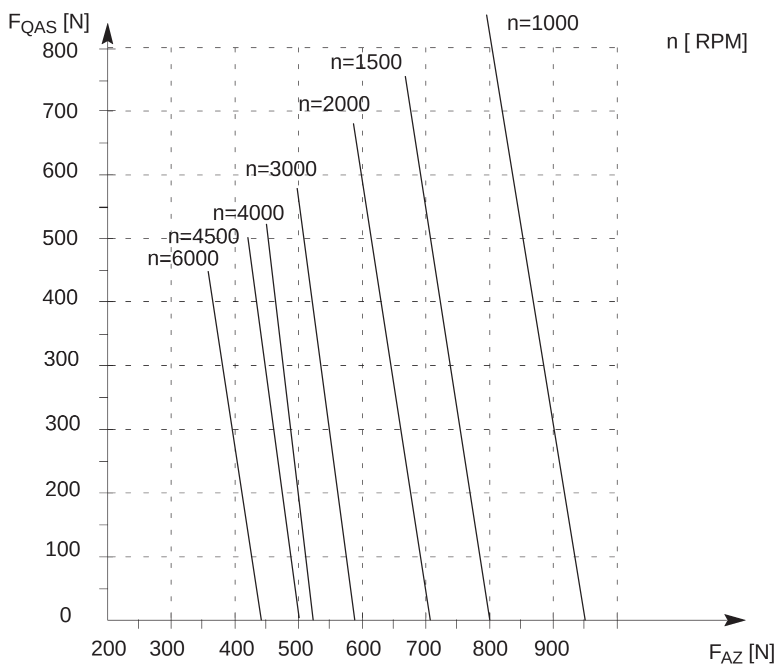
Designation	Description
Cantilever force 6SN2460 6SN2463	
Axial force 6SN2460 6SN2463	

Table 1-8 Technical data POSMO SI, cantilever/axial force stressing, continued

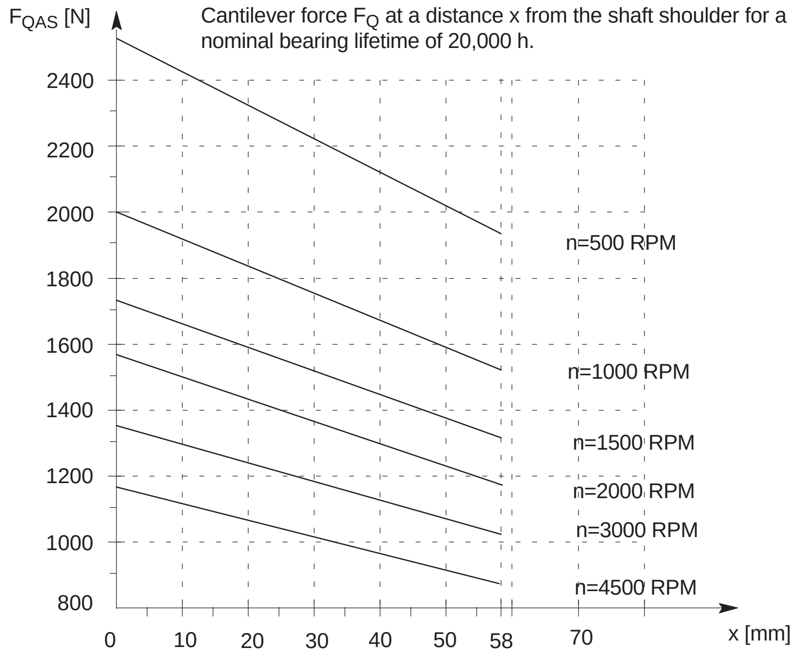
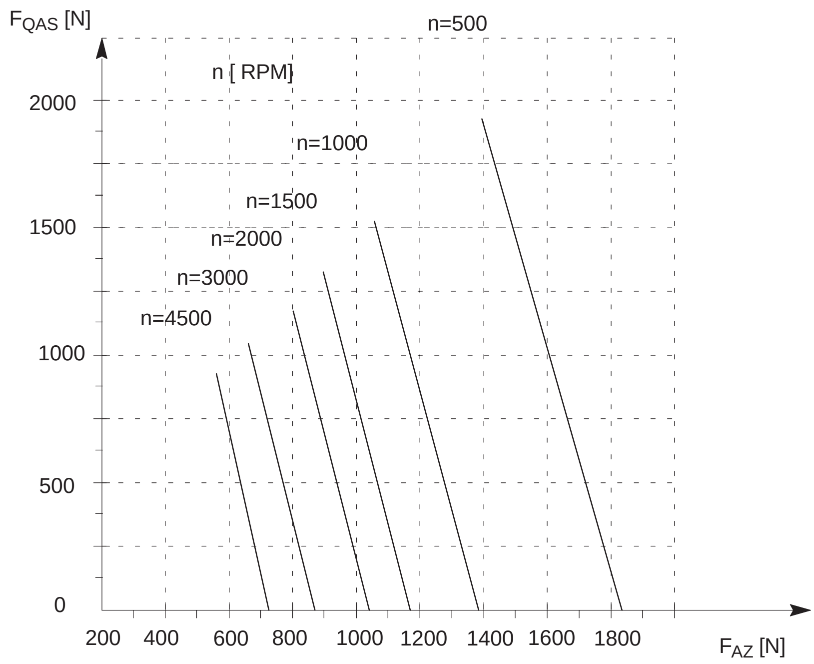
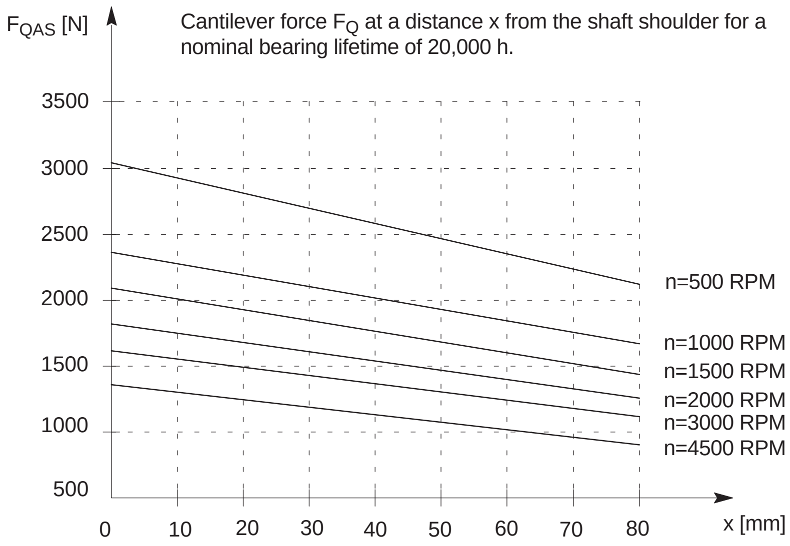
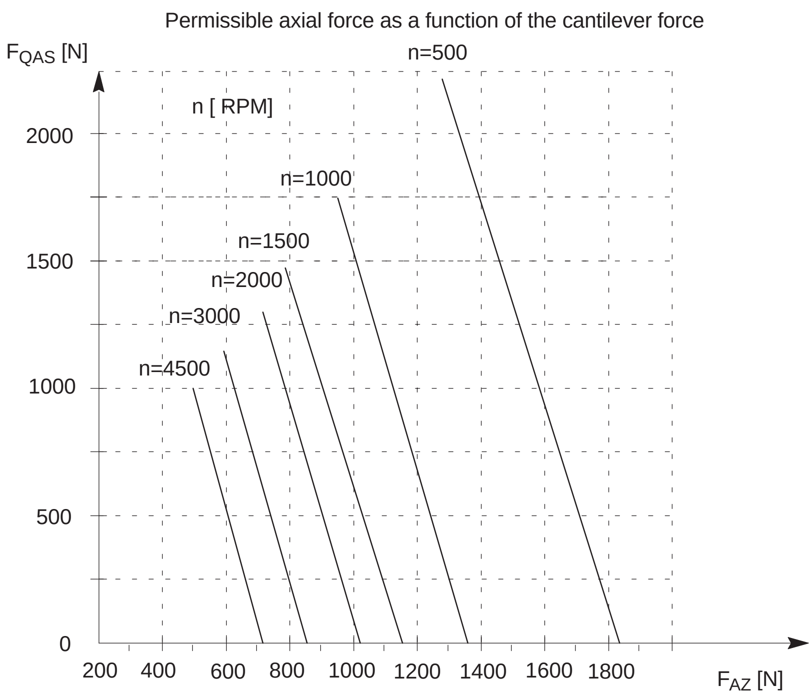
Designation		Description
Cantilever force 6SN2480 6SN2483		
Axial force 6SN2480 6SN2483		

Table 1-8 Technical data POSMO SI, cantilever/axial force stressing, continued

Designation	Description
Cantilever force 6SN2500	
Axial force 6SN2500	

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Effects on mounting

POSMO SI is flange-mounted which means that a component of the motor power loss is dissipated through this flange.

- **Non-thermally insulated mounting**

  The following mounting conditions apply for the specified motor data:

Table 1-9 Non-thermally insulated mounting conditions

Steel plate **width x height x thickness**	**Mounting surface** **[m^2]**
450 x 370 x 30	0.17

For larger mounting surfaces, the heat dissipation conditions improve.

- **Thermally insulated mounting without additionally mounted components**

  The motor torque must be reduced by between 5 % and 10 %. We recommend that the drive is dimensioned with the M_0(60 K) values.

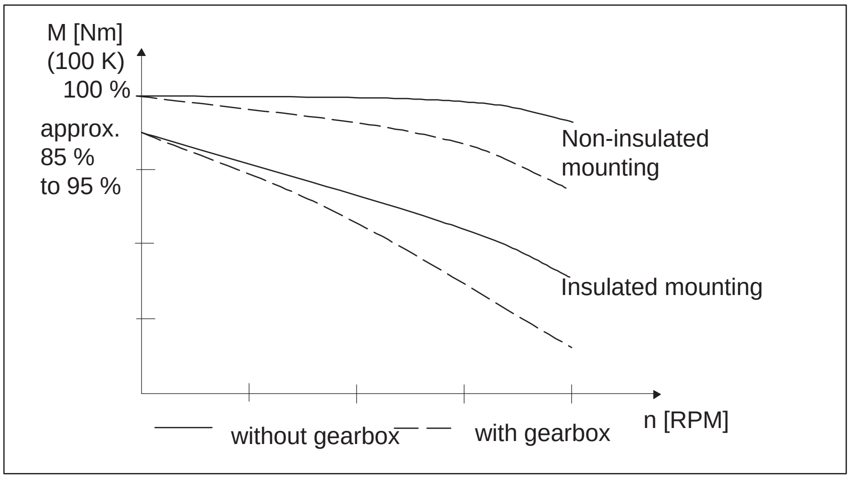


Fig. 1-11 S1 characteristics

- **Thermally insulated mounting with additionally mounted components**
  - Holding brake (integrated in the motor)
    Additional torque reduction is not required
  - Gearbox
    Torque reduction is required (refer to the diagram above)

  Information on the rating plate: **"Reduce rating with gearing"**

1.3.2 POSMO CD/CA

Table 1-10 Technical data POSMO CD/CA

Designation		Description
Electrical data	Line supply types	TN: POSMO CA; POSMO CD TT/IT: POSMO CA observe the limitations, refer to Chapters 2.2.5 and 2.2.4 POSMO CD: observe the limitations, refer to Chapter 2.2.4
	Supply voltages	POSMO CD: 400...750 V DC
		POSMO CA: 3-ph. 400...480 V AC ±10 % 45...66 Hz **Warning** When connected to 480 V, parameter P1171 should be set to 1! --> refer to ”General information on commissioning” Chapter 4.1, Table 4-1
	Output voltage	POSMO CD: 3-ph. 0...430 V AC
		POSMO CA: 3-ph. 0...380 V (for 400 V supply voltage) 3-ph. 0...460 V AC (for 480 V supply voltage)
	Power drain	600 V DC_{type} POSMO CD 9A: 8.7 A; 5.2 kW POSMO CD 18A: 17.2 A; 10.3 kW
		400 V AC_{type} POSMO CA 9A: 10.5 A(max); 5.6 kW
	Rated current I_N	POSMO CD 9A: 9.0 A POSMO CD 18A: 18.0 A
		POSMO CA: 9.0 A
	Max. current I_{max}	POSMO CD 9A: 18.0 A POSMO CD 18A: 36.0 A
		POSMO CA: 18.0 A
	Rated power P_N	POSMO CD 9A: 5.0 kW POSMO CD 18A: 10.0 kW (referred to a 600 V DC link voltage)
		POSMO CA: 5.0 kW (refer to a 400 V line supply voltage)
	Pulsed resistor	Only for POSMO CA (refer to Chapter 6.6)
	Electronics power supply	Voltage: 24 V DC ±20 % Current drain: ≤600 mA
	Digital inputs	Voltage: 24 V DC ±20 % Current drain, typical: 6 mA at 24 V
	Digital outputs	Maximum current/output: 100 mA

Table 1-10 Technical data POSMO CD/CA, continued

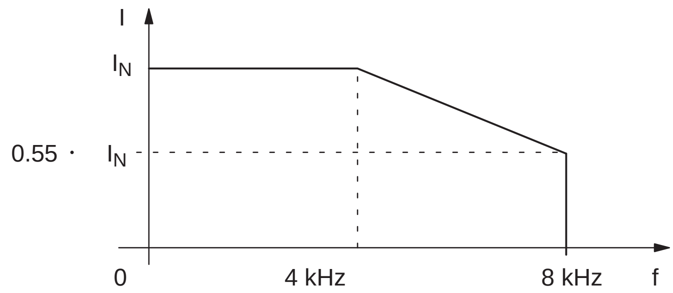
Designation		Description
Electrical data	Pulse frequency-dependent de-rating	
	Load duty cycle calculation I^2t	see ChapterA.2
Communication	Max. data transfer rate	12 Mbaud
	Physical interface Cu	RS485, electrically isolated
	Data transfer medium, copper (Cu)	M20 gland, terminal system
	diagnostics	LED
Mechanical data	Dimensions (H x W x D in mm, with angle connectors)	POSMO CD 9A: 355 x 300 x 141 POSMO CD 18A: 545 x 300 x 141 POSMO CA 9A: 545 x 300 x 141
	Weight	POSMO CD 9A: 8.9 kg POSMO CD 18A: 14.8 kg POSMO CA 9A: 15.5 kg
	Cooling	Non-ventilated (free convection)
	Mounting position	• Vertical heatsink – Connector outlet POSMO CD: at the bottom or the top – Connector outlet POSMO CA: bottom • Heatsink, horizontal – Connector outlet, POSMO CD/CA: top
Degree of protection	Acc. to DIN EN 60034	IP 65
Protective conductor connection	POSMO CD/CA	PE is routed in the power cable. Due to the high discharge current (leakage current), an additional PE cable must always be connected to the PE screw connection at the equipment enclosure.
Grounding	DC power cable	Shielded
	AC power cables	Shielded and non-shielded possible
	Motor cables	Shielded
	Encoder cables	Shielded
	Terminals/BERO	Shielded and non-shielded possible

Table 1-10 Technical data POSMO CD/CA, continued

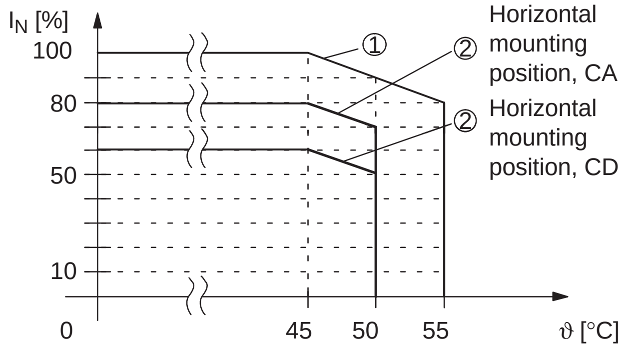
Designation		Description
Electro-magnetic compatibility (EMV)	• Basic Standard, noise emission, industrial environment EN 50081-2	
	– POSMO CA with line filter	Noise emission limit values according to EN 55011 Class A
	– POSMO CD	Noise emission limit values according to EN55011 Class A when using the recommended line infeeds with the appropriate line filters —> refer to Chapter 2.2.4
	• Generic Standard, noise immunity, industrial environment EN 61000-6-2	
	• EMC product standard EN 61800-3	
Climatic conditions	Relevant Standards	IEC 68-2-1, IEC 68-2-2, IEC 68-2-14
	Operating temperature range	0...+45 °C (without current de-rating, for a vertical mounting position)
	Extended operating temperature range	+45...+55 °C (with current de-rating); de-rating 2 %/K--> ① +45...+50 °C (with current de-rating); de-rating 2 %/K--> ② 
	Transport and storage	–40...+70 °C
	Temp. change, in storage	max. 20 K/h without moisture condensation
	Temp change, during transport (shock)	–40 °C/+30 °C
	Note: Data applies for components which have been packed ready for transport.	
Installation altitude and permissible power	Power limitation	All of the specific load currents and powers are rated for an installation altitude ≤1000 m in covered areas. These values must be reduced for installation altitudes >1000 m. Installation altitude above sea level in m / Permissible power as a % of rated power 1000 / 100 1500 / 97 2000 / 94 2500 / 90 3000 / 86 3500 / 82 4000 / 77
Mechanical ambient conditions	Relevant Standards	IEC 68-2-32

Table 1-10 Technical data POSMO CD/CA, continued

Designation		Description
Test conditions **Vibration and shock stress-ing in oper-ation**	• Vibration stressing in operation	
	Frequency range 2 ... 9 Hz	With constant deflection = 15 mm
	Frequency range 9 ... 200 Hz	With constant acceleration = 5 g
	Relevant Standards	IEC 68-2-6, DIN EN 60721 Part 3-0 and Part 3-3 Class 3M8
	• Shock stressing in operation	
	Peak acceleration	max. 25 g
	Shock duration	6 ms
	Relevant Standards	DIN EN 60721 Part 3-0 and Part 3-3 Class 3M8
Vibration and shock stress-ing during transport	Relevant Standards	DIN EN 60721 Part 3-3 Class 2M2
		Note: Data applies for components which have been packed ready for transport.
Pollutant stressing	Relevant Standards	IEC 68-2-60, Method 4

Thermal limiting characteristic

The following intermittent duty applies for POSMO CD/CA:

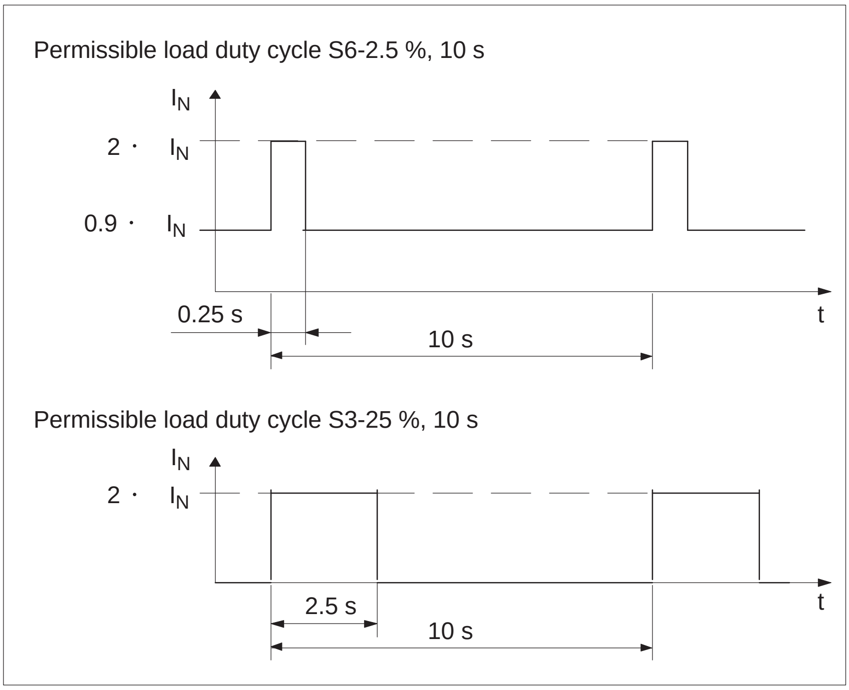


Fig. 1-12 Power-on duration for intermittent duty

1.3.3 Gearboxes for POSMO SI

General information

POSMO SI can be combined with planetary gears, series LP to easily create compact coaxially configured drive units. The gearboxes are directly flanged to POSMO SI.

When selecting the gearbox, it must be ensured that the motor speed does not exceed the permissible gearbox drive speed.

The gearboxes are only supplied unbalanced and with keyway.

Modular gearbox

For POSMO SI, the following gearboxes can be selected and used in accordance with Table 1-11:

Table 1-11 System data, modular gearbox with planetary gears

POSMO SI 1)	**Gear 1-stage** Torsional play ≤ 12 arcmin	**Available gearbox ratios**		**Moment of inertia, gearbox** J_G	**Max. permissible output torque**2) M_{G2}		**Max. perm. drive out shaft load** 3)	**Max. permissible input speed**2)
		i =			i = 5	i = 10	F_r	n_{G1}
	Type	5	10	$[10^{-4}$ kgm$^2]$	[Nm]	[Nm]	[N]	[RPM]
6SN2 460 6SN2 463	LP 120-M01	X	X	5.42	200	180	4600	4800
6SN2 480 6SN2 483	LP 155-M01	X	X	25.73	400	320	7500	4000
6SN2 500	LP 155-M01	X	–	25.73	400	–	7500	4000
Order code Gearbox shaft with keyway		V40	V42					

1) Mechanical dimensions POSMO SI —> refer to the Appendix C
Mechanical dimensions, gearbox —> Reference: /BU/ Catalog NC 60
Additional gearbox data are provided in the technical data —> refer to Chapter 1.3.1
2) Values for positioning duty S5
3) Referred to the drive-out shaft center, for 100 RPM

Ordering data

SIMODRIVE POSMO SI can be supplied from the factory (Siemens) with flange-mounted planetary gear.

Ordering data: 6SN2 □□□–2CF□0–□G□□

460
463
480
483
500

0 —> IP64
2 —> IP65

A
B
G
H

Drive shaft end at the DE:
A without brake/ with key
B with brake/ with key

G without brake/ with smooth shaft
H with brake/ with smooth shaft
(a smooth shaft is required to mount the LP gearbox)

Power connection
0 —> M20
1 —> ECOFAST

Gear
0 —> without
1 —> i = 5
2 —> i = 10

Continuous duty S1

Continuous duty (S1) is permissible for rated speed and rated torque. It is not permissible that a gearbox temperature of +90 ° C is exceeded.

Table 1-12 Continuous duty S1

Planetary gear type	Rated speed n_{N1} [RPM]	Max. perm. output torque M_{N2} at i = 5 [Nm]	Max. perm. output torque M_{N2} at i = 10 [Nm]
LP 120-M01	2600	100	90
LP 155-M01	2000	290	170

Note

Dimension data for the planetary gear, series LP are included in:

Reference: /BU/, Catalog NC 60

Dimensioning the gearbox

1. Selecting the gearbox size

   The following parameters must be taken into account:

   Accelerating torque, continuous torque, number of cycles, cycle type, permissible input speed, mounting position, torsional play, torsional stiffness, radial and axial forces.

   The motor and gearbox are assigned as follows:

   $M_{max,\ gear} \geq M_{0(100\ K)} \cdot f \cdot i$

$M_{max,\ gear}$	maximum permissible drive-out torque
$M_{0(100\ K)}$	motor standstill torque
i	ratio
f	supplementary factor

S1 duty:	f = 2	Factor due to gearbox temperature rise
S3 duty:	$f = f1 \cdot f2$	
	f1 = 2	for motor accelerating torque
	f2 = 1	for $\leq$ 1000 switching cycles of the gearbox
	f2 > 1	for > 1000 switching cycles (refer to gearbox catalog)

Note

Switching cycles can also be superimposed vibration!

The supplementary factor (f2) is then not sufficient when dimensioning the gearbox and gearboxes may fail.

The complete system should be optimized so that the higher-level vibration is minimized.

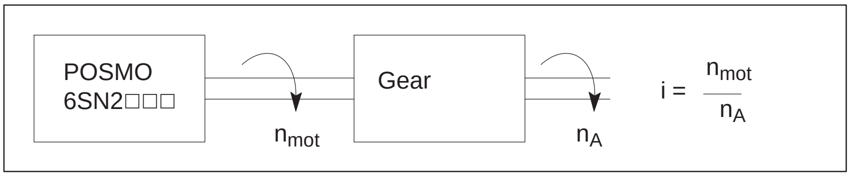


Fig. 1-13 Dimensioning the gearbox

2. Selecting the POSMO SI

   The load torque and the required traversing velocity define the gearbox output torque, the output speed and therefore the output power.

   The required drive power is calculated from this:

   $P_{out}\,[W] = P_{mot} \cdot \eta_G = (\pi/30) \cdot M_{mot}\,[Nm] \cdot n_{mot}\,[RPM] \cdot \eta_G$

1

The gearbox prevents heat being dissipated through the motor flange and itself generates heat due to friction.

For S1 duty, the torque must be reduced.

- **Dimensioning for S1 duty for non-ventilated systems**

  The required motor torque is calculated as follows:

$$M_{mot} = \sqrt{\left(\frac{M_{out}}{i \cdot 0.97} + M_V\right)^2 - M_V^2}$$

M_V	calculated "torque loss"
M_{mot}	required motor torque [Nm]
n_{mot}	motor speed [1RPM]
i	gear ratio (i > 1)
M_{out}	gearbox drive-out torque [Nm] only valid for 1 stage gearboxes: $M_{V6SN2460} = 1.445^{-4} \cdot n_{mot}$ $M_{V6SN2463} = 4.353^{-4} \cdot n_{mot}$ $M_{V6SN2480} = 2.779^{-4} \cdot n_{mot}$ $M_{V6SN2483} = 8.213^{-4} \cdot n_{mot}$ $M_{V6SN2500} = 9.752^{-4} \cdot n_{mot}$

- **Dimensioning for S3 duty for non-ventilated motors**

  The torque does not have to be reduced.

$$M_{mot} = M_{out} / (i \cdot \eta_G)$$

1.4 Safety information

Reader's note

In addition to the technical information provided in the Foreword of this User Manual, when using SIMODRIVE POSMO SI/CD/CA, the following danger and warning information must be observed!

Danger

1. In order to avoid danger and damage, the data and instructions in all of the documentation associated with this product should be carefully observed. Please refer to the Catalogs or contact your local SIEMENS office for the ordering data.
2. All of the work must be carried out by qualified, appropriately trained personnel.
3. Before starting any work on SIMODRIVE POSMO SI/CD/CA, the motor must be disconnected from the line supply according to the 5 safety rules. In addition to the main circuits, it is important to observe if there are any supplementary or auxiliary circuits.

   The "5 safety rules" according to DIN VDE 0105:

   Disconnect, lock-out to prevent reclosure, ensure that the equipment actually is in a no-voltage condition, ground and short-circuit and cover or partition-off adjacent parts under voltage.

   The previously mentioned measures may only be reversed/restored after all of the work has been completed and the motor has been completely installed.
4. All rating plates, warning labels and information labels on the SIMODRIVE POSMO SI/CD/CA must be carefully observed!
5. Commissioning is prohibited until it has been clearly identified that the machine, in which this component is to be installed, fulfills the conditions of Directive 98/37/EC.
6. Caution when coming into contact! SIMODRIVE POSMO SI/CD/CA can have surface temperatures exceeding 100 °C during operation! Danger of fire!
7. It is prohibited to use the units in hazardous zones!
8. For SIMODRIVE POSMO SI, the following applies:
   If the power electronics is defective, the motor can align itself (the shaft rotates through a maximum of 60 degrees without the drive being enabled).

1

Warning

9. Cable shield and cores/conductors of the power cables which are not used must be connected to PE potential. If this is not carefully observed, hazardous touch voltages can occur.
10. The DC link coupling has a safety protective interlocking function that is intended to provide protection against residual voltages. This can only be opened by qualified personnel using a suitable tool, e.g. screwdriver.
The DC link coupling may only be withdrawn at the earliest 4 min after the power supply voltage has been powered down!
11. Never disable protective functions and devices even for trial operation.
12. Safety-relevant contacts may only be evaluated via terminal IF (pulse enable).
13. Use suitable load suspension equipment for transport and mounting. The interlocking lever for the power connections may not be used for lifting and transporting.
14. The following applies for SIMODRIVE POSMO CD/CA:
The units generate a high discharge current and are designed for stationary applications where they are permanently connected.
In addition to the protective conductor in the line feeder cable, a second protective conductor with a minimum cross-section of 6 mm^2 must be connected at the
PE screw connection on the equipment housing with the M5 screw and contact washer provided. These are resistant to corrosion.
15. When connecting up the temperature monitoring circuits, the regulations relating to protective electrical separation according to DIN EN 50178 must be carefully observed. This is especially important when connecting up third-party motors, as protective electrical separation cannot be guaranteed. In case of doubt, additional measures should be used locally to ensure protective separation.
16. For SIMODRIVE POSMO SI, the following applies:
An M5 thread to connect a second protective conductor is provided in the housing of SIMODRIVE POSMO SI. This connection should be used when the equipment is mounted so that it is insulated. This means that the protective conductor function is maintained, even when the power feeder cable is not inserted.
17. For SIMODRIVE POSMO SI, the following applies:
For shaft ends with keyway and key, when testing the equipment without drive-out elements, the keyway must be secured so that it doesn't get flung out when the shaft rotates.
18. For SIMODRIVE POSMO SI, the following applies:
Check the direction of rotation with the drive uncoupled.

Caution

19. Suitable equipment must be used when mounting withdrawing drive-out elements (e.g. coupling disk, belt pulley, gear, ...).
20. The motor may not be used as a step.
21. The PROFIBUS unit may only be withdrawn and inserted when the power feed has been completely disconnected. The 24 V external power supply for the electronics is kept in order to maintain PROFIBUS communications to other nodes (stations).
22. It is not permissible to connect SIMODRIVE POSMO SI and CD to the three-phase line supply as this could destroy the equipment.
23. When mounting SIMODRIVE POSMO SI with the shaft end facing upwards, it must be guaranteed that liquid cannot penetrate into the top bearing assembly.
24. When mounting SIMODRIVE POSMO SI, it should be ensured that the flange mounting is correct and the unit is precisely aligned. The flange mounting is designed for Allen screws. If increased noise/vibration/temperatures occur, if in doubt, power down.
25. If large amounts of dirt accumulate, the air ducts should be regularly cleaned.
26. Axial forces are not permissible for SIMODRIVE POSMO SI with integrated holding brakes After the motor has been mounted, the brake should be checked to ensure that it functions perfectly.

    The brake is only designed for a limited number of emergency braking operations. It is not permissible to use the brake as operating brake.
27. Supporting SIMODRIVE POSMO SI

    For extreme vibration/shock stressing, the motor must be supported using an appropriate bracket and the three M8 tapped holes.
28. Degree of protection

    It is not permissible that foreign bodies, dirt or moisture accumulate at the connections.

    Cable entry glands that are not used must be sealed so that they are dust-tight and watertight!

    In order to guarantee the degree of protection, all of the connections must be sealed using dummy plugs or using an M gland.
29. When mounting and withdrawing drive-out elements at the output shaft, it is neither permissible to apply heavy knocks (e.g. using a hammer) to the shaft end nor exceed the maximum permissible axial or radial load at the shaft end.
30. SIMODRIVE POSMO SI must be stored in an environment with the following conditions:
    Dry, dust-free and low vibration levels ($v_{rms} \leq 0.2$ mm/s)
31. The valid national, local and plant/system-specific regulations and requirements must be carefully observed.

Notice

32. When using SIMODRIVE POSMO SI/CD/CA in UL certified plants and systems, the information/instructions in Chapter 2.2 should be observed.
33. If changes occur with respect to the normal operating condition, e.g. increased temperatures, noise or oscillation, if in doubt, power down the motor. The cause should then be determined and if necessary a SIEMENS Service Center should be contacted.
34. Machine and systems with SIMODRIVE POSMO SI/CD/CA must fulfill the protective requirements of the EMC Directive. The plant/machine manufacturer is responsible in ensuring this.

Note

35. It is not permitted to open up the drive units! We recommend that a SIEMENS service center carries out the repair and maintenance work.
36. When connecting SIMODRIVE POSMO SI/CD/CA, pre-assembled cables from the Siemens NC Z Catalog should be used.
37. After the product has served its lifetime, the individual parts should be disposed of in compliance with local regulations.
38. Possible special versions (including connection systems) and types of construction can differ regarding the technical details! If there is any uncertainty, we urgently recommend that you contact the manufacturer (specifying the type designation and serial number) or have the equipment repaired by a SIEMENS Service Center.
39. The transport company must be immediately informed of any damage which is identified after the equipment has been received. In case of damage, the drive units should not be commissioned.
40. When connecting-up, it should be ensured that the connecting cables are protected against torsional stressing, strain and pressure; it should also be ensured that cables cannot kink.
41. Observe the rating plate data regarding type of construction and degree of protection to ensure that they coincide with the conditions at the point of installation!
42. The equipment must be mounted so that any thermal power loss is adequately dissipated.
43. Note on UL applications:
    The devices do not have an integrated load and speed–dependent motor overload protection, nor do they save the motor's thermal condition after switching off or failure of the supply voltage (see NEC, Article 430.126(a)(2)).
    The devices offer integrated temperature monitoring (see Section 6.1.7).

■

Notes

2 Installing and Connecting-Up

2.1 Installing/removing

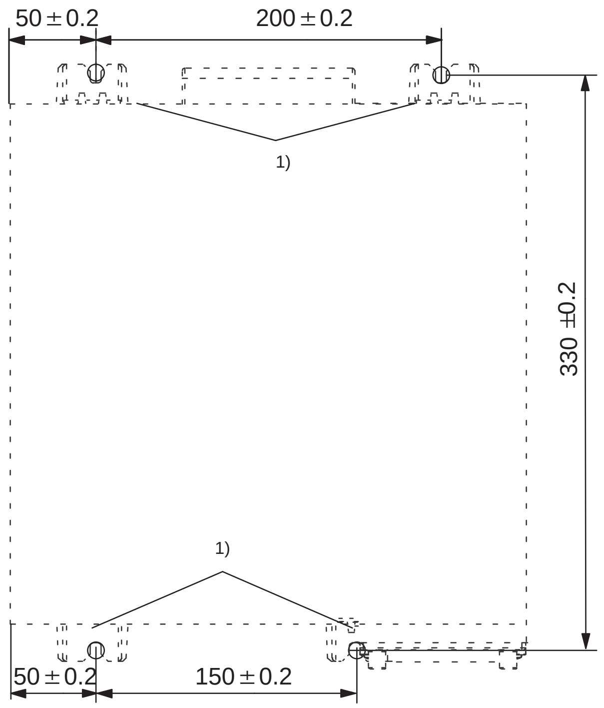
2.1.1 Installing POSMO CD/CA

Mounting position

POSMO CD/CA must be mounted as follows:

- Preferably in a vertical position with cable outlet facing downwards.
- A clearance of ⩾100 mm towards the top must be ensured. Air must be able to freely circulate!
- The units can be mounted horizontally with a cable outlet upwards, power de-rating and a clearance of ⩾100 mm around the complete unit and de-rating of the braking resistor (refer to the diagram in Table 1-10). Air must be able to freely circulate!
- Mounting dimensions, refer to Figs. 2-1 and 2-2

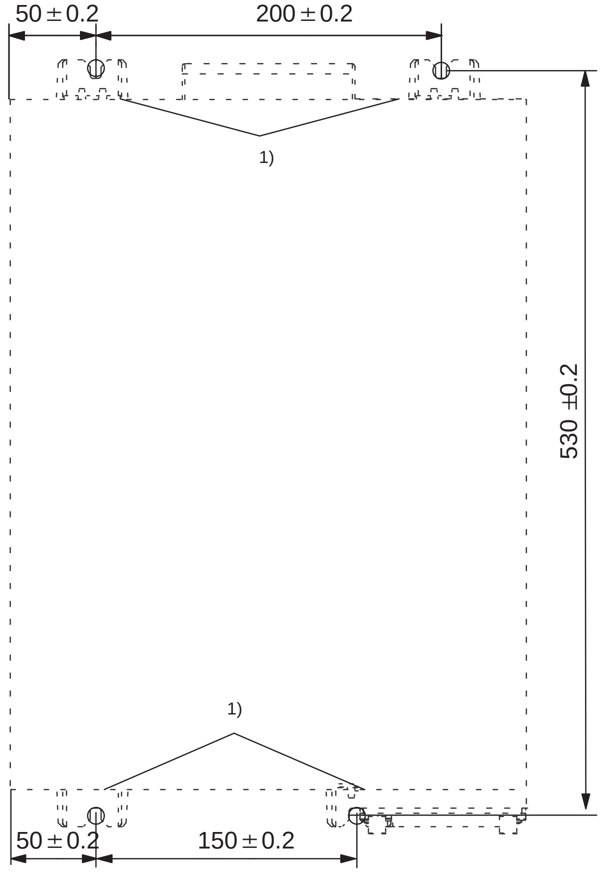
Hole clearances, screw sizes



Retained using four M6 screws (length, as required)
1) Note: The fillet is 7 mm thick

not to scale

Fig. 2-1 Hole dimensions, POSMO CD 9A



Retained using four M6 screws (length, as required)

1) Note: The fillet is 7 mm thick **not to scale**

Fig. 2-2 Hole dimensions, POSMO CA 9A and POSMO CD 18A

Recommended tightening torques

The following applies for screws that are used to retain POSMO CD/CA:

Tighten with torque =10 Nm

2.1.2 Installing POSMO SI

Mounting position

POSMO SI must be mounted as follows:

Note

If POSMO SI is mounted with the shaft end facing upwards, it must be guaranteed that no liquid (water, drilling or cooling emulsion etc.) can enter the upper bearing.

- Observe the rating plate data regarding the type of construction and degree of protection and check that they match the conditions at the mounting position!
- When mounting POSMO SI, the shaft end may not be subject to knocks and/or be inadmissibly stressed!
- The drive units must be mounted so that they are adequately cooled.
- The mounting flange of POSMO SI for mounting gearboxes and retaining the drive unit is designed for M8 Allen screws.
- Before mounting POSMO SI, any anti-corrosion agent must be completely removed from the shaft end using a commercially available solvent.

Reader's note

Also refer to the safety-related information and instructions in Chapter 1.4.

2.1.3 Replacing POSMO SI or POSMO CD/CA and/or upgrading the firmware

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Note

Special information and data when replacing POSMO SI, POSMO CD/CA and individual components are provided in Chapter 8.1.

Replacing POSMO SI or POSMO CD/CA

A drive (POSMO SI or POSMO CD/CA) should be installed/removed as follows:

Warning

It is only permissible to install/remove a drive when the system is in a no-voltage condition (i.e. powered-down)!

If the PROFIBUS unit and the memory module are removed/inserted under voltage, then this can destroy the components and data can be lost.

---

1. Brings the drive into a no-voltage condition.
2. Remove the drive from the system.
3. If the drive and the memory module are defective or you wish to use the firmware release of the drive, then you must download the same *.par file into the new drive using the "SimoCom U" parameterizing and start–up tool.
   Continue with point 5)
4. If the memory module is not defective, then remove it from the defective (old) drive and insert it into the "new" drive.

   Refer to Chapter 8.2 for the procedure when replacing the memory module.
5. Install the "new" drive instead of the "old" drive into the system and correctly re-connect it.

Referencing (homing)

If a motor with absolute value encoder is mounted to the drive, then if the firmware release was < 9.1, and a *.par file was downloaded into the memory module, then the drive must always be re-reference (re-homed), even if the drive already appears as if it has been referenced (homed).

If the referencing (homing) of the axis is completed and takes a lot of time, then it is possible to save the reference point (home position). A description on this is provided in the product support in the Internet under FAQs ID21821692.

If it involves a POSMO SI and if a new drive unit was mounted there on the motor, then in this case, it must always be re-referenced (re-homed).

Upgrading the firmware

In order to take into account technical advances, the drive firmware is continually being further developed with each software release.

Although the firmware has been optimized regarding its runtime behavior, it cannot be completely excluded that the later firmware release has a different runtime behavior. This must be especially taken into account if functions are used that take–up a lot of runtime.

Thus, when upgrading a drive to a new firmware release it should be checked as to whether the runtime behavior is still satisfactory. If required, re-optimize the drive parameterization or do not upgrade the firmware!

In order to be able to optimally use new firmware releases regarding the runtime behavior, we recommend that the latest hardware is always used.

2.2 Connecting–up, general

Connecting cables	Refer to Chapter 2.3. **Reference:** /Z/, Catalog NC Z
Fuses	Refer to Chapter 2.2.4
Terminals	**Reference:** /K/, Catalog NS K

Reader's note

Information on the subjects

- Cabinet design
- Basic rules regarding electromagnetic compatibility (basic EMC rules)
- Potential bonding
- Cable routing
- EMC-compliant wiring
- Shielding and shield connections
- Handling modules that can be damaged by electrostatic discharge (ESDS measures), etc.

are included in

Reference: /EMV/ EMC Guidelines, Configuration Manual

Information on the subjects

- Technical data is included in Chapter 1.3.
- Mounting is included in Chapter 8.

Warning

Cable shields and power cable conductors which are not used, must be connected to PE potential in order to discharge charges as a result of capacitive coupling.

Hazardous voltages can occur if this is not observed.

Warning

POSMO SI/CD/CA may only be operated when a protective conductor is connected!

Caution

Signal and power cables must be routed with a minimum clearance of 20 cm between each other, and as close as possible to grounded parts and components.

Note

Input and output supply voltages must be grounded!

Use only copper cables with a thermal stability of up to at least 60/75°C for connection and wiring. See Figure 2-16

Line infeed modules

Reader’s note

Information on how to connect line infeed modules, technical data as well as an interface overview are included in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter ”Line infeed (NE)”

/MAS1/ SIMOVERT MASTERDRIVES
Motion Control, Compendium
Chapter ”Configuration and connection examples” as well as ”Engineering”

When connecting POSMO SI and POSMO CD to SIEMENS line infeed modules, refer to Chapter 2.3.2 and Chapter 2.3.4 and Fig. 2-10.

UL-certified systems

Note

When using POSMO SI or POSMO CD in UL-certified plants and systems, UL-certified varistors must be used when connecting–up the line infeed!

When using the 5 kW SIMODRIVE UI module and for POSMO CA, an appropriate protective circuit is already integrated.

For SIMODRIVE line infeed modules from 10 kW, the overvoltage limiting modules, with Order No. 6SN1111–0BA00–0AA0 can be used.

When using the optional electronics power supply infeed, it is necessary to use a UL-certified varistor in the 24 V power supply cable for UL-certified systems; this varistor is integrated in the specified noise suppression filters (this is provided with the unit, or can be ordered with Siemens Order No. 6SN2414–2TX00–0AA1).

When using MASTERDRIVES and third–party infeed modules, the manufacturer’s data must be carefully observed!

PROFIBUS connection

The following general requirements must be observed:

- The PROFIBUS coupling is realized in compliance with the standard. A standard PROFIBUS cable can be used. To loop in the optional electronics power supply, the same bus cable can be used as in the distributed ET 200X I/O.

  References: /ET200X/ Distributed ET 200X I/O
- All bus nodes should be PROFIBUS-DP certified.
- If the bus communications and position sensing are to remain active even with the load power supply switched-out, then an optional electronics power supply (24 V $\pm$20 %) can be used. The conductors are routed in the ET 200X bus cable (distributed I/O system).

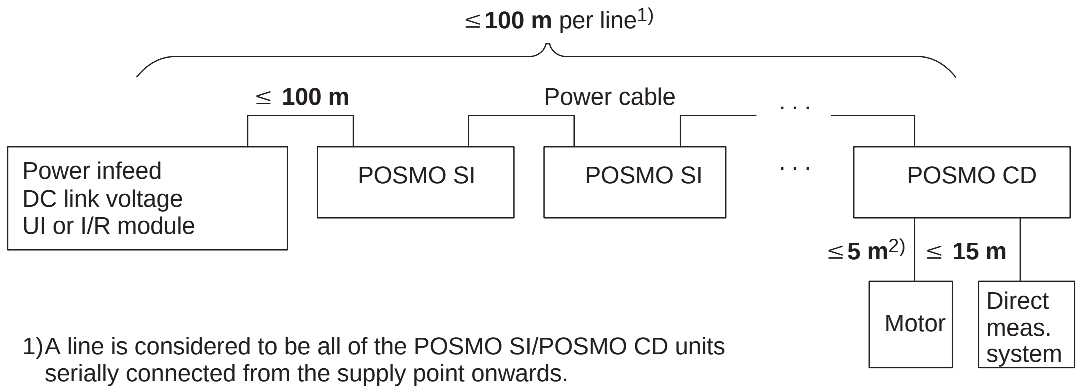
2.2.1 Cable lengths

Caution

The total cable length of all of the devices connected to an infeed should not exceed the following maximum cable length

- ≤ 350 m for sinusoidal infeed
- ≤ 500 m for squarewave infeed

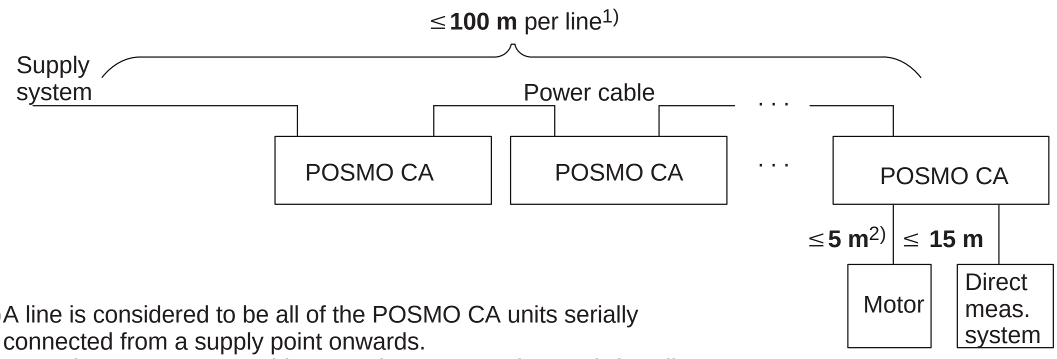
POSMO SI/CD



1) A line is considered to be all of the POSMO SI/POSMO CD units serially connected from the supply point onwards.
2) For POSMO CD 9 A a motor cable up to max. 6 m is permissible.
For POSMO CD 18 A, a motor cable up to max. 15 m is permissible.
Secondary and limiting conditions, refer to the following page under ”POSMO CD/CA motor cable”

Fig. 2-3 Max. permissible cable lengths, POSMO SI/CD

POSMO CA



1) A line is considered to be all of the POSMO CA units serially connected from a supply point onwards.
Up to three POSMO CA drives can be connected to each fuse line.
2) For POSMO CA 9 A, a motor cable up to max. 15 m is permissible.
Secondary and limiting conditions, refer to the following page under ”POSMO CD/CA motor cable”

Fig. 2-4 Max. permissible cable lengths, POSMO CA

PROFIBUS cables

The following cable lengths may not be exceeded:

- Max. overall cable length: 100 m

Limitations, 5-conductor cable:

- PROFIBUS-DP with more than 4 nodes

  The maximum cable length is given by L = 400/x.

  L = Total cable length

  x = No. of drives connected to the cable

- Max. PROFIBUS nodes in a cable line: 10

POSMO CD/CA motor cable

For POSMO CD 18 A /CA 9 A, a motor cable up to a maximum of 15 m and for POSMO CD 9 A up to a maximum of 6 m are permissible under the following limitations and secondary conditions.

Note

The sum of the motor cables ≥ 5 m must then be subtracted from the possible total cable length of all of the units connected to an infeed!

The following application conditions must be be fulfilled for motor cables >5 m:

- Line infeed only using SIMODRIVE I/R modules.
- An HFD commutating reactor with external pulsed resistor must be provided in the line infeed.
- Derating for rated current I_N

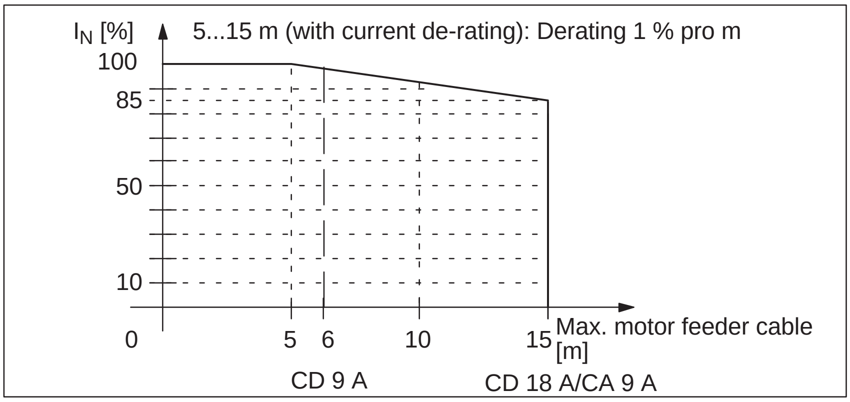


Fig. 2-5 Derating, rated current for a motor feeder cable >5 m for POSMO CD/CA

Reader's note

Engineering information and instructions for E/R modules, HFD commutating reactors and pulsed resistors, refer to

Reference: /PJU/ SIMODRIVE 611
Configuration Manual, Drive Converters

2.2.2 Power connected to a line

POSMO SI/CD should be connected to the DC link voltage and POSMO CA to the line supply using a 6 mm^2 power cable. This cable can, according to VDE, have a 29 A load up to 40 °C ambient temperature.

Note

For an ambient temperature > 40 °C the current carrying capacity of the power cable is reduced in accordance with EN 60204. At 45 °C ambient temperature, the correction factor is 0.91.

POSMO SI/CD

Table 2-1 Max. line power POSMO SI/CD

$V_{line\ supply}$ [V]	$V_{DC\ link}$ [V]		P_{Smax} [kW]
	I/R module	UI module	
400	600_{type}	–	17.40
	–	540	15.66
480	700...750	–	20.30...21.75
	–	648	18.80

The total power which can be connected to a line for POSMO SI/CD changes as follows when the coincidence factor is taken into account (only rough values):

Table 2-2 Coincidence factor

No. of axes	Coincidence factor
1	1
2	0.63
3	0.5
4	0.38
5	0.33
6	0.28

Reference: /KT60/, Catalog NC 60

POSMO CA

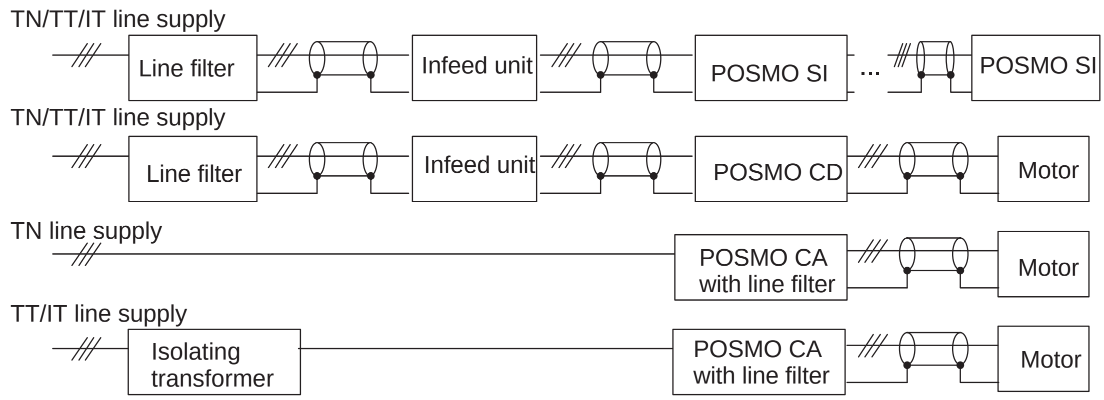
Table 2-3 Max. line power, POSMO CA

$V_{line\ supply}$ [V]	P_{Smax} [kVA]
400	20.0
480	24.1

2

2.2.3 Wiring in conformance with CE

In order to guarantee the CE conformance with respect to EMC in a machine/system, shielded signal cables should be used as well as shielded power cables after the line supply filter. A schematic overview is shown in Fig. 2-6.



Note:
For the SIMODRIVE 611 infeed unit, for TT/IT line supplies, an isolating transformer as listed in Catalog NC 60 is required, refer to Figs. 2-8 and 2-9.

Fig. 2-6 Wiring in conformance with CE

Reader's note

All of the cable connections are available in the form of pre-assembled cables for disturbance-free operation. The Order Nos. of pre-assembled cables can be taken from

Reference: /Z/, Catalog NC Z,
Connection System & System Components

2.2.4 Power infeed for POSMO SI/CD

General information

Requirements placed on the DC link voltage for POSMO SI/CD:

- Max. permissible DC link voltage 750 V DC
- Min. permissible DC link voltage 400 V DC
- DC link capacitance required in the line infeed for supplies without their own DC link capacitance:
  – POSMO SI $\geq$ 180 µF per drive
  – POSMO CD 9A $\geq$ 180 µF per drive
  – POSMO CD 18A $\geq$ 360 µF per drive

Warning

The unit could be destroyed if the DC link voltage is incorrectly connected (incorrect polarity) to the line infeed module.

Recommended line infeed

The following SIMODRIVE and MASTERDRIVES infeed (rectifier) modules can be selected to provide the DC link voltage for POSMO SI/CD. Table 2-4 lists the recommended line supply and required DC link fuses (DC link fuse). The user should mount the DC link fuses externally.

Table 2-4 Overview of possible line infeed modules

Device	Type	Line supply fuse (recommended)	Line supply type	Line voltage	Overvoltage limiting module1)	DC link fuse
SIMODRIVE 611	UI 5 kW	$V_{line\ supply}$ 415 V: 16 A D01; Neozed/B. No.; 5SE2116	TN Fig. 2-7 TT Fig. 2-8 IT Fig. 2-9	3–ph. 400 V AC –10% 3–ph. 480 V AC +6%	no	no
		$V_{line\ supply}$ 500 V: 16 A DII; Diazed/B. No.; 5SB261 16 A Size 00; NH/B. No.; 3NA3805				
	UI 10 kW	$V_{line\ supply}$ 415 V: 25 A D02; Neozed/B. No. 5SE2125			yes	no
		$V_{line\ supply}$ 500 V: 25 A DII; Diazed/B. No.; 5SB281 25 A Size 00; NH/B. No.; 3NA3810				
	UI 28 kW	80 A			yes	HLS 32 A Size 0; NH B. No.; 3NE4101 2)
	I/R 16 kW	35 A				
	I/R ≥ 36 kW	≥ 80 A				
MASTERDRIVES Compact Plus	UI 15 kW 4)	50 A	TN Fig. 2-7 TT Fig. 2-8 IT Fig. 2-9	3–ph. 380 V AC –15% 3–ph. 480 V AC +10%	no	
	UI ≥ 45 kW 4)					
MASTERDRIVES Compact	UI 15 kW 4)	50 A		3–ph. 380 V AC –15% 3–ph. 480 V AC +10%	2)	
	UI ≥ 37 kW 4)	100 A				
	I/R 7.5 kW 4)	refer to SIMODRIVE UI 10 kW				no
	I/R ≥ 15 kW	–				HLS 32 A Size 0; NH B. No.; 3NE4101 3)
	UI ≥ 37kW 4)	100 A				
MASTERDRIVES AFE	I/R ≥ 32kW 4)	–		3–ph. 380 V AC –15% 3–ph. 460 V AC +5%	–	

1) Overvoltage limiting module for line infeed modules from 10 kW for SIMODRIVE 611
2) The NE can be used with IT/TT line supplies; however, POSMO SI/CD requires, for UL, varistors on the line supply side due to the air and creepage distances.
3) Fuse holder 3NH3120
4) A maximum of 10 units can be connected, for UI 15 kW, a maximum of 4 (refer to Chapter 2.2.2).

When calculating the charge limit of the SIMODRIVE line infeed modules, for charging the ”DC link” an equivalent capacitance for POSMO SI/CD should be used for each unit depending on the pre-charging circuit of the line infeed module.

The ”braking function may only be enabled from POSMO SI/CD after the line infeed module is ”ready”.

The number of POSMO units connected to a infeed module is limited as a result of the charge limits.

Table 2-5 Equivalent capacitance for charge limits

Line infeed modules SIMODRIVE 611	POSMO SI/CD 9 A	POSMO CD 18 A
5 kW, 10 kW, 16 kW	600µF	1100µF
28 kW to 120 kW	1740µF	2200µF

Reader's note

Engineering information and instructions for the line infeed SIMODRIVE 611 for POSMO SI/CD are included in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters, Chapter
”Fundamental principles when engineering a drive”

DC link voltage monitoring

The thresholds for the DC link voltage monitoring are preset for a 400 V line supply voltage. For 480 V line supplies, parameter P1171 must be set to 1.

Table 2-6 Threshold for the DC link overvoltage

Threshold	P1171 = 0[1)]	P1171 = 1
Threshold, DC link voltage monitoring	$V_{line\ supply}$ 400 V	$V_{line\ supply}$ 480 V

1) Standard value

Line supply types

Note

Information on the various line supply types is included in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter ”System configuration”

Reader's note

Matching transformer types are included in

References: NC 60 Catalog

Line supply conditions SIMODRIVE 611/ MASTERDRIVES-NE

- **TN-C-line supply; TN-S-line supply; TN-C-S-line supply**

  Symmetrical 4-conductor or 5-conductor three–phase line supply with grounded neutral point which can be loaded, with a protective and neutral conductor connector connected at the neutral point which, depending on the line supply type, uses one or several conductors.

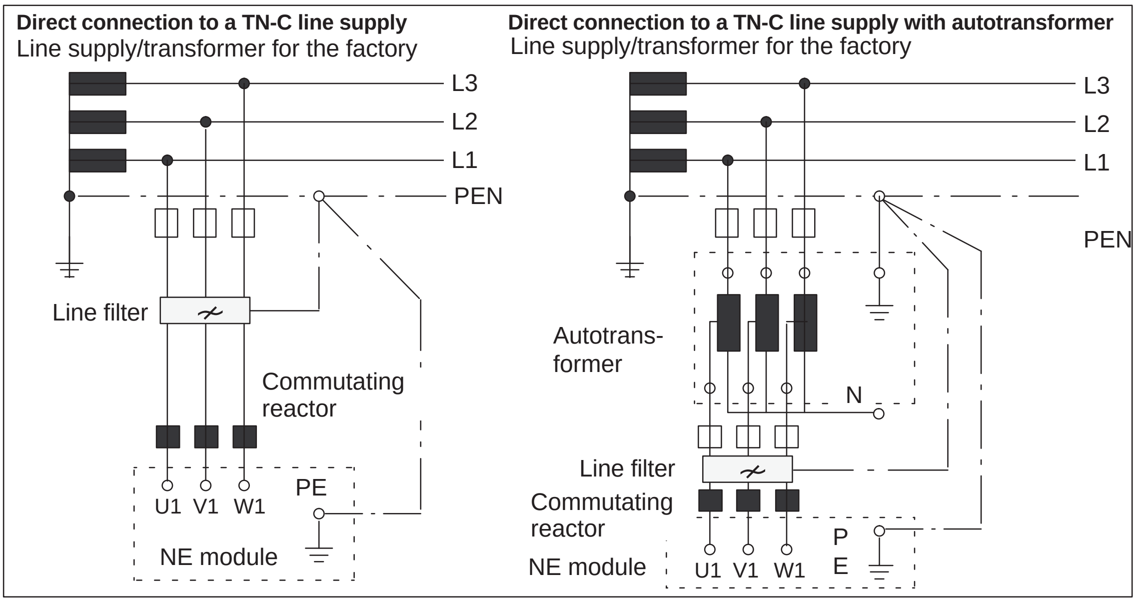


Fig. 2-7 Example, connection schematic for TN–C line supplies

- **TT line supply**
  Symmetrical 3-conductor or 4-conductor three–phase line supply with a directly grounded point, the loads are e.g. connected to grounding electrodes, which are not electrically connected directly to the grounded points of the line supply.

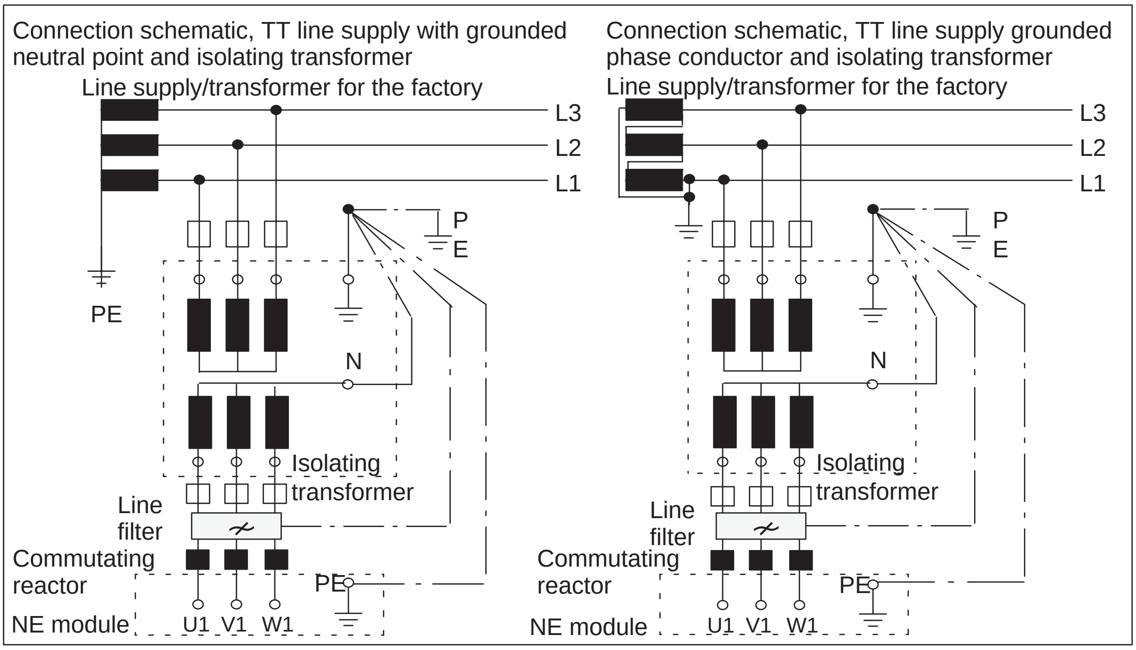


Fig. 2-8 Connection schematic, TT line supplies

- **IT line supply**
  Symmetrical 3-conductor or 4-conductor three–phase–phase line supply without a directly grounded point, the loads, are, e.g. connected to grounding electrodes.

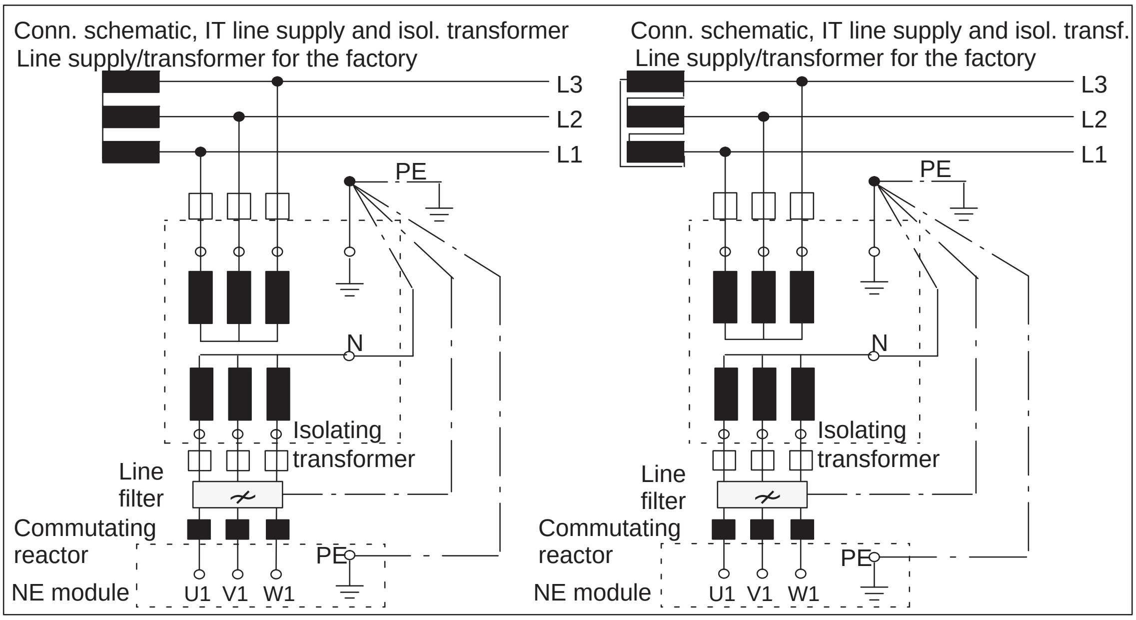


Fig. 2-9 Connection schematic, IT line supplies

Examples for connecting NE modules

The following diagrams show how power cables can be connected to a SIMODRIVE or MASTERDRIVES UI or I/R module.

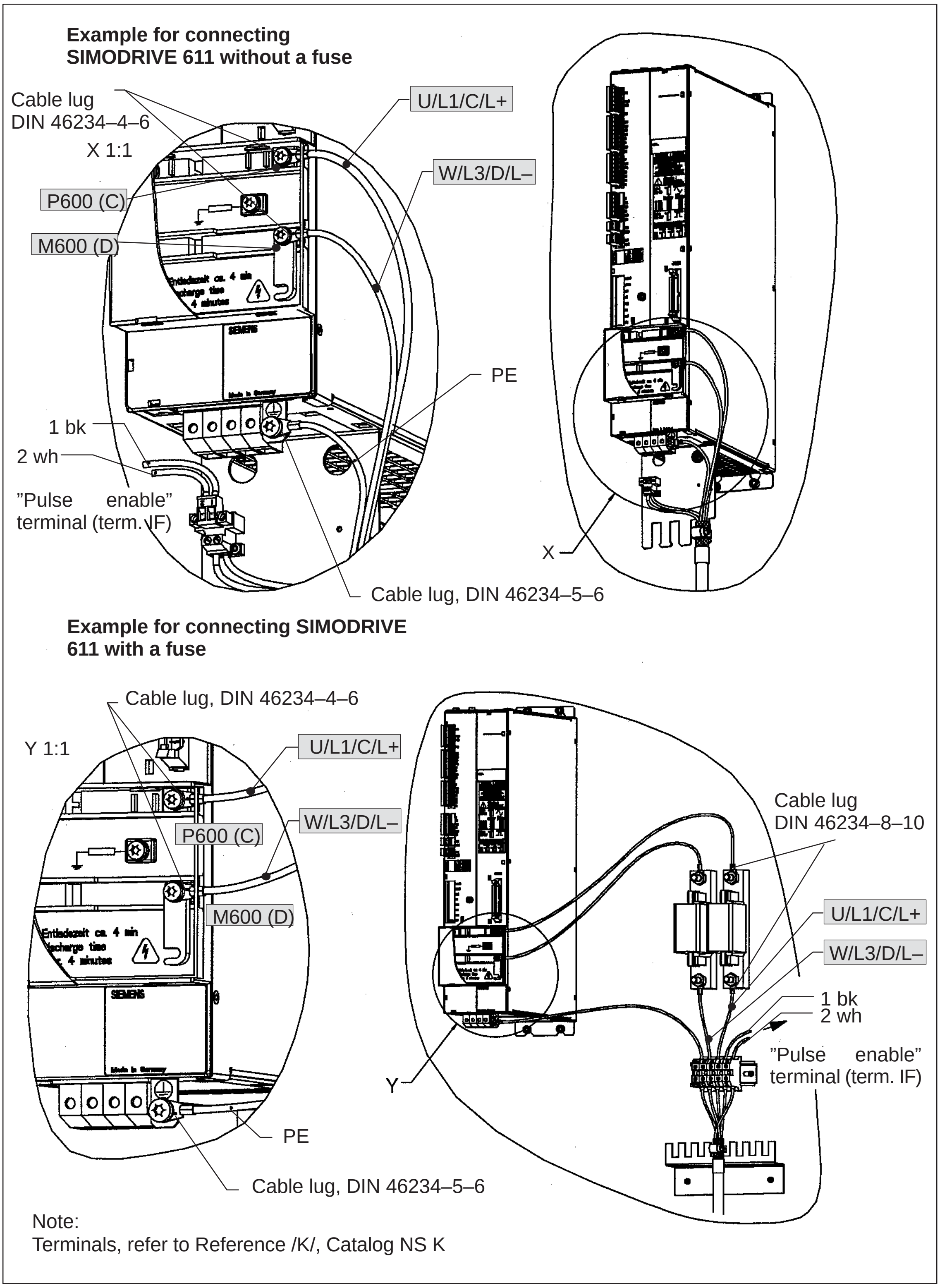


Fig. 2-10 Connecting a power cable to SIMODRIVE 611 (schematic)

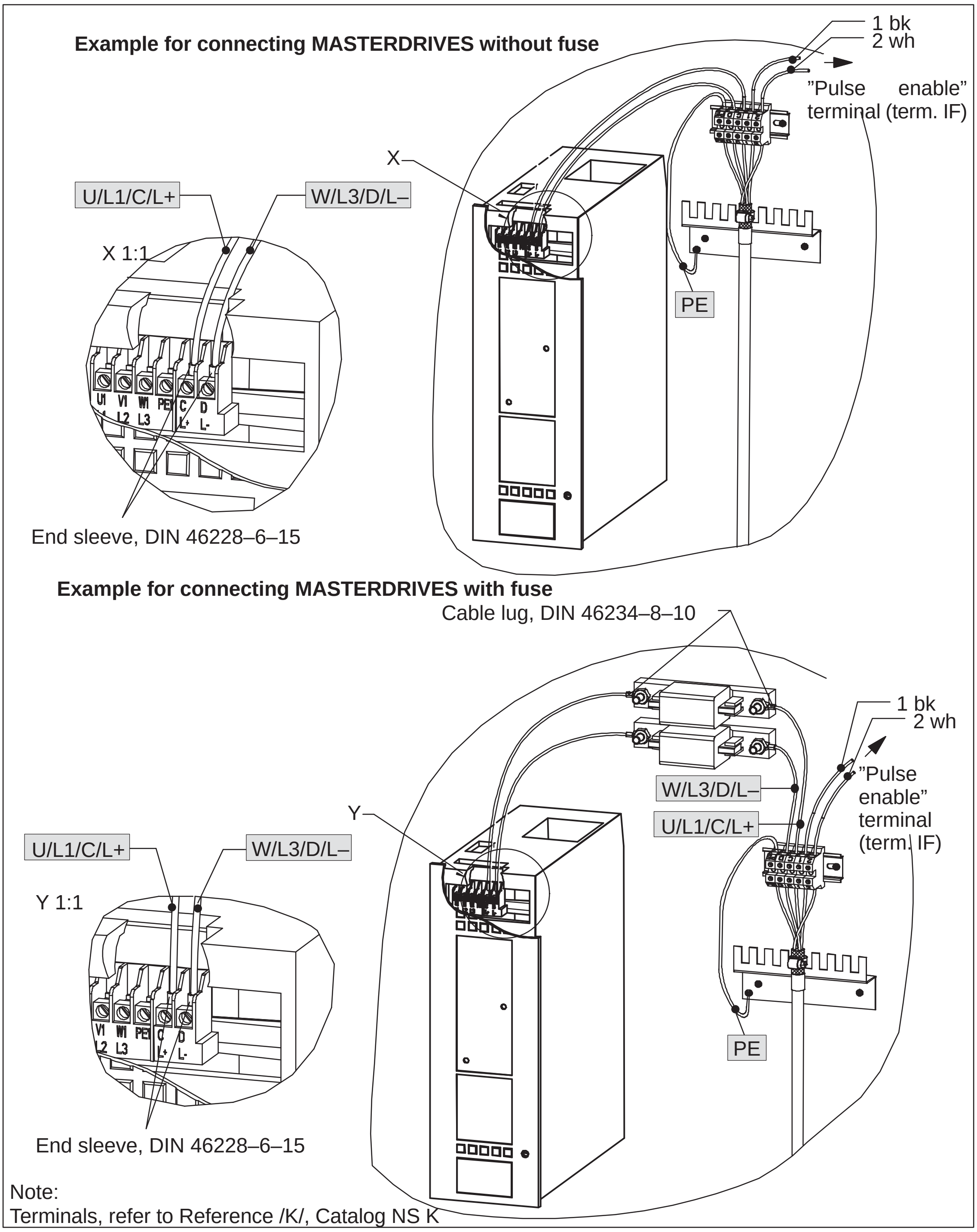


Fig. 2-11 Connecting a power cable to MASTERDRIVES (schematic)

Note

For POSMO SI/CD, the power cable shield must be attached to the side of the power supply at the end of the cable using a clamp.

2.2.5 Power infeed for POSMO CA

Line infeed

Supply from a three–phase line supply voltage (3–ph. 400/480 V AC).

POSMO CA is insulated in accordance with DIN EN 50178. This means that the insulation system has been designed so that the unit can be directly connected to a TN line supply with grounded neutral point. For all other line supply types, an isolating transformer with neutral point, grounded on the secondary side, must be used. This transformer is used to de-couple the line circuit (overvoltage Category III) from a non line-rupply circuit (overvoltage Category II), refer to IEC 60644-1. The neutral point of the isolating transformer must be connected to the housing of the drive unit.

The thresholds for the pulsed resistor management are preset for a 400 V line supply voltage. For 480 V line supplies, the thresholds can be increased using parameter P1171.

Table 2-7 Thresholds, pulsed resistor

Threshold	P1171 = 0[1)]	P1171 = 1
Switch-in, switch-out threshold, pulsed resistor	$V_{line\ supply}$ 400 V	$V_{line\ supply}$ = 480 V (415/440/460 V)

1) Standard value

Note

For POSMO CA, the integrated line filter includes noise suppression capacitors that are connected with respect to PE. The effective capacitance of the three jumpered line supply inputs with respect to ground is a maximum of 270 nF. In compliance with EN 50178, components such as these may neither be disconnected/isolated nor jumpered before the high-voltage test. In this particular case, a DC voltage should be used for testing, the magnitude of which can be taken from the subsequent data:

Rated voltage	DC test voltage
400 V AC	1900 V DC
480 V AC	2100 V DC

Line fuse

For POSMO CA 9A, the following line fuses should be used:

- $V_{line\ supply}$ 415 /500 V: HLS 32 A Size 0; NH B. No.; 3NE4101
- Fuse holder: 3NH3120

As an alternative, a SIRIUS 3 RV1031–4EA10 circuit-breaker can be used. The rated current should be set to 29 A. For a line supply voltage of 500 V, **in addition**, a circuit-breaker with limiter function 3RV13 31–4HC10 should be connected upstream. This only guarantees protection of the POSMO CA feeder cable against short-circuit and overload. The POSMO CA unit itself is not protected!

Line supply fault level

Note

The line supply fault level must be approx. 30 x greater than the rated output of the units operated together on the line.

2.2.6 Connecting motors to POSMO CD/CA

The motor is connected using a power cable with 6–pole connector (refer to Fig. 2-12).

Fig. 2-12 Connecting the motor cable to POSMO CD/CA

Table 2-8 Cable data (4x6 mm^2, 2x1.5 mm^2)

Cross-section [mm^2]	**Conductor coding**	**Con-duc-tor color**	**Motor**	
			Name	**Designation**
6	U/L1/C/L+	bk	Motor voltage	U
6	V/L2	bk	Motor voltage	V
6	W/L3/D/L–	bk	Motor voltage	W
6	none	gnye	Protective conductor	⏚
1.5	none	bk	Brake+1)	1 (BRP)
1.5	none	wh	Brake–1)	2 (BRM)

Table 2-9 Cable data (4x2.5 mm^2, 2x1.5 mm^2)

Cross-section [mm^2]	**Conductor coding**	**Con-duc-tor color**	**Motor**	
			Name	**Designation**
2.5	U	bk	Motor voltage	U
2.5	V	bk	Motor voltage	V
2.5	W	bk	Motor voltage	W
2.5	none	gnye	Protective conductor	⏚
1.5	none	bk	Brake +	1 (BRP)
1.5	none	wh	Brake –	2 (BRM)

Note

Connecting 1FN linear motors, refer to the following references:

- Equipment Manual SIMODRIVE Sensor Module External SME9x, 12/2005 Edition
- Configuration Manual SIMODRIVE 1FN1 and 1FN3–SL Linear Motors, 01/2006 Edition, Order No. [MLFB]: 6SN1197–0AB70–0AP6

Releasing the motor holding brake

Note

When commissioning and during service, the motor holding brake can be released by connecting an external 24 V voltage at connector X25 of the PROFIBUS unit (signals BRP and BRM, refer to Chapter 6.5).

2.2.7 Connecting measuring systems to POSMO CD/CA

Connecting the measuring system (only POSMO CD/CA)

Refer to Fig. 2-13.

Fig. 2-13 Connecting measuring systems to POSMO CD/CA

2.2.8 Noise suppression circuits connected to POSMO SI/CD/CA

In some cases, noise suppressing measures are required in the feeder cables of the ”pulse enable” terminal and the optional 24 V electronics power supply (PROFIBUS-DP). The type and principle of operation of the noise suppressing measure is described in Chapters 2.2 and 2.3 to 2.5.

Table 2-10 Overview of the necessary noise suppressing measures

Noise suppressing measure	”Pulse enable” terminal			PROFIBUS-DP 2-conductor			PROFIBUS-DP 5-conductor		
	SI	CD	CA	SI	CD	CA	SI	CD	CA
Filter (integrated Varistor)	yes 1)	no	no	no	no	no	yes 2)	yes 2)	yes 2)
Varistor	no	for cables>30 m or UL systems1)		no	no	no	no	no	no

1) Noise suppression measures are included in an accessories pack
2) Can be separately ordered when wiring with M20 gland, recommended when connecting–up with ECOFAST

2.3 Connecting POSMO SI/CD/CA

2.3.1 General information

Preparing the grounding

POSMO SI/CD/CA are grounded via the protective conductor of the power cable. The electronics ground (M) is connected with the housing.

Note

The protective conductor connection may neither include switches nor electronic components.

Notice

The units have a high discharge current and are designed for stationary applications where they are permanently connected.

In addition to the protective conductor in the line supply feeder cable, a second protective conductor with a cross-rection of 10 mm^2 (IEC 61800–5–1) should be connected at the PE screw connection at the equipment housing.

When removing a POSMO A it is not permissible that this protective conductor is interrupted.

We recommend the following when connecting-up the protective conductor:

- Star-type configuration, or
- The input and output of the protective conductor at the unit housing must be crimped in one cable lug (refer to Figs. 2-16, 2-17 and 2-18).

A corrosion–protected M5 stud and a corrosion protected contact washer are provided.

Cable shields, grounding

The shield of the power cable for POSMO SI/CD must be connected at the power supply (e.g. I/R module, refer to Fig. 2-10) to a suitable shield connecting point using a clamp.

Selecting the cable outlet

For POSMO SI, the power connection can either be angled or straight, and for POSMO CD/CA, only angled.

For POSMO CD/CA, the motor and measuring system can only be connected using angled connectors.

Note

POSMO CA either cannot be vertically mounted with the cable outlet to the top or this is only possible if the brake resistor is de-rated (70 %).

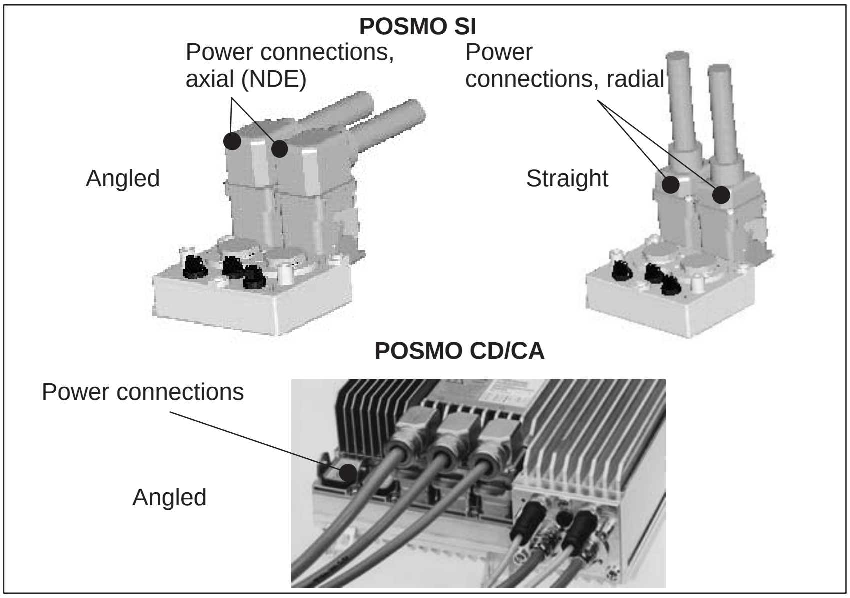


Fig. 2-14 Power connection system, POSMO SI/CD/CA

Connecting-up

Note

Pre-assembled cables from the SIEMENS Catalog should be used to connect-up POSMO SI/CD/CA.

Reference: /Z/ Catalog NC Z,
Connection System & System Components

The pre-assembled cables to connect the power are dimensioned and identified as follows:

Table 2-11 Cable data for the POSMO SI/CD/CA power connection (4x6 mm^2, 2x1.5 mm^2)

Cross-rection [mm^2]	**Conductor coding**	**Con-ductor color**	**POSMO SI/CD**		**POSMO CA**	
			Name	**Desig-nation**	**Name**	**Desig-nation**
6	U/L1/C/L+	bk	DC link voltage (P600)	C/L+	Line voltage	L1
6	V/L2	bk	Not assigned	–	Line voltage	L2
6	W/L3/D/L–	bk	DC link voltage (M600)	D/L–	Line voltage	L3
6	none	gnye	Protective conductor	⏚	Protective con-ductor	⏚
1.5	none	bk	”Pulse enable” terminal	Terminal IF (1)	”Pulse enable” terminal	Terminal IF (1)
1.5	none	wh	Reference potential for terminal IF	M24 (2)	Reference po-tential for termi-nal IF	M24 (2)

Example: POSMO SI with cables

The following diagram shows how cables are connected to a POSMO SI (with a cap on X25, diagnostics):

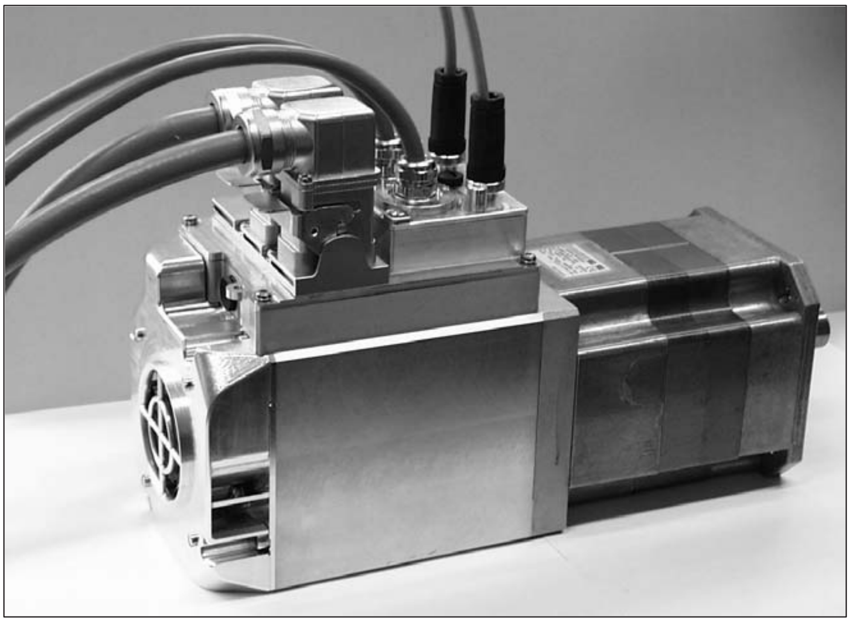
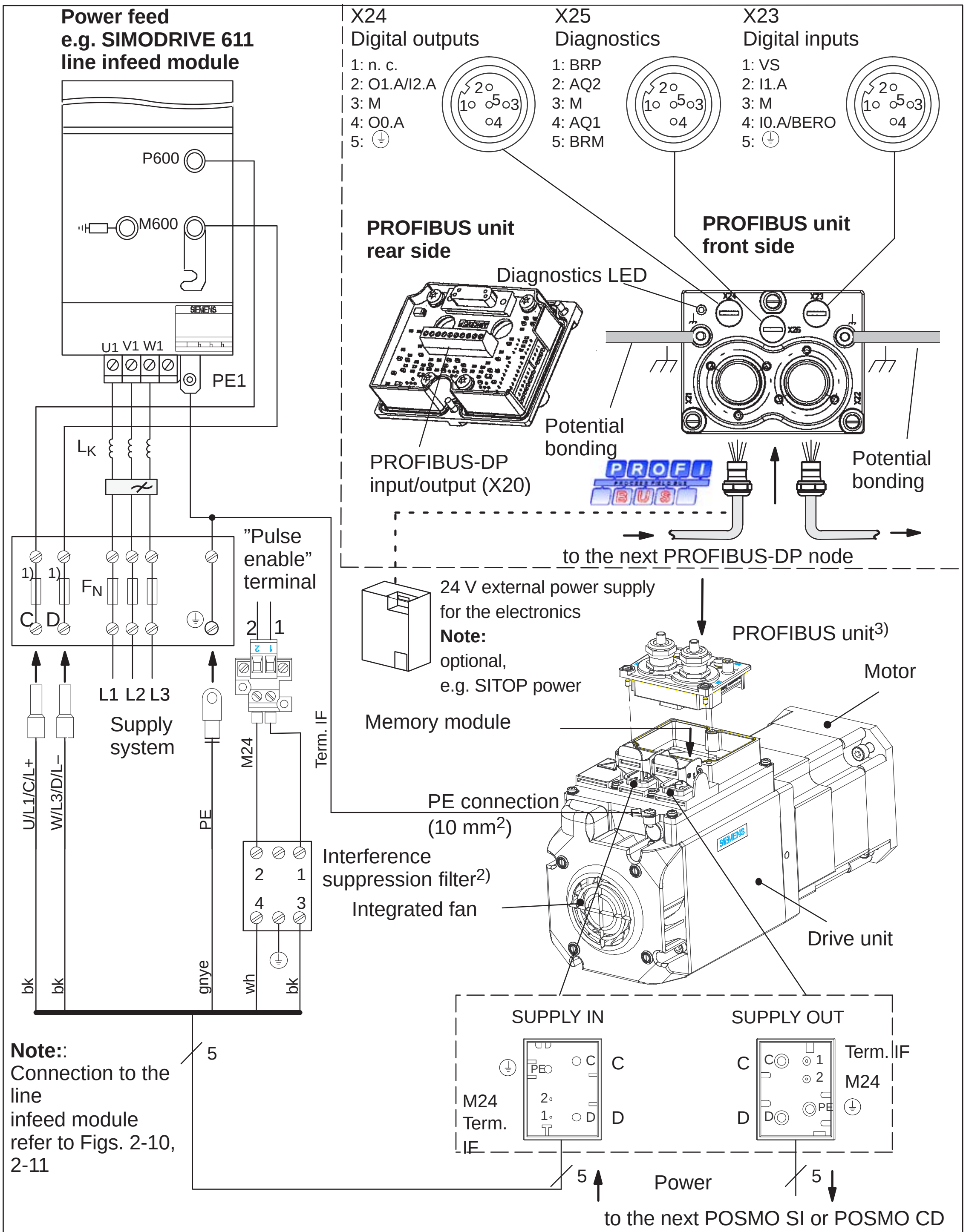


Fig. 2-15 Example: POSMO SI connection

2.3.2 Connection diagram, POSMO SI



1)Engineering information/instructions for fusing/protection, refer to Chapter 2.2.4.
2)Interference suppression filter (for data on this, refer to Table 2-12)
3)Secure the PROFIBUS unit with screws only when it has been applied in parallel to housing and inserted!

Note:

Use only copper cables with a thermal stability of up to at least 60/75°C. for connection and wiring.

Fig. 2-16 Connection diagram, POSMO SI

2.3.3 Assignment, DC link coupling with safety protective interlocking POSMO SI

Power connection

Table 2-12 Wiring, power connection POSMO SI

<table>
<tr><th>Connector
Designation</th><th>Function</th><th>Type 1)</th><th>Technical data</th></tr>
<tr><td>SUPPLY IN</td><td>Power input</td><td></td><td>Pre-assembled cable for wiring (Order No.):
• 6FX1002–5DA55–1□□□ or
• 6FX1002–5DA65–1□□□</td></tr>
<tr><td>C</td><td>DC link voltage P600</td><td>S</td><td rowspan="2">Permissible DC link voltage range
400 V...750 V DC</td></tr>
<tr><td>D</td><td>DC link voltage M600</td><td>S</td></tr>
<tr><td></td><td colspan="3">Note:
A 24 V voltage (1P24) ±2% with protective separation is generated from the DC link voltage. The following devices are connected to this voltage:
• The motor brake
• The digital outputs
• Supply for digital inputs (e.g. for BERO)

DC link connection:
• At SIMODRIVE 611, refer to Fig. 2-10 and 2-16
• At MASTERDRIVES, refer to Fig. 2-11 and Catalog DA 65.10
Warning:
The DC link coupling has a safety protective interlocking function that is intended to provide protection against residual voltages. This can only be opened by qualified personnel using a suitable tool, e.g. screwdriver. The DC link coupling may only be withdrawn at the earliest 4 min after the power supply voltage has been powered down!</td></tr>
<tr><td>⏚</td><td>Protective conductor PE</td><td>S</td><td></td></tr>
<tr><td>–</td><td>Free</td><td></td><td></td></tr>
<tr><td>1</td><td>”Pulse enable” terminal (terminal IF)</td><td>I</td><td rowspan="2">Voltage tolerance
(including ripple): 21 V...30 V
Current drain, typical: 1.4 mA at 24 V
max: 2.0 mA at 30 V
Note:
The ”pulse enable” terminal acts on all of the axes operated on a line. The pulse for specific axes are enabled using terminal IF and the PROFIBUS control word STW1.1 and STW1.3.
Connection conditions:
• Connect-up terminal IF (e.g. 24 V at 1; 0 V at 2); refer to Fig. 2-16</td></tr>
<tr><td>2</td><td>Reference potential for terminal IF (M24)</td><td>S</td></tr>
</table>

1) I: Input; S: Supply;

Table 2-12 Wiring, power connection POSMO SI, continued

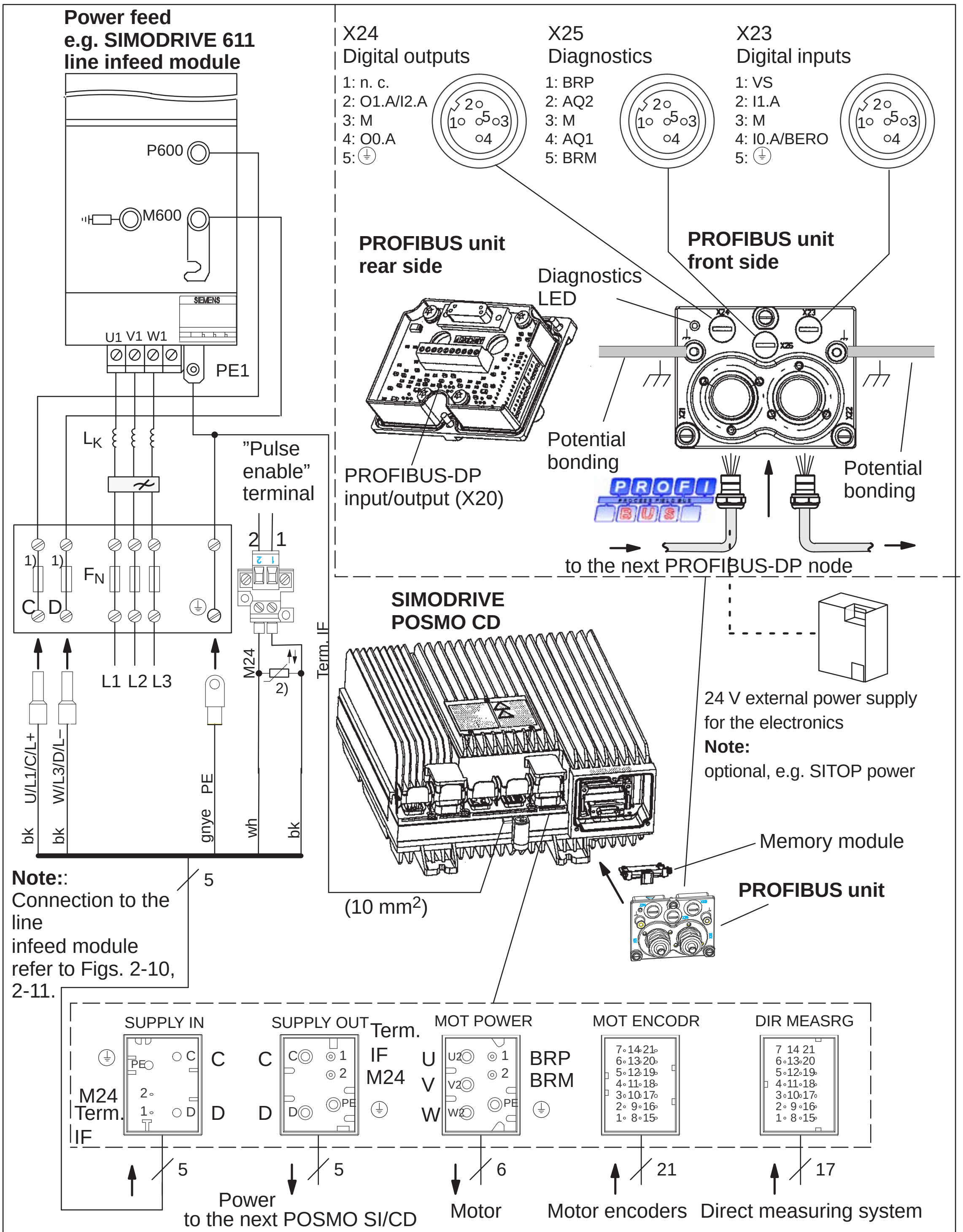
<table>
<tr><th>Connector
Designation</th><th>Function</th><th>Type 1)</th><th>Technical data</th></tr>
<tr><td></td><td colspan="3">”Pulse enable” terminal (terminal IF)
Note:
Additional connection conditions (refer to Fig. 2-16):
• Interference suppression filter
An interference suppression filter, which is connected with PE using a short connecting cable (<15 cm) must be used to increase the immunity against transient interference and disturbances (burst).
The interference suppression filter is provided with the unit.
Dimensions: w x h x d [mm] 22.5 x 75 x 55; can be mounted on the TS35 mounting rail</td></tr>
<tr><td>SUPPLY OUT</td><td>Power output</td><td></td><td>Pre-assembled cable to connect to additional POSMO SI (Order No.):
• 6FX1002–5DA05–1□□□ or
• 6FX1002–5DA35–1□□□
Pre-assembled cable for connecting to an additional POSMO SI or POSMO CD (Order No.):
• 6FX1002–5DA15–1□□□ or
• 6FX1002–5DA25–1□□□</td></tr>
<tr><td>C</td><td>DC link voltage P600</td><td>S</td><td rowspan="6">The DC link voltage, protective conductor and ”pulse enable” terminal are connected to the next POSMO SI/CD.
Important!
For the last node, the cover must remain on the SUPPLY OUT connector in order to guarantee the degree of protection!</td></tr>
<tr><td>D</td><td>DC link voltage M600</td><td>S</td></tr>
<tr><td>⏚</td><td>Protective conductor PE</td><td>S</td></tr>
<tr><td>–</td><td>Free</td><td></td></tr>
<tr><td>1</td><td>”Pulse enable” terminal (terminal IF)</td><td>O</td></tr>
<tr><td>2</td><td>Reference potential for terminal IF (M24)</td><td>S</td></tr>
<tr><td></td><td colspan="3">Warning:
The DC link coupling has a safety protective interlocking function that is intended to provide protection against residual voltages. This can only be opened by qualified personnel using a suitable tool, e.g. screwdriver. The DC link coupling may only be withdrawn at the earliest 4 min after the power supply voltage has been powered down!</td></tr>
</table>

1) S: Supply; O: Output;

Reader’s note

For a description of the interfaces of the PROFIBUS unit and its wiring, refer to Chapter 2.4.3.

2.3.4 Connection diagram, POSMO CD



1) Engineering information/instructions for fusing/protection, refer to Chapter 2.2.4.
2) Varistor (for data on this, refer to Table 2-13)
3) Secure the PROFIBUS unit with screws only when it has been applied in parallel to the housing and inserted!

Fig. 2-17 Connection diagram, POSMO CD

2.3.5 Assignment, DC link coupling with safety protective interlocking and connector POSMO CD

Power connection

Table 2-13 Connecting the POSMO CD to the power supply

<table>
<tr><th>Connector Designation</th><th>Function</th><th>Type 1)</th><th>Technical data</th></tr>
<tr><td>SUPPLY IN</td><td>Power input</td><td></td><td>Pre-assembled cable for wiring (Order No.):
• 6FX1002–5DA65–1□□□</td></tr>
<tr><td>C</td><td>DC link voltage P600</td><td>S</td><td rowspan="2">Permissible DC link voltage range
400 V...750 V DC</td></tr>
<tr><td>D</td><td>DC link voltage M600</td><td>S</td></tr>
<tr><td></td><td colspan="3">Note:
A 24 V voltage (1P24) ±2% with protective separation is generated from the DC link voltage. The following devices are connected to this voltage:
• The motor brake
• The digital outputs
• Supply for digital inputs (e.g. for BERO)
DC link connection:
• At SIMODRIVE 611, refer to Fig. 2-10 and 2-16
• At MASTERDRIVES, refer to Fig. 2-11 and Catalog DA 65.10
Warning:
The DC link coupling has a safety protective interlocking function that is intended to provide protection against residual voltages. This can only be opened by qualified personnel using a suitable tool, e.g. screwdriver. The DC link coupling may only be withdrawn at the earliest 4 min after the power supply voltage has been powered down!</td></tr>
<tr><td>⏚</td><td>Protective conductor PE</td><td>S</td><td></td></tr>
<tr><td>–</td><td>Free</td><td></td><td></td></tr>
<tr><td>1</td><td>”Pulse enable” terminal (terminal IF)</td><td>I</td><td rowspan="2">Voltage tolerance (including ripple): 21 V...30 V
Current drain, typical: 1.4 mA at 24 V
max: 2.0 mA at 30 V</td></tr>
<tr><td>2</td><td>Reference potential for terminal IF (M24)</td><td>S</td></tr>
<tr><td></td><td colspan="3">Note:
The ”pulse enable” terminal acts on all of the axes operated on a line. The pulse for specific axes are enabled using terminal IF and the PROFIBUS control word STW1.1 and STW1.3.
Connection conditions (refer to Fig. 2-17):
• Connect-up terminal IF (e.g. 24 V at 1; 0 V at 2)
• Varistor:
To maintain the limit values according to EN 61000–6–2 (cable lengths > 30 m), the SIOV–S20–K25 Varistor from EPCOS must be used between these terminals.</td></tr>
</table>

1) I: Input; S: Supply

Table 2-13 Connecting the POSMO CD to the power supply, continued

Connector Designation	Function	Type 1)	Technical data
SUPPLY OUT	**Power output**		Pre-assembled cable to connect to additional POSMO SI (Order No.): • 6FX1002–5DA35–1□□□ to additional POSMO SI or POSMO CD: • 6FX1002–5DA15–1□□□
C	DC link voltage P600	S	The DC link voltage, protective conductor and ”pulse enable” terminal are connected to the next POSMO SI/CD. **Important!** For the last node, the cover must remain on the SUPPLY OUT connector in order to guarantee the degree of protection!
D	DC link voltage M600	S	
⏚	Protective conductor PE	S	
–	Free		
1	”Pulse enable” terminal (terminal IF)	O	
2	Reference potential for terminal IF (M24)	S	
	Warning: The DC link coupling has a safety protective interlocking function that is intended to provide protection against residual voltages. This can only be opened by qualified personnel using a suitable tool, e.g. screwdriver. The DC link coupling may only be withdrawn at the earliest 4 min after the power supply voltage has been powered down!		

1) S: Supply; O: Output

Motor connection

Table 2-14 Wiring, motor connection POSMO CD

Connector Designation	Function	Type 1)	Technical data
MOT POWER	**Motor output**		Pre-assembled cable for wiring (Order No.): • 1FT6/1FK motor – 6FX1002–5DA01–1□□□ – 6FX1002–5DA02–1□□□ – 6FX1002–5DA03–1□□□ – 6FX1002–5DA85–1□□□ • Terminal box connection, 1PH motor – 6FX1002–5CA16–1□□□ – 6FX1002–5CA23–1□□□ – 6FX1002–5CA31–1□□□ – 6FX1002–5CA32–1□□□ • Connection 1FN motor, see Information Chapter 2.2.6 **Information regarding the ”brake” output** Voltage tolerance: 22.8...25.2 V Max. output current: 1.4 A
U2	Motor voltage U	O	
V2	Motor voltage V	O	
W2	Motor voltage W	O	
⏚	Protective conductor PE	S	
1	Brake + (BRP)	O	
2	Brake – (BRM)	O	

1) S: Supply; O: Output

Connection, measuring systems

Reader's note

Reference: /PJU/ SIMODRIVE 611
Configuration Manual, Drive Converters
Chapter "Indirect and direct position sensing"

Table 2-15 Connecting-up the POSMO CD measuring system

Connector Designation/ pin	Function	Type 1)	Technical data
MOT ENCODR	**Indirect measuring system**	I	Pre-assembled cable for wiring (Order No.): • 6FX1002–2AA60–1□□□ (incremental) or • 6FX1002–2AA70–1□□□ (absolute, EnDat) **Encoder limiting frequency:** Encoder with sin/cos 1Vpp: 350 kHz
1	PENC0		Encoder power supply, indirect measuring system
2	PSENSE0		Sense line, indirect measuring system
3	M		Power supply ground
4	MSENSE0		Sense line, indirect measuring system
5	AP0		Track A, indirect measuring system
6	AN0		Track *A, indirect measuring system inverse to A
7	BP0		Track B, indirect measuring system
8	BN0		Track *B, indirect measuring system inverse to B
9	CP0		Track C, indirect measuring system
10	CN0		Track *C, indirect measuring system inverse to C
11	DP0		Track D, indirect measuring system
12	DN0		Track *D, indirect measuring system inverse to D
13	RP0		Track R, indirect measuring system
14	RN0		Track *R, indirect measuring system inverse to R
15	ENDATCL0		Endat interface, clock indirect measuring system
16	XENDATCL0		Endat interface, clock indirect measuring system
17	ENDATDA0		Endat interface, data indirect measuring system
18	XENDATDA0		Endat interface, data indirect measuring system
19	SHIELD0		Shield connection, data indirect measuring system
20	TEMPP		Temperature sensor, motor
21	TEMPM		Temperature sensor, motor

1) I: Input

Table 2-15 Connecting-up the POSMO CD measuring system, continued

Connector Designation/ pin	Function	Type 1)	Technical data
DIR MEASRG	**Direct measuring system**	I	Pre-assembled cable for wiring (Order No.): • 6FX1002–2AA10–1□□□ (incremental) or • 6FX1002–2AA30–1□□□ (absolute, EnDat) **Encoder limiting frequency:** Encoder with sin/cos 1Vpp: 350 kHz
1	PENC1		Encoder power supply, direct measuring system
2	PSENSE1		Sense line, direct measuring system
3	M		Power supply ground
4	MSENSE1		Sense line, direct measuring system
5	AP1		Track A, direct measuring system
6	AN1		Track *A, direct measuring system inverse to A
7	BP1		Track B, direct measuring system
8	BN1		Track *B, direct measuring system inverse to B
9	RP1		Track R, direct measuring system
10	RN1		Track *R, direct measuring system inverse to R
11	ENDATCL1		Endat interface, clock direct measuring system
12	XENDATCL1		Endat interface, clock direct measuring system
13	ENDATDA1		Endat interface, data direct measuring system
14	XENDATDA1		Endat interface, data direct measuring system
15	SHIELD1		Shield connection, data direct measuring system
16	Reserved		
17	PENC2 (+24 V)		Encoder power supply
Important! The cover must remain on connector DIR MEASRG in order to guarantee the degree of protection, if a direct measuring system is not connected!			

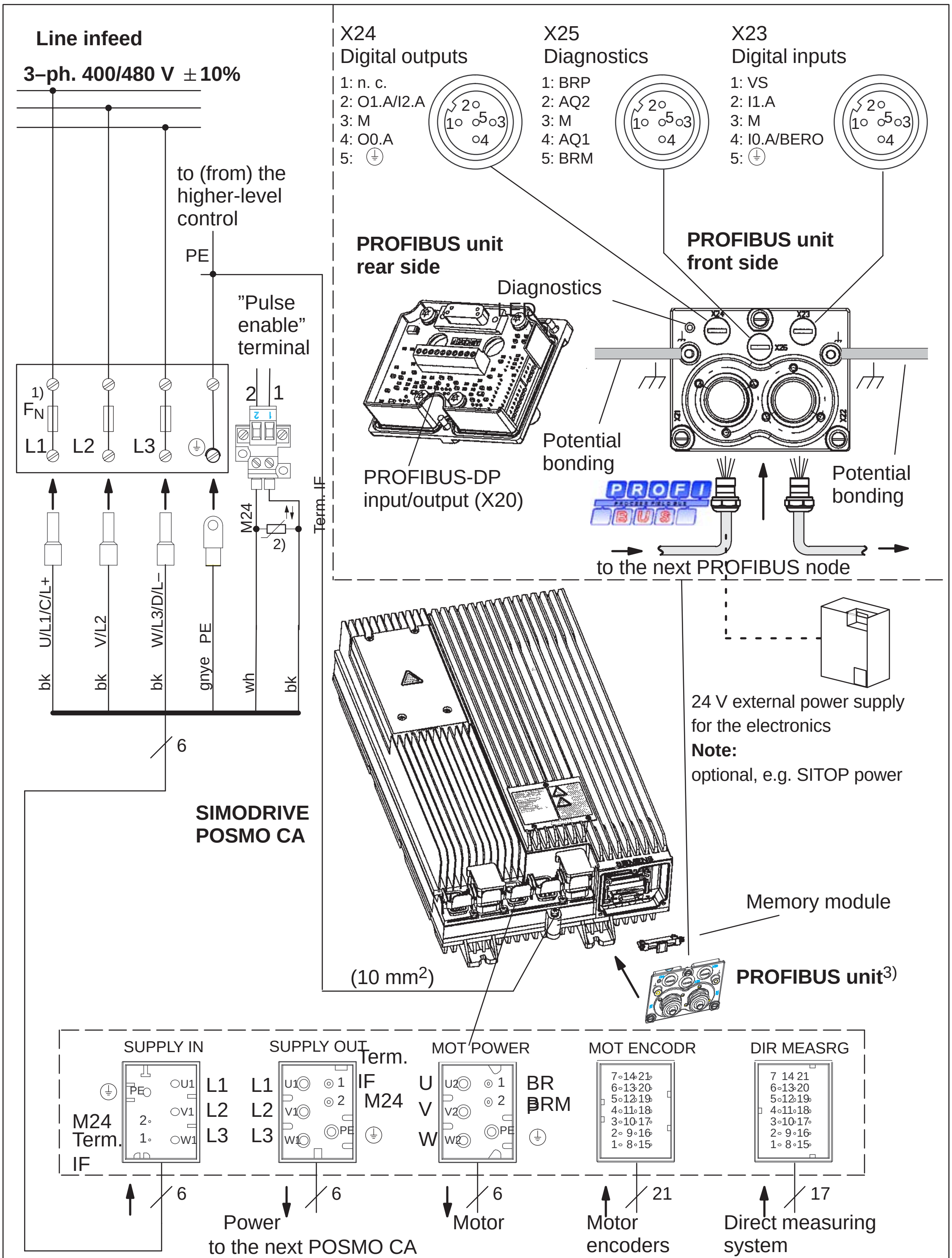
1) I: Input

PROFIBUS unit

Reader's note

For a description of the interfaces of the PROFIBUS unit and its wiring, refer to Chapter 2.4.3.

2.3.6 Connection diagram, POSMO CA



1) Engineering information/instructions for fusing/protection, refer to Chapter 2.2.5.
2) Varistor (for data on this, refer to Table 2-16)
3) Secure the PROFIBUS unit with screws only when it has been applied in parallel to the housing and inserted!

Fig. 2-18 Connection diagram, POSMO CA

2.3.7 Assignment, line supply coupling with safety protective interlocking and connector POSMO CA

Power connection

Table 2-16 Connecting the POSMO CA to the power supply

<table>
<tr><th>Connector
Designation</th><th>Function</th><th>Type 1)</th><th>Technical data</th></tr>
<tr><td>SUPPLY IN</td><td>Power input</td><td></td><td>Pre-assembled cable for wiring (Order No.):
• 6FX1002–5DA75–1□□□</td></tr>
<tr><td>L1</td><td>Line voltage</td><td>S</td><td rowspan="3">Line supply voltage: (3–ph. 400/480 V AC) ±10%</td></tr>
<tr><td>L2</td><td>Line voltage</td><td>S</td></tr>
<tr><td>L3</td><td>Line voltage</td><td>S</td></tr>
<tr><td>⏚</td><td>Protective conductor PE</td><td>S</td><td></td></tr>
<tr><td>1</td><td>”Pulse enable” terminal (terminal IF)</td><td>I</td><td rowspan="2">Voltage tolerance
(including ripple): 21 V...30 V
Current drain, typical:1.4 mA at 24 V
max: 2.0 mA at 30 V</td></tr>
<tr><td>2</td><td>Reference potential for terminal IF (M24)</td><td>S</td></tr>
<tr><td></td><td colspan="3">Note:
The ”pulse enable” terminal acts on all of the axes operated on a line. The pulse for specific axes are enabled using terminal IF and the PROFIBUS control word STW1.1 and STW1.3.
Connection conditions (refer to Fig. 2-18):
• Connect-up terminal IF (e.g. 24 V at 1; 0 V at 2)
• Varistor:
To maintain the limit values according to EN 61000–6–2 (cable lengths > 30 m), the SIOV–S20–K25 Varistor from EPCOS must be used between these terminals.
Note:
A 24 V voltage (1P24) ±2% with protective separation is generated from the internal DC link voltage. The following devices are connected to this voltage:
• The motor brake
• The digital outputs
• Supply for digital inputs (e.g. for BERO)</td></tr>
</table>

1) I: Input; S: Supply

Table 2-16 Connecting the POSMO CA to the power supply, continued

Connector Designation	Function	Type 1)	Technical data
SUPPLY OUT	**Power output**		Pre-assembled cable to connect to additional POSMO CA (Order No.): • 6FX1002–5DA45–1□□□
L1	Line voltage	S	The line supply voltage, protective conductor and ”pulse enable” terminal are connected to the next POSMO CA. **Important!** For the last node, the cover must remain on the SUPPLY OUT connector in order to guarantee the degree of protection!
L2	Line voltage	S	
L3	Line voltage	S	
⏚	Protective conductor PE	S	
–	Free		
1	”Pulse enable” terminal (terminal IF)	O	
2	Reference potential for terminal IF (M24)	S	
	Warning: The line supply coupling has a safety protective interlocking function that is intended to provide protection against residual voltages. This can only be opened by qualified personnel using a suitable tool, e.g. screwdriver. The line supply coupling may only be withdrawn at the earliest 4 minutes after powering down the power supply voltage!		

1) S: Supply; O: Output

Motor connection

Table 2-17 Connecting POSMO CA to the motor

Connector Designation/ pin	Function	Type 1)	Technical data
MOT POWER	**Motor output**		Pre-assembled cable for wiring (Order No.): • 1FT6/1FK motor – 6FX1002–5DA01–1□□□ – 6FX1002–5DA02–1□□□ – 6FX1002–5DA03–1□□□ – 6FX1002–5DA85–1□□□ • Terminal box connection, 1PH motor – 6FX1002–5CA16–1□□□ – 6FX1002–5CA23–1□□□ – 6FX1002–5CA31–1□□□ – 6FX1002–5CA32–1□□□ • Connection 1FN motor, see Information Chapter 2.2.6 **Information regarding the ”brake” output** Voltage tolerance: 22.8...25.2 V Max. output current: 1.4 A
U	Motor voltage U	O	
V	Motor voltage V	O	
W	Motor voltage W	O	
⏚	Protective conductor PE	S	
1	Brake + (BRP)	O	
2	Brake – (BRM)	O	

1) S: Supply; O: Output

Connection, measuring systems

Reader’s note

Reference: /PJU/ SIMODRIVE 611
Configuration Manual, Drive Converters
Chapter ”Indirect and direct position sensing”

Table 2-18 Connecting POSMO CA to the measuring system

Connector Designation/ pin	Function	Type 1)	Technical data
MOT ENCODR	**Indirect measuring system**	I	Connector type: 21–pin plug connector **Encoder limiting frequency:** Encoder with sin/cos 1Vpp: 350 kHz
1	PENC0		Encoder power supply, indirect measuring system
2	PSENSE0		Sense line, indirect measuring system
3	M		Power supply ground
4	MSENSE0		Sense line, indirect measuring system
5	AP0		Track A, indirect measuring system
6	AN0		Track *A, indirect measuring system inverse to A
7	BP0		Track B, indirect measuring system
8	BN0		Track *B, indirect measuring system inverse to B
9	CP0		Track C, indirect measuring system
10	CN0		Track *C, indirect measuring system inverse to C
11	DP0		Track D, indirect measuring system
12	DN0		Track *D, indirect measuring system inverse to D
13	RP0		Track R, indirect measuring system
14	RN0		Track *R, indirect measuring system inverse to R
15	ENDATCL0		Endat interface, clock indirect measuring system
16	XENDATCL0		Endat interface, clock indirect measuring system
17	ENDATDA0		Endat interface, data indirect measuring system
18	XENDATDA0		Endat interface, data indirect measuring system
19	SHIELD0		Shield connection, data indirect measuring system
20	TEMPP		Temperature sensor, motor
21	TEMPM		Temperature sensor, motor

1) I: Input

Table 2-18 Connecting POSMO CA to the measuring system, continued

Connector Designation/ pin	Function	Type 1)	Technical data
DIR MEASRG	**Direct measuring system**	I	Connector type: 17–pin plug connector **Encoder limiting frequency:** Encoder with sin/cos 1Vpp: 350 kHz
1	PENC1		Encoder power supply, direct measuring system
2	PSENSE1		Sense line, direct measuring system
3	M		Power supply ground
4	MSENSE1		Sense line, direct measuring system
5	AP1		Track A, direct measuring system
6	AN1		Track *A, direct measuring system inverse to A
7	BP1		Track B, direct measuring system
8	BN1		Track *B, direct measuring system inverse to B
9	RP1		Track R, direct measuring system
10	RN1		Track *R, direct measuring system inverse to R
11	ENDATCL1		Endat interface, clock direct measuring system
12	XENDATCL1		Endat interface, clock direct measuring system
13	ENDATDA1		Endat interface, data direct measuring system
14	XENDATDA1		Endat interface, data direct measuring system
15	SHIELD1		Shield connection, data direct measuring system
16	Reserved		
17	PENC2 (+24 V)		Encoder power supply
Important! The cover must remain on connector DIR MEASRG in order to guarantee the degree of protection, if a direct measuring system is not connected!			

1) I: Input

PROFIBUS unit

Reader's note

For a description of the interfaces of the PROFIBUS unit and its wiring, refer to Chapter 2.4.3.

2.4 Connecting-up the PROFIBUS unit

2.4.1 General information

Note

For POSMO SI, POSMO CD and POSMO CA, the same PROFIBUS unit is used!

Design

- The PROFIBUS signals and I/O signals are connected at the PROFIBUS unit.
- PROFIBUS-DP should be connected to the screw terminal strip X20 either using the metallic M20 gland (union nut) provided with integrated shield connection or using the pre-assembled cable including flange-mounted PG (refer to Chapter 2.4.4).
- If communications are to be maintained even when the power supply is powered down, then 24 V must be additionally input. In this case, a PROFIBUS cable with supplementary conductors (SIMATIC ET200X accessories) should be used.
- The digital input signals are connected to X23 and the digital output signals to X24. From SW 4.1, digital output 2 can be optionally parameterized as digital input 3.
- Diagnostic signals are fed to connector X25.
- Connectors X23...X25 use the M12 connector system, and when supplied, are provided with covers.

T functionality

The PROFIBUS unit is designed, so that when the PROFIBUS unit is withdrawn, the PROFIBUS segment can still function.

Warning

It is only permissible to ”withdraw” or ”insert” the PROFIBUS unit after the power has been disconnected!

Y connector element

If input or output signals are to be fed from or to different locations at connector X23 or distributed from connector X24, then these signals can be split up into individual signal cables via a Y connector element (wiring, see Fig. 2-21).

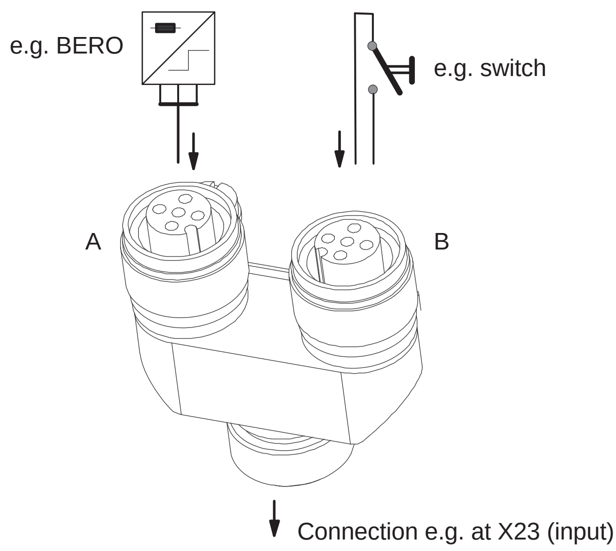


Fig. 2-19 Y connecting element M12, 5 pole (Order No. 6ES7 194–1KA01–0XA0)

Reader's note

The Y connector element is not part of the PROFIBUS unit.
For a description, refer to

Reference: SIMATIC, Distributed Peripheral Device ET 200X
EWA 4NEB 780 6016–01 04

Note: This literature is part of the documentation package with Order No. 6ES7 198–8FA01–8AA0

PROFIBUS cabling

!

Important

Connect the cable shield at each bus node to ground through the largest possible surface area (at POSMO SI/CD/CA in the metal M20 gland or flange-mounted PG).

Recommendation: Route the potential bonding conductor in parallel to the PROFIBUS cable (cable cross-rection, 4 to 16 mm^2). There are 2 M5 threads available on the PROFIBUS unit (see Fig. 2-20).

When using connector couplings for PROFIBUS-DP, perfect functioning is no longer guaranteed at higher data transfer rates (> 1.5 Mbaud) (due to cable reflection).

Optional 24 V electronics power supply

If bus communications and position sensing are to remain active even with the load power supply powered-down, then an optional electronics power supply can be used, e.g. SITOP power (24 V ± 20 %). The power supply cables are routed, non-rhielded in the PROFIBUS cable and may only be used for this particular application.

For additional, external 24 V units, a separate power supply cable must be used!

The maximum cable length for an external 24 V supply is determined by the following limitations:

- Maximum current
  - Typical current drain for each POSMO SI/CD/CA from the external 24 V: 600 mA
  - Current load carrying capacity of the 0.75 mm^2- cable (acc. to IEC 60364–5–52, 40 °-C, B1): 7.6 A
- Voltage drop along the cable
  - SITOP power: 24 V typ., POSMO SI/CD/CA 19 V min
    ⇒ 5 V voltage drop

The following cable lengths may not be exceeded:

- Max. overall cable length: 100 m

Limitations:

- For >4 units, the maximum cable length is
  L = 400/x.

  L = Total cable length

  x = No. of drives connected to the cable
- Max. POSMO SI/CD/CA on a 24 V line: 10
  UL systems: 5

24 V DC, which is generally used in machinery construction, can be used for the power supply.

Note

- The optional 24 V electronics power supply does not supply the digital inputs/outputs and the brake.
- In order to increase the immunity against transient interference and disturbances (burst) and to maintain the limit values of EN 61000–6–2, an interference suppression filter should be connected at the shielded cable entry point using a short connection (<15 cm) with respect to PE (refer to Fig. 2-20).
- The interference suppression filter can be ordered with SIEMENS Order No. 6SN2414–2TX00–0AA1. Dimensions:
  w x h x d [mm] 22.5 x 75 x 55; can be mounted on the TS35 mounting rail

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Recommended for the optional power supply:

Use the regulated SITOP power supply module

Reference: /SITOP/ Catalog, SITOP power
Regulated power supply module

Grounding, optional 24 V electronics power supply

Ground the 24 V electronics power supply on the secondary side in the cabinet.

2.4.2 Connection and wiring overview

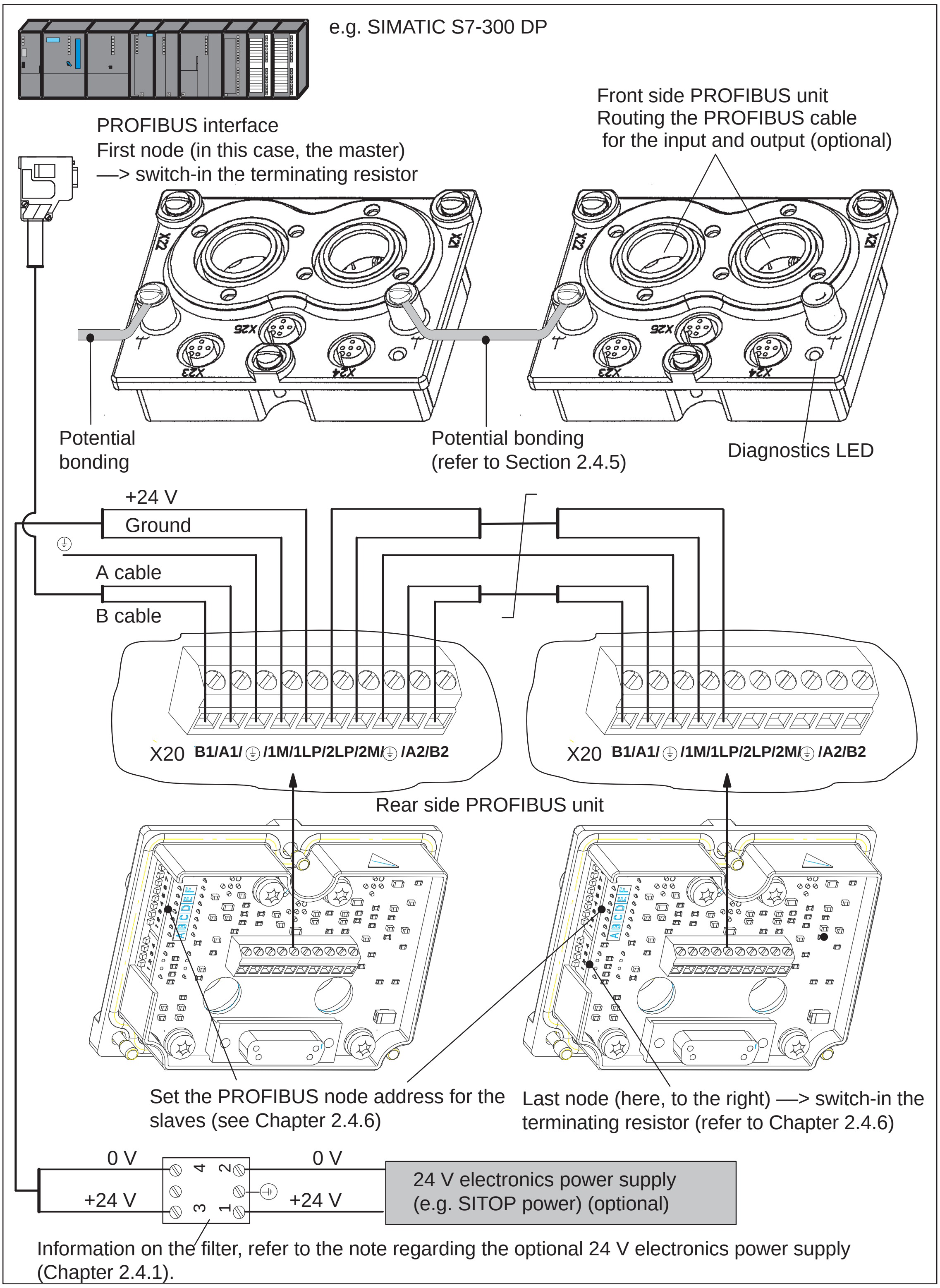


Fig. 2-20 Connection and wiring overview, PROFIBUS cable (example with additional electronics power supply)

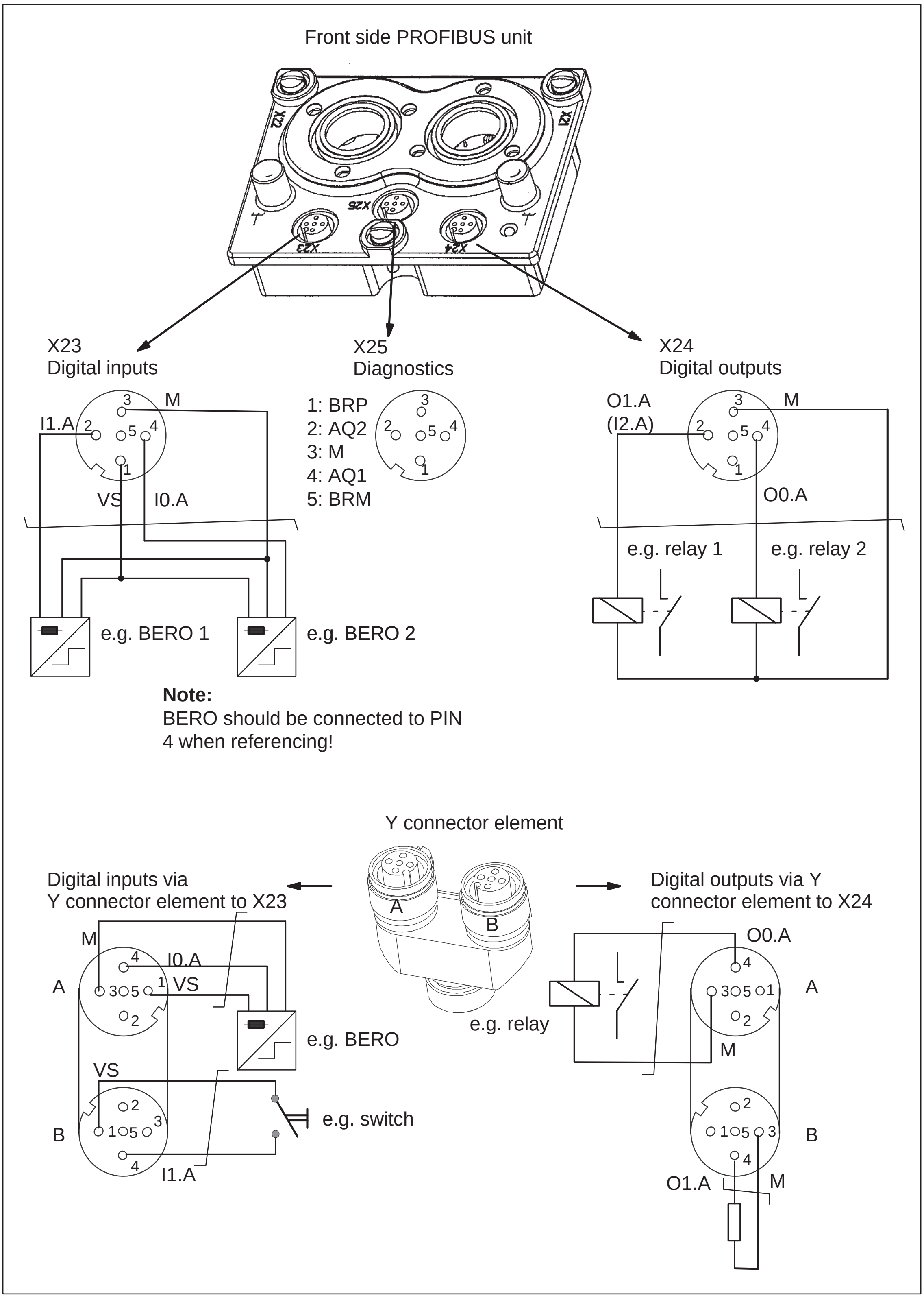


Fig. 2-21 Connection and wiring overview, M12 connector (example)

2.4.3 Terminal assignment

Table 2-19 Connecting-up the PROFIBUS unit

Terminal Designation	Terminal No.	Function	Type 1)	Technical data
PROFIBUS connection Cu PG (X20)				
X20		**PROFIBUS input**		Connector type: Screw terminal strip (X20) **Note:** • Pre-assembled cable for the wiring including flange–mounted PG at both ends (Order No.): – 5-conductor: 6FX1002–1AA00–1□□□ 6) – 2-conductor: 6FX1002–4EA00–1□□□ 6) • Pre-assembled cable for the wiring including flange–mounted PG at one end (Order No.): – 5-conductor: 6FX1002–1AA01–1□□□ 6) – 2-conductor: 6FX1002–4EA01–1□□□ 6) • Non–pre-assembled cable for connecting with an M20 gland: refer to cable assembly, Chapter 2.4.4. • The PROFIBUS cable should be assembled according to Chapter 2.4.4 and the cable conductors connected to X20. Note: Screwdriver for terminals (slotted screw) —> size 0 (0.4x2.5) —> tightening torque 0.22–0.25 Nm. • The cover must remain inserted at the last PROFIBUS node (station) in order to ensure the degree of protection! • 24 V input (optional, refer to Fig. 2-20): – In order to increase the immunity against transient interference and disturbances (burst) and to maintain the limit values of EN 61000–4–5, an interference suppression filter should be connected at the shielded cable entry point using a short connection (<15 cm) with respect to PE. – In addition to the necessary 5-conductor cable, an EMC set (Order No. 6SN2414–2TX00–0AA1), comprising interference suppression filter and installation instructions, must be ordered. Dimensions: w x h x d [mm] 22.5 x 75 x 55; can be mounted on the TS35 mounting rail
B1		B cable PROFIBUS	I	
A1		A cable PROFIBUS	I	
⏚		Protective conductor	S	
1M		Ground, 24 V input	S	
1LP		+24 V input	S	
		PROFIBUS output		
2LP		+24 V output	S	
2M		Ground, 24 V output	S	
⏚		Protective conductor	S	
A2		A cable PROFIBUS	O	
B2		B cable PROFIBUS	O	

Table 2-19 Connecting-up the PROFIBUS unit, continued

Terminal: Designation	Terminal: No.	Function	Type 1)	Technical data
Connection, digital inputs and supply (X23)				
	X23			Connector type: 5–pin M12 connector Signal cable: 5-conductor with conductor cross-rection $\leq$0.75 mm²
I0.A	X23.4	Digital input 1 2) Fast input 3) e.g. for BERO equivalent zero mark, external block change,	DI	Voltage: 24 V Current drain, typical: 6 mA at 24 V Reference potential: X23.3 Signal level (incl. ripple) High signal level: 15 V...30 V Low signal level: –3 V...5 V Signal run time for I0.A: typical 500 µs **Note:** • Parameterization of the input terminals and the standard assignment is described in Chapter 6.4.1. • An open-circuit input is interpreted as 0 signal.
I1.A	X23.2	Digital input 2 2)	DI	
VS	X23.1	+24 V	S	Voltage range: 24 V $\pm$2% (short-circuit proof) Current load: max. 100 mA **Note:** This voltage can be used to supply an external BERO.
M	X23.3	Ground, 24 V input	S	
⏚	X23.5	Protective conductor	S	not used
Connection, digital outputs and supply (X24)				
	X24			Connector type: 5–pin M12 connector Signal cable: 5-conductor with conductor cross-rection $\leq$0.75 mm²
O0.A	X24.4	Digital output 1	DO	Rated current per output: 100 mA short-circuit proof Reference potential: X24.3 **Note:** Parameterization of the output terminals as well as the standard assignment is described in Chapter 6.4.3. From SW 4.1, digital output 2 can also be optionally parameterized as digital input 3 (I2.A) (P0677 = 1).
O1.A (I2.A)	X24.2	Digital output 2 (digital input 3, from SW 4.1)	DO DI	
n.c.	X24.1	Not assigned		
M	X24.3	Ground, 24 V	S	
⏚	X24.5	Protective conductor	S	

Table 2-19 Connecting-up the PROFIBUS unit, continued

Terminal		Function	Type 1)	Technical data
Designation	No.			
Connection, diagnostics D/A converter and external brake control (X25)				
	X25			Connector type: 5–pin M12 connector Signal cable: 5-conductor with conductor cross-rection $\leq$0.75 mm^2
AQ1	X25.4	Diagnostics output 1[4)] (test socket 1)	AO	Resolution: 8 bit Voltage range: 0 V...5 V Maximum current: 3 mA No electrical isolation: Reference is X25.3 **Note:** Commissioning functions, see Chapter 7.3
AQ2	X25.2	Diagnostics output 2[4)] (test socket 2)	AO	
BRP	X25.1	Brake signal BRP	I	**Note:** The motor holding brake can be released for service work using an external 24 V power supply at BRP/BRM (refer to Chapter 6.5). Voltage: 24 V $\pm$10% Current drain: 1.3 A at 24 V (max)[5)]
M	X25.3	Ground, 24 V	S	
BRM	X25.5	Brake signal BRM	I	

1) I: Input; DI: Digital input; DO: Digital output; AO: Analog output;
S: Supply; O: Output
2) Can be freely parameterized
All of the digital inputs are de-bounced per software. The signal recognition results in a delay time of interpolation clock cycles (P1010).
3) I0.A is hardwired internally to the position sensing function where it acts almost instantaneously.
4) Can be freely parameterized
The digital outputs are updated in the interpolation clock cycle (P1010). This is supplemented by a hardware-related delay time of approx. 200 µs.
5) Dependent on the brake type
6) Lengths, analog to the data in Catalog NC60

Reader's note

Additional information on how to configure a PROFIBUS-DP network is included in:

Reference: /IKPI/ Catalog IK PI • 2005
Industrial communications and field devices

2.4.4 Assembly

General information

The PROFIBUS unit is mounted onto POSMO SI, POSMO CD or POSMO CA.

It must be removed when

- Connecting the PROFIBUS cable at X20,
- Setting the PROFIBUS address,
- Setting the terminating resistor at the last PROFIBUS node, and
- If the memory module has to be changed.

The PROFIBUS cable is connected via

- Flange–mounted PG (for pre-assembled cables, Order No., see Table 2-19) **or**
- M20 gland

at the screw terminal strip X20 (at the rear of the PROFIBUS unit).

Note

When supplied, the M20 gland and connectors X23...X25 are provided with covers.

In order to guarantee that degree of protection IP 65 is retained, the covers should only be removed at those locations where a signal cable is connected!

The following diagrams schematically show how the signal cables are connected to the PROFIBUS unit.

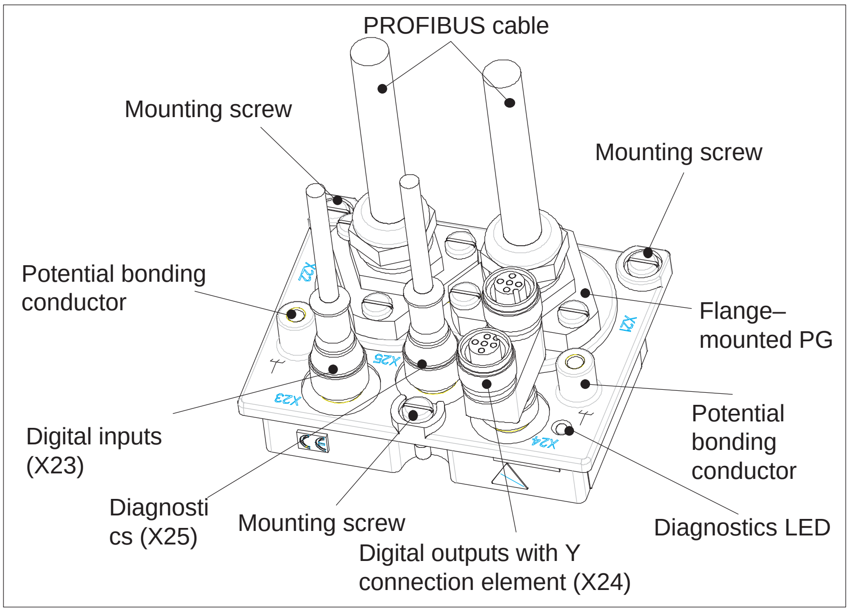
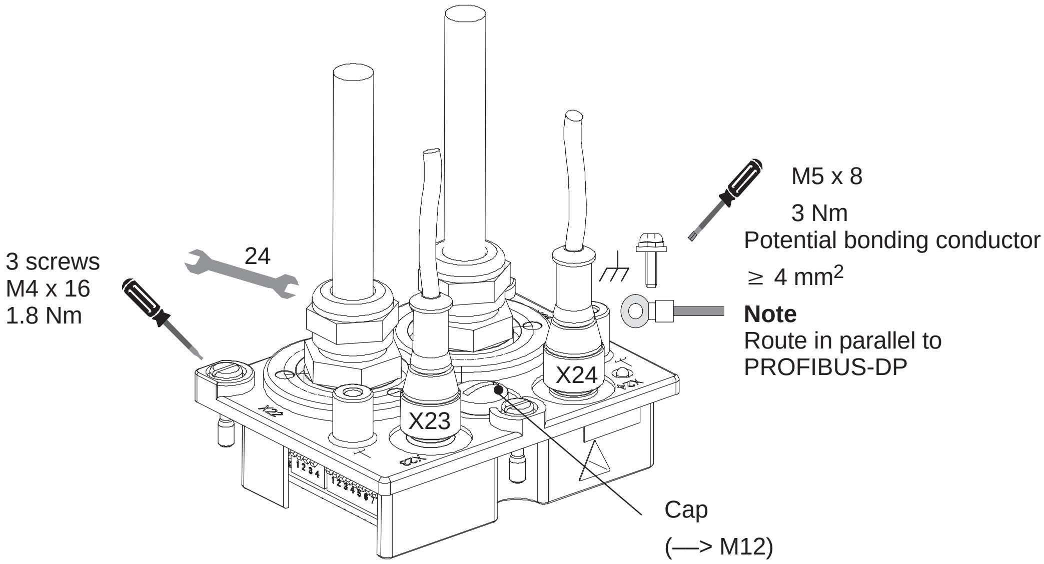


Fig. 2-22 Signal cable installation PROFIBUS unit, e.g. with a flange–mounted PG



Notice
When commissioning the PROFIBUS unit:
Completely screw-in the M12 connector
(screw-in depth 7 mm)

Fig. 2-23 Signal cable installation PROFIBUS unit, e.g. with an M20 gland

2

Mounting and installation steps

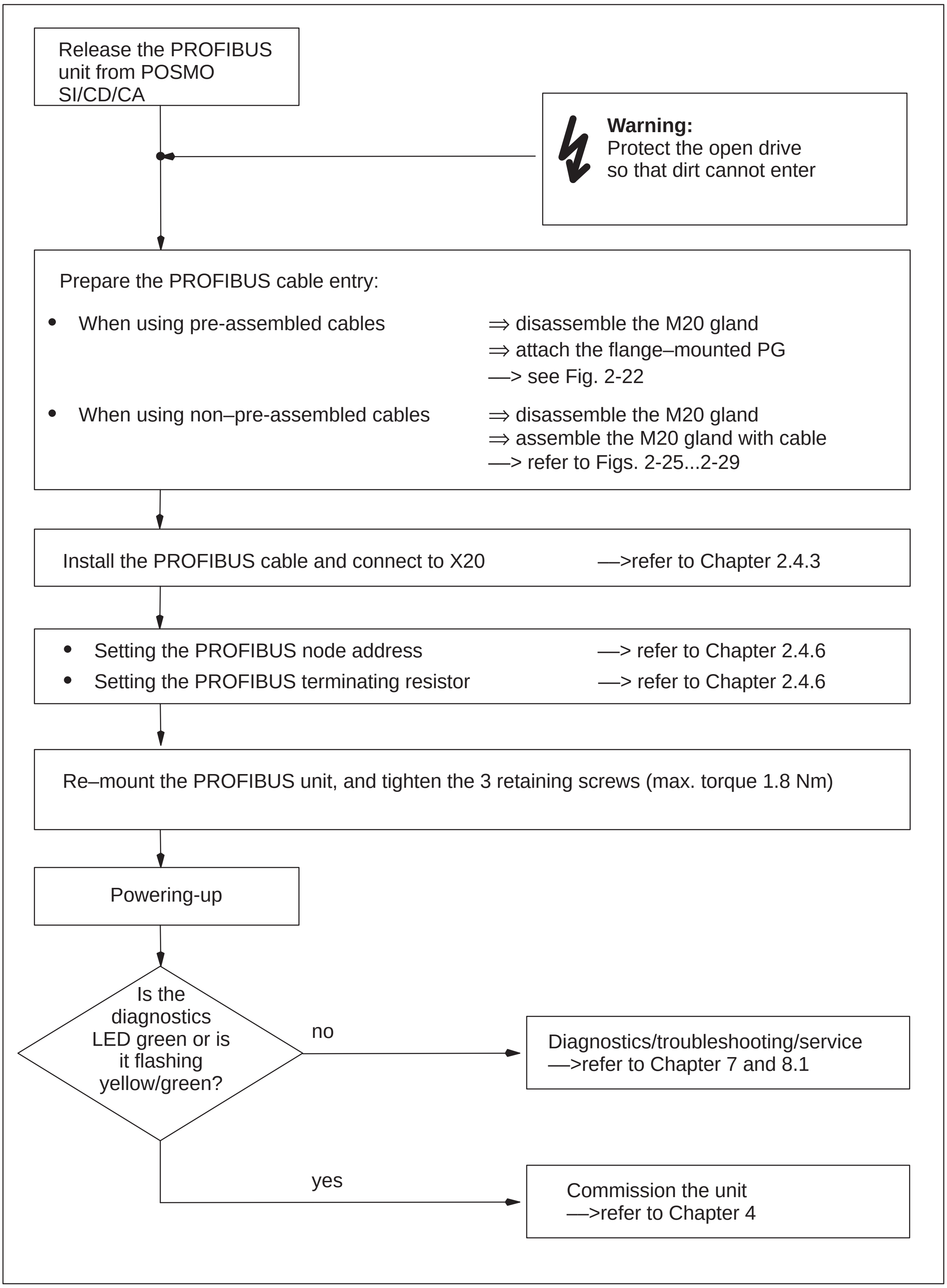


Fig. 2-24 Mounting and installation steps

2.4.5 Preparing the cables and installing

Procedure, assembling the cable with flange–mounted PG

If pre-assembled cables are used to connect-up PROFIBUS-DP, the flange–mounted PG (is supplied with the pre-assembled cable!) must be attached after removing the M20 gland.

The flange–mounted PG should be retained at the M20 thread with the three screws available at the flange–mounted PG (refer to Fig. 2-22).

Note

For screws: Tighten to
max. torque = 1.8 Nm

Preparing the PROFIBUS cable for M20 gland

Preparing the cable when connecting non pre-assembled cables:

Recommended sheath-rtripping tool: PROFIBUS FastConnect Stripping Tool (FCS) 6GK1905 6AA00

- **PROFIBUS cable, 2 conductor**
  2 x 0.35 mm^2, with shield

  Recommendation for 2-conductor cables sold by the meter:
  6XV1 830–3EH10

- **PROFIBUS cable, 5 conductor**
  2 x 0.35 mm^2, with shield → for PROFIBUS-DP +
  3 x 0.75 mm^2, without shield → for the electronics power supply

  Recommendation for 5-conductor cables sold by the meter:
  6ES7194–1LY00–0AA0

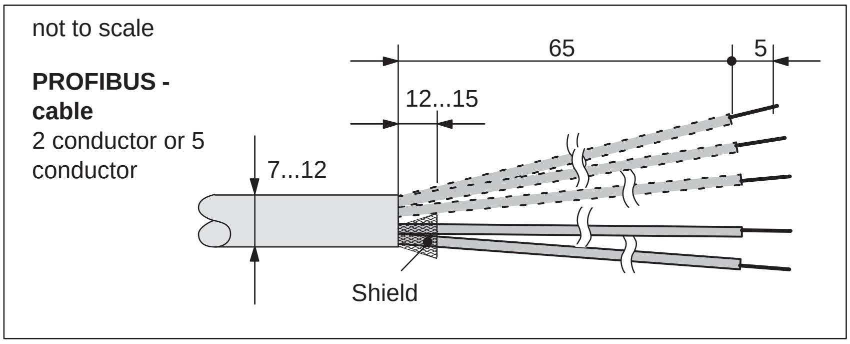


Fig. 2-25 Preparing PROFIBUS cable

Potential bonding cable

Cross-rection:	$\geq$ 4 mm^2
Thread:	M5 x 10, hole

Note:

Route the cable as parallel as possible to the PROFIBUS cable, as this enhances the PROFIBUS noise immunity.

Fig. 2-26 Potential bonding conductor

Example: Pre-assembled cable for M20 gland

The pre-assembled cable to connect-up PROFIBUS-DP is shown in the following diagram (5 conductor).

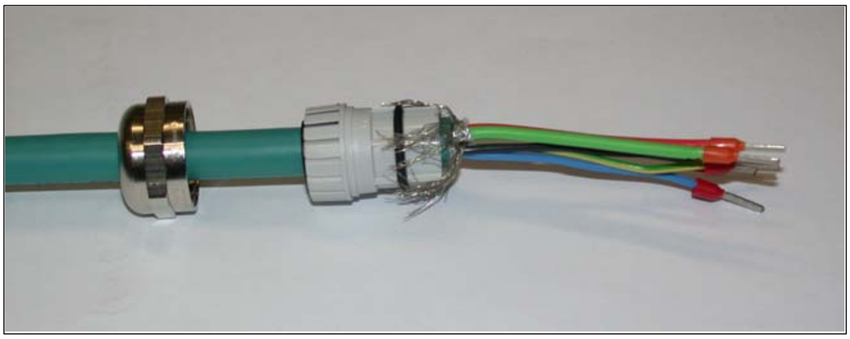


Fig. 2-27 Example: Prepared PROFIBUS cable

How are the prepared cables installed?

The following sequence should be observed when installing the prepared cable in the PROFIBUS unit (refer to Fig. 2-28):

1. Release the nut, cap and clamping insert/seal from the M20 gland.
2. Locate the nut and clamping insert/seal onto the cable.
3. Open-up the shield braiding (remove the insulating foil beneath it). The shield must cover the O-ring by approx. 2 mm. Cleanly cut-off any excessively long shield wires.
4. Assemble the nut with clamping insert/seal.
5. Insert in the M20 gland and tighten the nut.
6. Connect the ends of the cable to the rear of the PROFIBUS unit (X20).

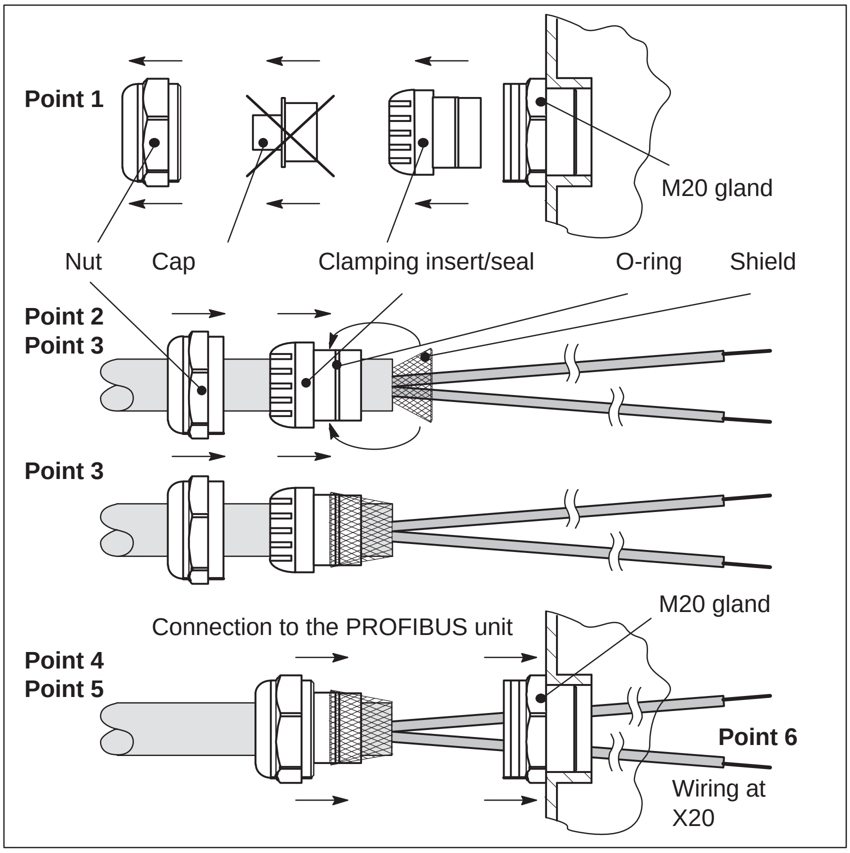


Fig. 2-28 How is the PROFIBUS cable attached?

Fig. 2-29 Example: M20 gland with all of the individual parts

Connections X23...X25

The following are required to connect the digital inputs (X23), the digital outputs (X24) and diagnostics (X25):

- One 5–pin M12 connector, which can be assembled
- Flexible 3, 4 or 5-conductor Cu cable, non-rhielded with a conductor cross-rection of $\leqslant 0.75\ mm^2$.

Note

When using a BERO, we recommend that a shielded cable and a 5–pin metal connector are used to increase the noise immunity.

The connector should be connected-up corresponding to the pin assignment of X23, X24 and X25 in Table 2-19.

We recommend the following connectors:

- Metal M12 coupling connector, 5 pin, can be assembled

  Order No.: 6SN2414–2RX00–0AA0

Note

All of the connectors or the covers must be inserted on X23, X24 and X25 so that the IP 65 degree of protection is guaranteed!

Example: PROFIBUS unit, installed

The following diagrams show a PROFIBUS unit which has been completely wired up:

- Front side —> refer to Fig. 2-30
- Rear side —> refer to Fig. 2-31

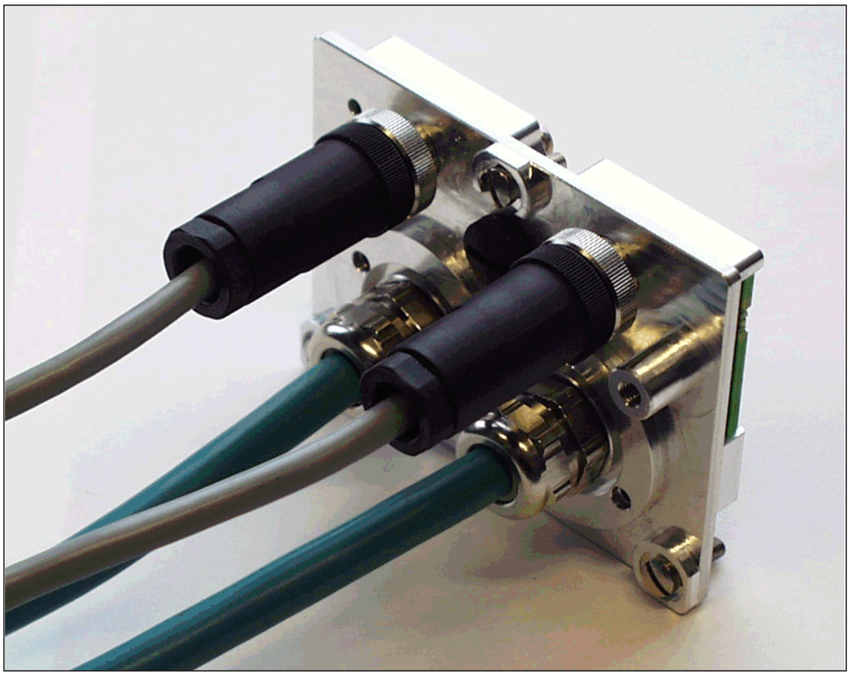


Fig. 2-30 PROFIBUS unit which has been connected up: Front view

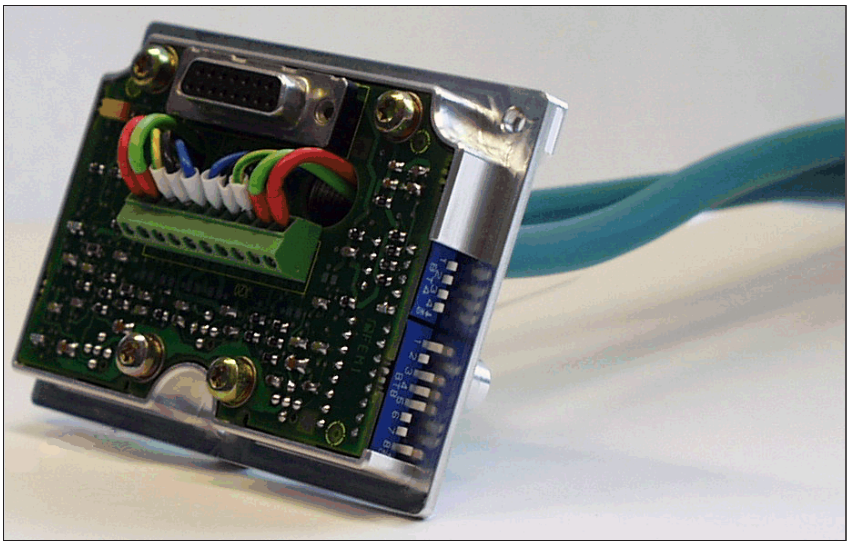


Fig. 2-31 PROFIBUS unit which has been connected up: Rear view

2.4.6 Address assignment and switching-in the terminating resistor

General information

Note

The PROFIBUS unit has to be disassembled to change the PROFIBUS address settings and the settings of the terminating resistor (refer to Chapter 2.4.4).

- If it must be possible to power down POSMO SI/CD/CA but still maintain PROFIBUS communications, then the following applies:
  - This ”DP slave POSMO SI/CD/CA” may not be used as the first or last PROFIBUS node.
  - The PROFIBUS terminating resistor for this ”DP slave POSMO SI/CD/CA” must be switched-out using switches S1-S4 (refer to Fig. 2-32).
  - Recommendation: Use an active bus terminating resistor

    The PROFIBUS component” active RS485 terminating element” has its own 24 V supply
    and can be used to terminate the PROFIBUS-DP independent of the DP slaves.

    Order No. (MLFB): 6ES7972–0DA00–0AA0

PROFIBUS address

The PROFIBUS address is set using an 8 pole DIL switch (S1-S7) at the rear of the PROFIBUS unit.

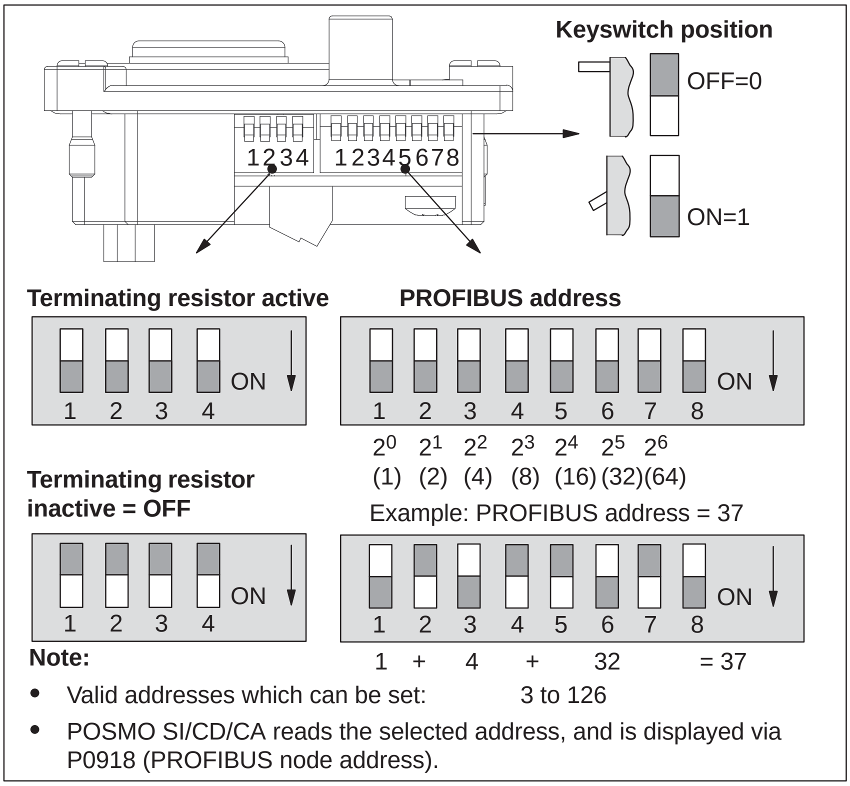


Fig. 2-32 Set the PROFIBUS address and terminating resistor

Bus termination for PROFIBUS-DP

The following should be observed when terminating PROFIBUS in conjunction with the ”DP slave POSMO SI/CD/CA”:

- The terminating resistor must be switched-in at the first and last bus nodes.
- Is the ”DP slave POSMO SI/CD/CA” the first or last bus node?
  - If yes?

    —> The bus termination should be switched-in using DIL switches S1-S4 (refer to Fig. 2-32).

    —> The switched-in bus termination is only effective if the PROFIBUS unit electronics power supply is powered up.
  - If no?

    —> The bus termination must be switched-out using switches S1-S4 (refer to Fig. 2-32).

Note

Switches S1-S4 must always have the same setting.

2.5 Connecting-up the PROFIBUS unit ECOFAST

2.5.1 General information

Note

For POSMO SI, POSMO CD and POSMO CA, the same PROFIBUS unit is used!

Design

- The PROFIBUS signals and I/O signals are connected at the PROFIBUS unit.
- PROFIBUS-DP should be connected to the existing field bus connector Han-Brid X21/X22 using a hybrid fieldbus cable for PROFIBUS-DP (refer to Chapter 2.5.4).
- If communications are to be maintained even when the power supply is powered down, then 24 V must be additionally input.
- The digital input signals are connected to X23 and the digital output signals to X24. From SW 4.1, digital output 2 can be optionally parameterized as digital input 3.
- Diagnostic signals are fed to connector X25.
- Connectors X23...X25 use the M12 connector system, and when supplied, are provided with covers.

T functionality

The PROFIBUS unit is designed, so that when the PROFIBUS unit is withdrawn, the PROFIBUS segment can still function.

Warning

It is only permissible to ”withdraw” or ”insert” the PROFIBUS unit or the ECOFAST after the power has been disconnected!

Y connector element

If input or output signals are to be fed from or to different locations at connector X23 or distributed from connector X24, then these signals can be split up into individual signal cables via a Y connector element (wiring, refer to Fig. 2-33).

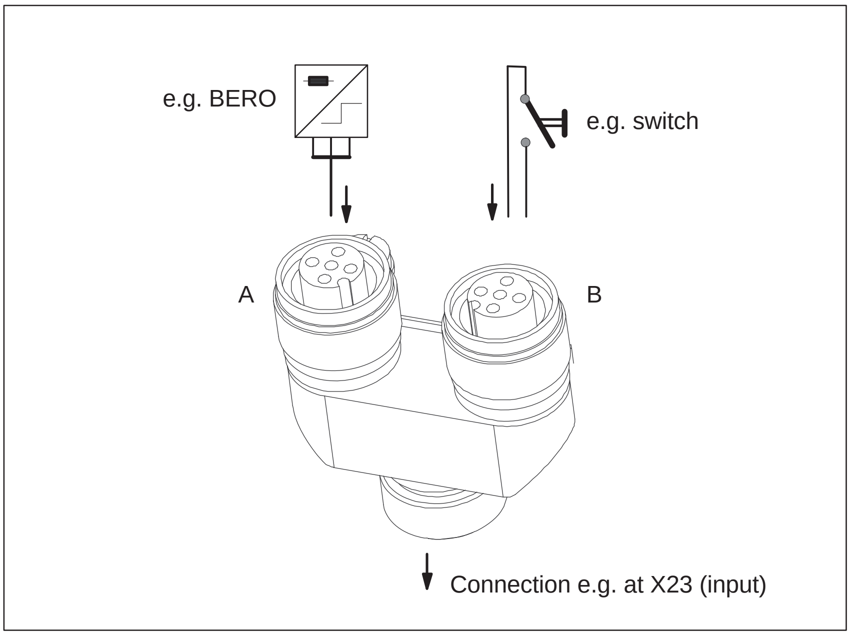


Fig. 2-33 Y connecting element M12, 5 pole (Order No. 6ES7 194–1KA01–0XA0)

Reader’s note

The Y connector element is not part of the PROFIBUS unit.
For a description, refer to

Reference: SIMATIC, Distributed Peripheral Device ET 200X
EWA 4NEB 780 6016–01 04

Note: This literature is part of the documentation package with Order No. 6ES7 198–8FA01–8AA0

PROFIBUS cabling

!

Important

Recommendation: Route the potential bonding conductor in parallel to the PROFIBUS cable (cable cross-rection, 4 to 16 mm^2). There are 2 M5 threads provided on the PROFIBUS unit (see Fig. 2-34).

When using connector couplings for PROFIBUS-DP, perfect functioning is no longer guaranteed at higher data transfer rates (> 1.5 Mbaud) (due to cable reflection).

2

Optional 24 V electronics power supply

If bus communications and position sensing are to remain active even with the load power supply powered-down, then an optional electronics power supply can be used, e.g. SITOP power (24 V ±20 %). The power supply conductors are routed, unshielded in the hybrid fieldbus cable.

The maximum cable length for an external 24 V supply is determined by the following limitations:

- Maximum current
  - Typical current drain for each POSMO SI/CD/CA from the external 24 V: 600 mA
  - Current load carrying capacity of the 1.5 mm^2 cable (acc. to IEC 60364–5–52, 40 °-C, B1): 10 A
- Voltage drop along the cable
  - SITOP power: 24 V typ., POSMO SI/CD/CA 19 V min
    ⇒ 5 V voltage drop

The following cable lengths may not be exceeded:

- Max. overall cable length: 100 m

Limitations:

- For >4 units, the maximum cable length is
  L = 400/x.
  L = Total cable length
  x = No. of drives connected to the cable
- Max. POSMO SI/CD/CA on a 24 V line: 10

24 V DC, which is generally used in machinery construction, can be used for the power supply.

Note

- The optional 24 V electronics power supply does not supply the digital inputs/outputs and the brake.
- In order to achieve improved noise immunity (EMC) when using the electronics power supply (24 V not switched), we urgently recommend that the additional noise suppression filter, Order No. 6SN2414–2TX00–0AA1 with a short PE connection (<15 cm) is used on the mounting panel. The electronics power supply filtered in this fashion may only be used by POSMO drives.
  Dimensions:
  w x h x d [mm] 22.5 x 75 x 55; can be mounted on the TS35 mounting rail

---

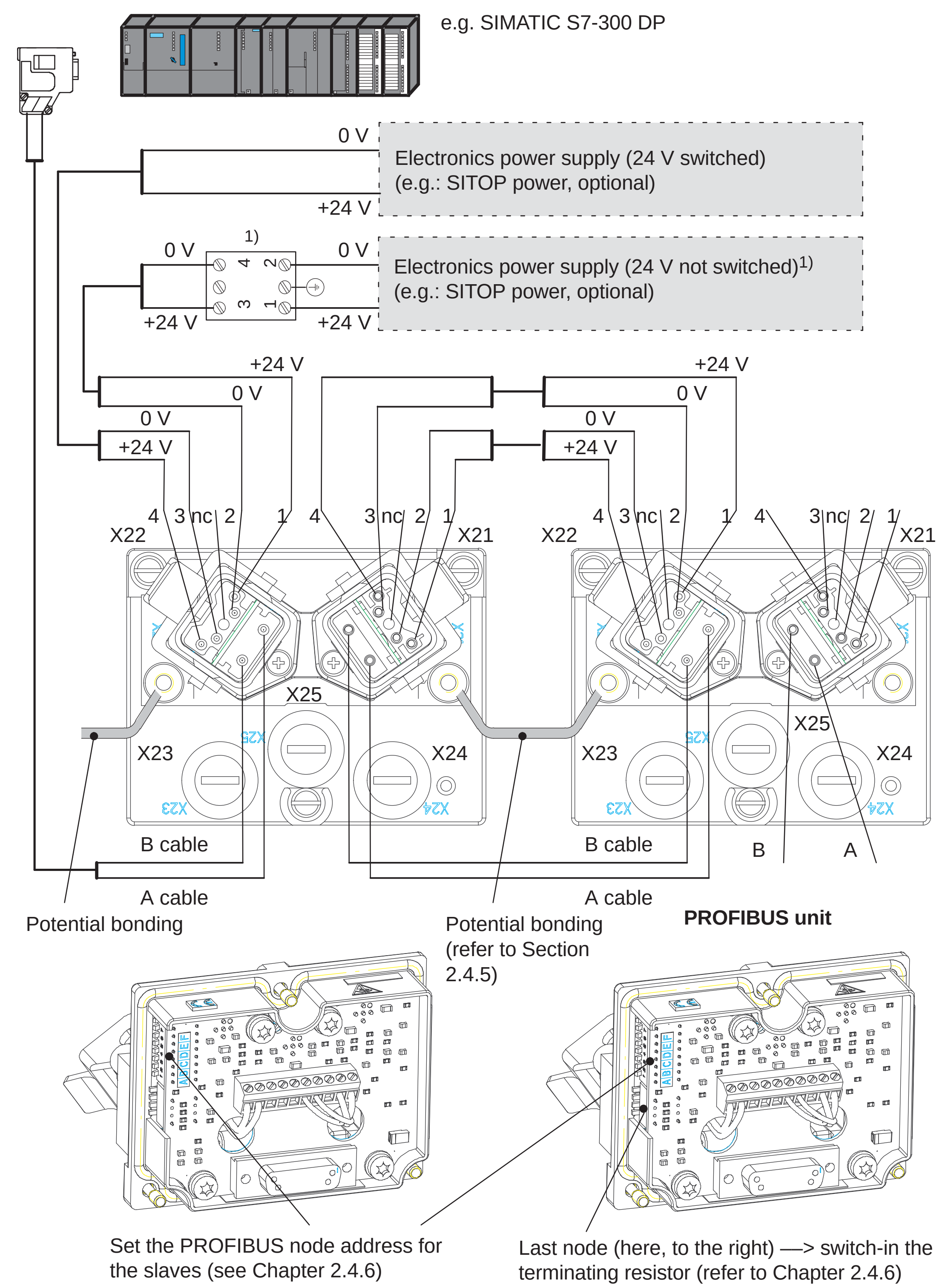
Recommended for the optional power supply:

- Using the regulated SITOP power supply module
  Reference: /SITOP/ Catalog, SITOP power
  Regulated power supply module
- Power supply from ECOFAST: Power and control module (P&C-M)
  Internet: http://www.siemens.com/ecofast

Grounding, optional 24 V electronics power supply

Ground the 24 V electronics power supply on the secondary side in the cabinet.

2.5.2 Connection and wiring overview



1) Recommendation: Use a filter in the cable to achieve improved noise immunity (EMC).

Fig. 2-34 Connection and wiring overview, hybrid fieldbus cable

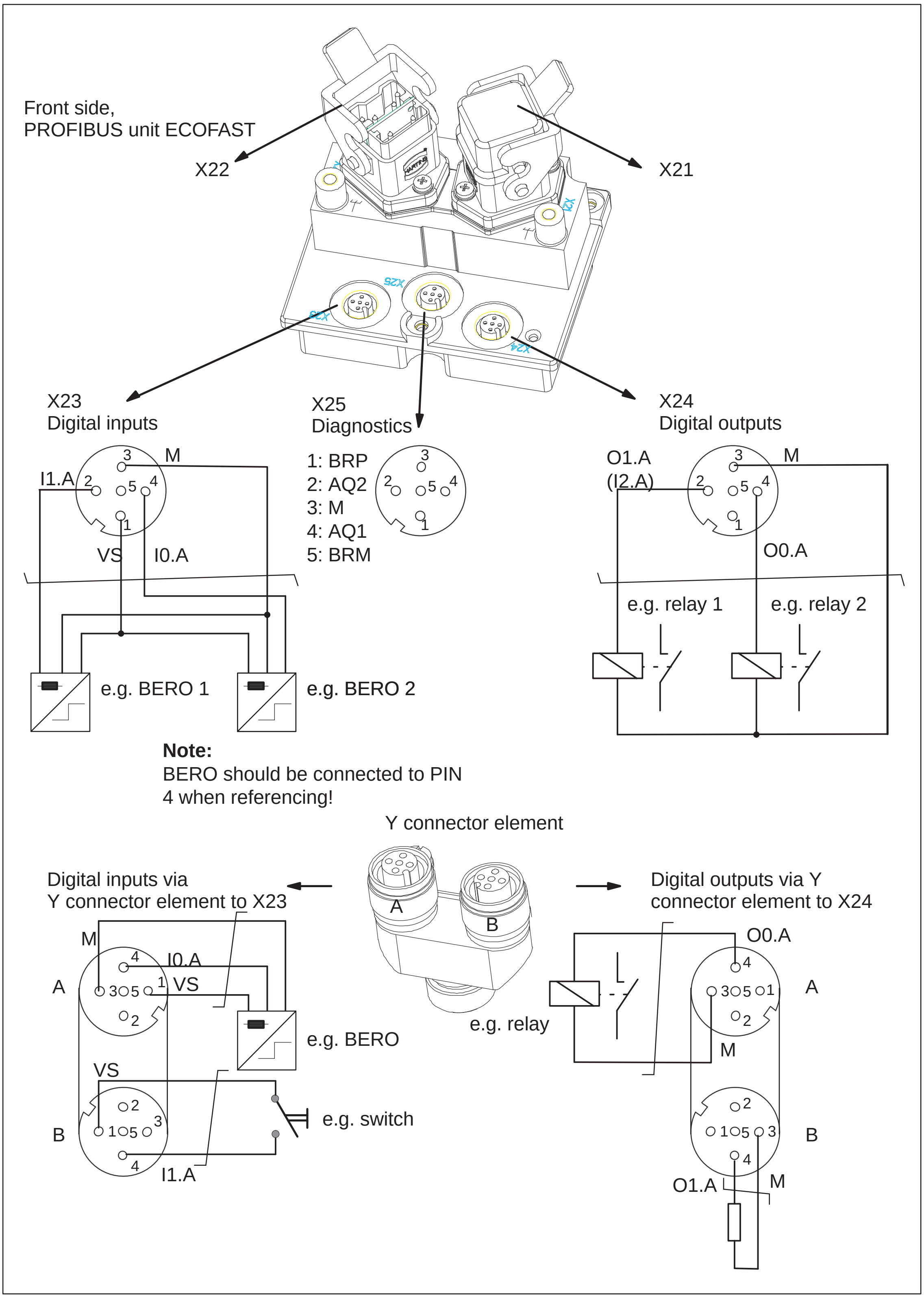


Fig. 2-35 Connection and wiring overview, M12 connector (example)

2.5.3 Terminal assignment

Table 2-20 Connecting-up the PROFIBUS unit ECOFAST

Terminal		Function	Type [1)]	Technical data
Designation	No.			
PROFIBUS connection ECOFAST (X21/X22)				
X22		**PROFIBUS input**		Connector type: Hybrid fieldbus connector, Han-Bird **Note:** • Pre-fabricated cable for connecting-up, including plug connector and socket connector – 6-conductor: 6XV1 830–7B□□□[6)] • Non-assembled cable for connecting-up – 6-conductor: 6XV1 830–7A□□□[6)] • The hybrid cable should be assembled according to Chapter 2.5.4 • The cover must remain inserted at the last PROFIBUS node (station) in order to ensure the degree of protection! • When setting the PROFIBUS address and the PROFIBUS terminating resistor --> see Chapter 2.4.6.
B		B cable PROFIBUS	I	
A		A cable PROFIBUS	I	
nc		–	S	
1		+24 V non-rwitched input	S	
2		0 V non-rwitched input	S	
3		0 V switched input	S	
4		+24 V switched input	S	
X21		**PROFIBUS output**		
B		B cable PROFIBUS	O	
A		A cable PROFIBUS	O	
nc		–	S	
1		+24 V non-rwitched input	S	
2		0 V non-rwitched input	S	
3		0 V switched input	S	
4		+24 V switched input	S	

Table 2-20 Connecting-up the PROFIBUS unit ECOFAST, continued

Terminal: Designation	Terminal: No.	Function	Type 1)	Technical data
Connection, digital inputs and supply (X23)				
	X23			Connector type: 5-pin M12 connector Signal cable: 5-conductor with conductor cross-rection $\leq$0.75 mm^2
I0.A	X23.4	Digital input 1 2) Fast input 3) e.g. for BERO equivalent zero mark, external block change,	DI	Voltage: 24 V Current drain, typical: 6 mA at 24 V Reference potential: X23.3 Signal level (incl. ripple) High signal level: 15 V...30 V Low signal level: –3 V...5 V Signal run time for I0.A: typical 500 µs **Note:** • Parameterization of the input terminals and the standard assignment is described in Chapter 6.4.1. • An open-circuit input is interpreted as 0 signal.
I1.A	X23.2	Digital input 2 2)	DI	
VS	X23.1	+24 V	S	Voltage range: 24 V $\pm$2% (short-circuit proof) Current load: max. 100 mA **Note:** This voltage can be used to supply an external BERO.
M	X23.3	Ground, 24 V input	S	
⏚	X23.5	Protective conductor	S	not used
Connection, digital outputs and supply (X24)				
	X24			Connector type: 5-pin M12 connector Signal cable: 5-conductor with conductor cross-rection $\leq$0.75 mm^2
O0.A	X24.4	Digital output 1	DO	Rated current per output: 100 mA short-circuit proof Reference potential: X24.3 **Note:** Parameterization of the output terminals as well as the standard assignment is described in Chapter 6.4.3. From SW 4.1, digital output 2 can also be optionally parameterized as digital input 3 (I2.A) (P0677 = 1).
O1.A (I2.A)	X24.2	Digital output 2 (digital input 3, from SW 4.1)	DO DI	
n.c.	X24.1	Not assigned		
M	X24.3	Ground, 24 V	S	
⏚	X24.5	Protective conductor	S	

Table 2-20 Connecting-up the PROFIBUS unit ECOFAST, continued

Terminal De-sig-na-tion	Terminal No.	Function	Type 1)	Technical data
Connection, diagnostics D/A converter and external brake control (X25)				
	X25			Connector type: 5-pin M12 connector Signal cable: 5-conductor with conductor cross-rec-tion $\leq$0.75 mm^2
AQ1	X25.4	Diagnostics output 1[4)] (test socket 1)	AO	Resolution: 8 bit Voltage range: 0 V...5 V Maximum current: 3 mA No electrical isolation: Reference is X25.3 **Note:** Commissioning functions, see Chapter 7.3
AQ2	X25.2	Diagnostics output 2[4)] (test socket 2)	AO	
BRP	X25.1	Brake signal BRP	I	**Note:** The motor holding brake can be released for ser-vice work using an external 24 V power supply at BRP/BRM (refer to Chapter 6.5). Voltage: 24 V $\pm$10% Current drain: 1.3 A at 24 V (max)[5)]
M	X25.3	Ground, 24 V	S	
BRM	X25.5	Brake signal BRM	I	

1) I: Input; DI: Digital input; DO: Digital output; AO: Analog output;
S: Supply; O: Output
2) Can be freely parameterized
All of the digital inputs are de–bounced per software. The signal recognition results in a delay time of interpolation clock cycles (P1010).
3) I0.A is hardwired internally to the position sensing function where it acts almost instantaneously.
4) Can be freely parameterized
The digital outputs are updated in the interpolation clock cycle (P1010). This is supplemented by a hardware-related delay time of approx. 200 µs.
5) Dependent on the brake type
6) Lengths, analog to the data in Catalog IK PI

Reader's note

Additional information on how to configure a PROFIBUS-DP network is included in:

Reference: /IKPI/ Catalog IKPI • 2005
Industrial communications and field devices

Internet: http://www.siemens.com/ecofast

2.5.4 Mounting

General information

The PROFIBUS unit is mounted onto POSMO SI, POSMO CD or POSMO CA.

It must be removed when

- setting the PROFIBUS address (refer to Chapter 2.4.6),
- setting the terminating resistor at the last PROFIBUS node (refer to Chapter 2.4.6) and
- If the memory module has to be changed.

The PROFIBUS cable is connected via

- HANBIRD hybrid fieldbus connectors,
  Order No. for hybrid fieldbus cable for PROFIBUS-DP
  refer to Table 2-20

Note

When supplied, connector X21 and connectors X23...X25 are provided with covers.

In order to guarantee that degree of protection IP 65 is retained, the covers should only be removed at those locations where a signal cable is connected!

The following diagrams schematically show how the signal cables are connected to the PROFIBUS unit ECOFAST.

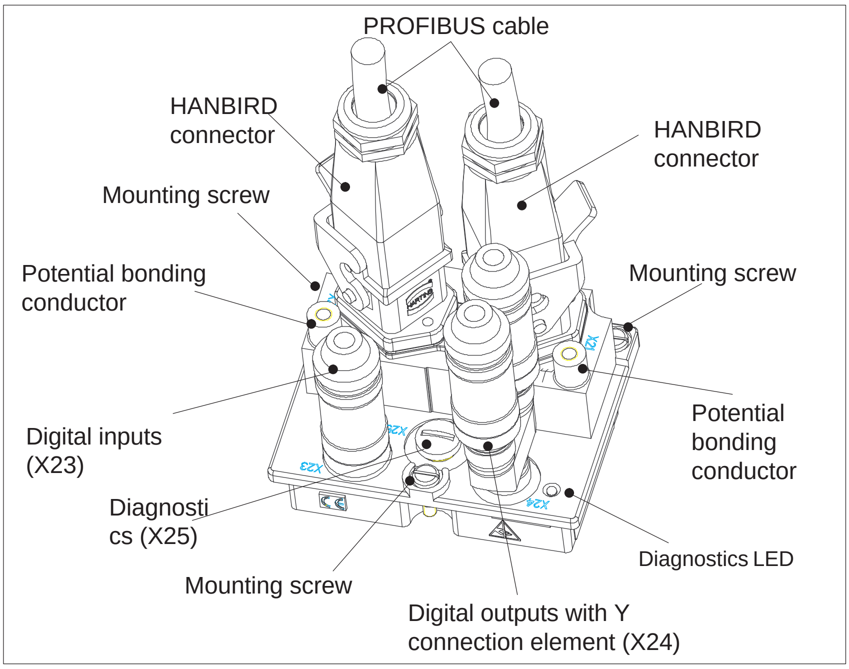


Fig. 2-36 Attaching the signal cable PROFIBUS unit ECOFAST

Mounting and installation steps

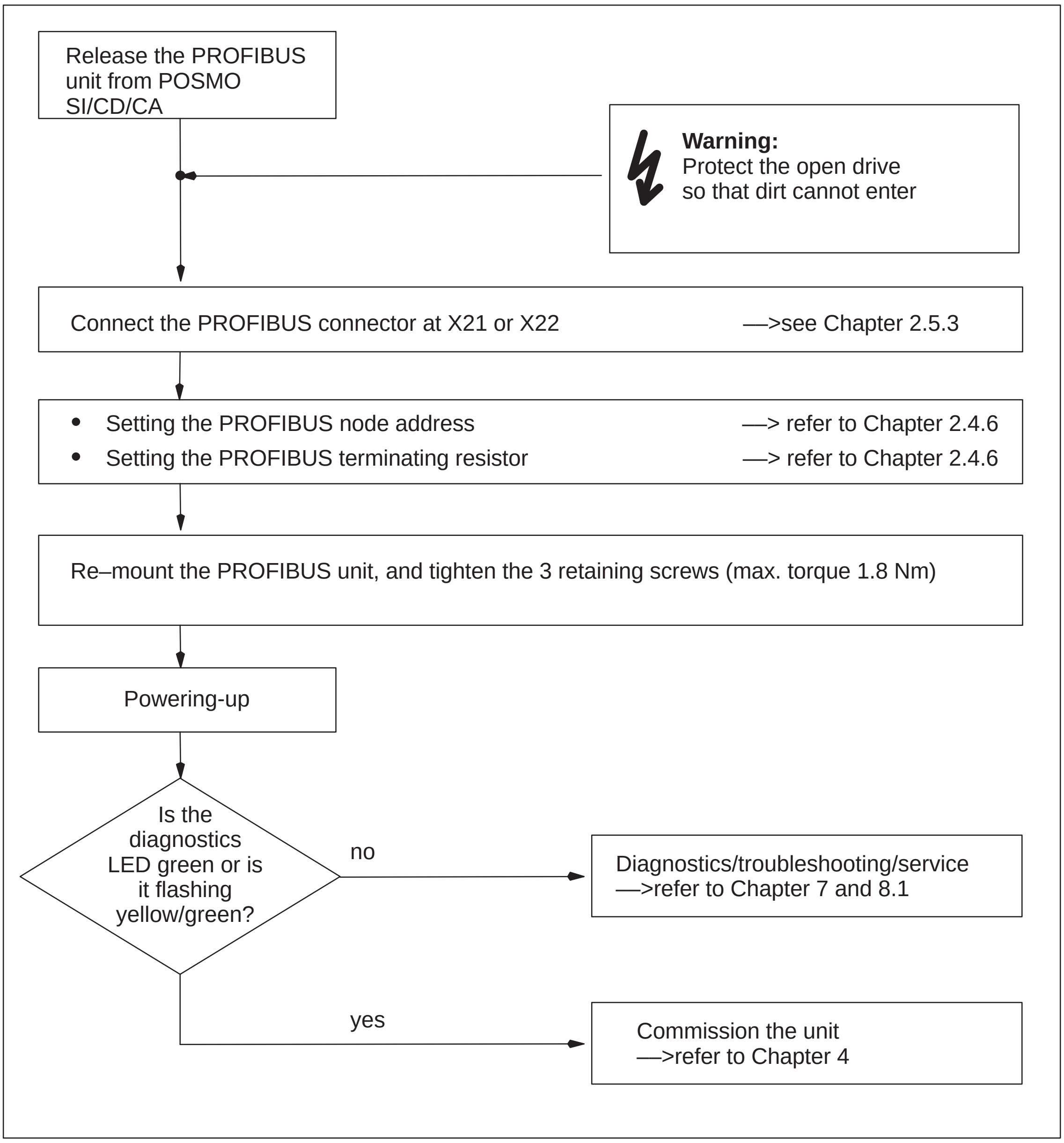


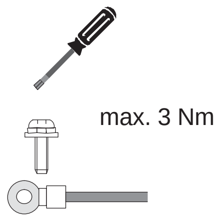
Fig. 2-37 Mounting and installation steps

2.5.5 Preparing the cables and installing

Connection X21/X22

Using pre-fabricated hybrid fieldbus cables.

Potential bonding cable



Cross-rection: $\geq$ 4 mm^2

Thread: M5 x 10, hole

Note:

Route the cable as parallel as possible to the PROFIBUS cable, as this enhances the PROFIBUS noise immunity.

Fig. 2-38 Potential bonding conductor

Connections X23...X25

The following are required to connect the digital inputs (X23), the digital outputs (X24) and diagnostics (X25):

- One 5-pin M12 connector, which can be assembled
- Flexible 3, 4 or 5-conductor Cu cable, non-rhielded with a conductor cross-rection of $\leqslant$0.75 mm^2.

Note

When using a BERO, we recommend that a shielded cable and a 5-pin metal connector are used to increase the noise immunity.

The connector should be connected-up corresponding to the pin assignment of X23, X24 and X25 in Table 2-20.

We recommend the following connectors:

- Metal M12 coupling connector, 5 pin, can be assembled

  Order No.: 6SN2414–2RX00–0AA0

Note

All of the connectors or the covers must be inserted on X23, X24 and X25 so that the IP 65 degree of protection is guaranteed!

■

Notes

3 Parameterizing

3.1 Overview when parameterizing

General information

POSMO SI and POSMO CD/CA are parameterized using the parameterizing and start-up tool (SimoCom U) on a PG/PC.

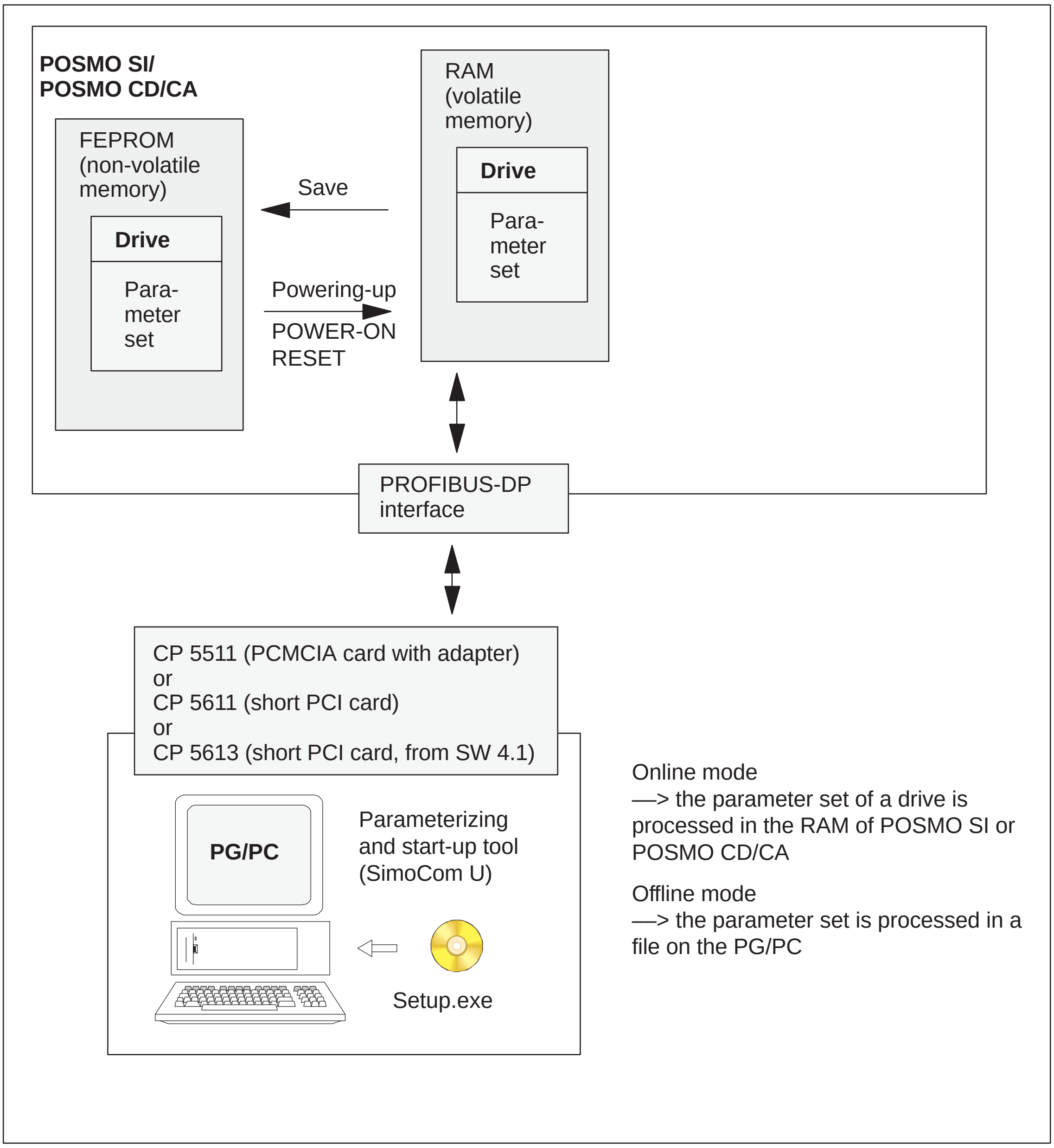


Fig. 3-1 Overview when parameterizing

3.2 Parameterizing using the ”SimoCom U” tool

3.2.1 Installing ”SimoCom U”

Note

”SimoCom U” is a tool that is used for commissioning, diagnostics and parameterization. It is not permissible to use this tool as operator interface for continuous operation of drives!

Prerequisite

A PG/PC is required to install the tool; it must fulfill the following requirements as a minimum:

- Operating system
  - Windows 98® or Windows NT®
  - from SW 4.1 also Windows ME® or Windows 2000®
  - from SW 6.1, also Window XP®
- 32 MB RAM memory
- Free memory required on the hard disk
  - Installing with one language —> 30 MB
  - Installing each additional language —> plus approx. 10 MB
- PROFIBUS-DP
  - PROFIBUS coupling via PCMCIA card CP 5511
  - PROFIBUS coupling via short PCI card CP 5611
  - PROFIBUS coupling via short PCI card CP 5613 (from SW 4.1)
- 1 free serial interface (RS232 interface)

Note

Note: If the PG/PC does not have a serial interface, then a commercially available USB/RS232 interface adapter can be connected!

Software supply

The software is available in the Internet under the following address:
https://support.automation.siemens.com
—> Products & Solutions —> Drive technology —> Distributed drive technology —> SIMODRIVE POSMO —> SIMODRIVE POSMO CD/CA or SIMODRIVE POSMO SI —> Downloads

Which ”SimoCom U” version optimally matches which drive?

The ”SimoCom U” parameterizing and start-up tool can be used for various drives.

The functional scope of ”SimoCom U” tool will be continually adapted to the functional expansion of these drives.

In order to parameterize and handle all of the functions of a drive using ”SimoCom U”, the optimum matching ”SimoCom U” must be used, depending on the drive software release.

Reader’s note

Which ”SimoCom U” version optimally matches which drive and which software release of the drive?

Refer to ”SimoCom U” as follows:

Help —> Info about ”SimoCom U” ... —> Versions

Installing ”SimoCom U”

This is how you install the ”SimoCom U” tool on your PG/PC:

Reader’s note

The ”readme.txt” file is provided on the software CD.
Please observe the information, tips and tricks provided in this file.

1. Insert the software CD into the appropriate drive of your PG/PC.
2. Run the ”setup.exe” file in the ”disk1” directory of the required version of SimoCom U.
   –> START –> RUN –> OPEN SETUP.EXE –> OK
3. Follow the instructions which the installation program displays step-by-step.

   Result:

   – The ”SimoCom U” tool is installed in the target directory which you selected.

   – The tool can e.g. be started as follows:
   –> START –> PROGRAMS –> SIMOCOMU
   –> SimoComU –> click on selection

Note

The firmware on the CD can be loaded into the appropriate module using the ”SimoCom U” tool.

Uninstalling ”SimoCom U”

You can un-install the ”SimoCom U” parameterizing and start-up tool from your PG/PC:

- Using the ”SimoCom U” program handling functionality

  The ”SimoCom U” tool can, e.g. be uninstalled as follows:

  –> START –> PROGRAMS –> SIMOCOMU
  –> Un-install SimoComU –> click

- Using the Control Panel just like any other Windows program
  - Select the ”control panel”
    –> START –> SETTINGS –> CONTROL PANEL
  - Double-click on the ”Software” symbol
  - Select the ”SimoCom U” program in the selection field
  - Press the ”add/remove...” button and then follow the instructions

3.2.2 Entry into ”SimoCom U”

Prerequisite

The ”SimoCom U” parameterizing and start-up tool is installed on the PG/PC in accordance with Chapter 3.2.1 and can be started.

The following basic screen is displayed after the first start:

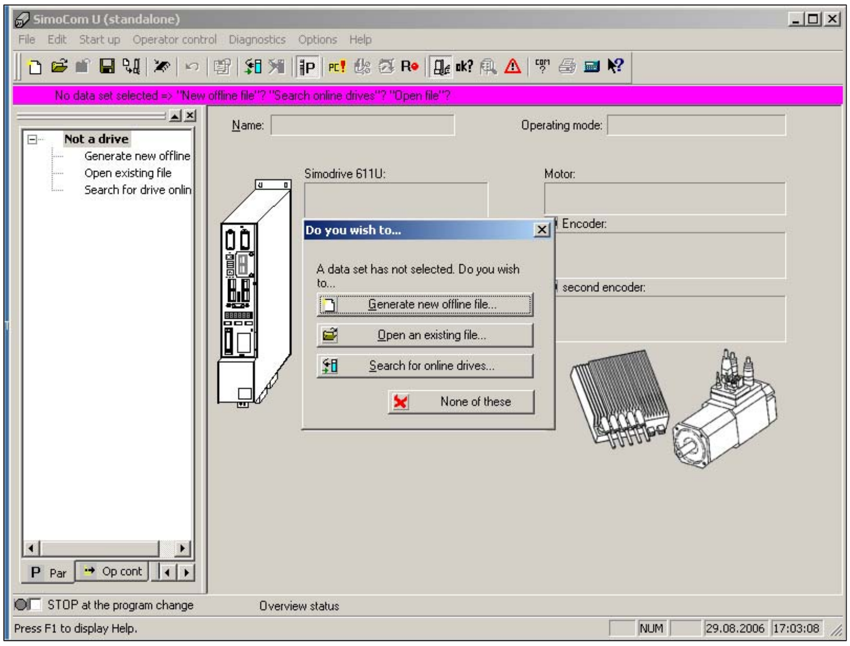


Fig. 3-2 Basic display of ”SimoCom U” for the latest version

Note

It is important to know the following when using ”SimoCom U”:

The program attempts to ”think with you”:

- If you select a command, which is presently not available for a specific reason (e.g. you are offline and wish to ”move an axis ”), then the program does what you would probably wish it to do:
  It goes ”online”, and offers you a list of drives and after the required drive has been selected, it opens the traversing window. However, if you do not wish to do this, then you can exit and continue as required.
- Only the information is provided in the dialog boxes which must be available as a result of the selected configuration.
  Example:
  If a synchronous motor is set, then a ramp-function generator is not made available in the dialog boxes for parameterization.

Information on ”SimoCom U”

The information in Table 2-4 provides basic information and instructions on how to use the ”SimoCom U” parameterizing and start-up tool.

Table 3-1 Information on ”SimoCom U”

Function	Description
Tasks which can be handled using ”SimoCom U”	• Check the wiring (go into the Online Help: connection diagrams) • Establish a connection to the drive to be parameterized • Change the parameters – The essential parameters are changed in interactive dialog – All of the parameters can be changed using the list parameterization • Upgrade firmware • Optimize the controller parameters • Traverse the axis • Diagnose the drive status – Identify the connected hardware – Displays the status of the I/O signals – Obtain a display of the alarms and information on how they can be removed • Carry-out diagnostics – Parameterize the test sockets (DAU1, DAU2) This means that selected signals in the drive can be routed to the test sockets for measurement with an oscilloscope. – Execute the measuring function It is possible to measure the most important quantities in the closed-loop current and speed control loop in the time and frequency domains without having to use external measuring equipment; these can then also be graphically displayed. – Execute trace functions Selected measuring quantities in the drive can be measured, corresponding to the specified measuring parameters and can be graphically displayed using ”SimoCom U”. • Save the results – Save the parameters in the drive FEPROM – Save the parameters in a file/open a file – Print the parameters • Comparing parameter sets This allows the differences between 2 parameter sets to be identified. • Boot the board The board status when originally shipped can be re-established using this function. • User parameter list The user can include a parameter in this list. This list has the same functionality as the expert list. • Password protection (from version 08.01) Using this function, access protection can be provided for SimoCom U and the drive firmware so that the drive configuration cannot be changed. To set the password protection, refer to Chapter 4.3.3.

Table 3-1 Information on ”SimoCom U”, continued

Function	Description
Working offline	... this means that you are only working at the computer and there is no connection to a POSMO SI or POSMO CD/CA drive. Only the opened files are included in the drive selection box of the toolbar.
Working online	... this means that you are connected with one or several POSMO SI or POSMO CD/CA drives, and ”SimoCom U” also recognizes these drives. This is the case, if ”SimoCom U” has already searched the interface. You go online, if • You make the selection with the operator action ”Search for online drives” In the online mode, the toolbars of the opened files are included in the drive selection box together with all of the drives available at the interface. Recommended interface setting: If you start ”SimoCom U” for the first time, you will be prompted for the interface pre-setting (default): • If you predominantly work in the office, then select ”work offline”. • If you predominantly work at the machine, then select ”connect via” and the serial interface at your computer. **Note:** Not all of the parameters displayed via ”SimoCom U” are cyclically read. Remedy: After you have changed parameters via PROFIBUS-DP, you should first go offline with ”SimoCom U” in order to re-establish online operation with updated data.
Working in the drive or in the file	You can work in a file directly in the drive or only at the PC – however, only with one data set at any one time. Opened parameter files can also be re-closed: Menu ”File/Close file”.
Expert List	... displays all of the parameters of POSMO SI and POSMO CD/POSMO CA. You can individually change any parameter via the expert list. The operator has no additional support here. This list parameterization should only be used in exceptional cases. • Operator control information – Call: Menu ”Start-up/Additional parameters/Expert list” – If you open the list, you will additionally obtain the menu, which can also be reached using the righthand mouse key. – It is especially interesting that the standard value and value limits for the actual parameters are displayed in the status line. – Modified values only become effective after pressing the Enter key or if another parameter was selected. Values which are inactive have a red background. – In the ”List” menu, you can select which data should appear in the list: All, or only the controller data, or only the sub-parameter set 0 or ... Furthermore, you can search for specific terms with F3 (or list/search menu), e.g. you can search for ”temp” if you wish to change the temperature warning threshold value. – Bit–coded values: With the cursor, go to the line and press F4 (or list/bit value menu); you then obtain the plain text display of the individual bits which you can select using the mouse.

Table 3-1 Information on ”SimoCom U”, continued

Function	Description
Assign the PC the master control	... this means, that the I/O signals at the plug connectors are ignored, and instead, the drive evaluates the signals which have been set by the PC. This means that the enable signals to traverse the drive can be output from the PC. Exception: The ”pulse enable” (terminal IF) must be available, as before, via the input terminal. This is for safety reasons: You can withdraw these enable signals at any time, using a switch in order to switch the drive into a no–current condition or shut it down.
Re-assign the master control from the PC back to the peripheral (I/O) signals	... you then obtain an indication of the voltage level available at the plug connectors compared to the signals set by the PC. The master control is only returned to the plug connectors after acknowledging.
Commissioning required	A drive that has still not been commissioned, logs-on with: ”Commissioning required!” You have 4 possibilities: 1. Open the Start-up Assistant – if you have not already created a file, which you wish to load into the drive. 2. Load an existing file into the drive. 3. Work offline – this means that you disconnect the link to the drive without start up the drive. 4. Emergency exit – in this case, you remain online without carrying out any commissioning (e.g. in order to upgrade the firmware before commissioning)
Procedure when commissioning	Recommendation: Go through the ”Start-up” menu, from the top to the bottom. The parameters are arranged according to importance:
1.) Drive configuration	... here, enter which power modules, which motors, which encoders are used with this drive, and in which operating mode the drive is used. If this data is changed, the controller data is re–calculated, i.e. previous changes made to the relevant parameters will be overwritten.
2.) Basic commissioning	... here, you will find the data, which is in most cases necessary and also sufficient for the motor and the operating mode that has been entered. You can access all of the parameters in the expert list.

Table 3-1 Information on ”SimoCom U”, continued

Function	Description
Traverse the drive	After the drive has been configured, you can already move the drive from the PC in the ”speed/torque setpoint” mode. Call: ”Operator control/Traverse/ ...” menu
Data transfer	Also here, the program attempts to ”think with you”: If you are presently working on a drive and select File/Download into drive” then the program assumes that you wish to download a file, still to be selected, into this particular drive. If a file is presently open, then the program assumes that using the same command, you wish to download this open data set into a drive still to be selected. If these assumptions are not applicable, then you can always undo by canceling.

Integrated help

The ”SimoCom U” tool is equipped with an integrated help function, which supports you in handling the tool and the ”POSMO SI/CD/CA” drive.

This is how you call up the integrated help function:

- Using the menu command **Help** ▸ **Help subjects...**

  or

- By pressing the **Help** button

  or

- By pressing key **F1**

Printing

Data for the following dialog boxes can be printed using the print symbol in the symbol bar:

- Traversing blocks
- Teach In
- User parameter list
- operating conditions
- Status parameters
- Trace function
- Measurement function
- Expert list

3.2.3 Online operation: ”SimoCom U” via PROFIBUS-DP

Description

The ”SimoCom U” parameterizing and start-up tool communicates with the drives via the PROFIBUS-DP fieldbus.

You can go into online operation as follows:

- Online operation via the CP 5511 / CP 5611 / CP 5613 directly with the fieldbus

  PG/PC <—> CP 5511 / CP 5611 / CP 5613 <—> PROFIBUS <—> drives

- Online operation via the MPI interface of SIMATIC S7

  PG/PC <—> MPI <—> PROFIBUS <—> drives

If the subsequently listed prerequisites are fulfilled, then the online mode can be established between ”SimoCom U” and all of the drives connected to the bus (”DP slaves POSMO SI/CD/CA”).

Settings for ”SimoCom U”

For ”SimoCom U”, communications via PROFIBUS-DP should be set as follows:

- Options – Settings – Communications —> ”Interface” dialog”
- For ”Go online connect via” set the following:
—> ”PROFIBUS” and
—> ”Direct connection”
—> if connected directly to the field bus
or
—> ”MPI –> PROFIBUS Routing”
—> if connected via the MPI interface
or
—> ”Communication via OPC server” (from SW 6.1)
—> if connected via OPC server

Then, online operation can be established directly to the drive via the fieldbus using the ”Search for online drives” function.

Prerequisites

The following prerequisites must be fulfilled in order to go into the online mode with ”SimoCom U” with a drive via the fieldbus PROFIBUS-DP:

1. ”SimoCom U” parameterizing and start-up tool from version 3.1
2. Communication modules
   – CP 5511 (PROFIBUS coupling via PCMCIA card)

     Structure:
     Type 2 PCMCIA card + adapter with 9-pin SUB-D socket to connected to PROFIBUS-DP.

     Order No. (MLFB): 6GK1551-1AA00

     or

   – CP 5611 (PROFIBUS coupling via short PCI card)

     Structure:
     Short PCI card with 9-pin SUB-D socket to connect to PROFIBUS-DP.

     Order No. (MLFB): 6GK1561-1AA00

   – CP 5613 (PROFIBUS coupling via short PCI card) (from SW 4.1)

     Structure:
     Short PCI card with 9-pin SUB-D socket to connect to PROFIBUS-DP,
     diagnostic LEDs,
     PROFIBUS controller ASPC2 StepE

     Order No. (MLFB): 6GK1561-3AA00
3. SIMATIC-CPU, when establishing a connection via MPI interface

   A routing–capable SIMATIC-CPU is required for a coupling via MPI interface.
4. S7-DOS from V5.0

   This software is supplied on the CD for ”POSMO SI/CD/CA”.
5. Connecting cable
   – between CP 5511 or CP 5611 and PROFIBUS-DP fieldbus

     or

   – between the MPI interface from the PG and SIMATIC-CPU

Note

Going online/offline via PROFIBUS-DP in cyclic transmission mode:

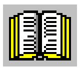
While PROFIBUS-DP is in cyclic operation, ”SimoCom U” with CPxx can be connected or disconnected from the fieldbus, using the following drop cable, without disturbing operation.

Order No.: (MLFB): 6ES7901-4BD00-0XA0 (connecting cable)

Prerequisites with the OPC server (from SW 6.1)

In order to go online with a drive using ”SimoCom U” via an OPC server PROFIBUS-DP, the OPC server must first be installed according to the manufacturer’s instructions and the following prerequisites must be fulfilled:

- Hardware
  - PROFIBUS card must be installed in the PC – cards from third-party manufacturers can also be used
  - Connecting cable
- Software
  - Driver software and the associated OPC server for the installed PROFIBUS card
  - Configuring software for the OPC server
    Most of the OPC server/PROFIBUS cards require that the bus is appropriately set (e.g. baud rate, protocol); some require that the drives connected to the bus are also configured.



Reader’s note

Please refer to the documentation of the appropriate manufacturer regarding information on how to configure a PROFIBUS card and OP server. These procedures depend on the particular manufacturer.

  - The OPC server, provided by the manufacturer, offers a possibility of accessing MSAC2 services according to DPV1 (EN50170) including the DataTransport service.
    OPC servers that have registered themselves with the system under the Category ”Profibus–DPV1–OPC server Version 1.0” fulfill this requirement.
    When selecting the interface, SimoCom U offers this OPC server in a separate selection box.
- SimoCom U from Version 6.1

  After this configuration of the OPC server has been activated, the access route to ”Communications via OPC server” can be set in SimoCom U under ”Options/Settings/Communication”.

  The OPC server to be used should then be selected using the ”OPC Configuration” button:
  - We recommend that the option ”Display all DPV1-OPC-Server” is selected and an OPC server selected from the selection box located below. The OPC servers, which are displayed for this particular selection, guarantee that the utilities (services), required by SimComU, as described in the software prerequisites, are provided.
  - If the required OPC server is not listed, but the required utilities (services) are however available, then the button ”Display all OPC servers” should be selected, whereby, all of the utilities, installed in the PC which support the OPC, are listed.
  - Alternatively, the so–called ClassID of the OPC server can be directly entered under the ”Specify OPC server name (only for experts!).

**Example:
”SimoCom U” via
PROFIBUS-DP**

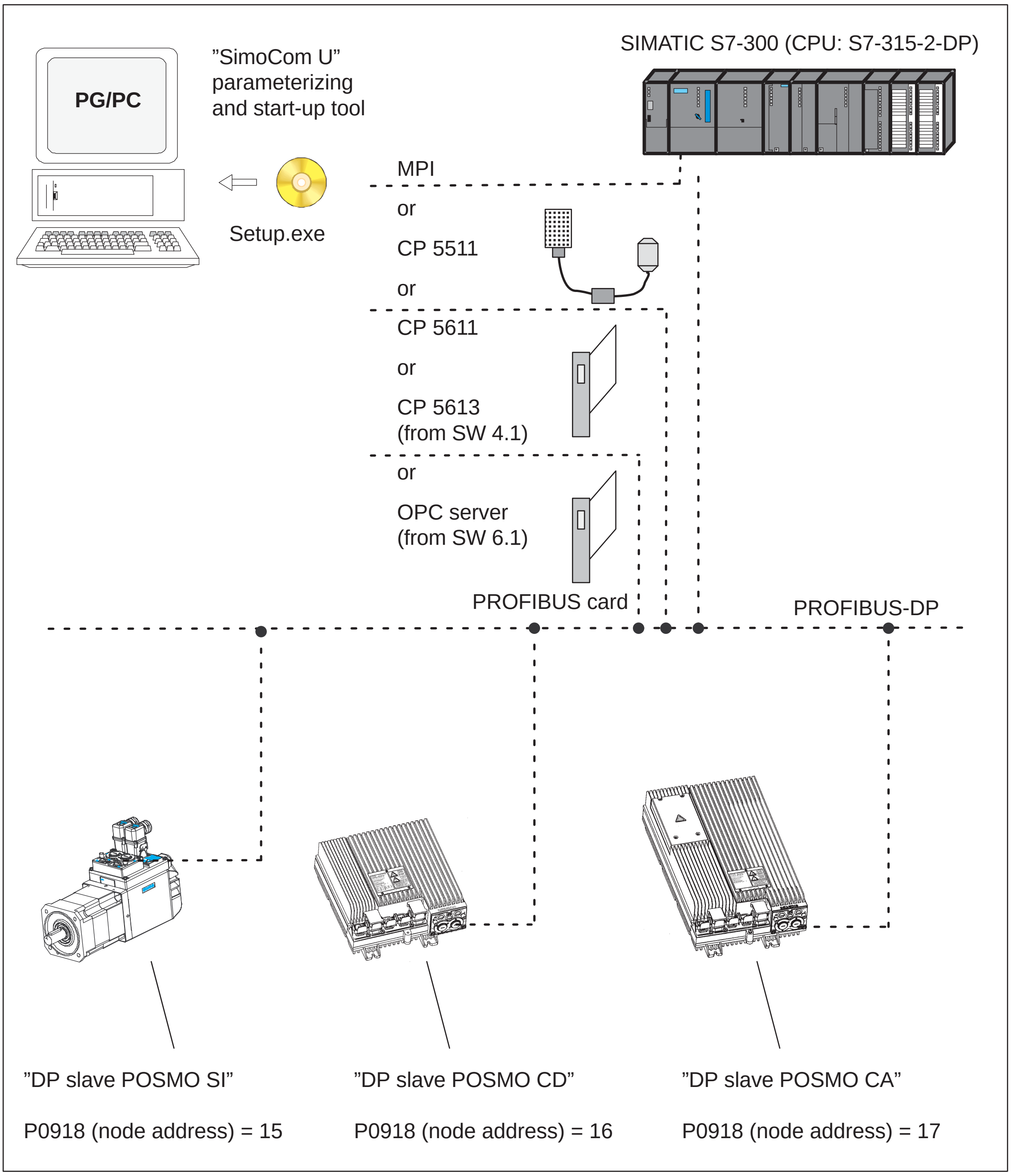


Fig. 3-3 ”SimoCom U” via PROFIBUS-DP (example with 3 POSMO SI/CD/CA)

■

Notes

4 Commissioning

4.1 General commissioning information

Commissioning

It is only possible to commission POSMO SI or POSMO CD/CA via PROFIBUS-DP. Commissioning is sub-divided as follows into

- First commissioning

  If there is still no matching parameter set for the drive, then the ”SimoCom U” tool must be used for the first commissioning (refer to Chapter 4.3.1).

- Series commissioning

  An existing data set can be transferred to the control board (memory board) via the ”SimoCom U” tool (refer to Chapter 4.3.2).

  Examples:

  – Several systems having the same configuration and functions are to be commissioned.

    For the first system, a first start-up (commissioning) must be executed, and for additional systems, a series start-up.

  – Replacing a drive unit

Note

- SimoCom U is a start-up tool for ”qualified commissioning personnel”
- **SimoCom U has neither been designed nor is suitable for operational control of the system!**
- When called via several PCs, only that PC displays modified data, from which the changes were also made!

Note

The original status of the board when shipped can always be re-established as follows:

- Using P0649 = 1
- Using the SimoCom U tool with the boot board function (refer to Chapter 3.2.2)

Prerequisites for commissioning

POSMO SI or POSMO CD/CA can be commissioned the fastest, if the following prerequisites are checked and are also fulfilled **before commissioning starts**:

Table 4-1 Prerequisites for commissioning

The following conditions must be fulfilled before commissioning!	**OK** ✓
The SIMODRIVE/MASTERDRIVES group has been configured.	
The wiring has been completed.	
The Order Nos. (MLFBs) of the motors and encoders are known.	
The system has been prepared so that it can be powered-up.	
Line supply voltage 400 V? • SIMODRIVE POSMO SI/CD For the line infeed module (SIMODRIVE NE module), set the line supply voltage to 400 V using switch S1. **Reference:** /PJU/, SIMODRIVE 611 Configuration Manual, Drive Converters • SIMODRIVE POSMO CA The unit is set as standard to a line supply voltage of 400 V.	
Line supply voltage 480V? • SIMODRIVE POSMO SI/CD For the line infeed module (SIMODRIVE NE module), set the line supply voltage to 480 V using switch S1. **Reference:** /PJU/, SIMODRIVE 611 Configuration Manual, Drive Converters • SIMODRIVE POSMO CA The drive unit should be changed-over to operate with a line supply voltage of 480 V. If the unit is operated at 480 V without making any changes, this will cause the unit to overheat and be destroyed. Proceed as follows to change over the unit to 480 V. – Connect the 24 V electronics power supply and power-up (refer to Chapter 2.4). – Go online using the ”SimoCom U” parameterizing and start-up tool, set P1171 to 1 and save in a non-volatile fashion (refer to Chapter 3.2). – From now onwards, the unit can be operated with a 480 V line supply voltage.	

Warning

Before powering up the SIMODRIVE group, the DC link cover and connector X181 must be installed at the NE module!

Check list for commissioning

The following checklist should help you to simply commission the components that we supplied, and to also guarantee a high availability when used in conjunction with your product:

- Compliance with all ESD measures during component handling.
- All screws are tightened to the correct torque. Pay special attention to the DC link bolt connections (1.8 Nm torque).
- All connectors are correctly attached and locked/screwed in place.
- Observe the power-on sequence in the Configuration Manual.
- If the unit is frequently powered down and up, the DC link pre-charging circuit locks itself out. This can only be re-charged again after a cooling time of several minutes (e.g. 4 minutes) with the line supply disconnected (powered down).
- Are there line supply/motor contactors connected to the drive converter? It is only permissible to switch these when they are in a no-current condition.
- All components are grounded and correctly shielded.
  Connection X131 at the NE module must be grounded.
- The load capability of the central power supply system is not exceeded
- Only discharge the unit at the DC link buses through a minimum of 20 Ω.
- The units are designed for the specified mechanical, climatic and electrical ambient conditions. None of the limit values may be exceeded in operation nor during transport. Please pay special attention to the following:
  - Line supply conditions
  - Pollutants
  - Damaging gases
  - Climatic ambient conditions
  - Storage/transport
  - Shock stressing
  - Vibratory load
  - Ambient temperature
  - Total (summed) current of the digital outputs (refer to Chapter 2.3.3)

Reader's note

More detailed information on the drive group and the ambient conditions is provided in:

Reference: /PJU/ SIMODRIVE 611
Configuration Manual, Drive Converters

4.2 POSMO SI/POSMO CD/CA run-up

General information

When booting, a differentiation is made as to whether the drive was already commissioned.

- Still not commissioned

  ⇒ The drive requests commissioning (refer to Chapter 4.3.1).

- Already commissioned

  ⇒ The drive runs up when there are no faults. The LED is lit green (significance of the diagnostics LED, refer to Chapter LEERER MERKER).

Reader’s note

Information regarding fault/error handling and diagnostics is provided in Chapter 7.

The following flow diagram shows how a POSMO SI or POSMO CD/CA system is commissioned.

The following is to be taken into account:

- POSMO SI is shipped in the commissioned status, i.e. it is especially important to note that the user does not have to enter the motor code, as long as he did not delete ”Delete drive configuration” via SimoCom U.
- The PROFIBUS address must be set using DIP switches.

  In this case, the PROFIBUS unit must be removed from POSMO SI or POSMO CD/CA (refer to Chapter 2.4.4).

4

Start-up procedure

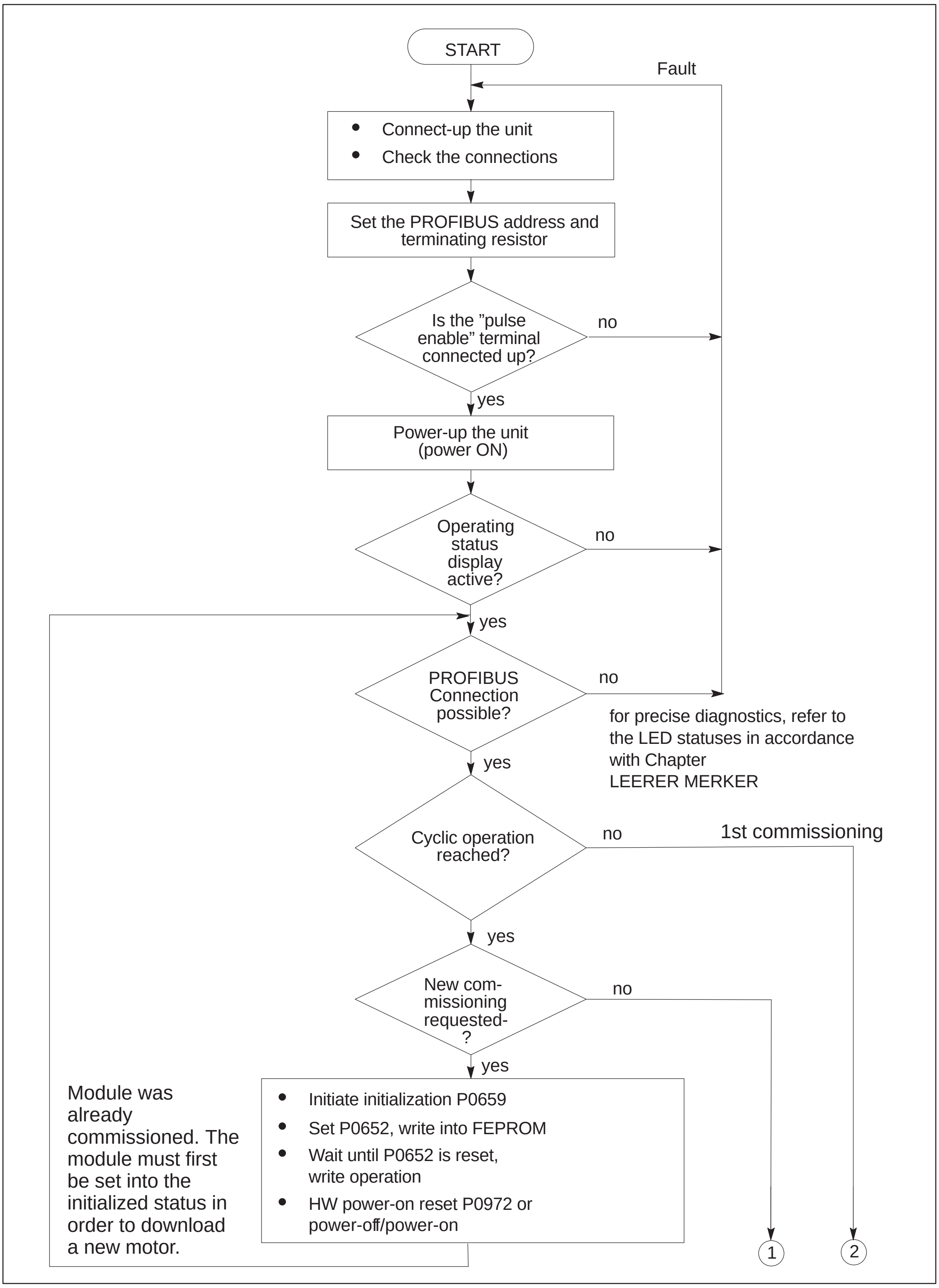


Fig. 4-1 Commissioning procedure, first/re-commissioning POSMO SI/POSMO CD/CA (Part 1)

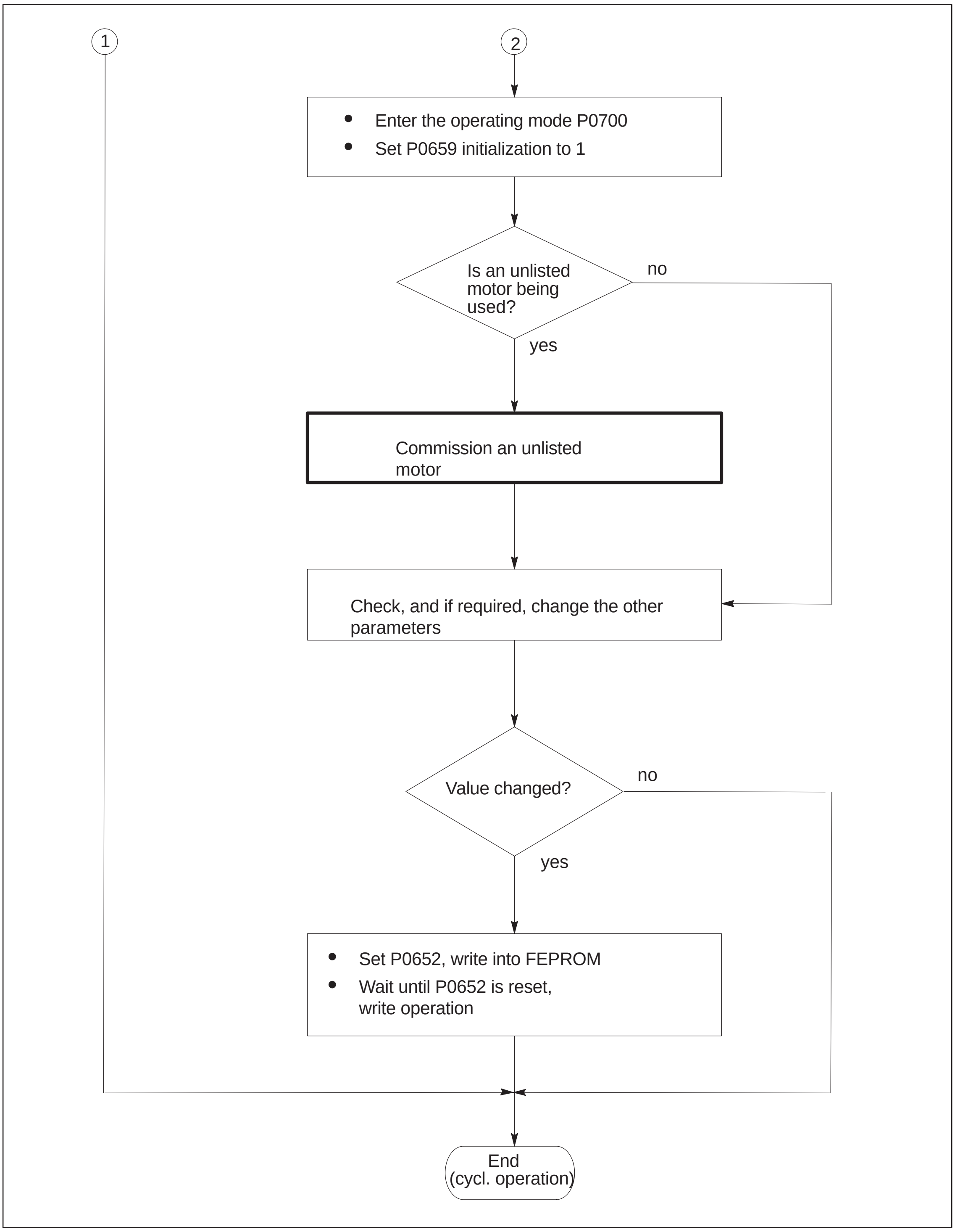


Fig. 4-2 Commissioning procedure, first/re-commissioning POSMO SI/POSMO CD/CA (Part 2)

4.3 Commissioning using ”SimoCom U”

Prerequisites

The following prerequisites must be fulfilled in order to be able to commission a drive using the ”SimoCom U” parameterizing and start-up tool:

1. All of the prerequisites for commissioning according to Chapter 4.1 have been fulfilled, i.e. the system with ”POSMO SI” and ”POSMO CD/CA” can be commissioned.
2. The checklist for commissioning according to Chapter 4.1 has been checked.
3. The ”SimoCom U” tool is installed on the PC/PG, which is to be used to commission the drive.
4. PC/PG is connected to PROFIBUS-DP with ”SimoCom U”.

Reader’s note

• Power and signal cables:	Refer to reference: /Z/, Catalog NC Z
• Installing ”SimoCom U”, Introduction to ”SimoCom U” and establishing online operation:	Refer to Chapter 3.2

Reader’s note

What is an unlisted motor?

A motor, which is not defined using a motor code number, and is therefore also not in the Attachment (refer to Chapter A.3.1, A.3.4 and A.3.5) is classified as an unlisted motor.
The motor can be supplied from Siemens or from another motor manufacturer.
To commission an unlisted motor, the associated parameters are required (refer under the index entry ” Unlisted motor - parameters for...”.

Commissioning via a file

A drive can be commissioned using ”SimoCom U” and a drive file.
The drive file is downloaded via PROFIBUS-DP.

4.3.1 First commissioning using ”SimoCom U”

Procedure when commissioning the drive for the first time

When commissioning POSMO SI or POSMO CD/CA for the first time using the ”SimoCom U” parameterizing and start-up tool, proceed as follows:

1. Power-up the drive group
2. Start ”SimoCom U”
3. Request online operation

   Operator action:
   In the ”Commission” menu, click on the item ”Search for online drives” and select the drive in the ”Drive and dialog browser”.

   Is the ”start-up required” window displayed?

   – Yes: —> Start the drive configuration Wizard

     —> This means that you provide the drive with the existing configuration.

   – No: —> Press ”re-configure drive” button

     —> This means that you change the existing configuration on the control board.

4. Execute the drive configuration, and at the end, press the ”Calculate controller data, save, reset” button.
5. Carry-out basic commissioning

   Set the ”Drive and dialog browser” (lefthand window) to ”Parameter”.
   To do this, press the ”P Par” button below the browser.

   The commissioning is now executed by working through the remaining dialog boxes for this drive in the ”Drive and dialog browser” from the top to the bottom. The required settings are made in the selected dialog boxes.

4.3.2 Series commissioning using ”SimoCom U”

Procedure for series commissioning

For series commissioning of POSMO SI or POSMO CD/CA using the ”SimoCom U” parameterizing and start-up tool,
proceed as follows:

1. Power-up the drive group
2. Start ”SimoCom U”
3. Request online operation

   Operator action:
   In the ”Commissioning” menu, click on ”Search for online drives” and select ”Drive” in the selection box.

   Is the ”start-up required” window displayed?

   – Yes:
     —> Click on the ”Load parameter file into the drive...” button

     —> After selecting the required parameter file for the drive and pressing ”Open”, the file is downloaded into the drive.

   – No:
     —> Click on the menu ”File —> Load into drive —> Load and save in the drive”

     —> After selecting the required parameter file for the drive and pressing ”Open”, the file is downloaded into the drive.

4.3.3 Password protection with SimoCom U

General information

Access protection using a password is possible in order to ensure that when service is carried-out the drive configuration is not changed.

The ”SimoCom U” parameterizing and start-up tool has a password input and change view in order to carry-out the following on a connected drive:

- Activate/de-activate the password protection
- Define the password
- Define the functions that are to be protected using the password

For a series commissioning, the password and the password configuration are transferred to the drive just like any other parameter assignment.

The password is not necessary to do the following:

- Open files
- Downloading files into a drive

The password must only be entered if the protected functions are to be accessed in the file or in the drive.

SimoCom U allows the password function to be copied between several drives.

Note

The function ”Password protection” only functions with a ”SimoCom U” parameterizing and start-up tool version $\geqslant$8.1.

Procedure when setting–up the password

Proceed as follows when setting–up a password using the ”SimoCom U” parameterizing and start–up tool:

1. Power–up the drive group
2. Start SimoCom U
3. Request that the required drive either goes into the offline or online mode
4. In the ”drive and dialog browser” (lefthand window), select the ”password” folder
5. Access to enter a PIN and browser to enter the functions to be protected is activated by a ”check” in the ”Activate password protection” field (righthand window)
6. Enter a PIN (4-digit number from 1000...9999) and acknowledge

7. Define the functions to be protected

   --> Functions that are already protected are displayed with a ”check” in the particular field in the ”righthand” display window (browser) (default setting).

   --> Further, additional functions can be assigned password protection by activating the button ”Activate all functions” or by entering a ”check” in the field of the function to be protected.

8. Press the ”Accept password configuration” button

9. Save the changes

Note

The ”Activate safety-relevant functions” and ”Activate all functions” buttons should only be pressed when actually required.

Access protection

Individual functions (operator masks, menu items, ...) can be protected or enabled.

The following safety-relevant functions are set as default values:

- Expert list
- Load to drive
- Reconfigure drive
- Establish the standard values of the current drive configuration
- Upgrade firmware
- User parameter list

Access with SimoCom U <Version 8.1

The drive inhibits write access operations via SimoCom U <Version 8.1 and outputs a warning.

A SimoCom U with Version$\geq$ Version 8.1 must be used in order to change the drive in any way at all.

Access via databus

Access operations via PROFIBUS-DP, CAN bus and other unlisted modules are not prevented, as in the normal operating state of the machine, these channels cannot be manipulated by the operator.

Enable the access

You can access a password-protected function via SimoCom U as follows:

1. In the online mode, SimoCom U prompts for the password.
   --> Enter password
2. All of the protected functions in the ”righthand” browser of the menu screen can now be changed.
3. After entry, the password remains valid up to the next time that SimoCom U goes online.
4. The protected functions cannot be accessed if the password was not entered.
5. If the password was incorrectly entered five times in a row, then SimoCom U must be re-started before the password can be re-entered.

Password forgotten?

The drive must be deleted using ”delete drive configuration” or ”boot board”. This deletes the complete parameterization.

Note

Before activating password protection using SimoCom U, we recommend that the functioning configuration of the drive is saved in a file.

There is no generally-valid password!

Password protection and other programs with SimoCom U

When using A&D Data Management (ADDM) and other programs, that SimoCom U uses, then password protection may not be activated.

4.3.4 Automated firmware download (from SW 8.1)

General information

Automated firmware download is possible using the ”SimoCom U” parameterizing and start–up tool.

This means that both the actual firmware as well as also the previous version releases (e.g. SW 7.2) can be downloaded.

”SimoCom U” is configured for the appropriate drive using registry files.

Data can be downloaded via the data bus (e.g. PROFIBUS-DP) or the serial interface.

Prerequisite

- When downloading via PROFIBUS-DP, the correct PROFIBUS node address must be parameterized for the appropriate drive.
- The registry files must be edited so that they match a specified drive configuration.
- It is necessary that ”SimoCom U” was installed – however, the application may not run while changing or running the registry file.

Procedure

1. Edit the .reg file and carry-out the settings (refer to Fig. 4-3).

   If you wish to only change the file names, the path or the PROFIBUS address, then the settings are also possible via SimoCom U without using the .reg files.

   --> Using the dialog menu ”Service” —--> ”Automated firmware download” —--> ”Define file” or ”Options” —--> ”Settings” —--> ”Communications”

2. Run the .reg file if you have not carried-out the settings via SimoCom U.

   --> The Windows registry editor prompts after the settings have been transferred into the registry.

   --> Acknowledge with ”Enter”.

   --> The Windows registry editor signals that the settings have been successfully transferred into the registry

   --> Again acknowledge this message with ”Enter”.

```
Windows Registry Editor Version 5.00

[HKEY_CURRENT_USER\Software\Siemens\SimoCom U\V08.00.05
”FixedFirmwareFile”=”D:\\Firmware\\611u.ufw”
”ShowBedWarnMsg”=dword:00000000
”WorkOnline”=dword:00000001
”PortType”=dword:00000004
”ProfibusAdresse”=dword:00000010
”FirstInvocation”=dword:00000000
```

SimoCom U Version

D:\\Firmware\\611u.ufw is the file name and the path for the firmware that is downloaded.

00000010 is the PROFIBUS address for the drive – in this case Drive No. 16 (hexadecimal).

Fig. 4-3 Text example for the ”.reg” file when connected via PROFIBUS-DP

3. Go online with SimoCom U

   --> Press **CTRL+H** to download the firmware

   --> SimoComU prompts you as to whether you wish to download the firmware into your drive.

   --> Acknowledge this using the ”Enter” key

4. A ”display window” shows the firmware being downloaded

   --> A drive reset is requested once the download has been successfully completed.

   --> Acknowledge using the ”Enter” key

5. Wait until the drive is again online and then check that the system is correctly operating.

   --> Then close SimoCom U (key combination **CTRL+ALT+Shift+F12)**.

Note

- In order to upgrade or downgrade several drives, you will require .”reg” files for each drive with the matching PROFIBUS address. Repeat all of the steps from the beginning to the end for each drive for which you wish to download the matching firmware.
- In order to download via the serial interface, an appropriate connection must be established and the line
  ”PortType”=dword:00000004
  changes into
  ”PortType”=dword:00000001,,
  --> refer to the text example in the diagram 4-3.
  The information in the ProfibusAdresse” line is ignored.
- When retrograding the drive to an older firmware release, it must be noted that after downloading the system firmware and running–up the module, it may be necessary to re-commission the drive.

4.4 Function-initiating and diagnostic parameters

Function-initiating parameters

Table 4-2 Function-initiating parameters

<table>
<tr><th colspan="7">Parameters</th></tr>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0649</td><td>Delete parameters, drives A and B</td><td>0</td><td>0</td><td>1</td><td>–</td><td>PO</td></tr>
<tr><td></td><td colspan="6">... all of the parameters can be deleted in the memory module FEPROM (user data). After these parameters have been deleted, the status of the POSMO SI/CD/CA when originally shipped is re-established.
0 Standard value
1 All of the parameters should be deleted (establish the status when first supplied)
Procedure when deleting all parameters:
• Switch-out the pulse and controller enable (e.g. using the ON/OFF1 control signal)
• Activate that all parameters are deleted in the FEPROM (P0649 = 1)
• Write into the FEPROM (P0652 = 1)
• Carry-out HW POWER-ON RESET
After booting, the board status when originally supplied is re-established.
Note:
Parameters cannot be deleted for drive B here, as only single-axis operation is possible for POSMO SI/CD/CA.
POSMO SI is commissioned for the first time in the factory.</td></tr>
<tr><td>0652</td><td>Transfer into the FEPROM</td><td>0</td><td>0</td><td>1</td><td>–</td><td>Immedi-ately</td></tr>
<tr><td></td><td colspan="6">This means that parameter values can be transferred from the RAM into the FEPROM.
0 –> 1 the values are written from the RAM into the FEPROM
The parameter is automatically set to 0 at the end of the data save operation.
1 Data is being saved – other parameters cannot be selected
Note:
Writing into the FEPROM memory depends on the manufacturer specifications, physically it is limited to 10^5 to 10^6 cycles. To prevent that the maximum number of write operations is exceeded during operation, automatic cyclic write operations can only be perfomed at sufficient intervals.</td></tr>
</table>

Table 4-2 Function-initiating parameters, continued

<table>
<tr><th colspan="7">Parameters</th></tr>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0659</td><td>Boot</td><td>0</td><td>0</td><td>4</td><td>–</td><td>PO</td></tr>
<tr><td></td><td colspan="6">... it is possible to toggle between the boot and standard state.
0 Establish the boot state
Sequence:
Establish boot state (P0659 = 0), write into the FEPROM
(P0652 = 1), carry-out HW POWER-ON RESET
Only the following parameters can be selected and changed in the boot state (first commissioning):
– P1106 (power module code number), if it was not automatically identified
– P1102 (motor code number)
– P1006 (IM encoder code number)
– P0700 (operating mode)
– P0918 (PROFIBUS node address)
– P0659 (boot), execute in the sense of a boot
0 → 1 Boot
All of the parameters, which are not listed above, are appropriately pre-set (default) standard values or are preset as a result of internal ”calculate controller data” routine.
1 Standard state
The standard values are loaded. The motor code and power module code are write-protected. The boot state can be re-established (with P0659 = 0).
2, 3, 4 Internal Siemens</td></tr>
<tr><td>1080</td><td>Calculate controller data</td><td>0</td><td>0</td><td>1</td><td>–</td><td>Immedi-ately</td></tr>
<tr><td></td><td colspan="6">Using this function, suitable settings for the control parameters are calculated from the motor parameters and several other parameters.
0 –>1 The controller data is being calculated, the function is active
0 Function inactive or exited error-free
Note:
• Recommendation: Execute this function with ”SimoCom U”, because the calculated parameters are displayed, and are only transferred and overwritten after acknowledgment.
• At the end of the calculation, the parameter is automatically reset to 0 or a fault code is written into it.
• If there is an error condition, the parameters for current, flux and speed controller were not able to be optimally pre-assigned. Standard values were entered.
The function can be re-started after the error cause has been removed.
Fault code:
–15 Magnetizing reactance (P1141) = 0
–16 Leakage reactance (P1139/P1140) = 0
–17 Rated motor frequency (P1134) = 0
–18 Rotor resistance (P1138) = 0
–19 Motor moment of inertia (P1117) = 0
–21 Speed at the start of field weakening (P1142) = 0
–22 Motor standstill current (P1118) = 0
–23 The ratio between the maximum current (P1104) and the motor standstill (stall) current (P1118) is greater than the maximum value for the torque limit (P1230) and the power limit (P1235)
–24 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is not permissible (pole pair number)</td></tr>
</table>

Table 4-2 Function-initiating parameters, continued

<table>
<tr><th colspan="7">Parameters</th></tr>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>1081</td><td>Calculate the equivalent circuit diagram data (ARM)</td><td>0</td><td>0</td><td>1</td><td>–</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">1 Equivalent circuit diagram data is calculated, the function is active
0 Inactive or exited fault-free
Procedure for unlisted motors:
• Select ”unlisted motor” when commissioning the system for the first time (refer to Chap. A.3)
• Enter all rating plate data
• Calculate the equivalent circuit diagram data via P1081 = 1
• Calculate unlisted motor via P1082 = 1
Note:
• At the end of the calculation, the parameter is automatically reset to 0 or a fault code is written into it.
• Under fault conditions, the equivalent circuit diagram data are not changed (exception: Coding –56).
The function can be re-started after the cause of the fault has been removed.
Fault code:
–51 Rated motor power (P1130) = 0
–52 Rated motor voltage (P1132) = 0
–53 Rated motor current (P1103) = 0
–54 Cos φ (P1129 = 0 or > 0.996)
–55 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is not permissible (pole pair number)
–56 Warning: Speed at the start of field weakening (P1142) < Rated motor speed (P1400)
–57 The function is only only permissible for unlisted motors (P1102 = 99)</td></tr>
<tr><td>1082</td><td>Calculate unlisted motor</td><td>0</td><td>0</td><td>1</td><td>–</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">... the ”Calculate unlisted motor” function is started. Parameters P1105 (only SRM), P1147, P1241, P1401 are pre-assigned, the ”Calculate controller data” function executed and the appropriate unlisted motor code entered into P1102.
By entering the unlisted motor code in P1102, at the next POWER ON, motor data which were possibly changed, are no longer overwritten by the catalog motor data (previous motor code).
0 Inactive
1 Calculate unlisted motor
Procedure:
Are all equivalent circuit diagram data known?
• if no: Calculate the equivalent circuit diagram data via P1081 and set P1082 to 1
• if yes: Enter all of the equivalent circuit diagram data and set P1082 to 1
Note:
At the end of the calculation, the parameter is automatically set to 0, or an error code is written into it (refer to the ”calculate controller data” function, P1080).</td></tr>
<tr><td>1083</td><td>Function selection, motor data optimization (ARM)</td><td>1</td><td>1</td><td>4</td><td>–</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">... specifies the function number for the motor data optimization.
1 Determine the leakage inductance and rotor resistance
2 Determine the no-load current and magnetizing reactance
3 Determine the speed at field weakening
4 Determine the moment of inertia</td></tr>
</table>

Table 4-2 Function-initiating parameters, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1084	Start motor data optimization (ARM)	0	0	1	–	Immedi-ately
	... starts the ”motor data optimization” function, which is set in P1083. 0 Inactive or exited fault-free 1 Start motor data optimization **Note:** At the end, 0 or a fault code is automatically written into the parameter. **Fault code:** –2 A pulse frequency (P1100) of 4 kHz or 8 kHz required –3 Controller/pulse enable missing –4 Speed setpoint <> 0 –5 Motor is presently being changed-over –6 Error when determining the leakage inductance (result < 0) –7 V/f operation is active –8 As a result of the motor changeover, the incorrect motor was selected –9 Parameterized maximum speed is too low for the measurement –11 Changeover speed, open-loop/closed-loop controlled is too high (P1466) –12 Speed range too low (P1466 or P1160 too high) –13 Ramp-function generator enable missing –14 Open-loop torque controlled operation is selected –15 Motor data optimization for a listed motor is not permissible –16 An excessively high current results in i2t limiting by the power module model					

Diagnostic parameters

Diagnostic parameters are display parameters, i.e. they can only be read.

Table 4-3 Diagnostic parameters

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0599	Active motor data set	–	–	–	Hex	RO
	... indicates whether the motor changeover has been enabled, or which motor data set is active. 0 Motor changeover inhibited (P1013 = 0) 1 Motor data set 1 (P1xxx) active 2 Motor data set 2 (P2xxx) active 3 Motor data set 3 (P3xxx) active 4 Motor data set 4 (P4xxx) active **Note:** Motor changeover is described in Chapter 6.9.					

Additional parameters for diagnostics (refer to Chapter A.1)

The following additional parameters are available for diagnostics:

- P0653 Image, input signals, Part 1
- P0654 Image, input signals, Part 2
- P0655 Image, input signals, Part 3
- P0656 Image, output signals, Part 1
- P0657 Image, output signals, Part 2
- P0658 Image, output signals, Part 3
- P0678 Image of the input terminals
- P0698 Image of the output terminals

4.5 Parameters for hardware, operating mode and clock cycles

Hardware parameters

The drive must recognize the hardware that is being used (motor and encoder), so that it can appropriately respond. The hardware can only be identified when the drive is in the booted state.

- Specify the hardware with ”SimoCom U”

  The motor and encoder used are selected from a list using their Order No. (MLFB). The appropriate code is then automatically entered.

Caution

A power module could be destroyed for the following reasons:

- Incorrect motor code
- Incorrect motor data
- Inverter clock frequency or current controller gain too high

---

Calculate equivalent circuit diagram data, calculate unlisted motor

Procedure when commissioning an unlisted motor for the first time:

- Select ”unlisted motor”, e.g. synchronous or induction motor
- Enter all of the rating plate data, and if known, all of the equivalent circuit diagram data. The equivalent circuit diagram data can also be calculated using parameter P1081.
- Set parameter P1082 ”Calculate unlisted motor”.
  This means that the controller data is internally calculated and the motor code number corresponding to the motor type is saved.

Automatic power module identification

The permanently installed power module is automatically identified when the drive system is commissioned for the first time.
The appropriate code is entered into P1106 (power module code number) and P1110 (power module version).

Table 4-4 Hardware parameters

Parameters						
No.	Name	Min.	Standard	Max.	Units	Effective
1102	Motor code number	0	0	FFFF	–	PO
	The motor code number defines the connected motor. **Note:** • The motor code of the existing motor is located in the following lists: – for rotating synchronous motors (SRM) —> refer to Chapter A.3.1 – for linear synchronous motors (SLM) —> refer to Chapter A.3.4 – for induction motors (ARM) —> refer to Chapter A.3.5 • At the first commissioning and at each POWER ON, the motor data are pre-assigned according to the entered motor code (Exception: unlisted motor). • For unlisted motors, the parameters must be manually assigned (refer to Chapter A.3).					
1106	Power module code number	0	0	FFFF	–	PO
	The power module code number defines the power module used. **Note:** • The power module code can be determined from a list (refer to Chapter A.2).					
1006	IM encoder code number	0	0	65 535	–	PO
	The encoder code number describes the connected encoders. **Note:** • The encoder code number is in the following list (refer to Chapter A.4). • At the first commissioning and at each POWER ON the encoder data are pre-assigned corresponding to the entered encoder code number (Exception: Unlisted encoder). • For unlisted encoders, the parameters must be manually assigned (refer to Chapter A.4).					

Parameters for the operating mode

The ”POSMO SI” or ”POSMO CD/CA” mode is selected via P0700 (operating mode).

It is not possible to change over the operating mode in the powered-on status, as the parameter only becomes effective after POWER ON.

Table 4-5 Parameters for the operating mode

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0700	Operating mode	0	1	3	–	PO
	= 0 Reserved = 1 Speed/torque setpoint (refer to Chapter 6.1) In this mode, the drive can be operated in the following operating states: – closed-loop speed controlled mode (n_{set} mode) – open-loop torque controlled mode (M_{set} mode) – torque reduction (M_{Red}) = 2 Invalid = 3 Positioning (refer to Chapter 6.2) In this mode, traversing blocks can be selected and executed. Every traversing block can be freely parameterized, and in addition to the block number, it also contains additional data, e.g. target position, acceleration, velocity, command and block enable circuit. **Note:** • The drive can either be operated in the ”speed/torque setpoint” and ”positioning” modes via peripheral (I/O) signals or via PROFIBUS-DP or mixed (refer to Chapter 5.4). • For operation with PROFIBUS-DP: Mode — Process data – Speed/torque setpoint — (refer to Chapter 5.6.1) – Positioning — (refer to Chapter 5.6.1)					

Parameters for clock cycles

The clock cycles (current controller, speed controller, position controller and interpolation clock cycle) are set as standard for ”POSMO SI” or ”POSMO CD/CA” and generally do not have to be changed.

However, the dynamic performance of the speed controller can be further increased by reducing the speed controller clock cycle.

Note

In standard operation, use the standard clock cycle settings.

After the clock cycles have been changed, the ”calculate controller data” function (P1080 = 1) should be executed.

Table 4-6 Parameters for clock cycles

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1000	Current controller clock cycle	2	2	2	31.25 µs	PO
1001	Speed controller clock cycle	2	4	16	31.25 µs	PO
1009	Position controller cycle	32	32	128	31.25 µs	PO
1010	Interpolation clock cycle	64	128	640	31.25 µs	PO

The clock cycles are derived from the basic HW clock cycle (31.25 µs).
When changing the clock cycles, the data in the following tables and the associated limitations must be observed.

Current ctr clk cycle P1000	Speed ctr clk cycle P1001	Position ctr clk cycle P1009	Inter-polation clock cycle P1010	Clock cycles / Values
2 (62.5 µs)	4 (125 µs)	32 (1 ms)	128 (4 ms)	Standard
2 (62.5 µs)	2 (62.5 µs) 4 (125 µs) 8 (250 µs) 12 (500 µs)	1 ms to 4 ms	4 ms to 20 ms	Possible values (also refer to Limitations)

Limitations:

- Position controller clock cycle: must be an integer multiple of the speed contr. clock cycle
- Interpolation clock cycle: must be an integer multiple of the position contr. clock cycle

4.6 IM operation with induction motor (only POSMO CD/CA)

4.6.1 Description

IM operation

The IM function permits pure encoderless operation (IM operation) or mixed operation (encoderless operation/operation with encoder).

The IM operation for the ”SIMODRIVE POSMO CD/CA” drive is used for 4 quadrant speed control of induction motors without speed or rotor position encoder.

Induction motor operation permits higher demands to be fulfilled regarding the dynamic control performance and the stall immunity of conventional converter drives with V/Hz characteristic control. Compared to drives with rotor position encoder, the speed accuracy is somewhat lower and therefore it must be taken into account, that in the lower speed range, the dynamic response and smooth running characteristics will deteriorate.

Applications

IM (Induction Motor) operation is used, e.g. in the area of special high-speed motors, for grinding applications and for drives for punches and presses.

Closed-loop control

As the dynamic performance in IM operation is less than MSD operation with encoder, a speed-torque-frequency pre-control is implemented to improve the control dynamic performance.
This pre-control is only active in induction motor operation. The drive torque is known, and it controls, taking into account the existing torque and current limits as well as the load (motor – P1117 + load – P1123:8), the required torque for the fastest possible speed change. This means, that when correctly parameterized, overshoot is prevented and the controlled dynamic performance is enhanced.

For the torque pre-control, a smoothing time can be parameterized via P1459.
The speed controller is parameterized for induction motor operation using P1451 and P1453 due to the low dynamic performance.

In the low speed range, for pure induction motor operation, the actual speed, the orientation and the actual flux can no longer be calculated. This is due to the accuracy of the measured values and the parameter sensitivity of the technique. Thus, an open-loop current/frequency control is selected.
The changeover threshold is parameterized using P1466 , whereby a 5 % hysteresis is implemented.
In order to be able to accept a high load torque, even in the open-loop controlled range, the motor current can be increased via P1458.

Behavior after pulse cancellation

When the pulses are canceled and in pure induction motor operation, the drive converter has no information about the actual motor speed. When the pulses are re-enabled, the speed actual value must first be searched for.

Parameter P1012.7 can be used to define whether the search should start at the setpoint speed or at speed = 0.

P1012.7	= 0	Search starts at the setpoint speed
	= 1	Search starts at speed = 0

When the motor is stationary and P1012.7 = 0, you should avoid applying a high setpoint before the pulses have been enabled.

Warning

When the motor gating pulses are cancelled (PROFIBUS-DP, Term. IF or internally withdrawn when faults occur), there is no data available about the motor speed. The computed speed actual value is then set to 0. Thus, all of the speed actual value signals, speed actual value messages and output signals ($| n_{act} | < n_{min}$, ramp-function generator ended, $| n_{act} | < n_x$, $n_{set} = n_{act}$) are no longer reliable.

MSD/IM operation

The IM function allows the control characteristic to be changed over, online from MSD to IM control (it is not possible to have mixed operation on MSD and IM control).
The changeover is realized automatically depending on the setting of the speed threshold in P1465.

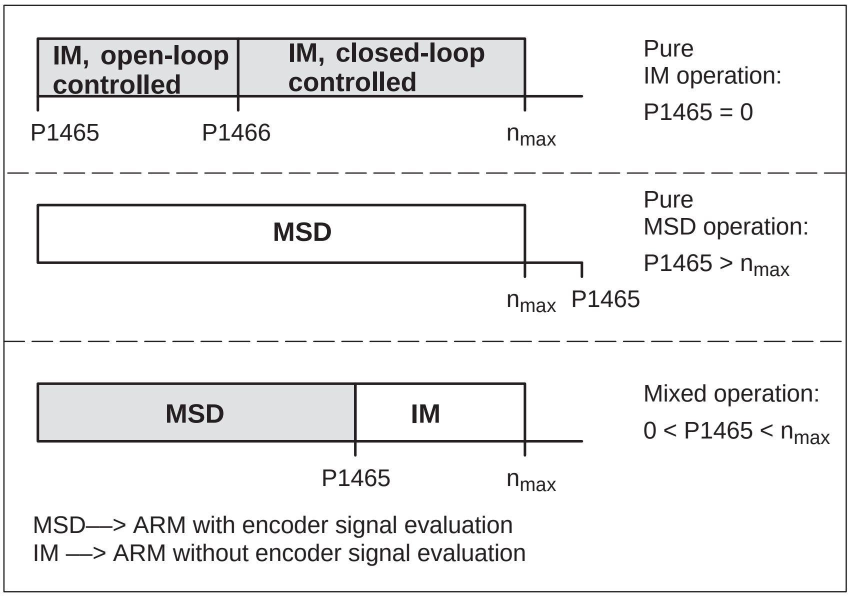


Fig. 4-4 Operating ranges, MSD/IM

Note

For pure IM operation, a rotor position encoder is not necessarily required. A fixed temperature must be selected in P1608, as in this case, generally temperature sensing is not connected.

When IM operation is selected, only drive converter frequencies (P1100) of 4 or 8 kHz are permissible.

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter ”Power modules”

Series reactor

When high-speed special motors are used, or other low leakage induction motors, a series reactor may be required to ensure stable operation of the current controller.

This reactor is taken into account in the current model using P1119.

4.6.2 Commissioning induction motors (ARM) without encoder

Danger

The EMERGENCY STOP functions must always be functioning when commissioning the drive. The relevant safety regulations must be observed to exclude danger for man and machine.

When optimizing the motor data, motor movements are initiated, which can reach the maximum motor speed.

Motor data-optimization

The motor data optimization routine supports connecting unlisted induction motors to POSMO CD/CA drives.

Often, the commissioning engineer only knows the rating plate data (manufacturer's data according to DIN VDE 0530, Part 1) of the motor.

The "Calculate equivalent circuit diagram data" function can be used to calculate other motor data.
The result of the calculation is merely an approximate estimate. The motor data optimization is used to improve the result.

When optimizing the motor data, voltage, current and speed setpoint patterns are output to the motor, and information regarding the equivalent circuit diagram data is taken from the motor response.

Prerequisites for commissioning

The following prerequisites are necessary when commissioning the drive system:

- Pulses, controller and ramp-function generator must be enabled
- Motor data optimization is possible in the MSD and IM modes.
- For MSD operation, it is not necessary to determine the moment of inertia.

Note

As a result of the many motors available in the market, it cannot always be guaranteed that the motor data optimization routine supplies results for all motor types. This is especially true for motors with a low power rating.

In this case, in addition to using the data on the motor rating plate, an attempt can also be made to only execute those steps 1...4 for motor data optimization (Chapter 4.6.3) that can be executed without any problems being encountered. If step 2 results in problems, then only the data on the motor rating plate should be used. So, after the motor data optimization has been completed, an attempt can be made to increase the flux gain (P1150). If this is also not successful, then unfortunately, the motor cannot be used together with SIMODRIVE CD/CA!

Commissioning, induction motors without encoder

For POSMO CD/CA, the system is always commissioned, user-prompted via SimoCom U.

4.6.3 Motor data optimization, steps 1 to 4

Reader's note

What happens to the faults occurring during motor data optimization?

Faults, which occur during the commissioning steps, are written into P1084 as fault code (refer to the parameter list in Chapter A.1).

Prerequisites for the commissioning steps 1 to 4:

- Enable the pulses, controller and ramp-function generator
- Set the converter switching frequency (P1100) to 4 or 8 kHz

---

Optimizing using ”SimoCom U”

From SW 5.1, the ”SimoCom U” start–up tool supports motor data optimization.

After ”motor data optimization” has been selected, a menu is displayed in which, the following optimization steps can be selected one after another from the ”Settings” selection box. These optimizing steps can be started using the ”Start” button:

1. Step 1: Determining the resistances and reactances
2. Step 2: Finely defining the no-load current, magnetizing field reactance
3. Step 3: Determining the speed at the start of field weakening
4. Step 4: Determining the moment of inertia

For the listed parameters, the results of the optimization steps are displayed, up-to-date, in the menu screen.

Optimizing with the parameter settings

The motor can also be optimized as follows using parameter settings.

Commissioning step 1

Determine the resistance and reactance values of the motor and an improved no-load current value.

Note

- The motor does not move and may not move during this measurement.
- Monitoring is not possible, as the induction motor does not have an encoder.

Carrying-out step 1

The step is executed as follows:

1. Select step: P1083 = 1
2. Start step: P1084 = 1
   - P1084 = 1 The step was started and is running – it can be exited with P1084 = 0.
   - P1084 = 1/0 The step was successfully completed
   - P1084 = –x The step was cancelled with fault–x (refer to P1084 in Chapter A.1) Start again after the fault has been removed.

Changed parameters

The following parameters are calculated/written into:

- P1136, P1137, P1138, P1139, P1140, P1141

Commissioning step 2

Determine the no-load current and magnetizing reactance.

The no-load current is set, so that at rated speed, the no-load voltage is present at the motor terminals.

⚠

Danger

The motor is accelerated, with a positive rotating field, up to the rated speed.

Note

If the speed actual value is not steady (toothed-wheel encoder), then it cannot be guaranteed that this commissioning step will be correctly executed (the setting will take too long).

Remedy: Set the speed actual value smoothing (P1522) to min. 1 ms.

Carrying-out step 2

The step is executed as follows:

1. Select the step: P1083 = 2
2. Start the step: P1084 = 1
   - P1084 = 1 The step was started and is running – it can be exited with P1084 = 0.
   - P1084 = 1/0 The step was successfully completed
   - P1084 = –x The step was cancelled with fault–x (refer to P1084 in Chapter A.1) Start again after the fault has been removed.

Changed parameters

The following parameters are calculated/written into:

- P1136, P1141

Commissioning step 3

Determine the speed at the start of field weakening.

When traveling at the threshold speed for the start of field weakening and a DC link voltage $V_{DC\ link}$, the converter output voltage is set to 380 V.
If $V_{DC\ link}$ < 600 V, the converter output voltage is reduced by the factor $V_{DC\ link}$/ 600 V.

Danger

The motor is accelerated up to the speed at the start of field weakening with a positive rotating field; the speed is limited to the currently effective limit.

Note

If the speed actual value is not steady (toothed-wheel encoder), then it cannot be guaranteed that this commissioning step will be correctly executed (the setting will take too long).

Remedy: Set the speed actual value smoothing (P1522) to min. 1 ms.

Carrying-out step 3

The step is executed as follows:

1. Select the step: P1083 = 3
2. Start the step: P1084 = 1
   - P1084 = 1 The step was started and is running – it can be exited with P1084 = 0.
   - P1084 = 1/0 The step was successfully completed
   - P1084 = –x The step was cancelled with fault–x (refer to P1084 in Chapter A.1) Start again after the fault has been removed.

Changed parameters

The following parameters are calculated/written into:

- P1142

Commissioning step 4

(not required when carrying-out self-commissioning in the MSD mode)

Determine the moment of inertia.

The moment of inertia is set, so that when the motor accelerates to the maximum speed, no I component is set in the speed controller.

Note

If there is a significant load moment of inertia in actual operation, this step should be executed with a coupled load.

During the identification runs, the total moment of inertia (P1117 + P1123:8) is taken into account and corrected in P1117.
The commissioning engineer must make the appropriate distribution between P1117 and P1123:8 (parameter set independent and dependent).

⚠

Danger

The motor is accelerated with a positive field direction of rotation up to the maximum speed along the torque limit.

Carrying-out step 4

The step is executed as follows:

1. Select the step: P1083 = 4
2. Start the step: P1084 = 1
   - P1084 = 1 — The step was started and is running – it can be exited with P1084 = 0.
   - P1084 = 1/0 — The step was successfully completed
   - P1084 = –x — The step was cancelled with fault–x (refer to P1084 in Chapter A.1)
     Start again after the fault has been removed.

Changed parameters

The following parameters are calculated/written into:

- P1117

Parameter overview

For IM operation (encoderless operation), the following parameters are available:

Table 4-7 Parameter overview for IM operation (encoderless operation)

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1451:8	P gain, speed controller IM (ARM)	0.0	0.3	9 999.999	Nms/rad	Immediately
	... the P gain of the speed controller in IM operation is set (operation without encoder). **Note:** The parameter is preset when executing the ”calculate controller data”/”calculate unlisted motor” function.					
1453:8	Integral action time, speed controller IM (ARM)	0.0	140.0	6 000.0	ms	Immediately
	... the integral action time of the speed controller is set in IM operation (operation without encoder). **Note:** The parameter is preset when executing the ”calculate controller data”/”calculate unlisted motor” function.					
1458	Current setpoint open-loop controlled range IM (ARM)	0.0	90.0	150.0	%	Immediately
	For pure IM operation (P1465 = 0), the drive is open-loop, current-frequency controlled below the changeover speed (P1466). In order to be able to accept a higher load torque, the motor current in this range can be increased using P1458. **Note:** This is entered as a percentage of the rated motor current (P1103). The current is limited to 90% of the current limit value (P1238).					
1459	Torque smoothing time constant AM (ARM)	0.0	4.0	100.0	ms	Immediately
	... the pre-control value for the torque is smoothed (initial rounding-off). **Note:** In IM operation, a speed-torque-frequency pre-control is implemented due to the low dynamic performance.					
1465	Changeover speed MSD/IM (ARM)	0.0	100 000.0	100 000.0	RPM	Immediately
	Above this, the drive runs, in IM operation with the speed set in this parameter. P1465 = 0 — pure IM operation P1466 < P1465 < n_{max} — mixed operation, MSD/IM P1465 > n_{max} — only MSD operation **Note:** • When IM operation is selected, only pulse frequencies (P1100) of 4 and 8 kHz are permissible. • The parameter is preset to 0 when first commissioning, if there is no motor measuring system (P1006 = 98, P1027.5 = 1).					
1466	Changeover speed, closed-loop/open-loop control IM (ARM)	150.0	300.0	100 000.0	RPM	Immediately
	For pure IM operation (P1465 = 0), the drive is open-loop, current-frequency controlled below the speed set using this parameter. **Note:** The parameter is preset when executing the ”calculate controller data”/”calculate unlisted motor” function.					

4.7 Permanent-magnet synchronous motor not and with field weakening (PE spindle, only with POSMO CD 18A/CA 9A)

4.7.1 Description

What is a permanent–magnet synchronous motor with field weakening?

The permanent-magnet synchronous motors with field weakening (1FE1 motor series) are liquid-cooled synchronous motors, which are supplied as components. After the components have been assembled on the spindle, a complete motor spindle unit is formed.

The rotors of 1FE1 motors are equipped with permanent magnets. The high speeds for spindle operation are achieved by a current which opposes the field. This is similar to field weakening for induction motors.

Advantages

The advantages of permanent-magnet spindles in comparison to induction motors are:

- Extremely low power loss in the rotor
  —> low bearing temperature
- Higher torque for the same active part dimensions
  —> more compact machine design
- Shorter accelerating times with the same moment of inertia
- Improved efficiency
- Favorable Cos φ
  —> it may be possible to use a smaller power module
- More favorable speed/power characteristic
  —> no power reduction in the upper speed range

Reader’s note

Detailed information on 1FE1 motors, configuring and mounting built-in motors are provided in:

Reference: /PJFE/ AC Motors for Main Spindle Drives
Synchronous Built-in Motors 1FE1
Configuration Manual/Mounting Guide
Manufacturers Documentation

Motor spindle components

A motor spindle generally consists of the following components:

- Spindle box
- Spindle with bearings
- Cooling system

  The spindle manufacturer is responsible for designing the bearings, lubrication and cooling.
- Built-in motor
- Encoder system (integrated encoder)
  - Hollow shaft measuring systems with sin/cos 1 Vpp (e.g. SIZAG 2 or SIMAG H)

System prerequisites

The prerequisites are as follows:

- POSMO CD 18A for encoder with sin/cos 1Vpp
- Maximum motor cable length = 5 m

4.7.2 Commissioning synchronous motor

General information on commissioning 1FE1 motors

The following questions must be positively responded to before commissioning synchronous motor:

- Are all of the prerequisites for commissioning checked and were the points in the checklist for commissioning checked (refer to Chapter 4.1)?
- Is the motor used a standard or an unlisted motor?
  - Standard motor?

    The motor is in a list of permanent-magnet synchronous motors with field weakening, and has an allocated motor code (refer to Chapter A.3.2)?

    When commissioning, the motor used is selected from a list.
  - Unlisted motor?

    The motor is not included in the list of permanent-magnet synchronous motors with field-weakening, and it does not have a motor code (refer to Chapter A.3.2)?

    When commissioning, the data of the motor used must be available and must be manually entered.

    The data required can be found in the table under the index entry "Unlisted motor - parameters for PE spindle".
- Are the motor and encoder already mounted and ready to be powered up?

Commissioning 1FE1 motors with SimoCom U

1FE1 motors are commissioned using the SimoCom U parameterizing and start-up tool as follows:

1. Establishing an online connection

   Operator action: e.g. with "Commissioning - search for online drives"
2. Configure the drive

   Generally, the following is valid:
   You can reach the next or the previous dialog box by pressing "next" or "back".
   - "Drive name" dialog box
   - "Motor selection" dialog box for standard motors:

"Motor" field	"Motor type" field
–> Standard motor	–> 1FT6, 1FK6, 1FE1 (synchronous)

     —> select the motor used
     —> continue with the "measuring system/encoder" dialog box

– ”Motor selection” dialog box for unlisted motor:

”Motor” field –> Enter data
”Motor type” field –> Synchronous motor (SRM)

After ”continue”, the motor data and the pre-setting for the current controller adaptation must be entered:

P-No.	Name	Value	Units
1103	Rated motor current		A(rms)
1104	Maximum motor current (as for P1122)		A(rms)
1112	Motor pole pair number		–
1113	Torque constant		Nm/A
1114	Voltage constant		V(rms)
1115	Armature resistance		Ohm
1116	Armature inductance		mH
1117	Motor moment of inertia		kgm^2
1118	Motor standstill current		A(rms)
1122	Motor limiting current (as for P1104)		A(rms)
1128	Optimum load angle		Degrees
1146	Maximum motor speed		RPM
1149	Reluctance torque constant		mH
1180	Lower current limit adaptation	0	%
1181	Upper current limit adaptation	30	%
1182	Current controller data factor	30	%
1400	Rated motor speed		RPM

– ”Measuring system/encoder” dialog box

Field
”Which motor measuring system are you using?” –> Enter data

The encoder data should be entered after ”continue”:

Incremental – without zero mark yes

Rotor position identification yes

Note: This results in, P1011 = $3XXX_{Hex}$

Speed actual value inversion first remains like this

P1005 (encoder pulse number) _ _ _ _ _ _

– ”Operating mode” dialog box

– ”Complete the drive configuration” dialog box

After the data that has been set has been carefully checked, the drive configuration is completed by pressing
”Accept this drive configuration”.

3. Set PE specific parameters and activate the PE spindle (only for unlisted motors)
   – Enter or change the following parameters via the expert list.

P-No.	Name	Value	Units
1136	Motor locked-rotor current		A(rms)
1142	Speed at the start of field weakening		RPM
1015	Activate PE-MSD	1: Activated 0: De-activated	–

   – Execute the "calculate controller data" function

     After this, the controller data is pre-assigned, PE-specific.

   – Save the parameters in the FEPROM

   – Carry-out POWER-ON RESET

Note

This completes the basic commissioning.

The motor can be operated with these settings.

After this first commissioning, for reasons of accuracy, the rotor position identification run must be executed with zero mark and the angular commutation offset determined.

Reader's note

Additional commissioning instructions/information regarding motor optimization are provided in the following.

Additional commissioning information/ instructions to optimize the motor

1. Check the control sense of the speed control loop
   – P1146 = _ _ _ _ _ _
     P1147 = _ _ _ _ _ _ Note values so that they can be written back into the system
   – P1146 (maximum motor speed) —> enter a low value P1147 (speed limiting) —> enter a low value
   – Enable the drive and operate the drive with a low speed setpoint

If	Then
No error	Control sense OK
Fault (e.g. the drive oscillates at n_{set} = 0)	If the control sense is incorrect, e.g. due to incorrect phase sequence (counter-clockwise rotating field) or interchanged encoder tracks —> correct the phase sequence or change the inversion of the speed actual value (P1011.0) and carry out POWER-ON RESET
Fault (e.g. fault 608)	If the control sense or encoder pulse number (P1005) is incorrect —> correct P1005 and execute a POWER-ON RESET

   – P1146 and P1147: Re-enter the old parameter values
2. Motor pole position identification is described in Chapter 6.14.
3. Check the rotor position identification routine via the ramp-up time measurement

   In order to check the rotor position identification routine, the ramp-up time measurements can also be made in both directions of rotation.

   Objective:
   Set P1016 so that the ramp-up times in both directions of rotation are approximately the same
4. Set the current controller adaptation (refer to Chapter 4.7.3)
   – P1120 is pre-set with ”Calculate controller data”
   – Check the pre-setting for the current controller adaptation (the values were already entered together with the motor data): P1180 = 0 %, P1181 = 30 %, P1182 = 30 %

4.7.3 Current controller adaptation

Pre-setting of the current controller adaptation

The current controller adaptation must be pre-set as follows before subsequently setting and checking:

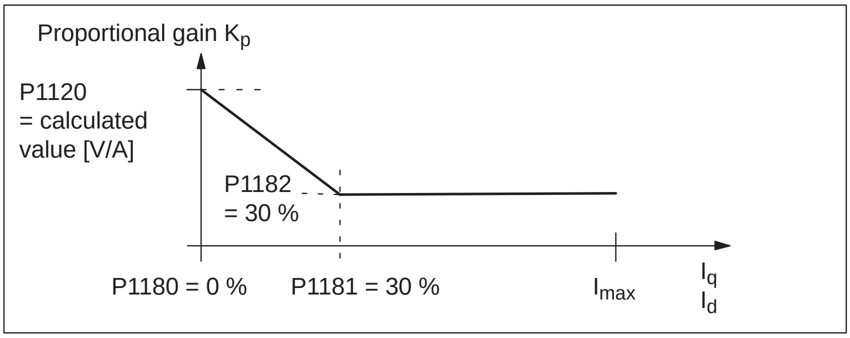


Fig. 4-5 Pre-setting of the current controller adaptation for 1FE1 motors

Setting the current controller-adaptation

To check and set the current controller adaptation, different current setpoint steps are entered via the SimoCom U parameterizing and start-up tool using the measuring function. The appropriate step response is then evaluated (current actual value = torque actual value).

Goal when setting the P gain K_p

The adaptation characteristic for the P gain K_p of the current controller should be set over the complete current I_q, so that the controller is optimally set at each current, and does not overshoot.

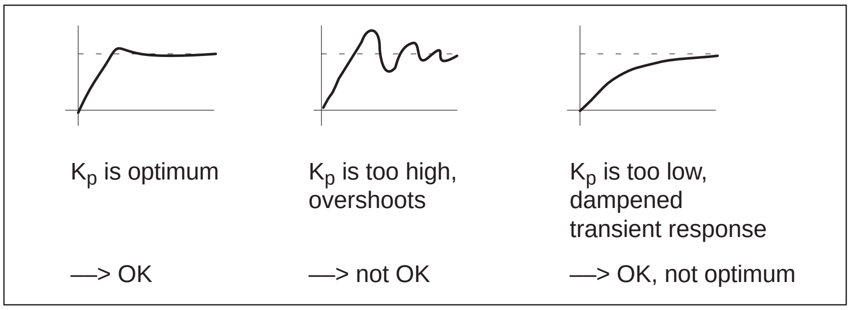


Fig. 4-6 How should the step response be evaluated?

Procedure when checking the adaptation characteristic

The pre-setting (default) of the adaptation characteristic can, e.g. be checked and set as follows:

1. Current setpoint input (amplitude = 2 % + offset = 0 %)

   Check the start of the adaptation characteristic for I_q = 0 %.

   Step response?
   OK: P1120 is correct
   Not OK: Increase/decrease P1120
   —> Target: Optimum transient response
   (refer to Fig. 4-6, left)

2. Current setpoint input (amplitude = 2 % + offset = 100 %)

   Check the constant adaptation characteristic range at I_q = 100 %.

   Step response?
   OK: P1182 is correct
   Not OK: Increase/decrease P1182
   —> Objective: Optimum transient response
   (refer to Fig. 4-6, left)

3. Current setpoint input (2 % amplitude + 30, 20, 10, 5 % offset)

   Check the transition point and the gradient of the adaptation characteristic at I_q = 30 %, 20 %, 10 %.

   Step response?
   OK: P1181 is correct
   Not OK: Increase/decrease P1181
   —> Objective: Well dampened transient response
   (refer to Fig. 4-6, right)

Note

The reference for the current setpoint (amplitude and offset) refer to the power module transistor current (P1107, units: A(pk), peak value).

Example:
P1107 = 50 A(pk) —> 50 A/$\sqrt{2}$ ≈ 36 A(rms) —> 50 % ≐ 18 A
—> 10 % ≐ 3.6 A, etc.

Parameter overview

The following parameters are used for the current controller adaptation:

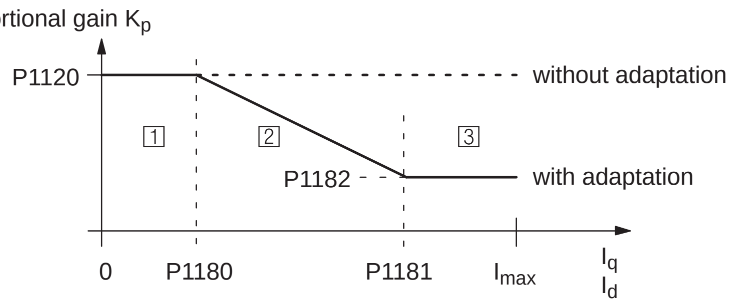
Table 4-8 Parameter overview for the current controller adaptation

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1180	Lower current limit adaptation (SRM, SLM)	0.0	0.0	100.0	%	Immediately
1181	Upper current limit adaptation (SRM, SLM)	0.0	100.0	100.0	%	Immediately
1182	Factor, current controller adaptation (SRM, SLM)	1.0	100.0	100.0	%	Immediately

The P gain of the current control (K_P, P1120) can be reduced, depending on the current, using the current controller adaptation.

The adaptation characteristic is defined using P1180, P1181 and P1182.
The following value pairs are obtained:

- First value pair: P1180/100 %
- Second value pair: P1181/P1182



1 Constant lower current range: I_q or I_d < P1180
2 Adaptation range: P1180 < I_q or I_d < P1181
3 Constant upper range: I_q or I_d > P1181

Note:

P1180, P1181: Percentage values referred to P1104 (max. motor current)

P1182: Percentage value referred to P1120 (P gain, current controller)

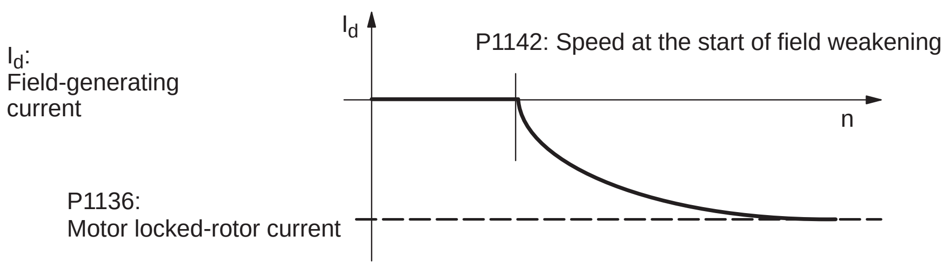
The following applies: P1180 (lower current limit adaptation) < P1181 (upper current limit adaptation)

4.7.4 Parameters for PE spindles

Parameter overview

The following parameters are used for permanent-magnet spindles (PE spindles):

Table 4-9 Parameter overview for PE spindles

<table>
<tr><th colspan="7">Parameters</th></tr>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>1015</td><td>Activate PE-MSD (SRM)</td><td>0</td><td>0</td><td>1</td><td>–</td><td>PO</td></tr>
<tr><td></td><td colspan="6">... the permanent-magnet spindle (PE spindle, 1FE1 motor) is activated/deactivated for this drive.
= 1 Permanent-magnet spindle is activated
= 0 Permanent-magnet spindle is de-activated</td></tr>
<tr><td>1136</td><td>Motor locked-rotor current</td><td>0.0</td><td>0.0</td><td>500.0</td><td>A(rms)</td><td>Immedi-ately</td></tr>
<tr><td></td><td colspan="6">The parameter is set by selecting the motor from the motor list or according to the data sheet of the motor manufacturer.
If the motor manufacturer has no data, then the motor locked-rotor current can be calculated according to the following formula:
$P1136 = (P1114 \bullet 60\ [sec]) / (\sqrt{3} \bullet P1112 \bullet P1116 \bullet 2\pi)$
Note:
P1112 Motor pole pair number
P1114 Voltage constant (V_{eff}/1000 U/rpm)
P1116 Armature inductance (mH)
Note:
For PE spindles, the maximum motor locked-rotor current (no-load current) influences the high motor speeds. This means that if the power module rating is too low, the maximum speed will not be reached. Otherwise, the functionality is not restricted.</td></tr>
<tr><td>1142</td><td>Speed at the start of field weakening (SRM, ARM)</td><td>0.0</td><td>0.0</td><td>100 000.0</td><td>RPM</td><td>Immedi-ately</td></tr>
<tr><td></td><td colspan="6">The speed at the start of field weakening is assigned when selecting the motor from the motor list, or according to the motor manufacturer’s data sheet.
If the motor manufacturer has no data, then the speed at the start of field weakening can be calculated according to the following formula:
$P1142 = 380\ V \bullet 1000\ [RPM] / P1114$
Note:
P1114 Voltage constant

</td></tr>
</table>

4.8 Linear motors (1FN3 motors, only with POSMO CD/CA)

4.8.1 General information on commissioning linear motors

General information on commissioning linear motors

The following question must be answered before commissioning motors:

- Are all of the prerequisites for commissioning checked and were the points in the checklist for commissioning checked (refer to Chapter 4.1)?

Reader's note

Detailed information on linear motors, encoders and power connection, configuring and mounting are provided in:

Reference: Configuration Manual Linear Motors of the Product Family 1FN1 or Linear Motors 1FN Peak-Load Motors of the Product Family 1FN3

Checks in the no-current state

The following checks can be made:

1. Linear motor
   - Which linear motor is being used?
   - Is the motor in the list (refer to Chapter A.3.4)?

     Yes Which? 1FN _ _ _ _ – _ _ _ _ _ _ – _ _ _ _

     No Is the data of the ”unlisted” linear motor available? (refer under the index entry ”Unlisted motor – Parameters for SLM”)
   - Is the motor already mounted and ready to be powered up?
   - If a cooling circuit is being used, is it functional?

2. Mechanical system
   - Is the axis easy to move over the complete traversing range?
   - Does the air gap between the primary and secondary section and the mounting dimensions correspond to the motor manufacturer’s data (refer to Chapter 4.8.4)?
   - Suspended/hanging axis:
     If weight equalization is being used for the axis, is this functional?
   - Brake:
     If a brake is being used, is it correctly controlled?
   - Traversing range limiting:
     Are the mechanical end stops available and tightly bolted to both ends of the traversing path?
   - Are the moving feeder cables correctly routed in a cable drag assembly?
3. Measuring system (refer to Chapter 4.8.6)
   - Which measuring system is being used? _ _ _ _ _ _ _ _ _ _ _ _ _

     Absolute or incremental abs ☐ incr ☐

     Grid spacing _ _ _ _ _ _ _ _ _ _ _ µm

     Zero marks (number and position) _ _ _ _ _ _ _ _ _ _ _ _ _
   - Which is the positive drive direction? (refer to Chapter 4.8.6)
     Which is the positive counting direction of the measuring system?

     Invert (P1011.0)? yes ☐ no ☐
4. Connecting-up
   - Power module (connect UVW, phase sequence, clockwise rotating field)
   - Protective conductor connected?
   - Screen connected?
   - Temperature monitoring circuits:
     Are the cables connected to the terminal block of the screen connecting plate?

     —> Temperature sensor (Temp-F):
     The average absolute winding temperature can be measured using the temperature sensor (Temp-F).

     —> Overtemperature switch (Temp-S)
     The individual motor phase windings can be digitally monitored for overtemperature using the overtemperature trip circuit (Temp-S).

Danger

The circuits of Temp-F and Temp-S neither have ”protective separation” between each other nor to the power circuits in accordance with VDE 0160/EN 50178.

Thus, they may not be used as SELV/PELV circuits, or connected with these. Also refer to

Reference: Configuration Manual Linear Motors of the Product Family 1FN1 or Linear Motors 1FN Peak-Load Motors of the Product Family 1FN3

– Temperature sensor evaluation (refer to Chapter 4.8.5)

5. Measuring system cable
   Is the measuring system cable inserted at MOT ENCODR?

Danger

Presently, the connection does not correspond to ”protective separation” according to VDE 0160/EN 50178.

Thus, they may not be used as SELV/PELV circuits, or connected with these. Also refer to

Reference: Configuration Manual Linear Motors of the Product Family 1FN1 or Linear Motors 1FN Peak-Load Motors of the Product Family 1FN3

4.8.2 Commissioning: Linear motor with one primary section

Procedure when commissioning using ”SimoCom U”

Linear motors with a primary section (single motor) should be commissioned as follows using the parameterizing and start-up tool:

Warning

The ”pulse enable” terminal (terminal IF) must first be switched-out for safety reasons, before powering up the drive.

---

1. Establishing an online connection

   Operator action: e.g. with ”Commissioning - search for online drives”

2. Configure the drive

   Generally, the following is valid:
   You can reach the next or the previous dialog box by pressing ”next” or ”back”.

   – ”Drive name” dialog box

   – ”Power module” dialog box (only if it is not automatically identified)

   – ”Motor selection” dialog box:

   Is the linear motor included in the list of linear motors?

”Motor” field	”Motor type” field
–> Standard motor	–> 1FN3

   The linear motor is not included in the list of linear motors?
   —>Unlisted motor

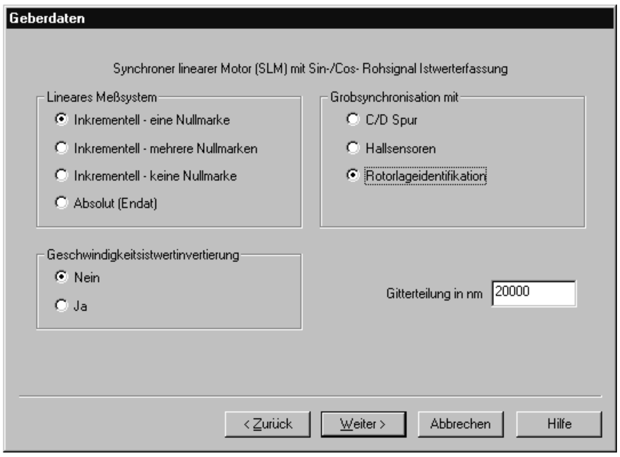
”Motor” field	”Motor type” field
–> Enter data	–> Linear motor (SLM)

   The motor data should be entered after ”continue”.

– ”Measuring system/encoder” dialog box

Field
”Which motor measuring system are you using?” –> Enter data

The encoder data should be entered after ”continue”.



”Linear measuring system” field

Incremental – a zero mark
There is an incremental measuring system with 1 zero mark in the traversing range.

Incremental – several zero marks
An incremental measuring system is used with several zero marks in the traversing range.

Incremental – no zero mark
An incremental measuring system is used without any zero marks in the traversing range.

Absolute (EnDat)
An absolute measuring system (EnDat) is used.

Speed actual value inversion
The inversion must be set, as was already determined under ”Check in the no-current status”.

Grid spacing
The grid spacing should be set as was already entered in the ”check in the no-current status” point.

Rotor position identification yes
(only for incremental measuring systems)

– ”Operating mode” dialog box

– ”Complete the drive configuration” dialog box

After the data that has been set has been carefully checked, the drive configuration is completed by pressing
”Accept this drive configuration”.

3. Fixed temperature?

   If the temperature monitoring is realized through a PLC and not through the drive (refer to case c), then for the temperature sensor evaluation, refer to Chapter 4.8.5), the monitoring function must be disabled by specifying a fixed temperature > 0.

   – P1608 (fixed temperature) = e.g. 80 °C Monitoring off
   – P1608 (fixed temperature) = 0 °C Monitoring on

4. Reduce the maximum motor current for safety reasons

   – P1105 (maximum motor current) = e.g. enter 20 %

Danger

Linear drives can achieve significantly higher rates of acceleration and velocities than conventional drives.

The traversing range must always be kept clear in order to avoid any potential danger for man or machine.

---

5. Determine the angular commutation offset

   The angular commutation offset is determined as follows:

   a) Select the identification technique using P1075. Possibly adapt other machine data for the rotor position identification routine.

   b) Save the parameters and carry-out a POWER ON RESET.

   c) Depending on the measuring system used, proceed as follows:

For an incremental measuring system:

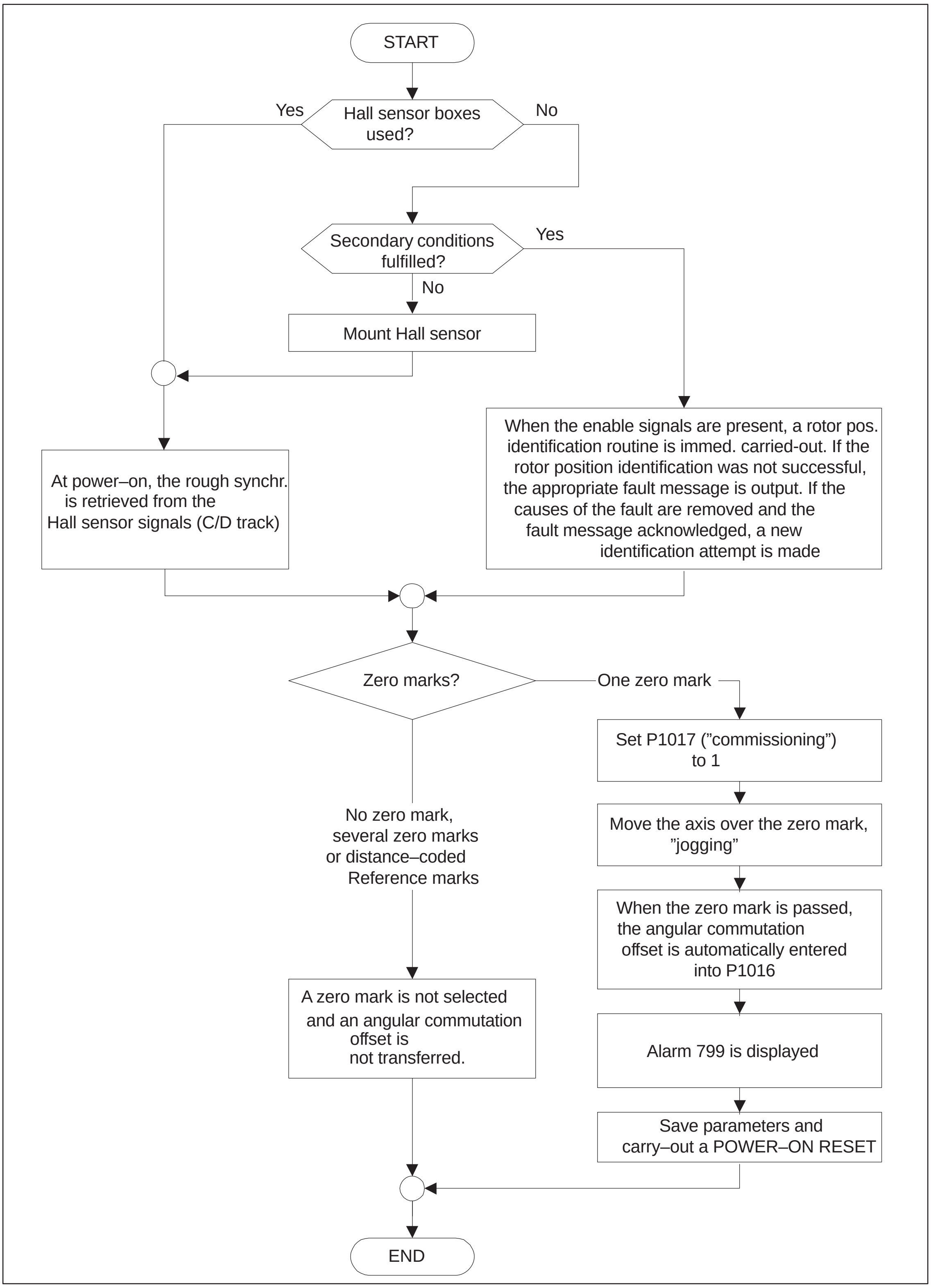


Fig. 4-7 Incremental measuring system

For an absolute measuring system:

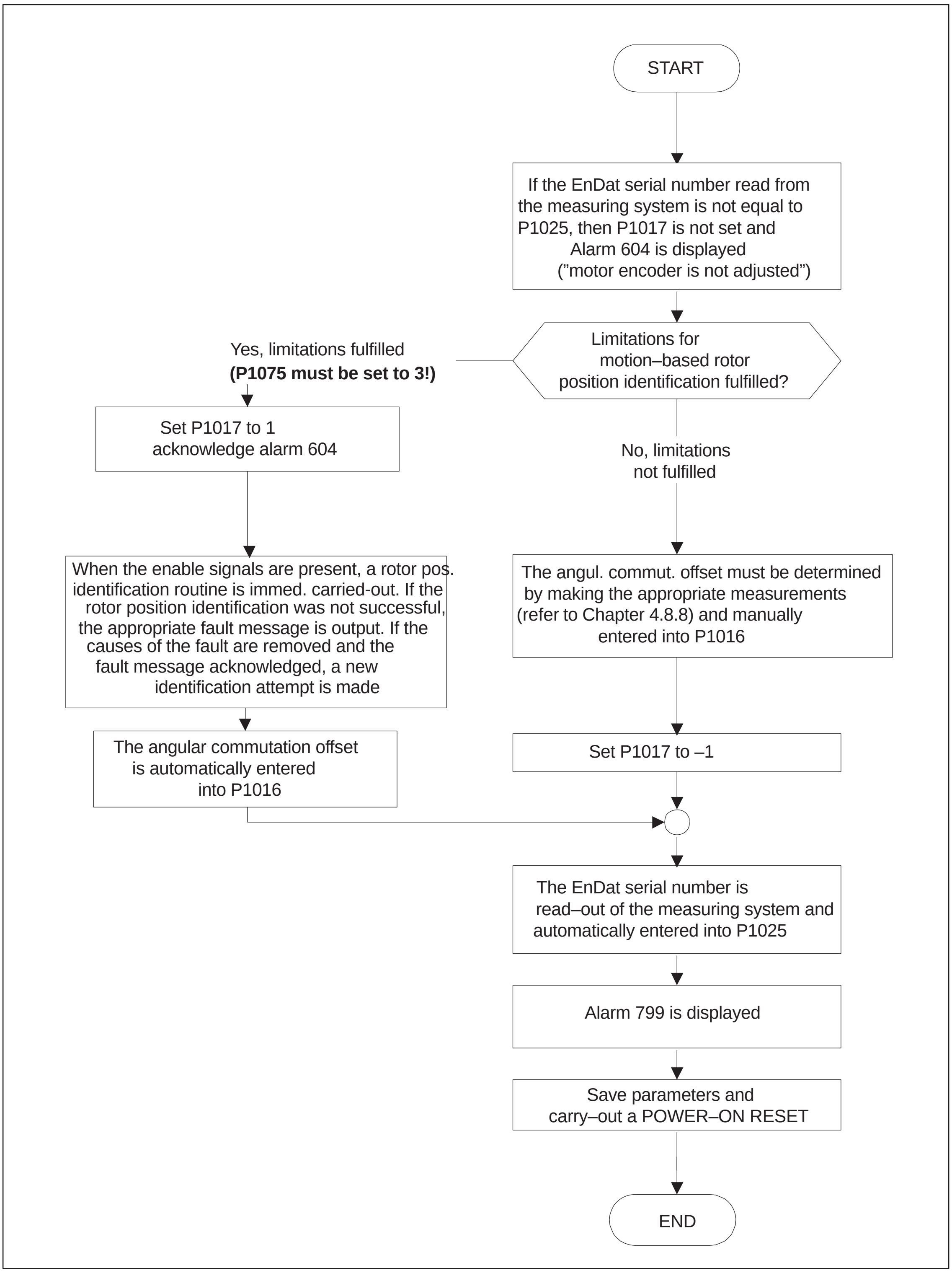


Fig. 4-8 Absolute measuring system

For a distance-coded measuring system:

This measuring system will be supported by ”SIMODRIVE POSMO SI/CD/CA” from SW 8.3 onwards. Essentially the same as incremental
measuring systems, several zero marks must be selected.

Note

For unlisted motors, a rotor position identification routine to determine the angular commutation offset cannot be guaranteed. Depending on the motor design, the following can be possibly used for both measuring systems:

- The technique based on saturation.
- The technique based on motion.
- For an absolute measuring system: The angular commutation offset is determined by making the appropriate measurements (refer to Chapter 4.8.8).

When commissioning has been completed, it is absolutely necessary that the angular commutation offset is carefully checked again by making the appropriate measurements. This is independent of whether it involves an unlisted or SIEMENS motor!

---

6. Traverse the axis and check that it is functioning correctly
   – Traversing in the closed-loop speed controlled mode

     When a speed setpoint is entered, does the axis traverse correctly?
     Yes Set the rotor position identification (Point 10.)
     No longer reduce the maximum current
     (set P1105 to 100 %)
     Optimize the current and speed controllers
     (refer to Chapter 6.1.4)
     If a higher-level closed-loop position control is used, after these points have been executed, the linear motor has been commissioned, otherwise after ”yes” immediately proceed with the next point.

     No Resolve the problem (refer to Chapter7.2.2)
     If fault 608 (speed controller output limited)
     is displayed
     —> Invert the speed actual value (change P1011.0)

   – Traversing in the positioning mode

     Does the axis traverse with a positive velocity setpoint in the required direction?
     Yes OK
     No Change P0232 (position reference value inversion)

     Is the traversing path OK (10 mm is specified —> 10 mm traversing path)?

7. Set or carry-out referencing/adjusting
   – Incremental measuring system: Referencing (refer to Chap. 6.2.5)
   – Absolute measuring system: Adjust (refer to Chapter 6.2.7)

8. Set software limit switches
   – P0314, P0315 and P0316
     (refer under the index entry ”Software limit switch”)
9. Optimizing the axis controller settings

   Note:
   Generally, the automatic controller setting for linear motors does not provide adequate results, as the measuring system mounting plays a significant role in the closed-loop control characteristics.
   – Current and speed controllers (refer to Chapter 6.1.4)
   – Position controller (refer under the index entry ”Kv factor”)
10. Check and set the rotor position identification

    To check the rotor position identification, using a test function, you can determine the difference between the calculated rotor angle position and that actually used by the closed-loop control. Proceed as follows:
    – Start the test function several times and evaluate the difference
      Start Set P1736 (test rotor position identification) to 1
      Difference P1737 (difference, rotor position identification)

      = _ _ _ _ , _ _ _ _ , _ _ _ _ , _ _ _ _ , _ _ _ _
    – Is the spread of the measured values less than 10 degrees electrical?
      Yes: OK
      No: Increase P1019 (e.g. by 10 %)
      and repeat the measurements

      If OK after having repeated the measurements, then the angular commutation offset can be re-determined:

      For an incremental measuring system
      (incremental – one zero mark):
      as for Point 5. (determining the angular commutation offset)

      For an absolute measuring system:
      Power-down the drive (POWER-ON RESET)
      Power-up the drive with the pulse or controller enable signals switched-out
      Set P1017.0 to 1
      Switch-in the pulse and enable signals
      —> The angular offset is automatically entered into P1016
      —> Fault 799
      (Save to FEPROM and HW-RESET required)
      is displayed
      Save to FEPROM and carry-out a HW-RESET

      For incremental measuring system
      (incremental – no or several zero marks):
      Save to FEPROM and carry-out a HW-RESET

4.8.3 Commissioning: Linear motor with 2 identical primary sections

General information

If it is certain that the EMF of both motors have the same relative phase position to one another, the connecting cables can be connected in parallel and operated from one drive.

Linear motors, which are connected in parallel, are commissioned, based on the commissioning of a single linear motor.

First, only one linear motor (motor 1) is connected to the drive, and is commissioned as individual motor (1FNx ...). The angular commutation offset is automatically determined and noted.

Instead of motor 1, motor 2 is connected and is commissioned as individual motor. Also here, the angular commutation offset is automatically determined and noted.

If the difference between the angular commutation offset of motor 1 and motor 2 is less than 10 degrees electrical, then both motors can be

connected in parallel to the drive and 2 linear motors (2 • 1FN3xxx) can be commissioned as parallel circuit configuration.

Procedure for commissioning linear motors connected in parallel

Linear motors connected in parallel are commissioned as follows:

1. Disconnect the parallel circuit

   Only connect motor 1 to the power module.
2. Commission motor 1 as a single motor
   —> Observe the information/data in Chapter 4.8.1
   —> Commission as described in Chapter 4.8.2 (up to and including Point 5.)
   —> Check and set the rotor position identification (refer to Chapter 4.8.2, Point 10.)
3. Traverse the axis and check that it is functioning correctly
4. Note the angular commutation offset of motor 1
   – P1016 (motor 1) = _ _ _ _ _ _ _ _ degrees electrical
5. Power-down and wait until the DC link has been discharged
6. Instead of motor 1, connect motor 2 to the power module

   Notice:
   For a Janus configuration, interchange phases U and V.
7. Power-up with the pulse and controller enable signals switched out

8. Determine the angular commutation offset of motor 2

   For an incremental measuring system:
   as for Chapter 4.8.2, Point 5. (determining the angular commutation offset)

   For an absolute measuring system:
   Power-down the drive (POWER-ON RESET)
   Power-up the drive with the pulse or controller enable signals switched-out
   Set P1017.0 to 1
   Switch-in the pulse and enable signals
   —> The angular offset is automatically entered into P1016
   —> Fault 799
   (Save to FEPROM and HW-RESET required)
   is displayed
   Save to FEPROM and carry-out a HW-RESET

9. Traverse the axis and check that it is functioning correctly

10. Note the angular commutation offset of motor 2

    – P1016 (motor 2) = _ _ _ _ _ _ _ _ degrees electrical

11. Deviation between Point 4. (motor 1) and Point 10. (motor 2)

    if ≤ 10 degrees—> OK

    If > 10 degrees
    —> Check and correct the mechanical design
    (refer to Chapter 4.8.4)
    or
    —> Carry-out a check by making the appropriate measurements
    (refer to Chapter 4.8.8)

12. Delete the drive configuration

    Operator action: ”Options – Service – Delete drive configuration”

13. Power-down and wait until the DC link has been discharged

14. Connect the 2 linear motors in parallel again

    Connect both of the motors back to the power module.

15. Power-up with the pulse and controller enable signals switched out

16. Commission the linear motors connected in parallel

    – Work completely through Chapter 4.8.2

    – In the ”motor selection” dialog box, select the motor connected in parallel (2 • 1FNx ...)
    or
    enter the data of the unlisted motor connected in parallel (refer under the index entry ”unlisted motor – parameters for SLM”)

17. Compare the angular commutation offset between motors 1 and 2

P1016 (motor 1, refer to Point 4.) = _ _ _ _ _
P1016 (motor 2, refer to Point 10.) = _ _ _ _ _

if the difference $\leq$ 10 degrees OK

if the difference $>$ 10 degrees not OK

Check and correct the motor cable connection at the power module and determine the angular commutation offset.

For an incremental measuring system:
as for Chapter 4.8.2, Point 5. (determining the angular commutation offset)

For an absolute measuring system:
Power-down the drive (POWER-ON RESET)
Power-up the drive with the pulse or controller enable signals switched-out
Set P1017.0 to 1
Switch-in the pulse and enable signals
—> The angular offset is automatically entered into P1016
—> Fault 799
(Save to FEPROM and HW-RESET required)
is displayed
Save to FEPROM and carry-out a HW-RESET

4.8.4 Mechanical system

Checking the mounting dimensions and air gap

A precision gauge block or feeler gauge can be used to check the mounting dimensions before the motor is installed.

Note

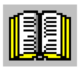
Information on how to check the valid installation dimensions can be taken from the following References:

- Reference: PJLM/ SIMODRIVE
  Configuration Manual Linear Motors
  1FN3 AC Linear Motor 1FN3
- Data sheet of the appropriate motor

For the mounting dimensions and air gap, the following applies:
Only the mounting dimensions are decisive and not the air gap which can be measured, when it comes to maintaining the electrical and system-related characteristics of the linear motor.

4.8.5 Thermal motor protection

Refer to the following literature for information regarding protecting the primary sections against inadmissibly high thermal stressing as well as temperature monitoring:



Reader's note

- Reference: Configuration Manual of the Product Family 1FN1 or 1FN3

4.8.6 Measuring system

Determining the control sense

The control sense of an axis is correct if the positive direction of the drive (= clockwise rotating field U, V, W) coincides with the positive counting direction of the measuring system.

Note

The data to determine the drive direction is only valid for Siemens motors (1FNx motors).

If the positive direction of the drive and positive counting direction of the measuring system **do not coincide**, then when commissioning, the speed actual value (P1011.0) must be inverted in the "measuring system/encoder" dialog box.

The control sense can also be checked by first parameterizing the drive, and then manually moving it, with the enable signals inhibited (switched out).
If the axis is pushed in the positive direction (refer to the definition in Fig. 4-9), then the velocity actual value must also count in the positive direction.

Determining the drive direction

The direction of the drive is then positive if the primary section moves relative to the secondary section in the opposite direction to the cable outlet direction.

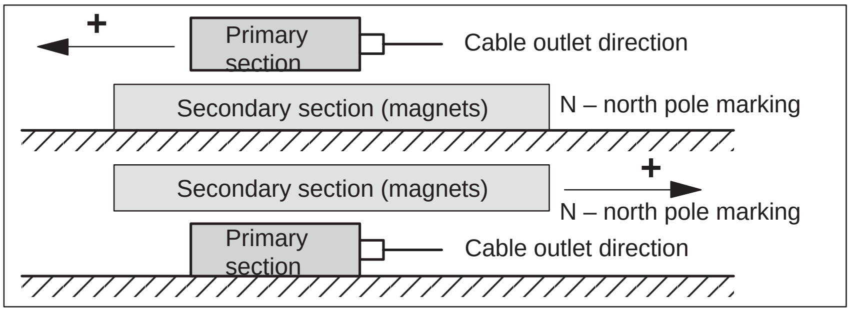


Fig. 4-9 Determining the positive direction of the drive

Determining the counting direction of the measuring system

The counting direction is determined depending on the measuring system itself.

- Measuring systems from the Heidenhain Company

Note

The counting direction of the measuring system is positive, if the distance between the sensor head and rating plate increases.

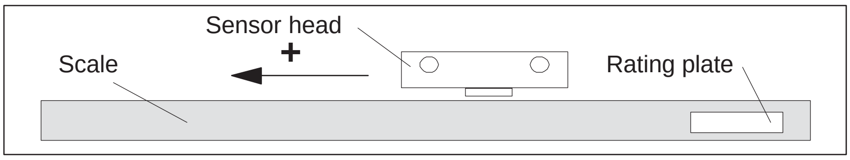


Fig. 4-10 Determining the counting direction for measuring systems from the Heidenhain Company

- Measuring systems from Renishaw (e.g. RGH22B)

The RGH22B measuring system from Renishaw (grid division = 20 μm) only has connections which are compatible to Heidenhain from serial number G69289 onwards. For earlier sensor heads, the zero mark cannot be evaluated.
As the reference mark for the Renishaw RGH22B has a direction-dependent position, with control cables BID and DIR, the encoder must be parameterized, so that the reference mark is only output in one direction.
The direction (positive/negative) depends on the geometrical arrangement at the machine and the reference point approach direction.

Table 4-10 Signal and pin assignments, signal marshaling

Signal	Cable color	Round connector 12-pin	connected to	
			+5 V	0 V
BID	black	Pin 9	Reference mark in both directions	Reference mark in one direction
DIR	Orange	Pin 7	Positive directions	Negative direction
+5 V	Brown	Pin 12		
0 V	White	Pin 10		

The counting direction of the measuring system is positive if the sensor head moves relative to the gold band in the cable outlet direction.

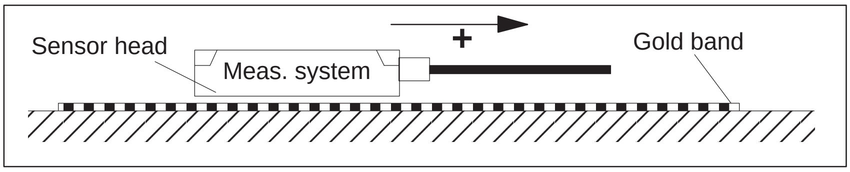


Fig. 4-11 Determining the counting direction for measuring systems from Renishaw

Note

If the sensor head is mechanically connected to the primary section, the cable outlet direction must be different. Otherwise, invert the actual value!

- Measuring systems from Zeiss (e.g. LIE 5)

Note

The positive counting direction of the linear measuring system from the Zeiss company should be determined just like the measuring system RGH22B from Renishaw (refer to Fig. 4-11).

4.8.7 Parallel and double-cam arrangement of linear motors

Note

Only identical linear motors (the same forces, winding types, secondary section types and air gap) may be connected in parallel. (Order designation or MLFB of the primary sections, to be connected in parallel, must be identical up to the winding sense and/or primary section length.)

Note

If linear motors in an axis are connected in parallel, the position of the primary sections with respect to one another and to the secondary sections must exhibit a specific grid, in order to achieve a matching electrical phase position.

Note

Additional data, refer to:

Reference: PJLM/ SIMODRIVE
Configuration Manual Linear Motors
1FN1 and 1FN3

4.8.8 Checking the linear motor by making measurements

Why make measurements?

If the linear motor was commissioned according to the relevant instructions, and unexplained fault/error messages still occur, then all of the signals must be checked using an oscilloscope.

Checking the phase sequence U–V–W

For primary sections connected in parallel,
the EMF_U from motor 1 must be in phase with the EMF_U from motor 2.
The same applies to EMF_V and EMF_W.
These must be checked using the appropriate measurements.

Procedure for making the necessary measurements:

- Switch.out ”pulse enable” terminal (terminal IF).
- Notice: Wait until the DC link has been discharged!
- Disconnect the power cables from the drive.
- Form an artificial neutral point using 1 kOhm resistors.

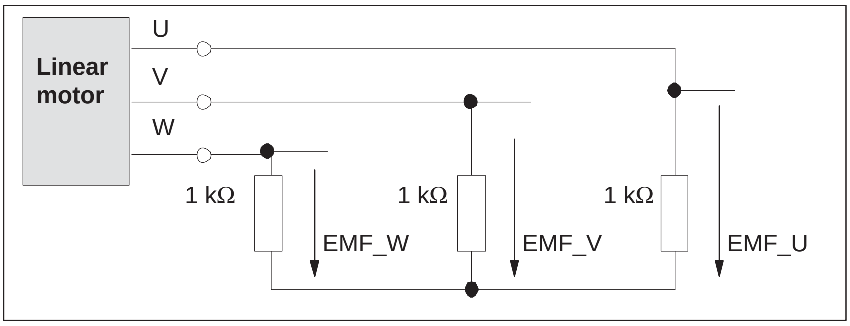


Fig. 4-12 Configuration for making the measurements

For a positive traversing direction, the phase sequence must be U–V–W.
The direction of the drive is then positive if the primary section moves relative to the secondary section in the opposite direction to the cable outlet direction.

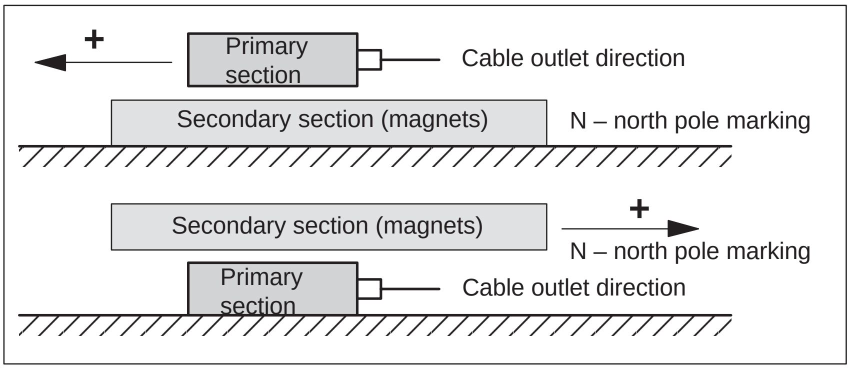


Fig. 4-13 The positive direction of the drive (clockwise rotating field)

4.9 Direct measuring system for closed-loop position control (only POSMO CD/CA)

Description

As an alternative to the motor encoder (indirect measuring system, IM), for POSMO CD/CA, a direct measuring system (DM) can be used for closed-loop position control.

The direct measuring system is connected to connector DIR MEASRG.

After the direct measuring system has been activated, the drive evaluates both measuring systems as follows:

- Motor encoder (IM) at connector MOT ENCODR:
  —> for the closed-loop speed control of the axis
  —> for the coarse synchronization of the axis rotor position
- Direct measuring system (DM) at connector DIR MEASRG:
  —> for ”precise” position sensing of the axis

Advantage:

The ”actual” position of the axis is sensed using a direct measuring system. If there is any play between the motor and table, this is not detected.

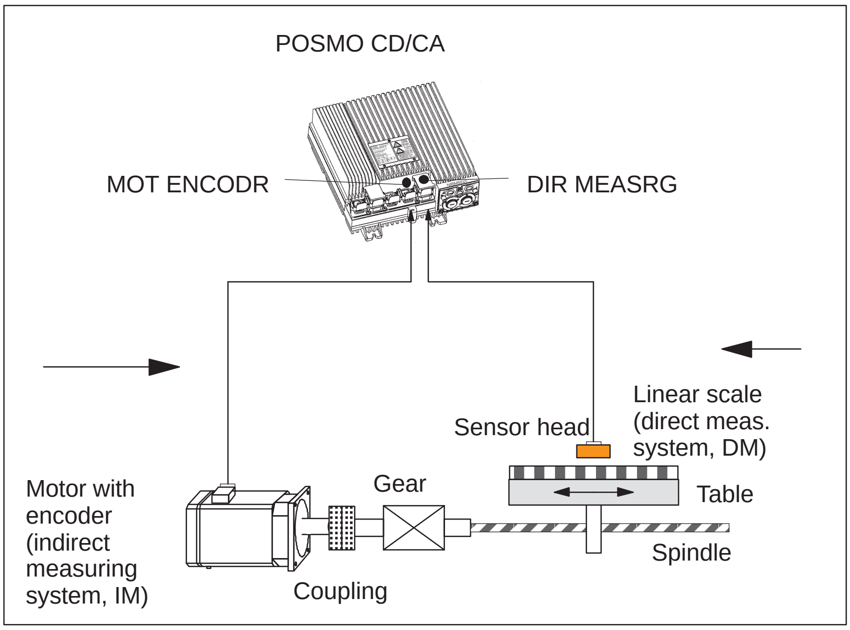


Fig. 4-14 Indirect and direct measuring system for POSMO CD/CA

Limitations and rules for a direct measuring system

The following restrictions and rules apply for the ”direct measuring system” function:

1. The direct measuring system may only be directly connected at the load side without measuring gearbox.
2. POSMO CD or POSMO CA are required for this function.
3. The direct measuring system is connected at connector DIR MEASRG.
4. The direct measuring system can only be used for closed-loop position control (in the drive, or externally in the control).
5. Which encoder systems are available for the direct measuring system?
   - Encoder without measuring gearbox
   - Incremental encoder with sin/cos 1 Vpp
   - Absolute value encoder with EnDat protocol
6. Process data for the direct measuring system

   The actual values of the position controller can be read via status word XistP.
7. The ”direct measuring system” function is activated with P0250 = 1.

   The following applies:
   - This activation becomes effective after POWER ON
   - The direct measuring system must have been commissioned —> refer to ”commissioning the direct measuring system”
   - The drive may not be operated without measuring system —> the following must be valid: P1027.5 = 0
8. Direction adaptation for direct measuring systems
   - P0231 Position act. value inversion
   - P0232 Position reference value inversion
9. You can toggle between the indirect measuring system (IM) and the direct measuring system (DM) by changing P0250 and executing a POWER-ON RESET.
   - The parameters for the closed-loop position control are only available once and must also be appropriately adapted, e.g.:

     P0231 Position act. value inversion

     P0332 Position reference value inversion

     P0201 Backlash compensation
   - The parameters for the gearbox and spindle pitch are only available once and must be set for the indirect measuring system, e.g.:

     P0236 Spindle pitch

     P0237:8 Encoder revolutions

     P0238:8 Load revolutions

– The adjustment status for absolute value encoders is changed after changeover, i.e. P0175 is set to 0.
A new adjustment is then required.

10. Which measuring system does the drive control use?

—> refer to P1792 (active measuring system)

Commissioning the direct measuring system

The following should be observed when commissioning:

Prerequisites:

1. The direct measuring system must be mounted, connected to DIR MEASRG and the system must be ready to be powered up.
2. The specified rules and limitations have been maintained.

Procedure:

1. Enter an encoder code for the direct measuring system

   The encoder code number is requested when first commissioning the system in the ”Positioning” mode via P1036.

if	then
no DM	P1036 = 0
DM in Table	P1036 = encoder code number from Table xxx
DM not in the table	P1036 = 99 (unlisted encoder) and enter data (refer to Table xxx)

2. Activate the direct measuring system

   Set P0250 to 1

3. Carry-out a POWER-ON RESET and check the function

Reader's note

Refer to Chapter for more information on the direct measuring system refer to Chapter A.4.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the indirect and direct measuring systems:

Table 4-11 Parameter overview for indirect and direct measuring systems

Indirect measuring system (IM[1], motor encoder) Parameters		Direct measuring system (DM)[2)3)] Parameters	
No.	**Name**	**No.**	**Name**
–	–	0250	Activates the direct measuring system
1005	IM encoder pulse number	1007	DM encoder pulse number
1006	IM encoder code number	1036	DM encoder code number
1008	IM encoder phase error correction	–	–
1011	IM configuration, actual value sensing	1030	DM configuration, actual value sensing
1018	IM pole pair number resolver	1040	DM pole pair number resolver
1021	IM multi-turn resolution, absolute value encoder	1031	DM multi-turn resolution, absolute value encoder
1022	IM single-turn resolution, absolute value encoder	1032	DM single-turn resolution, absolute value encoder
1023	IM diagnostics	1033	DM diagnostics
1024	IM grid division	1034	DM grid division
1025	IM serial number, low component	1038	DM serial number, low component
1026	IM serial number, high component	1039	DM serial number, high component
1027	IM configuration, encoder	1037	DM configuration, encoder

1) IM —> indirect measuring system (motor encoder)
2) DM —> direct measuring system
3) only for POSMO CD/CA

■

Communications via PROFIBUS-DP 5

5.1 General information about PROFIBUS-DP for POSMO SI/CD/CA

General information

PROFIBUS-DP is an international, open fieldbus standard, which is specified in the European Fieldbus Standard EN 50170 Part 2.

The PROFIBUS-DP is optimized for fast, time-critical data transmissions at the field level.

The fieldbus is used for cyclic and non-cyclic data transfer between a master and the slaves assigned to this master.

The following communication possibilities are available:

- **Cyclic communications**

  —> Setpoint, actual value transfer using process data (PZD communications)

  – According to the DP standard functionality
    For standard DP operation, a new cycle is started after the old cycle has been completed.
    —> refer to Chapter 5.2

  – Clock-cycle synchronous functionality
    For clock-cycle synchronous operation a new cycle is started with the set Tp clock cycle.
    —> refer to Chapter 5.2

  – Slave-to-slave communications
    Fast, distributed data transfer between drives (slaves) is possible using the ”slave-to-slave” communications function without involving the master.
    —> refer to Chapter 5.10

Note
PROFIBUS-DP cycles >15 ms are not permissible.

- **Non-cyclic communications**

  —> Access to the drive parameters

  – Parameterization using the ”SimoCom U” tool
  —> refer to Chapter 3.2

  – Data transfer using the SIMATIC Operation Panel (SIMATIC OP)
  —> refer to Chapter 5.3

  – PKW area in the net data structure according to PPOs
  —> refer to Chapter 5.6.7

  – Data exchange with the master (e.g. SIMATIC S7) and other control devices, utilizing the DPV1 utility (service) ”read data set/ write data set” corresponding to the PROFIdrive Profile
  —> refer to Chapter 5.3

- **Configuration**

  —> Configuring defines the data, which the master transfers to the ”DP slaves” at every bus run-up via the parameterizing telegram and the configuration telegram.

  The system can be configured in the following ways (refer to Chapter 5.7):

  – using the GSD file (SIEM808F.GSD/SI02808F.GSD)

  – using the ”Slave object manager” (Drive ES)

PROFIdrive conformance

The profile defines, among other things, how setpoints and actual values are transferred and how PROFIdrive parameters can be accessed.

- The profile includes the necessary definitions for the operating mode ”Speed setpoint” and ”Positioning”.
- It defines the basic drive functions and leaves sufficient freedom for application-specific expanded functionality and ongoing developments.
- The profile includes an image of the application functions on PROFIBUS-DP.
- The PROFIdrive Profile provides a total of 6 different application classes.
- For POSMO SI/CD/CA, the profile conformance for application Class 1 and from SW 6.1, application Class 4 are fulfilled.

The following functional scope has been implemented corresponding to the directive PROFIdrive V3.1 – 2002:

- Clock-cycle synchronous operation
- Configuring a telegram
- Encoder interface
- Non-cyclic parameter access using DPV1 utilities
- Profile parameters

The following parameters should be set in order, for this functionality, to achieve the precise compatibility to profile version V3.1:

- P0878 Bit 0 =1, Bit 1 = 1, Bit 2 = 1 (from SW 8.2)
- P0879 Bit 0 = 1, Bit 1 = 0, Bit 2 = 0, Bit 9 =1
- P1012 Bit 12 = 1, Bit 13 = 1, Bit 14 = 0, Bit 15 = 1 (from SW 9.1)

Reader’s note

Standard telegrams are defined to simplify configuring PROFIBUS-DP.

Telegrams 1, 2 ..., 6 are designated as standard telegrams corresponding to PROFIdrive definitions and telegrams 102...110 from Siemens are designated as standard telegram.

Master and slaves

For PROFIBUS-DP, a differentiation is made between master and slave devices.

- Master (active bus device)

  Devices, which represent a master on the bus, define data transfer along the bus, and are therefore known as active bus nodes.
  A differentiation is made between two classes of master:

  – DP Master class 1 (DPMC1):
  These are central master systems that exchange data with the slaves in defined message cycles.
  Examples: SIMATIC S5, SIMATIC S7, etc.

  – DP Master class 2 (DPMC2):
  These are devices for configuring, commissioning, operator control and monitoring during running operations.
  Examples: Programming devices, HMI

- Slaves (passive bus nodes)

  These devices may only receive, acknowledge and transfer messages to a master when so requested.

Reader’s note

SIMODRIVE POSMO SI/CD/CA is a slave on the fieldbus.

This slave is designated ”DP slave POSMO SI/CD/CA” in the following text.

Data transfer technology, baud rate

The ”DP slave POSMO SI/CD/CA” automatically detects the bus baud rate when it is powered up.

The following baud rates are possible:

9.6 kbaud, 19.2 kbaud, 93.75 kbaud, 187.5 kbaud,
500 kbaud, 1.5 Mbaud, 3.0 Mbaud, 6.0 Mbaud, 12 Mbaud

Note

- When using Optical Link Plugs (OLPs), the baud rate is limited to 1.5 Mbaud.
- When several slaves are connected to a master, for practical and sensible operation with SimoCom U, a baud rate $\geqslant$187.5 kbaud should be set.

When commissioning the fieldbus, the baud rate is defined the **same for all devices** starting from the master.

Data transfer via PROFIBUS

Data is transferred according to the master-slave technique whereby the drives are always the slaves. This permits extremely fast cyclic data transfer.

In addition, non-cyclic communications functions are also used for parameterization, diagnostics and fault/error handling during cyclic data transfer with drives.

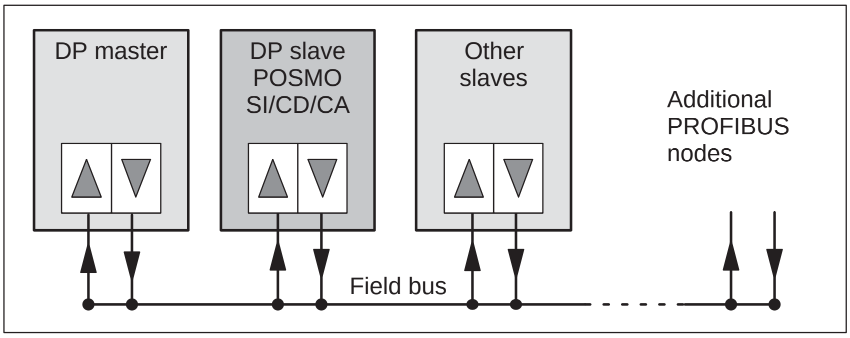


Fig. 5-1 Data transfer via PROFIBUS

Transferring words and double words

All of the word and double-word quantities which are used are transferred in the big Endian format, i.e. the high byte or high word is transferred before the low byte or low word (word length = 16 bit double word length = 32 bit).

Control words

From the perspective of the DP master, control words are setpoints.

Status words

From the perspective of the DP master, status words are actual values.

Protocols

Corresponding to the communications type, the protocols, illustrated in Fig. 5-2, are used for the ”DP slave POSMO SI/CD/CA”.

DPV1 parameter channel (from SW 6.1)

Parameters can be read and written into according to the protocol, defined in the PROFIdrive Profile via the DPV1 parameter channel.

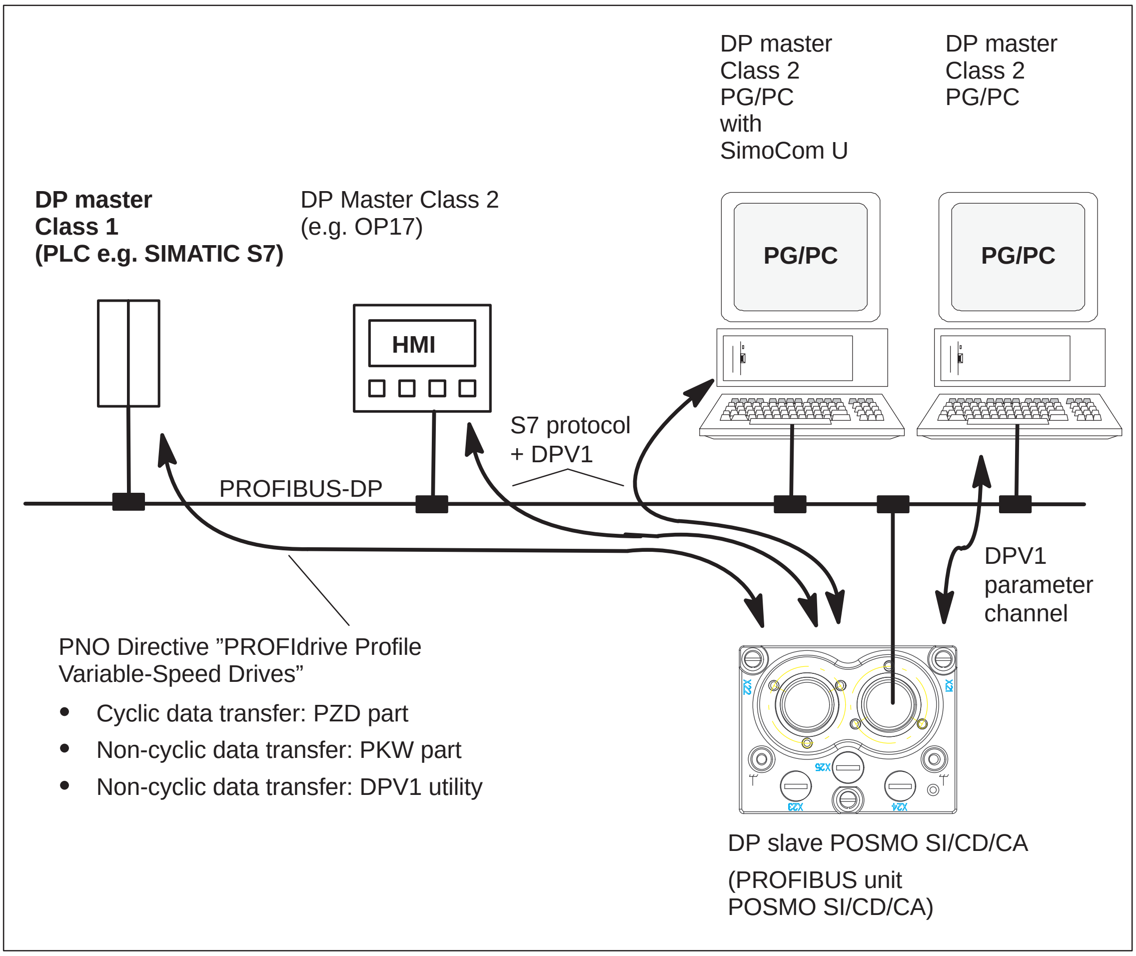


Fig. 5-2 Protocols for ”DP slave POSMO SI/CD/CA”

5.2 Basic functions of cyclic data transfer

Net data structure according to PPOs

The structure of the net data for cyclic operation is referred to as a parameter process data object (PPO) in the ”PROFIBUS profile for variable-speed drives”.

The net data structure for cyclic data transfer is sub-divided into two areas, which are transferred in each telegram.

- Parameter area (PKW, parameter identification value)

  This telegram section is used to read and/or write parameters and to read out faults. The data transfer is optional and can be defined by appropriately configuring the system.

  The mechanisms, used to apply the PKW part, are described in Chapter 5.6.7.

- Process data area (PZD, process data)

  This area contains the control words, setpoints and status information and actual values.

  The following data is transferred with the process data:

  – Control words and setpoints (task: master —> drive) and

  – Status words and actual values (responses: drive —> master)

When the bus system is commissioned, the master defines which PPO type is used to address a drive. The selected PPO type is automatically signaled to the ”DP slave POSMO SI/CD/CA” when running up, using the configuration telegram.

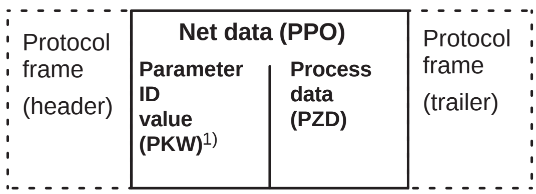
Telegram structure for cyclic data transfer

With cyclic data transfer, setpoints and actual values are transferred one after the other between the master and its associated slaves in a cycle.

For standard DP operation, a new cycle is started after the old cycle has been completed.

For clock-synchronous operation, a new cycle is started with the selected T_{DP} clock cycle.

The telegrams of the cyclic data transfer have, in both cases, the following basic structure:



Note:

1) Transfer is optional and is defined by appropriately configuring the system.

Fig. 5-3 Telegram structure for cyclic data transfer

PPOs

The PPO selection can be subdivided into:

- Net data **without** parameter area
  with 2 to 16 words for the process data.

  and

- Net data **with** parameter area
  with 2 to 16 words for the process data.
  These are the PPO types 1, 2 and 5.

A different number of process data is permissible for the reference values/setpoints and actual values.

In addition to be able to freely set the number of process data, the configuring allows standard settings to be selected. This includes, in addition to the PPO types PPO1 to PPO5 (refer to Table 5-1) a whole series of configured functions (GSD file, Drive ES), which are suitable for the various standard telegrams.

Table 5-1 Parameter process data objects (PPO types)

	Net data													
	PKW • see Chapter5.6.7				**PZD** • In closed-loop speed controlled operation, refer to Chapter 5.6.6 • In the positioning mode, refer to Chapter 5.6.6									
	PKE	IND	PWE		PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
	1st word	2nd word	3rd word	4th word	1st word	2nd word	3rd word	4th word	5th word	6th word	7th word	8th word	9th word	10th word
PPO1														
PPO2														
PPO3														
PPO4														
PPO5														

Abbreviations:

PPO	Parameter process data object	IND	Sub-index, sub-parameter number, array index
PKW	Parameter identifier value	PWE	Parameter value
PKE	Parameter ID	PZD	Process data

!

Important

The five various PPOs are selected with different data length depending on the task that the drive has to fulfill in the automation environment.

Configuring process data

The process data structure of the telegram can be defined and configured as follows:

- By selecting a standard telegram
- By freely configuring a telegram
  —> Refer to Chapter 5.6.5

5.3 Basic functions of the non-cyclic data transfer

Non-cyclic parameter access

There are three non-cyclic channels which can be used to access the drive parameters of SIMODRIVE POSMO SI/CD/CA via PROFIBUS-DP.

An overview of how parameters can be accessed for SIMODRIVE POSMO SI/CD/CA is shown in the following diagram.

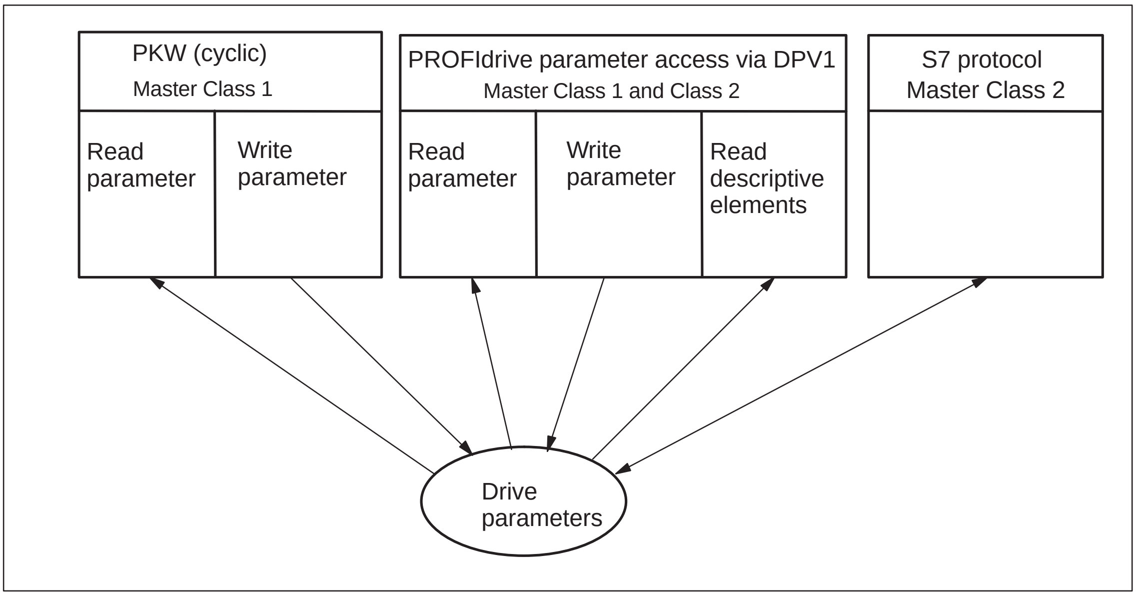


Fig. 5-4 Overview, parameter access operations for PROFIdrive

Note

Every parameter is allocated a parameter number. Profile-specific parameters are defined for the ranges decimal 900 to 999 and are reserved from decimal 60000 to 65535.

In order to remain compatible to previous parameter assignments, when accessing via the DPV1 parameter channel (reading/writing) in the drive firmware, the index is output starting with 1 and on the PROFIBUS side reduced by 1 (n–1).

PKW (cyclic)

"SIMODRIVE POSMO SI/CD/CA" is compatible to the PKW mechanism in the PROFIdrive profile Version 2 and P0879.11; this allows a non-cyclic parameter access to be carried-out within the cyclic data exchange.

Parameter access via DPV1

Using PROFIdrive, it is possible to transfer parameters via DPV1 using non-cyclic communications. The parameter definition and parameter access via the DPV1 mechanism is defined in the PROFIdrive parameter model, which is part of the PROFIdrive Profile Version 3.

The function blocks and project examples for SIMATIC S7 can be used to transfer drive parameters in a non-cyclic fashion:

Product	Order No. (MLFB):
Drive ES SIMATIC V5.2	6SW1700-5JC00-2AA0

Reader's note

Reference: /KT654/, PROFIdrive-Profile Drive Technology, Draft Version 3.1 July 2002, (Chapter 3.4)

Parameters, reading/writing DPV1 (from SW 6.1)

A protocol has been defined for accessing parameters which comprises tasks and the associated responses. The tasks are non-cyclically transferred using the DPV1 utility "write data" and the responses with "read data". Several drive parameters (e.g. traversing block) can be simultaneously accessed using a task/response.

A DPV1 parameter task and a DPV1 parameter response with individual fields is defined and documented in the PROFIdrive profile.

When reading and writing parameters, that, depending on the current configuring of the drive, are not valid – e.g. P1083 is only valid for induction motors, however, a synchronous motor is configured – then the Siemens-specific DPV1 error code 0x65 (parameter presently de-activated) is output.

Values of signal parameters (50000-type parameters) can only be read if this was configured in the PROFIBUS telegram (P0915, P0916). A negative acknowledgement (DPV1 error code 0x65) is output when reading signal parameters using non-cyclic data transfer that were not configured in the PROFIBUS Telegram.

Read the parameter description DPV1 (from SW 6.1)

The parameters, defined by the profile, are documented in a list form in

the PROFIdrive profile.

This includes both parameters with the implementation rule *"mandatory"*, i.e. parameters that are absolutely necessary in order to be in conformance with the profile as well as parameters with the implementation rule *"optional"* .

Parameter descriptions can be read so that now a master knows which parameters a drive knows and the properties which each of these parameters has.

Reader's note

Reference: /PPA/ PROFIdrive Profile Drive Technology, Draft Version 3.1 July 2002, (Chapter 3.4)

S7 protocol DPV1

It is possible to non-cyclically transfer parameters via the S7 protocol. For this type of communication, the S7 protocols link to DPV1.

Communications with SIMATIC OP (from SW 4.1)

From SW 4.1 onwards, data can be transferred with a SIMATIC Operator Panel (SIMATIC OP) to POSMO SI/CD/CA via PROFIBUS-DP.

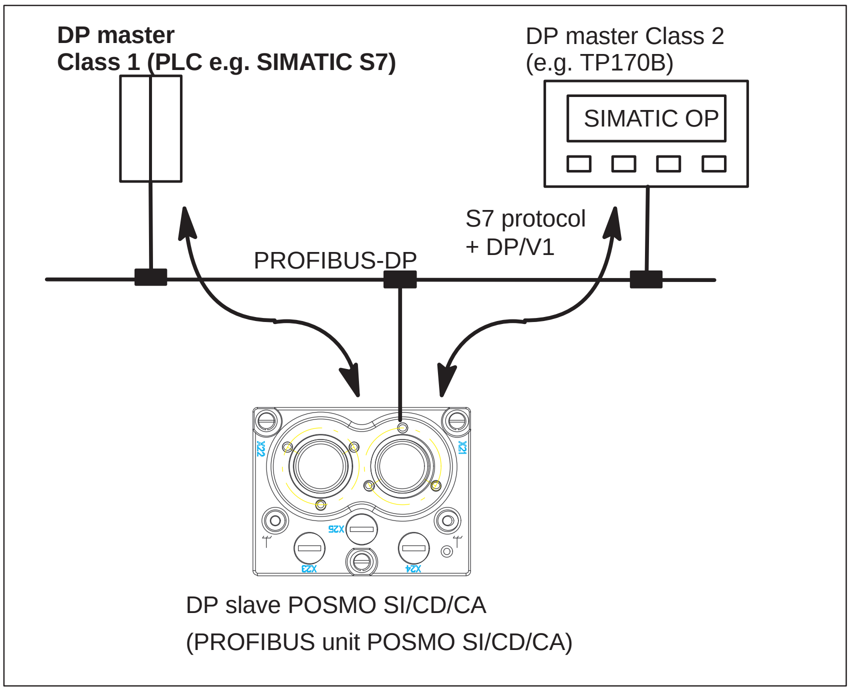


Fig. 5-5 Communications, SIMATIC OP – POSMO SI/CD/CA

- Technical details
  - Communications are realized directly between the SIMATIC OP (e.g. TP170B) as Class 2 master and POSMO SI/CD/CA as slave using the S7 protocol and the non-cyclic DP/V1 utilities.
  - SIMATIC OP can read and write into drive parameters.
  - A Class 1 master is not required.

- Configured in SIMATIC OP
  - The drive parameters are addressed using the data block and data word.
    —> Axis:
    Data block number_OP = Parameter number_POSMO SI/CD/CA
    Data word_OP = sub-parameter_POSMO SI/CD/CA
- Parameterization in the POSMO SI/CD/CA
  - Parameterize from where the drive is to be operated

    —> PROFIBUS-DP Master Class 1:
    Set P0875 = 4

    —> HW terminals
    Set P0875 to 0
- Setpoint selection
  - it is not possible to directly enter setpoints from the SIMATIC OP.
  - Setpoints can be indirectly entered using the SIMATIC OP by changing parameters, e.g. P0641 (fixed setpoint)

    —> Enter the setpoint via HW terminals (P0875 = 0)

Danger

For applications where SIMATIC OP enters setpoints, in addition, an enable or EMERGENCY STOP signal should be connected to the SIMATIC OP. This is because an interrupted connection between SIMATIC OP and POSMO SI/CD/CA does not result in a fault in the drive.

5.4 Terminal signals and PROFIBUS signals

Standard case

When the system is commissioned for the first time, the digital inputs (terminals) are automatically pre-assigned as follows:

I0.A, I1.A and I2.A (optional) = inactive

From SW 4.1, digital output 2 can also be optionally parameterized as digital input 3 (I2.A) (P0677 = 1).

Table 5-2 Input terminals for the standard case

If	Then
PROFIBUS was detected when commissioned for the first time in the boot state,	these parameters are pre-assigned as follows: • P0660 = 0 (function, input terminal I0.A) • P0661 = 0 (function, input terminal I1.A) • P0662 = 0 (function, input terminal I2.A)
Note: • Parameter value 0 signifies: the terminal is inactive	

Mixed operation

The terminal, inactive or switched-out as standard, can be assigned a function by appropriately parameterizing it.

Note

- Rule for input signals:
  – A HW terminal **has priority over** a PROFIBUS signal.
- Rule for output signals:
  – The signal is output via the hardware terminal **and** PROFIBUS

5

5.5 Internal effect of PROFIBUS signals and hardware terminals

Central enable signals

Fig. 5-6 indicates from which input terminal signals and PROFIBUS control signals the central, internal enable signals are dependent.

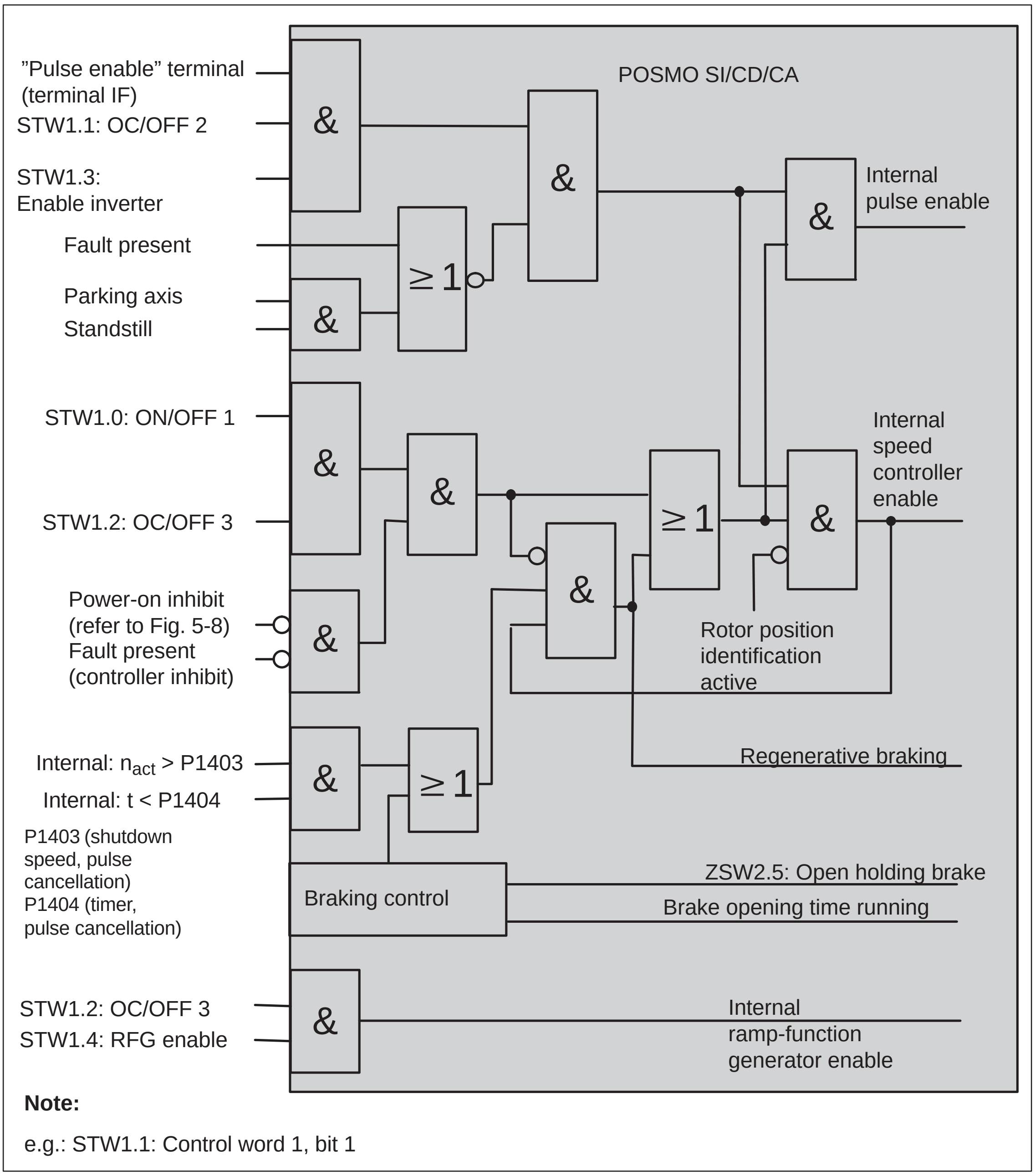


Fig. 5-6 Central enable signals and their dependency on the hardware terminals and PROFIBUS signals

Statuses from the terminal and control signals

Fig. 5-7 indicates from which input terminal signals and PROFIBUS control signals, the most important status signals are dependent and are formed.

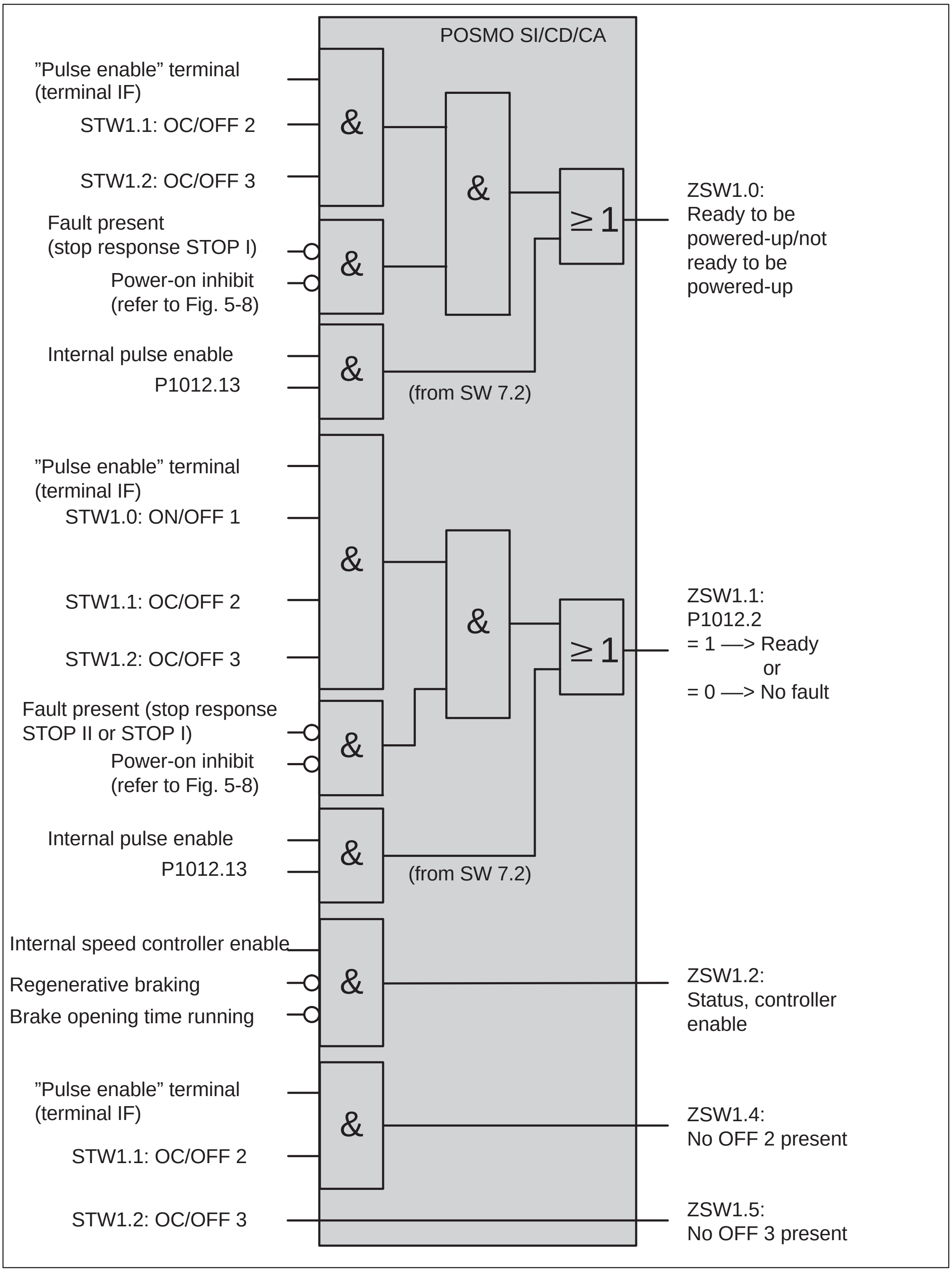


Fig. 5-7 States dependent on hardware terminals and PROFIBUS signals

Generating the power-on inhibit

If the power-on inhibit is active (P1012.12 = 1) the drive can no longer start by itself.

The ”power-on inhibit” status must be removed in order to traverse the drive.

In order to activate the behavior/response in conformance with the PROFIdrive from SW 6.1, bit 13 (power-on inhibit according to the PROFIdrive Profile) is pre-assigned a value of 1 in parameter P1012 (function switch).
This means that the behavior/response, in conformance with PROFIdrive, is activated as standard.

Fig. 5-8 indicates which signals and parameters influence the power-on inhibit.

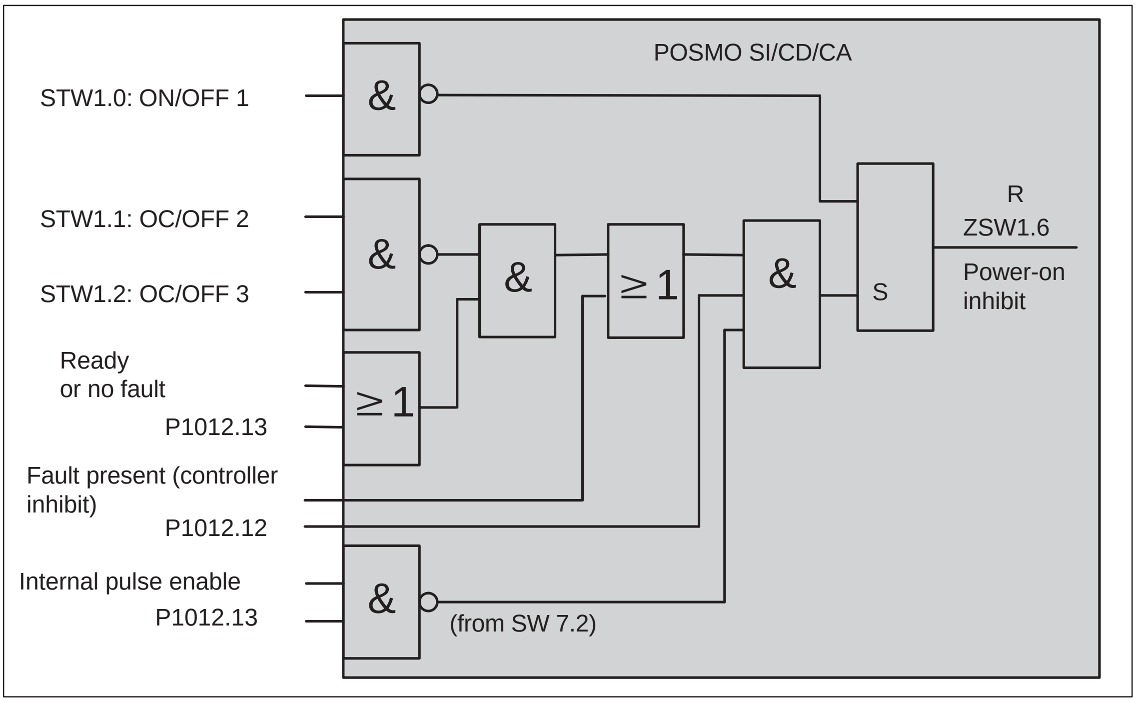


Fig. 5-8 Generating the power-on inhibit

Note

For SIMODRIVE POSMO SI/CD/CA, in addition to P1012.13 = 1 also P1012.14 is set to 1, when the status of signals STW1.1 (OC/OFF 2), STW1.2 (OC/OFF 3 and STW1.0 (ON/OFF 1) changes from 0 —> 1, this does **not** result in the ”power-on inhibit” state. This deviates from the PROFIdrive profile.

Removing the power-on inhibit?

If there is no longer a setting condition for the power-on inhibit, then it can be removed as follows:

- Reset control signal STW1.0

Switching out the power-on inhibit?

The power-on inhibit can be switched-out with P1012.12 = 0.

5.6 Net data (PKW and PZD area)

5.6.1 Overview of the process data (PZD area)

Reader’s note

In the index, for each process data (control/status word), it is specified on which page information can be found on this word.

- refer to ”Process data in the n-set mode – control words ...”
  refer to ”Process data in the n-set mode – status words ...”
- refer to ”Process data in the pos mode control words ...”
  refer to the ”Process data in the pos mode – status words – ...”

Overview of the control words (setpoints)

From the perspective of the DP master, control words are setpoints.

The ”DP slave POSMO SI/CD/CA” displays an image of the received process data (control words, setpoints) in P1788:17 (received process data, PROFIBUS).

Table 5-3 Overview of the control words (setpoints)

Control word				Operating mode		Comment
Abbreviation	**Meaning**	**Data type3)**	**Signal number1)**	**n-set**	**pos**	
STW1	Control word 1	U16	50001	x	–	
STW1	Control word 1	U16	50001	–	x	
STW2	Control word 2	U16	50003	x	x	
NSOLL_A	Speed setpoint, most significant word (nsoll-h)	I16	50005	x	–	
NSOLL_B	Speed setpoint, most significant and least significant word (nsoll–(h+l))	I32	50007	x	–	
G1_STW	Encoder 1 control word	U16	50009	x	–	
G2_STW	Encoder 2, control word2)	U16	50013	x	–	
XERR	System deviation (DSC)	I32	50025	x	–	from SW 4.1
KPC	Position controller gain factor (DSC)	U32	50026	x	–	from SW 4.1
MomRed	Torque reduction	U16	50101	x	x	
DIG_OUT	Digital outputs O0.A and O1.A	U16	50107	x	x	
XSP	Target position for ”spindle positioning”	I32	50109	x	–	from SW 5.1
DezEing	Distributed inputs	U16	50111	x	x	from SW 4.1
MsollExt	External torque setpoint	I16	50113	x	–	from SW 4.1
QStw	Control word, slave-to-slave communication	U16	50117	–	x	from SW 4.1
SatzAnw	Block selection	U16	50201	x	x	(n-set from SW 5.1)
PosStw	Position control word	U16	50203	–	x	
Over	Override	U16	50205	–	x	
Xext	External position reference value	I32	50207	–	x	from SW 4.1
dXcorExt	Correction, external position reference value	I32	50209	–	x	from SW 4.1
MDIPos	MDI position	I32	50221	–	x	from SW 7.1
MDIVel	MDI velocity	U32	50223	–	x	from SW 7.1
MDIAcc	MDI acceleration override	U16	50225	–	x	from SW 7.1
MDIDec	MDI deceleration override	U16	50227	–	x	from SW 7.1
MDIMode	MDI mode	U16	50229	–	x	from SW 7.1

1) The signals are assigned to the process data in the setpoint telegram using P0915:17 (PZD setpoint assignment, PROFIBUS) (refer under the index entry ”Configuring process data”).
2) The process data for encoder 2 must be activated via P0879.12.
3) Data type: U16/U 32 —> unsigned integer 16/32 bit ; I16/I 32 —> integer 16/32 bit

Overview of the status words (actual values)

From the perspective of the DP master, status words are actual values.

The ”DP slave POSMO SI/CD/CA” displays an image of the process data which has been sent (status words, actual values) in P1789:17 (process data sent to PROFIBUS).

Table 5-4 Overview of the status words (actual values)

Status word				Operating mode		Comment
Abbreviation	**Meaning**	**Data type**[3)]	**Signal number**[1)]	**n-set**	**pos**	
ZSW1	Status word 1	U16	50002	x	–	
ZSW1	Status word 1	U16	50002	–	x	
ZSW2	Status word 2	U16	50004	x	x	
NIST_A	Speed actual value, most significant word (nist-h)	I16	50006	x	x	
NIST_B	Speed actual value, most significant and least significant word (nist–(h+l))	I32	50008	x	x	
G1_ZSW	Encoder 1 status word	U16	50010	x	–	
G1_XIST1	Encoder 1 actual position 1	U32	50011	x	–	
G1_XIST2	Encoder 1 actual position 2	U32	50012	x	–	
G2_ZSW	Encoder 2, status word[2)]	U16	50014	x	–	
G2_XIST1	Encoder 2, pos. actual value 1[2)]	U32	50015	x	–	
G2_XIST2	Encoder 2, pos. actual value 2[2)]	U32	50016	x	–	
MeldW	Message word	U16	50102	x	x	
DIG_IN	Digital inputs I0.A to I2.A	U16	50108	x	x	
Ausl	Utilization	U16	50110	x	x	
Pwirk	Active power	U16	50112	x	x	
Msoll	Smoothed torque setpoint	I16	50114	x	x	
IqGl	Smoothed, torque-generating current Iq	I16	50116	x	x	
QZsw	Status word, slave-to-slave communications	U16	50118	–	x	from SW 4.1
UZK1	DC link voltage	U16	50119	x	x	from SW 8.3
AktSatz	Currently selected block	U16	50202	x	x	(n-set from SW 5.1)
PosZsw	Positioning status word	U16	50204	–	x	
XistP	Position actual value (pos. mode)	I32	50206	–	x	
XsollP	Position reference value (positioning mode)	I32	50208	–	x	from SW 4.1
dXcor	Correction, position reference value	I32	50210	–	x	from SW 4.1

1) The signals are assigned to the process data in the actual value telegram using P0916:17 (PZD actual value assignment, PROFIBUS) (refer under the index entry ”Configuring process data”).
2) The process data for encoder 2 must be activated via P0879.12.
3) Data type: U16/U 32 —> unsigned integer 16/32 bit ; I16/I 32 —> integer 16/32 bit

5.6.2 Description of the control words (setpoints)

Control word STW1 (n-set mode)

Table 5-5 Control word STW1 for the n-set mode

STW 1

Bit	Signal
15	Spindle positioning on (from SW 5.1)
14	Open-loop torque controlled mode
13	Ramp-up time zero for controller enable
12	Opening the holding brake for test purposes (from SW 4.1)
11	Reserved
10	Control requested/no control requested
9	Reserved
8	Activate the function generator (edge) (from SW 8.1)
7	Reset the fault memory
6	Enable setpoint/inhibit setpoint
5	Ramp-function generator start/ramp-function generator stop
4	Ramp-function generator enable
3	Enable inverter/pulse inhibit
2	Operating condition/OFF 3
1	Operating condition/OFF 2
0	ON/OFF 1

Note:

- From the POSMO SI/CD/CA perspective, the control signals are input signals and are described in Chapter 6.4.2.

  Also refer in the index under "Input signal, digital ...".
- The signals designated like this must have at least a 1 signal in order to be able to operate a motor with the speed setpoint NSOLL_A or NSOLL_B.

Control word STW1 (pos mode)

Table 5-6 Control word STW1 for positioning

STW 1

Bit	Signal
15	Request passive referencing (from SW 5.1)[1)]
14	Reserved
13	External block change
12	Opening the holding brake for test purposes (from SW 4.1)
11	Start referencing/cancel referencing
10	Control requested/no control requested
9	Jogging 2 ON/jogging 2 OFF
8	Jogging 1 ON/jogging 1 OFF
7	Reset the fault memory
6	Activate traversing task (edge)
5	Operating condition/intermediate stop
4	Operating condition/reject traversing task
3	Enable inverter/pulse inhibit
2	Operating condition/OFF 3
1	Operating condition/OFF 2
0	ON/OFF 1

Note:

- From the POSMO SI/CD/CA perspective, the control signals are input signals and are described in Chapter 6.4.2.

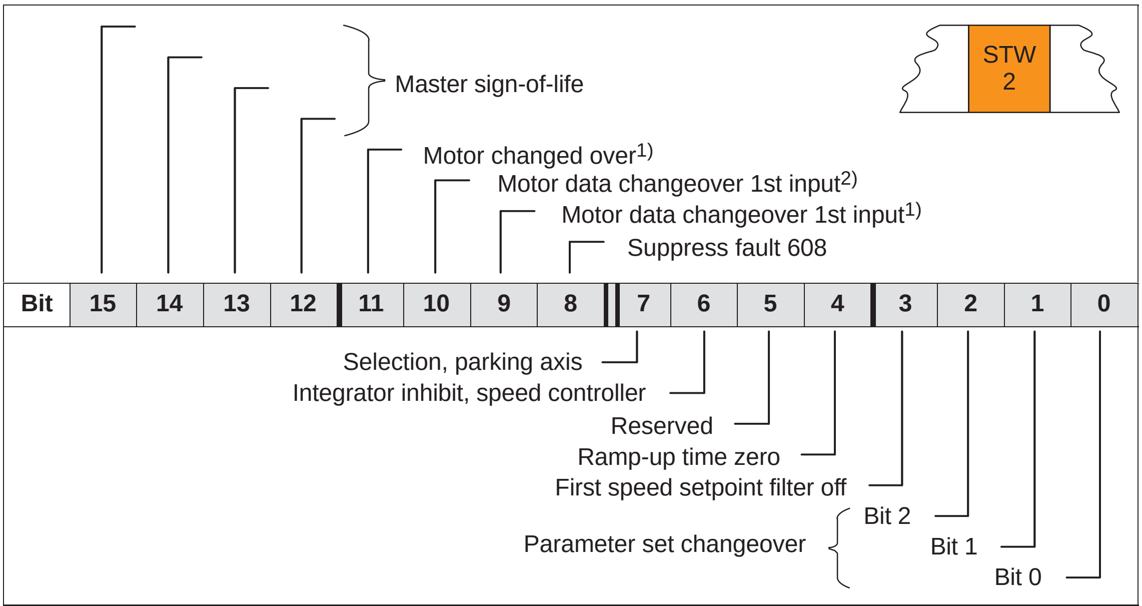
  Also refer to the index entry ”Input signal, digital ...”.
- The signals designated like this, must have at least a 1 signal, in order to be able to start a traversing block using the ”activate traversing task (0/1, positive edge)” control signal.

1) QStw.1 is OR’d.

5

Control word STW2

Table 5-7 Control word STW2



Note:

From the POSMO SI/CD/CA perspective, the control signals are input signals and are described in Chapter 6.4.2 (also refer under the index entry ”Input signal, digital ...”).

1) Only available in the n-set mode

Control word NSOLL_A NSOLL_B (n-set mode)

The speed setpoint can be entered as follows:

- via NSOLL_A (nsoll-h) —> lower resolution
- via NSOLL_B (nsoll-h + nsoll-l) —> higher resolution

Table 5-8 Speed setpoint via NSOLL_A or via NSOLL_B

NSOLL_B										Comment
NSOLL_A (nsoll-h)				nsoll-l[1]				Decimal value for		
Bit 31[2]	24	23	16	15	8	7[3]	0[3]	nsoll-h	nsoll-h + nsoll-l	
7	F	F	F	F	F	F[3]	F[3]	+32 767	2 147 483 647	Highest value[4]
	:				:			:	:	:
4	0	0	0	0	0	0	0	+16 384	1 073 741 824	Positive normalization value (P0880)
	:				:			:	:	:
0	0	0	0	0	0	0	0	0	0	nset = 0
F	F	F	F	F	F	F	F	–1	–1	nset = –1
	:				:			:	:	:
C	0	0	0	0	0	0	0	–16 384	–1 073 741 824	Negative normalization value (P0880)
	:				:			:	:	:
8	0	0	0	0	0	0	0	–32 768	–2 147 483 648	Lowest value[4]

1) The speed setpoint resolution is increased with nsoll-l.
The control word nsoll-l is only transferred for the PPO types PPO2, PPO4 and PPO5.
2) Sign bit: Bit = 0 —> positive value, bit = 1 —> negative value
3) The drive does not evaluate these values (low byte from nsoll-l)
4) The speed is limited by the lowest setting in P1401/P1146 or P1147.

Speed normalization (P0880)

P0880 is used to define which speed is obtained for NSOLL_A = 4000_{Hex} or NSOLL_B = $4000\ 0000_{Hex}$.

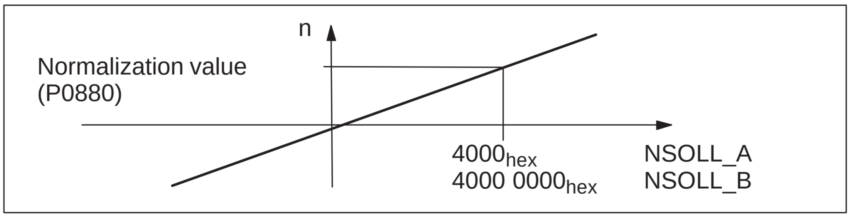
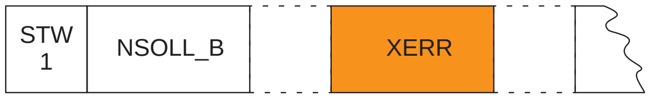


Fig. 5-9 Normalization of speed

Example:
Assumptions: The speed setpoint is entered via nsoll-h and P0880 = 16384
—> resolution = 1, i.e. 1 digit ≙ 1 RPM

Control word XERR (n-set mode) (from SW 4.1)

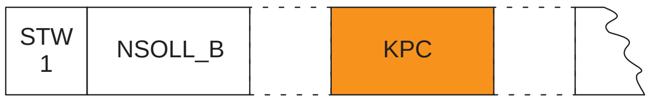
The system deviation for the dynamic servo control (DSC) is transferred via this control word.



The format of XERR is identical with the format of G1_XIST1 (refer to Chapter 5.6.4)

Control word KPC (n-set mode) (from SW 4.1)

For dynamic servo control (DSC) the position controller gain factor is transferred via this control word.



Transfer format: KPC is transmitted in the units 0.001 1/s

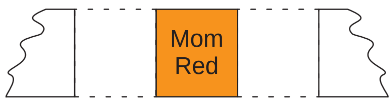
Example:
A2C2AH $\hat{=}$ 666666D $\hat{=}$ KPC = 666.666 1/s $\hat{=}$ KPC = 40 1000/min

Value range: 0 to 4000.0

Special case:
For KPC = 0, the dynamic servo control is de-activated.

Control word MomRed

The torque limit can be reduced via this control word.



Normalization of MomRed (P0881)

The normalization of MomRed is defined using P0881 (evaluation, torque reduction PROFIBUS). All 16 bits in the PROFIBUS process data are evaluated and interpreted as positive number. The result of the conversion is a percentage factor k which is applied to P1230 (torque limit) and P1235 (power limit).

$$k = \text{maximum}\left(0;\ 1 - \frac{\text{P0881}/100\ \%}{16384} \cdot \text{MomRed}\right)$$

Example:
Assumption: Best possible resolution for the full limiting range

Input: P0881 = 25 %

It then means:

- Full torque

  MomRed = 0000
  —> k = 1 (i.e. 1 · P1230 and 1 · P1235 are effective)

- No torque

  MomRed = FFFF
  —> k = 1 – 65535 / 65536 = 0.0000153 or almost 0

with a total of 65536 intermediate steps.

When P0881 is parameterized > 25 %, then it is possible to reduce to precisely 0.

Control word DIG_OUT

The digital outputs at the drive can be controlled from the master side via PROFIBUS-DP using this control word.

This terminal must be assigned function number 38 so that an output terminal can be controlled.

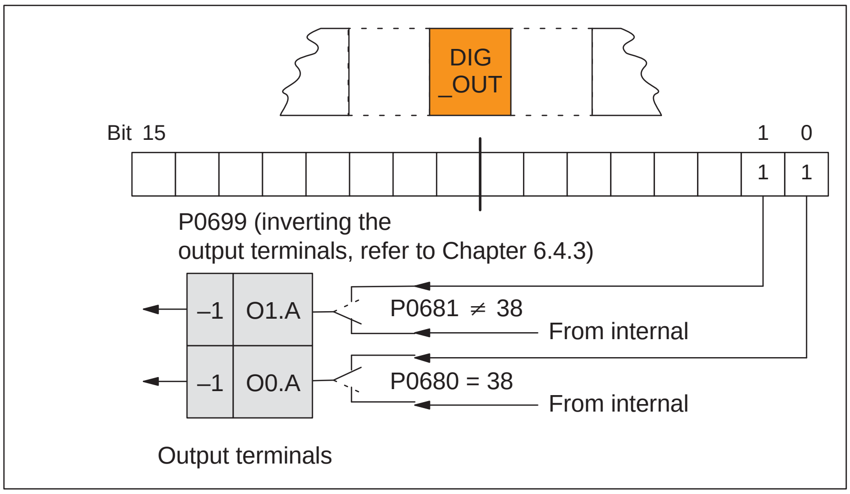


Fig. 5-10 Control word DIG_OUT

Control word XSP (n-set mode) (from SW 5.1)

For the ”Spindle positioning” function, the target position is entered via this control word.

Data transfer format: 1000 ≙ 1 degree

Example: XSP = 145500 —> 145.5 degrees

Control word DezEing (from SW 4.1)

Control signals can be directly read in from another slave (publisher) using this control word without the signals having first to be routed via the master.

The individual bits in the control word must then be assigned functions using P0888, for example, ”ramp-function generator enable” or ”hardware limit switch”.

Table 5-9 Control word DezEing

Dez Eing

Parameterize with P0888

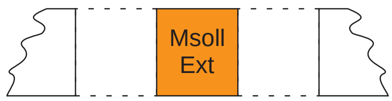
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Parameterize with P0888

Note:
From the POSMO SI/CD/CA perspective, the control signals are input signals and are described in Chapter 6.4.2. Also refer in the index under ”Input signal, digital ...”).

Control word MsollExt

For two rigidly connected drives, the actual torque setpoint of the master drive (ZSW Msoll) can be read into the slave drive using this control word.



Normalization of MsollExt (P0882)

Normalization of MsollExt is defined using P0882 (evaluation, torque setpoint PROFIBUS).

The polarity of the torque setpoint can be inverted by entering negative values.

Actual torque setpoint for

- Synchronous motors:

$$\text{Torque setpoint [Nm]} = \text{P1118} \cdot \text{P1113} \cdot \frac{\text{P0882}}{4000_{\text{Hex}}} \cdot \text{MsollExt}$$

- Induction motors:

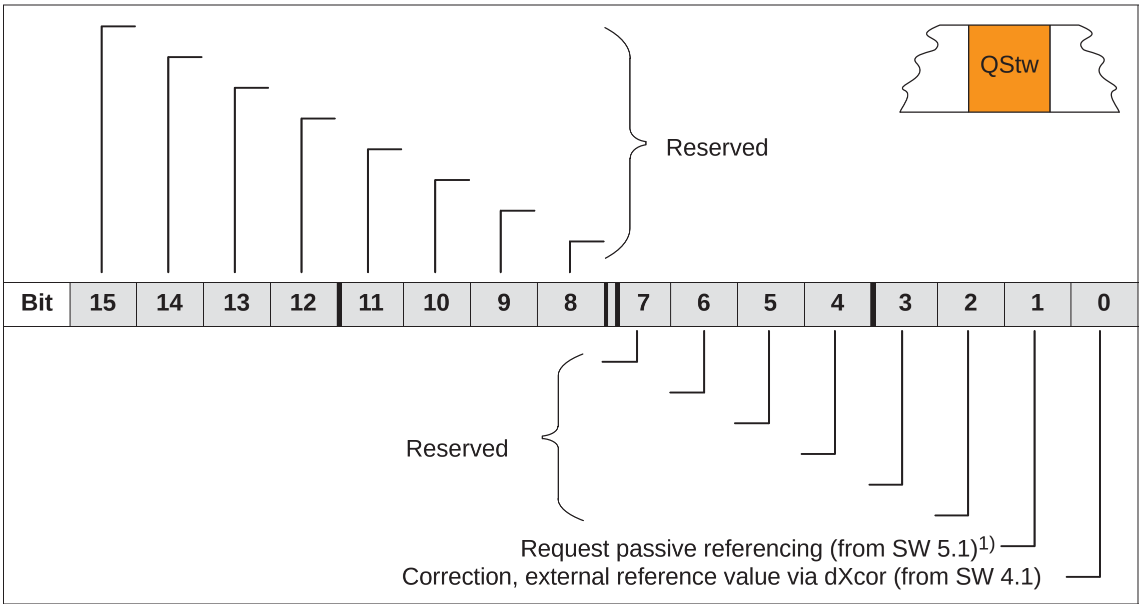
$$\text{Torque setpoint [Nm]} = \frac{60 \cdot \text{P1130} \cdot 1000}{2\,\pi \cdot \text{P1400}} \cdot \frac{\text{P0882}}{4000_{\text{Hex}}} \cdot \text{MsollExt}$$

Note

The slave drive must be changed over into the open-loop torque controlled mode using STW1.14.

Control word QStw (pos-mode) (from SW 4.1)

Table 5-10 Control word QStw



Note:

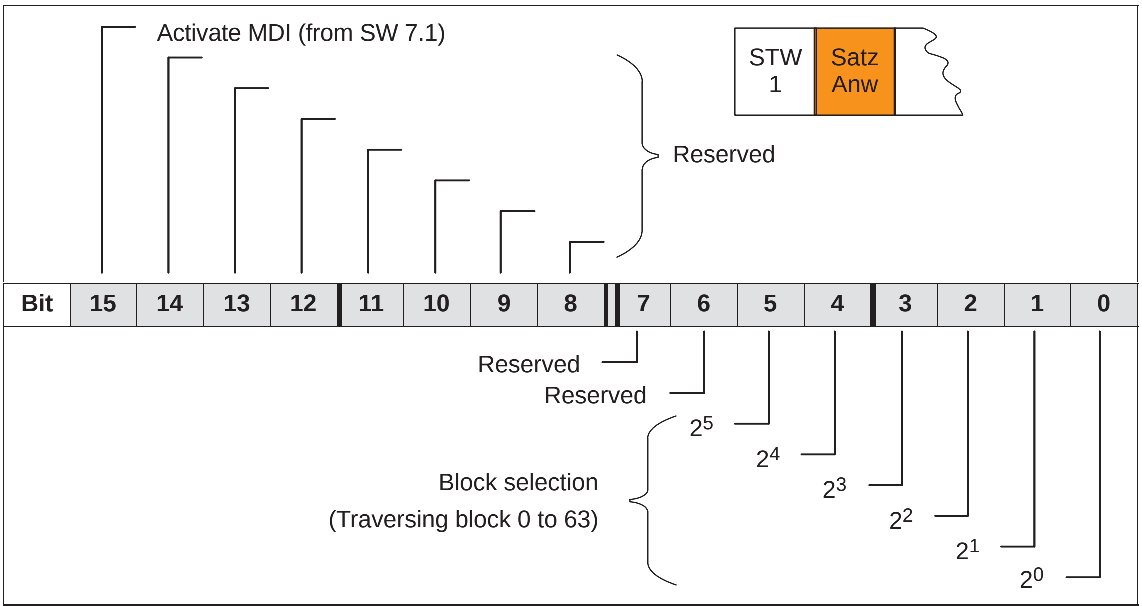
From the POSMO SI/CD/CA perspective, the control signals are input signals and are described in Chapter 6.4.2.

Also refer in the index under ”Input signal, digital ...”).

1) STW1.15 is OR’d.

Control word SatzAnw

Table 5-11 Control word SatzAnw for positioning

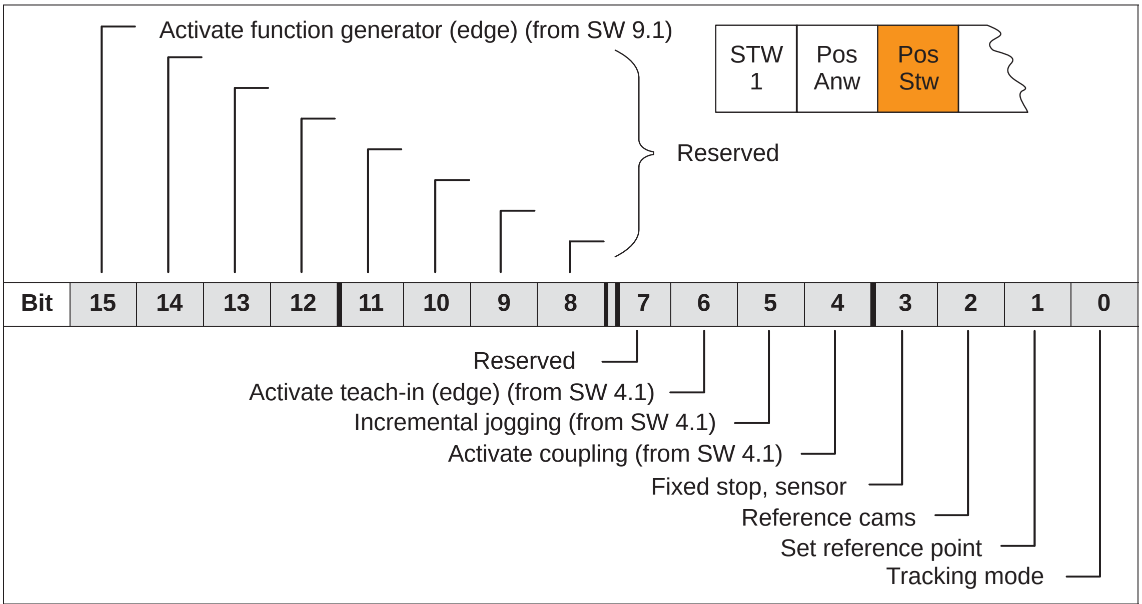


Note:

From the POSMO SI/CD/CA perspective, the control signals are input signals and are described in Chapter 6.4.2. (Also refer under the index entry ”Input signal, digital ...”).

Control word PosStw (pos mode)

Table 5-12 Control word (PosStw) for positioning



Note:

From the POSMO SI/CD/CA perspective, the control signals are input signals and are described in Chapter 6.4.2 (also refer under the index entry "Input signal, digital ...").

Control word Over (pos mode)

The percentage value for the velocity override is specified using this control word.

Normalization of the override (P0883)

The override normalization is defined using P0883 (override evaluation PROFIBUS).

$$\text{Actual override} = \frac{P0883}{16384} \cdot \text{Over}$$

Notice

As the drive cannot rotate with Over = 0 %, then it is important for PPO types 2, 4 and 5, that a practical value (greater than 0%) is in this control word.

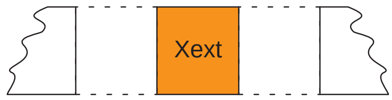
Negative values are interpreted as maximum values, because this control word is not considered to be signed.

Control word Xext (pos mode) (from SW 4.1)

Using this control word, a master drive can control a slave drive with a position reference value.

Xext can be connected with the XsollP or XistP quantities from the master drive.

When using a POSMO SI/CD/CA in the n-set mode as master drive, a connection can be established with the actual value Gx_XIST1 from the encoder interface.



Data transfer format: P0895 and P0896 define the input format

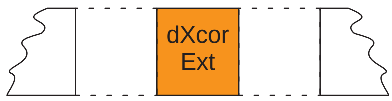
The following applies: $\text{Position in MSR} = \text{input value} \cdot \dfrac{\text{P0896}}{\text{P0895}}$

Note

Setpoints, entered via the source, are only evaluated (input evaluation) for a coupling via PROFIBUS-DP (P0891 = 4).

Control word dXcorExt (pos mode) (from SW 4.1)

The correction value, by which the position reference value jumps, e.g. when referencing in the master drive (publisher) can also be read-in and taken into account in the slave drive (subscriber) using this control word.

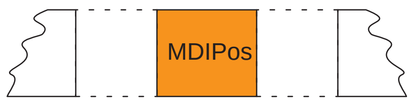


Data transfer format: P0895 and P0896 define the input format

The following applies: $\text{Position in MSR} = \text{input value} \cdot \dfrac{\text{P0896}}{\text{P0895}}$

Control word MDIPos (pos mode) (from SW 7.1)

For MDI blocks, the position is transferred via this control word.



Data transfer format: Units as for parameter P0081:64 in MSR
Limits: min: –200000000 MSR
max: 200000000 MSR

Control word MDIVel (pos mode) (from SW 7.1)

For MDI blocks, the velocity is transferred via this control word.

Transfer format: Units as for parameter P0082:64 in c*MSR/min
Limits min: 1000 c*MSR/min
max: 2000000000 c*MSR/min

Control word MDIAcc (pos mode) (from SW 7.1.)

For MDI blocks, the acceleration override is transferred via this control word.

Data transfer format: Units as for parameter P0083:64 in %
Limits: min: 1 %
max: 100 %

Control word MDIDec (pos mode) (from SW 7.1)

For MDI blocks, the deceleration override is transferred via this control word.

Data transfer format: Units as for parameter P0084:64 in %
Limits: min: 1 %
max: 100 %

Control word MDIMode (pos mode) (from SW 7.1)

For MDI blocks, the mode is transferred via this control word.

Data transfer format: Units as for parameter P0087:64 in Hex

The following ID is only active for MDI:
x0x = ABSOLUTE
x1x = RELATIVE
x2x = ABS_POS
x3x = ABS_NEG
0xx = END
3xx = CONTINUE EXTERNAL

5.6.3 Description of the status words (actual values)

Status word ZSW1
(n-set mode)

Table 5-13 Status word ZSW1 for closed-loop speed controlled operation

ZSW 1	n–ist–h	n–ist–l	ZSW 2

Bit	
15	Spindle positioning on (from SW 5.1)
14	Open-loop torque controlled operation
13	Function generator active (from SW 6.1)
12	Reserved
11	Reserved
10	Comparison value reached/comparison value not reached
9	Control requested/no control possible
8	$n_{set} = n_{act}$
7	Warning present/no warning present
6	Power-on inhibit/no power-on inhibit
5	No OFF 3 present/OFF 3 present
4	No OFF 2 present/OFF 2 present
3	Fault present/no fault present
2	Status, controller enable
1	Ready or no fault
0	Ready to be powered-up/not ready to be powered-up

Note:
From the POSMO SI/CD/CA perspective, the status signals are output signals and are described in Chapter 6.4.4 (also refer under the index entry ”Output signal, digital ...”).

Status word ZSW1 (pos mode)

Table 5-14 Status word ZSW1 for positioning

ZSW 1	Pos Anw	Pos Zsw	ZSW 2

Bit	Meaning
15	Request passive referencing (from SW 5.1)
14	Open-loop torque controlled operation
13	Drive stationary/drive moving
12	Setpoint acknowledge (edge)
11	Reference point set/no reference point set
10	Reference position reached/outside reference position
9	Control requested/no control possible
8	No following error/following error
7	Warning present/no warning present
6	Power-on inhibit/no power-on inhibit
5	No OFF 3 present/OFF 3 present
4	No OFF 2 present/OFF 2 present
3	Fault present/no fault present
2	Status, controller enable
1	Ready or no fault
0	Ready to be powered-up/not ready to be powered-up

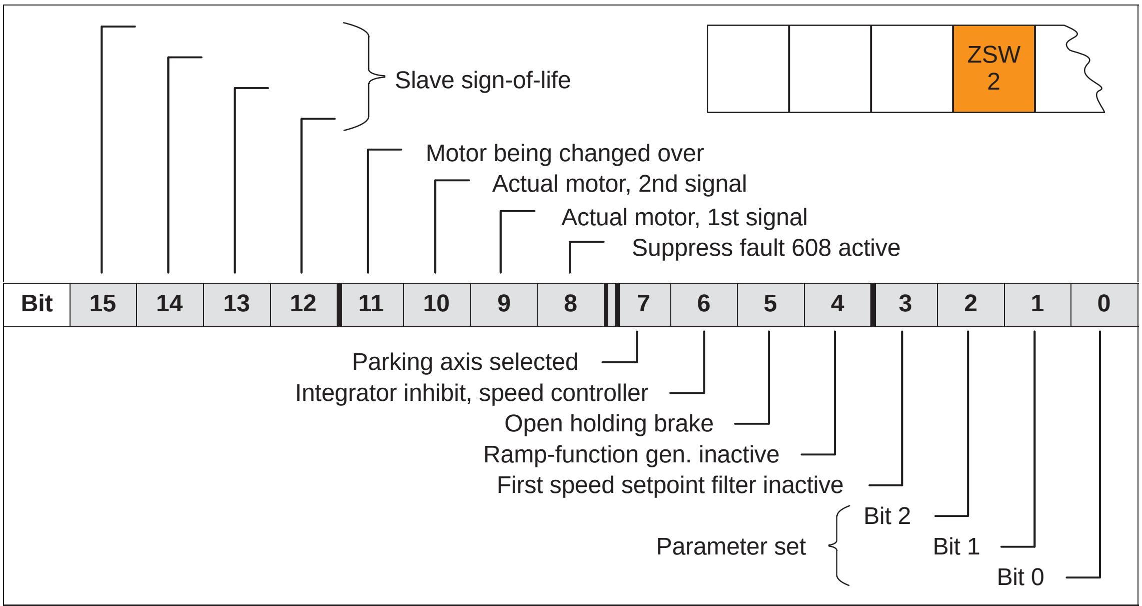
Note:

From the POSMO SI/CD/CA perspective, the status signals are output signals and are described in Chapter 6.4.4 (also refer under the index entry ”Output signal, digital ...”).

5

Status word ZSW2

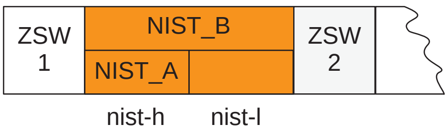
Table 5-15 Status word ZSW2



Note:
From the POSMO SI/CD/CA perspective, the status signals are output signals and are described in Chapter 6.4.4 (also refer under the index entry ”Output signal, digital ...”).

Status word NIST_A NIST_B

For closed-loop speed controlled operation, the speed actual value is displayed as follows:



NIST_A (nist-h) —> lower resolution
NIST_B (nist–(h+l)) —> higher resolution

Note

The speed actual value is signaled in the same format as the speed setpoint is specified
(refer to control word NSOLL_A (nsoll-h) and NSOLL_B (nsoll–(h+l)).

Status word MeldW

Table 5-16 Status word MeldW for closed-loop speed controlled operation

ZSW 2 … MeldW

Bit	Meaning
15	Spindle position reached (spindle position 2, from SW 5.1)
14	Position reached (spindle position 1, from SW 5.1)
13	Pulses enabled
12	Feedback signal, drive ready (from SW 9.1)
11	Pulsed resistor not overloaded (only for POSMO CA)
10	Power module current not limited
9	Electronics temperature pre-warning
8	$n_{set} = n_{act}$
7	Power module temperature pre-warning
6	Motor overtemperature pre-warning
5	Variable signaling function
4	DC link monitoring $V_{DC\ link} > V_x$
3	$\mid n_{act} \mid < n_x$
2	$\mid n_{act} \mid < n_{min}$
1	$\mid M \mid < M_x$
0	Ramp-up completed

Note:

From the POSMO SI/CD/CA perspective, the status signals are output signals and are described in Chapter 6.4.4 (also refer under the index entry "Output signal, digital ...").

Status word DIG_IN

The digital inputs at the drive can be read-in and evaluated on the master side via PROFIBUS-DP using this status word.

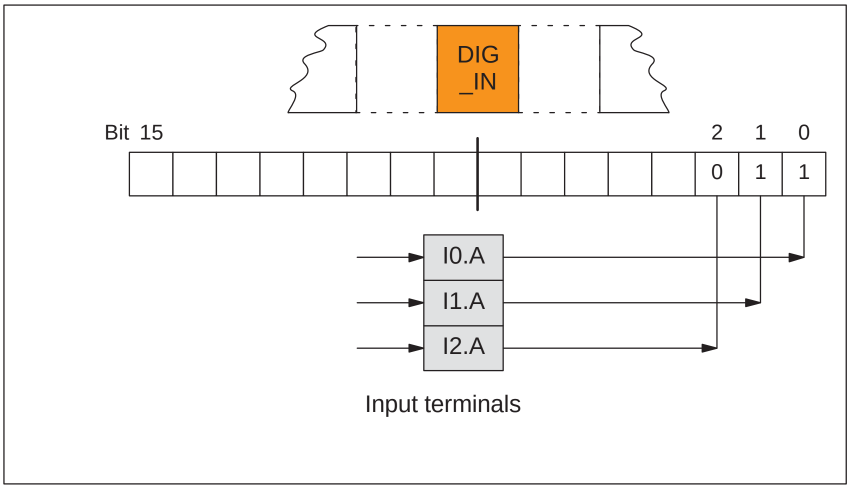
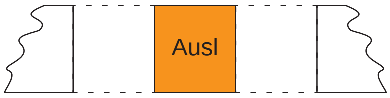


Fig. 5-11 Status word DIG_IN

Status word Ausl

This status word is used to display the ratio between the actual torque and torque limit or between the actual power and the power limit.



Note

The utilization value is smoothed using P1251 (time constant (smoothing) motor utilization).

Data transfer format: $7FFF_{hex} \doteq 100\ \%$

Update rate at which this signal is provided:

- Isochronous PROFIBUS-DP
  —> n-set mode: Position controller clock cycle (T_{MAPC}) of the master
  —> pos mode: Position controller clock cycle (P1009)
- Non clock-synchronous PROFIBUS-DP
  —> n-set mode: Position controller clock cycle (P1009)
  —> pos mode: Interpolation clock cycle (P1010)

Status word Pwirk

The actual drive active power is displayed using this status word.

The active power is calculated from the speed actual value and the actual torque setpoint. Contrary to the torque and power limits, in this case, the current limiting is not taken into account.

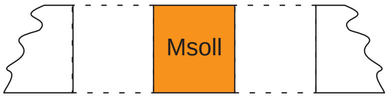
Data transfer format: $100 \doteq 1$ kW

Update rate at which this signal is provided:

- Isochronous PROFIBUS-DP
  —> n-set mode: Position controller clock cycle (T_{MAPC}) of the master
  —> pos mode: Position controller clock cycle (P1009)
- Non clock-synchronous PROFIBUS-DP
  —> n-set mode: Position controller clock cycle (P1009)
  —> pos mode: Interpolation clock cycle (P1010)

Status word Msoll

The torque setpoint calculated by the control is displayed using this status word.



Normalization of Msoll (P0882)

The normalization of Msoll is defined (from SW 4.1) using P0882 (evaluation, torque setpoint PROFIBUS).

Actual torque setpoint for

- Synchronous motors:

$$\text{Torque setpoint [Nm]} = P1118 \cdot P1113 \cdot \frac{P0882}{4000_{Hex}} \cdot Msoll$$

- Induction motors:

$$\text{Torque setpoint [Nm]} = \frac{60 \cdot P1130 \cdot 1000}{2\,\pi \cdot P1400} \cdot \frac{P0882}{4000_{Hex}} \cdot Msoll$$

Note

The reference torque is displayed in P1725 (normalization, torque setpoint).

The torque value is smoothed via P1252 (transition frequency, torque setpoint smoothing).

Transfer format: 4000_{Hex} = 16384 ≙ reference torque (in P1725)

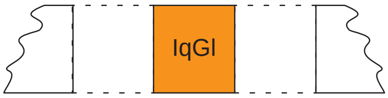
Update rate at which this signal is provided:

- Isochronous PROFIBUS-DP
  —> generally: DP clock cycle, sensed at instant in time T_i
- Non clock-synchronous PROFIBUS-DP
  —> n-set mode: Position controller clock cycle (P1009)
  —> pos mode: Interpolation clock cycle (P1010)

Status word IqGl

The actual smoothed torque-generating current Iq of the drive is displayed using this status word.

The smoothing can be set using P1250 (transition frequency, current actual value smoothing).



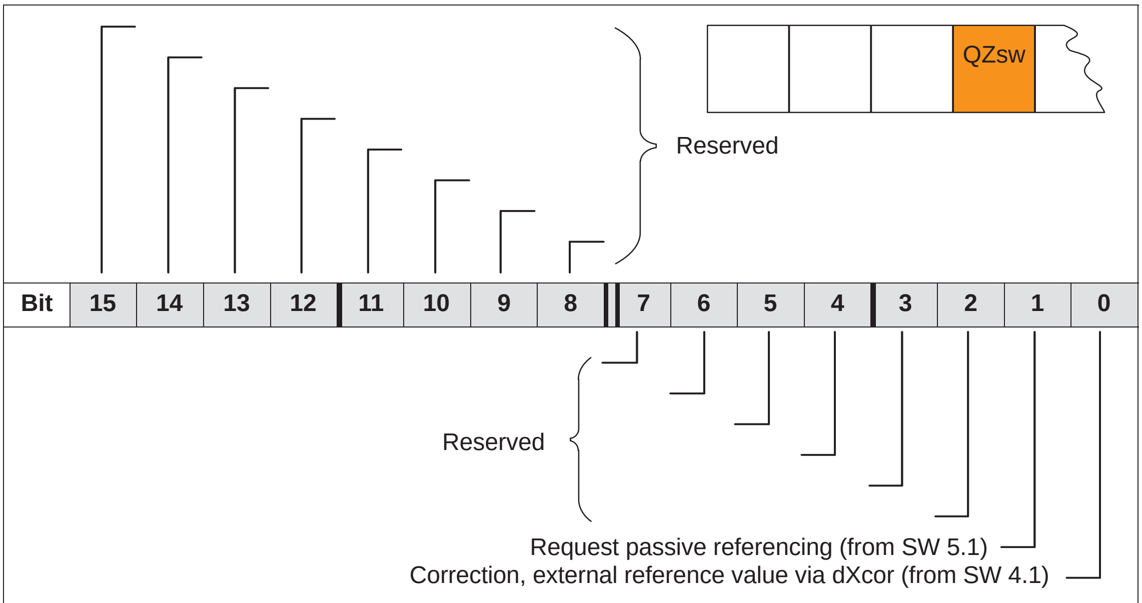
Transfer format: $4000_{Hex} = 16384 \doteq$ P1107 (transistor limit current)

Update rate at which this signal is provided:

- Isochronous PROFIBUS-DP
  —> generally: DP clock cycle, sensed at instant in time T_i
- Non clock-synchronous PROFIBUS-DP
  —> n-set mode: Position controller clock cycle (P1009)
  —> pos mode: Interpolation clock cycle (P1010)

Status word QZsw (pos mode) (from SW 4.1)

Table 5-17 Status word QZsw



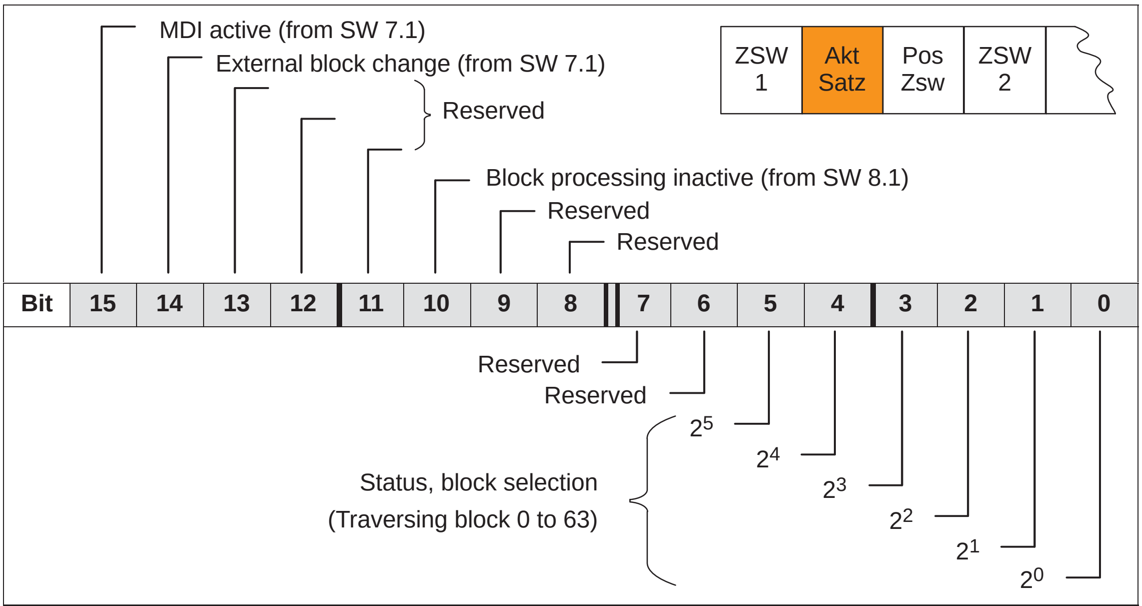
Note:

From the perspective of ”POSMO SI/CD/CA” the status signals are output signals and are described in Chapter 6.4.4.

Also refer in the index under ”Output signal, digital ...”).

Status word AktSatz

Table 5-18 Status word AktSatz



Note:

As long as the block is not active, a –1 is displayed. The actual block number is displayed with the input signal ”activate traversing task”.

From the perspective of POSMO SI/CD/CA the status signals are output signals and are described in Chapter 6.4.4.

Also refer in the index under ”Output signal, digital ...”.

5

Status word PosZsw (pos mode)

Table 5-19 Status word PosZsw for positioning

ZSW 1	Akt Satz	Pos Zsw	ZSW 2

Bit	Signal
15	Teach-in executed (from SW 4.1)
14	Travel to fixed stop active
13	Fixed stop, clamping torque reached
12	Fixed endstop reached
11	Direct output 2 via the traversing block
10	Direct output 1 via the traversing block
9	Cam switching signal 2
8	Cam switching signal 1
7	Plus software limit switch actuated
6	Minus software limit switch actuated
5	Axis moves backwards
4	Axis moves forwards
3	In synchronism (from SW 4.1)
2	Setpoint static
1	Velocity limiting active
0	Tracking mode active

Note:
From the POSMO SI/CD/CA perspective, the status signals are output signals and are described in Chapter 6.4.4 (also refer under the index entry "Output signal, digital ...").

Status word XistP (pos mode)

Position actual value (positioning)

P1792 = 1 —> XistP is received from the motor measuring system

P1792 = 2 —> XistP is received from the direct measuring system

Table 5-20 Status word XistP

XistP									Comment
Bit 31[1]	24	23	16	15	8	7	0	Decimal values	
7	F	F	F	F	F	F	F	2 147 483 647	Highest value
	:				:			:	:
0	0	0	0	0	0	0	0	0	XistP = 0[2]
F	F	F	F	F	F	F	F	–1	XistP = –1
	:				:			:	:
8	0	0	0	0	0	0	0	–2 147 483 648	Lowest value

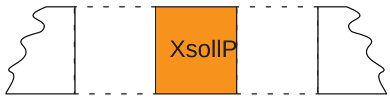
1) Sign bit: Bit = 0 —> positive value, bit = 1 —> negative value
2) Resolution: 1 digit ≙ 1 measuring system grid (MSR)

Transfer format: P0884 and P0896 define the position output format

The following applies: $\text{Output value} = \text{position in MSR} \cdot \frac{P0884}{P0896}$

Status word XsollP (pos mode) (from SW 4.1)

The actual position reference value at the output of the interpolator or at the input of the fine interpolator is displayed in the drive using this status word.

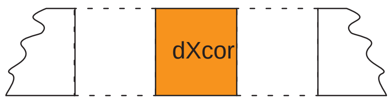


Transfer format: P0884 and P0896 define the position output format

The following applies: $\text{Output value} = \text{position in MSR} \cdot \frac{P0884}{P0896}$

Status word dXcor (pos mode) (from SW 4.1)

The correction value by which the position reference value jumps, e.g. when referencing in the master drive (publisher) is displayed in the drive using this status word.



Transfer format: P0884 and P0896 define the position output format

The following applies: $\text{Output value} = \text{position in MSR} \cdot \frac{P0884}{P0896}$

Status word UZK1 (from SW 8.3)

The actual DC link voltage in the drive is displayed using this status word.

Data transfer format: hexadecimal, non-normalized
e.g.: $258_{hex} = 600_{dec} = 600$ V

Reading the status word UZK1 must be configured in the standard telegram (P0922 = 0; refer to Chapter 5.6.5).

5.6.4 Encoder interface (n-set mode)

Encoder interface process data

The encoder interface comprises the following components:

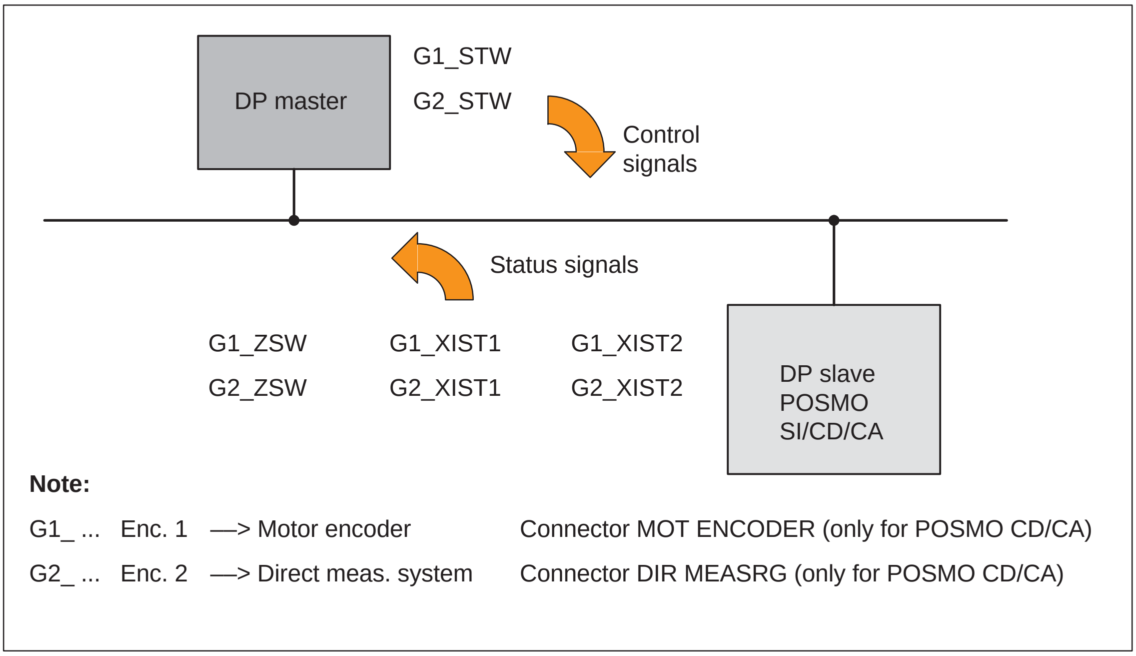


Fig. 5-12 Encoder interface process data

Note

- The process data of the encoder interface can be included in the telegram when configuring the process data.

  —> Refer to Chapter 5.6.5
  - Encoder 1: Standard telegram 3 or 102 (refer to P0922)
  - Encoder 2: Standard telegram 103 (refer to P0922)
- The process data for encoder 2 must be activated via P0879.12.
- The description of this process data can be taken from the following literature:

  Reference: /PPA/, PROFIdrive Profile Drive Technology

Gx_STW Encoder x control word

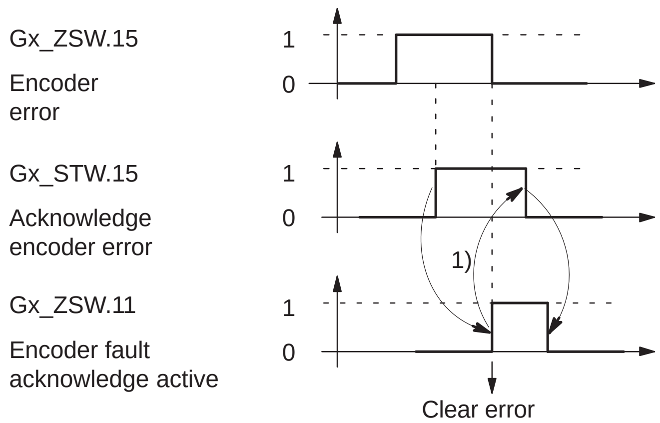
x: Space retainer for encoder 1 or 2

—> to control the encoder functionality

Table 5-21 Description of the individual signals in the encoder control word (Gx_STW)

<table>
<tr><th>Bit</th><th colspan="2">Name</th><th colspan="2">Signal status, description</th></tr>
<tr><td>0</td><td rowspan="8">Find reference mark
or
Flying measurement</td><td rowspan="4">Functions</td><td colspan="2" rowspan="4">If bit 7 = 0, then find reference mark request applies:
Bit Meaning
0 Function 1 Reference mark 1
1 Function 2 Reference mark 2
2 Function 3 Reference mark 3
3 Function 4 Reference mark 4
If bit 7 = 1, then flying measurement request applies:
Bit Meaning
0 Function 1 Measuring probe, positive edge
1 Function 2 Measuring probe, negative edge
Note:
• Bit x = 1 Request function
Bit x = 0 Do not request function
• The following applies if more than 1 function is activated:
The values for all functions cannot be read until each activated function has terminated and this has been confirmed in the corresponding status bit (STW.0/.1/.2/.3 ”0” signal again).
• Find reference mark
Up to 4 reference marks can be found. Reference marks can also be skipped (e.g. find reference marks 1 and 3).
• Equivalent zero mark
Input terminal I0.A with function number 79 (refer to Chapter 6.4.1)
P0879.13/.14 (refer to Chapter A.1)
• Flying measurement
The positive and negative edge can be activated simultaneously.
The measuring probe signal is recognized depending on the direction. The values are read out in succession.
Input terminal I0.A with function number 80 (refer to Chapter 6.4.1)</td></tr>
<tr><td>1</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td><td rowspan="3">Command</td><td colspan="2" rowspan="3">Bit 6, 5, 4 Meaning
000 –
001 Activate function x
010 Read value x
011 Abort function x</td></tr>
<tr><td>5</td></tr>
<tr><td>6</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Mode</td><td>1</td><td>Flying measurement</td></tr>
<tr><td>0</td><td>Find reference mark (zero mark or BERO)</td></tr>
</table>

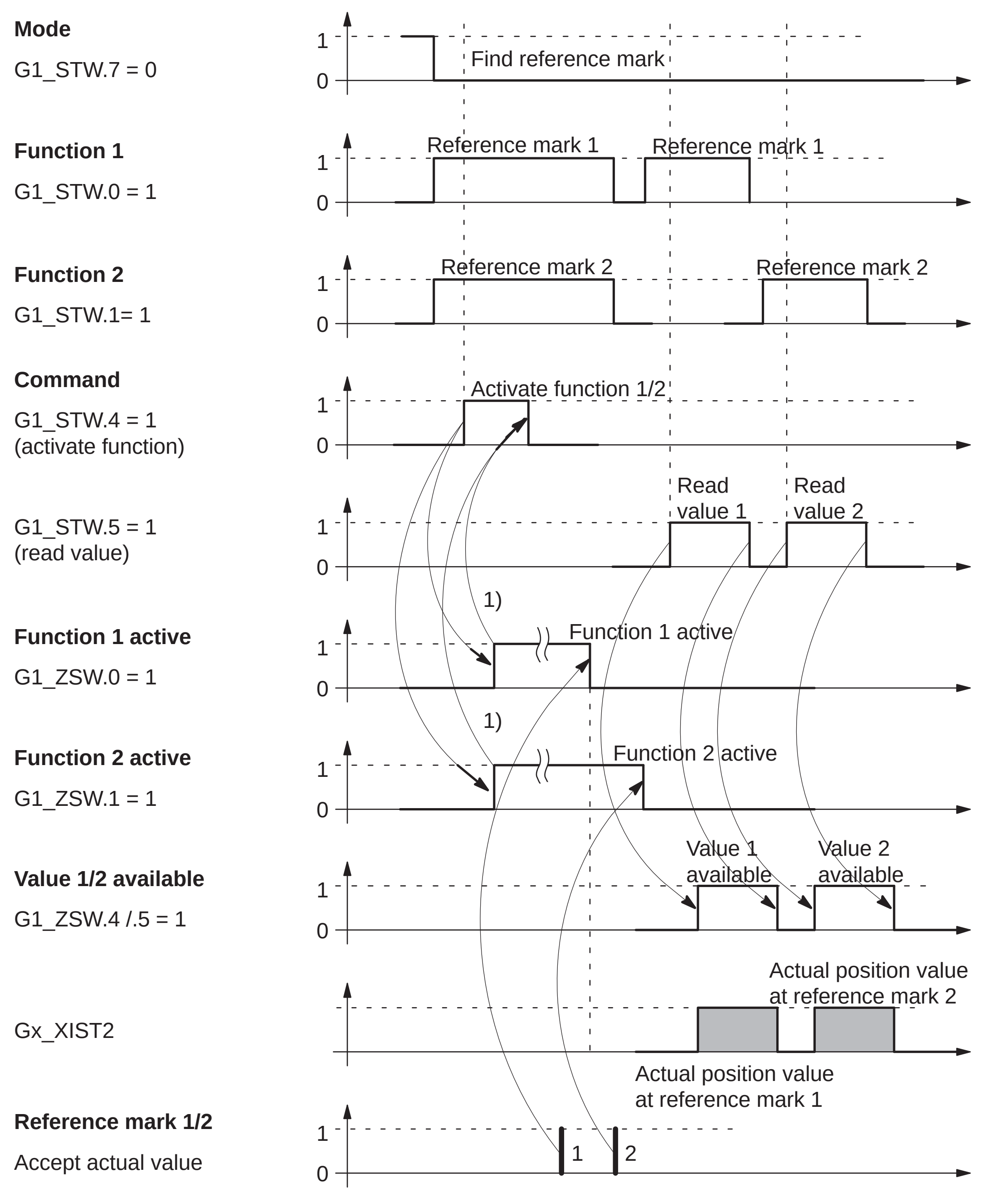
Table 5-21 Description of the individual signals in the encoder control word (Gx_STW), continued

Bit	Name	Signal status, description	
8 ... 12	–	Reserved	
13	Request absolute value cyclic	1	Request to cyclically transfer the absolute track of the absolute value encoder (EnDat encoder) via Gx_XIST2 Used for (e.g.): • Additional measuring system monitoring • Synchronization while booting
		0	No request
14	Activate parking encoder	1	Request to deactivate measuring system monitoring and actual-value sensing. Used for (e.g.): Removing an encoder or motor with encoder without having to change the drive configuration and without initiating a fault condition.
		0	No request
15	Acknowledge encoder error	0/1	Request to reset encoder faults  1) Signal must be reset by user
		0	No request

Example 1: Find reference mark

Assumptions for the example:

- Distance-coded reference mark
- Two reference marks (function 1/function 2)
- Closed-loop position control with encoder 1 (in the closed-loop speed controlled mode)



1) Signal must be reset by user

Fig. 5-13 Flowchart for ”find reference mark”

Example 2: Flying measurement

Assumptions for the example:

- Measuring probe with a positive edge (function 1)
- Closed-loop position control with encoder 1 (in the closed-loop speed controlled mode)

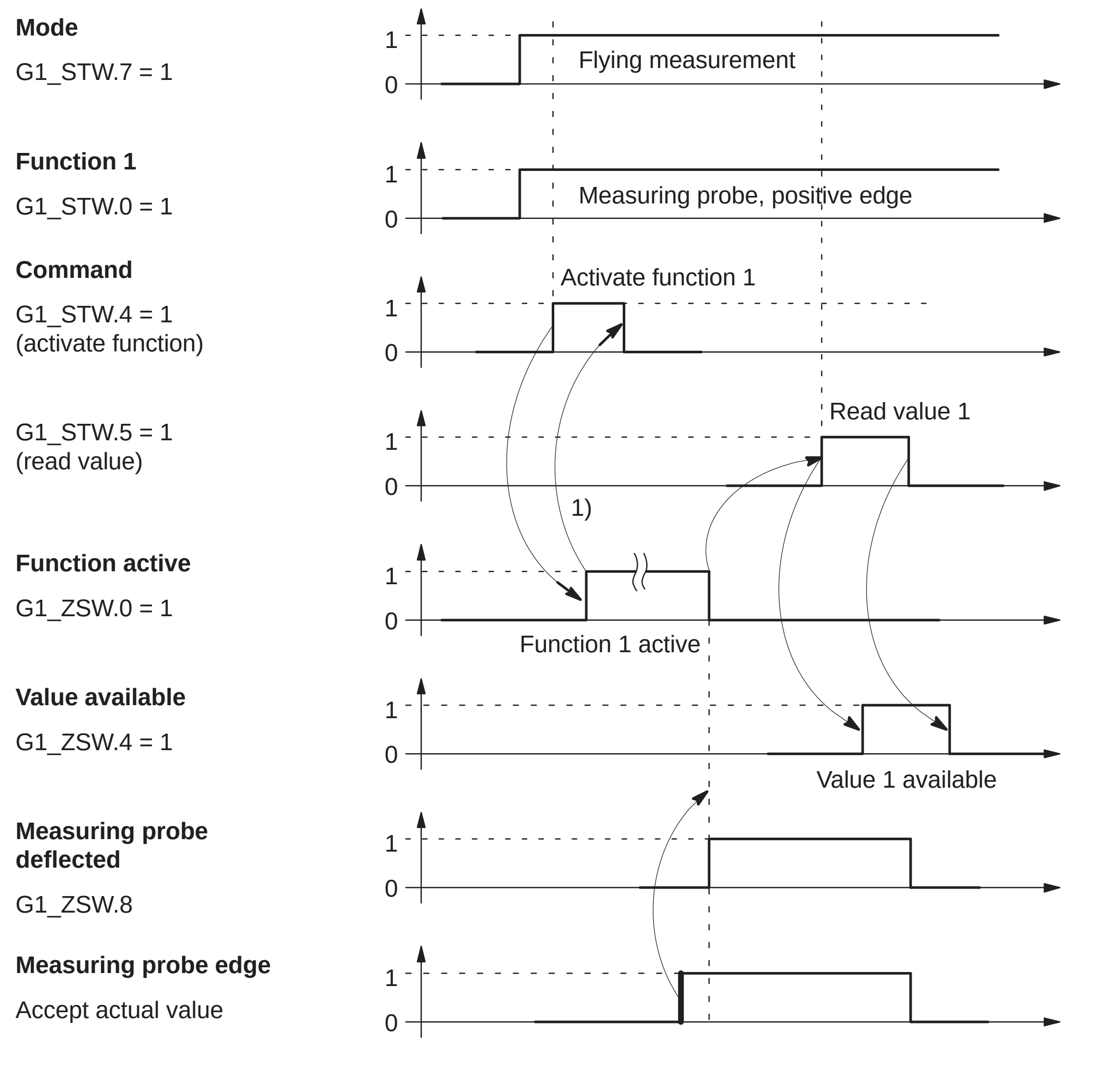


Fig. 5-14 Flowchart for ”flying measurement”

Gx_ZSW Encoder x status word

x: Space retainer for encoder 1 or 2

—–> to display statuses, acknowledgments, faults/errors etc.

Table 5-22 Description of the individual signals in the encoder status word (Gx_ZSW)

Bit	Name		Signal status, description
0 1 2 3	Find reference mark or Flying measurement	**Status:** **Function 1 – 4 active**	Valid for find reference mark and flying measurement Bit Meaning 0 Function 1 Reference mark 1 Measuring probe, positive edge 1 Function 2 Reference mark 2 Measuring probe, negative edge 2 Function 3 Reference mark 3 3 Function 4 Reference mark 4 **Note:** • Bit x = 1 Function active Bit x = 0 Function inactive • P0879 is set to indicate whether it involves a zero mark or an equivalent zero mark (BERO). The equivalent zero mark must be parameterized for input terminal I0.A.
4 5 6 7		**Status:** **Value 1 – 4 available**	Valid for find reference mark and flying measurement Bit Meaning 4 Value 1 Reference mark 1 Measuring probe, positive edge 5 Value 2 Reference mark 2 Measuring probe, negative edge 6 Value 3 Reference mark 3 7 Value 4 Reference mark 4 **Note:** • Bit x = 1 Value available Bit x = 0 Value not available • Only one value can be fetched at a time. Reason: Only one shared status word Gx_XIST2 is available for reading the values. • The measuring probe must be parameterized at input terminal I0.x.
8		Measuring probe deflected	1 Measuring probe deflected 0 Measuring probe is not deflected
9 10	–		Reserved
11	Encoder fault acknowledge active		1 Encoder fault acknowledge active **Note:** Refer under STW.15 (acknowledge encoder error) 0 No acknowledgement active
12	–		Reserved

Table 5-22 Description of the individual signals in the encoder status word (Gx_ZSW), continued

Bit	Name	Signal status, description	
13	Transmit cyclic absolute value	1	Acknowledgement for Gx_STW.13 (request cyclic absolute value) **Note:** Cyclic transmission of the absolute value can be interrupted by a function with higher priority. The bit remains set although no absolute value is transmitted via Gx_XIST2. —> refer to Fig. 5-16 —> refer to Gx_XIST2
		0	No acknowledgement
14	Parking encoder active	1	Acknowledgment for Gx_STW.14 (activate parking encoder)
		0	No acknowledgement
15	Encoder error	1	Encoder or actual value sensing fault present **Note:** The error code is stored in Gx_XIST2
		0	No fault present

Gx_XIST1

Encoder x position actual value 1 —> position actual value

- Resolution: Encoder pulses • 2^n

  n: Fine resolution
  Number of bits for the internal multiplication

  The fine resolution is defined via P1042/P1044.

  P1042 Encoder 1, fine resolution G1_XIST1

  P1044 Encoder 2 fine resolution G2_XIST1

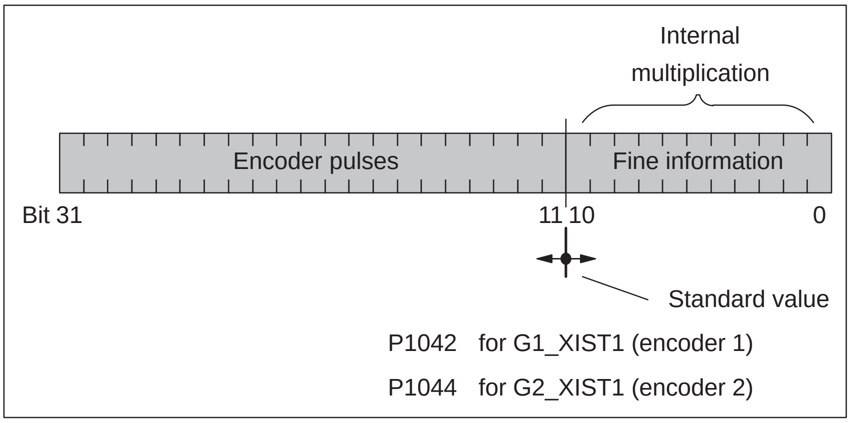


Fig. 5-15 Partitioning and settings for Gx_XIST1

- Encoder pulses
  - The following applies for encoders with sin/cos 1Vpp:

    Encoder pulses = No. of sinusoidal signal periods
- The following applies after power up: Gx_XIST1 = 0.
- The higher-level control must suitably handle the situation if Gx_XIST1 overflows.
- There is no modulo interpretation of Gx_XIST1 on the drive.

Gx_XIST2

Encoder x position actual value 2 —> Additional position actual value

Different values are entered in Gx_XIST2 depending on the function (refer to Fig. 5-16).

- Priorities for Gx_XIST2

  The following priorities should be considered for values in Gx_XIST2:

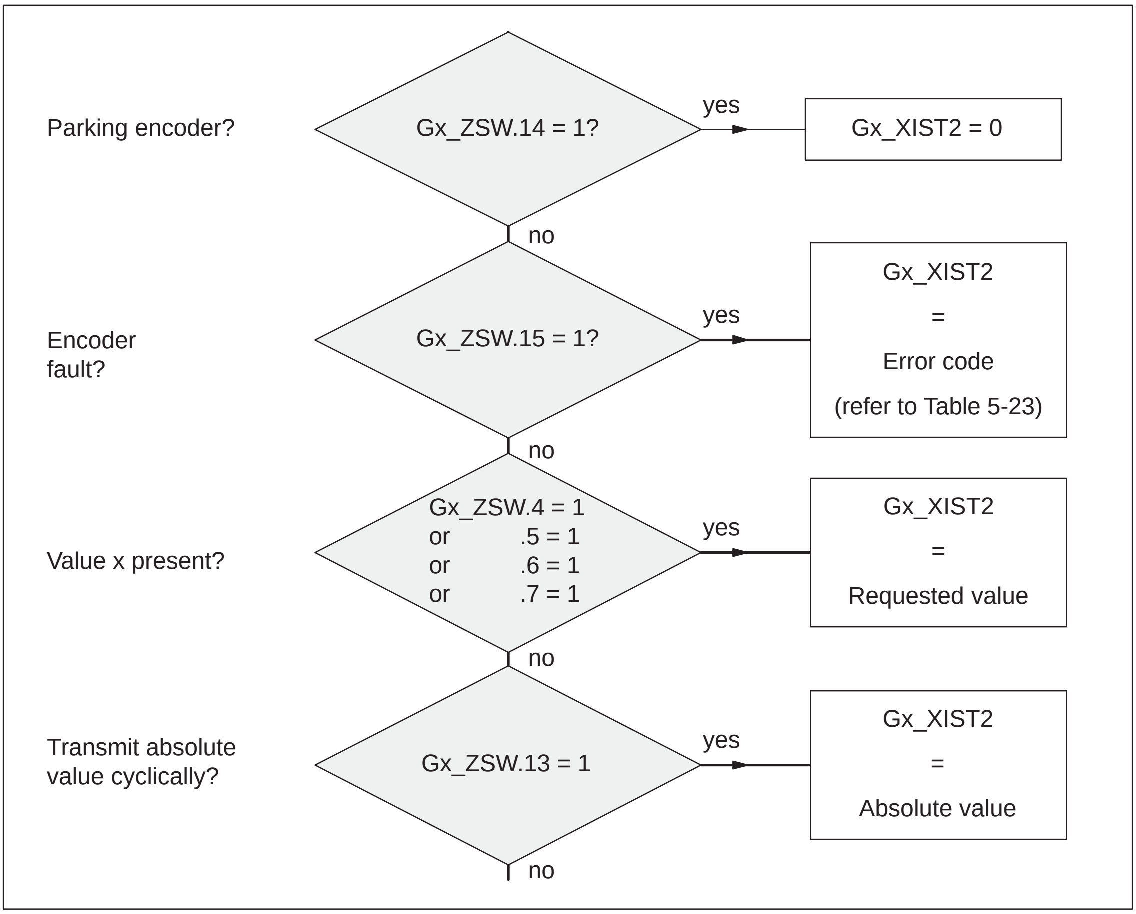


Fig. 5-16 Priorities for functions and Gx_XIST2

- Resolution: Encoder pulses • 2^n

  n: Fine resolution
  Number of bits for the internal multiplication

  The fine resolution is defined via P1043/P1045 or P1042/P1044 for the ”requested value” or the ”absolute value” in Gx_XIST2.

P1043	Encoder 1, fine resolution, absolute track G1_XIST2
P1045	Encoder 2, fine resolution, absolute track G2_XIST2
P1042	Encoder 1, fine resolution G1_XIST1
P1044	Encoder 2 fine resolution G2_XIST1

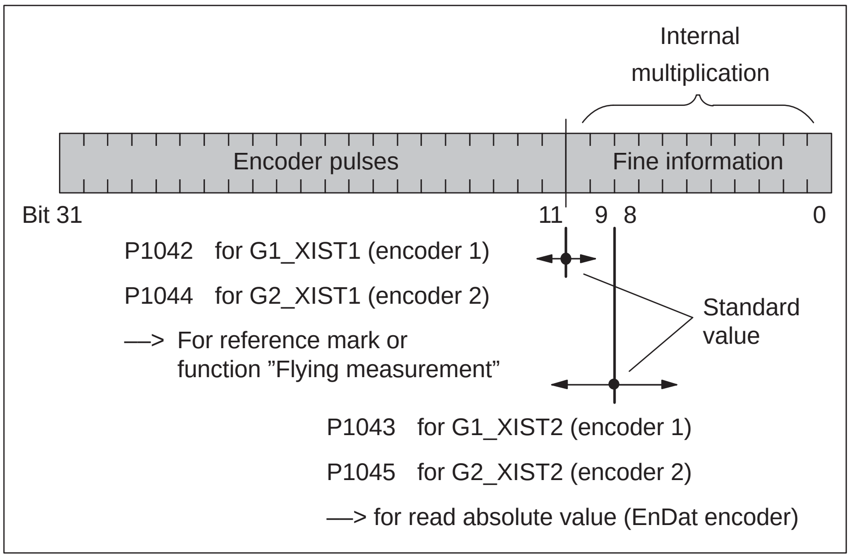


Fig. 5-17 Partitioning and settings for Gx_XIST2

5

- Encoder pulses
  - The following applies for encoders with sin/cos 1Vpp:

    Encoder pulses = No. of sinusoidal signal periods
- Error code

Table 5-23 Fault code in Gx_XIST2

Gx_XIST2	Meaning	Possible causes/description
1_{HEX}	Encoder sum error	The fault description should be taken from the following faults (refer to Chapter 7.2.2): • Fault 514 Motor measuring system (encoder 1) • Fault 609 Encoder limiting frequency exceeded • Fault 512 Direct measuring system (encoder 2) • Fault 615 DM encoder limiting frequency exceeded
2_{HEX}	Zero-mark monitoring	The fault description should be taken from the following faults (refer to Chapter 7.2.2): • Fault 508 Motor measuring system (encoder 1) • Fault 514 Direct measuring system (encoder 2)
3_{HEX}	Abort parking encoder	The ”parking axis” was already selected.

Table 5-23 Fault code in Gx_XIST2, continued

Gx_XIST2	Meaning	Possible causes/description
4_{HEX}	Abort, reference mark search	• A fault is present (Gx_ZSW.15 = 1) • Parking encoder/axis active • ”Flying measurement” function already active • Change of function type • No reference mark programmed • Hardware already busy with another function • Only BERO: BERO not at terminal I0.A • Not BERO: EnDat encoder being used • Invalid combination of reference marks for distance-coded encoder (1–2, 3–4, 1–2–3–4 are supported)
5_{HEX}	Retrieve reference value interrupted	• A fault is present (Gx_ZSW.15 = 1) • Parking encoder/axis active • No reference mark programmed • Requested value not available • Change of function type
6_{HEX}	Abort, flying measurement	• A fault is present (Gx_ZSW.15 = 1) • Parking encoder/axis active • Change of function type • Reference point approach still active • Measuring probe not at terminal I0.A and measuring probe 1 not used • Hardware already busy with another function • Spindle positioning active (P0125=1, from SW 5.1)
7_{HEX}	Abort, retrieve measured value	• A fault is present (Gx_ZSW.15 = 1) • Parking encoder/axis active • Change of function type • Requested value not available • Not exactly 1 value to be retrieved
8_{HEX}	Abort absolute value transmission on	• EnDat encoder not being used
A_{HEX}	Error on reading absolute track of absolute encoder (EnDat encoder)	For further diagnostics: • —> refer to P1023 IM diagnostics • —> refer to P1033 DM diagnostics
$F01_{Hex}$ (from SW 8.2)	Command is not supported	• Encoder x control word Gx_STW.6 = 1

Limitations and rules for connecting up encoder 2 (direct measuring system)

The following limitations and rules apply:

1. A 2nd encoder can only be connected for POSMO CD/CA.
2. Which encoder systems are available for encoder 2?

   The following rotary or linear measuring systems can be connected at connector DIR MEASRG (refer to Chapter 2):

   – Incremental encoder with sin/cos 1 Vpp

   – Absolute value encoder with EnDat protocol
3. Process data for encoder 2

   – Control word: G2_STW

   – Status words: G2_ZSW, G2_XIST1 and G2_XIST2
4. Encoder 2 is activated with P0879.12 = 1.

   The following applies:

   – This activation becomes effective after POWER ON

   – Encoder 2 must be commissioned

   —> refer to the Start-up Wizard of SimoCom U

   – It is not permissible that POSMO CD/CA is used without a motor measuring system.

   —> The following must be valid: P1027.5 = 0

5

5.6.5 Configuring process data

Description

The process data structure of the telegram can be defined and configured as follows:

1. By selecting a standard telegram (P0922 > 0)

   Examples:

   – P0922 = 1 standard telegram for n_{set} interface 16 bit

   – P0922 = 101 telegram is dependent on the mode (positioning mode)

2. By freely-configuring the telegram (P0922 = 0)

   Example:

   – P0922 = 0 **Before SW 4.1:**

   PZD1 to PZD4 are defined as standard
   PZD5 to PZD16 can be freely configured

   From SW 4.1:
   PZD1 remains defined as standard
   PZD2 to PZD16 can be freely configured

   Setpoint direction
   (refer to the parameter overview for P0915:17)
   e.g.:
   P0915:5 = xxxx (required signal ID)
   P0915:6 = yyyy ...

   or
   Actual value direction
   (refer to the parameter overview for P0916:17)
   e.g.:
   P0916:5 = uuuu (requested signal ID)
   P0916:6 = vvvv ...

Note

The standard signals, defined in the PROFIdrive profile, as well as the signals, which have only been specifically defined for the ”DP slave POSMO SI/CD/CA” can be configured as setpoints/actual values.

For double-word signals (length = 32 bit), the appropriate signal ID must be configured twice for consecutive process data.

Example:
P0916:7 = 50011 —> G1_XIST1 is assigned to PZD7
P0916:8 = 50011 —> G1_XIST1 is assigned to PZD8
—> as G1_XIST1 is a double word (32 bits), it must be assigned 2 PZDs.

Parameter overview

The following parameters are available for the process data configuring:

Table 5-24 Parameters for configuring the process data

No.	Name	Min.	Standard	Max.	Units	Effective
0915:17	PZD setpoint assignment PROFIBUS	0	0	65 535	–	Immedi-ately

... is used to assign the signals to the process data in the setpoint telegram.

Permissible signals for the setpoint direction (control words) are:

ID	Significance	Abbrev.	Length	Mode
• Signals according to the PROFIdrive Profile				
0	No signal	NIL	16 bit	
50001	Control word 1	STW1	16 bit	
50003	Control word 2	STW2	16 bit	
50005	Speed setpoint A (nsoll-h)	NSOLL_A	16 bit	n-set
50007	Speed setpoint B (n-soll (h + l))	NSOLL_B	32 bit	n-set
50009	Encoder 1 control word	G1_STW	16 bit	n-set
50013	Encoder 2 control word	G2_STW	16 bit	n-set
50025	System deviation (DSC) (from SW 4.1)	XERR	32 bit	n-set
50026	Pos. contr. gain factor (DSC) (from SW 4.1)	KPC	32 bit	n-set
• Unit-specific signals specifically for POSMO SI/CD/CA				
50101	Torque reduction	MomRed	16 bit	
50107	Digital outputs, terminals O0.A to O1.A	DIG_OUT	16 bit	
50109	Target pos. for ”Spindle positioning” (from SW 5.1)	XSP	32 bit	n-set
50111	Distributed inputs (from SW 4.1)	DezEing	16 bit	
50113	Torque setpoint external (read-in, subscriber) (from SW 4.1)	MsollExt	16 bit	
50117	Cntrl word slave-to-slave traffic (from SW 4.1)	QStw	16 bit	pos
50201	Block selection	SatzAnw	16 bit	
50203	Position control word	PosStw	16 bit	pos
50205	Override	Over	16 bit	pos
50207	Ext. position reference value (from SW 4.1)	Xext	32 bit	pos
50209	Correction, ext. pos. ref. val. (from SW 4.1)	XcorExt	32 bit	pos
50221	MDI position (from SW 7.1)	MDIPos	32 bit	pos
50223	MDI velocity (from SW 7.1)	MDIVel	32 bit	pos
50225	MDI acceleration override (from SW 7.1)	MDIAcc	16 bit	pos
50227	MDI deceleration override (from SW 7.1)	MDIDec	16 bit	pos
50229	MDI mode (from SW 7.1)	MDIMode	16 bit	pos

Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
	Note: • For P0922 > 0, the following is valid: P0915:17 is pre-assigned when booting corresponding to the selected standard telegram in P0922. When P0915:2 to P0915:16 are changed, at the next run-up, these are overwritten again corresponding to the selected standard telegram. • Operating mode not specified —> possible in every operating mode • The following applies for P0922 = 0: **Before SW 4.1** —> From P0915:5 (assignment for PZD5), process data can be freely configured. This means from P0915:5, the signal ID of the requested signal can be entered. **From SW 4.1** —> From P0915:2 (assignment for PZD2), process data can be freely configured, i.e. from P0915:2, the signal ID of the required signal can be entered. P0915:0 No significance P0915:1 PZD1 Configuring not possible (standard setting) P0915:2 PZD2 Free configuring possible (from SW 4.1, before SW 4.1 from PZD5), i.e. enter the required signal ID ... ... P0915:16 PZD16 Free configuring possible, i.e. enter the required signal ID • An overview of the control words is available in Chapter 5.6.1. • The process data for encoder 2 must be activated via P0879.12.					

Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0916:17	PZD actual value assignment PROFIBUS	0	0	65 535	–	Immedi-ately

... is used to assign the signals to the process data in the actual value telegram.
Permissible signals for the actual value direction (status words) are:

ID	Significance	Abbrev.	Length	Mode
• Signals according to the PROFIdrive Profile				
0	No signal	NIL	16 bit	
50002	Status word 1	ZSW1	16 bit	
50004	Status word 2	ZSW2	16 bit	
50006	Speed actual value A (nist-h)	NIST_A	16 bit	
50008	Speed actual value B (n-ist (h + l))	NIST_B	32 bit	
50010	Encoder 1 status word	G1_ZSW	16 bit	n-set
50011	Encoder 1 position actual value 1	G1_XIST1	32 bit	n-set
50012	Encoder 1 position actual value 2	G1_XIST2	32 bit	n-set
50014	Encoder 2 status word	G2_ZSW	16 bit	n-set
50015	Encoder 2 position actual value 1	G2_XIST1	32 bit	n-set
50016	Encoder 2 position actual value 2	G2_XIST2	32 bit	n-set
• Unit-specific signals specifically for POSMO SI/CD/CA				
50102	Message word	MeldW	16 bit	
50108	Digital inputs terminals I0.A to I2.A	DIG_IN	16 bit	
50110	Utilization	Ausl	16 bit	
50112	Active power	Pwirk	16 bit	
50114	Smoothed torque setpoint	Msoll	16 bit	
50116	Smoothed, torque-generating current Iq	IqGl	16 bit	
50118	Cntrl word slave-to-slave traffic (from SW 4.1)	QZsw	16 bit	pos
50119	DC link voltage (from SW 8.3)	UZK1	16 bit	
50202	Currently selected block	AktSatz	16 bit	
50204	Positioning status word	PosZsw	16 bit	pos
50206	Position actual value (positioning mode)	XistP	32 bit	pos
50208	Position reference value (from SW 4.1)	XsollP	32 bit	pos
50210	Correction, pos. ref. value (from SW 4.1)	Xcor	32 bit	pos

Note:

- The following applies for P0922 > 0:
  P0916:17 is pre-assigned when the system boots corresponding to the selected standard telegram in P0922. When P0916:2 to P0916:16 are changed, at the next run-up, these are overwritten corresponding to the selected standard telegram.
- Operating mode not specified —> possible in every operating mode
- The following applies for P0922 = 0:
  before SW 4.1 —> From P0916:5 (assignment for PZD5), process data can be freely configured. This means from P0916:5, the signal ID of the requested signal can be entered.
  From SW 4.1 —> From P0916:2 (assignment for PZD2), process data can be freely configured, i.e. from P0916:2, the signal ID of the required signal can be entered.

P0916:0	No significance	
P0916:1	PZD1	Configuring not possible (standard setting)
P0916:2	PZD2	Free configuring possible (from SW 4.1, before SW 4.1 from PZD5), i.e. enter the required signal ID
...	...	
P0916:16	PZD16	Free configuring possible, i.e. enter the required signal ID

- An overview of the status words is provided in Chapter 5.6.1.
- The process data for encoder 2 must be activated via P0879.12.

Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0922	Telegram selection PROFIBUS	0	101	109	–	PO

... is used to set the free configurability or to select a standard telegram.

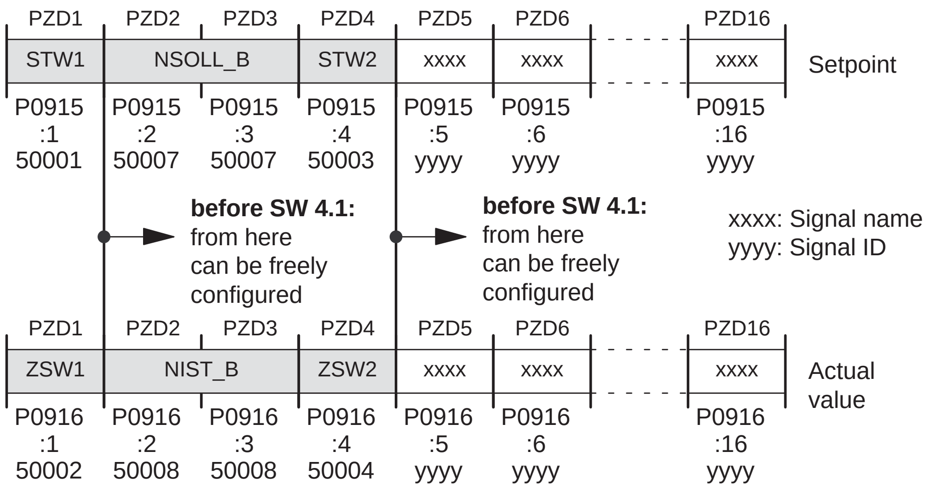
Note:

- The signal IDs of the process data can be entered into P0915:17 and P0916:17 and pre-assigned default values corresponding to the selection when the drive boots.
- POSMO SI, telegrams, which contain an external encoder contains, cannot be used!

P0922 = **0** **The telegram can be freely configured**

i.e. PZD1 is pre-assigned default values as standard, dependent on the selected operating mode and PZD2 to PZD16 can be configured using P0915:2 to P0915:16 or P0916:2 to P0916:16 by entering the required signal ID.

Operating mode:
P0700 = 1 (speed/torque setpoint)



Operating mode:
P0700 = 3 (positioning)

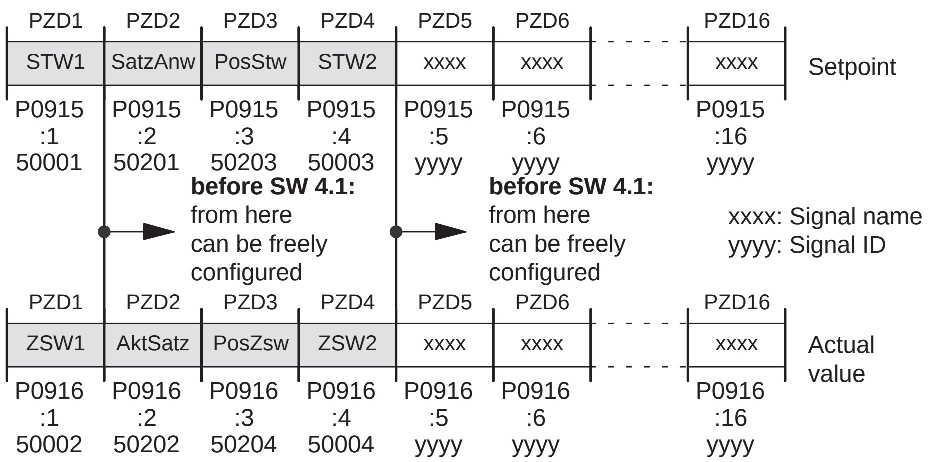


Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**1 Standard telegram 1, n_{set}- interface 16 bit**					

Setpoint

PZD1	PZD2
STW1	NSOLL_A
P0915 :1 50001	P0915 :2 50005

Actual value

PZD1	PZD2
ZSW1	NIST_A
P0916 :1 50002	P0916 :2 50006

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**2 Standard telegram 2, n_{set}- interface 32 bit without encoder**					

Setpoint

PZD1	PZD2	PZD3	PZD4
STW1	NSOLL_B		STW2
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003

Actual value

PZD1	PZD2	PZD3	PZD4
ZSW1	NIST_B		ZSW2
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**3 Standard telegram 3, n_{set}- interface 32 bit with encoder**					

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5
STW1	NSOLL_B		STW2	G1_STW
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50009

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9
ZSW1	NIST_B		ZSW2	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50010	P0916 :6 50011	P0916 :7 50011	P0916 :8 50012	P0916 :9 50012

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

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Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**4** **Standard telegram 4, n_{set} interface, 32-bit with encoder 1 and encoder 2**					

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
STW1	NSOLL_B		STW2	G1_STW	G2_STW
P0915 :1	P0915 :2	P0915 :3	P0915 :4	P0915 :5	P0915 :6
50001	50007	50007	50003	50009	50013

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9
ZSW1	NIST_B		ZSW2	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1	P0916 :2	P0916 :3	P0916 :4	P0916 :5	P0916 :6	P0916 :7	P0916 :8	P0916 :9
50002	50008	50008	50004	50010	50011	50011	50012	50012

PZD 10	PZD11	PZD12	PZD13	PZD14
G2_ZSW	G2_XIST1		G2_XIST2	
P0916 :10	P0916 :11	P0916 :12	P0916 :13	P0916 :14
50014	50015	50015	50016	50016

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**5** **Standard telegram 5, n_{set} interface with KPC (DSC) and encoder 1**					

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9
STW1	NSOLL_B		STW2	G1_STW	XERR		KPC	
P0915 :1	P0915 :2	P0915 :3	P0915 :4	P0915 :5	P0915 :6	P0915 :7	P0915 :8	P0915 :9
50001	50007	50007	50003	50009	50025	50025	50026	50026

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9
ZSW1	NIST_B		ZSW2	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1	P0916 :2	P0916 :3	P0916 :4	P0916 :5	P0916 :6	P0916 :7	P0916 :8	P0916 :9
50002	50008	50008	50004	50010	50011	50011	50012	50012

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**6** **Standard telegram 6, n_{set} interface with KPC (DSC) and encoder 1 and encoder 2**					

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
STW1	NSOLL_B		STW2	G1_STW	G2_STW	XERR		KPC	
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50009	P0915 :6 50013	P0915 :7 50025	P0915 :8 50025	P0915 :9 50026	P0915 :10 50026

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
ZSW1	NIST_B		ZSW2	G1_ZSW	G1_XIST1		G1_XIST2		G2_ZSW
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50010	P0916 :6 50011	P0916 :7 50011	P0916 :8 50012	P0916 :9 50012	P0916 :10 50014

Actual value

PZD11	PZD12	PZD13	PZD14
G2_XIST1		G2_XIST2	
P0916 :11 50015	P0916 :12 50015	P0916 :13 50016	P0916 :14 50016

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**101** **The telegram structure depends on the operating mode** this means that the process data are pre-assigned default values as follows depending on the selected operating mode.					

Operating mode: P0700 = 1 (speed/torque setpoint)

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7
STW1	NSOLL_B		STW2	MomRed	Reserved	Reserved
P0915 :1	P0915 :2	P0915 :3	P0915 :4	P0915 :5		
50001	50007	50007	50003	50101		

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	Reserved	Reserved	Ausl	Pwirk	Msoll
P0916 :1	P0916 :2	P0916 :3	P0916 :4	P0916 :5			P0916 :8	P0916 :9	P0916 :10
50002	50008	50008	50004	50102			50110	50112	50114

Operating mode: P0700 = 3 (positioning)

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7
STW1	SatzAnw	PosStw	STW2	Over	Reserved	Reserved
P0915 :1	P0915 :2	P0915 :3	P0915 :4	P0915 :5		
50001	50201	50203	50003	50205		

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
ZSW1	AktSatz	PosZsw	ZSW2	MeldW	Reserved	Reserved	Ausl	Pwirk	Msoll
P0916 :1	P0916 :2	P0916 :3	P0916 :4	P0916 :5			P0916 :8	P0916 :9	P0916 :10
50002	50202	50204	50004	50102			50110	50112	50114

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**102** **Standard telegram 102, n_{set} interface with encoder 1**					

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
STW1	NSOLL_B		STW2	MomRed	G1_STW
P0915 :1	P0915 :2	P0915 :3	P0915 :4	P0915 :5	P0915 :6
50001	50007	50007	50003	50101	50009

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1	P0916 :2	P0916 :3	P0916 :4	P0916 :5	P0916 :6	P0916 :7	P0916 :8	P0916 :9	P0916 :10
50002	50008	50008	50004	50102	50010	50011	50011	50012	50012

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**103 Standard telegram 103, n_{set} interface with encoder 1 and encoder 2**					

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7
STW1	NSOLL_B		STW2	MomRed	G1_STW	G2_STW
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50009	P0915 :7 50013

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50010	P0916 :7 50011	P0916 :8 50011	P0916 :9 50012	P0916 :10 50012

Actual value

PZD11	PZD12	PZD13	PZD14	PZD15
G2_ZSW	G2_XIST1		G2_XIST2	
P0916 :11 50014	P0916 :12 50015	P0916 :13 50015	P0916 :14 50016	P0916 :15 50016

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

No.	Name
P0922 = from SW 4.1	**105 Standard telegram 105, n_{set} interface with KPC (DSC) and encoder 1**

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
STW1	NSOLL_B		STW2	MomRed	G1_STW	XERR		KPC	
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50009	P0915 :7 50025	P0915 :8 50025	P0915 :9 50026	P0915 :10 50026

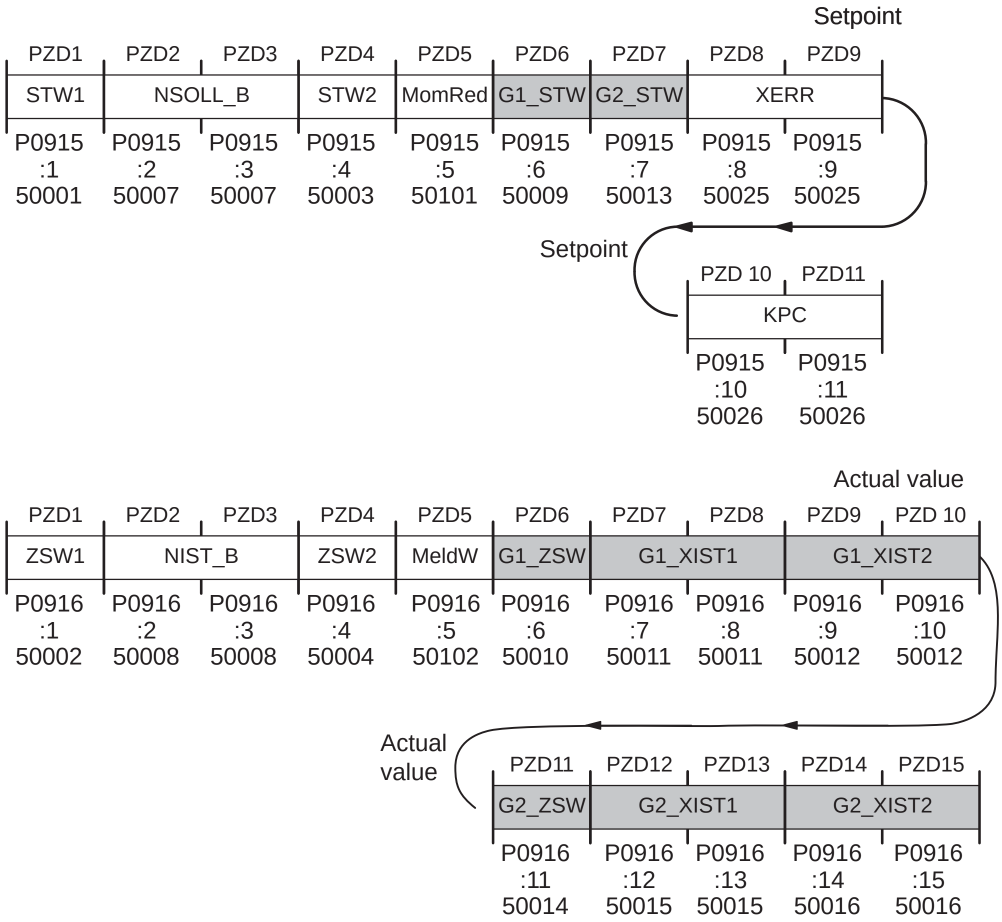
Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50010	P0916 :7 50011	P0916 :8 50011	P0916 :9 50012	P0916 :10 50012

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-24 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**106** **Standard telegram 106, n_{set} interface with KPC (DSC) and encoder 1 and encoder 2**					



This process data is associated with the encoder interface (refer to Chapter 5.6.4)

P0922 = **108** **Standard telegram 108, positioning, master drive for the position reference value coupling (publisher)**

from SW 4.1

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5
STW1	SatzAnw	PosStw	STW2	Over
P0915 :1 50001	P0915 :2 50201	P0915 :3 50203	P0915 :4 50003	P0915 :5 50205

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
ZSW1	AktSatz	PosZsw	ZSW2	MeldW	XsollP		QZsw	Xcor	
P0916 :1 50002	P0916 :2 50202	P0916 :3 50204	P0916 :4 50004	P0916 :5 50102	P0916 :6 50208	P0916 :7 50208	P0916 :8 50118	P0916 :9 50210	P0916 :10 50210

P0922 = **109** **Standard telegram 109, positioning, slave drive for the position reference value coupling (subscriber)**

from SW 4.1

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD 10
STW1	SatzAnw	PosStw	STW2	Over	Xext		QStw	XcorExt	
P0915 :1 50001	P0915 :2 50201	P0915 :3 50203	P0915 :4 50003	P0915 :5 50205	P0915 :6 50207	P0915 :7 50207	P0915 :8 50117	P0915 :9 50209	P0915 :10 50209

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7
ZSW1	AktSatz	PosZsw	ZSW2	MeldW	XistP	
P0916 :1 50002	P0916 :2 50202	P0916 :3 50204	P0916 :4 50004	P0916 :5 50102	P0916 :6 50206	P0916 :7 50206

P0922 = **110** **Standard telegram 110, positioning with MDI**

(from SW 7.1)

Setpoint

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9
STW1	SatzAnw	PosStw	STW2	Over	MDIPos		MDIVel	
P0915 :1 50001	P0915 :2 50201	P0915 :3 50203	P0915 :4 50003	P0915 :5 50205	P0915 :6 50221	P0915 :7 50221	P0915 :8 50223	P0915 :9 50223

PZD 10	PZD11	PZD12
MDIAcc	MDIDec	MDIMode
P0915 :10 50225	P0915 :11 50227	P0915 :12 50229

Actual value

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7
ZSW1	AktSatz	PosZsw	ZSW2	MeldW	XistP	
P0916 :1 50002	P0916 :2 50202	P0916 :3 50204	P0916 :4 50004	P0916 :5 50102	P0916 :6 50206	P0916 :7 50206

5

5.6.6 Defining the process data according to the PPO type

Process data in the closed-loop speed-controlled mode

The following process data is transferred in the speed-controlled mode when using standard telegram 101, depending on the particular PPO type:

Table 5-25 Process data in the closed-loop speed controlled mode

					PZD									
					PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
					1st word	2nd word	3rd word	4th word	5th word	6th word	7th word	8th word	9th word	10th word
Master → Slave Control words (setpoints)					STW 1	n-soll -h	n-soll -l	STW 2	Mom Red	Re-serve d	Re-serve d			
					The control words are described in Chapter 5.6.2. The status words are described in Chapter 5.6.3.									
Master ← Slave Status words (actual values)					ZSW 1	n-ist-h	n-ist-l	ZSW 2	Meld W	Re-serve d	Re-serve d	Ausl	Pwirk	Msoll
PPO1														
PPO2														
PPO3														
PPO4														
PPO5														

Abbreviations:

PPO	Parameter process data object
PZD	Process data
STW1	Control word 1
n-soll	Speed setpoint
STW2	Control word 2
MomRed	Torque reduction
ZSW1	Status word 1
n-ist	Speed actual value
ZSW2	Status word 2
MeldW	Message word
Ausl	Utilization
Pwirk	Active power
Msoll	Smoothed torque setpoint

Note

Operation is also possible with the PPO types which cannot transfer all process data (e.g. PPO1 and PPO3).

PPO type 3 is sufficient for closed-loop speed controlled operation with a simple basic functionality (2 control and 2 status words).

Example: Operating the drive via PROFIBUS in the closed-loop speed controlled mode

The POSMO SI/CD/CA drive is to be operated in the ”speed/torque setpoint” mode with a speed of 1500 RPM via PROFIBUS-DP.

Assumptions for the slave:

- The drive has been completely commissioned is connected to PROFIBUS-DP and is ready to run.
- P0918 (PROFIBUS node address) = 12

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7-315-2-DP)
- Hardware configuration
  - PPO type 1, node address = 12
  - Part, I address, O address:

Part	I address	O address
PKW	272 – 279	272 – 279 (not shown in the example)
PZD	280 – 283	280 – 283

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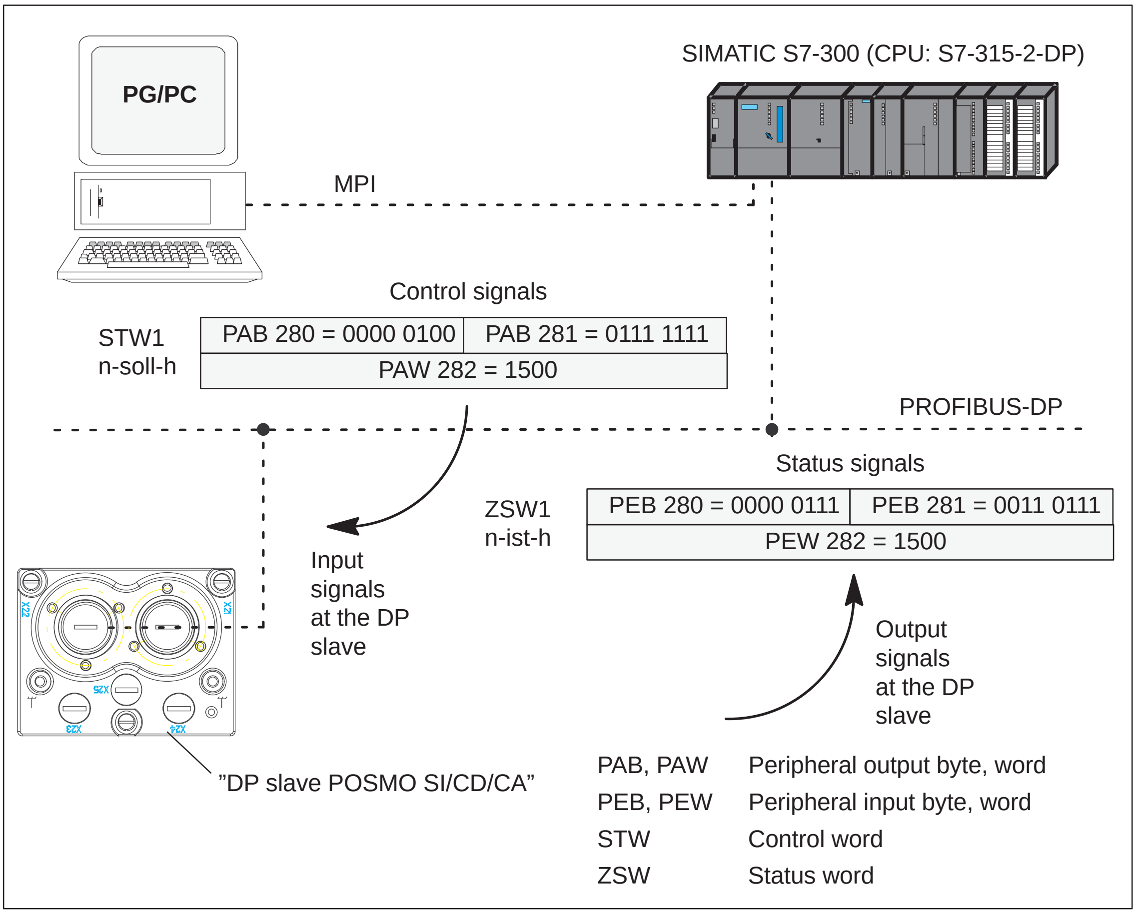


Fig. 5-18 Example: Operating the drive via PROFIBUS-DP

Process data in the positioning mode

Dependent on the PPO type, in the positioning mode, the following process data is transferred when using standard telegram 101:

Table 5-26 Process data in the positioning mode

					PZD									
					PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
					1st word	2nd word	3rd word	4th word	5th word	6th word	7th word	8th word	9th word	10th word
Master → Slave Control words (setpoints)					STW 1	Satz Anw	Pos Stw	STW 2	Over	Re-serve d	Re-serve d			
					The control words are described in Chapter 5.6.2. The status words are described in Chapter 5.6.3.									
Master ← Slave Status words (actual values)					ZSW 1	Akt Satz	Pos Zsw	ZSW 2	Meld W	Re-serve d	Re-serve d	Ausl	Pwirk	Msoll
PPO1														
PPO2														
PPO3														
PPO4														
PPO5														

Abbreviations:

PPO	Parameter process data object	ZSW1	Status word 1
PZD	Process data	AktSatz	Currently selected block
STW1	Control word 1	PosZsw	Positioning status word
SatzAnw	Block selection	ZSW2	Status word 2
PosStw	Position control word	MeldW	Message word
STW2	Control word 2	Ausl	Utilization
Over	Override	Pwirk	Active power
		Msoll	Smoothed torque setpoint

Note

Operation is also possible with the PPO types which cannot transfer all process data (e.g. PPO1 and PPO3).

PPO type 3 is sufficient for positioning operation with a simple basic functionality (2 control and 2 status words).

5.6.7 Parameter area (PKW area)

Tasks

For PPO types 1, 2 and 5 for the net data (useful data), a parameter range with 4 words is also transferred.
The following tasks are possible using the parameter range:

- Request parameter value (read parameters)
- Change parameter value (write parameters)
- Request number of array elements

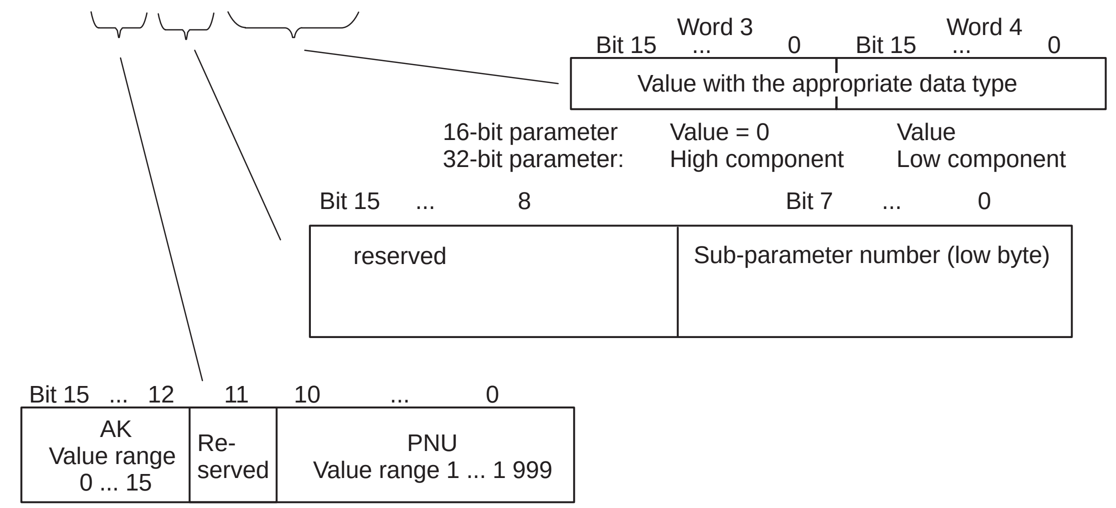
Structure of the PKW area

The PKW area comprises the parameter ID (PKE), the sub-index (IND) and the parameter value (PWE).

5

Table 5-27 Structure of the parameter area (PKW)

	Net data													
	PKW				PZD									
	PKE	IND	PWE		PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
Word	1	2	3	4	1	2	3	4	5	6	7	8	9	10
PPO1														
PPO2														
PPO5														



Abbreviations:

PPO	Parameter process data object
PKW	Parameter identifier value
PZD	Process data
PKE	Parameter ID
IND	Sub-index, sub-parameter number, array index
PWE	Parameter value
AK	Task and response ID (refer to Table 5-28 or 5-29)
PNU	Parameter number

Task telegram, IDs

The IDs for the task telegram (master —> slave) should be taken from the following table:

Table 5-28 Task IDs (master —> slave)

Request identifier	Function	Response IDs (positive)
0	No task	0
1	Request parameter value	1, 2
2	Change parameter value (word)	1
3	Change parameter value (double word)	2
4, 5	–	–
6	Request parameter value (array)	4, 5
7	Change parameter value (array word)	4
8	Change parameter value (array double word)	5
9	Request number of array elements	6
10 (from SW 4.1)	Quickly change the parameter value (array, double word)	5

Note:

- **All** POSMO SI/CD/CA parameters can be read or written into with task IDs 6 and 8.
- The negative response ID is 7.
- The IDs are defined so that they indicate which fields of the PKW interface must also be evaluated.
- Task 8 Data is first calculated into the control and then a response telegram is sent
- Task 10 Data is calculated into the control and a response telegram is sent at the same time

  For example, in order to be able to issue a start task immediately after a traversing block has been completely transferred, the last write task should have the ID 8.

Response telegram, IDs

The IDs for the response telegram (master —> slave) should be taken from the following table:

Table 5-29 Response IDs (slave —> master)

Response ID	Function
0	No response
1	Transfer parameter value (word)
2	Transfer parameter value (double word)
3	–
4	Transfer parameter value (array word)
5	Transfer parameter value (array double word)
6	Transfer number of array elements
7	Task cannot be executed (with error number)
8, 9 and 10	–

How is a task executed?

The master transfers a task to a slave and repeats this task for at least as long as the associated response is received from the slave.

The slave provides the response until the master has formulated a new task.
For responses, which include parameter values, the slave always cyclically responds with an updated value. This involves all responses to the tasks ”request parameter value” and ”request parameter value (array)”.

Fault evaluation

If tasks cannot be executed, the slave responds as follows:

- Outputs a response ID = 7
- Outputs an error number in word 4 of the parameter area

Table 5-30 Fault IDs for ”DP slave POSMO SI/CD/CA”

Fault ID	Error cause
0	Illegal parameter number (the parameter does not exist)
1	Parameter value cannot be changed (Parameter can only be read or is write protected)
2	Upper or lower value limit exceeded
3	Incorrect sub-index
4	No array (parameter does not have any sub-parameter)
5	Incorrect data type (is not required for the type conversion)
6 to 19	not required
20 to 100	Reserved

Data types

The data type, assigned to the parameter must be written into the parameter value via the PKW mechanism (refer under data type in the parameter list in Chapter A.1).

Table 5-31 Data types

Data type for ”DP slave POSMO SI/CD/CA”	Meaning	Data type for SIMATIC S7
Integer16	Integer number, 16 bit	INT
Integer32	Integer number, 32 bit	DINT
Unsigned16	Integer number without sign (unsigned) 16 bit	WORD
Unsigned32	Integer number without sign (unsigned) 32 bit	DWORD
Floating point	Floating-point number	REAL

Transferring traversing blocks

In the ”positioning” operating mode, for POSMO SI/CD/CA, the traversing blocks are saved in parameters and can therefore be read and changed via the PKW mechanism.

Reader’s note

The parameters for the traversing blocks are described in Chapter 6.2.10.

When mapping the traversing blocks to the parameters, the parameter number defines the block components (position, velocity, etc.) and the sub-parameter number of the traversing block number.

Example: P0081:17 Position for traversing block 17

Addressing in the PKW mechanism:

- The parameter ID (PKE) addresses the block components.
- The sub-index (IND) addresses the traversing block number

This means that a complete set can only be read or changed one after the other via the individual components.

From SW 7.1, during positioning, a new position or a new traversing block can be accepted and executed (flying block change) using the function ”MDI” (refer to Chapter 6.2.12).

Rules for processing tasks/responses

1. A task or a response can always only be referred to one parameter.
2. The master must repeat a task until it has received the appropriate response from the slave.
3. The slave provides the response until the master has formulated a new task.
4. The master recognize the response to a task which it issued:
   – by evaluating the response ID
   – by evaluating the parameter number (PNU)
   – also, if required, by evaluating the parameter index (IND)
5. For response telegrams, which include parameter values, the slave always cyclically responds with an updated value.
   This involves all responses to the tasks ”request parameter value” and ”request parameter value (array)”.

Example: Reading parameters via PROFIBUS

When there is at least one fault, the drive fault buffer (P0945:1 to P0945:8) should be read out via PROFIBUS, and buffered on the master side.

Assumptions for the slave:

- The drive has been completely commissioned is connected to PROFIBUS-DP and is ready to run.
- P0918 = 12 (PROFIBUS node address) has been set

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - PPO type 1, node address = 12
Part	I address	O address
PKW	272 – 279	272 – 279
PZD	280 – 283	280 – 283 (not shown in the example)

What has to be programmed on the master side?

If the input signal from the peripheral (I/O) area E281.3 (ZSW1.3, fault present/no fault present) = ”1” signal, then the following must be executed on the master side (refer to Fig. 5-19):

1. Programming SFC14 and SFC15

   The standard functions SFC14 ”read slave data” and SFC15 ”write slave data” are required in order to consistently transfer more than 4 bytes.

2. Request parameter value
   - Write into the PKW output signals (PAB 272 –279) with AK = 6, PNU = 945, IND = 1, PWE = no significance

3. Read parameter value and save
   - Evaluate the PKW input signals (PEB 272 –279)
   - If AK = 4 or 5, PNU = 945, IND = 1 and PWE = xx then OK
   - Read and save P945:1 = xx
   - If AK = 7, then evaluate the fault number in PEW 278 (refer to Table 5-30)

4. Repeat points 1 and 2 to read the other sub-parameters of the fault condition

   P945:2 —> PNU = 945, IND = 2
   to to
   P945:8 —> PNU = 945, IND = 8

   This repetitive procedure can be exited if a ”0” is in one of the sub-parameters.
   All of the faults of the last fault situation are then detected.

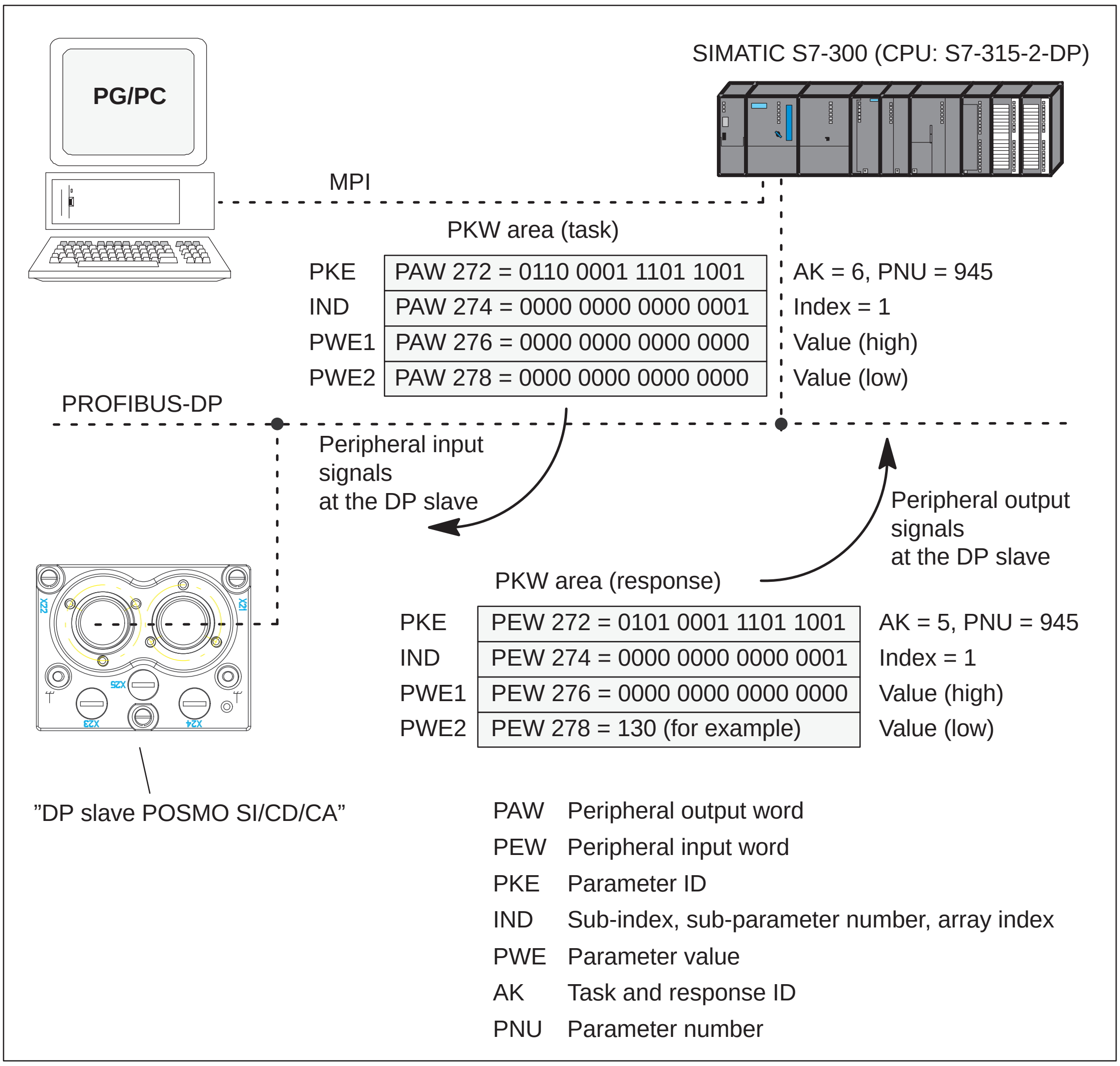


Fig. 5-19 Example: Reading parameters via PROFIBUS

Note

The ”FC 92” SIMATIC S7 block can be used for ”read parameters via PROFIBUS”.
This block is included in the toolbox of the CD for ”POSMO SI/CD/CA” in the file ”s7_Baust.arj” and is documented using its block comments.

Example: Reading parameters via PROFIBUS

Depending on a condition, the position in traversing block 4 (P0081:3) should be adapted as required via PROFIBUS.
In this particular example, P0081:3 = 14 586 is written.

Assumptions for the slave:

- The drive has been complete commissioned, has been connected to PROFIBUS and is ready for operation.
- P0700 = 3 (”positioning” mode) has been set
- P0918 = 12 (PROFIBUS node address) has been set

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - PPO type 1, node address = 12
Part	I address	O address
PKW	272 – 279	272 – 279
PZD	280 – 283	280 – 283 (not shown in the example)

What has to be programmed on the master side?

If the condition to write the position in traversing block 4 is available, then the following must occur on the master side (refer to Fig. 5-20):

1. Write the parameter value (define task)
   - PKW output signals (PAB 272 – 279) written into with AK = 8, PNU = 81, IND = 3, PWE2 = 14586
2. Check the task
   - Evaluate the PKW input signals (PEB 272 –279)
   - If AK = 5, PNU = 81, IND = 3 and PWE2 = 14586 then OK
   - If AK = 7,
     then evaluate the fault number in PEW 278 (refer to Table 5-30)

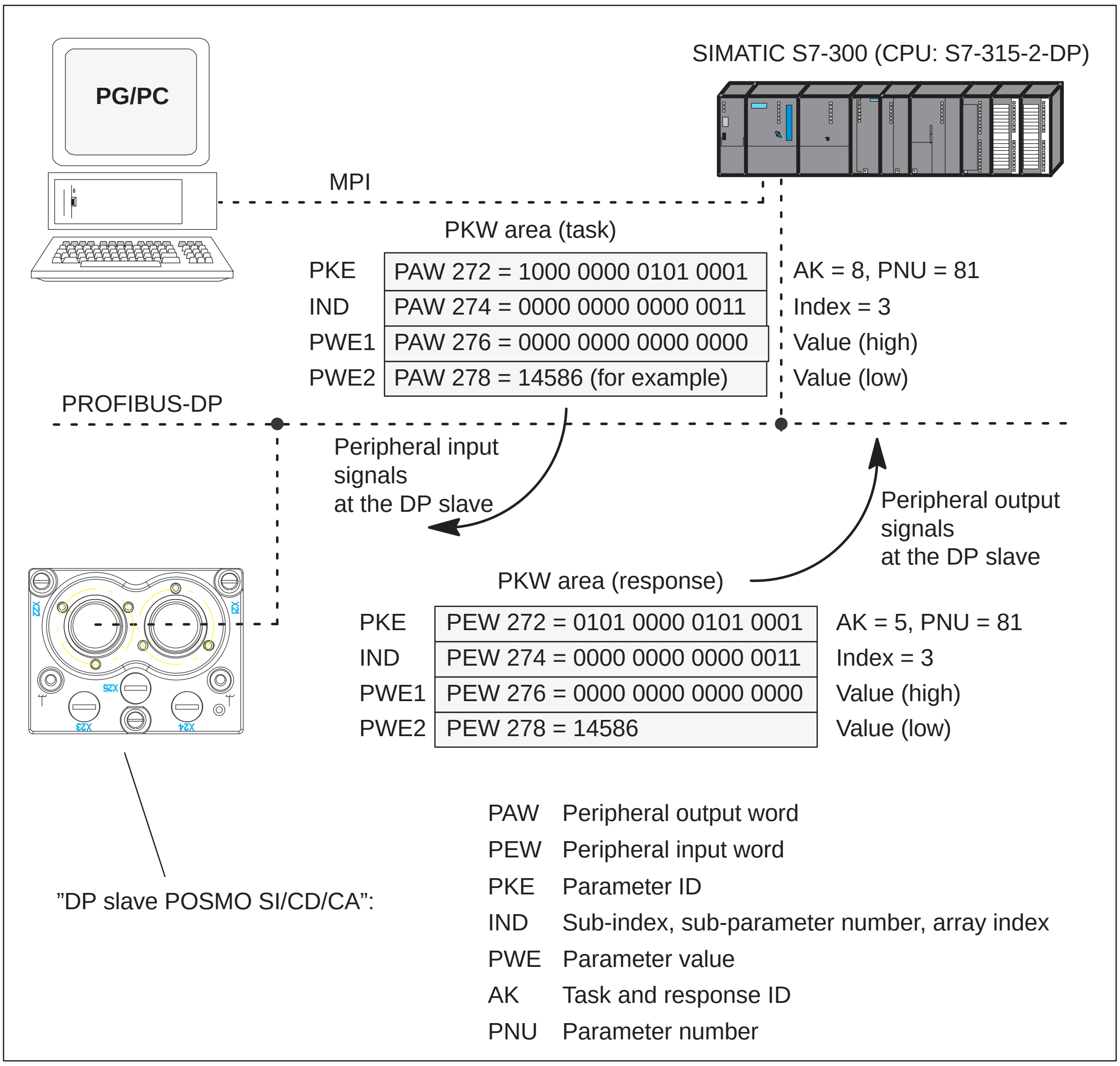


Fig. 5-20 Example: Writing parameters via PROFIBUS

Note

The ”FC 93” SIMATIC S7 block can be used for ”write parameters via PROFIBUS”.
This block is included in the toolbox of the CD for ”POSMO SI/CD/CA” in the file ”s7_Baust.arj” and is documented using its block comments.

5.7 Settings at the PROFIBUS-DP master

5.7.1 Master device file and configuring

Performance features of the PROFIBUS devices

PROFIBUS devices have different performance features.
In order that all master systems can correctly address the "DP slave POSMO SI/CD/CA", the characteristic features of the slave are summarized in a standardized master device file (GSD).

The "DP slave POSMO SI/CD/CA" is exclusively operated as DP standard slave.

Master device file for "DP slave POSMO SI/CD/CA"

The following master device file (GSD) is available for the "DP slave POSMO SI/CD/CA":

- SIEM808F.GSD

From SW 6.1:

- SIEM808F.GSD PROFIdrive Application Class 1
- SI02808F.GSD PROFIdrive Application Class 4

  Using the GSD file SI02808F.GSD, it is no longer necessary to enter the block for clock-cycle synchronism into the parameterizing telegram manually byte-for-byte.

  In order to use the GSD file SI02808F.GSD, a configuring tool is required which supports the GSD Revision 4 (e.g. Step7 HW-Config Version x.xx)

The GSDs are available as ASCII files on the data medium (e.g. CD) for POSMO SI/CD/CA.

These files clearly and completely describe the features/characteristics of the "DP slaves POSMO SI/CD/CA" in a precisely defined format.

The GSD file must be inserted into the configuring tool of the master.

If this is not possible, the appropriate information must be derived from the GSD file for the "DP slave POSMO SI/CD/CA".

Reader's note

Information on the PROFIBUS-DP master settings should be taken from the literature of the master used.

Configuration

Configuring defines the data, which the master transfers to the ”DP slaves” at every bus run-up via the parameterizing telegram and the configuration telegram.

Configuring can be realized in the following ways:

1. via the ”SIEM808F.GSD” or ”SI02808F.GSD”
2. Using the ”Slave Object Manager (Drive ES Slave-OM)”, which is included in the following products:

Product	Order No. (MLFB):
Drive ES Basic V5.1 SP2	6SW1700–5JA00–1AA0 (single license) 6SW1700–5JA00–1AA1 (company license) 6SW1700–5JA00–1AA4 (upgrade)
Drive ES SIMATIC V5.2	6SW1700–5JC00–2AA0 6SW1700–5JC00–2AA4 (upgrade)

The products require the basic SIMATIC-STEP 7 software as basis.

Compared to the GSD file, Drive ES offers a higher degree of user friendliness regarding the telegram structure and clock cycle-synchronous operation.

Slave-to-slave communications does not function without Drive ES.

The parameterizing and configuring data, received from the ”DP slave POSMO SI/CD/CA”, are displayed in the following parameters:

- P1783:64 Received PROFIBUS parameterizing data
- P1784:64 Received PROFIBUS configuration data

Parameterizing telegram

For the parameterizing data, the following should be noted:

- For DP slave with SIEM808F.GSD
  - If there is no clock-synchronous operation

    The standard setting from the GSD can be used for the parameterizing data.
  - If there is clock-synchronous operation

    The parameterizing data must, in some cases, be modified (refer to Chapter 5.8.5).

Configuration telegram

The following must be observed for the configuration data:

- For DP slave with SIEM808F.GSD

  Using the configuring telegram, the length of the input/output data, the number of axes and consistent or inconsistent data transfer is signaled to the ”DP slave POSMO SI/CD/CA”.

  Net data – maximum length
  The maximum length of the net data is 20 words for each drive (PKW section = 4 words, PZD section = max. 16 words).

  PZD – minimum length
  if no clock-synchronous operation: I/O = min. 2/2 words
  for clock-synchronous operation: I/O = min. 4/4 words

  Any combination of I/O data is possible, whereby the length for the data must be specified as either word or double-word resolution (1 word = 16 bits).

5

Table 5-32 IDs in the configuration telegram

Entry	Meaning	Data transfer	
		Consistent	Inconsistent
1	PKW No PKW	F3 00 or ≠ F3	
1 or 2 ... last	n words I/O	F(n–1) with the exception F3	7(n–1)
1 or 2 ... last	n words I	D(n–1)	5(n–1)
1 or 2 ... last	n words O	E(n–1)	6(n–1)

Table 5-33 Examples: Configuration data for SIEM808F.GSD

Example	Data transfer	
	Consistent (complete length)	Inconsistent (consistent over 1 word)
With PKW with PZD = 10/10 words (I/O), ≙ PPO 5)	F3F9	F379 the PKW section is always consistent
Without PKW with PZD = 8/15 words (I/O)	D7EE	576E

5.7.2 Commissioning

Prerequisites for a slave

The slave must fulfill the following prerequisites or they must be clarified in order to commission the ”DP slaves POSMO SI/CD/CA”:

- What is the node address of the DP slave?

  The node address must be set using the DIL switch on the lower side of the PROFIBUS unit (refer to Chapter 2.4.6).

Note

If an error occurs when reading-out the node address of a POSMO SI/CD/CA, then the slave signals itself with address 126.

- In which mode is the DP slave operated?

  This mode is set in P0700.

  The selected mode is significant when defining the functional scope of the DP slave and the function of the control and status signals.

  – ”Speed/torque setpoint” mode
    The speed-controlled mode represents a subset of the positioning mode.
    The functional scope is defined by the control and status words specified in Chapter 5.6.1.

  – ”Positioning” mode
    In the positioning mode, the functional scope is defined by the control and status words, specified in Chapter 5.6.1.

Note

When commissioning all of the nodes (stations) connected to PROFIBUS-DP, it may be necessary to temporarily switch-out the ”disturbing” DP slaves (refer to Chapter 5.9 under P0875).

Caution

If a ”DP slave POSMO SI/CD/CA” has been powered-up, the enable terminal and PROFIBUS enable signals are required to move the drive.

Prerequisites and information about or to the master

The following must be observed on the master side when commissioning the ”DP slave POSMO SI/CD/CA”:

- Node address
  What is the node address (P0918) of the ”DP slave POSMO SI/CD/CA” to be commissioned?
- Master device file (GSD file)
  Is there a GSD file SIEM808F.GSD for the ”DP-Slave POSMO SI/CD/CA” for the master?
  If not, then the GSD file must be inserted into the configuring tool of the master for the ”DP-Slave POSMO SI/CD/CA”.
- Data transfer (consistent/inconsistent)

  The following applies when programming the data transfer (consistent/inconsistent) in the user program of the master:
  (e.g. for the SIMATIC S7, CPU 315–2DP)

  – PKW part

    —> with SFC 14/15

  – PZD part

    consistent data transfer (consistent over the complete length):

    —> with SFC 14/15

    non-consistent data transfer (consistent over 1 word):

    —> An SFC14/15 cannot be used. Instead, a direct peripheral access must be used (PAW/PEW).
- In the GSD file SIEM808F.GSD, when selecting the PPO type, the consistent data transfer for POSMO SI/CD/CA is pre-assigned as default.

5

Parameterizing the ”DP slave POSMO SI/CD/CA” via PROFIBUS

Communications must be possible between the master and slave when parameterizing a DP slave via PROFIBUS. The PROFIBUS node address must be selected at the lower side of the PROFIBUS unit for the ”DP slave POSMO SI/CD/CA” using the DIL switch (refer to Chapter 2.4.6).

Note

Cyclic operation is possible between the ”DP slave POSMO SI/CD/CA” and the DP master. This means that it can be commissioned and parameterized in the following ways:

- With ”SimoCom U via PROFIBUS”
  - Establish online operation (refer to Chapter 3.2.3)
  - Carry-out the first and series commissioning with SimoCom U (refer to Chapter 4.3.1 or 4.3.2).
- With ”read/write parameter” via the PKW part
  The parameters of the ”DP slave SIMODRIVE” can be read/written into, from the PROFIBUS-DP master, via the PKW part.

5.7.3 Diagnostics and troubleshooting

Diagnostics LED

There is a two-color diagnostics LED on the PROFIBUS unit (refer to Chapter LEERER MERKER).

Evaluating faults via PROFIBUS

Faults which occur are entered into a fault buffer. The fault code, fault number, fault time and fault value for each fault are specified using the appropriate parameters.

Status signal for faults

The POSMO SI/CD/CA drive signals whether there is at least one fault present via ”Fault present/no fault present” using the status bit or output signal ZSW1.3.

Fault buffer

The fault buffer comprises 8 fault cases, each of which can include 8 fault entries.

For fault case 1, the faults which have occurred are saved and they remain there until the fault case has been removed, i.e. all of the faults have been removed and also acknowledged.

In fault cases 2 to 8, the acknowledged fault cases since the last POWER ON are saved. The number of fault cases since POWER ON can be read from P0952.

Index	P0945:65 Fault code	P0947:65 Fault number	P0948:65 Fault time	P0949:65 Fault value	
0	No significance				
1	101	2	t_101	w_101	**Fault case 1**
2	1114	10	t_114	w_114	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	90	3	t_90	w_90	**Fault case 2**
10	0	0	0	0	
to		to			
16	0	0	0	0	
		to			to
57	0	0	0	0	**Fault case 8**
58	0	0	0	0	
to		to			
64	0	0	0	0	

Fig. 5-21 Fault buffer structure

Rules regarding the fault buffer

The following rules apply to the fault buffer:

- At POWER ON, the complete fault buffer is deleted.
- The faults are entered in the sequence that they occur, in the parameter of fault case 1, i.e.
  - 1st fault that has occurred —> parameter with index 1
  - 2nd fault that has occurred —> parameter with index 2, etc.

  If more than 8 faults occur, then these are not displayed.
- Fault case 1 is considered to have been resolved, if, the following is valid for **all** of the entered faults:
  - the cause has been removed and
  - the fault has been acknowledged

The fault buffer is then re-arranged so that the faults of fault case 1 go into fault case 2 and those from fault case 2 into fault case 3 etc. This means that the parameters of fault case 1 are again free for additional entries.

If more than 8 fault cases have occurred since the last POWER ON, then fault case 8 is overwritten, the oldest fault case is eliminated.

- If there is at least one fault in fault case 1, which must be acknowledged with POWER ON, then this applies for the complete fault situation.

Reader's note

A description of the faults, the way in which they can be acknowledged as well as a list of all the faults, is provided in Chapter 7.

Evaluate warnings via PROFIBUS

The warnings which occurred, are displayed, bit-coded in P0953 to P0960.

Status signal for warnings

The POSMO SI/CD/CA drive signals whether at least one warning is present using the status bit or output signal ZSW1.7 ”Warning present/ no warning present.

Reader's note

A description of the warnings as well as a list of all of the warnings is provided in Chapter 7.

Diagnostics of the process data

The sent and received process data of the ”DP slave POSMO SI/CD/CA” are displayed using the following parameters:

- P1788:17 Received process data PROFIBUS
- P1789:17 Sent process data PROFIBUS

PKW data diagnostics

The sent and received PKW data of the ”DP slave POSMO SI/CD/CA” are displayed using the following parameters:

- P1786:5 Received PKW data PROFIBUS
- P1787:5 Sent PKW data PROFIBUS

Diagnostics of the parameterizing and configuration data

The parameterizing and configuration data, received from the DP master, are displayed using the following parameters:

- P1783:64 Received PROFIBUS parameterizing data
- P1784:64 Received PROFIBUS configuration data

5.8 Motion Control with PROFIBUS-DP

General information

A clock cycle synchronous drive coupling can be implemented between a DP master and one or several slaves via the PROFIBUS-DP fieldbus using the ”Motion Control with PROFIBUS-DP” function.

Reader’s note

The clock-Synchronous drive coupling is defined in the following profile:

Reference: /PPA/, PROFIdrive-Profile Drive Technology, draft Version 3.1 July 2002

Which clock–synchronous masters are there?

Clock-synchronous operation can be implemented using the following DP masters:

Table 5-34 Examples for clock-synchronous masters

DP MASTER	DP slave POSMO SI/CD/CA
SINUMERIK 802D	In the ”speed/torque setpoint” mode (n-set mode)
SINUMERIK 840Di	
Positioning and path control board FM 357–2	
SIMATIC S7–300 6ES7315–2AF03–xxxx	In the ”positioning” operating mode (pos mode)

Activating

The clock-synchronous coupling can be activated if all of the prerequisites for the master and slave have been fulfilled, and the function is selected in the DP master using the appropriate parameterizing/configuring.

Parameterizing equidistant operation

The parameters for equidistant operation are included in the slave-specific master device file SIEM808F.GSD. Parameterization is also possible via Drive ES.

The master configuring ensures, that all of the DP slaves in the application use the same clock cycle times and processing instants.

When PROFIBUS-DP runs up, this information, required by the DP slaves, is sent from the master to all of the slaves via the parameterizing telegram.

DP cycle

Every DP cycle starts with a Global Control Telegram (GC), which is then followed, one after the other, with the data transfer with the individual slaves (S1, S2, ...).

The GC telegram is a broadcast telegram, sent from the master, and which is received simultaneously by all slaves.

The internal clock cycle of the ”DP slave POSMO SI/CD/CA” is synchronized to the DP clock cycle using this GC telegram and the PLL used for the PROFIBUS3 option module.

Note

PROFIBUS-DP cycles >15 ms are not permissible.

Prerequisites and features

The clock-synchronous coupling has the following prerequisites and features:

- Prerequisites for a DP slave
  - Configuring the encoder interface in the process data (refer to Chapter 5.6.5)
- Prerequisites for a DP master
  - ”Motion Control with PROFIBUS-DP” function
  - A DP interface is used in the DP master which supports clock-synchronous operation
  - Data transfer rate: Can be set between 1.5 and 12 Mbaud
- Telegram transfer between the DP master and slave in equidistant cycles
- Post-synchronizing the slave clock cycles to the equidistant DP cycle via the Global Control Telegram at the start of the DP cycle
- The maximum permissible fluctuation when identifying the Global Control Telegram (jitter) depends on the data transfer rate:

Data transfer rate	Max. permissible jitter
12 Mbaud	1.0 µs
3 or 6 Mbaud	0.9 µs
1.5 Mbaud	0.8 µs

  Clock-synchronous operation with the ”DP slave POSMO SI/CD/CA” is only guaranteed when the maximum permissible jitter is fallen below.

  If, for example, repeaters or optical bus components are used when configuring the bus system, it should be ensured that the maximum permissible jitter is not exceeded.

5.8.1 Equidistant DP cycle operation in the n-set mode

Overview

With the function, the closed-position control loop is closed through PROFIBUS. The position controller is in the DP master, the closed-loop current and speed control as well as the position actual value sensing (encoder interface) are in the DP slave.

The position controller clock cycle is transferred to the DP slaves via the fieldbus, and the slaves synchronize their speed/current controller clock cycle to the position controller clock cycle of the DP master.

The DP master enters the speed setpoint.

Both the motor encoder as well as a direct measuring system can be used for the position actual values sensing in the DP slave.

- Indirect measuring system (motor encoder) at the connector
  MOT ENCODER —> Encoder 1
- Direct measuring system at the connector
  DIR MEASRG —> Encoder 2

The encoder interface must be configured in the process data.

—> Refer to Chapter 5.6.5

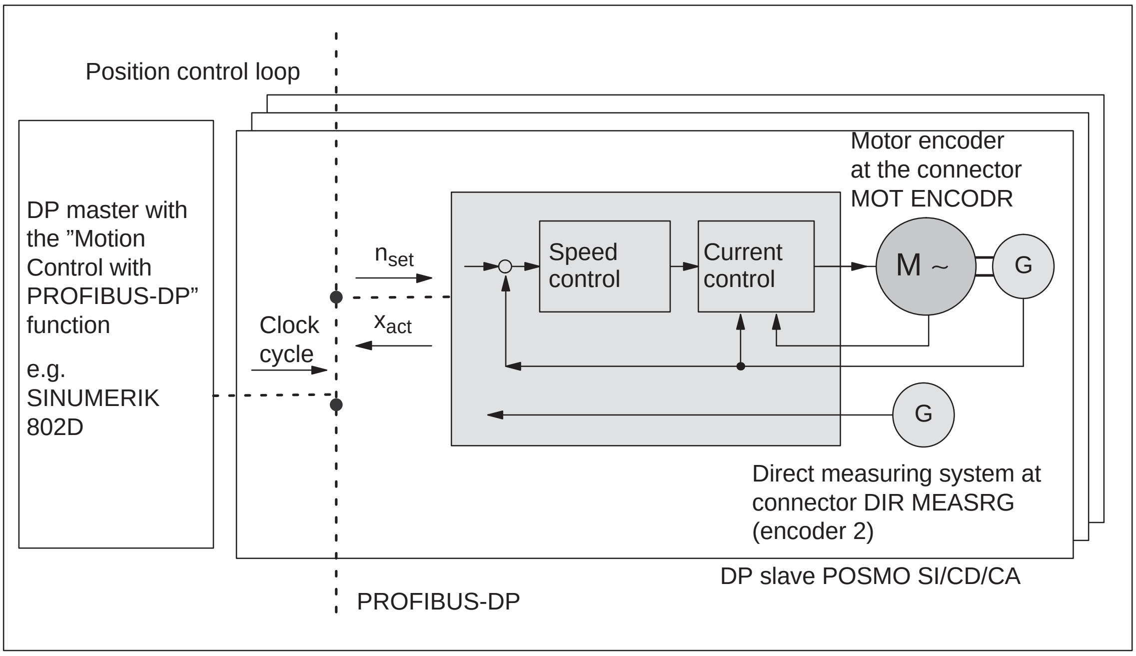


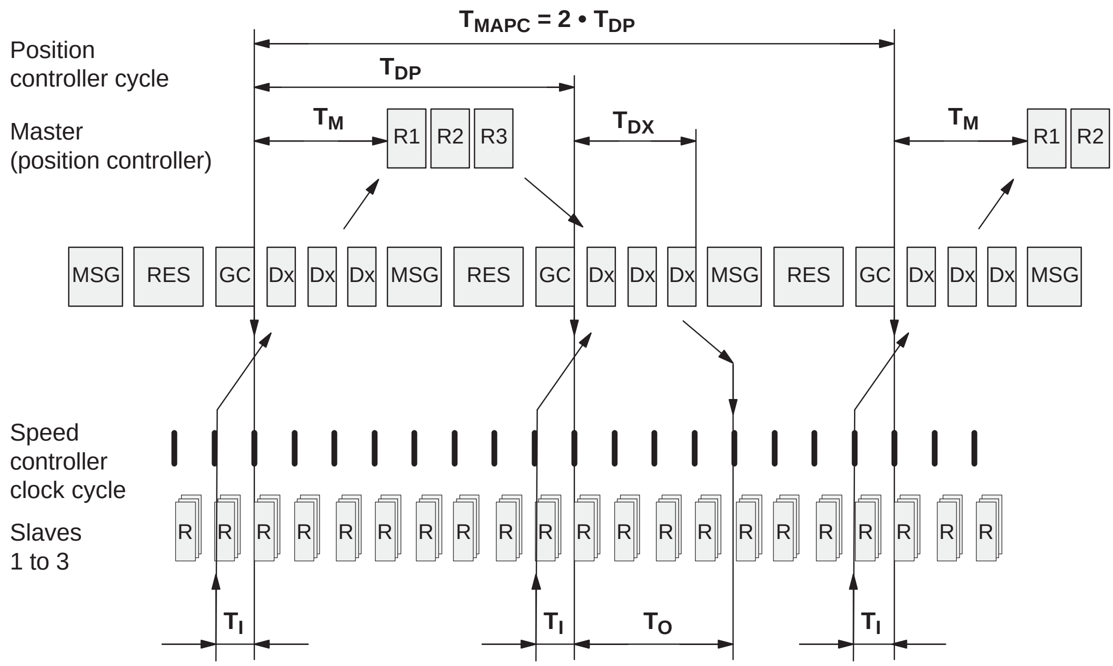
Fig. 5-22 Overview for "Motion Control with PROFIBUS-DP": Example with DP master and 3 DP slaves

Timing

The position actual value x_{act} is read in to the telegram image at time T_I before the start of each DP clock cycle, and is transferred to the DP master at the next DP cycle.

The closed-loop DP master control starts at the time T_M after each position controller clock cycle, and uses the slave actual values which were previously read. The master transfers the calculated setpoints to the telegram image of the slave in the next DP cycle. The speed setpoint n_{set} is input into the control at instant T_O after the start of the DP cycle.

By minimizing the times T_O and T_I the deadtime is also minimized in the higher-level position control loop.



T_{MAPC}	Master application cycle: Position controller cycle
T_{DP}	DP cycle time
T_{DX}	Data Exchange Time: Sum of the data transfer times of all of the slaves
T_M	Master Time: Start of the closed-loop master control
T_I	Input Time: Instant in time for the actual value sensing
T_O	Output Time: Time of setpoint transfer
GC	Global Control telegram (broadcast telegram)
R	Computation time, speed/position controller
Dx	Slaves: Net data transfer between master and slave 1 – n
MSG	Acyclic utilities (for example, DP/V1, token passing)
RES	Reserve: ”Active pause” until the isochronous (equidistant) cycle has expired

Fig. 5-23 Example: optimized DP cycle with $T_{MAPC} = 2 • T_{DP}$

Average value generation for n_{set}

The speed setpoint is accepted in the ”DP slave POSMO SI/CD/CA” at instant T_O in each nth DP clock cycle ($n = T_{MAPC}/T_{DP}$).

In order to eliminate having to trace the setpoint steps, the speed setpoint can be averaged using an average value filter (P1012.8).

5.8.2 Equidistant DP cycle operation in the positioning mode

Overview

The traversing motion for several drives can be simultaneously started via the clock-cycle synchronous PROFIBUS-DP.

If the traversing blocks are identically parameterized (travel, velocity, acceleration) in the various drives, then the axes can move in synchronism.

Traversing blocks are simultaneously started and synchronous movements of the motion profile are realized precisely in the IPO clock cycle.

In this case, position differences only result in different following errors in the axes.

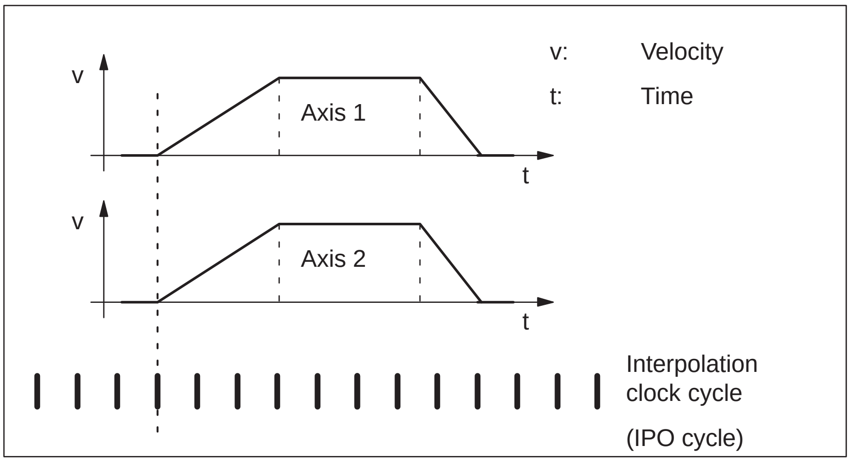


Fig. 5-24 Example: Simultaneously starting the traversing motion

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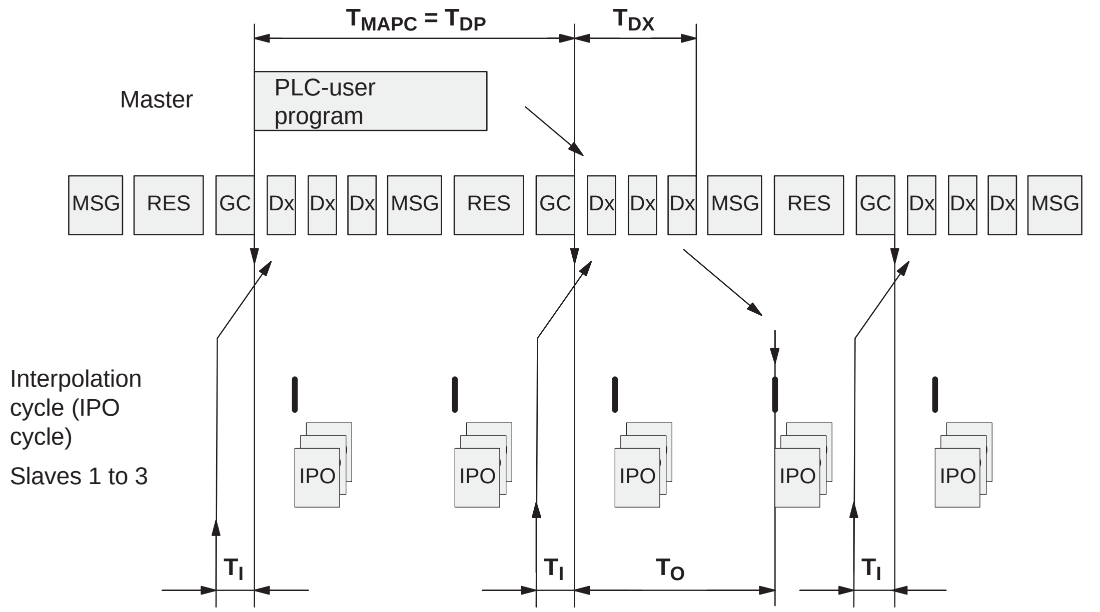
Note

For the equidistant DP cycle sequence in the pos mode a setpoint transfer instant (T_O) of at least 750 µs must be configured (refer to Fig. 5-23). If the configured time is <750 µs then it is possible that either inconsistent or ”old” actual values are transferred, e.g. XistP, XsollP, dXcor.

Timing

The clock-cycle synchronous PROFIBUS-DP ensures that the IPO clock cycles run in synchronism in all of the axes involved which means that the traversing enable signals become effective at the same time.

The SYNC telegram from the DP master guarantees that the axes start in the same DP clock cycle.



T_{MAPC}	Master application cycle: Master application clock cycle
T_{DP}	DP cycle time
T_{DX}	Data Exchange Time: Sum of the data transfer times of all of the slaves
T_I	Input Time: Instant in time for the actual value sensing
T_O	Output Time: Time of setpoint transfer
GC	Global Control telegram (broadcast telegram)
Dx	Slaves: Net data transfer between master and slave 1 – n
MSG	Acyclic utilities (for example, DP/V1, token passing)
RES	Reserve: ”Active pause” until the isochronous (equidistant) cycle has expired

Fig. 5-25 Example: T_{IPO} = 4 ms and T_{DP} = 8 ms

Prerequisites

General prerequisites:

- The interpolation clock cycle (P1010) must be parameterized the same for all axes.
- The master application clock cycle T_{MAPC} must be an integer multiple of the interpolation clock cycle.
- T_I and T_O must be the same for all axes.
- T_{DP} must be less than or equal to 16 ms.
- For masters, which cannot generate a master sign of life (e.g. SIMATIC S7), T_{MAPC} must be = to T_{DP} and the sign-of-life monitoring in operation must be disabled using P0879.8 = 1.

Additional prerequisites for SIMATIC S7:

- Presently, there is no run level that is in synchronism with DP cycle in S7 user programs. This means, that if axes are to be simultaneously started, in addition to the clock-synchronous PROFIBUS operation, the ”classic” SYNC mechanism must be used.

  SYNC mechanism

  —> refer to the documentation of the DP master SIMATIC S7 (SFC 11 ”DPSYNC_FR”)

  The SYNC mechanism may only be activated after the drive has set the status bit ZSW1.9 ”control requested”.

5

5.8.3 Times in the equidistant DP cycle

General information

The ”DP slave POSMO SI/CD/CA” requires the following timing information for equidistant operation, clock cycles and signal processing instants:

Table 5-35 Time settings for the ”DP slave POSMO SI/CD/CA”

Name	Value[1)]	Limit value	Description
T_{BASE_DP}	$5DC_{hex}$ ≐ 1500_{dec}:	–	Time base for T_{DP} Calculation: T_{BASE_DP} = 1500 • T_{Bit} = 125 µs T_{Bit} = 1/12 µs at 12 Mbaud
T_{DP}	8	$T_{DP} \geq T_{DP\_MIN}$	DP cycle time T_{DP} = integer multiple • T_{BASE_DP} Calculation: T_{DP} = 8 • T_{BASE_DP} = 1 ms
		T_{DP_MIN} = 8	Minimum DP cycle time Calculation: T_{DP_MIN} = 8 • T_{BASE_DP} = 1 ms
T_{MAPC}	1	n • T_{DP} n = 1 – 14	Master application cycle time This is the time frame in which the master application generates new setpoints (e.g. in the position controller cycle). Calculation: T_{MAPC} = 1 • T_{DP} = 1 ms
T_{BASE_IO}	$5DC_{hex}$ ≐ 1500_{dec}:	–	Time base for T_I, T_O Calculation: T_{BASE_IO} = 1500 • T_{Bit} = 125 µs T_{Bit} = 1/12 µs at 12 Mbaud
T_I	2	$T_{I\_MIN} \leq T_I < T_{DP}$	Time of actual value sensing Is the time, where the position actual value is sensed before the start of a DP cycle. T_I = integer multiple of T_{BASE_IO} Calculation: T_I = 2 • 125 µs = 250 µs For T_I = 0, the following is valid: $T_I \doteq T_{DP}$
		T_{I_MIN} = 1	Minimum T_I Calculation: T_{I_MIN} = 1 • T_{BASE_IO} = 125 µs
T_O	4	$T_{DX} + T_{O\_MIN}$ $\leq T_O \leq T_{DP}$	Time of setpoint transfer This is the time that the setpoints (speed setpoint) are transferred to the closed-loop control after the start of DP cycle. T_O = integer multiple of T_{BASE_IO} Calculation: T_O = 4 • 125 µs = 500 µs For T_O = 0, the following is valid: $T_O \doteq T_{DP}$
		T_{O_MIN} = 1	Minimum time interval between T_O and T_{DX} T_{O_MIN} = 1 • T_{BASE_IO} = 125 µs

Table 5-35 Time settings for the ”DP slave POSMO SI/CD/CA”, continued

Name	Value[1)]	Limit value	Description
T_{DX}	$E10_{hex}$ $\doteq 3600_{dec}$	$T_{DX} < T_{DP}$	Data exchange time This is the time which is required to transfer, within one DP cycle, the process data to all of the slaves. T_{DX} = integer multiple of T_{Bit} T_{Bit} = 1/12 µs at 12 Mbaud Calculation: T_{DX} = 3600 • T_{BIT} = 300 µs
T_{PLL_W}	A_{hex} $\doteq 10_{dec}$	–	PLL window (half the width of the GC synchronization window) The following applies to the setting: • Small window —> minimization of synchronization fluctuations on the drive • Large window —> higher tolerance of GC fluctuations Calculation: T_{PPL_W} = 10 • T_{BIT} = 0.833 µs T_{Bit} = 1/12 µs at 12 Mbaud Recommendation: Set T_{PLL_W} to 0 (standard value) —> the ”DP slave POSMO SS/CD/CA” then automatically uses the standard value of 0.81 µs
T_{PLL_D}	0	–	PLL dead time The PLL dead time can be used to compensate for different data transfer times to the slaves (e.g. due to repeaters). The slaves with faster transfer times are delayed with a corresponding PLL dead time. Calculation: T_{PLL_D} = 0 • T_{BIT} = 0 µs T_{Bit} = 1/12 µs at 12 Mbaud

1) The values correspond to the master device file SIEM808F.GSD

5

Setting criteria

The following criteria must be taken into account when setting the times:

- DP cycle (T_{DP})
  - Time T_{DP} must be set the same for all bus nodes.
  - The following must be valid: $T_{DP} > T_{DX}$ and $T_{DP} \geqq T_O$

    Time T_{DP} is therefore long enough to permit communications with all of the bus nodes.
  - Specific reserves must be available

    This allows additional masters to be connected and non-cyclic communications.
- T_I and T_O
  - Setting the times in T_I and T_O as short as possible reduces the dead time in the position control loop.
  - The following must be valid: $T_O > T_{DX} + T_{Omin}$
- The following is valid for interpolating axes:
  - T_I of the interpolating axes should be the same
  - T_O of the interpolating axes should be the same

5.8.4 Bus run-up, synchronization and net data save

Bus run-up and synchronization

When booting, the DP master checks the DP slave by requesting diagnostic information.

The following faults/errors are identified:

- Parameterizing and configuring errors
- The DP slave has been assigned to another master
- Static user diagnostics
- Operational readiness of the DP slave

If a fault has not been detected, then the DP master, with this DP slave, goes into cyclic net data operation,
i.e. input and output data are exchanged.

With the transition into cyclic net data transfer, the DP slave is synchronized to the master sign-of-life.

The DP slave runs in synchronism with the master, if

- The status signal ZSW1.9 (control requested/no control possible) = ”1”

  and
- The slave sign-of-life (ZSW2.12 to ZSW2.15, value = 1 to 15) is counted

Net data save

The net data save is realized in both data transfer directions (master <—> slave) using a sign-of-life that comprises a 4-bit counter.

The sign-of-life counter is always incremented from 1 to 15, and then starts again with the value 1.

- Master sign-of-life (M-SoL)
  - The control signals STW2.12 to STW2.15 are used as master sign-of-life.
  - The master sign-of-life counter is incremented in each master application cycle (T_{MAPC}).
  - P0879. 2 to .0 Permissible sign-of-life error
  - P0879. 8 Operation without master sign-of-life monitoring
  - Monitoring

    The master sign-of-life is monitored in the DP slave. If the master sign-of-life does not consecutively correspond to the expected value or more often than is permitted in P0879 bit 2 to bit 0, then the following occurs:

    —> fault 597 (PROFIBUS: Synchronization error) is output

    —> zero is output as slave sign-of-life

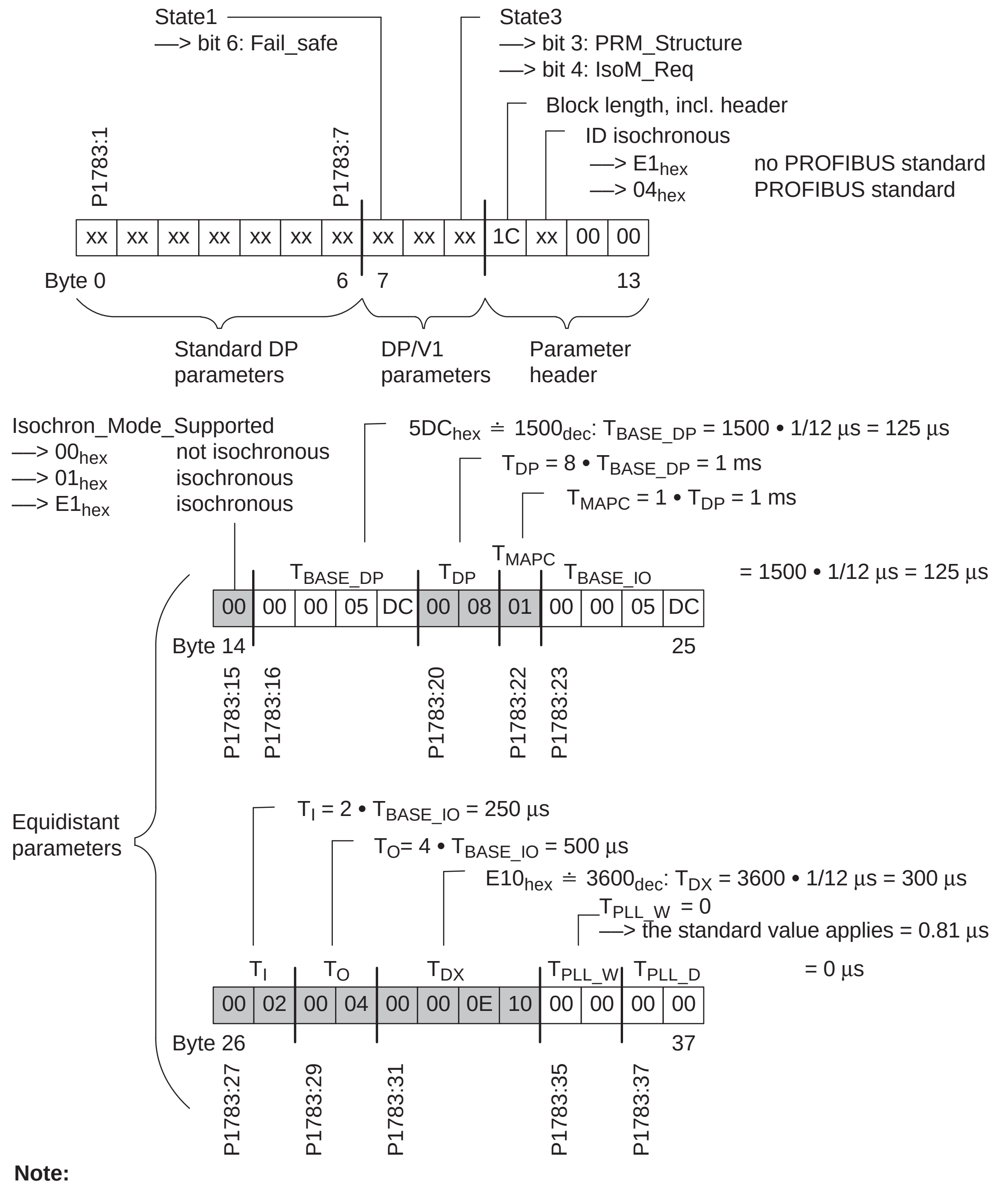
    —> the status signal ZSW1.9 (control requested/ control not possible) is set to ”0”

    —> the system re-synchronizes to the master sign-of-life
- Slave sign-of-life (S-SoL)
  - The status signals ZSW2.12 to ZSW2.15 are used as slave sign-of-life.
  - The slave sign-of-life counter is incremented in every DP cycle (T_{DP}).

5

5.8.5 Parameterization using the parameterizing telegram

For parameterization, DP slave POSMO SI/CD/CA" is supplied with the following equidistant parameters in a parameterizing telegram (Set_Prm):



Note:

P1783:64 is used for diagnostics, parameterizing data.

e.g. 02 This data must be set

- P1783:0 No. of valid bytes
- P1783:1 1st byte of the received parameterizing data, etc.

Fig. 5-26 Parameterizing telegram Set_Prm

5.9 Parameter overview of PROFIBUS-DP

Parameter overview

The following parameters are available for PROFIBUS-DP:

Table 5-36 Parameters for PROFIBUS-DP

Parameter No.	Description	Min.	Standard	Max.	Units	Effective
0875	Expected optional module type	0	0	4	–	PO
	... indicates as to how the drive, connected to PROFIBUS-DP should behave. 0 Powering down the ”DP slaves POSMO SI/CD/CA” and therefore the setpoint input from the master. The drive is only moved via the digital inputs. 4 Operation on PROFIBUS-DP (clock-cycle synchronous or non clock-cycle synchronous operation) with the setpoint entered from the DP master. This means, that e.g. ”disturbing” slaves can be temporarily disabled when commissioning the other nodes (refer under the index entry ”Start-up PROFIBUS-DP”).					
0879	PROFIBUS configuration	0	1	FFFF	Hex	PO
	Bit 2, 1, 0 Permissible sign-of-life error Bit 8 Operation with/without master sign-of-life monitoring Bit 11 PKW area: Sub-index in the high/low byte of IND Bit 12 Activates the direct measuring system (encoder 2) for the encoder interface Bit 13 Incremental motor measuring system with/without equivalent zero mark Bit 14 Incremental direct measuring system with/without equivalent zero mark					
0880	Speed evaluation PROFIBUS (SRM, ARM) Motor velocity evaluation PROFIBUS (SLM)	0.0	16 384.0	100 000.0	RPM m/min	Immediately
	... defines the normalization of the speed or velocity when traversing with PROFIBUS. 4000_{Hex} or 16384_{Dec} $\hat{=}$ of the speed or velocity in P0880					
0881 (from SW 4.1)	Evaluation of torque/power reduction PROFIBUS (SRM, ARM) Evaluation of force/power reduction PROFIBUS (SLM)	0.0	16 384.0	16 384.0	% %	Immediately
	... defines the normalization of the torque/power reduction or force/power reduction when using PROFIBUS-DP. **Note:** 4000 hex or 16384 dec in the control word MomRed corresponds to a reduction by the percentage specified in P0881.					

Table 5-36 Parameters for PROFIBUS-DP, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0882 (from SW 4.1)	Torque setpoint evaluation PROFIBUS (SRM, ARM) Force setpoint evaluation PROFIBUS (SLM)	–16384.0	800.0	16 384.0	% %	Immediately
	... defines the normalization of the torque or force setpoint when entered via PROFIBUS-DP. **Note:** P0882 is a percentage value referred to the rated motor torque. The parameter acts on the process data MsollExt (torque setpoint external in the input direction) and Msoll (torque setpoint in the output direction). 4000 hex or 16384 dec in the control word corresponds to the percentage entered into P0882.					
0883	Override evaluation, PROFIBUS	0.0	16 384.0	16 384.0	%	Immediately
	... defines the normalization of the override when entered via PROFIBUS. 4000_{hex} or 16384_{dec} ≙ the override in P0883					
0884 (from SW 4.1)	PROFIBUS position output evaluation number of increments	1	2048	8388607	–	PO
	... defines the normalization of the override when entered via PROFIBUS. 4000_{hex} or 16384_{dec} ≙ the override in P0883					
0888:16 (from SW 4.1)	Function, distributed input (PROFIBUS)	0	0	82	–	Immediately
	... defines which function a signal has which was read in via the PROFIBUS-PZD for distributed inputs (DezEing). The function number from the ”list of input signals” is entered. The following applies for the individual indices of P0888: :0 Function DezEing bit 0 :1 Function DezEing bit 1 :2 etc.					
0891 (from SW 4.1)	Source, external position reference value	–1	–1	4	–	PO
	... defines the source for the external position reference value –1 No external position reference value 1 Reserved 2 Reserved 3 Reserved 4 PROFIBUS-DP					
0895 (from SW 4.1)	External position reference value – number of increments	1	2048	8388607	–	PO
	... defines, together with P0896 for couplings, the ratio between input increments and the dimension system grids. **Note:** Setpoint input from P0895 corresponds to P0896 MSR					

Table 5-36 Parameters for PROFIBUS-DP, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0896 (from SW 4.1)	External position reference value – number of dimension system grids	1	5	8388607	MSR	PO
	... defines, together with P0895, for couplings, the ratio between the input pulse periods (or input bit) and the dimension system grids.					
0915	PZD setpoint assignment PROFIBUS	0	0	65 535	–	Immediately
	... is used to assign the signals to the process data in the setpoint telegram. —> Refer to Chapter 5.6.5					
0916	PZD actual value assignment PROFIBUS	0	0	65 535	–	Immediately
	... is used to assign the signals to the process data in the actual value telegram. —> Refer to Chapter 5.6.5					
0918	PROFIBUS node address	0	0	126	–	RO
	... specifies with which address the POSMO SI/CD/CA is addressed as DP slave on PROFIBUS (this is only a display parameter). **Note:** • The address should be set using the DIL switch on the PROFIBUS unit. • Every node connected to PROFIBUS must have a unique address.					
0922	Telegram selection PROFIBUS	0	101	103	–	PO
	... is used to set the free configurability or to select a standard telegram. —> Refer to Chapter 5.6.5					
0945:65	Fault code	–	–	–	–	RO
	... the fault code, i.e. the number of the fault which occurred, is entered. The faults which occurred, are entered as follows into the fault buffer: – first fault which occurred —> parameter with index 1 to – eight faults which occurred —> parameter with index 8 **Note:** • The following belongs to a fault: Fault code (P0945:65), fault number (P0947:65), fault time (P0948:65) and fault value (P0949:65) • A description of the faults, the way in which they can be acknowledged as well as a list of all the faults, is provided in Chapter 7. • This parameter is reset at POWER ON.					
0947:65	Fault number	–	–	–	–	RO
	Note: This parameter has no significance for POSMO SI/CD/CA.					

Table 5-36 Parameters for PROFIBUS-DP, continued

Parameter						
No.	Description	Min.	Standard	Max.	Units	Effective
0948:65	Fault time	–	–	–	ms	RO
	This parameter specifies at which relative system time, the fault occurred. **Note:** This parameter is set to zero at POWER ON, and the time is then started.					
0949:65	Fault value	–	–	–	–	RO
	The supplementary information associated with a fault which occurred, is entered in this parameter. **Note:** • A description of the faults, the way in which they can be acknowledged as well as a list of all the faults, is provided in Chapter 7. • This parameter is reset at POWER ON.					
0952	Number of faults	–	–	–	–	RO
	The parameter specifies the faults which occurred after POWER ON an. **Note:** This parameter is reset at POWER ON.					
0953	Warnings 800 – 815	–	–	–	Hex	RO
0954	Warnings 816 – 831	–	–	–	Hex	RO
0955	Warnings 832 – 847	–	–	–	Hex	RO
0956	Warnings 848 – 863	–	–	–	Hex	RO
0957	Warnings 864 – 879	–	–	–	Hex	RO
0958	Warnings 880 – 895	–	–	–	Hex	RO
0959	Warnings 896 – 911	–	–	–	Hex	RO
0960	Warnings 912 – 927	–	–	–	Hex	RO
	... indicates which warning(s) is(are) present. Bit x = 1 warning yyy present Bit x = 0 a warning is not present **Example:** P0955 = 0110 —> bits 8 and 4 are set —> warnings 840 and 836 are present					

Parameter	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0 Bit
P0953	815	814	813	812	811	810	809	808	807	806	805	804	803	802	801	800
P0954	831	830	829	828	827	826	825	824	823	822	821	820	819	818	817	816
P0955	847	846	845	844	843	842	841	840	839	838	837	836	835	834	833	832
P0956	863	862	861	860	859	858	857	856	855	854	853	852	851	850	849	848
P0957	879	878	877	876	875	874	873	872	871	870	869	868	867	866	865	864
P0958	895	894	893	892	891	890	889	888	887	886	885	884	883	882	881	880
P0959	911	910	909	908	907	906	905	904	903	902	901	900	899	898	897	896
P0960	927	926	925	924	923	922	921	920	919	918	917	916	915	914	913	912

Table 5-36 Parameters for PROFIBUS-DP, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0963	Baud rate PROFIBUS	–	–	–	–	RO
	... contains the actual baud rate of the PROFIBUS. 0 9.6 kbit/s 1 19.2 kbit/s 2 93.75 kbit/s 3 187.5 kbit/s 4 500 kbit/s 6 1500 kbit/s 7 3000 kbit/s 8 6000 bit/s 9 12000 kbit/s 10 31.25 kbit/s 11 45.45 kbit/s					
0967	PROFIBUS Control Word	–	–	–	Hex	RO
	... represents the image of control word STW1 from PROFIBUS. **Note:** The bit assignment can be found as follows: under the index entry ”Process data in the n-set mode – control words – STW1” under the index entry ”Process data in the pos mode – control words – STW1”					
0968	PROFIBUS status word	–	–	–	Hex	RO
	... represents the image of status word ZSW1 from PROFIBUS. **Note:** The bit assignment can be found as follows: under the index entry ”Process data in the n-set mode – status words – ZSW1” under the index entry ”Process data in the pos mode – status words – ZSW1”					
0969	Actual time difference	–	–	–	ms	RO
	... contains the relative system time since the last time that the drive was powered-up or since the last counter overflow					
1781:17 (from SW 4.1)	Setpoint source, PROFIBUS process data	–	–	–	Hex	RO
	... indicates the source of the process data received via PROFIBUS The high byte includes a reference to the source device (0xFF for the master, DP address for a Publisher) and the lower byte includes the offset within the received telegram (counted in bytes starting with 1). The following applies: P1781:0 Number of valid entries P1781:1 Source of process data 1 (STW1) P1781:2 Source of process data 2 (PZD2), etc.					

5

Table 5-36 Parameters for PROFIBUS-DP, continued

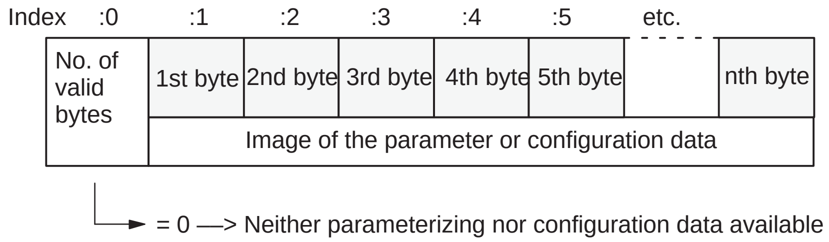
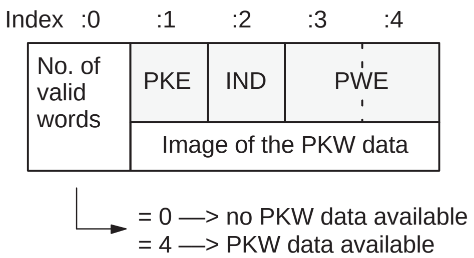
<table>
<tr><th colspan="7">Parameter</th></tr>
<tr><th>No.</th><th>Description</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>1782:17 (from SW 4.1)</td><td>Target offset, PROFIBUS process data</td><td>–</td><td>–</td><td>–</td><td>Hex</td><td>RO</td></tr>
<tr><td></td><td colspan="6">... indicates which offset process data, sent to the master or the subscribers via PROFIBUS, have in the sent telegram
(counted in bytes starting with 1).
The following applies:
P1782:0 Number of valid entries
P1782:1 Target offset of process data 1 (ZSW1)
P1782:2 Target offset of process data 2 (PZD2), etc.</td></tr>
<tr><td>1783:64</td><td>Received parameterizing data PROFIBUS</td><td>–</td><td>–</td><td>–</td><td>Hex</td><td>RO</td></tr>
<tr><td>1784:64</td><td>Received configuring data PROFIBUS</td><td>–</td><td>–</td><td>–</td><td>Hex</td><td>RO</td></tr>
<tr><td></td><td colspan="6">P1783:64 ... is an image of the parameterizing data received from the DP slave.
—> refer to Chapter 5.8.5
P1784:64 ... is an image of the configuring data received from the DP slave.
—> refer to Chapter 5.7.1
</td></tr>
<tr><td>1785:13</td><td>Extended PROFIBUS diagnostics</td><td>–</td><td>–</td><td>–</td><td>Hex</td><td>RO</td></tr>
<tr><td></td><td colspan="6">... contains diagnostics information to operate PROFIBUS. The following applies for the individual indices of P1785:
:0 Error master sign-of-life since POWER ON
:1 Clock-cycle synchronous operation selected
:2 Interpolation clock cycle (Tipo) in µs
:3 Position controller clock cycle (Tlr) in µs
:4 Master application cycle type (Tmapc) in µs
:5 DP cycle time (Tdp) in µs
:6 Data exchange time (Tdx) in µs
:7 Instant in time of the setpoint sensing (To) in µs
:8 Instant in time of the actual value sensing (Ti) in µs
:9 PLL window (Tpllw) in 1/12 µs
:10 PLL delay time (Tplld) in 1/12 µs
:11 External slave-to-slave communication connections
:12 Internal slave-to-slave communication connections</td></tr>
</table>

Table 5-36 Parameters for PROFIBUS-DP, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1786:5	Received PKW data PROFIBUS	–	–	–	Hex	RO
1787:5	Sent PKW data PROFIBUS	–	–	–	Hex	RO

P1786:5 ... is an image of the PKW data received from the DP slave.

P1787:5 ... is an image of the PKW data sent to the DP master.



PKE	Parameter ID
IND	Sub-index, sub-parameter number, array index
PWE	Parameter value
PKW	Parameter identifier value

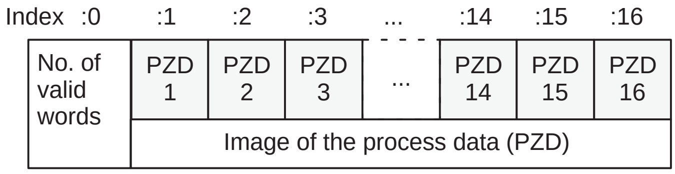
Note:

The parameter range (PKW range) is described in Chapter 5.6.7.

No.	Description	Min.	Standard	Max.	Units	Effective
1788:17	Received process data PROFIBUS	–	–	–	Hex	RO
1789:17	Sent process data PROFIBUS	–	–	–	Hex	RO

P1788:17 ... is an image of the process data received from the DP slave (control words).

P1789:17 ... is an image of the process data sent to the DP master (status words).



PZD: Process data

Note:

- The number of valid words in P1788:0 and P1789:0 depends on the selected PPO type.
- Invalid words (are contained in parameters with an index greater than the number) have the value 0.
- Example:
  P1788:0 = 2 2 words are valid, i.e. it involves either a PPO1 or PPO3 P1788:1 contains the process data 1 (PZD1) P1788:2 contains the process data 2 (PZD2)
  P1788:3 to P1788:10 have the value 0
- An overview of the process data in the speed-controlled mode and in the positioning mode is included in Chapter 5.6.1.

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Additional parameters relevant for PROFIBUS-DP (refer to Chapter A.1)

- P0653 Image, input signals, Part 1
- P0654 Image, input signals, Part 2
- P0656 Image, output signals, Part 1
- P0657 Image, output signals, Part 2
- P0658 Image, output signals, Part 3
- P0660 Function, input terminal I0.x
- P0661 Function, input terminal I1.x
- P0662 Function, input terminal I2.x (from SW 4.1)
- P0677 O1.x as input I2.x (from SW 4.1)
- P0680 Function, output terminal O0.x
- P0681 Function, output terminal O1.x
- P0972 Request POWER-ON RESET
- P1012.2 Function switch
  Bit 2 ”Ready or no fault”
- P1012.12 Function switch, bit 12 ”power-on inhibit”

5.10 Slave-to-slave communications (from SW 4.1)

5.10.1 General information

Description

For PROFIBUS-DP, the master addresses all of the slaves one after the other in a DP cycle. In this case, the master transfers its output data (setpoints) to the particular slave and receives as response the input data (actual values).

Fast, distributed data transfer between drives (slaves) is possible using the ”slave-to-slave” communications function without involving the master.

The following terms are used for the functions described here:

- Slave-to-slave communications
- Data exchange broadcast (DXB.req)
- Slave-to-slave communications (is used in the following)

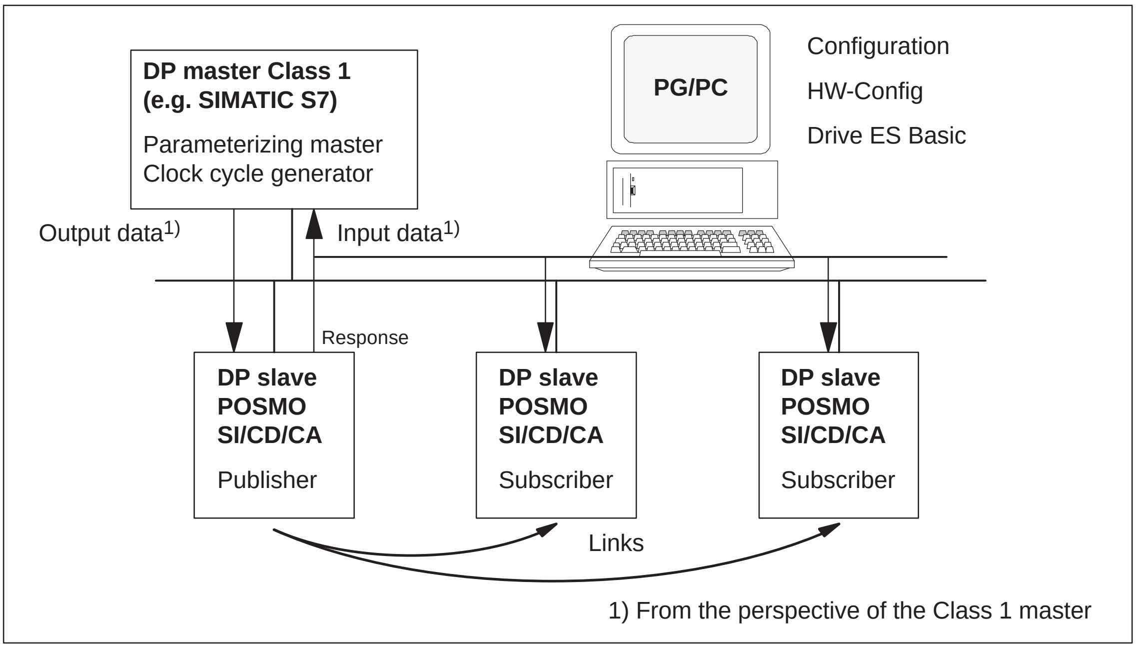


Fig. 5-27 Slave-to-slave communications with the publisher-subscriber model

Publisher

For the ”slave-to-slave communications” function, at least one slave must accept the role of publisher.

The master addresses the publisher, when transferring the output data, with a modified Layer 2 function code (DXB.req). The publisher then sends its input data to the master with a broadcast telegram to all bus nodes.

Subscriber

The subscribers evaluate the broadcast telegrams, sent from the publishers, and use the data which has been received as setpoints.

The setpoints are used, in addition to the setpoints received from the master, corresponding to the configured telegram structure (P0915).

Links and taps

The links configured in the subscriber (connection to publisher) contain the following information:

- From which publishers may input data be received?
- Which input data is there?
- A which location should the input data be used as setpoints?

Several taps are possible within a link. Several input data or input data areas, which are not associated with one another, can be used as setpoint via a tap.

Prerequisites and limitations

The following limitations should be observed for the ”slave-to-slave” communications function:

- Drive ES Basic V5.1 SP1
- POSMO SI/CD/CA $\geq$ SW 4.1
- Number of process data max. of 16 per drive

Applications

For example, the following applications can be implemented using the ”slave-to-slave communications” function:

- Axis couplings (this is practical for clock cycle synchronous operation) (refer to Chapter 6.3)
  – Angular synchronism where the position reference value or position actual value is entered
  – Torque setpoint coupling (master/slave operation)

Master drive	<—>	Slave drive
Closed-loop speed controlled		Open-loop torque controlled
- Entering digital input signals from another slave (refer to Chapter 5.10.4)

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”slave-to-slave communications” function:

- P0032 External position reference value
- P0401 Coupling factor, revolutions master drive
- P0402 Coupling factor, revolutions slave drive
- P0410 Configuration, coupling that can be switched-in
- P0412 Synchronous offset position
- P0413 Offset, synchronous velocity
- P0420 Position difference, measuring probe to the zero point, slave drive
- P0425:16 Coupling positions
- P0879 PROFIBUS configuration
- P0882 Evaluation, torque setpoint PROFIBUS
- P0884 PROFIBUS position output evaluation Number of increments
- P0888 Function, distributed inputs (PROFIBUS)
- P0891 Source, external position reference value
- P0895 External position reference value – No. of increments
- P0896 Ext. position ref. value – No. of dimension system grids
- P0897 Inversion, external position reference value
- P0898 Modulo range, master drive
- P1781 Setpoint source, PROFIBUS process data
- P1782 Target offset, PROFIBUS process data
- P1785:13 Extended PROFIBUS diagnostics

Input/output signals (see Chapter 5.6)

The following signals are available for the ”slave-to-slave communications” function:

- Input signals
  - ”Correction, external position reference value via dXcor (from SW 4.1)”

    —> via the PROFIBUS control signal ”QStw.0”
  - ”Request passive referencing (from SW 5.1)”

    —> via the PROFIBUS control signal QStw.1 or STW1.15”
- Output signals
  - ”Correction, external position reference value via dXcor (from SW 4.1)”

    —> via PROFIBUS control signal ”QZsw.0”
  - ”Request passive referencing (from SW 5.1)”

    —> via the PROFIBUS control signal QZsw.1 or ZSW1.15”

5.10.2 Setpoint assignment in the subscriber

Setpoints?

The following statements can be made about the setpoint/reference values:

- Number of setpoint/reference values

  When bus communications is being established, the master signals the slave the number of setpoints/reference values (process data) to be transferred using the configuring telegram (ChkCfg).

- Contents of the setpoints/reference values

  The structure and contents of the data are defined using the local process data configuring for ”DP slave POSMO SI/CD/CA” (P0915, P0922).

- Operation as ”standard” DP slave

  The drive (slave) only receives its setpoints and output data from the DP master.

- Operation as subscriber

  When operating a slave subscriber, some of the setpoints are entered from one or several publishers instead of from the master.

  The slave is signaled the assignment when bus communications are being established, using the parameterizing and configuring telegram.

Example, setpoint assignment

The slave in Fig. 5-28 receives its process data as follows:

- STW1 and STW2 from the master
- NSOLL_B and MomRed as tap from a publisher

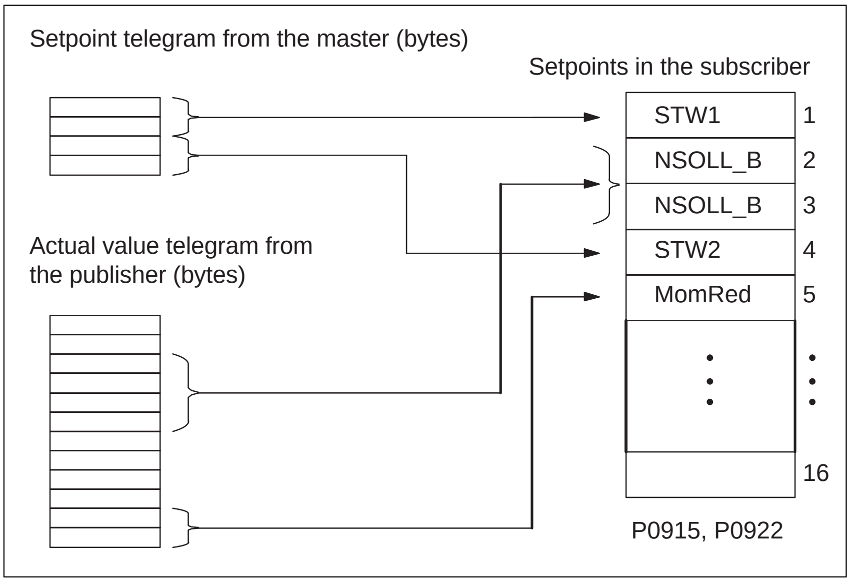


Fig. 5-28 Example, setpoint assignment

5.10.3 Activating/parameterizing slave-to-slave communications

The ”slave-to-slave communications” function must be activated both in the publishers as well as in the subscribers.

Activation in the publisher

By configuring the links with Drive ES Basic, the master can identify which slaves are to be addressed as publisher with a modified layer 2 function code (DDB-Distributed Data Base).

The publisher then does not send its input data to the master, but to all bus nodes as broadcast telegram.

Activation in the subscriber

The slave, which is to be used as subscriber, requires a filter table. The slave must know which setpoints are received from the master and which are received from a publisher.

The filter table contains the following information:

- From which publisher is data to be retrieved?
- The length of the publisher input data (test purposes)?
- From which position (offset) in the input data is data to be taken?
- How much data is to be taken?
- To which position in the setpoints is the data, which has been taken, to be copied?

Parameterizing telegram (SetPrm)

The filter table is transferred, as dedicated block from the master to the slave with the parameterizing telegram when bus communications are established.

If: The block for the filter table is not available
or
element ”number of links” = 0

Then: —> no subscriber functionality

The precise structure of this block, together with the permissible setting values is shown in Fig. 5-29.

Configuration telegram (ChkCfg)

Using the configuration telegram, a slave knows how may setpoints are to be received from the master and how many actual values are to be sent to the master.

For slave-to-slave communications, a special empty ID is required for each data access, which is then transferred with the ChkCfg.

Structure of the empty ID for Drive ES Basic (S7 ID format):

0x04 0x00 0x00 **0xD3** 0x40

Block header	Block-Len[1)]	12 – 244
	Command	0xE2
	Slot	0x00
	Specifier	0x00
Filter table header	Version ID	0xE2
	Number of links	0 – 3
	Offset Link1	
	...	
	Offset Link n	
Link1	Publisher DP address	
	Publisher input length	
Tap1	Offset in the publisher data	
	Target offset in the subscriber	
	Length of the data access	
Tap2	...	
Link2	Publisher DP address	
	...	

1) Data in bytes
2) Calculated from the version ID

Fig. 5-29 Filter block in the parameterizing telegram (SetPrm)

5.10.4 Telegram structure

Configuring a telegram

In order to be able to use the process data for slave-to-slave communications, the appropriate signal IDs must be entered into P0915 and P0916 for the telegram configuration.

Synchronous operation

For synchronous operation, where position reference values or actual values are entered for the axis couplings (refer to Chapter 6.3), the following process data is required for data transfer via PROFIBUS-DP:

- Signals for synchronous operation in the actual value direction (publisher)
  - Position actual value —> Signal ID 50206
  - Position reference value —> Signal ID 50208
  - Correction, position reference value —> Signal ID 50210
  - Status word, slave-to-slave comm. —> Signal ID 50118
- Signals for synchronous operation in the setpoint direction (subscriber)
  - External position reference value —> Signal ID 50207
  - Correction, ext. position ref. value —> Signal ID 50209
  - Control word, slave-to-slave comm. —> Signal ID 50117

For a description of this process data, refer to Chapter 5.6.

Example,synchronous operation

An example of a synchronous application, from the perspective of the slave drive, is shown in Fig. 5-30. Most of the control words are entered from the PROFIBUS-DP master; on the other hand, the actual setpoints are received from a ”POSMO SI/CD/CA” as master drive.

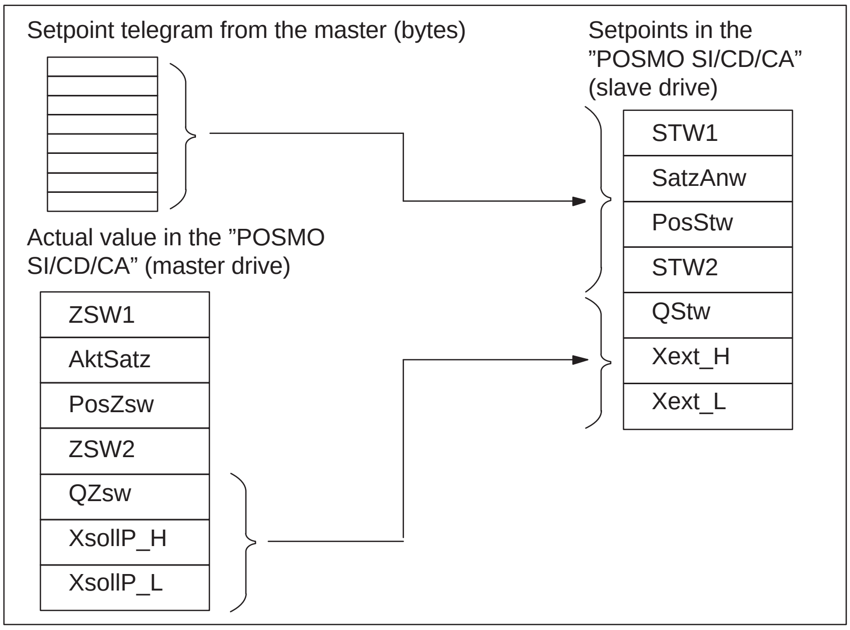


Fig. 5-30 Example, assigning the process data for a synchronous application

Distributed input signals

When distributed input signals are read in, a ”POSMO SI/CD/CA” can directly read in control signals from another slave (publisher) without the signals first having to be routed via the master.

Either an input module, which is capable of slave-to-slave communications (e.g. ET200) can be used as publisher, or another drive, whose status signals can be used as control signals.

The following process data is required for the telegram configuring to read in these input signals:

Distributed inputs —> Signal ID 50111

For a description of the process data, refer to Chapter 5.6.

The individual bits in the process data must be assigned functions using parameter P0888. The same function IDs are used as when parameterizing the input terminals via P0660 to P0662 (function numbers from the ”List of input signals”, refer to Chapter 6.4.1).

Using this function assignment, signal sources can be mixed. The following hierarchy applies (1. = highest priority):

1. Signal is received from the local digital input on the ”POSMO SI/ CD/CA” hardware.
2. The signal comes from a publisher via the process data ”DezEing”.
3. Signal comes from the PROFIBUS master via ”STW1”, ”STW2”, etc.

Example, mixed operation

For the example from Fig. 5-31, all setpoints, with the exception of the hardware limit switch, are entered from the PROFIBUS-DP master.

The hardware limit switches are read in via an ET200 module and entered into the process data ”DezEing” (bit 0 and bit1).

In this case, it is necessary that the appropriate telegram is configured using P0915 and P0888 is assigned the function numbers for the hardware limit switch.

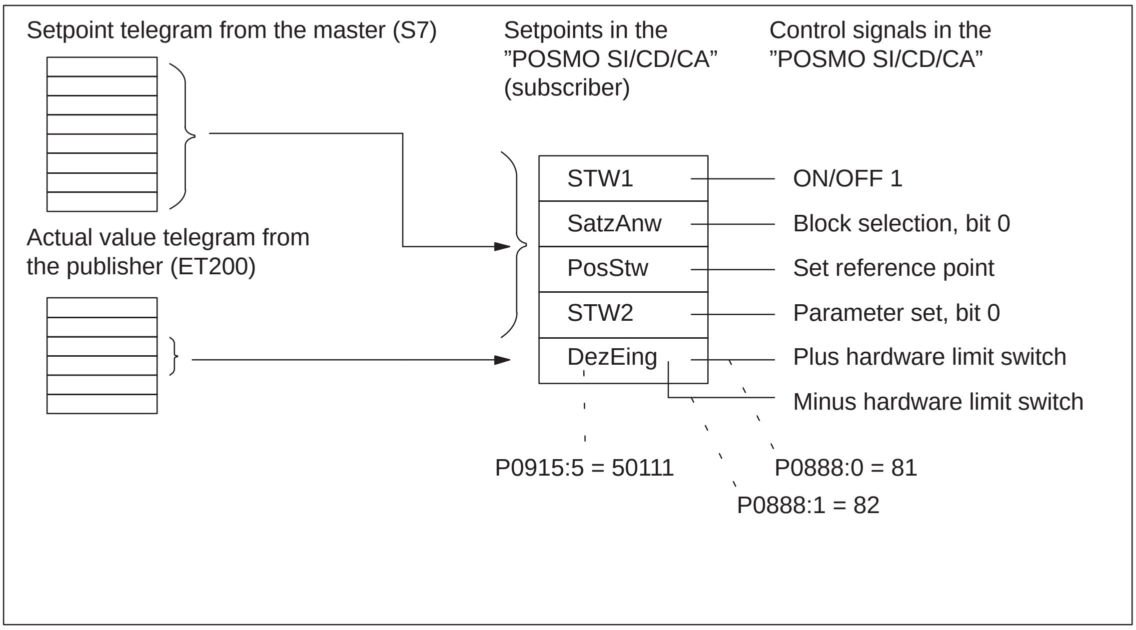


Fig. 5-31 Example, mixed operation for the control signals

5

5.10.5 Example: Position reference value coupling for 2 drives

General information

The following example is based on the functionality of slave-to-slave communications via PROFIBUS-DP. It indicates the steps which are necessary to parameterize the master and slave drive.

We recommend the following sequence when parameterizing:

1. Configure the DP master, e.g. SIMATIC S7
2. Parameterizing the master drive
3. Parameterizing the slave drive

Assumptions for the example

- Standard telegram 108 for the master drive (publisher)
- Standard telegram 109 for the slave drive (subscriber)
- Default ±5 m, sufficient for the traversing range
- An SFC14/15 cannot be used
- P1009 = 4 ms

Configuring DP master

The steps when configuring an S7 are shown in the following Figs.:

The following data should be parameterized in the DP master (S7):

- Configuration, master drive matching telegram 108
  —> number of process data
  - 4 words, PKW
  - 10 words, actual values to the DP master (inconsistent)
  - 10 words, setpoints from the DP master (inconsistent)

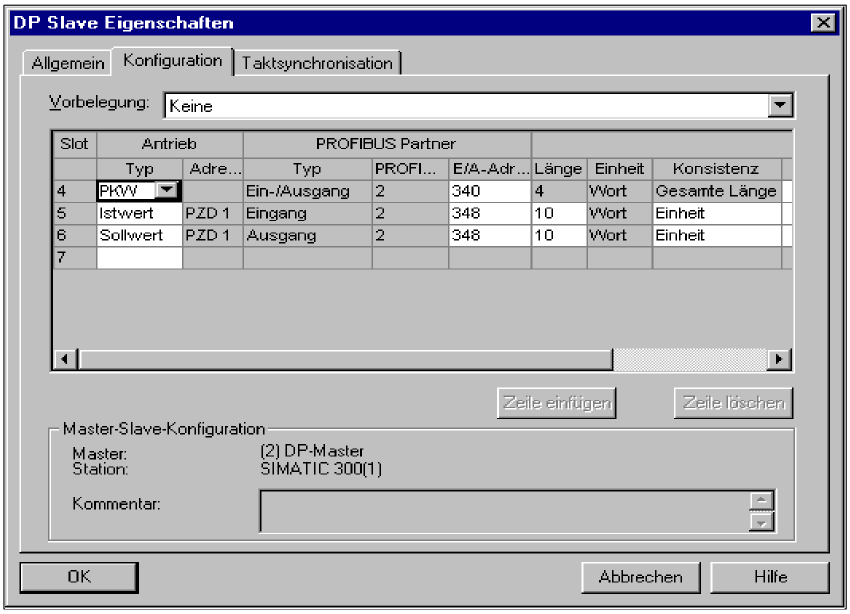


Fig. 5-32 Example, configuring the master drive for S7

- Configuring the slave drive matching telegram 109
  —> Definition of the slave-to-slave communications link
  – 4 words, PKW
  – 10 words, actual values to the DP master (inconsistent)
  – 5 words, setpoints from the DP master (inconsistent)
  – 5 words, setpoints via slave-to-slave communications

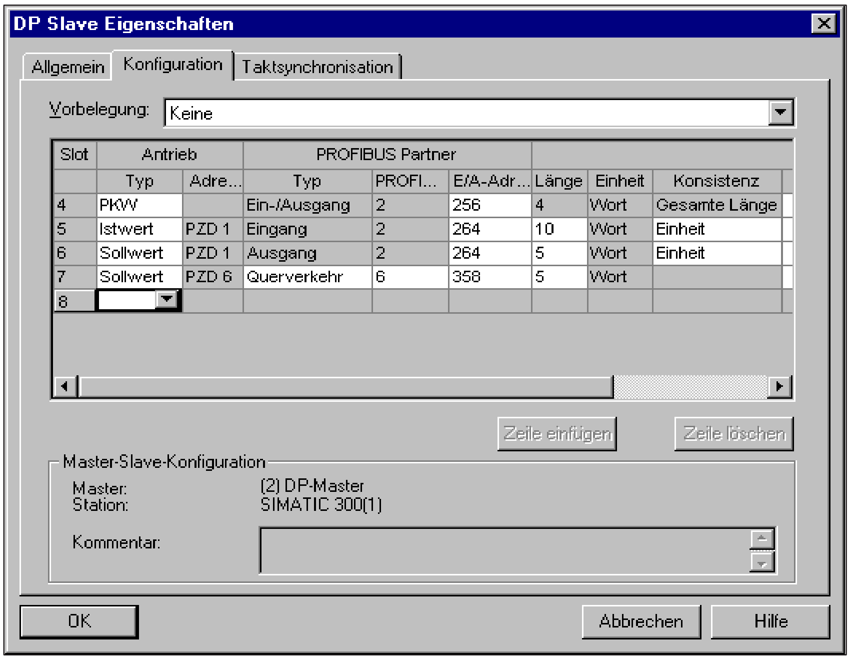


Fig. 5-33 Example, configuring the slave drive for S7

- Clock cycle synchronization —> applicable for the master and slave drives

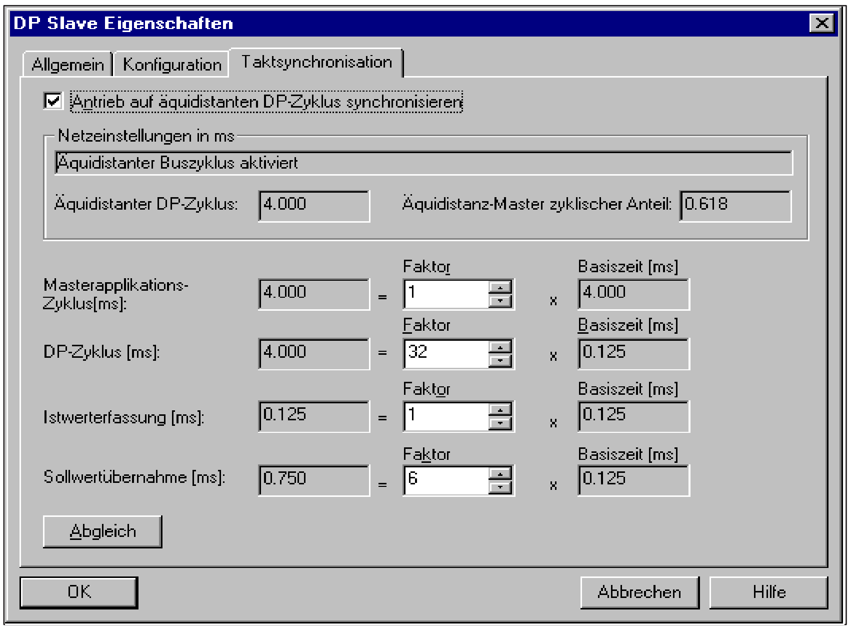


Fig. 5-34 Example, clock cycle synchronization for configuring S7
DP cycle 4 ms

5

Note

When transferring data via the clock-cycle synchronous PROFIBUS-DP, a setpoint transfer instant in time of (T_O) of at least 750 µs must be configured. If the configured time is <750 µs then it is possible that either inconsistent or "old" actual values are transferred, e.g. XistP, XsollP, dXcor.

Parameterizing the master drive

The following parameters should be set:

- P0922 = 108
  —> Standard telegram 108: Master drive for the position reference value coupling
- Set the normalization, external position reference value using P0884 and P0896 differently than recommended if the traversing range of ±5 m is no longer sufficient
  - Setting for the best possible resolution:
    P0884 = 2048 increments $\hat{=}$ P0896 = 5 MSR
  - Normalization: Set so that the required traversing range can be represented according to

  Max. traversing distance which can be represented: $\pm \dfrac{2^{31}}{P0884} \cdot P0896$
- Optional: Inverting the external position reference value using P0897

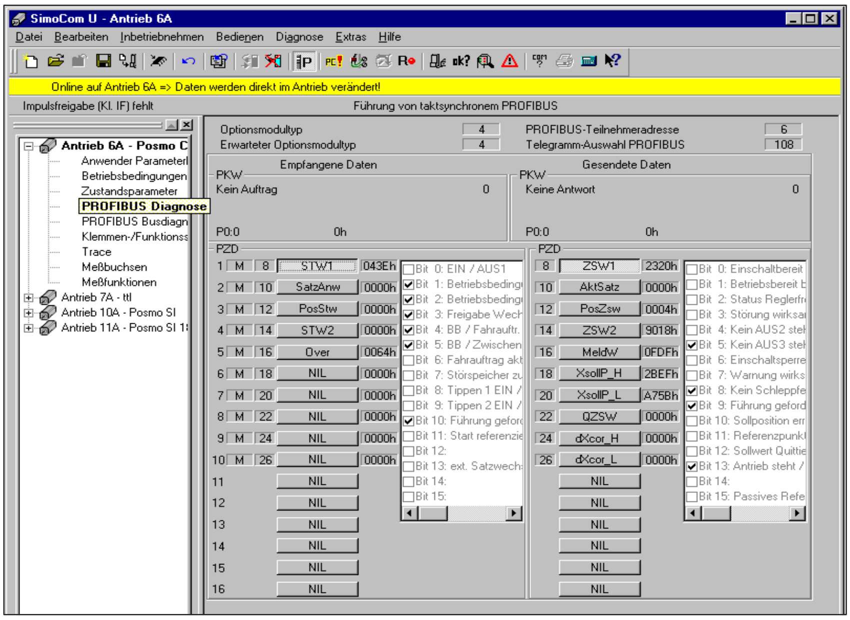


Fig. 5-35 Parameterizing PROFIBUS-DP master drive

Note

In order to ensure that the process data is correctly assigned between the publisher and subscriber, the offsets of the sent and received data must match.

For example, actual values (sent data) for PZD 18 (XsollP_H) in the master drive (Fig. 5-35) must match the setpoint/reference value (received data) for PZD 18 (Xext_H) in the slave drive (Fig. 5-36).

Parameterizing the slave drive

The following parameters should be set:

- P0922 = 109
  —> Standard telegram 109: Slave drive for the position reference value coupling
- Set the normalization, external position reference value using P0895 and P0896 differently than recommended if the traversing range of ± 5 m is no longer sufficient
  - Setting for the best possible resolution:
    P0895 = 2048 increments ≙ P0896 = 5 MSR
  - Normalization: Set the same values as for the master drive

    —> $P0895_{\text{slave drive}} = P0884_{\text{master drive}}$

    —> $P0896_{\text{slave drive}} = P0896_{\text{master drive}}$
- Optional: Inverting the external position reference value using P0897

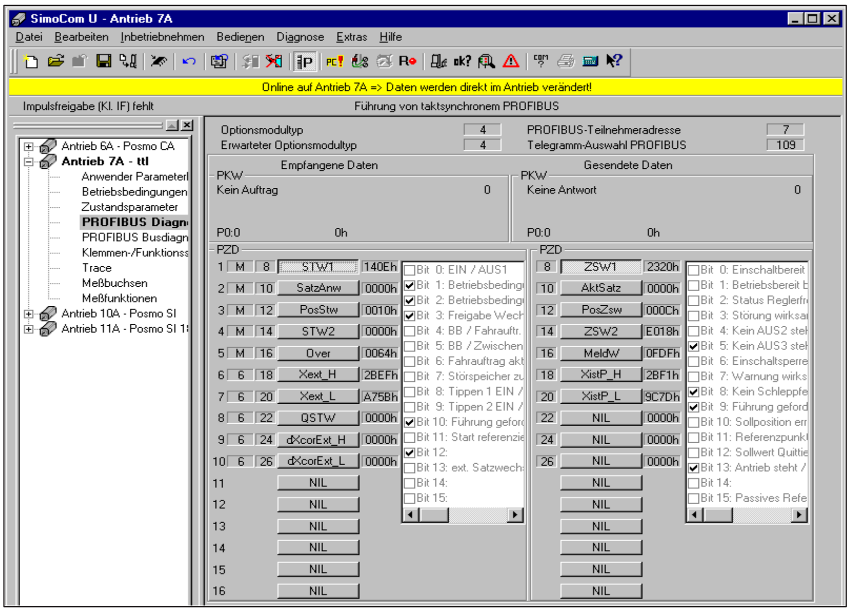


Fig. 5-36 Parameterizing PROFIBUS-DP slave drive

Configuring the coupling

The following parameters should be set at the slave drive:

- Source for the ”external position reference value”

  —> P0891 = 4: PROFIBUS-DP

- Select the coupling type using P0410

  —> e.g.: P0410 = 7: Coupling to the absolute position + P0412 via the digital input signal

- Define the optional coupling factor for revolutions, master and slave drive

  —> P0401 and P0402 (e.g. 1)

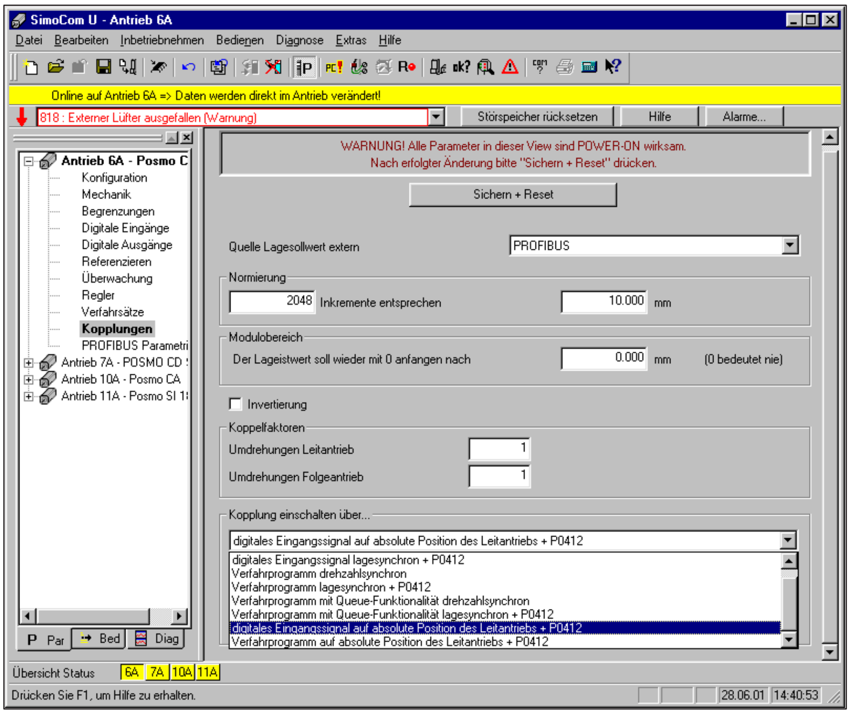


Fig. 5-37 Parameterization, couplings, slave drive

The DP master must set control word PosStw.4 in order to activate the coupling.

■

Description of the Functions

6

6.1 Speed setpoint mode (P0700 = 1)

6.1.1 Application examples

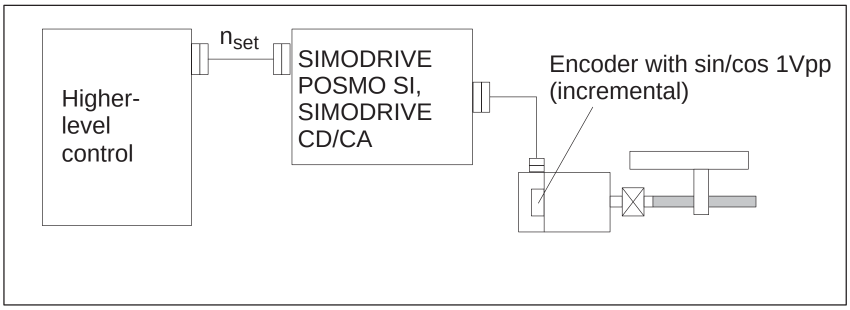


Fig. 6-1 Variable-speed drive

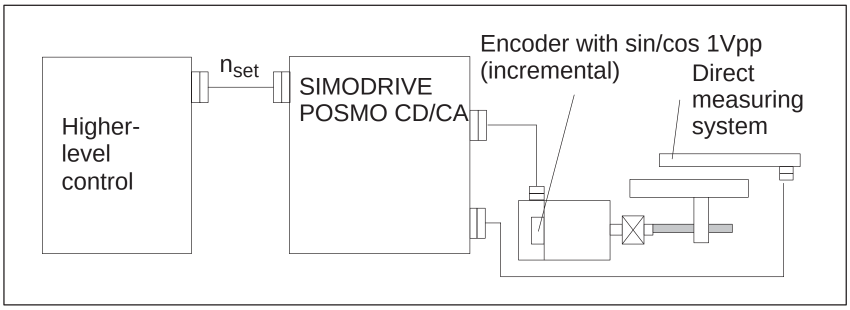


Fig. 6-2 Positioning drive using a higher-level open-loop control, position actual value generation via a direct measuring system

6

6.1.2 Current and speed control

General information

For "POSMO SI" and "POSMO CD/CA", in the "speed setpoint" mode, a setpoint can be entered via PROFIBUS-DP:

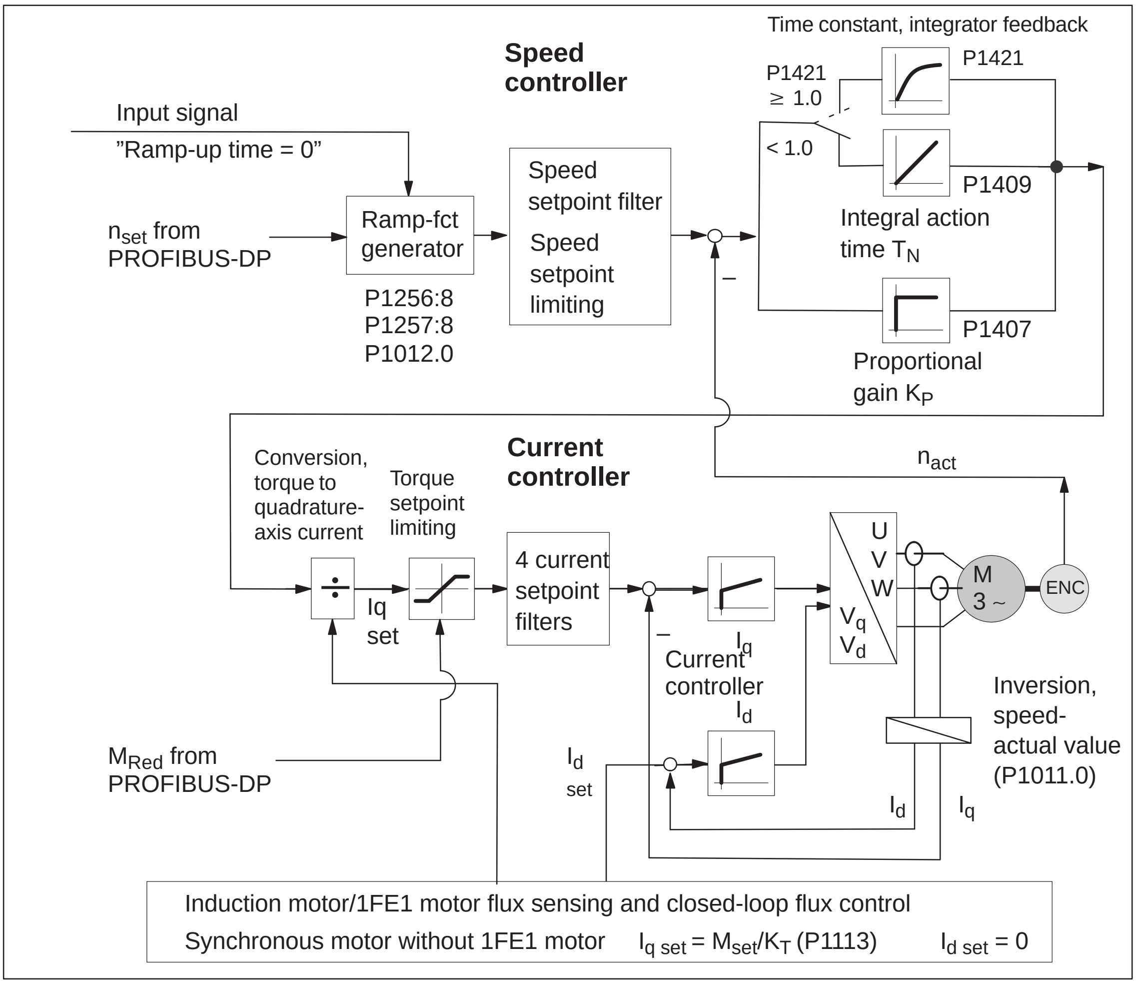


Fig. 6-3 Current and speed control

Reader’s note

The following explains

- Ramp-function generator
- Optimizing the current and speed controllers
- Speed controller adaptation

All additional parameters to optimize the current and speed control loop can be adapted using the expert list.

Detailed information regarding the current and speed control loop are included in:

Reference:	/FBA/	SIMODRIVE 611 digital/ SINUMERIK 840D/810D Description of Functions, Drive Functions

6.1.3 Ramp-function generator

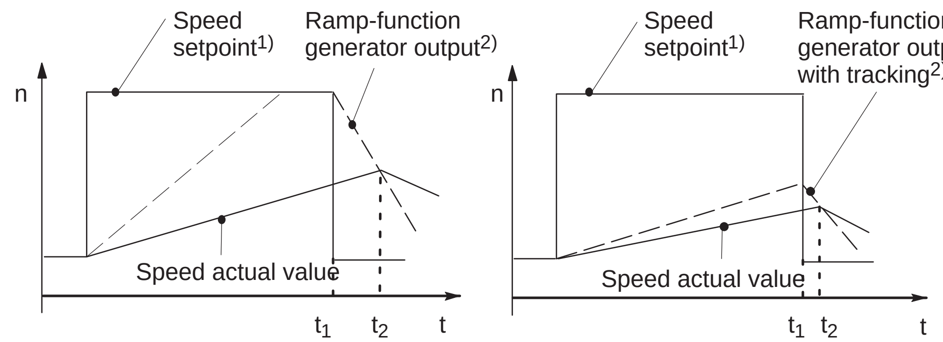
General information

The ramp-function generator is used to limit the acceleration when the speed setpoint changes as a step function.
Various parameter set-dependent ramps can be entered for ramp-up and ramp-down.

Parameter overview

The following parameters are available for the ramp-function generator:

Table 6-1 Parameter overview for the ramp-function generator

Parameter						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1256:8	Ramp-function generator, ramp-up time (ARM) (SRM, SLM)	0.0	2.0 0.0	600.0	s	Immedi-ately
	The setpoint is increased from zero to the max. permissible actual speed in this time. • Max. permissible actual speed for synchronous motors: Minimum from 1.1 •P1400 and P1147 • Max. permissible actual speed for induction motors: Minimum from P1146 and P1147 • Max. permissible actual speed for linear motors: from P1147					
1257:8	Ramp-function generator, ramp-down time (ARM) (SRM, SLM)	0.0	2.0 0.0	600.0	s	Immedi-ately
	The setpoint is changed from the max. permissible actual speed to zero in this time. • Max. permissible actual speed for synchronous motors: Minimum from 1.2 •P1400 and P1147 • Max. permissible actual speed for induction motors: Minimum from P1146 and P1147					
1012.0	Ramp-function generator tracking	–	–	–	Hex	Immedi-ately
	The ramp-function generator tracking can be activated/de-activated using P1012 bit 0. = 1 Active (standard) = 0 Not active  **without ramp-function generator tracking** The drive continues to accelerate between t_1 and t_2, although the speed setpoint (e.g. setpoint 0) is less than the speed actual value. **with ramp-function generator tracking** The ramp-function generator output is prevented from leading the speed actual value so that t_1 and t_2 almost merge. **Note:** 1) For example, from the PROFIBUS control word NSOLL or P0641 (fixed speed setpoint). 2) Ramp-function generator output corresponds to the speed setpoint trace parameter.					

Input/output signals for the ramp-function generator

For the ramp-function generator, the following signals are used:

Input signal: – ramp-function generator enable
– ramp-up time zero
– ramp-up time zero for controller enable

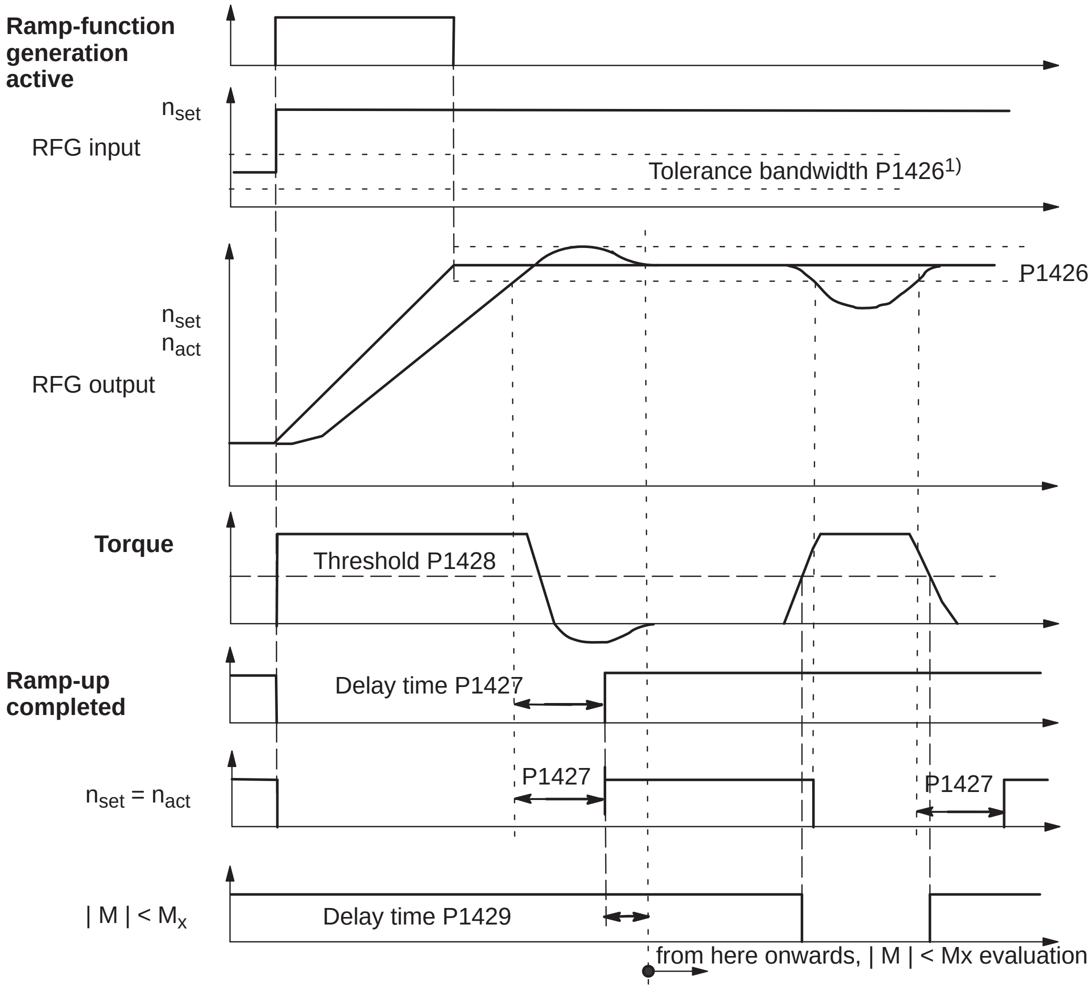
Output signal: – ramp-up completed

Reader's note

The signals can be entered or output as follows:

- via terminals —> refer to Chapter 6.4.1 or 6.4.3
- via PROFIBUS-DP —> refer to Chapter 5.6.1

All of the input/output signals are shown and described in Chapter 6.4.2 and 6.4.4 and can be found in the Index under "Input signal..." or "Output signal...".



1) For an active average-value filter for the speed setpoint (P1012.8=1), a setpoint step somewhat greater than P1426 must be used in order to clearly identify the start of a new ramp-up operation.

Fig. 6-4 Signal characteristics for the ramp-function generator

6.1.4 Optimizing the current and speed controllers

When optimizing the cascaded control structure (current, speed controller), you generally proceed from the inside to the outside.

Optimizing the current controller

At the first commissioning or later, the current controller is pre-set using the ”Calculate controller data” function, and generally no longer has to be optimized.

However, all parameters for the current control loop can be adapted via the expert list of the ”SimoCom U” tool.

Optimizing the speed controller

At the first start-up (first commissioning) or later, the speed controller is pre-set using the ”Calculate controller data”.

This speed controller setting is calculated for a motor operating under no-load conditions, and corresponds to a ”safe” setting.

In order to be able to fully utilize the dynamic performance of the drive including the mechanical system, some post-optimization will be necessary.

- Optimizing using the ”SimoCom U” tool

  For ”SIMODRIVE POSMO SI/CD/CA” the controller can be automatically set using the ”SimoCom U” tool (only in the online mode).

  Call:
  Press the ”Execute automatic controller setting” button under ”Controller” and execute the steps offered.

Reader’s note

Recommendation when optimizing the controller:

Optimize the control loop with ”SimoCom U” and the ”Execute automatic controller setting” function.

Table 6-2 Parameters for the speed controller optimization

Parameter						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1407:8	P gain, speed controller (SRM, ARM) P gain, velocity controller (SLM)	0.0	0.3 2 000.0	999 999.0	Nm*s/rad Ns/m	Immediately
	... specifies the magnitude of the proportional (gain K_p, proportional component) of the control loop.					
1409:8	Integral action time, speed controller (SRM, ARM) Integral action time, velocity controller (SLM)	0.0	10.0	500.0	ms	Immediately
	... specifies the integral action time (T_N, integral component) of the control loop.					

Reader's note

When optimizing, e.g. linear drives, it may be necessary to set the current and speed setpoint filters.
This procedure is described in:

Reference: /FBA/ SIMODRIVE 611 digital/
SINUMERIK 840D/810D
Description of Functions, Drive Functions

6.1.5 Speed controller adaptation

Description

The speed controller can be adapted, depending on the speed or velocity, using the speed/velocity controller adaptation.

For example, in order to better overcome stiction at lower speeds, a higher proportional gain can be set than for higher speeds.

Enabling/disabling adaptation

Adaptation is enabled/disabled with P1413.

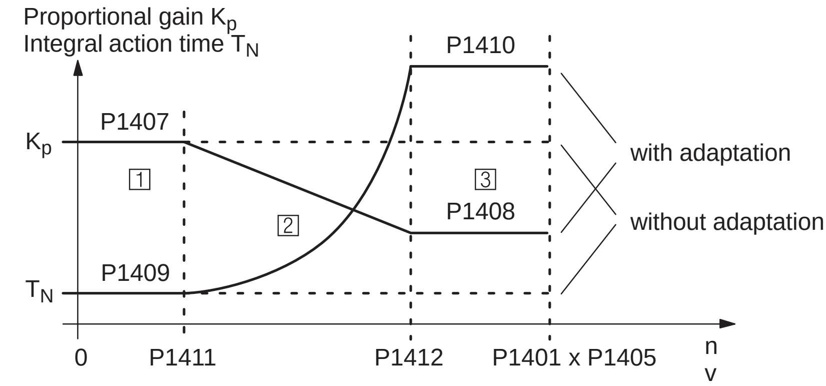
- The following is valid with the adaptation enabled (P1413 = 1):

  Proportional gain (K_p):
  The settings in P1407 and P1408 are effective as a function of the lower (P1411) and upper thresholds (P1412).
  The values are linearly interpolated in the adaptation range.

  Integral action time (T_N):
  The settings in P1409 and P1410 are effective as a function of the lower (P1411) and upper thresholds (P1412).

- With adaptation disabled (P1413 = 0) the following is valid:

  The proportional gain (K_p, P1407) and the integral action time (T_N, P1409) are effective over the complete range.



1	Constant lower speed range	(n or v < P1411)
2	Adaptation range	(P1411 < n or v < P1412)
3	Constant upper speed range	(n or v > P1412)

Fig. 6-5 Adaptation of the speed controller parameters using the characteristic

Note

Only the position controller output is taken into account for limit sensing (upper and lower adaptation speed).

Parameter overview

The following parameters are available for the speed controller adaptation:

Table 6-3 Parameters for the speed controller adaptation

Parameter						
No.	**Name**	**Min.**	**Stan-dard**	**Max.**	**Units**	**Ef-fec-tive**
1413	Select adaptation, speed controller (SRM) Select adaptation, speed controller (ARM) Select adaptation, velocity controller (SLM)	0	0 1 0	1	–	Im-me-di-ately
	... the adaptation can be activated/de-activated immediately. 1 The adaptation is active 0 The adaptation is not active **Note:** For induction motors (ARM), the speed controller adaptation is switched-in as standard.					
1408:8	P gain, upper adaptation speed (SRM, ARM) P gain, upper adaptation velocity (SLM)	0.0	0.3 2 000.0	999 999.0	Nm*s/rad Ns/m	Im-me-di-ately
	... defines the P gain in the constant, upper range (n or v > P1412). **Note:** When a value of 0 is entered, the associated integral component (P1410) is automatically de-activated.					
1410:8	Integral action time, upper adaptation speed (SRM, ARM) Integral action time, upper adaptation velocity (SLM)	0.0	10.0	500.0	ms	Im-me-di-ately
	... defines the integral action time in the constant, upper range (n or v > P1412). **Notice:** With the adaptation activated, you should avoid de-activating the integral component for only one range (P1409 = 0 and P1410 ≠ 0 or vice versa). Problem: Torque jumps when resetting the integral value at the transition from the adaptation range to the constant range. **Note:** If a value of 0 is entered, this de-activates the integral component for the range greater than set in P1412.					
1411	Lower adaptation speed (SRM, ARM) Lower adaptation velocity, motor (SLM)	0.0	0.0	100 000.0	RPM m/min	Im-me-di-ately
	... defines the lower threshold for adaptation.					
1412	Upper adaptation speed (SRM, ARM) Upper adaptation velocity, motor (SLM)	0.0	0.0	100 000.0	RPM m/min	Im-me-di-ately
	... defines the upper threshold for adaptation.					

6.1.6 Fixed speed setpoint

Description

Speed setpoints can be defined in parameters using this function. The required fixed setpoint for the speed setpoint input is selected via input signals. The currently selected fixed setpoint can be displayed via output signals.

Input/output signals

The following signals are used for the ”fixed speed setpoint” function:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - Fixed speed setpoint 1st input (function number = 15)
  - Fixed speed setpoint 2nd input (function number = 16)
  - Fixed speed setpoint 3rd input (function number = 17)
  - Fixed speed setpoint 4th input (function number = 18)
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - Status, fixed speed setpoint 1st output (function number = 15)
  - Status, fixed speed setpoint 2nd output (function number = 16)
  - Status, fixed speed setpoint 3rd output (function number = 17)
  - Status, fixed speed setpoint 4th output (function number = 18)

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”fixed speed setpoint” function:

- P0641:16 Fixed speed setpoint (SRM, ARM)
  Fixed velocity setpoint (SLM)

Commissioning the function

The following sequence is practical when commissioning:

1. Enter the required fixed speed setpoints (refer to Chapter A.1)
   P0641:0 = no significance
   P0641:1 = required fixed setpoint 1
   P0641:2 = required fixed setpoint 2, etc.
2. Parameterize the input terminals (refer to Chapters 6.4.1 and 6.4.2)
3. Parameterize the output terminals (refer to Chapters 6.4.3 and 6.4.4)
4. Check the function

6.1.7 Monitoring functions

What temperature monitoring functions are available?

The following temperature monitoring functions are available in order to protect the individual drive system components against thermal overload and also destruction:

- Motor temperature monitoring
- Electronics temperature monitoring
- Power module temperature monitoring

Motor temperature monitoring

The temperature limit values are pre-assigned, corresponding to the selected motor when the motor code is specified; the user should not change these.

The following motor temperature monitoring functions are available:

- Temperature monitoring with pre-warning (P1602 + P1603)

  If the temperature warning threshold (P1602) is exceeded, the result is as follows:
  – Warning 814 is output
  – Timer (P1603) is started
  – Normally, the output signal ”motor temperature pre-warning” (MeldW.6) is set, and when a fault condition occurs, reset

  If the overtemperature condition still remains after the time set in P1603, then this results in fault 614 and the drive is powered down.

  The monitoring function can be enabled/disabled using P1601.14.

- Temperature monitoring without pre-warning (P1607)

  If the temperature threshold in P1607 is exceeded, this immediately results in fault 613 and the drive is powered down.

  The monitoring function can be enabled/disabled using P1601.13.

Note

The temperature monitoring functions (warning P1602 + timer P1603 or P1607) are not subject to any mutual restrictions, i.e. it is permissible that P1607 < P1602.

- Specifying a fixed temperature (P1608)

  When specifying a fixed temperature, the rotor resistance is adapted as a function of the temperature using this fixed temperature.

Note

The temperature monitoring functions of the motor, set using P1602 or P1607, are then no longer effective.

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Electronics temperature monitoring

The electronics temperature monitoring is a temperature monitoring function with pre-warning

- Pre-warning when the warning threshold is exceeded

  Warning threshold:

  POSMO SI —> 95 °C
  POSMO CD/CA —> 90 °C

  When the permanently set temperature warning threshold is exceeded, a pre-warning is output with the following effect:

  – Warning 813 is output
  – A permanently set timer is started (4 min)
  – Normally, the output signal ”electronics temperature pre-warning” (MeldW.9) is set, and when a fault condition occurs, reset.

- Fault, if the temperature is exceeded for longer than the timer stage

  If the overtemperature condition lasts for longer than that set in the permanently set timer stage, then fault 516 is output and the drive is shutdown.

- Diagnostic parameters

  P1751 Electronics temperature

Power module temperature monitoring

The power module temperature monitoring is a temperature monitoring function with pre-warning.

- Pre-warning when the warning threshold is exceeded

  Warning threshold:

  POSMO SI —> 90 °C
  POSMO CD/CA —> 105 °C

  When the permanently set temperature warning threshold is exceeded, a pre-warning is output with the following effect:

  – Warning 815 is output
  – A permanently set timer is started (4 min)
  – Normally, the output signal ”power module temperature pre-warning” (MeldW.7) is set, and is reset when a fault condition occurs

- Fault, if the temperature is exceeded for longer than the timer stage

  If the overtemperature condition lasts for longer than that set in the permanently set timer stage, then fault 515 is output and the drive is shutdown.

- Diagnostic parameters

  P1750 Power module temperature

Parameter overview (refer to Chapter A.1)

The following parameters are used for the temperature monitoring function:

- Motor temperature monitoring
  - P0603 Motor temperature
  - P1601.13 Faults which can be suppressed 2
    Immediate shutdown for a motor overtemperature (P1607) (fault 613)
  - P1601.14 Faults which can be suppressed 2
    Delayed trip for motor over-temperature (P1602 and P1603) (fault 614)
  - P1602 Warning threshold, motor temperature
  - P1603 Timer stage, motor temperature alarm
  - P1607 Shutdown limit, motor temperature
  - P1608 Fixed temperature
- Electronics temperature monitoring
  - P1751 Electronics temperature
- Power module temperature monitoring
  - P1750 Power module temperature

Torque setpoint monitoring (speed controller output limited, speed controller at its endstop)

The following is monitored:

- Is the speed controller output (torque setpoint) at its limit for longer than the time in P1605 (torque, power, stall or current limit)?

  and

- Is the absolute actual speed less than that in P1606?

When the monitoring function responds, fault 608 (speed controller output limited) is output and the pulse enable is withdrawn.

Note

Fault 608 (speed controller output limited) can be suppressed using the ”suppress fault 608” input signal.

Parameter overview (refer to Chapter A.1)

- Torque setpoint monitoring
  - P1605 Timer stage, speed controller at its endstop
  - P1606 Threshold speed controller at its endstop

DC link voltage monitoring

The following monitoring functions/warnings are available for the DC link voltage:

- Monitoring the DC link for an overvoltage condition

  Threshold: P1163 ”Max. DC link voltage”

  Threshold: 710 V (line supply voltage 400 V, P1171 = 0)
  800 V (line supply voltage 480 V, P1171 = 1)

  The permissible upper limit of the DC link voltage is defined using P1163. The upper limit is limited internally using P1171. If the standard value is entered into P1163, then the appropriate monitoring function is inactive.

  Fault 617, if the DC link voltage, when the pulses are enabled, is greater than the threshold. The shutdown response can be configured using P1613 bit 16 or 17.

- Monitoring for a DC link undervoltage condition

  Threshold: P1162 ”Minimum DC link voltage”

  Defines the permissible lower limit for the DC link voltage.

  Fault 616 is generated if the DC link voltage when setting the enable signals is less than the threshold. The monitoring only becomes active if $V_{DC\ link}$ (P1701) has at least fallen below the value in P1162 once.
  The shutdown response to fault 616 can be configured using P1613 bit 16 or 17.

- Undervoltage warning

  Threshold: P1604

  The threshold is used to generate the output signal ”DC link monitoring $V_{DC\ link} > V_x$”(Fct. No. 30 or MeldW.4) (refer to Chapter 6.4.4)

Parameter overview (refer to Chapter A.1)

– P1171 Line supply voltage 480 V

– P1604 DC link undervoltage warning threshold

Hardware limit switch (HW limit switch) (from SW 8.1)

When using ”POSMO SI/CD/CA” with a higher-level control, it can occur that for coordinate transformation, e.g. shifting and rotating the tool, that the software limit switches cannot be activated/evaluated in the higher-level control.

An axis fast stop is possible using a hardware limit switch monitoring function.

The HW limit switches must be connected to an input terminal with the following function numbers:

- ”Plus hardware limit switch” function —> function number 81
- ”Minus hardware limit switch” function —> function number 82

  —> Refer to Chapter 6.4.1

Traversing to a hardware limit switch?

When traversing to a hardware limit switch, the associated input signal is set to ”0” and the following response is automatically initiated:

- A setpoint of zero is entered in the selecting speed direction – the axis is braked and comes to a standstill. The drive remains in the closed-loop controlled mode.

  If it is switched-in, the ramp-function generator remains active. The braking that is initiated runs with or without braking ramp.
- One of the following warnings is output:
  - Warning 800 Minus hardware limit switch
  - Warning 801 Plus hardware limit switch

The hardware limit switch signal must always remain at a ”0 signal” outside the permitted traversing range. A brief change from ”0 signal” to ”1 signal” is not permitted.

As a result of the zero speed input when reaching the hardware limit switch, alarms, e.g. ”following error too high” or similar faults must be detected in the higher-level control.

How can an axis be moved away from a hardware limit switch?

If an axis is located at a hardware limit switch, then it can be moved away again as follows:

- Enter a setpoint in the opposite direction to the approach direction

  or
- Withdraw the controller enable and move the drive away manually

After moving away from the hardware limit switch, warning 800 or 801 is automatically deleted.

6

Other monitoring functions

Reader's note

For POSMO SI/CD/CA, additional monitoring functions can be parameterized and processed via output signals (terminals, PROFIBUS-DP) (refer to Chapter 6.4.4).

6.1.8 Limits

Limiting the speed setpoint

The speed setpoint is limited to the maximum value which is set.

How is the speed setpoint limiting calculated?

	Motor type	Interdependencies
•	SRM, SLM:	P1405 • P1401
•	ARM:	Minimum (P1405 • P1401, 1.02 • P1147, 1.02 • P1146)

Note

The maximum useful motor speed, set via P1401:8, is taken into account when calculating the speed setpoint, i.e. P1401:8 acts as speed limiting.

This is valid, independent of whether the setpoint is entered via a terminal or PROFIBUS-DP.

Speed limiting

If the actual speed value exceeds the limit setting by more than 2%, the torque is set to zero.
Thus, further acceleration is not possible.
The torque limiting is canceled if the speed actual value falls below the limit value.

How is the speed limiting calculated?

	Motor type	Interdependencies
•	SRM:	Minimum (P1147, 1.2 • P1400)
•	ARM, SLM, PE spindle:	Minimum (P1147, P1146)

Table 6-4 Parameters for speed limiting

No.	Description	Min.	Standard	Max.	Units	Effective
1146	Maximum motor speed (SRM) Maximum motor speed (ARM) Maximum motor velocity (SLM)	0.0	0.0 15000.0 0.0	100 000.0	RPM RPM m/min	PO
	... specifies the maximum motor speed or maximum motor velocity defined by the motor manufacturer. **Note:** This is only included in the speed limiting for rotary induction motors (ARM).					
1147	Speed limit (SRM) Speed limit (ARM) Velocity limit, motor (SLM)	0.0	7 000.0 8 000.0 120.0	100 000.0	RPM RPM m/min	Immediately
	... specifies the maximum permissible motor speed or motor velocity . The parameter is pre-set at the first start-up and for ”Calculate unlisted motors”: • SRM 1.1 • P1400 • ARM, SLM, PE spindle P1146 Speed actual value > Speed limit • Exceeded by more than 2 %: The torque limit when motoring is internally set to zero, the drive is prevented from accelerating any further. With the appropriate setting, the ”speed controller at its limit” monitoring can respond.					
1401:8	Speed for max. useful motor speed (SRM, ARM) Velocity for max. motor useful velocity (SLM)	–100 000.0	0.0	100 000.0	RPM m/min	Immediately
	... limits the speed to the maximum useful motor speed. The parameter is pre-set at the first start-up and for ”Calculate unlisted motor”: • SRM P1400 • ARM, SLM, PE spindle P1146					
1405:8	Monitoring speed, motor (SRM, ARM) Monitoring velocity, motor (SLM)	100.0	110.0	110.0	%	Immediately
	... specifies the maximum permissible setpoint as a percentage referred to P1401:8. The parameter is pre-assigned as follows when the system is commissioned for the first time and for ”calculate unlisted motor”: • SRM 110 % 105 % (”SIMODRIVE 611 universal HR”)					

Limiting the torque setpoint

The following limits all effect the torque setpoint at the speed controller output. The ”lowest” (minimum) is used if different limits are available.

- Torque limiting
  The value specifies the maximum permissible torque, whereby different limits can be parameterized for motoring and generating operation.
- Power limiting
  The value specifies the maximum permissible power, whereby different limits can be parameterized for motoring and generating operation.
- Stall limiting (only for ARM and PE spindle)
  The stall limiting is internally calculated in the drive from the motor data. The internally calculated limit can be changed using the torque reduction factor.

Warning

If the stall limit has been set too high, this can cause the motor to ”stall”.

As the current limiting additionally limits the maximum torque which the motor can provide, if the torque limit is increased, more torque will only be available if a higher current can also flow. It may be necessary to also adapt the current limit.

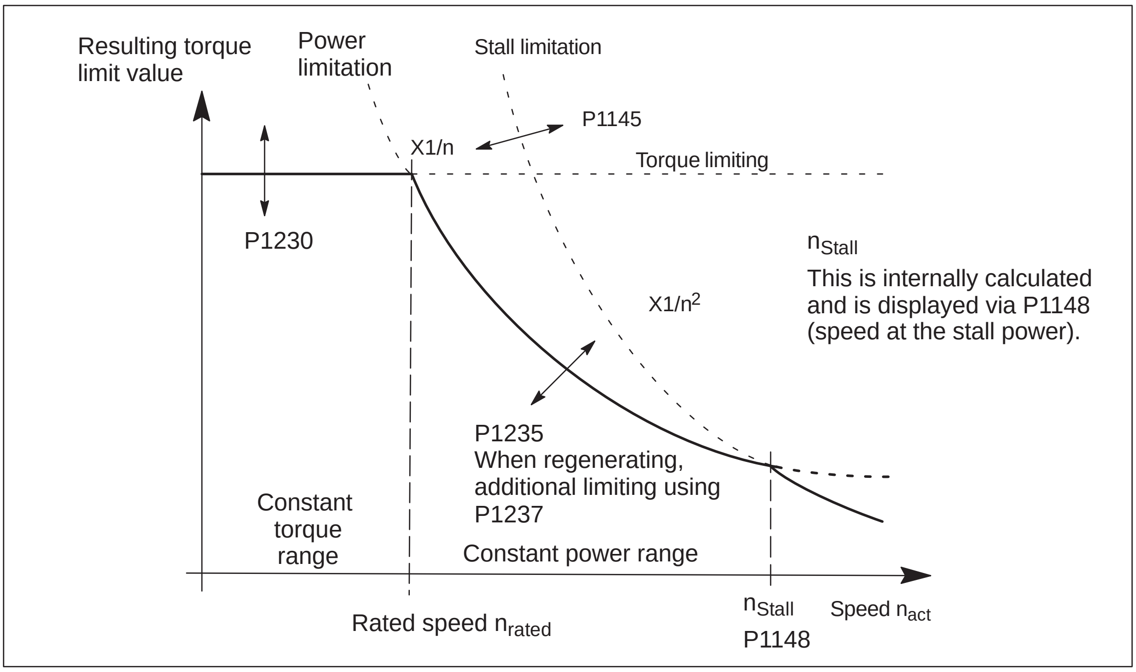


Fig. 6-6 Limiting the torque setpoint

The torque/power can be reduced continuously by reducing the currently effective torque limit using ”MomRed” control word (refer to Chapter 5.6.6). The result of the conversion is a percentage factor k which is applied to P1230 (torque limit) and P1235 (power limit). In Fig. 6-6, for the specified k factor, P1230 is replaced by k • P1230 and P1235 by k • P1235.

Table 6-5 Parameters for limits

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1145	Stall torque reduction factor	5.0	100.0	1 000.0	%	Immediately
	... the start of stall torque limiting can be changed (refer to Fig. 6-6). For a setting greater than 100%, the intervention point is increased. For a setting of less than 100%, the intervention point is decreased.					
1230:8	1st torque limit value (SRM, ARM) 1st force limit value (SLM)	5.0	100.0	900.0	%	Immediately
	... specifies the maximum torque referred to the pull-out torque (SRM), rated motor torque (ARM) or stall force (SLM) of the motor. **SRM/SLM:** Stall torque/stall force = P1118 • P1113 P1118: Motor standstill (stall) current P1113: Torque constant **ARM:** Rated motor torque = ((P1130 • 1000)/(2π • P1400/60)) = 9549.3 • (P1130/P1400) P1130: Rated motor power P1400: Rated motor speed The minimum of the torque, power and stall torque limits are always effective as limit (refer to Fig.6-6). The standard pre-assignment for ARM is 100%. For SRM/SLM, this is realized with the following operator action **Calculate controller data**, whereby the value is obtained from the following formula: SRM/SLM: P1230 = (P1104/P1118) • 100 % The following is especially true for ARM: In order to achieve significantly shorter ramp-up times up to the maximum speed, the power and current limits must also be increased. **Notice:** If the motor is overloaded for a longer period of time, this can result in an impermissible temperature rise (the drive is shutdown as a result of a motor overtemperature condition); the motor can also be destroyed.					

6

Table 6-5 Parameters for limits, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1235:8	1st power limit value	5.0	100.0	900.0	%	Immediately
	... specifies the maximum permissible power referred to the motor power (SRM) or the rated motor power (ARM – P1130: Rated motor power). Motor power for SRM [kW] = 1/9549.3 • (P1118 • P1113) • P1400 P1118: Motor standstill (stall) current P1113: Torque constant P1400: Rated motor speed As shown in Fig. 6-6, using the power limiting (constant power), the torque is limited (P = 2π • M • n; with P = constant —> M ~ 1/n). The minimum of the torque, power and stall torque limits are always effective as limit (refer to Fig.6-6). **SRM/SLM:** P1235 = (P1104/P1118) • 100 % For SRM/SLM, this parameter is automatically pre-assigned using the operator action **calculate controller data**, whereby the value is obtained from the formula above : **ARM:** The standard default is 100%. The following is especially true for ARM: If the speed at the start of field weakening is greater than the rated speed, then the ramp-up times can already be shorted and the power yield increased if only the power limit is increased (with the same current limit). As the current limit (P1238) can also limit the maximum torque which can be specified, if the output limit (power limit) is increased further, more torque can only be obtained if the current limit is also increased. **Notice:** If the motor is overloaded for a longer period of time, this can result in an impermissible temperature rise (the drive is shutdown as a result of a motor overtemperature condition); the motor can also be destroyed. Corresponding parameters are: P1104, P1145 and P1233 to P1238.					
1233:8	Regenerative limiting	5.0	100.0	100.0	%	Immediately
	... specifies the regenerative limiting. The setting refers to the parameter value in P1230.					
1237	Maximum regenerative power	0.1	100.0	500.0	kW	Immediately
	... allows the regenerative power to be limited for the input/regenerative feedback module. An appropriately lower value should be entered here, especially when using an uncontrolled NE module.					

Torque reduction at nset=0 (from SW 9.1)

Drives, for which a stop was initiated as a result of one of the following measures, are braked with the maximum possible motor current (P1104) taking into account the reduction in P1105:

- Generating an alarm, which initiates a Stop II, and therefore withdraws the internal controller enable.
- Withdrawing controller enable (ON/OFF 1).

This may possible cause the plant/machine to be mechanically damaged.

For this case, a torque reduction can be parameterized for a setpoint of zero.

The following definitions apply:

- P1096: Used to configured the torque reduction at nset = 0.

  Bit 0 = 1: Reduces the torque limit for a regenerative stop with a speed setpoint of zero.

  Bit 1 = 0 Monitors the speed controller at its endstop for torque reduction

  If the motor brakes with a low torque, then fault 608 can be initiated. If it is not desirable that this fault is initiated, then the fault can be suppressed using bit 1 = 1.
- P1097: Specifies the torque reduction at nset = 0.

Note

The percentage value from P1097 only refers to the torque obtained at the maximum motor current if P1105 = 100%.

- The braking behavior is influenced by:
  - P1403: Shutdown speed/velocity, pulse cancellation

    If the absolute speed actual value or velocity actual value falls below the specified shutdown speed in P1403 while braking, then the pulse enable is withdrawn and the drive coasts down.
  - P1404: Timer for pulse cancellation

    The pulses are cancelled before this if the timer set in P1404 has expired.
  - P1605: Timer, n controller at its limit

    After the set time has expired, then drive coasts down after braking.
  - P1613: Shutdown response, faults

    If the torque reduction is to be initiated by a fault at nset = 0, then this must be parameterized using the shutdown response STOP II.

6

Current limiting

The motor current is limited to a maximum value.

The maximum value is obtained from the minimum between the parameterization according to Table 6-6 and the limiting as a result of the power module.

Table 6-6 Parameters for the current limiting

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1238	Current limit (ARM)	0.0	150.0	400.0	%	Immediately
	... specifies the maximum permissible motor current referred to the rated motor current (P1103). In order to shorten the ramp-up (accelerating) times, it may make sense to set the current limit to values > 100 %, and additionally increase the power and torque limit. If the motor current is at its limit due to high torque/power limits, the monitoring function intervenes with P1605 and P1606 (speed controller at its limit).					
1105	Reducing the maximum motor current (SRM, SLM)	0	100	100	%	Immediately
	... specifies the maximum permissible motor current referred to the maximum motor current (P1104). The parameter is pre-set at the first start-up and for ”Calculate unlisted motor”: SRM: P1105 = (P1122/P1104) • 100 %					

i^2t power module limitation

This limit protects the power module from continuous overload.

Reader’s note

For an explanation on the i^2t power module limiting, refer to Chapter A.2.

Torque/power reduction

The torque/power can be reduced continuously by reducing the currently effective torque limit using ”MomRed” control word (refer to Chapter 5.6.6).

The reduction is:

- In the constant torque range,
  referred to the 1st torque limit (P1230)
- Constant power range
  referred to the first power limit (P1235)

The actual reduction is displayed in P1717.

The torque/power reduction can be limited to motoring operation using P1259 (in an emergency, it is still possible to brake quickly).

P1259 = 0 —> reduction is effective, both motoring and generating

P1259 = 1 —> reduction is only effective motoring

6.1.9 Position measuring system with distance-coded reference marks (from SW 4.1)

General information

In order that large distances do not have to be traversed for reference point approach, for indirect and direct measuring systems, it is possible to use a position measuring system with distance-coded reference marks.

This guarantees that the measuring system has already been referenced after a short traversing distance (e.g. 20 mm).

Note

Referencing with distance-coded reference marks is only possible using PROFIBUS-DP in an external control (refer to Chapter 5.6.4). It is not possible to evaluate the coding in the board itself!

Procedure

The procedure is the same as when referencing with normal incremental measuring systems.

The following conditions should be observed:

- Indirect measuring system (motor measuring system, IM)
  - P1027.7 = 1 (IM configuration, encoder)
    —> distance-coded reference scale
  - P1050 or P1051
    —> basic distance between two fixed reference marks
- Direct measuring system (DM)
  - P1037.7 = 1 (DM configuration, encoder)
    —> distance-coded reference scale
  - P1052 or P1053
    —> distance-coded reference scale

6.2 Positioning mode (P0700 = 3)

General information on positioning for POSMO SI/CD/CA

The following functions are available in the ”positioning” mode:

- Referencing or adjusting
  - Referencing for incremental positioning measuring systems
  - Adjusting absolute position measuring systems
  - Set reference point
- Programming and selecting traversing blocks
  The max. 64 traversing blocks per drive can be freely programmed and are saved in the parameters.
  - How many blocks can be individually selected via terminals?
    max. 8 blocks (3 terminals, from SW 4.1)
  - How many blocks can be individually selected via PROFIBUS-DP?
    all 64 blocks

  A block contains the following information:
  - Block number
  - Item
  - Velocity
  - Acceleration override
  - Deceleration override
  - Command
  - Command parameters
  - Mode: Block change enable – positioning mode – IDs

  When programming a traversing block, the block enable condition is specified. This means that when starting a block, precisely one block can be executed (for a block enable condition END) or automatic, even for several blocks (if the block enable condition CONTINUE FLYING, CONTINUE WITH STOP, CONTINUE EXTERNAL).
  The blocks are executed according to the consecutive block number up to the block with the block enable condition END.
- Position-related switching signals (cams)
  Signals are generated and output as a function of the actual position actual value and parameter setting.
- Jogging
  This operating mode allows speed-controlled traversing in the ”positioning” mode. From SW 4.1, the drive can be jogged in the closed-loop position controlled mode (incremental) (refer to Chapter 6.2.9).
- Monitoring functions
  Dynamic following error monitoring, positioning monitoring, standstill monitoring, hardware/software limit switches

6.2.1 Encoder adaptation

Normalization of the encoder signals

The mechanical characteristics of the axis must be specified using the appropriate parameters to adapt the encoder.

The POSMO SI/CD/CA drive then calculates the ratio between the travel and encoder increments from this data and can therefore identify the motion on the load side.

Linear axis with rotary motor encoder

The following parameters are supplied using this configuration:

- P1027.4 = 0: Rotary motor encoder
- P1005 IM encoder pulses per revolution (only encoders with sin/cos 1Vpp)
- P0236 Spindle pitch or fictitious spindle pitch
- P0237:8 Encoder revolutions
- P0238:8 Load revolutions

6

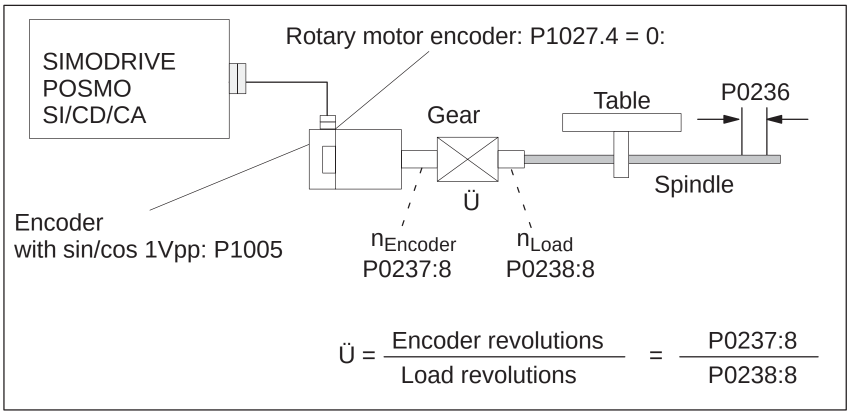


Fig. 6-7 Linear axis with rotary motor encoder (ballscrew)

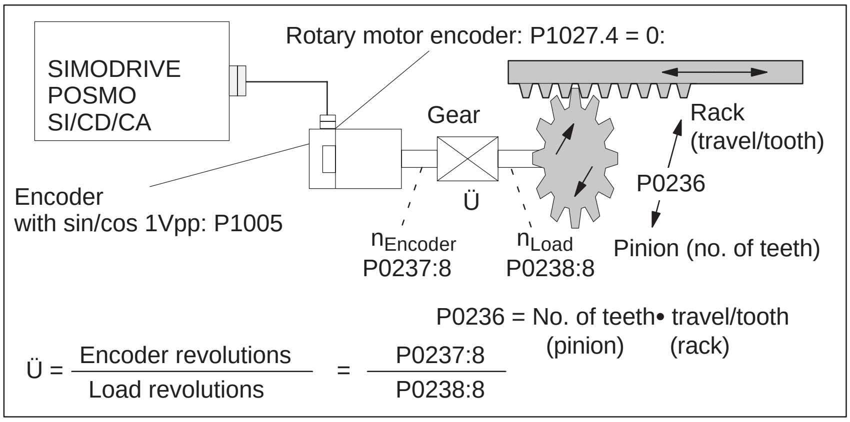


Fig. 6-8 Linear axis with rotary motor encoder (rack/pinion)

Linear axis with linear motor encoder

The following parameters are supplied using this configuration:

- P1027.4 = 1: Linear motor encoder
- P1024 Grid divisions, linear measuring system

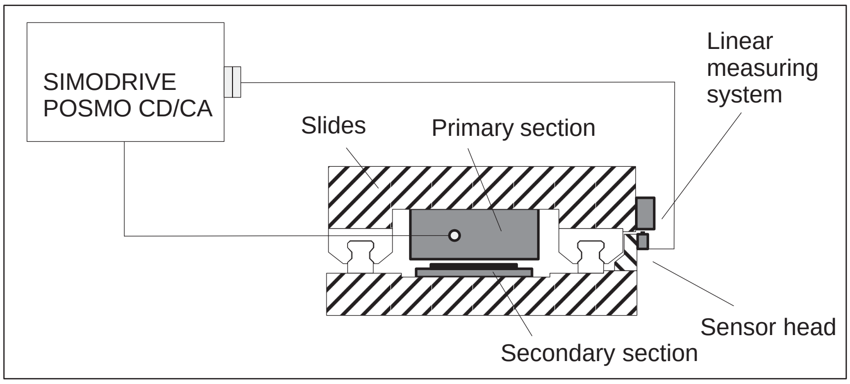


Fig. 6-9 Linear axis with linear motor encoder

Rotary axis with rotary motor encoder

The following parameters are supplied using this configuration:

- P1027.4 = 0: Rotary motor encoder
- P1005 IM encoder pulses per revolution (only encoders with sin/cos 1Vpp)
- P0237:8 Encoder revolutions
- P0238:8 Load revolutions

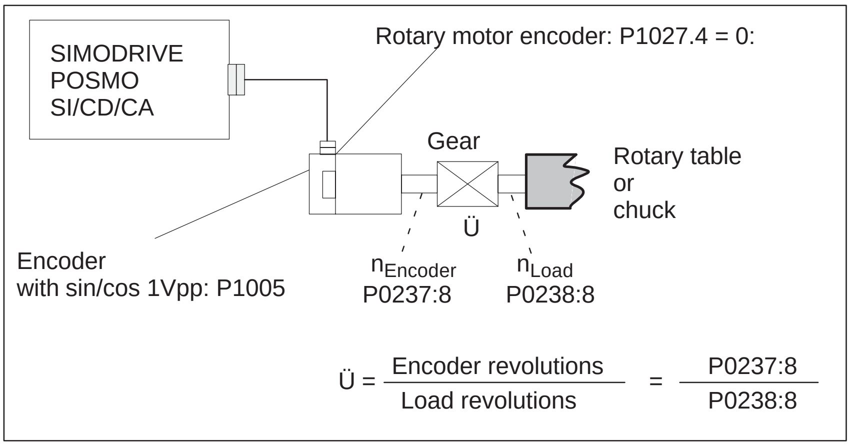


Fig. 6-10 Linear axis with rotary motor encoder

Rotary axis without/with modulo correction

A modulo rotary axis is set using the following parameters:

- P0241 (activates modulo conversion)
- P0242 (modulo range, rotary axis)

Secondary conditions for axis/encoder

The following secondary conditions must be observed, dependent on the axis type:

Table 6-7 Restrictions for axis/encoder

Axis/encoder		Limitations
Linear axis	Rotary incremental encoder	The axis must be referenced after power-up.
	Linear absolute value encoder (e.g. LC 181)	none
	Rotary absolute value encoder (e.g. EQN 1325, P1021 = 4096)	Overflow after the number of revolutions entered in P1021 (multiturn resolution, motor absolute value encoder). For linear axis with encoder connected to the motor, the following is valid: —> The maximum traversing travel is: P1021 • effective spindle pitch Example: EQN 1325, 10 mm spindle pitch —> max. traversing distance = –20.48 m to 20.48 m • The machine zero can be completely freely selected in the range from –20.48 m to +20.48 m.
Rotary axis endlessly rotating	Incremental encoder	The axis must be referenced after power-up.
	Absolute encoder	Motor encoder —> max. revolutions in P1021 (e.g. 4096) **Note:** The same restrictions apply as for linear axes and rotary absolute value encoders.
Rotary axis endlessly rotating (modulo rotary axis)	Absolute encoder	The encoder must be mounted onto the motor. **Notice:** **Before SW 8.1:** The gear ratio cannot be freely selected. The ratio between the encoder and load must be selected so that the full range of encoder is an integer multiple of the modulo range. The following condition must be fulfilled: $P1021 \bullet \frac{P0238:8}{P0237:8} \bullet \frac{360000}{P0242}$ = integer multiple P1021 Multi-turn resolution, absolute value encoder motor P0238:8 Load revolutions P0237:8 Encoder revolutions P0242 Modulo range, rotary axis in MSR Example: P1021 = 4096 P0237:0 = 64, P0238:0 = 72 P0242 = 360 000 are permitted, because 4096 • 72/64 • 360/360 = 4608 = is an integer number **Note:** When a fault develops, fault 139 is signaled (modulo range and ratio do not match).

Table 6-7 Restrictions for axis/encoder, continued

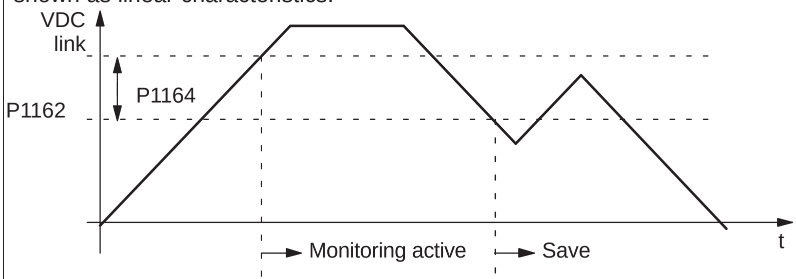
Axis/encoder		Limitations
Rotary axis end-lessly rotating (modulo rotary axis)	Absolute encoder	**From SW 8.1:** Any gearbox ratio can be selected. The following condition applies: Modulo range EnDat encoder (traversing range) ⩾ modulo range, load $P1021 \cdot \frac{P0238:8}{P0237:8} \cdot \frac{360000}{P0242\ [MSR]} \geq 1$ **From SW 8.3:** A random gearbox ratio can only be selected for firmware card from version C onwards. **Prerequisites:** • P1162 > 380 V (minimal DC link voltage) • P1161 = 0 (DC link voltage is deactivated) When powering-down or when the DC link voltage decreases, the energy saved in the DC link can be used to maintain the closed-loop control for a specific time. When powering-down or when the DC link voltage decreases, the supply for the closed-loop control must still be maintained until the data save operation has been completed. The thresholds to save the absolute value encoder data as a function of the DC link voltage are shown in the following diagram. For reasons of simplicity, the DC link charging and the decrease in the DC link voltage are shown as linear characteristics.  The gear ratio can be freely selected (fault 139 is no longer output). Example: P0237:0 = 3 P0238:0 = 1 After the measuring system has been adjusted, the position of the load is determined from the absolute position of the motor measuring system via the gearbox factor (Ü=P0238:8/P0237:8). In order to determine the clear position of the load, then it must be guaranteed that after being powered-down, the motor can only move within half of the absolute encoder range that can be represented (coast down or manual motion). This is the reason that it is not permissible to use single-turn absolute value encoders. Exceptions are possible if the user can ensure that the drive does not move by more than half of an encoder revolution. **Notice:** If half of the absolute encoder range that can be represented is exceeded after powering-down, then the assumed actual position is incorrect and after powering–up again **no** fault or warning is generated! **Note:** • If a fault condition develops, fault 149 (incorrect data for modulo drive with absolute value encoder and any gearbox factor). In this case, P1162 (minimum DC link voltage) should be checked as the encoder data is saved when the entered threshold value is fallen below. The axis must be re-adjusted after fault 149 occurs. • If, during the commissioning, position reference value (setpoint) inversion is selected, then the next step is to carry-out a power on. Only then can the reference point be set.

Table 6-7 Restrictions for axis/encoder, continued

Axis/encoder		Limitations
Rotary axis end-lessly ro-tating (modulo rotary axis)	Absolute encoder	**Notice:** The encoder data is only saved when the DC link voltage decreases ($V_{DC\ link}$). This is the reason that this function is **not** effective if only the PROFIBUS power supply (24 V) is shutdown. If the drive goes into regenerative operation after power-down, then this can also cause problems when saving data if the control board is re-acti-vated by the energy fed back.
Rotary axis end-lessly ro-tating (modulo rotary axis)	Incremental en-coder	For incremental encoders, the above condition is not checked. If the machine mechanical design does not fulfill the conditions specified above, then the rotary axis must be re-referenced after each endless operation and after it has been powered up again. The following is valid when evaluating the zero mark: • The evaluated zero mark must always be located at the same load side position of the modulo range (the ratio is taken into account). • For several zero marks, one must be defined for evaluation (e.g. set via cams). • If it is not possible to reference the system using the encoder zero mark, then the equivalent zero mark must be used (e.g. BERO at the input with the ”equivalent zero mark” function).

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Note

For SIMODRIVE POSMO SI, the following applies:

The ratio (P0237, P0238) should be specified even for drives supplied from the factory with gearboxes (no factory pre-parameterization).

Parameter overview

Table 6-8 Parameters for the encoder adaptation

No.	Name	Min.	Standard	Max.	Units	Effective
1027.4	IM configuration, encoder	–	–	–	Hex	PO
	The motor encoder type is specified using P1027, bit 4. **Bit 4 Linear measuring system** = 1 Linear motor encoder = 0 Rotary motor encoder					
1005	IM encoder pulse number (SRM, ARM)	1	2048	65 535	–	PO
	The parameter is only relevant for rotary motor encoders. • For encoders with voltage signals sin/cos 1 Vpp (rotary motor encoder) The encoder pulses per revolution are specified using this parameter.					

Table 6-8 Parameters for the encoder adaptation, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0236	Leadscrew pitch	1	10 000	8 388 607	MSR/ rev	PO
	The spindle pitch is specified in this parameter (e.g. ball screw spindle with 10 mm/revolution and metric dimension system —> P0236 = 10 000 MSR/rev).					
0237:8	Encoder revolutions	1	1	8 388 607	–	PO
0238:8	Load revolutions	1	1	8 388 607	–	PO
	The gearbox ratio between the motor encoder and load is specified using these parameters. $\ddot{u} = \frac{\text{Encoder revolutions}}{\text{Load revolutions}} = \frac{\text{P0237:8}}{\text{P0238:8}}$ Ü: Ratio **Note:** The parameters are dependent on the parameter set. The effective parameter set can be selected via the ”parameter set changeover” input signals.					
0241	Activates the modulo conversion, rotary axis (SRM, ARM)	0	0	1	–	PO
	... activates/de-activates the modulo conversion for a rotary axis. 1 Modulo conversion activated, the modulo correction is executed according to P0242 0 Modulo conversion de-activated					
0242	Modulo range, rotary axis (SRM, ARM)	1	360 000	100 000 000	MSR	PO
	... defines the modulo range of the rotary axis. Practical modulo range values include: n • 360 degrees with n = 1, 2, ...					
1162	Minimum DC link voltage	0	0	800	V(pk)	Immediately
	... defines the permissible lower limit for the DC link voltage. If the DC link voltage falls below the parameterized value, then the stop response, parameterized in P1613, bit 16 is initiated and the encoder data is saved in the FEPROM.					
1164	Hysteresis, DC link voltage (from SW 8.1)	0	50	600	V(pk)	Immediately
	... defines the hysteresis for the DC link voltage. This parameter refers to P1162. For absolute value encoders with freely selectable gear ratio, when voltage fluctuations occur, several data save operations of the absolute value encoder data can, to a certain extent, be suppressed. These fluctuations can occur, e.g. when the drive regenerates into the DC link.					

Reader’s note

Refer to Chapter A.4 for additional information on measuring systems.

6.2.2 Units for travel, velocity and acceleration

Dimension system grid (MSR)

When setting the dimension system (mm, inch or degrees) for a drive configuration in the ”Position mode”, then the dimension system grid (MSR) is also defined:

Table 6-9 Dimension system and dimension system grid (MSR)

Dimension system		Meaning
P0100 = 1	mm (in)	1 MSR = 10^{-3} mm (µm, micrometers)
P0100 = 2	inch	1 MSR = 10^{-4} inch
P0100 = 3	Degrees	1 MSR = 10^{-3} degrees (mdegrees, milli degrees)

Reader’s note

The units of the physical quantities are displayed differently or must be interpreted differently.

- In the parameter list (refer to Chapter A.1) and when reading and writing into parameters via PROFIBUS-DP, there is the dimension system grid (MSR) or a multiple (constant) of the MSR.

  Examples in the mm dimension system:
  - Distance (travel) has the units [MSR]
  - Velocity has the units [c*MSR/min], c = 1
  - Acceleration has the units [1000 MSR/s^2]
- For SimoCom U, converted units are used (for the dialog boxes and expert list).

  Examples in the mm dimension system:
  - Travel (distance) has the units [mm]
  - Velocity has the units [mm/min]
  - Acceleration has the units [mm/s^2]

The units for the various dimension systems (mm, inch or degrees) can be listed in the following tables using specific examples.

Units in the metric dimension system

In the metric dimension system (P0100 = 1), the following units are used for distance, velocity and acceleration:

Table 6-10 Units in the metric dimension system

Physical quantity		Units for		
		Parameter list (A.1)	PROFIBUS-DP (5.6.7)	SimoCom U (3.2)
Distance Example:	 123.456 mm	**µm** 123456 [MSR] —>123.456 mm		**mm (in)** 123.456 mm
Velocity Example:	 4766.176 mm/min	**µm/min** 4766176 [c * MSR/min]1) —> 4766.176 mm/min —> 4.766176 m/min		**mm/min** 4766.176 mm/min
Acceleration Example:	 4.378 m/s^2	**mm/s^2** 4378 [1000 MSR/s^2] —> 4378 mm/s^2 —> 4.378 m/s^2		**mm/s^2** 4378 mm/s^2

1) The units are specified as follows in the parameter list (refer to Chapter A.1): [c * MSR/min], c = 1

Units in the inch dimension system

In the inch dimension system (P0100 = 2) the following units are used for distance, velocity and acceleration:

Table 6-11 Units in the inch dimension system

Physical quantity		Units for		
		Parameter list (A.1)	PROFIBUS-DP (5.6.7)	SimoCom U (3.2)
Distance Example:	 123.4567 inch	**10^{-4} inch** 1234567 [MSR] —> 123.456 7 inch		**inch** 123.4567 inch
Velocity Example:	 476.1765 inch/min	**10^{-4} inch/min** 4761765 [c * MSR/min]1) —> 476.1765 inch/min		**inch/min** 476.1765 inch/min
Acceleration Example:	 243.7 inch/s^2	**10^{-1} inch/s^2** 2437 [1000 MSR/s^2] —> 2437*0.1 inch/s^2 —> 243.7 inch/s^2		**inch/s^2** 243.7 inch/s^2

1) The units are specified as follows in the parameter list (refer to Chapter A.1): [c * MSR/min], c = 1

Units in the degree dimension system

In the degrees dimension system (P0100 = 3) the following units are used for distance, velocity and acceleration:

Table 6-12 Units in the degree dimension system

Physical quantity		Units for		
		Parameter list (A.1)	PROFIBUS-DP (5.6.7)	SimoCom U (3.2)
Distance Example:	 123.456 degrees	**mdegrees** 123456 [MSR] —> 123.456 degrees		**Degrees** 123.456 degrees
Velocity Example:	 4766.17 degr./min	**10 mdegrees/min** 476617 [c * MSR/min][1)] —> 4766.17 degrees/min		**degrees/min** 4766.17 degrees/min
Acceleration Example:	 24 degrees/s^2	**degrees/s^2** 24 [1000 MSR/s^2] —> 24 degrees/s^2		**degrees/s^2** 24 degrees/s^2

1) The units are specified as follows in the parameter list (refer to Chapter A.1): [c * MSR/min], c = 10

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6.2.3 Closed-loop position control components

General information

The axis closed-loop control consists of the current and speed control loop and a higher-level position control loop.

The closed-loop position control fulfills the following tasks:

- Controls the velocity of the drive during movement
- The axis is precisely moved to the programmed target position
- Holds the axis at a target position even when disturbances are present

The closed-loop position controller is a P controller. Various function units are provided in its environment, which provide support for special tasks in the motion control, and which can be adapted to the axis characteristics using numerous parameters.

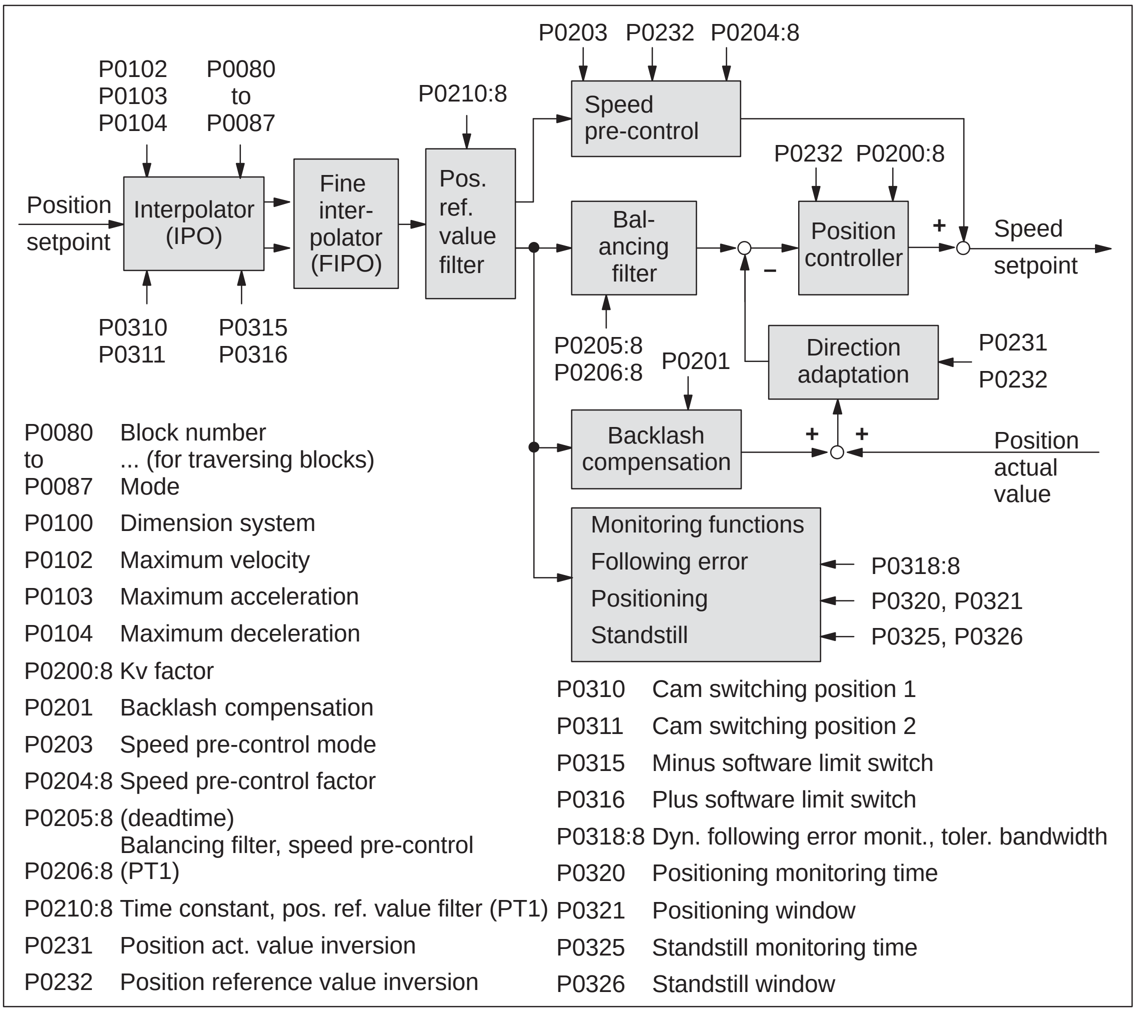

Fig. 6-11 Closed-loop position control components

Dimension system setting P0100

The units of an axis are defined using the dimension system setting.

Note

- In the following text, the dimension system grid (MSR) term is used as unit of the selected dimension system.
  – The following is valid depending on P0100:
  1 MSR = 10^{-3} mm or 10^{-4} inch or 10^{-3} degrees
  – Example: Assumption P0100 = 1 —> 10^3 MSR = 1 mm
- The dimension system is selected depending on the axis type (linear axis, rotary axis), i.e. for a rotary axis, the dimension system 10^{-3} degrees must be parameterized.
- The dimension system setting must be specified when POSMO SI/CD/CA is commissioned for the first time.

Dimension system changeover mm <–> inch

Recommendation:
Carry-out the first start-up using the ”correct” dimension system, so that it isn’t necessary to later changeover (refer to the following warning information).

The following steps should be taken if the dimension system setting has to be changed between mm and inch after POSMO SI/CD/CA has been commissioned for the first time:

1. Enter the required dimension system into P0100
2. Carry-out a POWER ON

   During run-up, it is identified, that P0100 $\neq$ P0101 and automatically, all of the parameters, dependent on the dimension system (refer to Chapter A.1) are converted corresponding to the setting in P0100.

   Parameters that are dependent on the dimension system have the following units:

   – MSR
   – k * MSR/min
   – 1 000 MSR/s
   – 1 000 MSR/s^2
   – 1 000 MSR/s^3
   – MSR/rev

   Example:
   If 254 [mm] is located in P0081:4 and a changeover is made from metric to inch (imperial units), then afterwards, 10 [inch] is located in P0081:4.

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Warning

Although it is possible to subsequently change over the dimension system, we recommend that you do not do this:

When subsequently changing-over the dimension system from mm to inch, data, dependent on the dimension system, is converted, whereby rounding-off errors can occur and value limits can be violated.

The conversion is not made when changing between a rotary axis (degrees) and linear axis (mm/inch).

Table 6-13 Parameters for the dimension system setting and changeover

No.	Name	Min.	Standard	Max.	Units	Effective
0100	Dimension system	1	1	3	–	PO
	... specifies the dimension system grid (MSR) which is being used. = 1 —> 1 MSR = 10^{-3} mm used for linear axes in the metric system = 2 —> 1 MSR = 10^{-4} mm used for linear axes in the inch (imperial) system = 3 —> 1 MSR = 10^{-3} degrees used for rotary axes **Example:** P0100 = 1 —> 345 123 MSR = 345.123 mm					
0101	Actual dimension system	–	–	–	–	RO
	... indicates the currently active dimension system. **Note:** If it is identified at POWER ON that P0100 $\neq$ is P0101, then a dimension system changeover is automatically made.					

Maximum velocity P0102

The maximum velocity of an axis is defined using this parameter.

The drive is limited to this velocity if a higher velocity is specified or programmed via the override for the reference point approach or is programmed in the traversing block.

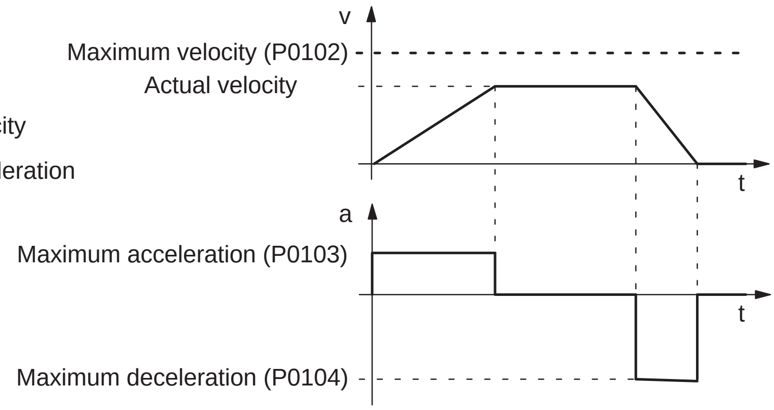
The maximum velocity limit is effective for reference point approach, when executing a traversing block and in the jogging mode.

Maximum acceleration P0103
Maximum deceleration P0104

The maximum acceleration when approaching and the maximum deceleration when braking an axis can be specified, independently of one another, using these two parameters.

The selected acceleration and deceleration are effective for reference point approach, when executing a traversing block, and when jogging (jog mode).

Table 6-14 Parameters for the maximum velocity, acceleration and deceleration

No.	Name	Min.	Standard	Max.	Units	Effective
0102	Maximum velocity	1 000	30 000 000	2 000 000 000	c*MSR/min	Immediately
	... defines the maximum velocity of the axis in the ”Positioning” mode.					
0103	Maximum acceleration	1	100	999 999	1 000 MSR/s^2	Vset_0
0104	Maximum deceleration	1	100	999 999	1 000 MSR/s^2	Vset_0
	... defines the maximum acceleration/deceleration of the axis when approaching/braking. v: Velocity a : Acceleration t: Time 					
	Note: • The maximum acceleration/deceleration is a step function. • The effective acceleration or deceleration can be set in the traversing block using an override (P0083:64 or P0084:64).					

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Jerk limiting P0107

Acceleration and deceleration are step-like if jerk limiting is not used.

Using jerk limiting, a ramp-type increase can be parameterized for both quantities, so that approach and braking are ”smooth” (jerk-limited).

Applications

Jerk limiting can be used, e.g. for positioning tasks using liquids or generally to reduce the mechanical stressing on an axis.

Table 6-15 Jerk limiting parameters

No.	Name	Min.	Standard	Max.	Units	Effective
0107	Jerk limiting	0	0	100 000 000	1 000 MSR/s^3	Vset_0

The duration of the acceleration ramp (jerk time T_R) is calculated from the higher value of the maximum acceleration (P0103), the maximum deceleration (P0104) and the selected jerk limiting (P0107).

$$T_R\ [s] = \frac{amax\ [10^3\ MSR/s^2]}{r\ [10^3\ MSR/s^3]}$$

v: Velocity
a_{max}: Acceleration (higher value from P0103 and P0104)
r: Jerk
T_R: Jerk time (calculated jerk time: refer to P1726)

0 Jerk limiting off

> 0 Jerk limiting on, the selected value is effective (refer to P1726)
Note:
The jerk is internally limited to the appropriate jerk time of 200 ms.

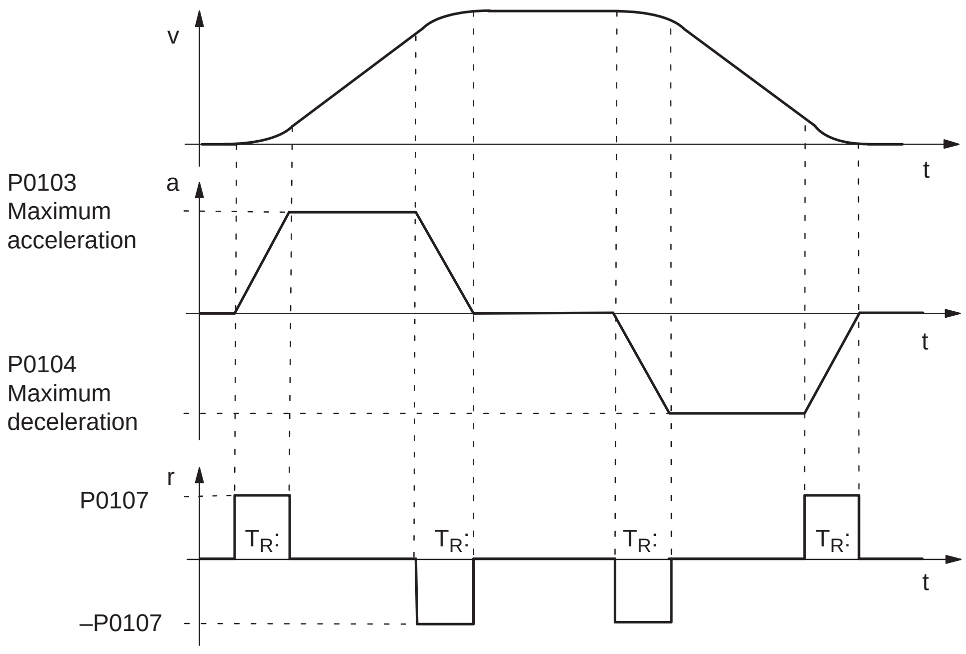

Table 6-15 Jerk limiting parameters, continued

No.	Name	Min.	Standard	Max.	Units	Effective
	Note: • The following is valid for this diagram: Acceleration and deceleration have been set the same. • If, when setting the jerk limiting, the warning 870 "Jerk: Jerk time is limited" is displayed, then the actual motion is "harder" than that set in P0107. • For traversing motion with a direct transition between acceleration and deceleration (i.e. jerk time T_R is greater than the constant velocity phase), jerk r can increase up to twice the parameterized jerk.					
1726	Calculated jerk time	–	–	–	ms	RO
	... indicates the calculated, current effective jerk time. **Note:** The jerk time is internally limited to 200 ms.					

Table 6-16 Examples for acceleration, deceleration and jerk limiting

P0103[1)] (Maximum acceleration) [1000 MSR/s^2]	**P0104[1)] (Maximum deceleration) [1000 MSR/s^2]**	**P0107[1)] (Jerk limiting) [1000 MSR/s^3]**	**Which jerk time is effective for acceleration and deceleration?**
= 2 000 —> 2 m/s^2	= 2 000 —> 2 m/s^2	= 100 000 —> 100 m/s^3	a_{max} = 2 m/s^2 —> Jerk time = 20 ms
= 8 000 —> 8 m/s^2	= 2 000 —> 2 m/s^2	= 100 000 —> 100 m/s^3	a_{max} = 8 m/s^2 —> Jerk time = 80 ms The jerk time of 80 ms is effective for acceleration and deceleration.
= 2 000 —> 2 m/s^2	= 8 000 —> 8 m/s^2	= 100 000 —> 100 m/s^3	a_{max} = 8 m/s^2 —> Jerk time = 80 ms The jerk time of 80 ms is effective for acceleration and deceleration.
= 30 000 —> 30 m/s^2	= 25 000 —> 25 m/s^2	= 100 000 —> 100 m/s^3	a_{max} = 30 m/s^2 —> Jerk time = 300 ms A warning is output, and the jerk is limited corresponding to the jerk time of 200 ms for acceleration and deceleration.
= 8 000 —> 8 m/s^2	= 2 000 —> 2 m/s^2	= 200 000 —> 200 m/s^3	a_{max} = 8 m/s^2 —> Jerk time = 40 ms The jerk time of 40 ms is effective for acceleration and deceleration.

1) Prerequisites:
There is a metric linear axis (dimension system P0100 = 1 —> 1000 MSR = 1 mm)

Velocity override

The velocity of an axis can be influenced using the velocity override or also known as just override.

Note

The maximum traversing velocity is limited by the maximum velocity set in P0102.

The override has no effect on the acceleration/deceleration, i.e. when the override is doubled, the axis velocity is doubled, but the positioning time is not halved.

How can the override be entered?

The override can be entered as follows:

- PROFIBUS-DP
  The override is entered via the ”Over” control word.

Limit switch monitoring functions

For POSMO SI/CD/CA, the following limit switch monitoring functions can be used:

- Hardware limit switch
- Software limit switches

The limit switch monitoring functions can be used to limit the operating range or to protect the machine.

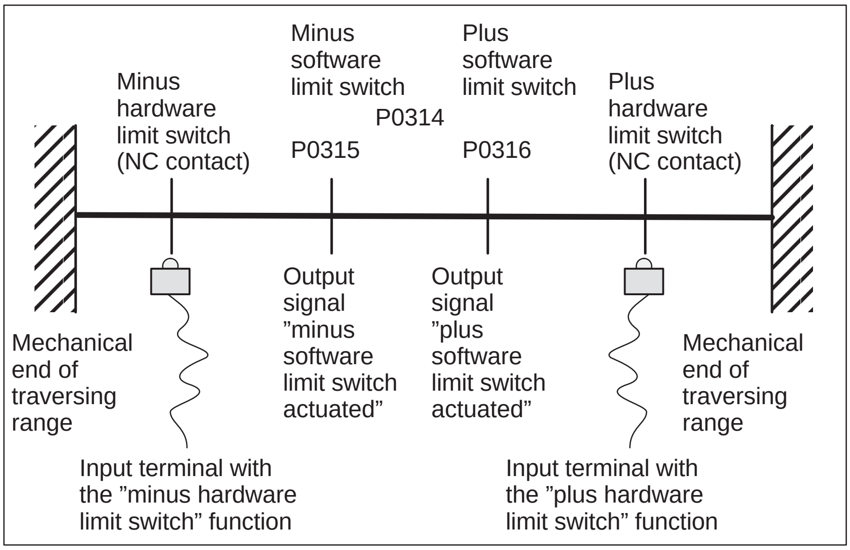

Fig. 6-12 Limit switch monitoring functions

Hardware limit switch (HW limit switch)

There is a hardware limit switch for every axis and every approach direction. The HW limit switches must be connected to an input terminal with the following function numbers:

- ”Plus hardware limit switch” function —> function number 81
- ”Minus hardware limit switch” function —> function number 82

—> Refer to Chapter 6.4.1

Traversing to a hardware limit switch?

When traversing to a hardware limit switch, the associated input signal is set and the following response is automatically initiated:

- The axis is braked with the deceleration level set in P0104 (maximum deceleration) and therefore comes to a standstill after the limit switch. The drive remains in the closed-loop controlled mode.
- One of the following faults is signaled:
  - Fault 140 Minus hardware limit switch
  - Fault 141 Plus hardware limit switch
- The jogging key is inhibited in the direction of motion
- The traversing block is exited

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How can an axis be moved away from a hardware limit switch?

If an axis is located **at** a hardware limit switch, then it can be moved away again as follows:

- Return the axis to the valid traversing range
  - Move away jogging in the opposite direction to the approach direction

    or
  - Withdraw the controller enable and move the drive away manually
- Withdraw the controller enable (control signal ON/OFF1)
- Acknowledge the fault

Software limit switches (SW limit switches) P0314 P0315 P0316

The minus software limit switch (P0315) and the plus software limit switch (P0316) must be appropriately set to limit the working range or to protect the machine.

Notice

The software limit switches only become active if the following conditions exist:

- The function is activated via P0314
- The axis is referenced (”reference point set” output signal)

Only then is it certain that the axis will be immediately stopped if it attempts to move out of the permissible range.

Note

The SW limit switch monitoring is dependent on the axis type as follows:

- For a linear axis or rotary axis with modulo correction, the following is valid:

  The software limit switches can be activated via P0314 and set via P0315 and P0316.
- For rotary axes with modulo correction, the following is valid:

  The software limit switches are automatically de-activated. If monitoring is parameterized, it has no effect.

Output signals

The status of a software limit switch is displayed using the following signals (refer to Chapter 6.4.3):

- ”Minus software limit switch actuated” output signal

  or
- ”Plus software limit switch actuated” output signal

Traversing to a software limit switch?

When traversing to a software limit switch, the following response is automatically initiated:

- Behavior in the jog mode (via velocity)
  – When the axis reaches the software limit switch, it is braked with the deceleration level set in P0104 (maximum deceleration) and therefore comes to a standstill after the limit switch.
  – One of the following faults is signaled:

    Fault 132 (drive is located after the minus software limit switch)

    Fault 133 (drive is located after the plus software limit switch)
  – The jog button is inhibited in the approach direction.
- Behavior in the positioning mode (traversing blocks) and for incremental jogging operation (from SW 4.1)
  – The axis comes to a standstill directly at the software limit switch.
  – The traversing block or jogging operation is interrupted.
  – One of the following faults/warnings is signaled:

    P0118.0 = 0 (standard, before SW 4.1)

    Fault 119 (PLUS software limit switch actuated)

    Fault 120 (MINUS software limit switch actuated)

    P0118.0 = 1 (from SW 4.1)

    Warning 849 (PLUS software limit switch actuated)

    Warning 850 (MINUS software limit switch actuated)
  – When a target position is parameterized after a software limit switch, the traversing block is not started and fault 101 or 102 is output.

How can an axis be moved away from a software limit switch?

If an axis is located **at** a software limit switch, then it can be moved away again as follows:

- P0118.0 = 0 (standard, before SW 4.1)
  - Return the axis to the valid traversing range

    In the jogging mode (via velocity), move away in the direction opposite to the approach direction

    or

    Withdraw the controller enable and move the drive away manually
  - Withdraw the controller enable (control signal ON/OFF1)
  - Acknowledge the fault
- P0118.0 = 1 (from SW 4.1)
  - In the jogging mode (incremental or via velocity), move away in the direction opposite to the approach direction

    or
  - Move away, with the traversing block in the opposite direction to the approach direction

If an axis is located after a software limit switch, then it is only possible to move away in the opposite direction to the approach direction in the jog mode via velocity.

Table 6-17 Parameters for software limit switch

No.	Name	Min.	Standard	Max.	Units	Effective
0118	Software limit switch configuration	0	0	1	–	Immediately
	The configuration for software limit switch reached is defined using these parameters. Bit 0 = 1 Software limit switch reached with warning 849/850 (from SW 4.1) Bit 0 = 0 Software limit switch reached with fault 119/120 (before SW 4.1)					
0314	Software limit switch activation	0	0	1	–	PrgE
	The software limit switches can be activated/de-activated using these parameters. = 1 Software limit switch active = 0 Software limit switch inactive (e.g. this is necessary for a rotary axis)					
0315	Minus software limit switch	–200 000 000	–200 000 000	200 000 000	MSR	PrgE
0316	Plus software limit switch	–200 000 000	200 000 000	200 000 000	MSR	PrgE
	The minus and plus positions for the software limit switches are set using these parameters. **Note:** The following applies: P0315 (minus software limit switch) < P0316 (plus software limit switch)					

Position-related switching signals (cams) P0310 P0311

Using the position-dependent switching signals 1 and 2, cams can be simulated without any mechanical equipment (e.g. at inaccessible positions), dependent on the actual position value.

The absolute cam switching positions are entered via parameter, and the associated cam switching signals are output as output signal.

Notice

Only after the axis has been referenced, is it guaranteed that the cam switching signals really do have a "true" position reference when output.

This means that an AND logic operation must be externally established between the "Reference point set/reference point not set" output signal and the "Cam switching signals 1, 2" output signals
(e.g. using an external PLC).

Table 6-18 Parameters for position-related switching signals (cams)

No.	Name	Min.	Standard	Max.	Units	Effective
0310	Cam switching position 1	–200 000 000	0	200 000 000	MSR	Immediately
0311	Cam switching position 2	–200 000 000	0	200 000 000	MSR	Immediately
	The cam switching positions 1 and 2 are set using these parameters. The following assignment applies: P0310 (cam switching position 1) —> cam switching signal 1 P0311 (cam switching position 2) —> cam switching signal 2 **Note:** Also refer under the index entry "Output signal, cam switching signals 1 and 2"					

Backlash compensation P0201

When mechanical force is transferred between a machine part and its drive, generally backlash occurs. If the mechanical system was to be adjusted/designed so that there was absolutely no play, this would result in high wear. Thus, backlash (play) can occur between the machine component and the encoder.

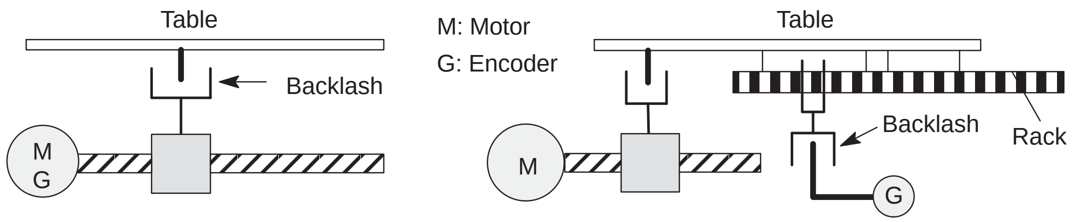
For axes with indirect position sensing, mechanical backlash results in a falsification of the traversing distance, as, at direction reversal, the axis travels either too far or not far enough corresponding to the absolute value of the backlash.

Note

The backlash compensation is active, after

- The axis has been referenced for incremental measuring systems.
- The axis has been adjusted for absolute measuring systems.

In order to compensate the backlash, the determined backlash must be specified in P0201 with the correct polarity.
At each direction of rotation reversal, the axis actual value is corrected dependent on the actual traversing direction.



The encoder actual value leads the actual value (table) at direction reversal.
—> the table doesn't travel far enough
—> **positive backlash** (standard case)

The actual value (table) leads the encoder actual value at a direction of rotation reversal.
—> the table travels too far
—> **negative backlash**

Fig. 6-13 Positive and negative backlash compensation

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Table 6-19 Parameters for backlash compensation

No.	Name	Min.	Standard	Max.	Units	Effective
0201	Backlash compensation	–20 000	0	20 000	MSR	Immedi-ately

... switches the backlash compensation in/out, and defines the absolute backlash amount for a positive or negative backlash.

= 0 The backlash (play) compensation is disabled

> 0 Positive play (standard situation)
For a direction of rotation reversal, the encoder actual value leads the actual value (table). The table does not travel far enough.

< 0 Negative play
The actual value (table) leads the encoder actual value at direction reversal. The table travels too far.

Note:

- Reference point approach: When is the compensation value switched-in?

  When the zero mark is detected, backlash compensation is activated, only for P0173 = 1 (no reference cams).

  If the axis continues to move

  – in the same direction after the reference point approach —> then a compensation value is not entered

  – in the opposite direction —> the compensation value is entered when the velocity set-point reverses

- Reference point setting: When is the compensation value switched-in?

  The behavior when first traversing after the ”Set reference point” in the positive or negative direction depends on the setting ”Reference point approach – plus/minus” (P0166).

  P0166
  0 Traversing in the pos. direction —> a comp. value is not entered
  Traversing in the neg. direction —> comp. value is immediately entered
  1 Traversing in the pos. direction —> comp. value is immediately entered
  Traversing in the neg. direction —> a comp. value is not entered
  = 1 —> Negative direction
  = 0 —> Positive direction

  If the reference point is simply set again (new command, with and without withdrawing the bit ”axis is referenced”), then for backlash compensation, the system acts as if the reference point was not set again. The behavior mentioned above is only seen after power-on or POWER-ON RESET!

- Absolute value encoder adjusted: When is the compensation value switched-in?

  The behavior when first traversing after power-on, depends on the setting for ”reference cams – with/without” (P0173) and ”Direction reference point approach – positive/negative” (P0166).
  The following applies:

P0173	P0166	
0	0	Traversing in the pos. direction —> comp. value is immediately entered Traversing in the neg. direction —> a comp. value is not entered
0	1	Traversing in the pos. direction —> comp. value is not entered Traversing in the neg. direction —> a comp. value is immediately entered
1	0	Traversing in the pos. direction —> comp. value is not entered Traversing in the neg. direction —> a comp. value is immediately entered
1	1	Traversing in the pos. direction —> comp. value is immediately entered Traversing in the neg. direction —> a comp. value is not entered

  = 1 —> Negative direction
  = 0 —> Positive direction

  = 1 —> No reference cams used
  = 0 —> Reference cams used

Position loop gain (Kv factor) P0200:8 P0031

The position loop gain (Kv factor) defines which following error is obtained at which axis traversing velocity.
The mathematical (proportional) equation is as follows:

$$\text{Kv factor} = \frac{\text{Velocity}}{\text{Following error}} = \frac{v \quad [1000]}{\Delta s \quad [\text{min}]} \qquad \frac{\frac{1\ \text{m}}{\text{min}}}{\text{mm (in)}} = \frac{1000}{\text{min}}$$

The K_v factor influences the following important characteristic quantities of the axis:

- Positioning accuracy and holding control
- Uniformity of the motion
- Positioning time

The better the axis design (high degree of stiffness), then the higher is the achievable K_v- factor, and therefore the better the axis parameters from the technological perspective (lower following error).

Note

The stable position loop gain which can actually be set for the complete position control loop is influenced by time constants as well as backlash (play) and spring elements in the control loop.

The required Kv factor is entered in P0200:8.
The actual (measured) Kv factor is displayed in P0031.

Table 6-20 Parameters for the position loop gain

No.	Name	Min.	Standard	Max.	Units	Effective
0200:8	Kv factor (position loop gain)	0.0	1.0	300.0	1 000/min	Immediately
	The Kv factor defines at which traversing velocity of the axis which following error is obtained. Low Kv factor: Slow response to setpoint-actual value difference Δs is high High Kv factor: Fast response to setpoint-actual value difference Δs is low Examples: Kv factor / Significance = 0.5 — at v = 1 m/min an Δs of 2 mm = 1 is obtained — at v = 1 m/min an Δs of 1 mm = 2 is obtained — at v = 1 m/min an Δs of 0.5 mm is obtained **Note:** The following parameters are available for position loop gain diagnostics: • P0029 (following error) • P0030 (system deviation, position controller input) • P0031 (actual Kv factor (position loop gain)) Refer under the index entry ”Diagnostics of the motion status”					

Speed pre-control
P0203
P0204:8
P0205:8
P0206:8

For speed pre-control, in addition a speed/velocity setpoint can be directly entered at the speed controller input. This additional setpoint can be weighed with a factor.

The speed pre-control improves the control characteristics of the position control loop in so much that for a constant velocity, the following error is almost completely reduced, i.e. to almost zero.

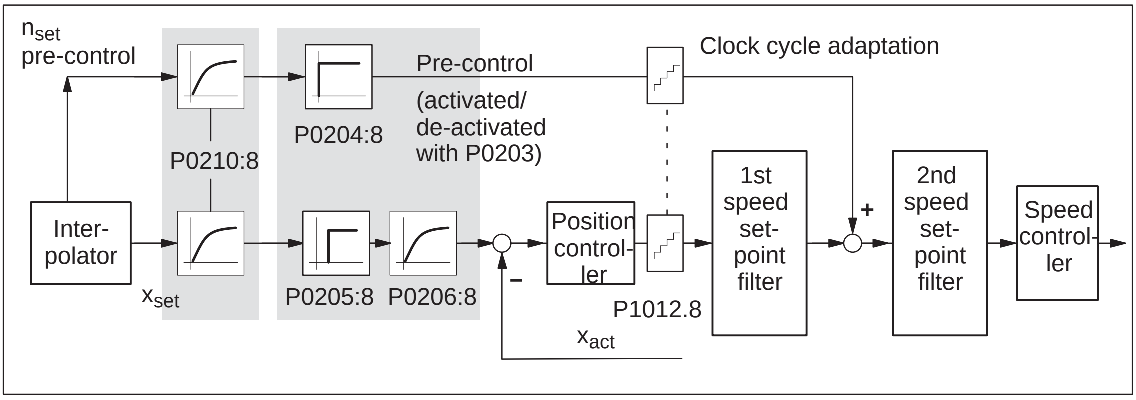

Fig. 6-14 Speed pre-control

Setting the speed pre-control

The following prerequisites must be fulfilled to set the speed pre-control:

- The current, speed and position control loop must be optimized.

After that, the speed pre-control can be set as follows:

1. Set P0203 = 1 —> this activates speed pre-control
2. Set P0204:8 to 100 % (this is the standard value)
3. P0206:8 = Set the approximate value from the sum of P1502:8 (time constant, speed setpoint filter 1) and P1503:8 (time constant, speed setpoint filter 2)
4. P0205:8 = determine the value
   Setting goal is: Positioning without undershoot or overshoot

   Recommendation:
   Traverse the axis using the traversing blocks, and evaluate positioning by plotting the position actual value using the trace function (refer to Chapter 7.3.2).

   With the trace function, the approach characteristics of the axis can be zoomed-in using the appropriate scaling and then evaluated.

Table 6-21 Parameters for speed pre-control

No.	Name	Min.	Standard	Max.	Units	Effective
0203	Speed pre-control mode	0	0	1	–	Immedi-ately
	... the speed pre-control can be activated/de-activated. 1 Speed pre-control active 0 Pre-control not active					
0204:8	Factor, speed pre-control	1.0	100.0	100.0	%	Immedi-ately
	... the supplementary speed setpoint which was entered is weighted. When the axis control loop has been optimally set as well as a precisely determined equivalent time constant of the speed control loop (P0205, P0206), the pre-control factor has the value 100%.					
0205:8	Balancing filter, speed pre-control (dead time)	0.0	0.0	10.0	ms	Immedi-ately
	... allows the performance of the speed control loop to be simulated with a dead time. **Note:** The entered value is limited to two position controller clock cycles (P1009) (1 position controller clock cycle is, as standard = 1 ms, refer to Chapter 4.5).					
0206:8	Balancing filter, speed pre-control (PT1)	0.0	0.0	100.0	ms	Immedi-ately
	... allows, in addition to P0205:8 the performance of the speed control loop to be simulated using a PT_1- filter (low-pass filter). ... allows a possibly active speed setpoint smoothing to be better emulated (PT1).					
0210:8	Time constant, position reference value filter	0.0	0.0	1 000.0	ms	Immedi-ately
	... is the time constant of the PT1 position reference value filter. The effective Kv factor is reduced using the filter (position loop gain). **Applications:** • To reduce the pre-control dynamic performance Example: Kv factor = 3 * 1000/min —> P0210:8 = 20.0 ms • Jerk limiting This makes it possible to achieve smoother control characteristics with improved response to disturbances.					
1012.8	Average value filter, speed setpoint	–	–	–	Hex	Immedi-ately
	... selects whether the speed setpoint steps from the position controller output (position controller clock cycle) are interpolated in the speed controller clock cycle (adapted). 1 signal Average value filter, speed setpoint on (standard) Disadvantage: Delay in the position control loop by half a position controller clock cycle. 0 signal Average value filter, speed setpoint out					

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Direction adaptation P0231 P0232

The position actual value and the position reference value can be adapted using these parameters.

The direction adaptation should be made as follows:

1. The position control sense is not correct?

   Effect:
   A fault is immediately signaled when moving the axis (e.g.: 131 (following error too high) or 135 (standstill monitoring has responded).

   Remedy:
   Invert the position actual value in P0231; POWER ON and check the control sense.

2. The direction of motion is not correct?

   Effect:
   The axis does not move in the required direction.

   Remedy:
   Invert the position reference value in P0232; POWER ON, and check the direction of motion.

Table 6-22 Parameters for direction adaptation

No.	Name	Min.	Standard	Max.	Units	Effective
0231	Position actual value inversion	0	0	1	–	PO
	... the control sense of the position controller is established. = 1 Position actual value inversion = 0 No position actual value inversion **Note:** If the control sense of the position controller is not correct, then the position actual value must be inverted. The direction of motion is set using P0232.					
0232	Position reference value inversion	0	0	1	–	PO
	... the required motion direction is selected. = 1 Position reference value inversion Positive motor speed —> the position is decreased (negative position count direction) = 0 No position reference value inversion Positive motor speed —> the position is increased (positive position count direction) **Note:** The position controller control sense is not influenced, i.e. it is internally taken into consideration.					

Dynamic following error monitoring

When traversing an axis, a difference is obtained between the position reference value and position actual value, dependent on the following quantities (following error):

- The instantaneous traversing velocity
- The stabilizing characteristics of the position control loop, i.e. of the selected position control loop gain (Kv factor, P0200:8)

Fluctuations of the following error for a traversing axis signify inaccurate positioning.
In order to be able to check these fluctuations, the following error monitoring must be appropriately set.

Mode of operation

The dynamic following error monitoring is activated/de-activated with P0318:8, and is based on the continuous comparison between the measured and a calculated position actual value.

To calculate the following error, a model is used, which simulates the dynamic performance of the position control loop.

A tolerance bandwidth (P0318:8) for the maximum following error deviation is permitted so that the monitoring does not respond incorrectly as a result of slight speed fluctuations (caused by load changes or by a control loop model error).

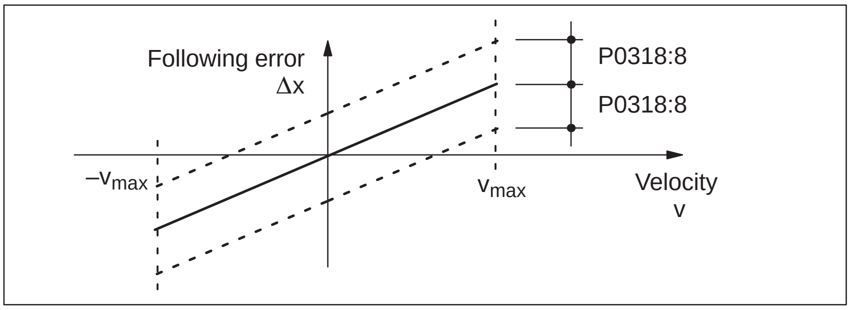


Fig. 6-15 Following error

Fault

When the monitoring function responds, the drive is braked down to standstill with the deceleration set in P0104 (max. deceleration) and fault 131 (following error too high) is output.
A changeover is made into the tracking mode.

Table 6-23 Parameters for the dynamic following error monitoring

No.	Name	Min.	Standard	Max.	Units	Effective
0318:8	Dynamic following error monitoring tolerance	0	1 000	200 000 000	MSR	Immedi-ately
	The parameter defines the maximum deviation between the measured and the calculated position actual value before an error is signaled. The tolerance bandwidth is intended to prevent the dynamic following error monitoring incorrectly responding caused by slight speed fluctuations resulting from operational control sequences (e.g. load surges). 0 Dynamic following error monitoring is de-activated 1 to max. value The following error monitoring is active with this value					

Standstill monitoring

Using the standstill monitoring function, it can be detected when the axis leaves the target position (under load, for hanging axes, etc.).

Mode of operation

The standstill monitoring time (P0325) is started after a motion block has been completed (position reference value = target reference value). After the delay time has expired, it is cyclically monitored as to whether the position actual value remains within the defined standstill window (P0326).

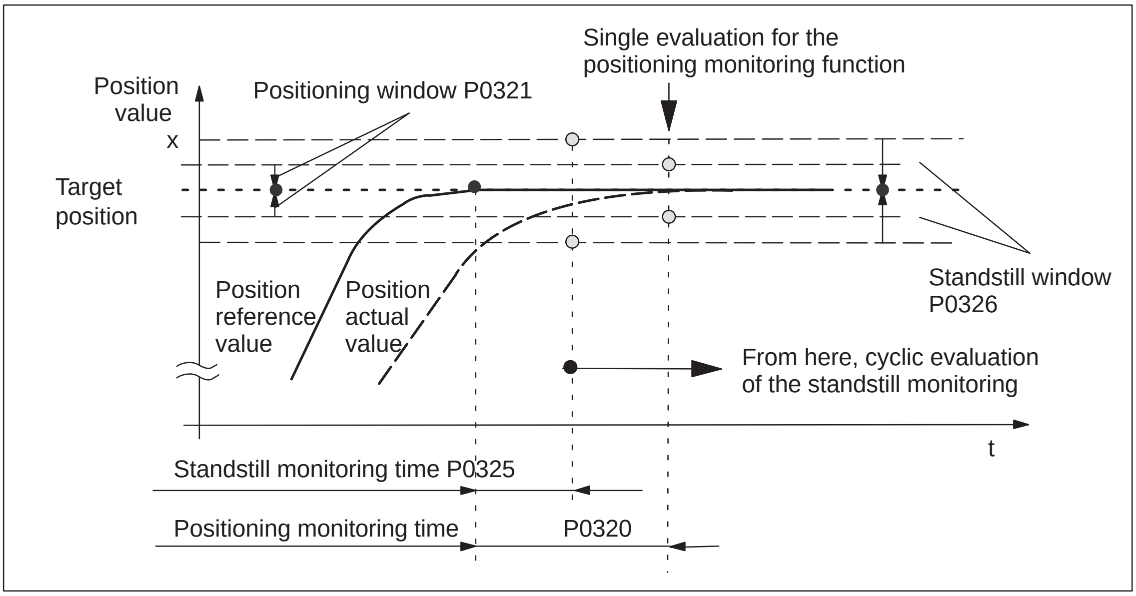


Fig. 6-16 Standstill and positioning monitoring

Fault

When the standstill monitoring function responds, the drive is braked down to standstill with the deceleration level set in P0104 (maximum deceleration) and fault 135 (standstill monitoring) is signaled.
A changeover is made into the tracking mode.

Switching-off

The standstill monitoring function is disabled, if

- a new traversing block is started
- tracking mode is selected
- the standstill window has the value zero (P0326 = 0)

Table 6-24 Parameters for the standstill monitoring function

No.	Name	Min.	Standard	Max.	Units	Effective
0325	Standstill monitoring time	0	400	100 000	ms	Immedi-ately
	This parameter defines the time after which, when approaching the position, the following error must be within the standstill window (P0326). **Note:** • The standstill monitoring time is rounded-off in the drive to an integer multiple of the position controller clock cycle (P1009). • If a larger value is entered in P0325 than in P0320, this is limited internally in the drive to P0320.					
0326	Standstill window	0	200	20 000	MSR	Immedi-ately
	This parameter defines the standstill window, within which the position actual value must be located after the standstill monitoring time has expired (P0325). 0 Standstill monitoring is de-activated 1 to max. value Standstill monitoring is active with this value					

Standstill and positioning monitoring

There are the following differences between the standstill and positioning monitoring:

- Standstill monitoring

  After the standstill monitoring time has expired, the system **cyclically** checks whether the axis remains within the standstill window around the target position.

  Objective: Continually checks that the position is maintained

- Positioning monitoring

  For this monitoring function, after the positioning monitoring time has expired, it is checked **once** whether the actual position lies within the positioning window around the target position.

  Objective: Single check as to whether the position has been reached with sufficient accuracy

---

Note

The following is valid when setting the standstill and positioning monitoring:

- Standstill monitoring time $\leq$ positioning monitoring time (P0325 $\leq$ P0320)
- Standstill window $\geq$ positioning window (P0326 $\geq$ P0321)

Positioning monitoring

The positioning monitoring can be used to identify when the target position is precisely approached.

Mode of operation

In order to ensure that an axis is positioned within a specific time, after a motion block has been completed (partial position reference value = 0, ≙ time t_1 in Fig. 6-17) the positioning monitoring time (P0320) is started.
After this time has expired, it is checked once as to whether the position actual value lies within the positioning window (P0321).

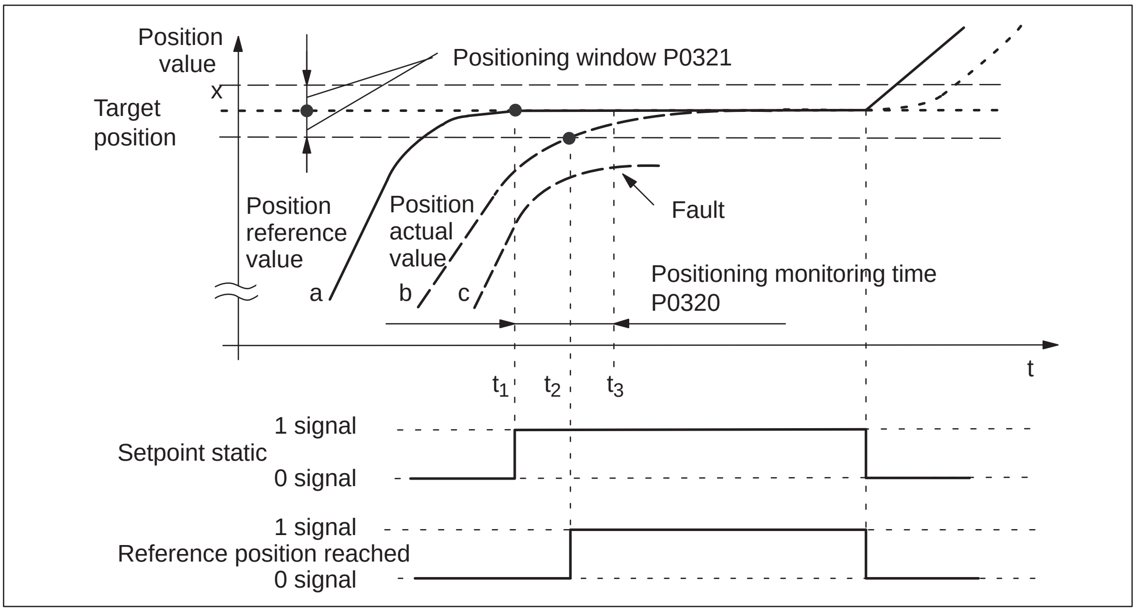


Fig. 6-17 Positioning monitoring

Table 6-25 Explanation of curves a, b and c

Curve	Description
a	After the target position has been reached in t_1 the interpolator starts the positioning monitoring time.
b	From time t_2 the position actual value is within the positioning window. Positioning is considered as having been completed.
c	After the positioning monitoring time has expired in t_3, the position actual value lies outside the positioning window. This results in an error.

Output signals

The following output signals are available
(description, refer under the index entry ”Output signal...”):

- Output signal, ”setpoint static”
- Output signal, ”reference position reached”

Fault

When the monitoring function responds, the drive is shutdown and fault 134 is issued (positioning monitoring). A changeover is made into the tracking mode.

Table 6-26 Parameters for the positioning monitoring function

No.	Name	Min.	Standard	Max.	Units	Effective
0320	Positioning monitoring time	0	1 000	100 000	ms	Immedi-ately
	This parameter defines the time when approaching the position, after which the following error must be within positioning window (P0321). **Note:** The following applies when setting the positioning and standstill monitoring: Positioning monitoring time (P0320) $\geq$ Standstill monitoring time (P0325)					
0321	Positioning window	0	40	20 000	MSR	Immedi-ately
	This parameter defines the positioning window within which the position actual value must be located after the positioning monitoring time has expired (P0320). 0 Positioning monitoring is de-activated 1 to max. value Positioning monitoring is active with this value **Note:** • The following applies when setting the positioning and standstill monitoring: Positioning window (P0321) $\leq$ Standstill window (P0326) • The following is valid if the specified positioning window is not reached: – The motion block has not been completed – It is not possible to traverse the axis any further – After the time in P0320 has expired, fault 134 is issued (positioning monitoring) • The size of the positioning window influences the block change time. The lower that this tolerance is selected, then the longer positioning takes. It also takes that much longer until the next traversing block can be executed.					

Tracking mode

If an axis is in the tracking mode, then the control is disabled and its position reference value tracks the actual position actual value.

The actual position of the axis is still being sensed – this means that it is not necessary to re-home (re-reference) the axis when the tracking mode (correcting mode) is cancelled.

Selection, signals

In the tracking mode, there are various selection possibilities and signals:

- The tracking mode is selected, if
  - The controller enable (e.g. control signal ON/OFF1) is withdrawn and
    the input signal ”tracking mode” is set to ”1”
  - Jogging operation (jogging 1, 2) is active (when jogging via the velocity, not for incremental jogging)
  - When a fault condition develops, automatically by POSMO SI/CD/CA
    (only for a STOP 0, I or II stop response)
- In all cases, the checkback signal is realized using the output signal ”tracking mode active”.

Activation

The ”tracking mode” input signal is only relevant, if the controller enable (control signal ON/OFF1) of the drive is withdrawn, or if the controller is re-enabled.

- Tracking mode = 1 (so-called tracking)

  When the axis-specific controller enable is withdrawn, the position reference value of the associated axis continuously tracks the actual position. In this status, the ”tracking mode active” output signal = ”1”.

  If the controller is re-enabled, all additional axis movements start at the actual position which may have changed.
- Tracking mode = 0 (stopping)

  No tracking mode is activated when the controller enable is withdrawn and the following error, positioning and standstill monitoring are disabled. This means that the old position reference value is kept. If the axis is pushed out of its position, a following error occurs between the position reference value and the position actual value, which is compensated when the controller enable is set. In this status, the ”tracking mode active” output signal = ”0”. However, when the monitoring function is enabled, tracking mode is activated and the position reference value follows the position actual value.

  All additional axis movements start at the reference position, which was available before the controller enable was withdrawn.

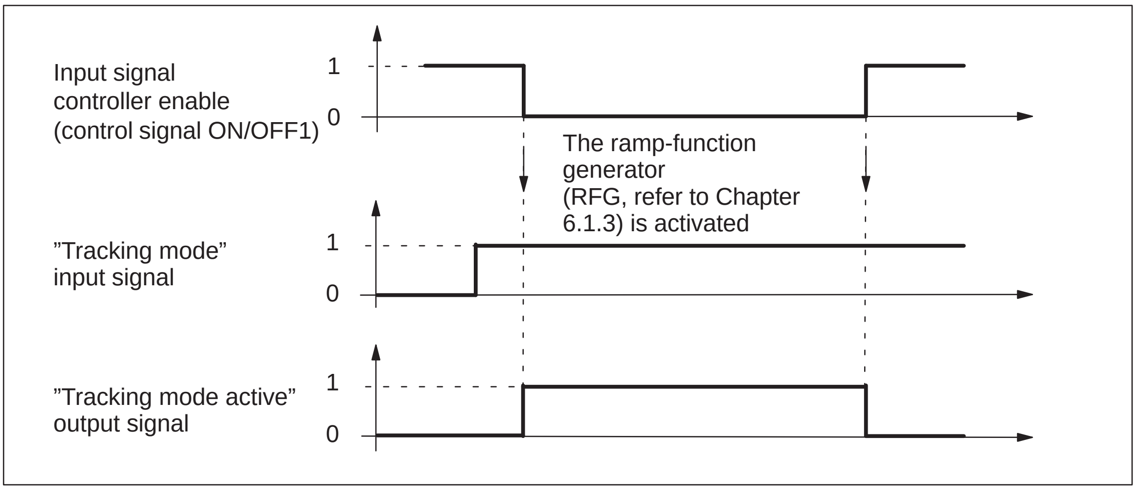


Fig. 6-18 Characteristics (time) in the tracking mode

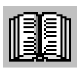
Note

If the tracking mode is active and the input signal ”tracking mode” is set, then the dynamic following error monitoring, the positioning monitoring and the standstill monitoring are not effective.

Diagnostics: Motion status of the axis

The following parameters provide information about the actual motion status of an axis:

- P0020 Position reference value
- P0021 Position actual value
- P0022 Distance to go
- P0023 Velocity setpoint
- P0024 Velocity actual value
- P0025 Effective override
- P0026 Position actual value, block change
- P0029 Following error
- P0030 System deviation, position controller input
- P0031 Actual Kv factor (position loop gain)



Reader’s note

The parameters are displayed and described in the parameter list is Chapter A.1.

6.2.4 Referencing, adjusting

Definitions

In order that the POSMO SI/CD/CA drive precisely knows the machine zero after the system has been powered up, the axis measuring system must be synchronized to the machine.

This synchronization is realized when referencing incremental measuring systems or adjusting absolute measuring systems.

Notice

The following functions are ineffective for axes which are either not referenced not adjusted:

- Software limit switches
- Backlash compensation
- Start the traversing blocks

6.2.5 Referencing for incremental measuring systems

General information

For axes with incremental measuring systems, each time the system is powered-up, the position reference to the machine zero point must be established.

Synchronization is realized at reference point approach by accepting a specific position value at a known point of the axis.

Note

- Before SW 4.1:

  The encoder must be re-referenced if, for a referenced incremental measuring system, a parameter set was changed over.

- From SW 4.1:

  Using P0239, the behavior for a parameter set changeover can be set for a motor measuring system.

  P0239 = 0: Behavior as before SW 4.1 (standard)

  P0239 = 1: For a parameter set changeover, it is only necessary to re-reference the encoder, if the ratio P0237/P0238 has changed.

Starting the reference point approach

The reference point approach can be started in the ”positioning” mode via the ”start referencing” input signal.

The signal can be entered via an input terminal or via PROFIBUS-DP, and must remain set until the end of the reference point approach travel via the ”reference point set” output signal.

If the ”start referencing” signal is reset during referencing, then referencing is exited and the drive stops.

The approach direction for reference point approach is defined using P0166.

Axis with reference cams (P0173 = 0)

Axes, which have several zero marks over their complete traversing range (e.g. incremental, rotary measuring system), require a reference cam to select the ”correct” zero mark when referencing.

The reference point approach for these axes is executed in 3 phases:

Phase 1: Traverse to the reference cams

When starting the reference point approach, the following statuses are available:

- Axis is located in front of the reference cam
  After the reference point approach is started, the axis moves with the reference point approach velocity (P0163) in the direction specified by P0166.
  The drive detects the reference cam using the input signal ”reference cam” and for a ”1” signal brakes down to standstill.
  It continues with the ”synchronization with the zero pulse”.

Note

The maximum possible travel from the starting position to the reference cam can be monitored using P0170 (max. travel to the reference cam).

The override influences the reference point approach velocity.

- The axis is located at the reference cam
  After the reference point approach has started, it is considered as having been completed with ”travel to the reference cam”.
  It continues with the ”synchronization with the zero pulse”.

Phase 2: Synchronization using the zero pulse

The axis traverses with the reference point shutdown velocity (P0164) in the opposite direction to that specified in P0166.
After the reference cam has been left (input signal, ”reference cam” = ”0” signal), the axis synchronizes with the first zero pulse. The axis brakes down to standstill.
The system continues with ”traverse to reference point”.

Note

The maximum permissible travel from the reference cams to the zero pulse can be monitored using P0171 (max. distance between the reference cam/zero pulse).

The override is not effective.

Phase 3:
Traversing to the reference point

The axis traverses with the reference point approach velocity (P0165), the reference point offset (P0162) in a positive or negative direction referred to the zero pulse.
The following is achieved when the axis reaches the reference point:

- The reference point coordinate (P0160) is transferred as the new reference position.
- The ”reference point set” output signal is set to a ”1” signal.
- From SW 8.3 onwards, the reference point approach can be terminated after the zero mark has been detected, refer to Table 6-29 (P0160 = 1).

Note

If the reference point offset is less than the braking travel of the axis from the reference point shutdown velocity to standstill, then the reference point is approached from the other direction.

The override is not effective.

Mounting a reference cam

The reference cam signal must be connected to an input terminal with function No. 78 (reference cam).
The signal characteristics of the reference cam (NO/NC behavior) must be adapted via P0167.

Table 6-27 Adapting the reference cam signal

If	then, when approaching/exiting the reference cam	P0167
NO contact	a 0/1 edge or 1/0 edge —>	P0167 = 0 (no inversion) (standard)
NC contact	a 1/0 edge or 0/1 edge —>	P0167 = 1 (inversion)

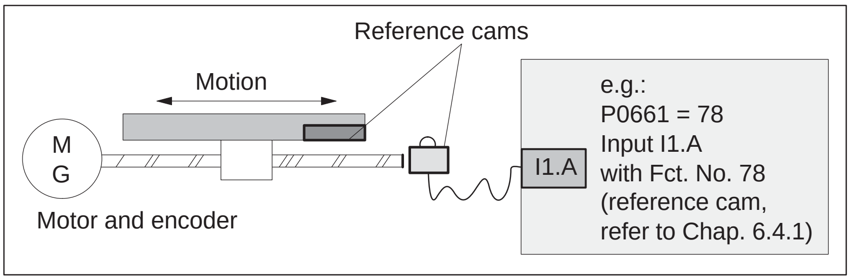


Fig. 6-19 Mounting a reference cam

Adjusting the reference cam

The following factors influence how the drive identifies the reference cam from a time perspective:

- Accuracy or time delay when detecting a reference cam
- Delay at the input, position controller clock cycle, interpolation clock cycle, ...

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Warning

If the reference cam is not adjusted, so that at each reference point approach, the same zero pulse is recognized for synchronization, then an ”incorrect” machine zero point is obtained.

Recommendation:
Experience has shown that it is best to adjust the reference cam edge, required for synchronization, at the center between two zero pulses.

Example when adjusting the reference cam

After the reference point approach, the distance between the reference cams and the zero pulse can be read in P0172.
This means that when the distance between 2 zero pulses is known, the reference cam offset travel can be calculated.

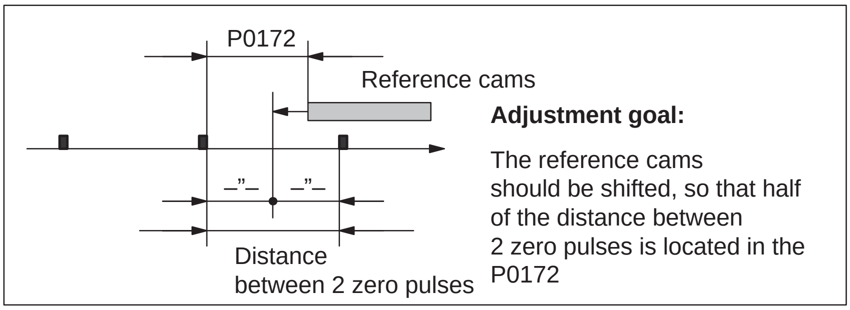


Fig. 6-20 Adjusting the reference cam

What is the minimum length of a reference cam?

The reference cam must be long enough, so that when the cam is approached with the reference point approach velocity, the braking travel ends right at the cam (the axis comes to a standstill at the cam), and the cam is exited with the reference point shutdown velocity.

The minimum length of the reference cam is calculated as follows:

$$\text{Min. length} = \frac{(\text{reference point approach velocity})^2}{2 \bullet \text{deceleration}} = \frac{\text{P0163}^2}{2 \bullet \text{P0104}}$$

Note:

This only applies if the jerk limiting is not active (P0107 = 0), otherwise longer.

Table 6-28 Reference cam up to the end of the traversing range?

If...,	Then ...
the cam extends up to the end of the traversing range, **Recommendation**	the reference point approach can be started from every point of the axis. **Reason:** There are 2 conditions in this case (in front of and actually at the cam). When starting the reference point approach, the axis behaves correspondingly and correctly traverses for the reference point approach.
the reference cam does not extend up to the end of the traversing range,	The axis must be traversed into the range, determined at start-up, before the reference point approach is started. **Reason:** In this case, there are 3 initial conditions (in front of, at or behind the cam). The drive cannot differentiate between in front of and behind the cam, and for the reference point approach, for a specific initial condition it does not reach the reference cam.

Axis without reference cams (P0173 = 1)

Axes, which only have one zero mark over their complete traversing range (e.g. rotary axes), do not require any reference cams when referencing.

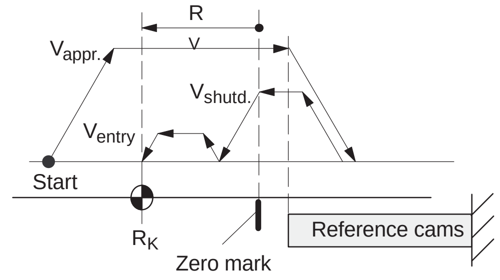
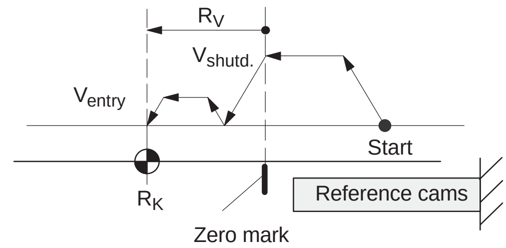
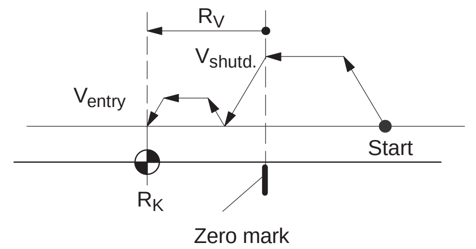
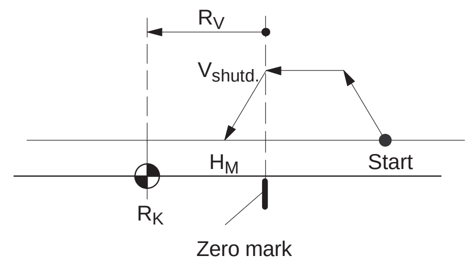
A reference point approach for these axes is executed as follows:

1. Synchronization with the zero pulse (phase 2, refer to "axis with reference cams" (P0173 = 0)"
2. Travel to the reference point (phase 3, refer to "axis with reference cam (P0173 = 0)"

Motion sequence when referencing

The referencing motion is shown in the following table as a function of the reference cams.

Table 6-29 Referencing sequence

With/without Reference cams	In front of/at Reference cams	Motion sequence
Axis **with** reference cams (P0173 = 0)	Axis is **in front of** the reference cam	
	Axis is **at** the reference cam	
Axis **with** reference cams (P0173 = 1)	Axis traverses up to the reference point (P0161 = 0)	
	Axis traverses up to after the zero mark (P0161 = 1)[1] (from SW 8.3)	

Abbreviations:

$V_{appr.}$ P0163 (reference point approach velocity)
$V_{shutd.}$ P0164 (reference point shutdown velocity)
V_{entry} P0165 (reference point entry velocity)
R_V P0162 (reference point offset)
R_K P0160 (reference point coordinate)
H_M P0161 (stop at marks)

1) When referencing (homing), the act. position is not displayed in SimoCom U.

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6.2.6 Referencing with a distance-coded measuring system (from SW 8.3)

General information

In the case of measurement systems with distancecoded reference marks, it is not necessary to evaluate a reference cam or approach a defined reference point in order to reference the machine axis.

Measuring systems of this type consist of a line grid and a reference mark track running parallel to this. The distance between two consecutive reference marks is defined variably, so that the absolute position of the machine axis can be determined from the distance.

For axes with incremental measuring systems, each time the system is powered-up, the position reference to the machine zero point must be established.

Synchronization is realized at reference point approach by accepting a specific position value at a known point of the axis.

Note

The distance between the zero marks is continually monitored.

Only encoders are monitored whose pulse number can be divide by either 16 or 10!

Starting the reference point approach

The reference point approach can be started in the ”positioning” mode via the ”start referencing” input signal.

The input signal is entered using an input terminal with function number 65, and must remain set until the end of the reference point approach is signaled using the output signal ”reference point set” (function number 61).

If the ”start referencing” signal is reset during referencing, then referencing is exited and the drive stops.

During the reference point approach (homing), at least two reference marks (zero marks) are passed. The reference point approach (homing) is completed when these zero marks have been passed and the drive has been braked.

The approach direction for reference point approach is defined using P0166.

The reference point approach (homing) is executed in 2 phases (refer to Table 6-30):

Phase 1: Synchronizing using two zero pulses

The axis traverses with the reference point shutdown velocity (P0164) in the direction specified in P0166.

The system is synchronized when passing two zero pulses (position of two zero marks). The axis brakes down to standstill after the second zero pulse.

The system continues with ”traverse to reference point”.

Note

The maximum permissible distance from the start up to the second zero pulse is monitored using P0171 (max. distance between the reference cams or start/zero pulse). For distance-coded measuring systems, it is practical to set the basic distance.

The override is not effective.

Phase 2: Traversing to the reference point (home position)

The axis traverses with the reference point approach velocity (P0165), the reference point offset (P0162) in a positive or negative direction referred to the zero pulse of the encoder.

The following is achieved when the axis reaches the reference point:

- The reference point coordinate (P0160) is transferred as the new reference position.
- The ”reference point set” output signal is set to a ”1” signal.

Note

If, after the second zero point, a reference point approach is not required (P0161 = 1), then the absolute position of the current position is calculated and accepted in the drive.

The ”reference point set” output signal is then set to a ”1”. Parameter P0162 and P0160 act the same as for a reference point approach with one zero mark. The reference point offset does not refer to the zero mark passed, but to the encoder zero.

Parameter change for a new commissioning

For a machine with distance-coded reference marks, there is no requirement to reference using cams.

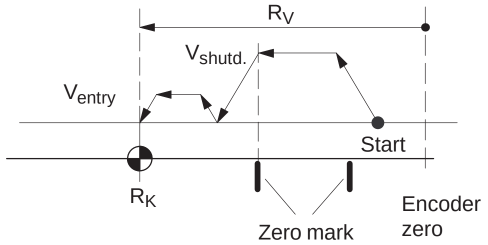
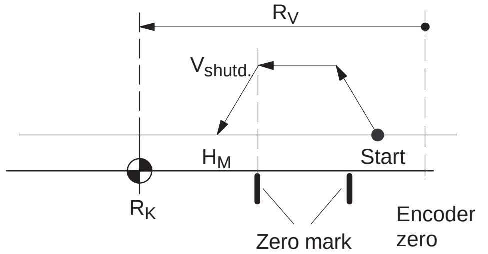
Standard setting when referencing with distance-coded measuring systems:

--> P0173 = 1: ”Referencing without cams”

Motion sequence when referencing

The referencing motion is shown in the following table as a function of the zero marks.

Table 6-30 Sequence when referencing with distance-coded measuring systems

With/without	In front of/at	Motion sequence
Reference cams		
Axis **with** reference cams (P0173 = 1)	Axis traverses up to the reference point (P0161 = 0)[1)]	
	Axis traverses up to after the zero mark (P0161 = 1)[1)] (from SW 8.3)	

Abbreviations:

$V_{shutd.}$	P0164 (reference point shutdown velocity)
V_{entry}	P0165 (reference point entry velocity)
R_V	P0162 (reference point offset)
R_K	P0160 (reference point coordinate)
H_M	P0161 (stop at marks)

1) When referencing (homing), the act. abs. pos. is not displayed in SimoCom U.

Input/output signals (refer to Chapter 6.4)

The following signals are used for the function ”referencing with distance-coded measuring system:

- Input signals
  (refer under the index entry, ”Input signal, digital – ...)
  - Input signal ”Start referencing/cancel referencing”
    —> using an input terminal with function number 65
- Output signal
  (refer under the index entry ”Output signal, digital – ...)
  - Output signal, ”Reference point set/no reference point set”
    —> using an output terminal with function number 61

Parameter overview (refer to Chapter 6.2.8 and A.1)

The following parameters are used for referencing with distance-coded measuring systems:

- P0161 Stopping at marks (from SW 8.3)
- P0173 Reference point approach (homing) without reference cams
- P1027 IM configuration, encoder
- P1037 DM configuration, encoder
- P1050 IM reference mark distance for distance-coded scales
- P1051 IM reference mark distance for distance-coded rotary encoders
- P1052 DM reference mark distance for distance-coded scales
- P1053 DM reference mark distance for distance-coded rotary encoders
- P1054 IM difference for distance-coded rotary encoders (from SW 8.3)
- P1055 DM difference for distance-coded rotary encoders (from SW 8.3)

6.2.7 Adjusting absolute measuring systems

General information

Axes with absolute value encoders automatically obtain their reference position without any axis motion after power-on.

Prerequisites:

- There is an absolute value encoder (single-turn/multi-turn absolute value encoder) (P0175 = 0)
- The absolute value encoder is considered to have been adjusted (P0175 = 3 for indirect measuring systems; P0175 = 4 for direct measuring systems)

Adjusting the absolute value encoder

An absolute value encoder is adjusted once when commissioning the axis
or
after the mechanical coupling between the measuring system and mechanical system has been opened, e.g. after:

- Replacing the measuring system and/or motor
- Changing the gearbox ratio (when changing the gearbox factors)
- Selection, ”parking axis” (if another EnDat encoder was connected)

Note

- POSMO SI/CD/CA can only recognize if the mechanical coupling between the measuring system and mechanical system is opened when it has been powered-up.
- When a parameter set is changed-over in operation (e.g. a gear ratio is changed), the ”not adjusted” information is lost at power-down if ”save to Feprom” is not explicitly initiated.

- Before SW 4.1:

  If a parameter set changeover was carried out with an adjusted absolute encoder for a particular motor measuring system, then the encoder must be re-adjusted.
- From SW 4.1:

  Using P0239, the behavior for a parameter set changeover can be set for a motor measuring system.

  P0239 = 0: Behavior as before SW 4.1 (standard)

  P0239 = 1: For a parameter set changeover, it is only necessary to adjust the encoder if the mechanical ratio of P0237/P0238 has been changed.

Procedure when adjusting an absolute value encoder

The following sequence is practical when adjusting absolute value encoders:

1. Traverse the axis to a known or measured position (this is the required actual value).
   The axis can be traversed, e.g. using ”Jogging 1” or ”Jogging 2”.
2. Set P0160 to ”required actual value”
3. Set P0175 = 1
   The POSMO SI/CD/CA drive determines the difference between the required actual value in P0160 and the encoder actual value and enters it into an internal parameter.
   If an error occurs, then P0175 is set to –1.
   If the operation was error-free, then P0175 is set to 3 or 4 (refer to Chapter 6.2.8) and the Fault 799 (save to FEPROM and carry-out HW-RESET) is signaled.
   – Save parameters in the FEPROM (P0652 = 1)
   – Carry-out a HW-RESET.
4. Check: Is the actual value correctly displayed after power-on?

Procedure when adjusting an absolute value encoder using SimoCom U

The absolute value encoder is adjusted, supported by the operator. The following sequence is practical:

1. Establish online operation between SimoCom U and the drive
2. Traverse the axis to a known or measured position (this is the required actual value).
   The axis can be traversed, e.g. using ”Jogging 1” or ”Jogging 2”.
3. Select the ”referencing” dialog box
   – Enter the ”required actual value” into the appropriate field.
   – Press the ”set absolute value” button
     The POSMO SI/CD/CA drive determines the difference between the required actual value in P0160 and the encoder actual value and enters it into an internal parameter.
     If this operation is error-free, fault 799 is then signaled (save to FEPROM and carry-out HW-RESET) and the operator is prompted to:

     Save parameters by carrying out a ”save to FEPROM”

     and

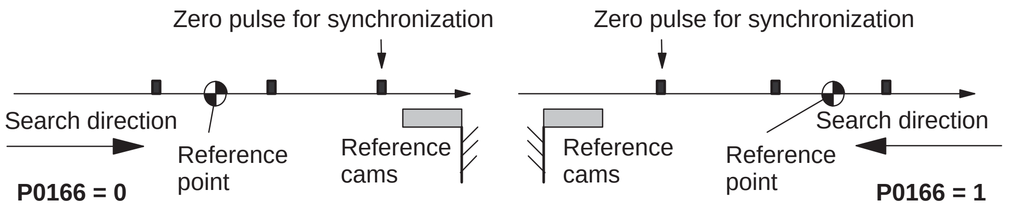
     Carry-out a ”HW-RESET”.
4. Check: Is the actual value correctly displayed after power-on?

6.2.8 Parameter overview when referencing/adjusting

Table 6-31 Parameter overview when referencing/adjusting

Parameter						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0160	Reference point coordinate	–200 000 000	0	200 000 000	MSR	Immediately
	The parameter defines the position value which is set, as actual axis position, after referencing or adjusting. • Incremental measuring system After the reference point has been reached, the drive accepts the position value in this parameter as the current axis position. • Absolute encoder When adjusting the encoder, the position value in this parameter is set as the actual axis position. The difference to the actual encoder actual value is entered into P0162.					
0161	Stopping at marks (from SW 8.3, being prepared)	0	0	1	–	Immediately
	...defines the behavior when stopping at marks. 0 Reference point approach (homing) is not interrupted at marks (standard) 1 Reference point approach (homing) remains stationary, if the first zero mark, or for distance-coded measuring systems, the second zero mark was found.					
0162	Reference point offset	–200 000 000	–2 000	200 000 000	MSR	PrgE
	Incremental measuring system After the reference zero pulse has been identified, the axis is moved through this distance. The axis has reached the reference point of this position, and accepts the reference point coordinate (P0160) as new actual value.					
0163	Reference point approach velocity	1 000	5 000 000	2 000 000 000	c*MSR/min	PrgE
	The axis moves with this velocity towards the reference cam after the reference point approach has been started. The velocity must be set, so that after the reference cam has been reached, and braking, the following conditions must be fulfilled: • The axis must come to a standstill at the reference cam • It is not permissible that the hardware limit switch is reached when braking					
0164	Reference point shutdown velocity	1 000	300 000	2 000 000 000	c*MSR/min	PrgE
	The axis moves with this velocity between identifying the reference cam and synchronizing with the first zero pulse (reference zero pulse).					
0165	Reference point entry velocity	1 000	300 000	2 000 000 000	c*MSR/min	PrgE
	The axis traverses with this velocity between synchronizing with the first zero pulse (reference zero pulse) and reaching the reference point.					

Table 6-31 Parameter overview when referencing/adjusting, continued

<table>
<tr><th colspan="7">Parameter</th></tr>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0166</td><td>Reference cam approach direction</td><td>0</td><td>0</td><td>1</td><td>–</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">This parameter defines the approach direction/search direction of the reference cam.
At power-on, the axis can be located in front of or at the reference cam.
• Assumption: The axis is located in front of the reference cam.
When starting reference point approach, the reference cam is searched for in the direction specified in this parameter.
• Assumption: The axis is located at the reference cam
When starting the reference point approach, the reference cam is already known. The axis now moves away from the reference cam in the direction opposite to that entered in this parameter and continues the reference point approach.
1 The reference cam is in the negative direction
0 The reference cam is in the positive direction


Note:
For an axis without reference cam (P0173 = 1), referencing is started with phase 2 (synchronizing with the zero reference pulse).
The approach direction when searching for the zero pulse is defined using P0166.</td></tr>
<tr><td>0167</td><td>Inverting reference cams</td><td>0</td><td>0</td><td>1</td><td>–</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">... the switching characteristics of the reference cam signal, which is fed via the input terminal with function No. 78 (reference cam), is adapted to POSMO SI/CD/CA.
1 Inversion —> necessary for an NC contact
0 No inversion —> necessary for an NO contact, standard</td></tr>
<tr><td>0170</td><td>Max. distance to the reference cam</td><td>0</td><td>10 000 000</td><td>200 000 000</td><td>MSR</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... specifies the maximum distance the axis can traverse from starting the reference point approach in order to find the reference cams.
Note:
When a fault condition occurs, the axis remains stationary and fault 160 is signaled (reference cam not reached).</td></tr>
</table>

Table 6-31 Parameter overview when referencing/adjusting, continued

<table>
<tr><th colspan="7">Parameter</th></tr>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Ef-
fec-
tive</th></tr>
<tr><td>0171</td><td>Max. distance up to the zero pulse</td><td>0</td><td>20 000</td><td>200 000 000</td><td>MSR</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... specifies the maximum distance the axis can move when leaving the reference cam or from the start in order to find the zero pulse.
Note:
• If a fault condition occurs, the axis remains stationary and fault 162 is signaled (no reference zero pulse available).
• If P0171 is entered and it is insignificantly higher than P0172, a fault can occur due to a degree of uncertainty when determining the actual value travel.</td></tr>
<tr><td>0172</td><td>Distance up to the zero pulse</td><td>–</td><td>–</td><td>–</td><td>MSR</td><td>RO</td></tr>
<tr><td></td><td colspan="6">The travel between leaving the reference cam or from the start up to reaching the zero pulse is entered in this parameter.
Note:
• This parameter helps to adjust the reference cam during start-up.
• There is some uncertainty in the actual distance between the reference cam and reference zero pulse. This is caused by the switching behavior (timing) of the reference cam switch and the sampling of the reference cam switching signals in the interpolation clock cycle.
The measured distance in P0172 can therefore be different at each reference point approach.</td></tr>
<tr><td>0173</td><td>Reference point approach without reference cams</td><td>0</td><td>0</td><td>1</td><td>–</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... identifies the type of axes, which do not require reference cams for referencing. These are the following axes:
• Axes that have only one zero mark over the complete traversing range
• Rotary axes that only have one zero mark per revolution
1 No reference cam available
For these axes, the reference point approach starts with phase 2 (synchronization with the reference zero pulse).
The approach direction is defined using P0166 (reference cam approach direction).
0 Reference cams available
For these axes, the reference point approach starts with phase 1 (travel to the reference cams).</td></tr>
<tr><td>0174</td><td>Referencing mode - position measuring system</td><td>1</td><td>1</td><td>2</td><td>–</td><td>Im-
medi-
ately</td></tr>
<tr><td></td><td colspan="6">The parameter defines the referencing mode.
1 Incremental measuring system available
The zero pulse on the encoder track is evaluated.
2 There is an incremental measuring system with equivalent zero mark
Instead of the zero mark from the encoder, an ”equivalent zero mark” (e.g. a BERO pulse) is expected at the input terminal I0.A.
Note:
The equivalent zero mark is identified, depending on the direction
(refer under the index entry ”Input signal – equivalent zero mark”).</td></tr>
</table>

Table 6-31 Parameter overview when referencing/adjusting, continued

<table>
<tr><th colspan="7">Parameter</th></tr>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0175</td><td>Adjustment status - absolute position measuring system</td><td>0</td><td>0</td><td>4</td><td>–</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">... indicates the status when adjusting the absolute value encoder
–1 Error/fault occurred when adjusting the encoder
0 Absolute value encoder has not been adjusted. Pre-setting when commissioning the system for the first time.
1 Absolute value encoder has still not been adjusted. Adjustment has been initiated. If the adjustment is error-free, the parameter is either set to 3 or 4. If an error occurs when making the adjustment, then the parameter is set to –1.
2 Reserved
3 Absolute value encoder IM has been adjusted
4 Absolute value encoder DM has been adjusted
Note:
• If a valid adjustment becomes invalid, then P0175 is set from 3 or 4 to 0. This can be realized by manually changing the parameter or also from POSMO SI/CD/CA itself (e.g. for a parameter set changeover, as this indicates that the mechanical connection between the measuring system and mechanical system has been opened - i.e. gearbox changeover).
• If a series start-up is executed (copying the parameters from drive x to drive y), then the adjustment value is also reset due to the ”serial number motor measuring system” (P1025/P1026) (P0175 = 0).</td></tr>
<tr><td>0239</td><td>Re-referencing or re-adjustment only when required (SRM ARM) (from SW 4.1)</td><td>0</td><td>0</td><td>1</td><td>–</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">0 Referencing or adjustment is withdrawn when a parameter set is changed (standard)
1 Referencing or adjustment is only withdrawn when a parameter set is changed if the mechanical ratio (Ü = P0237:8/P0238:8) has changed.</td></tr>
<tr><td>1050</td><td>IM reference mark distance for distance-coded measuring scales (from SW 4.1)</td><td>0</td><td>20 000</td><td>4294967295</td><td>µm</td><td>PO</td></tr>
<tr><td></td><td colspan="6">...specifies the basic distance between two fixed reference marks. If the control detects that the distance between each two reference marks is different and therefore incorrect, then the axis remains stationary. Fault 508 (zero mark monitoring, motor measuring system) is signaled.
Note:
This monitoring is only activated if P1050/P1024*1000 can either be divided by 16 or by 10.</td></tr>
</table>

6

Table 6-31 Parameter overview when referencing/adjusting, continued

Parameter						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1051	IM reference mark distance for distance-coded rotary encoders (from SW 4.1)	0	20 000	4294967295	mdegrees	PO
	...specifies the basic distance between two fixed reference marks. If the control detects that the distance between each two reference marks is different and therefore incorrect, then the axis remains stationary. Fault 508 (zero mark monitoring, motor measuring system) is signaled. **Note:** This monitoring is only activated if P1051/1000*P1005/360 can either be divided by 16 or by 10.					
1052	DM reference mark distance for distance-coded measuring scales (from SW 4.1)	0	20 000	4294967295	µm	PO
	...specifies the basic distance between two fixed reference marks. If the control detects that the distance between each two reference marks is different and therefore incorrect, then the axis remains stationary. Fault 514 (zero mark monitoring, direct measuring system) is signaled. **Note:** This monitoring is only activated if P1052/P1034*1000 can either be divided by 16 or by 10.					
1053	DM reference mark distance for distance-coded rotary encoders (from SW 4.1)	0	20 000	4294967295	mdegrees	PO
	...specifies the basic distance between two fixed reference marks. If the control detects that the distance between each two reference marks is different and therefore incorrect, then the axis remains stationary. Fault 514 (zero mark monitoring, direct measuring system) is signaled. **Note:** This monitoring is only activated if P1053/1000*P1007/360 can either be divided by 16 or by 10.					
1054	IM difference for distance-coded rotary encoders (from SW 8.3, being prepared)	0 0	20 20	450 000 500 000	mdegrees µm	PO
	...specifies the differential distance between two reference marks for distance-coded encoders, indirect measuring system (motor measuring system).					
1055	DM difference for distance-coded rotary encoders (from SW 8.3, being prepared)	0 0	20 20	450 000 500 000	mdegrees µm	PO
	...specifies the differential distance between two zero marks for distance-coded encoders, direct measuring system.					

6.2.9 Jogging operation

Description

Closed-loop speed controlled traversing is made possible when jogging in the ”positioning” mode. Jogging is executed using the input signal ”Jogging 1, 2 ON” .

Changing over into the jogging mode

The jogging mode can be selected using the input signal ”jogging incremental” (refer to Fig. 6-21):

- Jogging via velocity (standard)
- Jogging via velocity and increments (from SW 4.1)

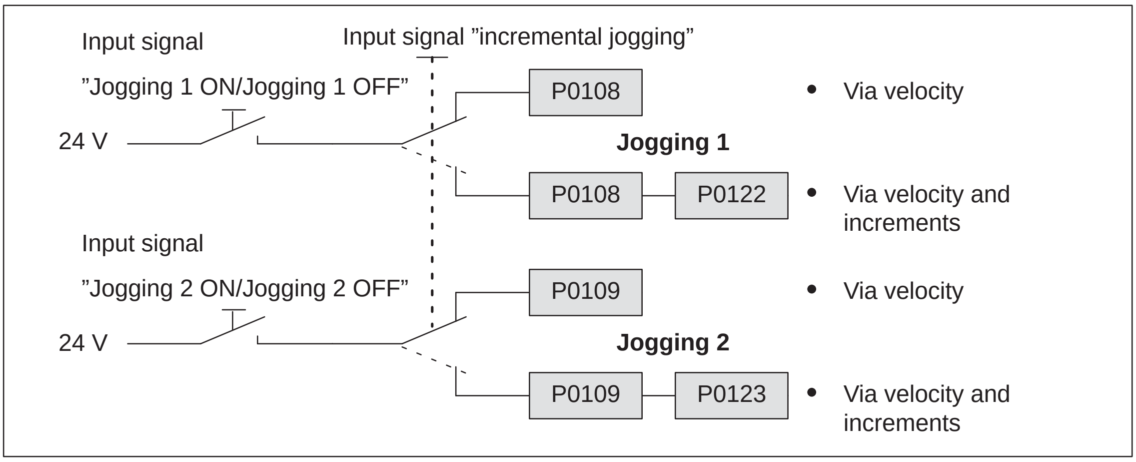


Fig. 6-21 Jogging: Via velocity or incrementally

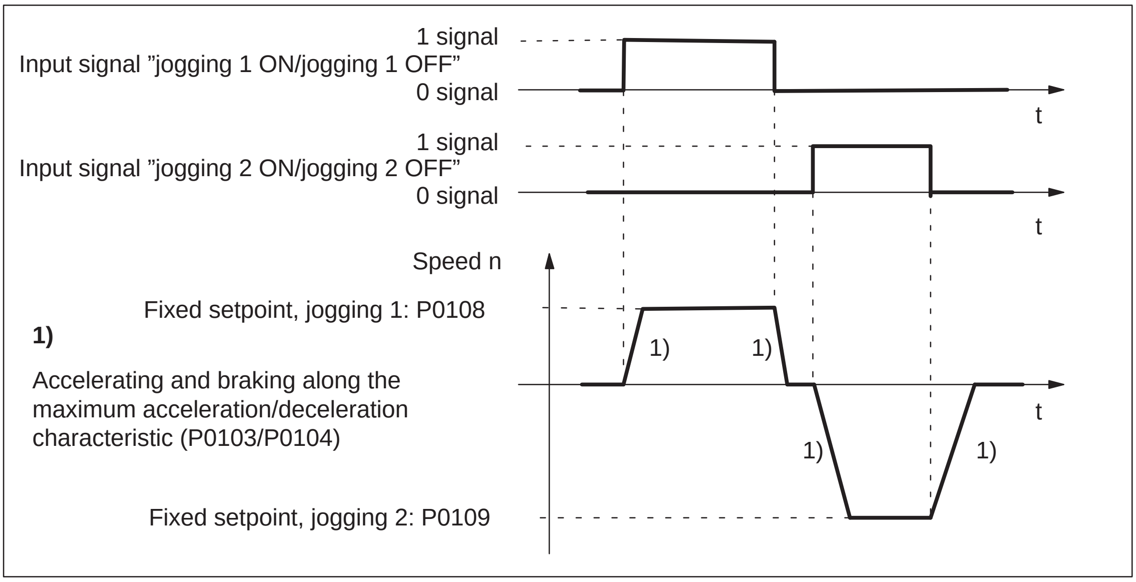


Fig. 6-22 Accelerating and braking when jogging

Note

The following is valid when jogging:

- The traversing direction is defined by the sign of P0108 or P0109.
- When the jogging signal is withdrawn, the axis comes to an immediate stop and, at the next ”1” signal is re-started with the same task.
- It is not possible to continue after incremental jogging has been interrupted.
- The software limit switches are effective if they have been activated and set for this axis, and the axis has been referenced. Contrary to operation in the positioning mode, the axis only starts to brake when the software limit switch is reached. The travel beyond the software limit switch depends on the active velocity setpoint for jogging 1/2 (P0108/P0109, override) and the selected maximum deceleration (P0104).
- The override is effective.
- If input signals for jogging 1 and 2 are simultaneously available, then an appropriate fault is signaled.
- If the position reference value is inverted (P0231, P0232), then the direction of rotation also changes in the jogging mode.
- For speed-controlled jogging, the drive is in the tracking status. In this case, the velocity setpoint and actual -value are formed from the speed controller.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”jogging mode” function:

- P0108 Velocity setpoint, jogging 1
- P0109 Velocity setpoint, jogging 2
- P0122 Jogging 1, increments (from SW 4.1)
- P0123 Jogging 2, increments (from SW 4.1)

Input signals (refer to Chapter 6.4)

The following signals are available for the ”jogging mode” function:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  – Input signal ”jogging 1 ON/jogging 1 OFF”
    —> using an input terminal with function number 62
    —> via PROFIBUS control signal ”STW1.8”
  – Input signal ”jogging 2 ON/jogging 2 OFF”
    —> using an input terminal with function number 63
    —> via PROFIBUS control signal ”STW1.9”
  – Input signal, ”incremental jogging ” (from SW 4.1)
    —> using an input terminal with function number 61
    —> via the PROFIBUS control signal ”PosStw.5”

6.2.10 Programming traversing blocks

Overview

For POSMO SI/CD/CA, a maximum of 64 traversing blocks can be programmed. The information associated with each block is listed in the following table:

Table 6-32 Overview of the traversing blocks

Block memory...			Description Description	Memory	
80:0	80:1	...	**Block number** A traversing block must be assigned a block number between 0 and 63, so that it becomes valid and can be started.	...	80:63
81:0	81:1	...	**Item** Specifies the target position in the block to be approached.	...	81:63
82:0	82:1	...	**Velocity** Specifies the velocity with which the target position is approached.	...	82:63
83:0	83:1	...	**Acceleration override** This allows the acceleration to be influenced, referred to P0103.	...	83:63
84:0	84:1	...	**Deceleration override** This allows the deceleration to be influenced, referred to P0104.	...	84:63
85:0	85:1	...	**Command** Each traversing block must contain a command (refer to Table 6-33). 1 POSITIONING (Standard) +: Block number, position, velocity, Acceleration override, deceleration override, mode 2/3 ENDLESS TRAVERSING_POS/ENDLESS TRAVERSING_NEG +: Block number, velocity, Acceleration override, deceleration override, mode 4 WAIT +: Block number, delay time in the ”command parameter”, mode 5 GOTO +: Block no., target block no. in the ”command parameter”, mode 6/7 SET_O/RESET_O +: Block number, output No. in the ”command parameter”, mode 8 FIXED STOP +: Block number, position, velocity, Acceleration override, deceleration override, Value range and units for clamping torque/clamping force in the ”Command parameter”, mode 9/10 COUPLING_IN/COUPLING_OUT (from SW 4.1) +: Block number, mode	...	85:63
86:0	86:1	...	**Command parameters** Additionally required information to execute the command is specified here.	...	86:63

Table 6-32 Overview of the traversing blocks, continued

Block memory...			Description	Description			Memory	
		...	**Mode** Spindle positioning (from SW 5.1)	Block change enable	Positioning mode	IDs		
87:0	87:1	...	**Xx**xx Target position via 0: Traversing block running 1: PROFIBUS	x**X**xx 0: END (standard) 1: CONTINUE WITH STOP 2: CONTINUE FLYING 3: CONTINUE EXTERNAL	xx**X**x 0: ABSOLUTE (standard) 1: RELATIVE 2: ABS_POS 3: ABS_NEG	xxx**X** 1: SKIP_BLOCK-	...	87:63

Command-dependent block information

The minimum block information which has to be made in a traversing block with this command, is specified in the following table, for each command.

Table 6-33 Command-dependent block information

Block information		Command-dependent block information which is required									
Command	P0085:64	POSITIONING	ENDLESS TRAVERSING_POS	ENDLESS TRAVERSING_NEG	WAITING	GOTO	SET_O	RESET_O	FIXED STOP	COUPLING_IN (from SW 4.1)	COUPLING_OUT (from SW 4.1)
Block number	P0080:64	x	x	x	x	x	x	x	x	x	x
Item	P0081:64	x	–	–	–	–	–	–	x	–	–
Velocity	P0082:64	x	x	x	–	–	–	–	x	–	–
Acceleration override	P0083:64	x	x	x	–	–	–	–	x	–	–
Deceleration override	P0084:64	x	x	x	–	–	–	–	x	–	–
Command parameters	P0086:64	–	–	–	x	x	x	x	x	–	–
Mode	P0087:64										
• IDs											
– SKIP BLOCK		+	+	+	+	+	+	+	+	+	+
• Positioning mode 1)											
– ABSOLUTE		x	–	–	–	–	–	–	x	–	–
– RELATIVE		x	–	–	–	–	–	–	x	–	–
– ABS_POS 2)		x	–	–	–	–	–	–	x	–	–
– ABS_NEG 2)		x	–	–	–	–	–	–	x	–	–
• Block change enable 1)											
– END		x	x	x	x	–	x	x	x	x	x
– CONTINUE WITH STOP		x	–	–	x	–	x	x	x	x	x
– CONTINUE FLYING		x	–	–	–	–	x	x	x	–	–
– CONTINUE EXTERNAL		x	x	x	x	–	–	–	–	x	–

Note:

- 1) Only 1 info can be alternatively specified
- 2) Only possible for rotary axis with modulo correction
- x: This information **must** be specified for this command
- +: This information **can** be specified
- –: This information is **not relevant**

Note

Input errors when entering block information are displayed using the appropriate error messages, for all traversing blocks after a traversing block has started.

Parameter overview

All of the parameters, which are used to program traversing blocks, are shown in the following.

Table 6-34 Parameters used to program traversing blocks

No.	Name	Min.	Standard	Max.	Units	Effective
0079	Reformatting the memory	0	0	1	–	Immedi-ately
	... the memory for the traversing blocks can be reformatted, i.e. re-assigned. 0 Inactive, initial status 0 –> 1 Memory is being reformatted When reformatting, increasing block numbers are written into the blocks at the beginning of the memory. Invalid blocks (block number – 1) are at the end of the memory. **Note:** • After reformatting has been completed, the parameter is automatically reset to 0. • Advantages of a reformatted memory: When displaying blocks using SimoCom U, the blocks are at the start of the memory, are consecutively sorted according to increasing block numbers and there are no gaps.					

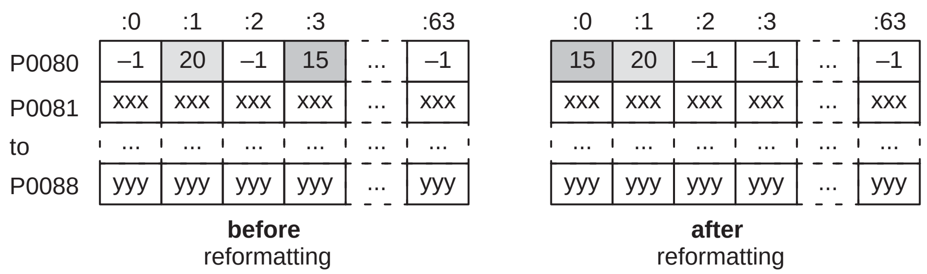


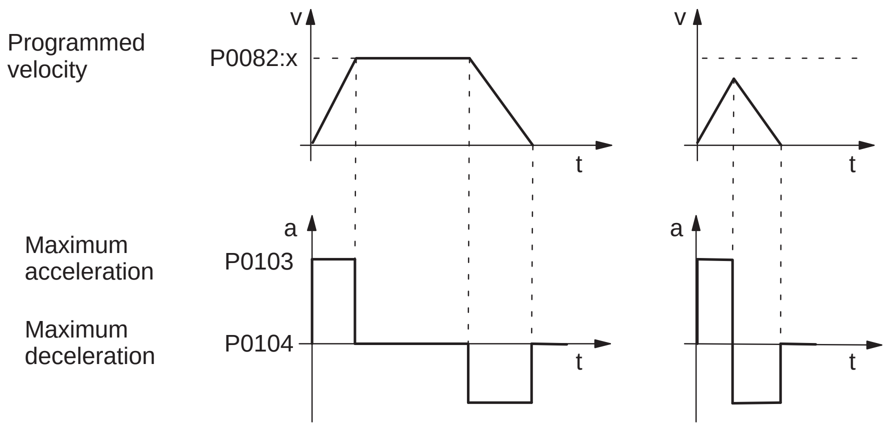
Table 6-34 Parameters used to program traversing blocks, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0080:64	Block number	–1	–1	63	–	PrgE
	A traversing block must be assigned a valid block number so that it can be started. –1 Invalid block number Blocks, with this block number are not taken into account by the program interpreter. 0 to 63 Valid block number **Note:** • The block change enable is saved in the traversing block in P0087:64 (mode - block change enable). There are the following possibilities for the block change enable: – END (standard) – CONTINUE WITH STOP – CONTINUE FLYING – CONTINUE EXTERNAL • Several blocks are processed in an increasing sequence of the block numbers (e.g. for blocks with the block change enable condition CONTINUE FLYING). • The block number must be unique over all traversing blocks otherwise fault 109 (block number available twice) is output when a traversing block is started. • A valid block is ”disabled” by entering the block number ”–1”, i.e. the block information remains saved, unchanged and when this block is re-assigned a valid block number, then the block information becomes visible again. Recommendation: A block can be made ineffective with ”skip block” (refer to P0087:64).					
0081:64	Item	–200 000 000	0	200 000 000	MSR	PrgE
	... specifies the target position in the traversing block. **Note:** • The target position is approached depending on P0087:64 (mode - positioning mode). • If, when selecting the traversing block, it is identified that the traversing range has been violated, then an appropriate fault signal is output.					

6

Table 6-34 Parameters used to program traversing blocks, continued

<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0082:64</td><td>Velocity</td><td>1 000</td><td>600 000</td><td>2 000 000 000</td><td>c*MSR/min</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... defines the velocity with which the target position is approached.



Velocity and acceleration profile for ”long” or ”short” blocks

Note:
• x: Space retainer in the block memory
• If the programmed velocity in P0082:64 is greater than in P0102 (maximum velocity), then the axis is limited to the maximum velocity and warning 803 is issued (programmed velocity > maximum velocity).
• For short traversing distances, it is possible that the programmed velocity will not be reached.</td></tr>
<tr><td>0083:64</td><td>Acceleration override</td><td>1</td><td>100</td><td>100</td><td>%</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... specifies which override is effective at the maximum acceleration (P0103).

$$a_{act} = P0103 \cdot \frac{P0083{:}x}{100\ \%}$$

x: Space retainer in the block memory</td></tr>
<tr><td>0084:64</td><td>Deceleration override</td><td>1</td><td>100</td><td>100</td><td>%</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... specifies which override is effective at the maximum deceleration (P0104).

$$a_{brake,\ act} = P0104 \cdot \frac{P0084{:}x}{100\ \%}$$

x: Space retainer in the block memory</td></tr>
</table>

Table 6-34 Parameters used to program traversing blocks, continued

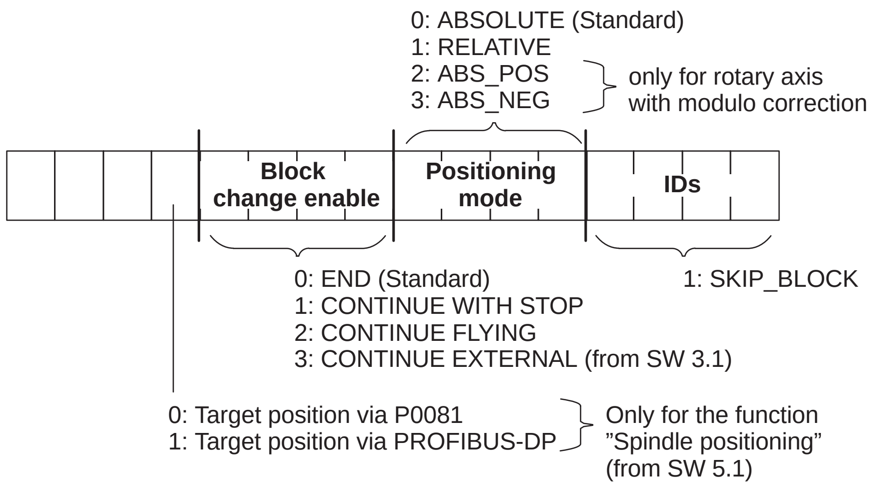
No.	Name	Min.	Standard	Max.	Units	Effective
0085:64	Command	1	1	10	–	PrgE
	Every traversing block must include precisely one command for execution. **1** **POSITIONING** A linear traversing motion (PTP) can be executed using this command. Note: Other block parameters are still effective (refer to Table 6-33). **2** **ENDLESS TRAVERSING_POS** **3** **ENDLESS TRAVERSING_NEG** With this command, the axis can be traversed with the velocity specified in the block, until – a limit switch is reached – motion is interrupted by the input signal "OC/intermediate stop" – motion is terminated by the input signal "OC/reject traversing task" Note: Other block parameters are still effective (refer to Table 6-33). Limitation for rotary axis (modulo): If a higher speed is entered in a traversing block (e.g. >1000 RPM) and if a low deceleration is set (e.g. standard setting 100 degrees/s^2), then a fault message is output. Remedy: The resulting braking travel must be <1000000 degrees. The braking travel depends on the deceleration and the velocity. $\text{Braking travel} = \dfrac{v^2\ [\text{degrees/s}]^2}{2 \cdot a\ [\text{degrees/s}^2]}$ **4** **WAITING** A delay time, which should expire before the following traversing block is processed, can be defined using this command. The delay time is specified in the command parameter (P0086:x). Note: The entry in the command parameter is made in ms and is internally and automatically rounded-off to a multiple of the interpolation clock cycle (P1010). **5** **GOTO** Jumps can be executed within a sequence of traversing blocks using this command. The jump destination and the block number are specified in the command parameter (P0086:x). Note: If the specified block number does not exist, then an appropriate fault is signaled when a traversing block is started.					

6

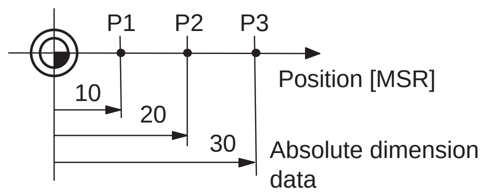
Table 6-34 Parameters used to program traversing blocks, continued

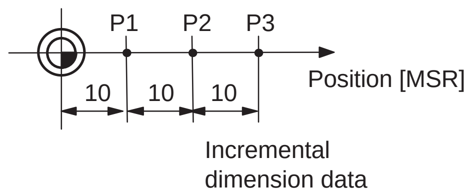
No.	Name	Min.	Standard	Max.	Units	Effective
	6 SET_O **7 RESET_O** An output signal can be set or reset using these commands. P0086:x (command parameter) is used to specify which output terminal or which status bit is to be controlled. P0086:x = 1 —> Output with Fct. No. 80 (direct output 1 via traversing block) P0086:x = 2 —> Output with Fct. No. 81 (direct output 2 via traversing block) P0086:x = 3 —> Output with Fct. Nos. 80 and 81 are controlled P0086:x = 1 —> status bit ”direct output 1 via traversing block” P0086:x = 2 —> status bit ”direct output 2 via traversing block” P0086:x = 3 —> both status bits are controlled Note: The function numbers for the outputs and the PROFIBUS bits are listed in the list of output signals (refer to Chapter 6.4.4) under ”Output signal, direct output 1/2 via traversing block”. The output signals, influenced using SET_O or RESET_O remain ”frozen”, when a fault develops, when a traversing block is interrupted, or at the end of the program. This means, that the signals are exclusively influenced using the SET_O/RESET_O commands. When starting or exiting the program, the output signals may possibly have to be ”programmed” in an initial status.					
	8 FIXED STOP The ”travel to fixed stop” function is activated with this command. **9 COUPLING_IN (from SW 4.1)** **10 COUPLING_OUT (from SW 4.1)** Using these commands, the axis coupling that can be switched-in/out can be switched-in/out in the ”positioning” mode. **Note:** The block change enable ”CONTINUE EXTERNAL” can be parameterized in the traversing block ”COUPLING IN”. In the ”COUPLING OUT” traversing block, a fault is output for ”CONTINUE EXTERNAL”.					
0086:64	Command parameters	0	1	65 535	–	PrgE
	... provides additional information for several commands. Command — Additional information WAITING — Waiting time in ms GOTO — Block number SET_O — 1, 2, 3: Set direct output 1, 2 or 3 (both signals) RESET_O — 1, 2, 3: Resetting direct output 1, 2 or 3 (both signals) FIXED STOP — Clamping torque or clamping force Rotating drive: 1 – 65 535 [0.01 Nm] Linear drive: 1 – 65 535 [N] **Note:** The command-dependent required block information is listed in the Table 6-33.					

Table 6-34 Parameters used to program traversing blocks, continued

<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0087:64</td><td>Mode</td><td>0</td><td>0</td><td>1331</td><td>Hex</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... specifies the following additional information for several commands:

</td></tr>
<tr><td>0087:64

xxxX</td><td colspan="6">SKIP_BLOCK ID
A block with the ID SKIP_BLOCK is not processed, and is skipped.</td></tr>
<tr><td>0087:64

xxXx</td><td colspan="6">ABSOLUTE or RELATIVE positioning mode
This data defines whether the program position should be interpreted as being absolute (as coordinate point) or relative (as the distance to be moved). This is valid for linear and rotary axes.
• ABSOLUTE or RELATIVE for a linear axis (or rotary axis without modulo correction)
– Absolute:
The axis moves to the specified position and references itself to the axis zero.
– Relative:
The axis moves around the specified position in the negative or positive direction and references itself to the last position it approached.




Examples for ABSOLUTE:
Position = +30 Travel to 30
Position = –10 Travel to –10

Examples for RELATIVE:
Position = –10 Travel through 10 negative
Position = +10 Travel through 10 positive</td></tr>
</table>

6

Table 6-34 Parameters used to program traversing blocks, continued

<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td></td><td colspan="6">

- ABSOLUTE or RELATIVE for a rotary axis with modulo correction
  - ABSOLUTE:
The axis approaches the program position within the modulo range, and it automatically selects the shortest distance. For the same distance in both directions, the axis moves in the positive direction.
For values with a negative sign or a value outside the modulo range, an appropriate fault is output when a traversing block starts.
  - RELATIVE:
The axis traverses through the programmed position in a negative or positive direction and refers itself to the position which was last approached.
The traversing distance can also be greater than the modulo range.

</td></tr>
<tr><td>0087:64

xxXx</td><td colspan="6">

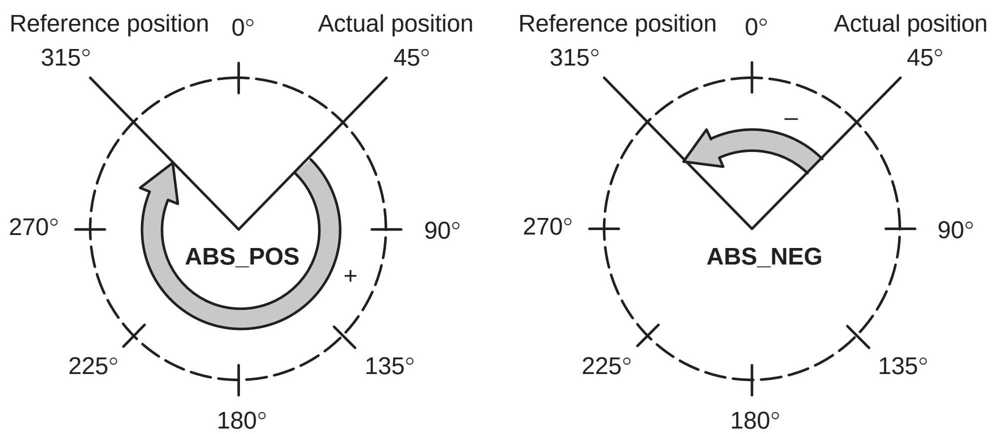
Positioning mode ABS_POS or ABS_NEG (only rotary axis with modulo correction)

With this information, for a rotary axis with modulo correction (P0241 = 1), the direction of travel is specified along with the reference position.

- ABS_POS :
The rotary axis traverses in the positive direction with respect to the reference position within the modulo range.
- ABS_NEG :
The rotary axis traverses in the negative direction with respect to the reference position within the modulo range.

Note:

An appropriate fault is signaled when starting a traversing block for values with negative sign or for a value outside the modulo range.



Example:
Positioning mode = ABS_POS
Position = 315
—> traverse to 315˚ in a pos. direction

Example:
Positioning mode = ABS_NEG
Position = 315
—> traverse to 315˚ in a neg. direction

</td></tr>
<tr><td>0087:64

xXxx</td><td colspan="6">

Block change enable END

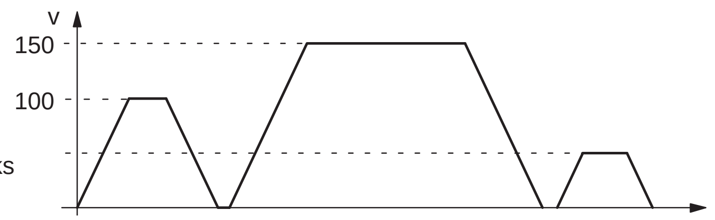
The block change enable can be used for the following traversing blocks:

- For pure single block operation, i.e. each block must be individually selected and started
- At the last block of a block sequence, i.e. the block identifies the end of the block sequence.

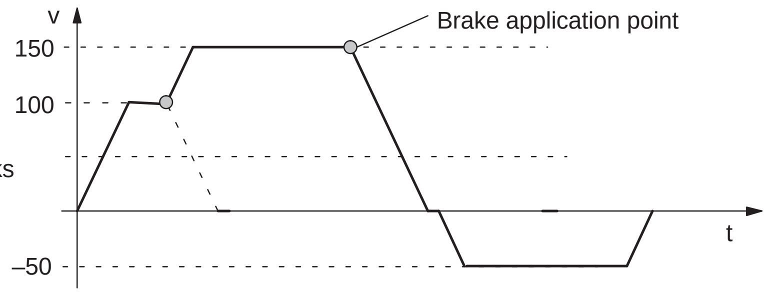
</td></tr>
</table>

Table 6-34 Parameters used to program traversing blocks, continued

<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0087:64

xXxx</td><td colspan="6">
Block change enable CONTINUE WITH STOP
This block change enable has the following properties
(corresponds to ”precise stop G60” acc. to DIN 66025):
• The position programmed in the block is precisely approached
• The axis braked until the positioning window is reached (P0321)
For P0321=0 or if the following error is less than P0321, the block change is executed as soon as the interpolator has reached its position reference value.
• The block is changed when the positioning window is reached.
<table>
<tr><th>Blk</th><th>Pos.</th><th>Vel.</th><th>Command</th><th>Pos. mode</th><th>Block change enable</th></tr>
<tr><td>0</td><td>10</td><td>100</td><td>POSITIONING</td><td>ABSOLUTE</td><td>CONTINUE WITH STOP</td></tr>
<tr><td>1</td><td>30</td><td>150</td><td>POSITIONING</td><td>RELATIVE</td><td>CONTINUE WITH STOP</td></tr>
<tr><td>2</td><td>10</td><td>50</td><td>POSITIONING</td><td>RELATIVE</td><td>END</td></tr>
</table>
Example:
Programming
3 traversing blocks


Note:
For an existing axis coupling (position coupling), the positioning window is not effective for CONTINUE WITH STOP. If this represents a problem in an application when the master drive is stationary, then the PLC would first have to release the coupling and then position the slave drive normally.
</td></tr>
<tr><td>0087:64

xXxx</td><td colspan="6">
Block change enable CONTINUE FLYING
This block change enable has the following properties
(corresponds to ”precise stop G64” acc. to DIN 66025):
• The following block is immediately processed when the time to apply the brake is reached
• For a direction change, the axis brakes down to standstill and waits until the position actual value has reached the positioning window (this corresponds to the block change enable ”continue with stop”
• If the deceleration override (P0084:64) between the actual block and the block to be changed into on the fly differ, then the flying block change is automatically prevented and instead of this, the CONTINUE WITH STOP block change executed
<table>
<tr><th>Blk</th><th>Pos.</th><th>Vel.</th><th>Command</th><th>Pos. mode</th><th>Block change enable</th></tr>
<tr><td>0</td><td>10</td><td>100</td><td>POSITIONING</td><td>ABSOLUTE</td><td>CONTINUE FLYING</td></tr>
<tr><td>1</td><td>30</td><td>150</td><td>POSITIONING</td><td>ABSOLUTE</td><td>CONTINUE FLYING</td></tr>
<tr><td>2</td><td>10</td><td>50</td><td>POSITIONING</td><td>ABSOLUTE</td><td>END</td></tr>
</table>
Example:
Programming
3 traversing blocks


There is a direction of reversal between block 1 and block 2. This is the reason that at the braking instant, the drive brakes from block 1 down to standstill and waits until the position actual value reaches the positioning window. After this, block 2 is executed.
Note:
For traversing blocks whose distance is able to be travelled through within an IPO clock cycle, then the drive brakes briefly.
</td></tr>
</table>

Table 6-34 Parameters used to program traversing blocks, continued

No.	Name	Min.	Standard	Max.	Units	Effective

0087:64

xXxx

Block change enable, CONTINUE FLYING

This block change enable has the following properties:

- For a traversing block with the block change enable CONTINUE EXTERNAL, a flying block change is made if an edge of the input signal ”external block change” is identified. If the deceleration override (P0084:64) differs between the current and the block which is to be changed into flying, then a flying block change is made.
- When using the commands SET_O and RESET_O, it is not possible to use the block change enable CONTINUE EXTERNAL!
- What happens, if...?
  - The following traversing block is programmed in the RELATIVE positioning mode
    —> The programmed position refers to the actual value at the instant that the external block change is requested
  - The braking travel is greater than the distance programmed in the following block
    —> The axis is held at the parameterized deceleration ramp and then traverses to the target position in the opposite direction.
  - A different behavior is necessary for ”external block change”?

    Then the required behavior must be set in P0110:

    P0110

    = 0 (standard) —> If the signal is not available up to the start of braking, then the axis is stopped in front of the target position (dependent on: Acceleration, deceleration, positioning velocity) and fault 109 (external block change not requested in the block) is output.

    = 1 —> If the signal is not present up to the start of braking, then a flying block change is made
    (refer to block change enable CONTINUE FLYING).

    = 2 —> The block is traversed, independent of the signal, to the end. The system only waits for the signal at the end of the block; when the signal is detected, a block change is executed.

    = 3 (from SW 5.1) —> if the signal is not present up to the end of the block, then the axis waits for the signal and when the signal is identified, a block change is made.

    Note: When P0110 is changed, the change is not accepted after v_set=0, but instead, only after the end of the program when the traversing block is re-started.
  - The subsequent traversing block is programmed with the WAIT command?

    After the signal edge has been detected, the position actual value is written into P0026, and the axis is braked down to standstill with the programmed deceleration (P0104 + deceleration override in P0084:64) and then the system waits. The other position data refer to the block change position.
  - Does the acceleration override (P0083:64) or deceleration override (P0084:64) differ between the actual (current) block and the following block to be changed into?

    When the ”external block change” input signal is detected, the acceleration or deceleration override of the block, which is now current, becomes valid and is immediately effective.
  - Was the deceleration changed during the braking ramp when positioning in absolute terms?
    —> a change is not accepted. Positioning is realized with the previously set braking ramp (P0084 or P0094).

Note:

If P0110 $\geq$ 2, then input terminal I0.x or I0.B may not be used as input, as, for these, the block change can be initiated from different signal edges.

Table 6-34 Parameters used to program traversing blocks, continued

No.	Name	Min.	Standard	Max.	Units	Effective

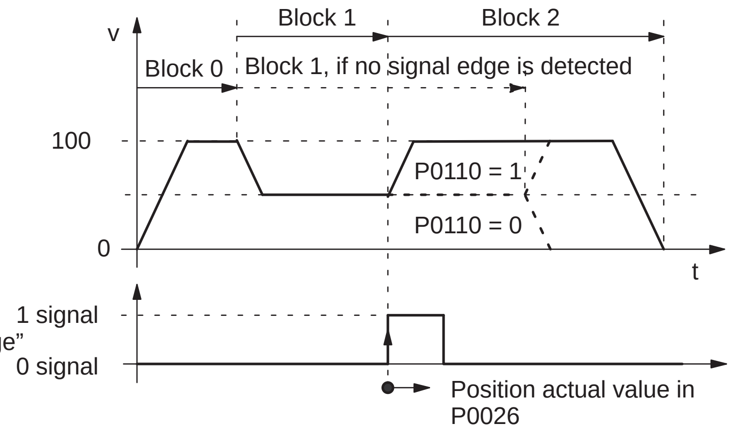
- The position actual value when detecting a signal edge at input signal ”external block change” is written into P0026 (position actual value, external block change).

Blk	Pos.	Vel.	Command	Pos. mode	Block change enable
0	100	100	POSITIONING	ABSOLUTE	CONTINUE FLYING
1	200	50	POSITIONING	ABSOLUTE	CONTINUE EXTERNAL
2	300	100	POSITIONING	ABSOLUTE	END

Example:
Programming
3 traversing blocks

Block 1 with
CONTINUE
EXTERNAL

Input signal
”external block change”



Note:
Refer under the index entry ”Input signal – external block change”.

No.	Name
0087:64 Xxxx	**Spindle positioning (from SW 5.1)** For the ”Spindle positioning” function, the target position is programmed in P0081 or transferred via PROFIBUS-DP. **Note:** Refer under the index entry ”Spindle positioning”

6.2.11 Starting, interrupting and exiting traversing blocks

Overview

The following input/output signals are available for traversing blocks:

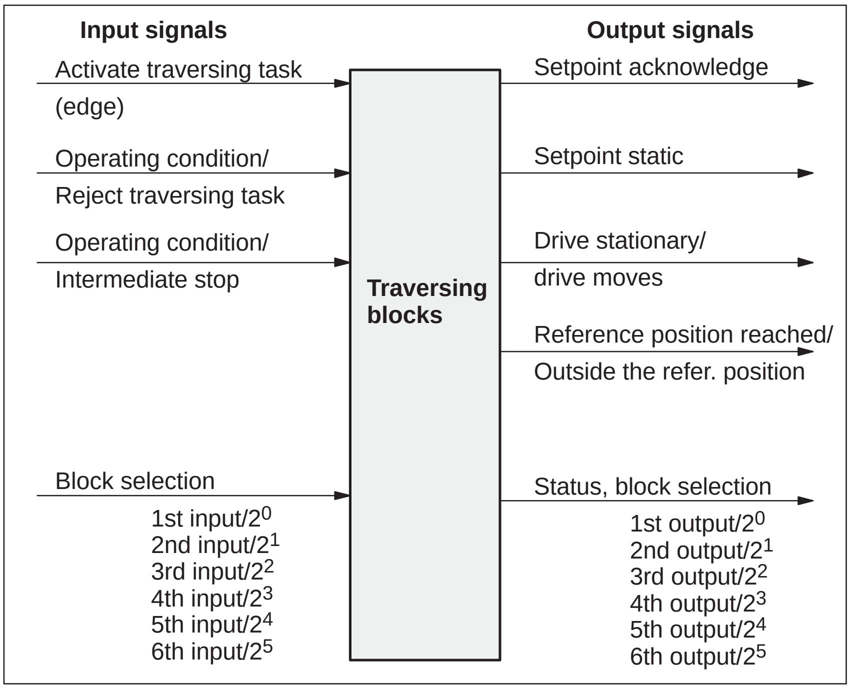


Fig. 6-23 Input/output signals for traversing blocks

Note

- Prerequisite for ”activate traversing task”:
  - All of the enable signals are set and the controlled drive is in the controller enable status (refer to Chapter 5.5, Fig. 5-7).
  - Previous jog operation must have been fully completed – this means that the output signal ”tracking mode active” must be 0 (Fct. No. 70 or PosZsw.0).
- When starting blocks, there must be at least 3 IPO clock cycles between the signal ”activate traversing task” and the motion being interrupted via ”OC/reject traversing task” or ”OC/intermediate stop”. This applies both for operation using PROFIBUS-DP as well as when using terminals.

Reader’s note

Generally, input/output signals are used in the following.

From the perspective of POSMO SI/CD/CA, the following applies:

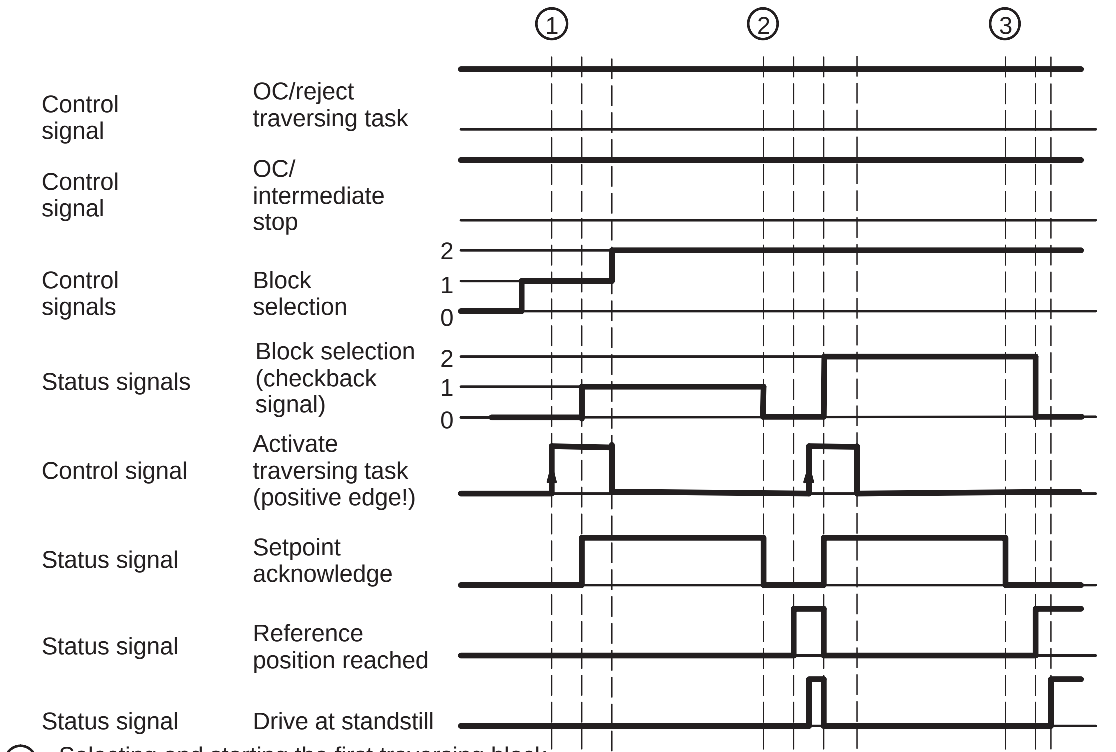
- for input signals:
  - when entered via terminals –> input terminal signals
  - when entered via PROFIBUS-DP –> control signals
- for output signals:
  - if output via terminals –> output terminal signals
  - if output via PROFIBUS-DP –> status signals
- **Caution!**

  There are only two input terminals (digital inputs – X23.2/.4) and two output terminals (digital outputs – X24.2/.4). This means that the selection/status of the traversing blocks via terminals is restricted to four.

  From SW 4.1, it is possible to change over the output O1.A (X24.2) as input I2.A using P0677, so that 8 traversing blocks are possible

Example: Sequentially starting individual blocks

In this case, a new traversing block is only started if the previous block had been completed, i.e. the drive has reached the reference position.



1. Selecting and starting the first traversing block
—> selected via ”block selection”
—> edge of ”activate traversing task” —> ”setpoint acknowledgment” is set to a ”1” signal.

2. End of the first positioning operation,
—> ”setpoint acknowledgment” is reset
—> ”reference position reached” is set if the actual position is within the defined window
—> ”drive stationary” is set, if the speed is less than the speed limit for ”drive stationary”
The second traversing block is started

3. End of the second positioning operation

Fig. 6-24 Sequentially starting individual blocks

Note

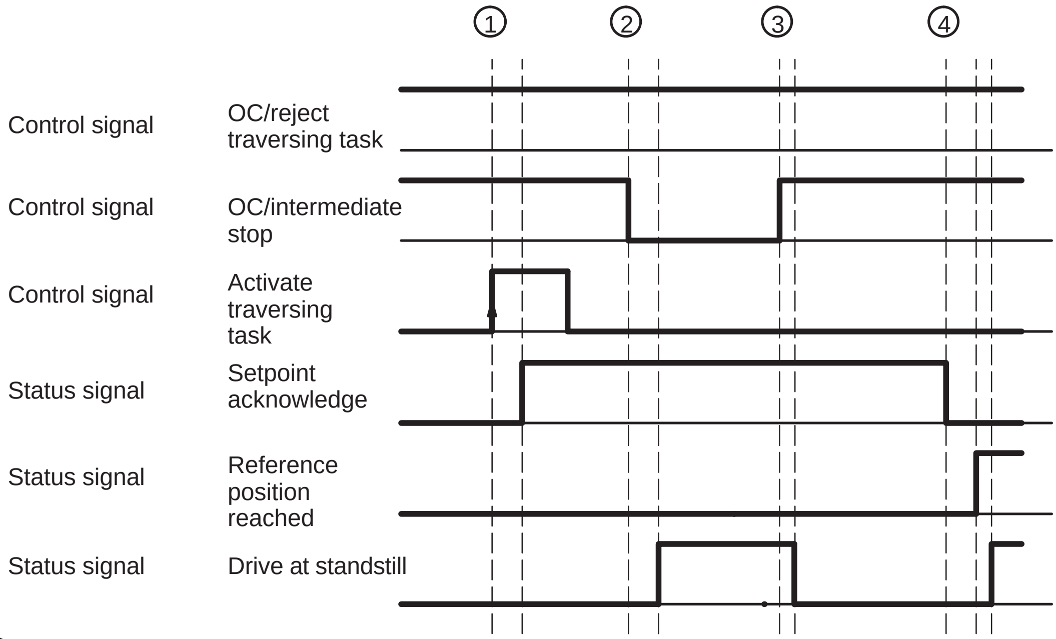
The selection and the status of the block selection are not binary-coded, but represented, simplified as value.

Intermediate stop

A traversing block can be interrupted using the ”operating condition/intermediate stop” control signal.

Features:

- A block which has been interrupted with ”intermediate stop” can then be continued.
- An axis in ”intermediate stop” can be traversed in the jog mode or referencing can be started. The interrupted traversing block is exited.
- If a traversing block is interrupted using the ”wait” command with ”Intermediate stop”, then the delay (waiting) time is stopped.



1 Selecting and starting the traversing block

2 Interrupting the traversing block
—> ”operating condition/intermediate stop” is reset
—> the axis is braked using the parameterized deceleration and ”drive stationary” signaled if the limit speed for standstill is fallen below

The ”setpoint acknowledgement” and ”reference position reached” signals are not influenced by an intermediate stop.

3 Continuing the traversing block
—> ”operating condition/intermediate stop” is set
—> the interrupted traversing block is continued and ”drive stationary” reset, if the speed limit for standstill is exceeded

4 End of positioning

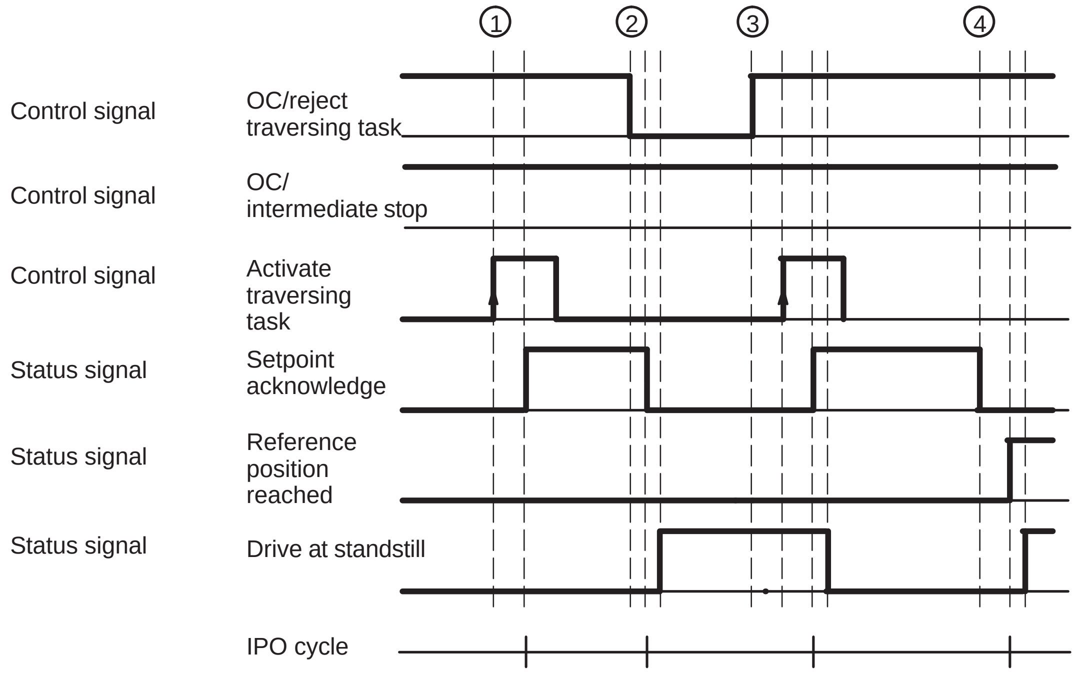
Fig. 6-25 Characteristics of an intermediate stop of a traversing block

Reject traversing task

A traversing block can be interrupted using the ”OC reject/traversing task” control signal.

Features:

- A block, interrupted with ”reject traversing task” can no longer be continued.
- A ”delete distance to go” is executed.
- It is also possible for a block with intermediate stop.



1 Selecting and starting the traversing block

2 Interrupting the traversing block using ”reject traversing task”
—> ”operating condition/reject traversing task” is reset
—> ”setpoint acknowledgement” is reset
—> the axis is braked down to standstill with the maximum deceleration and ”drive stationary” signaled if the speed limit for standstill is fallen below.
”Reference position reached” is not set.

3 Selecting and starting an additional (or the same) traversing block

4 End of positioning

Fig. 6-26 Characteristics when aborting a traversing block

Diagnostics: Image of the actual traversing block

Information about the traversing block presently being processed can be read from the following parameters:

- P0001 Actual traversing block – block number
- P0002 Actual traversing block – position
- P0003 Actual traversing block – velocity
- P0004 Actual traversing block – acceleration override
- P0005 Actual traversing block – deceleration override
- P0006 Actual traversing block – command
- P0007 Actual traversing block – command parameter
- P0008 Actual traversing block – mode

Reader's note

The parameters are displayed and described in the parameter list is Chapter A.1.

6.2.12 MDI operation (from SW 7.1)

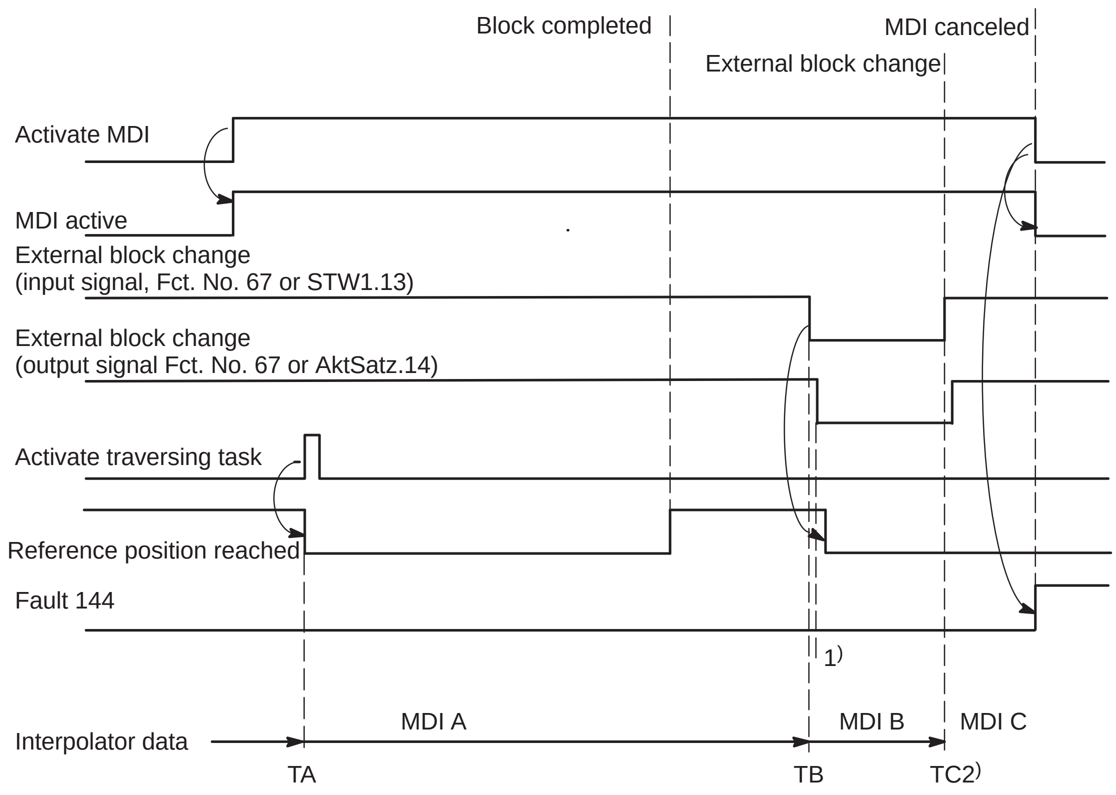
Description

Using the ”MDI operation” function and when in the ”positioning” mode it is possible to change the parameters of the MDI block (e.g. reference position, velocity, etc.) via process data and PROFIBUS-DP and/or via parameters (P0091 to P0094, P0097) while this is executed. If, for this particular block, the block change enable CONTINUE EXTERNAL is parameterized, then the changes which were made can be immediately activated with the signal to change the block. This means that the changes are accepted in the interpolator. For the block change enable END, the changes only become effective when this traversing block is re-started in the interpolator.

In this MDI block, only RELATIVE, ABSOLUTE positioning operations can be executed and for rotary axes with modulo correction, in addition, ABS_POS and ABS_NEG.

In this case, only END or CONTINUE EXTERNAL with P0110 = 2 or 3 are permissible as block change enable condition.

Signal timing MDI



1) For the earliest possible instant in time to enter new block parameters (PZD and/or default block), refer to Table 6-43 output signal function No. 67.

2) A new positioning operation is started without the MDI end position having been reached.

Fig. 6-27 Control and status signals for MDI

The data available in the block parameters (PZD and/or default block) at instant in time TA are transferred into the interpolator and processed. This data (MDI A) remains valid up to instant in time TB when new data is transferred into the interpolator. In turn, these (MDI B) remain valid until new data is transferred (TC/MDI C).

Note

The following applies for the MDI mode:

- MDI is switched-in using the ”activate MDI” signal via terminal (Fct. No. 83) or PROFIBUS (SatzAnw.15). The ”MDI active” signal is used for the feedback signal which is either transferred via terminal (Fct. No. 83) or PROFIBUS (AktSatz.15). A traversing block can be entered using process data (MDIPos, MDIVel, MDIAcc, MDIDec, MDIMode) via PROFIBUS-DP and started using the signal ”activate traversing task”.
- If either no MDI block or only individual block parameters are entered via PROFIBUS-DP, then the missing parameters are taken from the MDI default block (P0091 to P0094, P0097). However, if MDI process data are parameterized in P0915:17 and these are also transferred via PROFIBUS-DP, then the values in parameters P0091 to P0094 and P0097 are not taken into account.
- If CONTINUE EXTERNAL is parameterized as block change enable, then actual block parameters of the MDI block (entered via PZDs and/or MDI default block) are immediately transferred into the interpolator with the signal ”external block change”.
- For an MDI block, the block change enable signals CONTINUE WITH STOP and CONTINUE FLYING, are not possible. The block change enable CONTINUE EXTERNAL is only permissible with P0110 = 2 or 3 (configuration of an external block change).
- If the signal ”Activate MDI” is set to 0 while an MDI block is still running, then fault 144 is initiated. This means that MDI operation can only be disabled after the target position has been reached.
- The signals ”operating condition/reject traversing task” and ”operating condition/intermediate stop” are effective just the same as in the normal ”positioning” operating mode.
  The monitoring functions, e.g. software and hardware switches are also active.

6

MDI positioning block

The MDI block is a positioning block which can contain the following data:

Position	input MSR
Velocity	input c • MSR/min
Acceleration override	percentage of P0103
Deceleration override	percentage of P0104
Mode	ID x0x = ABSOLUTE x1x = RELATIVE x2x = ABS_POS x3x = ABS_NEG 0xx = END 3xx = CONTINUE EXTERNAL

The block parameters entered using PZDs via PROFIBUS-DP, are cyclically transferred. The block parameters which do not exist here, are supplemented by the data from the default block (P0091 to P0094, P0097). The parameters, valid up to when the traversing task is activated or the external block change, are then transferred into the interpolator and executed. This means, for example, that it may be sufficient to just enter the position reference value using PZD and to use the remaining data (velocity, acceleration override, etc.) from the default block.

MDI and external block change

If CONTINUE EXTERNAL block change enable is parameterized in the MDI block then the transfer of the ”possibly modified” block parameter into the running or ”waiting” MDI block is triggered using the ”external block change” signal. P0110 defines when the values become effective i.e. when they are transferred into the interpolator:

- P0110 = 2

  The system only waits for the signal at the end of the block; when the signal is detected, a block change is executed.

- P0110 = 3

  If the signal is not present up to the end of the block, then the axis waits for the signal and when this is detected, a block change is made. (from SW 5.1).

For the MDI function, only the configuration P0110 = 2 or 3 is permitted.

Note

If the deceleration was changed during the braking ramp with absolute positioning, then this is not accepted. Positioning is realized with the previously set braking ramp (P0084 or P0094).

MDI block influence

The input signal ”reject traversing task” deletes the programmed MDI block.

The input signal ”intermediate stop” holds the MDI block.

Limitations/ secondary conditions

- There is only one MDI block.
- The reference point must be approached or set, also for incremental MDI blocks.
- The MDI block can be entered via PROFIBUS-DP or the default block (P0091 to P0094, P0097). A combination is also possible. This means, for example, the position is entered via PROFIBUS and the remaining block parameters are taken from the default block.
- The interpolator requires 2 IPO clock cycles for a block change.
- If the transfer of modified block parameters is initiated using the ”external block change” signal while the MDI block is interrupted with an intermediate stop – then after the intermediate stop is withdrawn, the modified block is executed.
- For MDI blocks where the programmed position can no longer be reached in the specified direction of rotation, initially the axis is braked down to standstill and is then moved to the target position in the opposite direction.
- If relative positioning (incremental dimension) is parameterized for an MDI block, then for a CONTINUE EXTERNAL block change enable positioning is re-started from the current actual position with ”external block change”.
- If, for an MDI block, the deceleration override (STW MDIDec or P0094) is reduced too much, then fault 131 is output. However, for absolute positioning, this only applies if the braking ramp has still not started.
- If, for an MDI block, a block change is initiated, and the new target position does not differ from the previous target position, then the ”reference position reached” output signal is not reset.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”MDI” function:

- P0091 MDI position
- P0092 MDI velocity
- P0093 MDI acceleration override
- P0094 MDI deceleration override
- P0097 MDI mode
- P0110 Configuration, external block change
- P0655 Image, input signals, Part 3
- P0657 Image, output signals, Part 2
- P0915:17 PZD setpoint assignment, PROFIBUS
- P0916:17 PZD actual value assignment, PROFIBUS
- P0922 Telegram selection PROFIBUS

The MDI traversing block, transferred using the MDI telegram can be read, as before, using parameters P0001 to P0008.

6

Input/output signals (refer to Chapter 6.4)

The following signals are used for the ”MDI” function:

- Input signals
  (refer under the index entry ”Input signal, digital – ...)
  - Input signal ”activate MDI”

    —> using an input terminal with function number 83

    —> via PROFIBUS control signal ”SatzAnw.15”
  - Input signal ”external block change”
    (declares the MDI block valid)

    —> using an input terminal with function number 67

    —> via PROFIBUS control signal ”STW1.13”
  - Input signal ”operating condition/reject traversing task (deletes the programmed MDI block)

    —> using an input terminal with function number 58

    —> via PROFIBUS control signal ”STW1.4”
  - Input signal ”operating condition/intermediate stop”
    (holds the MDI block)

    —> using an input terminal with function number 59

    —> via PROFIBUS control signal ”STW1.5”
- Output signals
  (refer under the index entry, ”output signal, digital – ...)

  The output signals are only effective when ”Activate MDI” is selected.
  - Output signal ”MDI active”

    —> using an output terminal with function number 83

    —> using the PROFIBUS status signal ”AktSatz.15”
  - Output signal ”external block change” (this is an image of the input signal ”external block change”)

    —> using an output terminal with function number 67

    —> using the PROFIBUS status signal ”AktSatz.14”

6.3 Axis couplings (from SW 4.1)

General information

”SIMODRIVE POSMO SI/CD/CA” allows drives to coupled via PROFIBUS-DP.

The main applications include:

- Position reference value and position actual value coupling (”synchronous operation”)

  —> Refer to Chapter 6.3.1

- Torque setpoint coupling (”master/slave operation”)

  —> Refer to Chapter 6.3.3

Communications is realized using PROFIBUS-DP slave-to-slave communications. One or several slaves (drives) are operated as publishers, i.e. they not only provide their actual values to the DP master, but also to other slaves (subscribers) per broadcast.

Configuring defines which subscribers accept which data as setpoints from which publisher.

From the perspective of the coupling, the master drive is a publisher and a slave drive is a subscriber.

6.3.1 Position reference value and position actual value coupling

POSMO SI/CD/CA as master drive

The master drive must output process data via PROFIBUS-DP which the slave drive can use as position reference value. The following process data is available:

- XsollP (position reference value, number 50208)
- XistP (position actual value, number 50206)

Depending on the actual requirements, it is possible/necessary to output additional process data.

Beyond the output of these signals, the master drive is parameterized as a conventional positioning drive (”Positioning” mode, P0700 = 3).

POSMO SI/CD/CA assumes, when position reference value XsollP is output via PROFIBUS-DP, that it is being used as master drive. In order that the master and
slave drive simultaneously process the position reference values, the master drive correspondingly delays transferring data to its own position controller. If the position reference value is only to be output for diagnostic purposes, then the delay can be disabled using P1004.9 = 0.

POSMO SI/CD/CA as slave drive

An interface for an external position reference value is available in the”positioning” mode (P0700 = 3):

- Xext (external position reference value, number 50207)

Depending on the actual requirements, it is possible/necessary to output additional process data.

The normalization of the process data XsollP, XistP (master drive) or Xext (slave drive) can be parameterized using a numerator/denominator pair This means that not only is a coupling possible between POSMO SI/CD/CA, but also with other bus nodes (DP master or DP slave).

When the interface is switched-in, the drive responds to absolute position reference values which are entered via the angular incremental encoder interface, switched as input, or PROFIBUS-DP. In addition, traversing blocks can be executed, which result in superimposed motion.

When the interface is switched-out, the drive can execute, as usual, autonomous movements via traversing blocks.

The position reference value interface can be switched-in/switched-out via an input signal (PROFIBUS-DP or terminal) or via a traversing block.

The following possibilities are available for referencing for incremental position measuring systems:

- When the interface is switched-out, the drive can be individually referenced as usual (refer to Chapter 6.2.4).
- When the interface is switched-in, the drive follows the reference motion of the master drive via the ”passive referencing” function (from SW 5.1).

Table 6-35 Overview: Position reference value interface

Property	Description
Switch-in/switch-out	• via the ”activate coupling” input signal or PROFIBUS bit PosStw.4 P0410 = 1 Speed-synchronous P0410 = 2 Position synchronous + P0412 P0410 = 7 to the absolute position of the master drive + P0412 • via a traversing block with the COUPLING_IN or COUPLING_OUT command P0410 = 3 Speed-synchronous P0410 = 4 Position synchronous + P0412 P0410 = 8 to the absolute position of the master drive + P0412 • via the traversing block with the COUPLING_IN or COUPLING_OUT command and queue functionality (being prepared) P0410 = 5 Speed-synchronous P0410 = 6 Position synchronous + P0412
Superimposed motion	Yes, via traversing blocks with the coupling switched-in
Autonomous motion	Yes, via traversing blocks with the coupling switched-out
Possible position reference value source	• PROFIBUS-DP Master • PROFIBUS-DP slave (slave-to-slave communications)
Parameterize PROFIBUS interface as input	• P0891 Source, external position reference value • P0895 External position reference value – No. of increments • P0896 Ext. position ref. value – No. of dimension system grids • P0897 Inversion, external position reference value • P0898 Modulo range, master drive • P0401 Coupling factor, revolutions master drive • P0402 Coupling factor, revolutions slave drive
Referencing for incremental measuring systems	Required, if autonomous or superimposed motion has to be executed via traversing blocks —> Refer to Chapter 6.2.4
Available in the operating mode	”Positioning” (P0700 = 3)

Application possibilities

- DP master as position reference value source (clock cycle synchronous operation recommended).

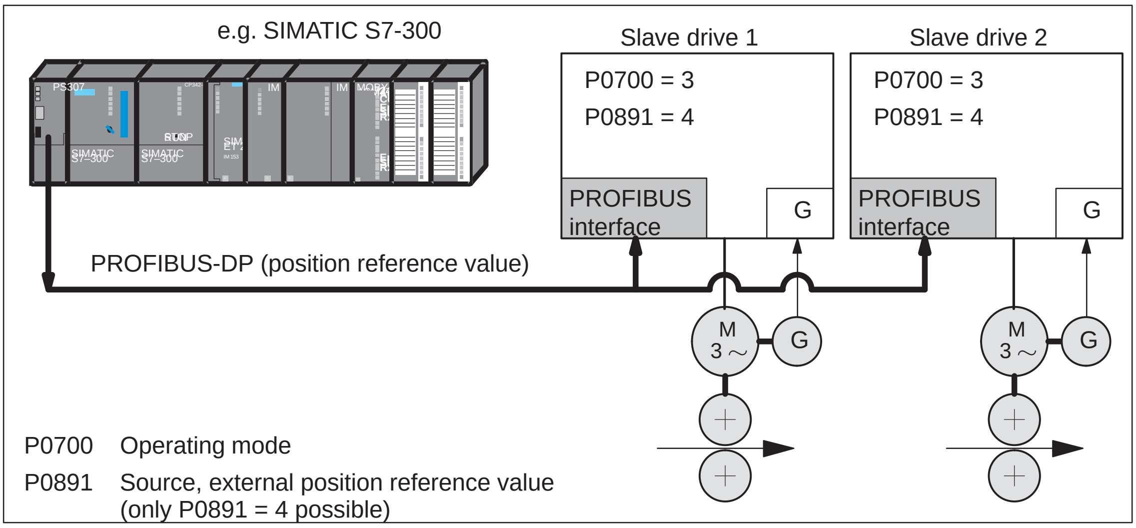


Fig. 6-28 DP master, e.g. SIMATIC S7300, as source for "external position reference value "

- Synchronous coupling between several DP slaves, of which, one must be a master drive.

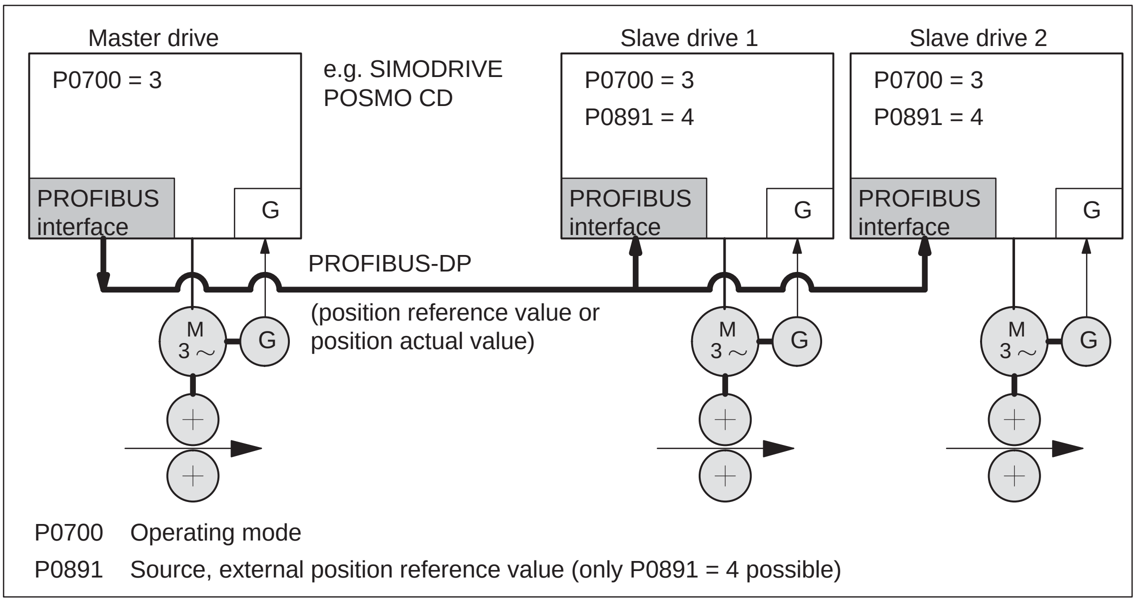


Fig. 6-29 Synchronous coupling between several DP slaves

Parameterizing the setpoint source

The external position reference value source is selected using P0891 (at the slave drive).

- P0891 = 4 Coupling via PROFIBUS-DP
  (the telegram must be appropriately parameterized on the master and slave drive sides)

PROFIBUS-DP process data and standard telegrams

The following process data is available for the master drive:

- XsollP (position reference value, number 50208)
- XistP (position actual value, number 50206)
- QZsw (status word, slave-to-slave communications, number 50118)
- dXcor (correction, position reference/actual value, number 50210)

The process data XsollP, QZsw and dXcor are included in standard telegram 108.

The following process data are available for the slave drive:

- Xext (external position reference value, number 50207)
- QStw (status word, slave-to-slave communications, number 50117)
- dXcorExt (correction, external position reference value, number 50209)

The process data Xext, QStw and dXcorExt are included in standard telegram 109.

For a position reference value coupling between POSMO SI/CD/CA, we recommend that standard telegram 108 is used for the master drive and standard telegram 109 for the slave drive.

Note

- It is not necessary to transfer dXcor or dXcorExt if, with the coupling switched-in, no external jumps/steps can occur in the external position reference value.
- It is not necessary to transfer QZsw or QStw if, when the coupling is switched-in, no external jumps/steps can occur in the position reference value and the ”passive referencing” function is not required.
- In the example in Chapter 5.10.5 for coupling 2 drives (master, slave drive) a description is provided how the hardware configuration can be parameterized for the necessary slave-to-slave data transfer and with SimoCom U, the telegrams.

6

Input/output evaluation

- Input format (slave drive):
  - Xext (external position reference value, number 50207)
  - dXcorExt (correction, external position reference value, number 50209)

  The following applies: $\text{Position in MSR} = \text{input value} \cdot \dfrac{P0896}{P0895}$

- Output format (master drive):
  - XsollP (position reference value, number 50208)
  - XistP (position actual value, number 50206)
  - dXcor (correction, position reference/actual value, 50210)

  The following applies: $\text{Output value} = \text{position in MSR} \cdot \dfrac{P0884}{P0896}$

  The output value must be able to be represented using 32 bits. This means that the maximum traversing distance that can be represented is:

  $$-2^{31} \frac{P0896}{P0895\ (P0884)} \cdots (2^{31}-1) \frac{P0896}{P0895\ (P0884)}$$

- The standard settings for PROFIBUS-DP are:
  - P0884 = 10000
  - P0895 = 10000
  - P0896 = 10000 MSR (μm)

  We recommend that this standard setting is modified as follows to achieve the best possible resolution:
  - P0884 = 2048
  - P0895 = 2048
  - P0896 = 5 MSR (μm)

  For this setting, the resolution is $\dfrac{5}{2048}$ μm
  and the traversing distance that can be represented is ± 5.24 m.

Note

Changes to P0884, P0895 and P0896 are incorporated in P0032 (external position reference value).

Position reference value inversion

The external position reference value can be inverted using P0897.

Note

Changes to P0897 are incorporated in P0032 (external position reference value).

Coupling factor

A coupling factor for all setpoint sources can be defined using P0401 and P0402. Revolutions of the master drive (P0401) correspond to revolutions of the slave drive (P0402).

Setpoint steps

If steps (jumps) occur in the external position reference value, e.g. after referencing the master drive, this must be signaled to the slave drive so that this does not execute this step

—>QZsw.0 = 1 (publisher) or QStw.0 = 1 (subscriber)

The amplitude of the step is transferred in word dXcor and is received in the word dXcorExt.

Note

- The slave drive corrects the setpoint when the 0/1 edge of the control bit is detected.
- If it can be guaranteed, that at the time of the setpoint step there is no coupling, then it is not necessary to transfer the step position dXcor.

Coupling configuration (P0410)

The coupling type is configured in the slave drive using P0410.

The following is defined for a coupling via P0410:

- Can be switched-in/switched-out via an input signal or traversing block
- Speed synchronism, position synchronism or to the absolute position of the master drive

—> refer to the following information.

For PROFIBUS-DP, P0410 = 7, i.e. can be switched-in/out via the input signal, coupling is preset to the absolute position.

6

Coupling-in/out via the input signal (P0410 = 1, 2 or 7)

For P0410 = 1, 2 or 7, the coupling can be switched-in/out via an input signal.

The following applies:

- When switching-in/switching-out the coupling, the drive to be coupled must remain stationary and a traversing program may not run.
- The coupling is switched-in/switched-out using the ”activate coupling” input signal.

  The input signal can be entered via input terminal or via PROFIBUS-DP.

  – Using input terminal with function number 72
  – Via PROFIBUS signal ”PosStw.4”

    What can be programmed for the coupling that is switched-in?

    After the ”activate traversing task” input signal, traversing blocks can be programmed with the commands:
    Relative position input, WAIT, GOTO, SET_O, RESET_O, ENDLESS TRAVERSING_POS, ENDLESS TRAVERSING_NEG
- Permissible block change enable circuits when coupled:

  Block change enable END, CONTINUE WITH STOP, CONTINUE FLYING and CONTINUE EXTERNAL (only for P0110 = 2)

- The coupling can be configured for speed synchronism, position synchronism or an absolute position.
  - P0410 = 1 Speed synchronism via input signal —> refer to Fig. 6-30
  - P0410 = 2 Position synchronism via input signal —> refer to Fig. 6-31
  - P0410 = 7 Absolute position

Note

If a traversing block is parameterized with COUPLING_IN and/or COUPLING_OUT and if the coupling is to be controlled using a digital signal, then when any traversing block is started, fault 166 is always output (not that traversing block with COUPLING_IN or with COUPLING_OUT).

Coupling-in/out via traversing block (P0410 = 3.4 or 8)

For P0410 = 3, 4 or 8, the coupling can be switched-in/switched-out via a traversing block.

The following applies:

- The coupling is switched-in/switched-out using the following commands:
  - COUPLING_IN

    What happens after COUPLING_IN?

    The drive waits until synchronism is achieved, and then executes the appropriate block change enable.

    When programmed with CONTINUE FLYING, the command always results in the block change enable CONTINUE WITH STOP.

    What can be programmed for the coupling that is switched-in?

    Traversing blocks can be programmed with the commands: Relative position data, WAIT, GOTO, SET_O, RESET_O.
    For ENDLESS TRAVERSING_POS, ENDLESS TRAVERSING_NEG, fault 105 is output.
  - COUPLING_OUT

    What happens after COUPLING_OUT?

    The drive switches-out the coupling, brakes down to standstill, and then executes the programmed block change enable.
- Permissible block change enable circuits when coupled:

  Block change enable END, CONTINUE WITH STOP, CONTINUE FLYING and CONTINUE EXTERNAL (only for P0110 = 2)

Note

- For blocks with COUPLING_IN/COUPLING_OUT, a block change enable with CONTINUE FLYING is not possible.
- For blocks with COUPLING_OUT, a block change enable with CONTINUE EXTERNAL is not possible.

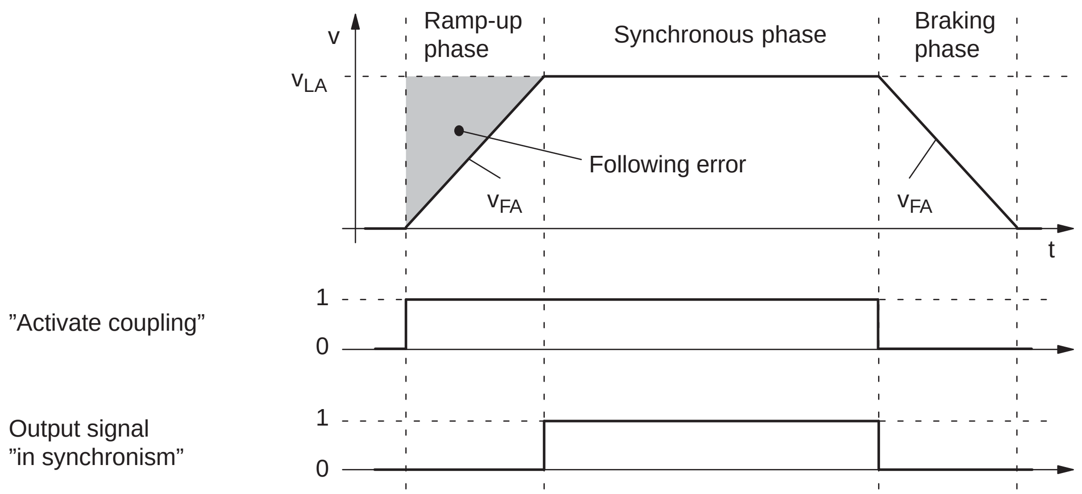
- The coupling can be configured for speed synchronism, position synchronism or an absolute position.
  - P0410 = 3 Speed synchronism via traversing block
    —> refer to Fig. 6-30
  - P0410 = 4 Position synchronism via traversing block
    —> refer to Fig. 6-31
  - P0410 = 8 Absolute position
    —> refer to Fig. 6-32

Speed synchronism (P0410 = 1 or 3)

For a speed-synchronous coupling, the drive accelerates after the coupling has been switched-in, with the acceleration in P0103, up to the speed of the master drive.

The following error, that is automatically obtained when the slave drive accelerates due to the different output velocities, is no longer reduced to zero.

The position difference of the two drives is constant in the synchronous phase.



v_{LA} Velocity, master drive

v_{FA} Speed setpoint, slave drive

Fig. 6-30 Speed synchronism (P0410 = 1 or 3)

Reader's note

The phases are described in Table 6-36.

Position synchronism (P0410 = 2 or 4)

For the position-synchronous coupling, the slave drive takes into account the distance moved by the master drive and the position offset, entered in P0412

After speed synchronism has been reached, the following error which has occurred and the position offset in P0412 is moved through with the supplementary speed in P0413.

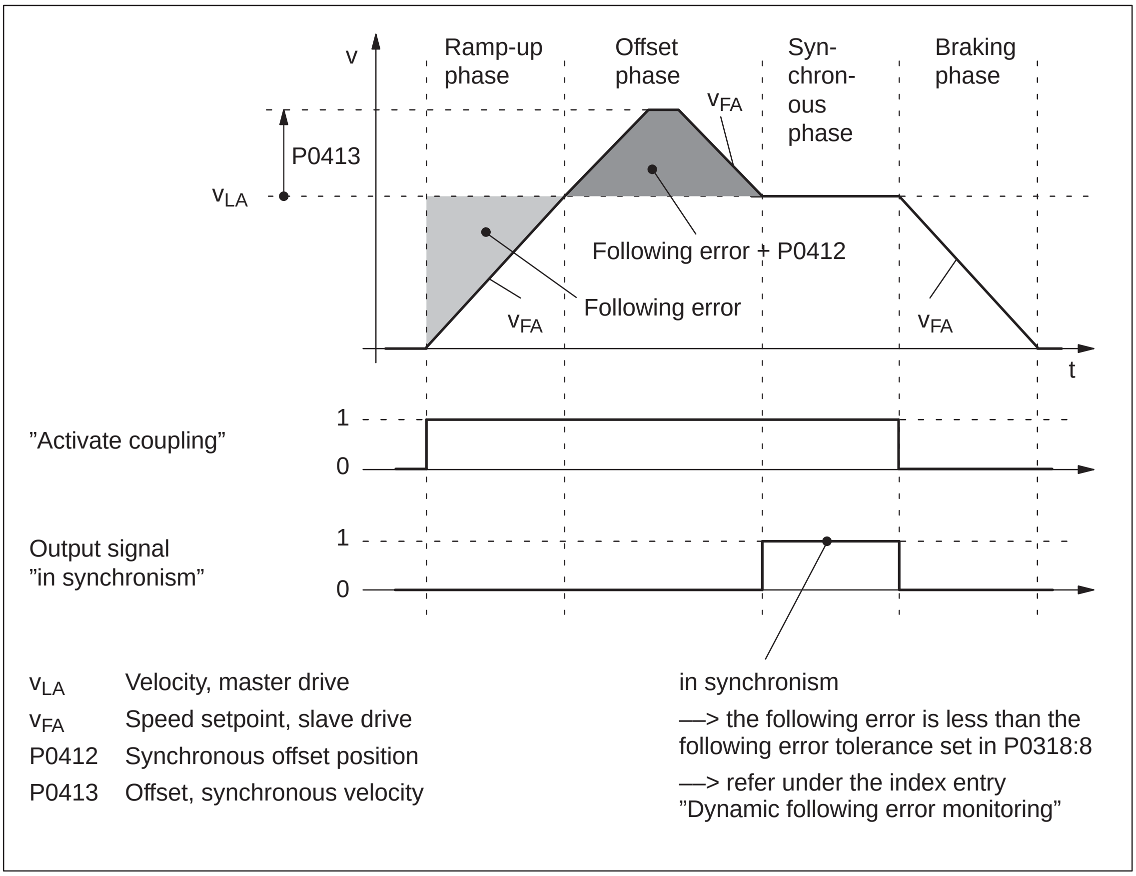


Fig. 6-31 Position synchronism (P0410 = 2 or 4)

Contrary to the coupling to the absolute position, an offset between the master and slave drives, existing before the coupling was established, is no longer taken into account in the offset phase.

Reader's note

The phases are described in Table 6-36.

Coupling to an absolute position (P0410 = 7 or 8)

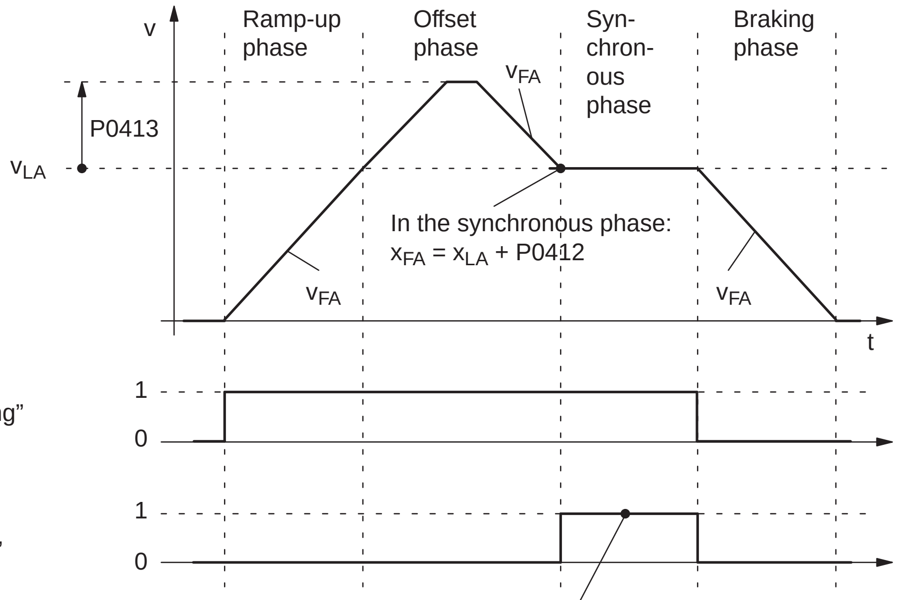
With this function, the slave drive, for P0410 = 7 or 8, synchronizes to the absolute position of the master drive plus an adjustable offset P0412. After synchronization, the master and slave drives have the same absolute position with the exception of the offset P0412.

The coupling can be switched-in/out using an input signal (P0410 = 7) or using a traversing block (P0410 = 8).

The following secondary conditions must be observed to implement a coupling to an absolute position:

- For P0891 = 4, the slave drive has the absolute position of the master drive.

  —> refer to the example, Chapter 5.10.5



v_{LA}	Velocity, master drive
v_{FA}	Speed setpoint, slave drive
x_{LA}	Position, master drive
xX_{FA}	Position, slave drive
P0412	Synchronous offset position
P0413	Offset, synchronous velocity

in synchronism

—> the following error is less than the following error tolerance set in P0318:8

—> refer under the index entry "Dynamic following error monitoring"

Fig. 6-32 To absolute position (P0410 = 7 or 8)

Reader's note

The phases are described in Table 6-36.

Table 6-36 Description of the phases for speed synchronism, position synchronism couplings and coupling to an absolute position

Phases	Speed-synchronous (P0410 = 1 or 3)	Position-synchronous (P0410 = 2 or 4)	Absolute position (P0410 = 7 or 8)
Ramp-up phase	After the coupling has been switched-in, the speed setpoint for the slave drive is ramped up to the master drive speed. The ramp gradient corresponds to the acceleration in P0103. This phase is completed after the slave drive has reached the speed of the master drive.		
Offset phase	–	After speed synchronism has been reached, the summed following error and the position offset, entered in P0412 is moved through with speed v_{LA} + P0413.	After speed synchronism has been reached, the drive moves by the offset in the absolute position of the master and slave drive and the position offset, entered into P0412 with speed v_{LA} + P0413.
Synchronous phase	For coupling-in/out using the input signal, the following applies (P0410 = 1, 2 or 7): —> A traversing program can be started. For coupling-in/out using the traversing block, the following applies (P0410 = 3, 4 or 8): —> The traversing program is continued. **Note:** • The setpoint input from PROFIBUS-DP and the setpoint input via the traversing blocks are superimposed on one another. • Traversing blocks with relative position data are permissible. • —> refer under the index entry "Output signal, digital – in synchronism"		
Braking phase	After the coupling has been switched-out, the drive goes into the braking phase and brakes down to standstill with the deceleration set in P0104. For coupling-in/out using the input signal, the following applies (P0410 = 1, 2 or 7): —> A traversing program can be started. For coupling-in/out using the traversing block, the following applies (P0410 = 3, 4 or 8): —> The traversing program is continued. **Note:** For coupling-in/out via input signal, the braking phase may only be initiated, if a traversing program is no longer running for the slave drive.		

Coupling using the queue functionality (P0410 = 5 or 6) (being prepared)

With this function, a coupling is established between the master and slave drives depending on a position memory (queue) being processed.

- Switching-in/switching-out the coupling: always via the traversing program
- P0410 = 5: Speed-synchronous
- P0410 = 6: Position-synchronous

Application example, queue functionality (refer to Fig. 6-33)

The master drive drives a conveyor belt. The position of the workpieces is detected using a measuring probe and saved in the slave drive in P0425:16. If a workpiece approaches its waiting position, the slave drive must accelerate in plenty of time so that it can move in synchronism with the workpiece in the machinery range.

Prerequisites:

When a workpiece is detected, the distance measured to the actual position of the slave drive is continuously entered into P0425:16. The first workpiece is entered under P0425:0 and the last under P0425:15.

A maximum of 16 positions can be saved —> otherwise, fault 168 is output (overflow, buffer memory).

For slave drives, a traversing program cyclically runs with coupling and machining commands.

Sequence:

1. The COUPLING IN command is executed, i.e. the slave drive waits to be synchronized to the master drive.
2. When will synchronization start, i.e. when will the coupling be switched-in?

   Synchronization is started when the next workpiece has reached the slave drive, i.e. if the distance between the workpiece and the slave drive in the next interpolation clock cycle is

   less than $\frac{v^2_{LA}}{2a_{FA}}$

   v_{LA} Velocity, master drive

   a_{FA} Acceleration, slave drive
3. To start, speed synchronism is established. After this, the oldest position is deleted from the position memory and for P0410 = 6, position synchronism established.

   The equalization motion is extremely short, as synchronization is predictive.

   After synchronism has been established, additional commands can be executed (e.g. to machine the workpiece).

   For the commands, the same conditions apply as for the programmable couplings.

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4. The coupling is switched-out using the command COUPLING_OUT. The drive remains stationary and the program is continued. From this time onwards, there are no restrictions regarding the commands.

   The slave drive can be returned to the waiting position e.g. using an additional command (POS ABS).

Traversing program in the slave drive

COUPLING IN ; wait until the next workpiece comes close

POS REL ; relative traversing motion

... blocks to be processed (i.e. for machining)

COUPLING OUT

POS ABS waiting position ; retraction to the waiting position

GOTO start

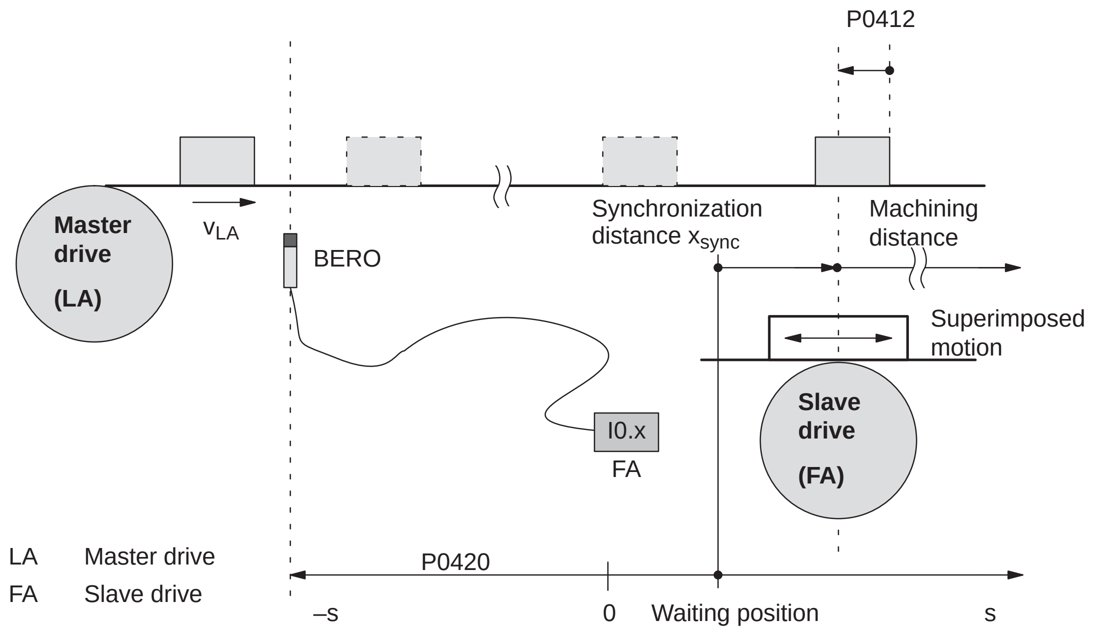

Fig. 6-33 Application example: Coupling via an input terminal with queue functionality

Axis coupling for modulo rotary axes (from SW 4.1)

In order to implement an axis coupling for modulo rotary axes, the following settings must be made:

- Which settings have to be made for the master axis?
  - ”Positioning” mode (P0700 = 3)
  - Set the modulo rotary axis (P0241, P0242)
- Which settings have to be made for the slave axis?
  - ”Positioning” mode (P0700 = 3)
  - Set the modulo rotary axis (P0241, P0242)
  - For the slave axis, the modulo range of the master axis must be specified in P0898.

    i.e.: P0242 (master axis) = P0898 (slave axis)

Note

The modulo range of the master axis can be the same or not equal to the modulo range of the slave axis.

This means: P0242 (master axis) = or ≠ P0242 (slave axis)

Modulo correction

Position reference value steps as a result of modulo correction are detected by the slave drive itself, i.e. it is not permissible that control bit QStw.0 or the correction value dXcorExt are set.

The following is required:

- P0898 must be correctly parameterized for the slave drive.
- The traversing difference between two position reference values is the maximum of half the modulo range (so that the direction of motion is clear)

Telegram loss

Telegrams may be lost when transferring data via Profibus-DP. In this case, the slave drive must extrapolate a new reference value position from the previous acceleration and velocity.

The correct position is only approached with the next valid telegram. If more telegrams are lost than are parameterized in P0879 , Fault 595 or 597 is output and the drive comes to a standstill.

Limitations/ secondary conditions

The following secondary conditions must be observed for position reference value and actual value coupling:

- Travel to fixed stop and coupling
  – It is not permissible to activate the ”travel to fixed stop” function when in the coupled mode (Fault 173).
  – The coupling cannot be switched-in while the ”travel to fixed stop” function is active (Fault 173).
- If it is predicted that a software limit switch will be passed, for coupled axes, one of the following faults/warnings will be signaled:
  – Fault 132 or 133 after a software limit switch has been passed (minus or plus)
  – Warning 891
  (software limit switch PLUS actuated, coupled)
  – Warning 892
  (software limit switch MINUS actuated, coupled)

  For a coupled drive, there is no response to warning 891 or 892. This can be signaled to the master drive using the output signal ”warning present”; this then allows the master drive to respond.

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- Only relative position data is permissible for traversing blocks when in the coupled mode (Fault 165).
- During an active coupling, a block change enable CONTINUE EXTERNAL is only possible with P0110 = 2 (Fault 172).
- The position of the master drive, at which the coupling was requested, is in P0425:0.
- The following applies for P0410 = 1, 2 or 7:
  - It is not possible to program the commands COUPLING_IN or COUPLING_OUT (Fault 166).
  - The coupling can be switched-in/switched-out via input terminal as follows:

    Assign function 72 to any input terminal
    —> Input signal ”activate coupling”
- The following applies for P0410 = 3, 4 or 8:

  The coupling cannot be switched-in/switched-out via an input signal.
- Rotary axis with modulo correction and basic coupling

  Coupling mode is permissible for rotary axes with modulo correction.
- For P0410 = 5 or 6, the following applies:
  - The standstill time of the slave drive up to the next workpiece must be at least 1 IPO clock cycle (P1010).
  - After COUPLING OUT for the slave drive, the drive should retract to its waiting position as otherwise it will continue to be positioned away from the target position.

- Limitations for a slave axis

Warning

When superimposing the speed of the master and slave drives, a resulting slave drive speed can be obtained which is greater than the maximum speed P0102. For slave axes, the speed monitoring in P1147, P1401:8 and P1405:8 applies.

Passive referencing for a slave drive (from SW 5.1)

The slave drive cannot autonomously reference if there is a permanent coupling. Instead, the master drive specifies the referencing motion. Using passive referencing, the slave drive can also be referenced.

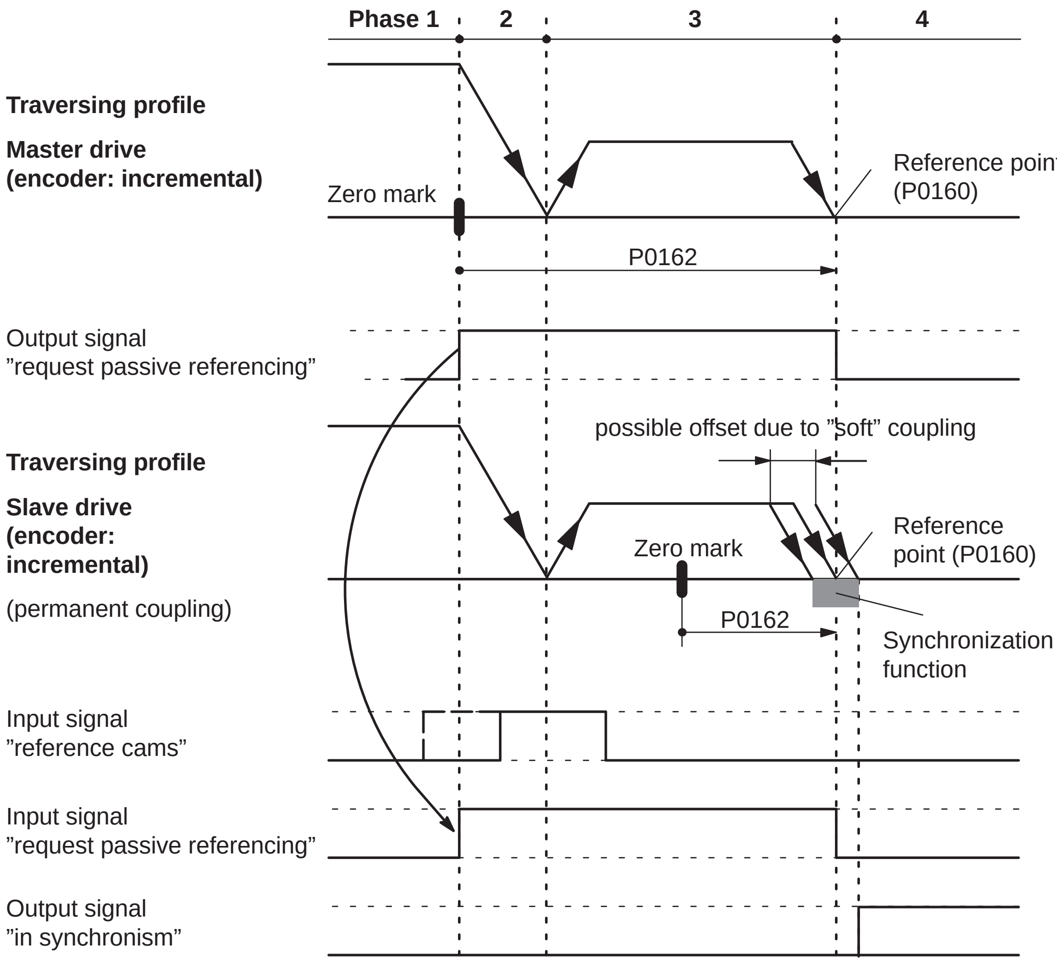
When executing passive referencing, the slave drive is precisely re-positioned at its own reference point.

The following commissioning help is available to determine and enter the reference point offset for the slave drive.

This means, e.g. that it is possible, for a gantry group, to automatically correct any possible skewing.

Passive referencing is possible for axes with absolute or incremental encoder. However, the drive with the absolute value encoder must first be adjusted using absolute value setting (Fault 176).

- Master and slave drive with incremental encoder.



P0160 Reference point coordinates

P0162 Reference point offset

Fig. 6-34 Sequence when passively referencing (master and slave drive with incremental encoder)

- Master drive with absolute value encoder and slave drive with incremental encoder.

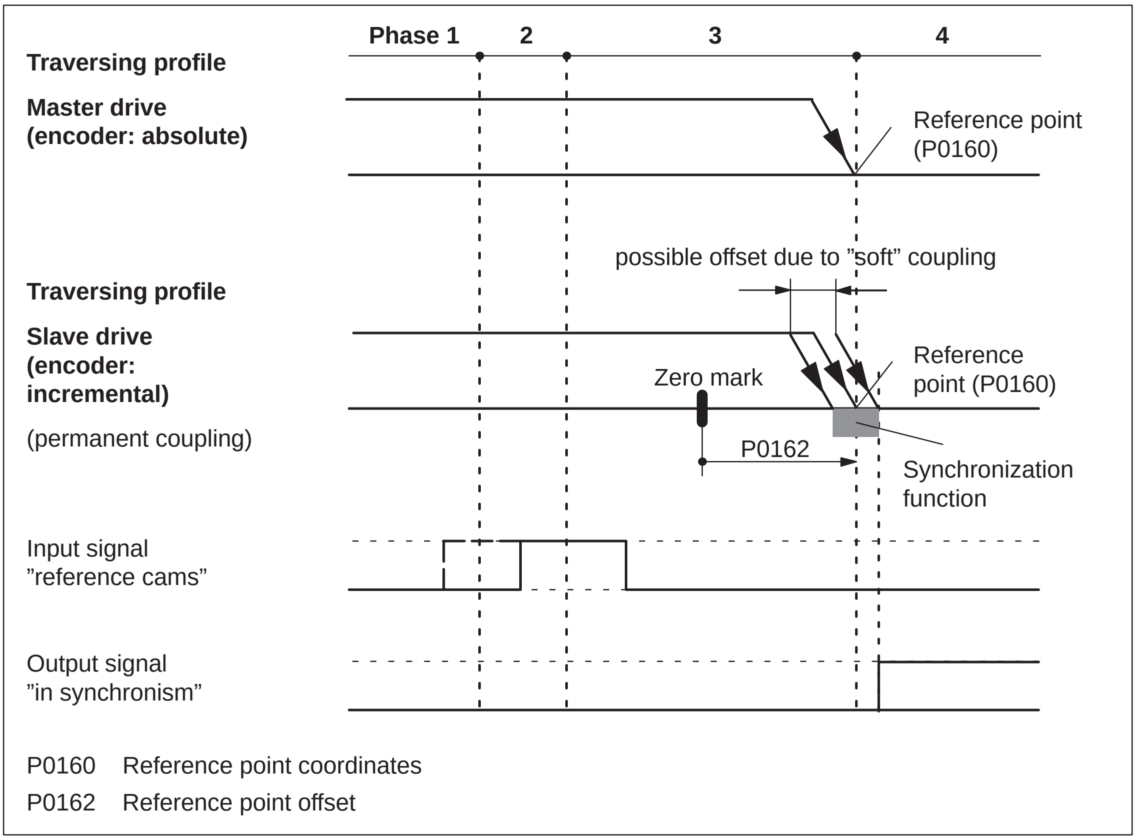


Fig. 6-35 Sequence when passively referencing (master drive with absolute value encoder, slave drive with incremental encoder)

If the slave drive with incremental encoder does not have any reference cams, then it must be referenced using the ”set reference point” input signal.

- Master drive with incremental encoder and slave drive with absolute value encoder.

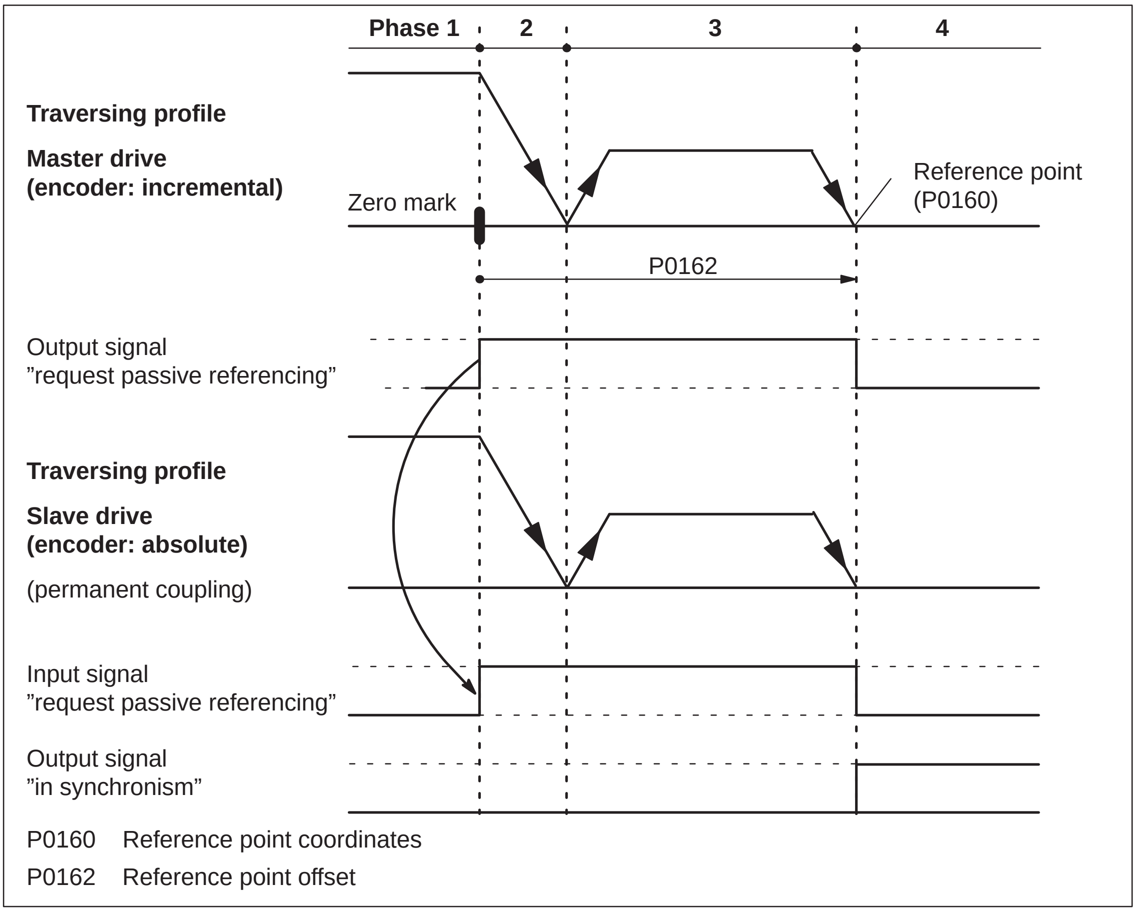


Fig. 6-36 Sequence when passively referencing (master drive with incremental encoder and slave drive with absolute value encoder)

Note

For a rigid mechanical coupling between the master and slave axes, it is not permissible that P0179 is set to 2 if the slave drive is equipped with an absolute value encoder. Otherwise, the slave drive would position (in absolute terms) to the position specified in P0160.

- Master and slave drive with absolute value encoder.

  For master and slave drive with absolute value encoder, passive referencing is not practical, as the axes have been adjusted corresponding to Chapter 6.2.7 (Adjustment for absolute measuring systems).

Timing when passively referencing (from SW 5.1)

The following timing for passive referencing applies when using incremental encoders for the master and slave drives. When referencing the master drive, after its zero mark is reached, passive referencing for the slave drive is requested. The master drive then traverses through the reference point offset up to the reference point.

During this travel, the slave drive must detect a 1/0 edge at the ”reference cam” input signal and then its own zero mark.

After the master drive has reached its reference point, the slave drive is moved to its reference point.

- Phase 1 Master drive searches for its zero mark

  The master drive has moved away from the reference cam and searches for the next zero mark.

  After the zero mark has been found, the following is initiated:

  – The drive is braked down to standstill

  – Master drive:
  Set the ”request passive referencing” output signal

  – Slave drive:
  When the ”request passive referencing” input signal has been detected, the slave drive starts to search for the 1/0 edge of the input signal ”reference cams” after which it searches for the zero mark

- Phase 2 The master drive starts to its reference point

  The master drive moves to traverse to its reference point. During this traversing operation, the slave drive continues to search for its zero mark.

- Phase 3 The master drive approaches its reference point

  When the reference point is reached, the following is initiated:

  – The ”request passive referencing” output signal is reset

  If the slave drive, up to this instant in time, has not found a zero mark, fault 175 is signaled.

- Phase 4 Slave drive referenced

  – For P0179 = 0

  After the reference point is reached, the value from P0160 is accepted as new actual value (set reference point).

  – For P0179 = 2

  After the axis has reached its standstill position, the axis is traversed, corresponding to P0162, to its own reference point with the velocity defined in P0413. The value from P0160 is then accepted as new actual value.

  —> Refer under the commissioning help for passive referencing of the slave drive

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Commissioning help to passively reference the slave drive (from SW 5.1)

The commissioning help is used to determine the reference point offset in P0162 for the slave drive.

Prerequisite: Set P0179 = 0

1. Carry-out passive referencing as usual (Fig.6-34).

Note

To execute the following points, the master drive must be precisely positioned at its reference point!

---

2. Slave drive:
   – In the jogging mode, the axis moves to its measured reference point

---

Note

Before ”jogging”, the coupling must be switched-out, otherwise ”jogging” is not possible. Switch-in the coupling again afterwards.

---

3. Slave drive:
   – Set P0179 = 1
     —> the distance between the zero mark and approached reference point is saved as offset in P0162
   – P0179 is internally set to 2
4. Save the parameters in the FEPROM
5. Carry-out a POWER-ON

This means that for future referencing, the reference point of the slave drive is ”correctly” approached.

Secondary conditions and limitations when passively referencing (from SW 5.1)

The following secondary conditions apply:

- The slave drive must find its own zero mark during phases 2 and 3.
- Passive referencing between the master and slave drive is controlled using the following signals:
  – Master drive: Output signal ”request passive referencing”
    —> using the output terminal with function number 69 (refer to Chapter 6.4)
    —> using the PROFIBUS status signal QZsw.1 (refer to Chapter 5.6.3)
  – Slave drive: Input signal ”request passive referencing”
    —> using an input terminal with function number 69 (refer to Chapter 6.4)
    —> using the PROFIBUS control signal QStw.1 (refer to Chapter 5.6.2)

  The master drive output signal should be connected to the input signal of the slave drive.

- The permanent coupling can be switched-in via an input signal or with the traversing block. Additional traversing blocks are not permitted.

  Example, switching-in with a traversing block using the ”Start-up Tool SimoCom U”:
  Command: COUPLING IN
  Block change enable: End
- If reference point approach is started at the master drive, and the slave drive is coupled-out and coupled-in again, then the slave drive outputs faults 131 and 605 if the master drive has reached its reference point. This means that after a reference point approach has been started, it is no longer possible to de-couple the axes.

Parameter overview (refer to Chapter A.1)

The following parameters are used for the function ”position reference value and actual value coupling”:

- P0179 Mode, passive referencing
- P0401 Coupling factor, revolutions master drive
- P0402 Coupling factor, revolutions slave drive
- P0410 Configuration, coupling that can be switched-in
- P0412 Synchronous offset position
- P0413 Offset, synchronous velocity
- P0420 Position difference, measuring probe to the zero point, slave drive
- P0425:16 Coupling positions
- P0884 PROFIBUS position output value - Number of increments
- P0891 Source, external position reference value
- P0895 External position reference value - No. of increments
- P0896 Ext. position reference value - No. of dimension system grids
- P0897 Inversion, external position reference value
- P0898 Modulo range, master drive

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Input/output signals (refer to Chapter 6.4, 5.6.2, 5.6.3)

The following signals are used for the function "position reference value and actual value coupling":

- Input signals
  (refer under index entry "Input signal, digital – ...")
  - Input signal, "activate coupling"
    —> using an input terminal with function number 72
    —> via the PROFIBUS control signal "PosStw.4"
  - Input signal "request passive referencing" (from SW 5.1)
    —> using an input terminal with function number 69
    —> using the PROFIBUS control signal "STW1.15" or alternatively "QStw.1"
- Output signals
  (refer under the index entry, "Output signal, digital – ...")
  - Output signal "in synchronism"
    —> using an output terminal with function number 71
    —> using the PROFIBUS status signal "PosZsw.3"
  - Output signal "request passive referencing" (from SW 5.1)
    —> using an output terminal with function number 69
    —> using the PROFIBUS control signal "ZSW1.15" or alternatively "QZsw.1"

Additional input/output signals

- Input signals
  (refer under index entry "Input signal, digital – ...")
  - Input signal, "set reference point"
  - Input signal "reference cams"
- Output signals
  (refer under the index entry, "Output signal, digital – ...")
  - Output signal, "controller enable status"
  - Output signal "fault present"
  - Output signal "warning present"

6.3.2 Handling faults in the master and slave drives

Overview

If a coupling is active, the master drive must be able to respond to slave drive faults.

It must also be guaranteed that the slave drive is reliably stopped, if the master drive develops a fault.

Faults in the slave drive

Dependent on the stop responses, the following should be observed for faults and warnings in the slave drive:

Table 6-37 Behavior when faults develop in the slave drive

Fault situations	What happens when these fault situations occur?
Faults with stop response STOP 0 STOP I STOP II STOP III	• The coupling is disconnected (switched-out) • The slave drive is appropriately braked • Output signals – Status, controller enable (status word ZSW1.2) = 0 – Fault present (status word ZSW1.3) = 1 – Warning present (status word ZSW1.7) = 0
Faults with stop response STOP IV STOP V STOP VI	• Block processing is interrupted • The slave drive remains closed-loop controlled and coupled • Output signals – Status, controller enable (status word ZSW1.2) = 1 – Fault present (status word ZSW1.3) = 1 – Warning present (status word ZSW1.7) = 0
Warnings with stop response STOP VII	• No response for the slave drive • Output signals – Status, controller enable (status word ZSW1.2) = 1 – Fault present (status word ZSW1.3) = 0 – Warning present (status word ZSW1.7) = 1
Withdrawing controller enable (control signal ON/OFF 1)	• When the controller enable is withdrawn (control signal ON/OFF 1) this does not have to result in faults being output • Output signals – Status, controller enable (status word ZSW1.2) = 0 – Fault present (status word ZSW1.3) = 0 – Warning present (status word ZSW1.7) = 0
Note: The required stop response can be initiated for a group of axes by appropriately externally evaluating the output signals of the slave drive.	

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Example:

In Fig. 6-37 it is shown how a differentiation can be made between the three stop classes as well as the withdrawal of the controller enable (control signal ON/OFF 1) using the three output signals ”status, controller enable”, ”fault present” and ”warning present”. Furthermore, it is indicated how the master drive and therefore the other slave drives could respond to these signals.

Note

The logical operations can be further optimized for the displayed behavior. However, at this position, it is important that a differentiation can be made between the various fault classes.

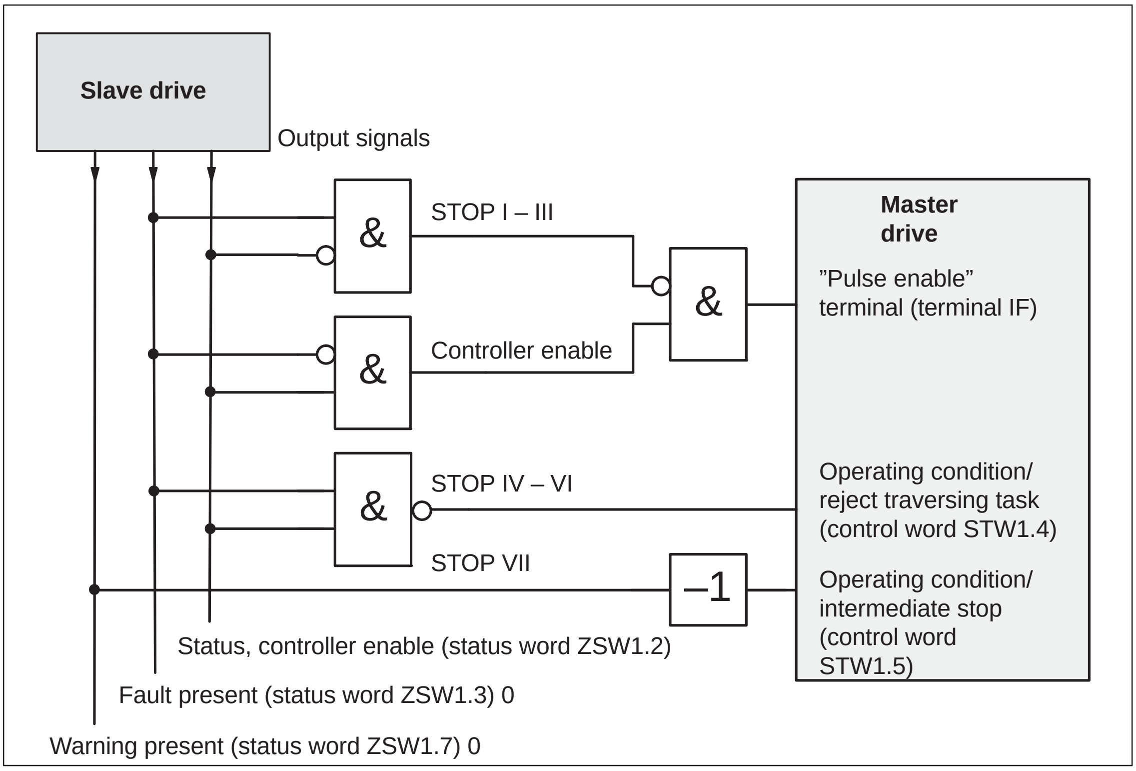


Fig. 6-37 Example: Handling faults in the slave drive through the master drive

Faults in the master drive

Faults in the master drive can be just as flexibly handled as the faults in the slave drive which were discussed above.

In this case, the master drive output signals are used, and are correspondingly connected to the input signals of the slave drive.

For an actual value coupling, it is not absolutely necessary to handle master drive faults, as the slave drive follows the actual value of the master drive anyway, and brakes when a fault situation develops.

On the other hand, for a setpoint coupling, it must be guaranteed that the drive group is correctly stopped when the setpoints fail.

6.3.3 Torque setpoint coupling

Description

A torque setpoint coupling (master/slave operation) between two rigidly connected drives can be established via PROFIBUS-DP.

How is this function activated?

- The master drive is changed-over into the closed-loop speed controlled mode.
- The torque setpoint at the speed controller output of the master drive is provided via the process data ”Msoll” (number 50114).
- The slave drive must be changed-over into the open-loop torque controlled mode using process data ”STW1.14”.
- The torque setpoint of the master drive should be read into the slave drive using process data ”MsollExt” (number 50113).

Standardization

P0882 determines the normalization of process data ”Msoll” and ”MsollExt”. The percentage value of the rated motor torque, entered into P0882, corresponds to value 16384 in the PROFIBUS interface.

The polarity of the torque setpoint can be inverted by entering negative values.

The torque, corresponding to 16384, is displayed in Nm in P1725 (P0882 · rated motor torque).

6

Smoothing and clock cycle

The ”Msoll” process data is smoothed using the transition frequency set in P1252. The pre-setting P1252 = 100 Hz can result in problems for mechanical couplings. If required, the smoothing (deadtime) should be disabled using P1252 = 0.

Application example master/slave

The master/slave functionality is implemented using PROFIBUS-DP.

Note

Master/slave operation is only possible for motors with encoders!

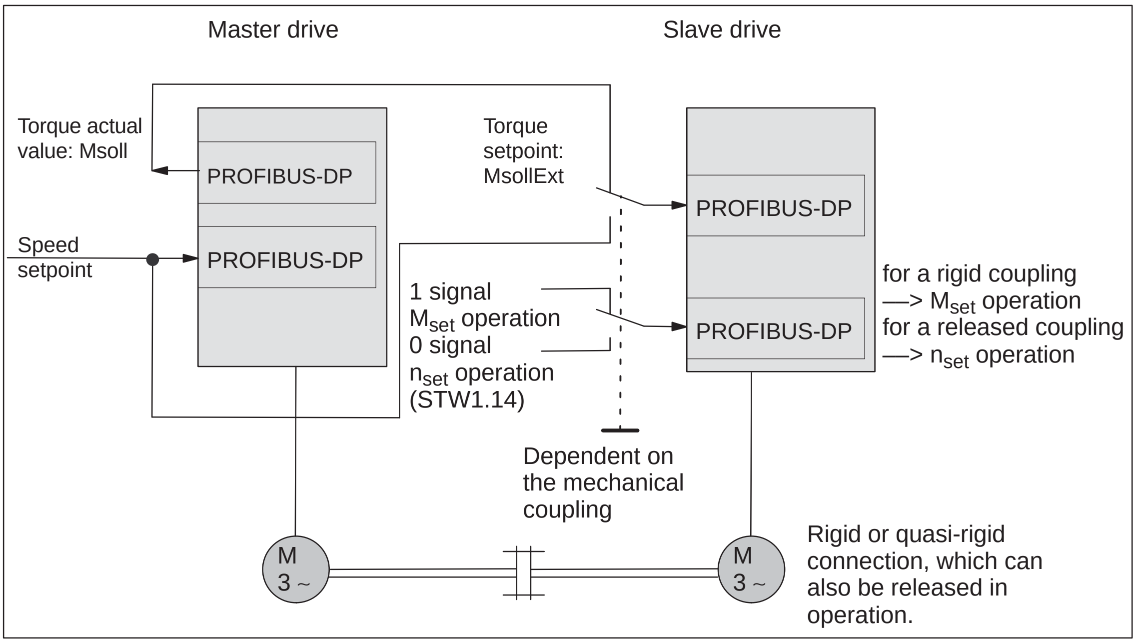


Fig. 6-38 Example: Coupling 2 drives with master/slave to PROFIBUS-DP

Warning

If, for a master/slave configuration, the rigid mechanical coupling is released (the coupling is opened) then at the same time the slave drive must be changed over to n_{set} operation as otherwise the slave drive would accelerate in an uncontrolled fashion to the maximum speed.

Parametrierung DP Master

The diagrams 6-40 and 6-39 indicate the steps when configuring S7 for an example with the standard telegram 102 as template.

In the example, it is assumed that the encoder interface is not required. The appropriate process data is therefore canceled.

The following data should be parameterized in the DP master (e.g. SIMATIC S7):

- Configuration, master drive —> Number of process data which must match the selected telegrams
  - 4 words, PKW
  - 6 words, actual values to the DP master
  - 5 words, setpoints from the DP master

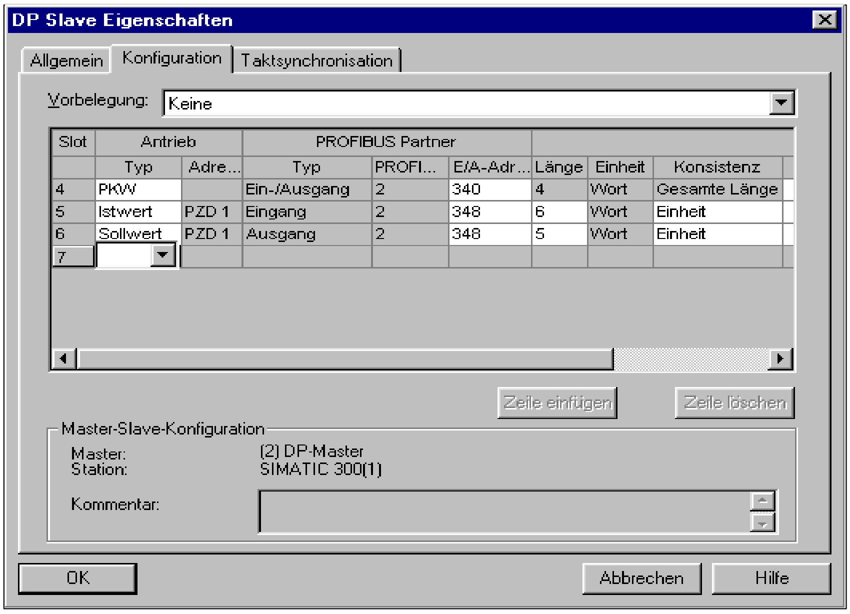


Fig. 6-39 Example, configuring the master drive for S7

- Configuring the slave drive to match the telegram
  —> define the slave-to-slave communication link
  - 4 words, PKW
  - 5 words, actual values to the DP master
  - 5 words, setpoints from the DP master
  - 1 word, setpoints via slave-to-slave communications

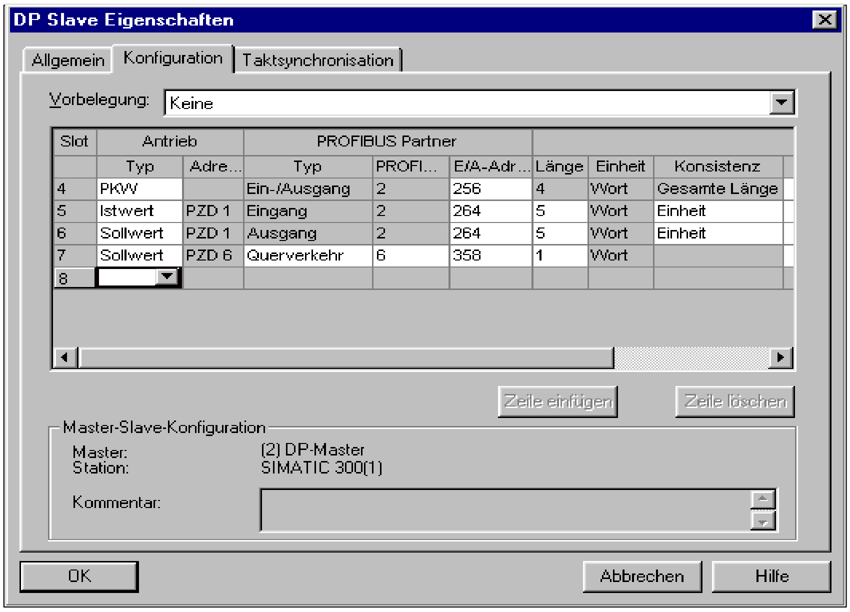


Fig. 6-40 Example, configuring the slave drive for S7

Parameterizing the master drive

The following parameters should be set:

- P0922 = 0
  In the example, the standard telegram 102 is extended by Msoll.
  —> the telegram should be configured as follows:

PZD1	PZD2	PZD3	PZD4	PZD5	
STW1	NSOLL_B		STW2	MomRed	**Setpoint**
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	
ZSW1	NIST_B		ZSW2	MeldW	Msoll	**Actual value**
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50114	

Fig. 6-41 Configuring the telegram, master drive

- P0916:6 = 50114 —> status word Msoll
- Check P1252 (smoothing, Msoll)
- P0915:6 = 0 and P0916:7...10 = 0
  —> disable the encoder interface (optional)

Parameterizing the slave drive

The following parameters should be set:

- P0922 = 0
  In the example, the standard telegram 102 is extended by MsollExt.
  —> the telegram should be configured as follows:

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	
STW1	NSOLL_B		STW2	MomRed	MsollExt	**Setpoint**
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50113	

PZD1	PZD2	PZD3	PZD4	PZD5	
ZSW1	NIST_B		ZSW2	MeldW	**Actual value**
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	

Fig. 6-42 Configuring a telegram, slave drive

- P0915:6 = 50113 —> control word MsollExt
- P0916:6...10 = 0 —> disables the encoder interface (optional)

Note

The normalization at the master and slave drive can be influenced using P0882.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”torque setpoint coupling” function:

- P0882 Evaluation, torque setpoint PROFIBUS
- P0881 Evaluation, torque/power reduction PROFIBUS
- P0916 PZD actual value assignment, PROFIBUS
- P0922 Telegram selection PROFIBUS
- P1252 Transition frequency, torque setpoint smoothing
- P1725 Normalization, torque setpoint

Input/output signals (refer to Chapter 6.4)

The following signals are used for the function ”torque setpoint coupling”:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  – Input signal ”open-loop torque controlled operation”
    —> using an input terminal with function number 4
    —> via PROFIBUS control signal ”STW1.14”
  – Input signal ”external torque setpoint”
    —> using the PROFIBUS control signal ”MsollExt”
  – Input signal ”torque limit reduction”
    —> via PROFIBUS control signal ”MomRed”
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  – Output signal ”in synchronism”
    —> using an output terminal with function number 71
    —>using the PROFIBUS status signal ”PosZsw.3”
  – Output signal ”open-loop torque controlled operation”
    —> using the PROFIBUS status signal ”ZSW1.14”
  – Output signal ”smoothed torque setpoint”
    —> using the PROFIBUS status signal ”Msoll”
  – Output signal ”smoothed torque-generating current Iq”
    —> using the PROFIBUS status signal ”IqGl”

6.4 Input/output terminals

Note

POSMO SI/CD/CA has no hardware input/output terminals.

Digital inputs and outputs are in the form of connectors.

In order that there is some commonality and standardization to the common parameter description, alarm list and online help between ”SIMODRIVE 611 universal” and POSMO SI/CD/CA, and also in the descriptive literature for POSMO, the term input/output terminals is used.

6.4.1 Digital inputs which can be freely parameterized (input terminals)

Description

There are two (three, from SW 4.1) digital input terminals which can be freely parameterized.

- Where are the digital input terminals connected?

  On the PROFIBUS unit (refer to Chapter 2.4):

  – Two via X23

  – One via X24, by parameterizing the output terminal X24.2 (O1.A) as input terminal (I2.A) (P0677 = 1)

- How are these digital input terminals parameterized?

  A digital input terminal is parameterized, by entering the appropriate function number into the assigned parameter.

  Which function numbers are available? —> Refer to Chapter 6.4.2

Note

- Rules when assigning input terminals a multiple number of times

  The terminals are evaluated in the following sequence:
  I0.A – I2.A
  If a function is assigned a multiple number of times to an input terminal, influence is only possible using the ”last” terminal assigned this particular function.

- Rule regarding hardware terminal and PROFIBUS signal

  The hardware terminal has priority over the PROFIBUS signal, this means that a signal via a terminal always has priority over the ”same” PROFIBUS signal.

Notice

Digital input terminals may only be parameterized after the pulses have been canceled.

If a function has been activated for an input terminal, but the input is not connected, then a ”0” signal is effective.

Note

Terminal I0.A is internally hard-wired to the position sensing where it acts almost instantaneously. The following input signals from Table 6-38 are only to be switched via this ”fast input”:

Fct. No.	Name of the function
79	Equivalent zero mark
80	Flying measurement/length measurement

Overview of the terminals and parameters

There is the following assignment between terminals and parameters:

Table 6-38 Overview of the freely-parameterizable input terminals

Terminal		Parameter						
		No.	Name	Min.	Standard	Max.	Units	Effective
I0.A	X23.4	0660	Function, input terminal I0.x	0	0 (SRM, SLM) 0 (ARM)	82	–	Immediately
I1.A	X23.2	0661	Function, input terminal I1.x	0	0 (SRM, SLM) 0 (ARM)	82	–	Immediately
I2.A	X24.2 (from SW 4.1)	0661	Function, input terminal I2.x	0	0 (SRM, SLM) 0 (ARM)	82	–	Immediately
–	–		Each input terminal can be assigned a function using these parameters. The function number from the list of input signals is entered (refer to Chapter 6.4.2). **Note:** The status of the input terminals is displayed in P0678 for diagnostic purposes (refer to Chapter 4.4). From SW 4.1, digital output 2 can also be optionally parameterized as digital input 3 (I2.A) (P0677 = 1).					

6.4.2 List of input signals

Table 6-39 Overview of the input signals

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Inactive	0	x	x	–
Reset the fault memory	3	x	x	STW1.7
Open-loop torque controlled mode	4	x	–	STW1.14
Motor data set changeover 1st input/2^0 2nd input/2^1	 5 6	 x x	 – –	 STW2.9 STW2.10
Ramp-up time zero	7	x	x	STW2.4
Integrator inhibit, speed controller	8	x	x	STW2.6
Parameter set changeover 1st input/2^0 2nd input/2^1 3rd input/2^2	 9 10 11	 x x x	 x x x	 STW2.0 STW2.1 STW2.2
Fixed speed setpoint 1st input/2^0 2nd input/2^1 3rd input/2^2 4th input/2^3	 15 16 17 18	 x x x x	 – – – –	 – – – –
First speed setpoint filter off	25	x	x	STW2.3
Suppress fault 608	26	x	x	STW2.8
Spindle positioning on (from SW 5.1)	28	x	–	STW1.15
ON/OFF 1	31 (from SW 8.3)	x	x	STW1.0
Operating condition/OFF 2	32 (from SW 4.1)	x	x	STW1.1
Operating condition/OFF 3	33 (from SW 5.1)	x	x	STW1.2
Enable inverter/pulse inhibit	34 (from SW 4.1)	x	x	STW1.3
Ramp-function generator enable	35	x	–	STW1.4
Selection, parking axis	40	x	x	STW2.7
Activate function generator (edge) (from SW 8.1)	41 (from SW 9.1)	x	–	STW1.8
Activate function generator (edge) (from SW 9.1)	41	–	x	PosStw.15
Opening the holding brake for test purposes (from SW 4.1)	42	x	x	STW1.12

Table 6-39 Overview of the input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Block selection 1st input/2^0	50	x	x	SatzAnw.0
2nd input/2^1	51	x	x	SatzAnw.1
3rd input/2^2	52	x	x	SatzAnw.2
4th input/2^3	53	x	x	SatzAnw.3
5th input/2^4	54	x	x	SatzAnw.4
6th input/2^5	55	x	x	SatzAnw.5
Operating condition/reject traversing task	58	–	x	STW1.4
Operating condition/intermediate stop	59	–	x	STW1.5
Activate traversing task (edge)	60	–	x	STW1.6
Incremental jogging (from SW 4.1)	61	–	x	PosStw.5
Jogging 1 ON/jogging 1 OFF	62	–	x	STW1.8
Jogging 2 ON/jogging 2 OFF	63	–	x	STW1.9
Activate teach-in (edge) (from SW 4.1)	64	–	x	PosStw.6
Start referencing/cancel referencing	65	–	x	STW1.11
External block change	67	–	x	STW1.13
Fixed stop, sensor	68	–	x	PosStw.3
Request passive referencing (from SW 5.1)	69	–	x	STW1.15
Tracking mode	70	–	x	PosStw.0
Set reference point	71	–	x	PosStw.1
Activate coupling (from SW 4.1)	72	–	x	PosStw.4
Reference cams	78	–	x	PosStw.2
Equivalent zero mark	79	x	x	–
Flying measurement/length measurement	80	x	–	–
Plus hardware limit switch (NC contact) (n-set from SW 8.1)	81	x	x	–
Minus hardware limit switch (NC contact) (n-set from SW 8.1)	82	x	x	–
Activate MDI (from SW 7.1)	83	–	x	SatzAnw.15
Ramp-function generator start/ramp-function generator stop	–	x	–	STW1.5
Enable setpoint/inhibit setpoint	–	x	–	STW1.6
Control requested/no control requested	–	x	x	STW1.10
Ramp-up time zero for controller enable (control signal ON/OFF 1)	–	x	–	STW1.13
Motor changed over	–	x	–	STW2.11
Master sign-of-life	–	x	x	STW2.12 STW2.13 STW2.14 STW2.15

6

Reader’s note

The drive receives the input signals, listed in Table 6-40, either from an input terminal or as control bit from PROFIBUS.

POSMO SI/CD/CA only has two (three, from SW 4.1) input terminals (digital inputs). This means that the input signals are limited to these three input terminals!
All of the input signals can be found under the index entry ”Input signal...”.

The following must be specified for each signal:

- Fct. No.:
  The function number is required to parameterize the input terminal.
- Operating mode (P0700):
  This specifies in which operating mode the signal is available
  (x: Available, –: Not available).

  n-set: ”Speed setpoint” mode
  pos: ”Positioning” mode
- PROFIBUS bit:
  The bit name is required to control the signal via PROFIBUS-DP (refer to Chapter 5.6.1).
  Example: STW1.4 —> that means control word 1, bit 4

Table 6-40 List of input signals

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n-set	pos	
Inactive	**0**	**x**	**x**	**–**
The input with this function is switched ”inactive”. The input terminal can still be connected-up, but is not evaluated. **Application:** During commissioning (start-up), ”disturbing” inputs are first disabled, and are then activated later and commissioned.				

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Reset the fault memory	**3**	**x**	**x**	**STW1.7**

Faults that are present that are acknowledged with RESET FAULT MEMORY, are reset via this input signal.

Before acknowledging faults/errors, their cause must first be removed.

Prerequisite: The controller enable (control signal ON/OFF1) has been withdrawn.

1 signal No effect

0/1 signal The fault memory is reset and the fault(s) acknowledged using a 0/1 edge.

0 signal No effect

Note:

- Faults, which can be acknowledged with POWER ON, cannot be reset in this fashion.
- The drive remains in the fault condition until all of the faults/errors have been removed.
  In the PROFIBUS mode the system then goes into the "power-on inhibit" status.
- From SW 6.1 onwards and for P1012.12=1, the fault can also be acknowledged without the prerequisite that the control signal STW1.0=0. The drive however, remains in the "power-on inhibit" condition.

Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
Open-loop torque controlled mode	**4**	**x**	**–**	**STW1.14**

It is possible to toggle between closed-loop speed controlled and open-loop torque controlled operation via this input signal.

1 signal Open-loop torque controlled operation (M_{set} mode)

0 signal Closed-loop speed controlled operation (n_{set} mode)

Application: Master/slave, refer to Chapter 6.3.3.

Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
Motor data set changeover				
1st input/2^0	**5**	**x**	**–**	**STW2.9**
2nd input/2^1	**6**	**x**	**–**	**STW2.10**

It is possible to toggle between a total of 4 motors/motor data sets using these 2 input signals.

Motor data set	1	2	3	4
1st input/weighting 2^0	0	1	0	1
2nd input/weighting 2^1	0	0	1	1

Note:

- The motor changeover version and therefore the behavior of the terminal, is selected using P1013 (motor changeover).
- Output terminal signals with function numbers 11, 12, 13 and 14 (motors 1, 2, 3 or 4 selected) are used to control the contactors to change over the motor.
- In order to ensure that the function changes over in a controlled fashion (identified as being simultaneous) the switching operation of the inputs must be completed with one interpolation clock cycle (P1010).
- Motor changeover is described in Chapter 6.9.

Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
Ramp-up time zero	**7**	**x**	**x**	**STW2.4**

The ramp-function generator (RFG) can be switched-in and out via this input signal.

1 signal Ramp-function generator off
This acts just like a ramp-up and ramp-down of the ramp-function generator of 0 ms.

0 signal Ramp-function generator on

6

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Integrator inhibit, speed controller	**8**	**x**	**x**	**STW2.6**
The integral component of the speed controller can be inhibited or enabled using this input signal. 1 signal Integrator inhibit, speed controller 0 signal The speed controller integrator is not inhibited **Note:** For a 1 signal, the integral component of the speed controller is deleted (cleared) and the integrator is inhibited.				
Parameter set changeover **1st input/2^0** **2nd input/2^1** **3rd input/2^2**	 **9** **10** **11**	 **x** **x** **x**	 **x** **x** **x**	 **STW2.0** **STW2.1** **STW2.2**

It is possible to toggle between a total of 8 parameter sets using these 3 input signals.

Parameter set	0	1	2	3	4	5	6	7
1st input/weighting 2^0	0	1	0	1	0	1	0	1
2nd input/weighting 2^1	0	0	1	1	0	0	1	1
3rd input/weighting 2^2	0	0	0	0	1	1	1	1

Standard setting

Note:

- The bits, which are not assigned to an input terminal, can still be controlled via PROFIBUS.
- To change over, e.g. from parameter set 0 to 1, only the signal of the 1st input is necessary.
- In order to ensure that the function changes over in a controlled fashion (identified as being simultaneous) the switching operation of the inputs must be completed with one interpolation clock cycle (P1010).
- The ”parameter set changeover” function is described in Chapter 6.8.

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Fixed speed setpoint **1st input/2^0** **2nd input/2^1** **3rd input/2^2** **4th input/2^3**	 **15** **16** **17** **18**	 **x** **x** **x** **x**	 **–** **–** **–** **–**	 **–** **–** **–** **–**

Using these input signals, the ”fixed speed setpoint” function can be selected with the required fixed setpoints 1 to 15, or the function can be canceled.

Fixed speed setpoint		**1**	**2**	**3**	**4**	**5**	**...**	**15**
1st input/weighting 2^0	0	1	0	1	0	1	...	1
2nd input/weighting 2^1	0	0	1	1	0	0	...	1
3rd input/weighting 2^2	0	0	0	0	1	1	...	1
4th input/weighting 2^3	0	0	0	0	0	0	...	1
Active fixed speed setpoint	↑	P0641:1	P0641:2	P0641:3	to			P0641:15

Canceling the function

Selecting the function and the required fixed setpoint

Note:

- The ”fixed speed setpoint” function is described in Chapter 6.1.6.
- In order to ensure that the function changes over in a controlled fashion (identified as being simultaneous) the switching operation of the inputs must be completed with one interpolation clock cycle (P1010).
- Refer to the ”status, fixed speed setpoint 1st to 4th input” output signal in Chapter 6.4.4.

Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
First speed setpoint filter off	**25**	**x**	**x**	**STW2.3**

The first speed setpoint filter is switched-in/switched-out using this input signal.

Notice:

This function is only effective if the filter was parameterized using P1501:8 as lowpass filter (e.g. PT1).

Thus, the low-pass filter of the 1st speed setpoint filter can be disabled/enabled using this input signal, which allows the speed setpoint to be smoothed.

1 signal	First speed setpoint filter is disabled	—>	Low-pass filter is disabled
0 signal	First speed setpoint filter is enabled	—>	Low-pass filter is enabled

Note:

The status of the 1st speed setpoint filter is displayed using the ”first speed setpoint filter inactive” output signal.

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Suppress fault 608	**26**	**x**	**x**	**STW2.8**
Fault 608 (speed controller output limited) can be suppressed/displayed using this input signal. 1 signal Fault 608 (speed controller output limited) is suppressed 0 signal Fault 608 is not suppressed **Note:** • The status of the suppress function is signaled using the PROFIBUS status signal ZSW2.8 ”Suppress fault 608 active”. • Refer to the index entry ”Output signal – suppress fault 608 active” • It is also possible to suppress the fault using P1601.8 (faults which can be suppressed 2, Fault 608).				
Spindle positioning on (from SW 5.1)	**28**	**x**	**–**	**STW1.15**
The function is activated using this input signal. 1 signal Activates the ”spindle positioning” function 0 signal De-activates the function **Note:** • Prerequisites to activate the ”Spindle positioning” function – ”n-set” mode —> P0700 = 1 • The ”spindle positioning” function is described in Chapter 6.13 (from SW 5.1).				
ON/OFF 1	**31 (from SW 8.3)**	**x**	**x**	**STW1.0**
0/1 signal ON state ”drive ready” The prerequisite is that STW1.1 and STW1.2 of the input signals ”operating condition/OFF2” (Fct. No. 32) and the ”operating condition/OFF3” (Fct. No. 33) are also set. The pulses remain canceled until the prerequisites for pulse enable have been fulfilled. 0 signal OFF 1 Stop The drive brakes along the ramp-function generator ramp. The gating pulses of the power transistors are cancelled (pulse inhibit) if one of the following conditions is fulfilled: – $\lvert n_{act} \rvert$ < n (P1403) or – the pulse cancellation timer stage (P1404) has expired				
Operating condition/OFF 2	**32 (from SW 4.1)**	**x**	**x**	**STW1.1**
1 signal Operating condition Prerequisite for the ”drive ready” status. 0 signal OFF 2 The motor is switched into a no-current condition and ”coasts down”. **Note:** The characteristics at power-on again can be defined via P1012.12. P1012.12 = 1 Power-on inhibit for alarm and OFF 2/OFF 3 = 0 No power-on inhibit				

Table 6-40 List of input signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Operating condition/OFF 3</td><td>33 (from SW 5.1)</td><td>x</td><td>x</td><td>STW1.2</td></tr>
<tr><td colspan="5">1 signal Operating condition
Prerequisite for the ”drive ready” status and ”ready to power-up”.
0 signal OFF 3
Fast stop
The drive brakes along the torque limit/current limit without ramp-function generator. In the open-loop torque controlled mode, this limit only corresponds to the specified torque setpoint and not the maximum possible torque.
The gating pulses of the power transistors are cancelled (pulse inhibit) if one of the following conditions is fulfilled:
– $|n_{act}| < n$ (P1403)
or
– the pulse cancellation timer stage (P1404) has expired
Note:
The characteristics at power-on again can be defined via P1012.12.
P1012.12 = 1 Power-on inhibit for alarm and OFF2/OFF3
= 0 No power-on inhibit</td></tr>
<tr><td>Enable inverter/pulse inhibit</td><td>34 (from SW 4.1)</td><td>x</td><td>x</td><td>STW1.3</td></tr>
<tr><td colspan="5">1 signal Enable inverter
Pulse enable, ramp-up with the setpoint entered
0 signal Pulse inhibit
The motor coasts down. In closed-loop speed controlled operation, the ”drive ready” state remains set.</td></tr>
<tr><td>Ramp-function generator enable</td><td>35</td><td>x</td><td>–</td><td>STW1.4</td></tr>
<tr><td colspan="5">This input signal has the following characteristics, dependent on the signal level:
1 signal Ramp-function generator is enabled
Any speed setpoint can be entered.
This is the condition that the motor rotates.
1/0 signal Ramp-function generator is not longer enabled
The drive brakes at the torque/current limit without ramp-function generator.
This is the fastest possible braking at the torque/current limit.
0 signal The ramp-function generator output (speed setpoint) is set to 0.
Application:
The drive can be braked as quickly as possible using this signal, i.e. not along the ramp-function generator ramp, but at the torque limit.</td></tr>
</table>

6

Table 6-40 List of input signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Selection, parking axis</td><td>40</td><td>x</td><td>x</td><td>STW2.7</td></tr>
<tr><td colspan="5">The drive can be declared a ”parking axis”, using this input signal.
1 signal ”Parking axis” selected
The parking axis selection is only activated when the pulses are canceled or the controller is inhibited with subsequent pulse cancellation (e.g. using terminal ”pulse enable” control signals ON/OFF1) (refer to the output signal ”Parking axis selected”).
The encoder-specific monitoring functions are suppressed for a parking axis.
The output signal ”reference point set” is withdrawn.
0 signal ”Parking axis” canceled
The monitoring functions are active corresponding to the setting in P1600.
Application:
It is possible to change over from one motor encoder unit to another unit using the ”parking axis” function, without having to power down the drive.
Note:
After the ”parking axis” function has been canceled, the following is valid:
• Incremental measuring system: The axis must be re-referenced (refer to Chapter 6.2.5).
• Absolute measuring system (EnDat): The axis must be re-adjusted (refer to Chapter 6.2.7).
The adjustment status cannot be withdrawn by just selecting or canceling the ”parking axis” function. This status is only permanently withdrawn when an another absolute value encoder has also been automatically detected.</td></tr>
<tr><td>Activate function generator (edge) (from SW 8.1)</td><td>41
(from SW 9.1)</td><td>x</td><td>–</td><td>STW1.8
(from SW 8.1)</td></tr>
<tr><td>Activate function generator (edge) (from SW 9.1)</td><td>41</td><td>–</td><td>x</td><td>PosStw.15</td></tr>
<tr><td colspan="5">When the function generator or the measuring function is appropriately parameterized, a synchronous start of the function generator or the measuring function is activated – e.g. for mechanically coupled axes (gantry axis group).
0/1 signal Function generator or measuring function is activated
1/0 signal Function generator or measuring function is de-activated
Note:
The function generator is described in Chapter 7.3.1.</td></tr>
<tr><td>Opening the holding brake for test purposes (from SW 4.1)</td><td>42</td><td>x</td><td>x</td><td>STW1.12</td></tr>
<tr><td colspan="5">A holding brake can be opened for test purposes during the commissioning phase using this input signal.
1 signal The function is activated
0 signal De-activates the function
Note:
This input signal is only evaluated if the brake control is activated using P0850 = 1. In the operating mode, the brake is controlled using P0850 (operating sequence control) and not via this input signal.</td></tr>
</table>

Table 6-40 List of input signals, continued

Signal name, description		Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Block selection	**1st input/2^0**	**50**	**x**	**x**	**SatzAnw.0**
	2nd input/2^1	**51**	**x**	**x**	**SatzAnw.1**
	3rd input/2^2	**52**	**x**	**x**	**SatzAnw.2**
	4th input/2^3	**53**	**x**	**x**	**SatzAnw.3**
	5th input/2^4	**54**	**x**	**x**	**SatzAnw.4**
	6th input/2^5	**55**	**x**	**x**	**SatzAnw.5**

Traversing blocks 0 to 63 can be selected using these 6 input signals.

Block number	**0**	**1**	**2**	**3**	**4**	**5**	**...**	**31**	**...**	**63**
1st input/weighting 2^0	0	1	0	1	0	1	...	1	...	1
2nd input/weighting 2^1	0	0	1	1	0	0	...	1	...	1
3rd input/weighting 2^2	0	0	0	0	1	1	...	1	...	1
4th input/weighting 2^3	0	0	0	0	0	0	...	1	...	1
5th input/weighting 2^4	0	0	0	0	0	0	...	1	...	1
6th input/weighting 2^5	0	0	0	0	0	0	...	0	...	1

Note:

- 64 traversing blocks can only be selected via PROFIBUS. When selecting the traversing blocks via terminals (max. 3), the number of traversing blocks is restricted to 8.
- The bits, which are not assigned to an input terminal, can still be controlled via PROFIBUS.
- When a block is selecting using PROFIBUS-DP (control word SatzAnw), the sign is not evaluated. The PROFIBUS bits SatzAnw.6...15 are ignored, e.g. an input of 65 is interpreted as 1.
- Also refer to the input signal ”activate traversing task (edge)”

Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
Operating condition/reject traversing task	**58**	**–**	**x**	**STW1.4**

This input signal is used as traversing enable to process traversing blocks.

1 signal — Operating condition for positioning
The 1 signal is a prerequisite so that a traversing task can be activated.

0 signal — The traversing task is rejected
When the block is being actively processed, the drive brakes with the specified deceleration (P0104) taking into account the deceleration override (P0084) to n = 0 with the following effects:
– The drive remains in closed-loop position control and the standstill monitoring function is activated
– The actual traversing task is rejected and **delete residual distance** is carried-out.

Note:

- If the axis was stopped with ”intermediate stop” and ”reject traversing task” was requested, then a delete distance to go is also executed.
- As long as ”reject traversing task” is present, a traversing block cannot be started, i.e. the ”activate traversing task (edge)” signal is ignored
- Also refer to the input signal ”activate traversing task (edge)”

6

Table 6-40 List of input signals, continued

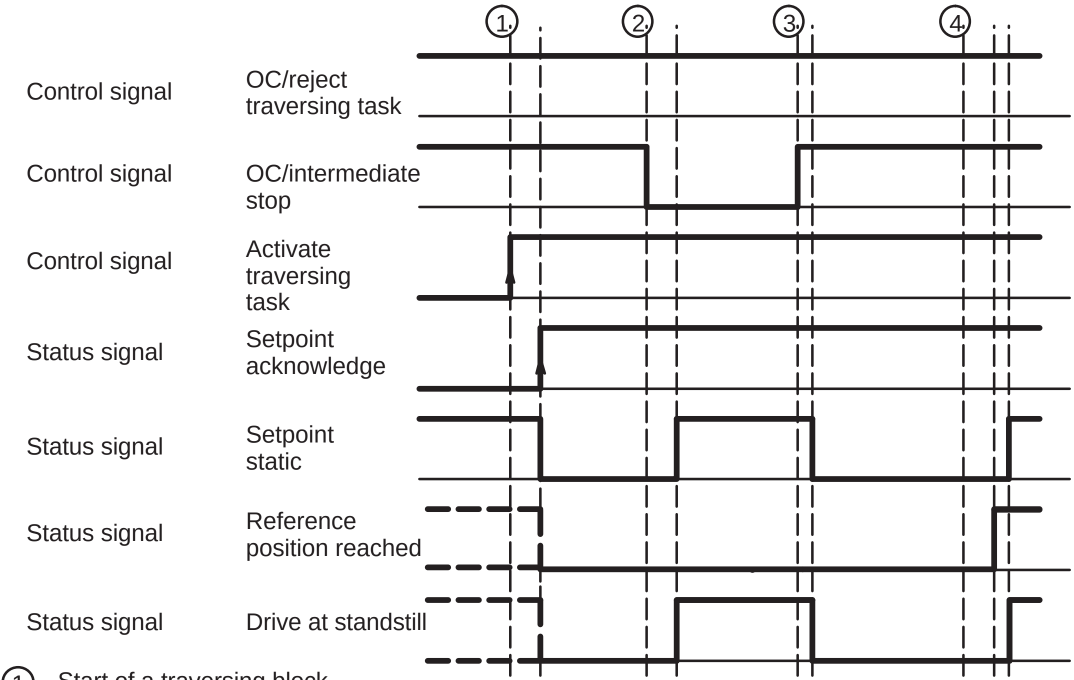
Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Operating condition/intermediate stop	**59**	**–**	**x**	**STW1.5**

Using this input signal, traversing block processing can be interrupted and then continued.

1 signal — Operating condition for positioning
The 1 signal must be continuously present in order to process a traversing block.

0/1 signal — A traversing block, interrupted by "intermediate stop", is continued.

0 signal — Intermediate stop
When the block is being actively processed, the drive brakes with the specified deceleration (P0104) taking into account the deceleration override (P0084) to n = 0 with the following effects:
– The drive remains in closed-loop position control and the standstill monitoring function is activated
– The actual traversing task is not rejected and is continued for a 0/1 edge



1 Start of a traversing block
2 Interrupting the traversing block using "intermediate stop"
3 Continuing the traversing block
4 End of positioning

Note:

- An axis in "intermediate stop" can be traversed in the jog mode or referencing can be started. The interrupted traversing block is exited.

Table 6-40 List of input signals, continued

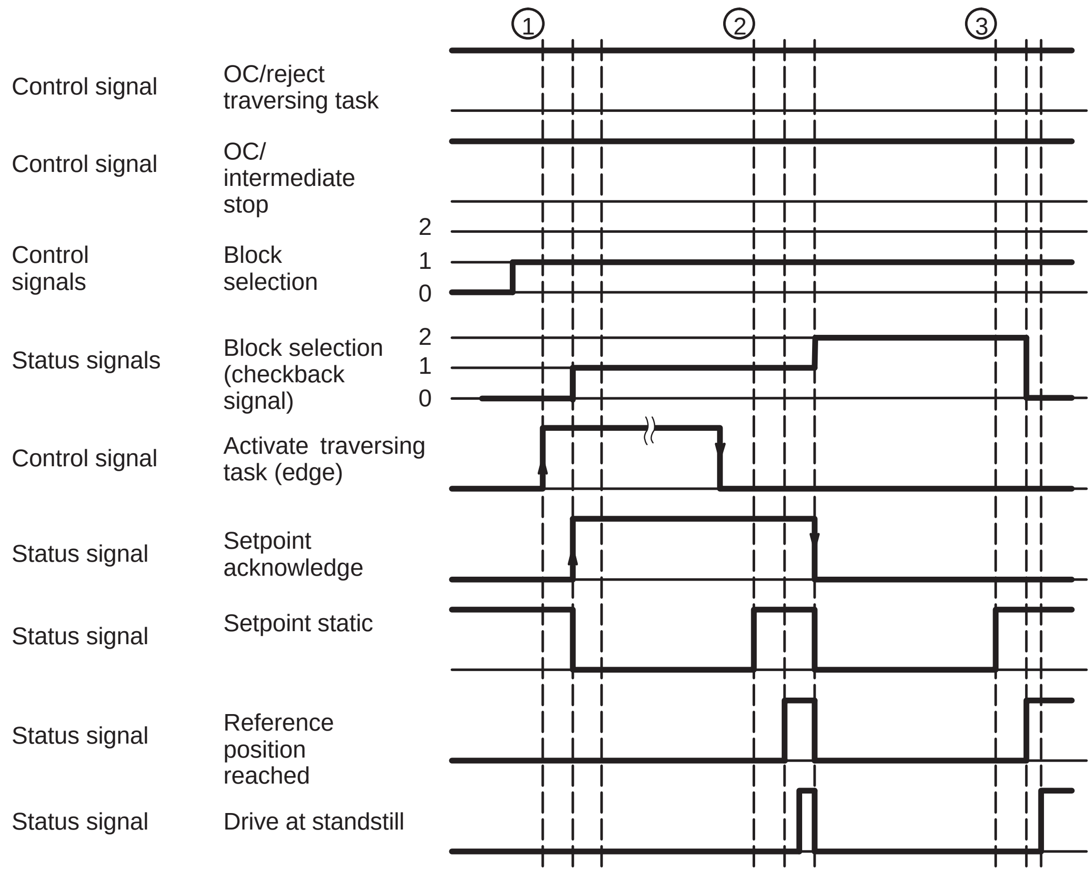
Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Activate traversing task (edge)	**60**	**–**	**x**	**STW1.6**

A 0/1 edge of this input signal starts the traversing block selected using ”block selection”.

An edge change is only permissible, if

- The drive has confirmed the previous traversing block via the ”acknowledge setpoint” output signal
- The axis is referenced
(reference point set/no reference point set” output signal = ”1”)
- The input signals ”operating condition/intermediate stop” and ”operating condition/reject traversing task” must be set to 1 in order to be able to start a block.

If a traversing task is activated and the secondary conditions are not fulfilled, then an appropriate warning is signaled. The ”setpoint acknowledgment” output signal is only set if the block was started so that a traversing task can be activated with the next signal edge.



1 Select and start a traversing block
2 End of the positioning operation and automatic block change
3 End of the positioning operation and end of program

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Incremental jogging (from SW 4.1)	**61**	**–**	**x**	**PosStw.5**
This input signal is used to define whether jogging is executed via velocity or via velocity and increments. 1 signal Jogging via velocity and increments is effective 0 signal Jogging via velocity is effective **Note:** This input signal is effective for jogging 1 and jogging 2. The ”jogging mode” function is described in Chapter 6.2.9.				
Jogging 1 ON/jogging 1 OFF	**62**	**–**	**x**	**STW1.8**
Jogging 2 ON/jogging 2 OFF	**63**	**–**	**x**	**STW1.9**
Using these input signals closed-loop speed controlled traversing is possible in the ”positioning” mode, without changing the mode. • For jogging 1, the drive traverses with the speed/velocity in P0108. • For jogging 2, the drive traverses with the speed/velocity P0109. 1 signal The drive traverses with the parameterized speed/velocity 1/0 signal The drive brakes down to standstill with the deceleration set in P0104 (maximum deceleration). The closed-loop position control is re-activated after the braking operation has been completed. 0 signal Output status for jogging 0/1 signal The drive accelerates to the speed/velocity, parameterized in P0108/P0109 with the acceleration set in P0103 (maximum acceleration) **Note:** For jogging, the software limit switch and the override are effective.				

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Activate teach-in (edge) (from SW 4.1)	**64**	**–**	**x**	**PosStw.6**

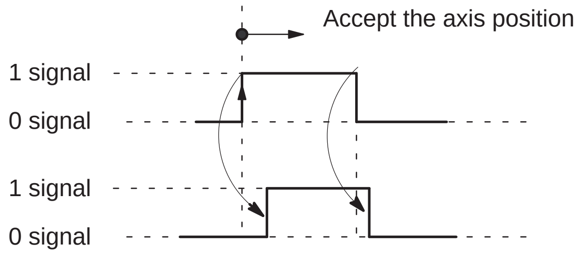
The ”teach-in” function is activated using this input signal.

When activated, the actual position reference value is entered as position reference value for the selected traversing block.

1 signal	No effect
1/0 signal	Resets the ”teach-in successful” output signal
0 signal	No effect
1/0 edge	Activates ”teach-in” and transfer the instantaneous axis position into the teach-in block

Input signal ”activate teach-in (edge)”

Output signal ”teach-in successful”



Note:

- Prerequisites to activate the ”teach-in” function:
  - ”Positioning” mode —> P0700 = 3
  - Traversing program isn’t running —> output signal ”drive stationary” = ”1”
  - Axis is referenced —> output signal ”reference point set” = ”1”
- Refer under the index entry ”Output signal – teach-in successful”
- The ”teach-in” function is described in Chapter 6.11.

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Start referencing/cancel referencing	**65**	**–**	**x**	**STW1.11**

... starts the reference point approach of an axis.

0/1 signal	The reference point approach is started
1/0 signal	A reference point approach which has been started is interrupted The drive brakes with the deceleration rate specified in P0104 (maximum deceleration). The ”reference point set” output signal remains at ”0”.

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n-set	pos	
External block change	**67**	**–**	**x**	**STW1.13**

For a traversing block with the block change enable CONTINUE EXTERNAL, a flying block change can be initiated using this input signal (refer to Chapter 6.2.10).

0/1 edge or

1/0 edge The external block change is initiated
When the edge is detected, in addition to the block change, the position actual value of the axis is written into P0026 (position actual value, block change).
The behavior when the signal edge is missing can be set using P0110 (configuration, external block change).

Note:

If the braking distance of the new block is too high due to a lower velocity override, then the block change enable is changed from CONTINUE FLYING to CONTINUE WITH STOP.

The ”external block change” function can be initiated as follows:

- Using input terminal I0.A
  - Recommended if P0110 $\leq$ 1, as it is a fast input
  - If the ”external block change” function was parameterized to input terminal I0.A, then the other terminal with this function or the PROFIBUS control signal ”external block change” is no longer effective.
  - The external block change is detected depending on the direction.

    The following applies:
    Traversing in a positive direction —> the 1/0 edge is identified as external block change
    Traversing in the negative direction —> the 0/1 edge is identified as external block change

    The actual value can be inverted using P1011.0, P0231 and P0232.

    There is no inversion, if none or 2 of these parameters are set to invert

    —> increasing (decreasing) position actual value corresponds to a positive (negative) direction

    The value is inverted, if 1 or all 3 parameters are set to invert.

    —> increasing (decreasing) position actual value corresponds to a negative (positive) direction
  - The value in P0026 corresponds to the existing position when the block change is detected.
- Using input terminal I1.A/I2.A
  - Recommended, if P0110 $\geq$ 2
  - The external block change is independent of the direction.
  - The value in P0026 does not precisely correspond to the block change position due to internal signal propagation times.
- Using the PROFIBUS control signal STW1.13
  - The external block change is independent of the direction.
  - The value in P0026 does not precisely correspond to the block change position due to internal signal propagation times.
- Refer under the index entry ”Block change enable – CONTINUE EXTERNAL”.

Note:

If P0110 $\geq$ 2, then input terminal I0.x or I0.B may not be used as input, as, for these, the block change can be initiated from different signal edges.

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Fixed stop, sensor	**68**	**–**	**x**	**PosStw.3**
Using this input signal, the drive recognizes the ”fixed stop reached” status via an external sensor. 1 signal Fixed stop is reached 0 signal Fixed stop has not been reached (standard) **Prerequisite:** The signal is only effective, if P0114 (fixed stop, configuration 2) = 1. **Note:** The ”travel to fixed stop” function is described in Chapter 6.10.				
Request passive referencing (from SW 5.1)	**69**	**–**	**x**	**STW1.15**
Using this input signal, passive referencing for the slave drive is controlled. 1/0 signal Set reference point P0179 = 0: The value in P0160 (reference point coordinate) is set as the actual axis position. = 2: The axis moves through the deviation to the reference position. 0/1 signal The reference cam and zero mark search are activated An appropriate fault is signaled if a zero mark has not been found up to the 1/0 edge. **Note:** The ”passive referencing” function is described in Chapter 6.3.				
Tracking mode	**70**	**–**	**x**	**PosStw.0**
The tracking mode for the axis is selected via this input signal. 1 signal Selects the tracking mode If the controller enable (control signal ON/OFF1) is also withdrawn, then the axis is switched into the tracking mode. In the tracking mode, the position control loop is open. The position reference value continually tracks the actual value, i.e. the actual value is still sensed and updated, but a setpoint is not output. If the axis is shifted from its position due to external effects, then the monitoring does not output an error message. 0 signal Canceling the tracking mode If the controller is re-enabled, then the axis movement continues at the new actual position which could have changed. The position control loop is closed. **Note:** • The tracking mode status is displayed via the ”tracking mode active” output signal. • The tracking mode can also be selected as internal control response to an error. • Refer under the index entry ”Tracking mode”				

6

Table 6-40 List of input signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Set reference point</td><td>71</td><td>–</td><td>x</td><td>PosStw.1</td></tr>
<tr><td colspan="5">An axis can be assigned a required actual value (P0160) (actual value setting) at any position using the 0/1 edge of the input signal. This is only possible if a traversing block is not being executed
0/1 signal The reference point is set, i.e. the value P0160 is assigned as actual position.
After this, the axis is considered to have been referenced (output signal ”reference point set” = ”1”).
Note:
If the reference point is still set again (new command), then for the backlash compensation, the system behaves as if the reference point was not set again.</td></tr>
<tr><td>Activate coupling (from SW 4.1)</td><td>72</td><td>–</td><td>x</td><td>PosStw.4</td></tr>
<tr><td colspan="5">The coupling, set via P0410, is activated using this input signal.
1 signal No function
0/1 signal Activate coupling
The coupling is activated corresponding to P0410.
P0410
= 1 or 2 —> Coupling is switched-in
= 3 or 4 —> The signal has no significance
= 5 or 6 —> The coupled position is transferred into the queue (being prepared)
= 7 —> Coupling is switched-in at the absolute position of the master drive (from SW 4.1)
= 8 —-> Coupling via the traversing program to the absolute position of the master drive (from SW 4.1)
0 signal Coupling-out, initial status
Note:
• The position when switching-in the coupling is displayed in P0425:0.
• The ”axis coupling” function is described in Chapter 6.3.</td></tr>
<tr><td>Reference cams</td><td>78</td><td>–</td><td>x</td><td>PosStw.2</td></tr>
<tr><td colspan="5">When referencing, this input signal indicates whether the axis is located at the reference cam.
1 signal The axis is located at the reference cam
0 signal The axis is not located at the reference cam</td></tr>
</table>

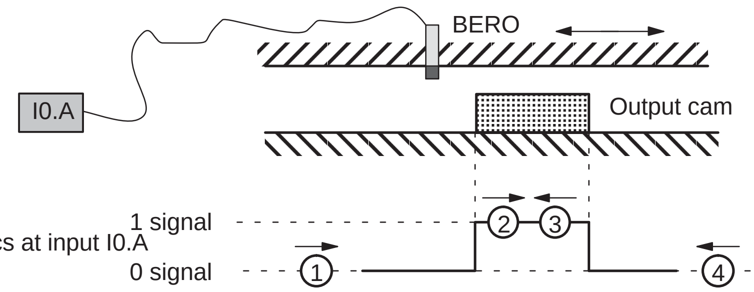
Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Equivalent zero mark	**79**	**x**	**x**	**–**

If the encoder zero pulse cannot be evaluated when referencing, then a signal supplied from a mounted sensor can be fed via this input as ”zero mark equivalent”.

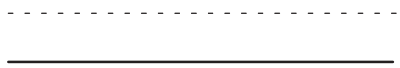
1 signal	No significance
1/0 signal	When passing the zero mark cam in a positive direction, this edge is detected as the equivalent zero mark
0/1 signal	When passing the zero mark cam in a negative direction, this edge is detected as the equivalent zero mark
0 signal	No significance

Assumption:
The BERO is high active

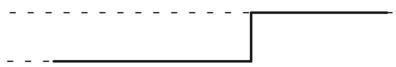


1 2 Starts before or at the cam and traverses in a positive direction —> the 1/0 edge at input I0.A is identified as equivalent zero mark

3 Starting at the cam and traversing in a negative direction —> an equivalent zero mark is not identified



4 Starts after the cam and traverses in a negative direction —> the 0/1 edge at input I0.A is identified as equivalent zero mark



Note:

- This function must be executed via input terminal I0.A (fast input).
- Activate the ”equivalent zero mark” function for an incremental measuring system:
  - refer to P0174
  - refer to P0879.13 or P0879.14
- The equivalent zero mark is identified as a function of the direction.
- The actual value can be inverted using P1011.0, P0231 and P0232.
  - There is no inversion, if none or 2 of these parameters are set to invert
    —> increasing (decreasing) position actual value corresponds to a positive (negative) direction
  - The value is inverted, if 1 or all 3 parameters are set to invert.
    —> increasing (decreasing) position actual value corresponds to a negative (positive) direction

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Flying measurement/length measurement	**80**	**x**	**–**	**–**
The encoder actual value can be retrieved via an input with this function. 0/1 signal or 1/0 signal The actual encoder value is retrieved **Note:** • This function must be executed via the fast input I0.A. • The function is only available for ”Motion Control with PROFIBUS”. —>refer under the index entry ”Encoder interface...” • This function cannot be executed for spindle positioning active (P0125=1). • The measuring probe signal is defined depending on the parameterized edge in control word Gx_STW.0/1 (refer to Chapter 5.6.4). • The edge clearance must be at least 150 ms. Measuring probe edges that are received faster (low clearance between signals) cannot be evaluated. • If the measuring probe signal is to be transferred via PROFIBUS in Gx_ZSW.8 then it must be present at input I0.x $\geq$4 ms.				
Plus hardware limit switch (NC contact)	**81**	**x1)**	**x**	**–**
Minus hardware limit switch (NC contact)	**82**	**x1)**	**x**	**–**
A hardware limit switch can be connected at an input with this function in order to limit the traversing range in either the positive or negative direction. 1/0 signal The plus or minus hardware limit switch has been actuated The axis is braked. The drive remains in the closed-loop controlled mode. In the pos mode: The axis can be moved-away from the limit switch jogging. In the n-set mode (from SW 8.1): The axis can be moved-away from the limit switch by entering a setpoint that is in the opposite direction to the approach direction. 1 signal No significance **Note:** 1) from SW 8.1 —> refer under the index entry ”Hardware limit switch”				
Activate MDI (from SW 7.1)	**83**	**–**	**x**	**SatzAnw.15**
1 signal The MDI function is activated. 0 signal The MDI function is not activated. **Note:** If MDI is switched-in with the traversing program active, or is switched-out while the traversing block is running, alarm 144 is initiated which interrupts the traversing program/traversing block.				
Ramp-function generator start/ramp-function generator stop	**–**	**x**	**–**	**STW1.5**
1 signal The ramp-function generator is enabled 0 signal The setpoint at the ramp-function generator output is frozen				

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Enable setpoint/inhibit setpoint	–	x	–	**STW1.6**
1 signal: Enable setpoint The setpoint at the ramp-function generator input is enabled. 0 signal: Inhibit setpoint The setpoint at the ramp-function generator input is set to zero.				
Control requested/no control requested	–	x	x	**STW1.10**
1 signal: This input signal must be set so that process data, transferred from the PROFIBUS master, is accepted by the slave and becomes effective. **Recommendation:** The input signal should only be set to ”1”, after the PROFIBUS slave has signaled back a realistic status using the status bit ”control requested/no control possible” = ”1”. 0 signal: Data transferred from the PROFIBUS master is rejected by the slave, i.e. it is accepted as zero.				
Ramp-up time zero for controller enable	–	x	–	**STW1.13**
The ramp-function generator (RFG) can be enabled/disabled as a function of the controller enable (control signal ON/OFF 1) using this input signal. 1 signal: Operating case: Controller enabled —> the drive ramp-function generator is off —> the ”zero ramp-up time” is controlled —> a higher-level control can assume the ramp-function generator function Error situation: Controller not enabled —> drive ramp-function generator is on —> the drive brakes via P1257:8 (ramp-fct. generator ramp-down time) 0 signal: Ramp-function generator on **Application:** The following is valid when the signal is set: If the controller is enabled, a higher-level control can assume the ramp-function generator function. If the controller is not enabled, the drive ramp-function generator is again effective. **Note:** Refer to the ”zero ramp-up time” input signal				

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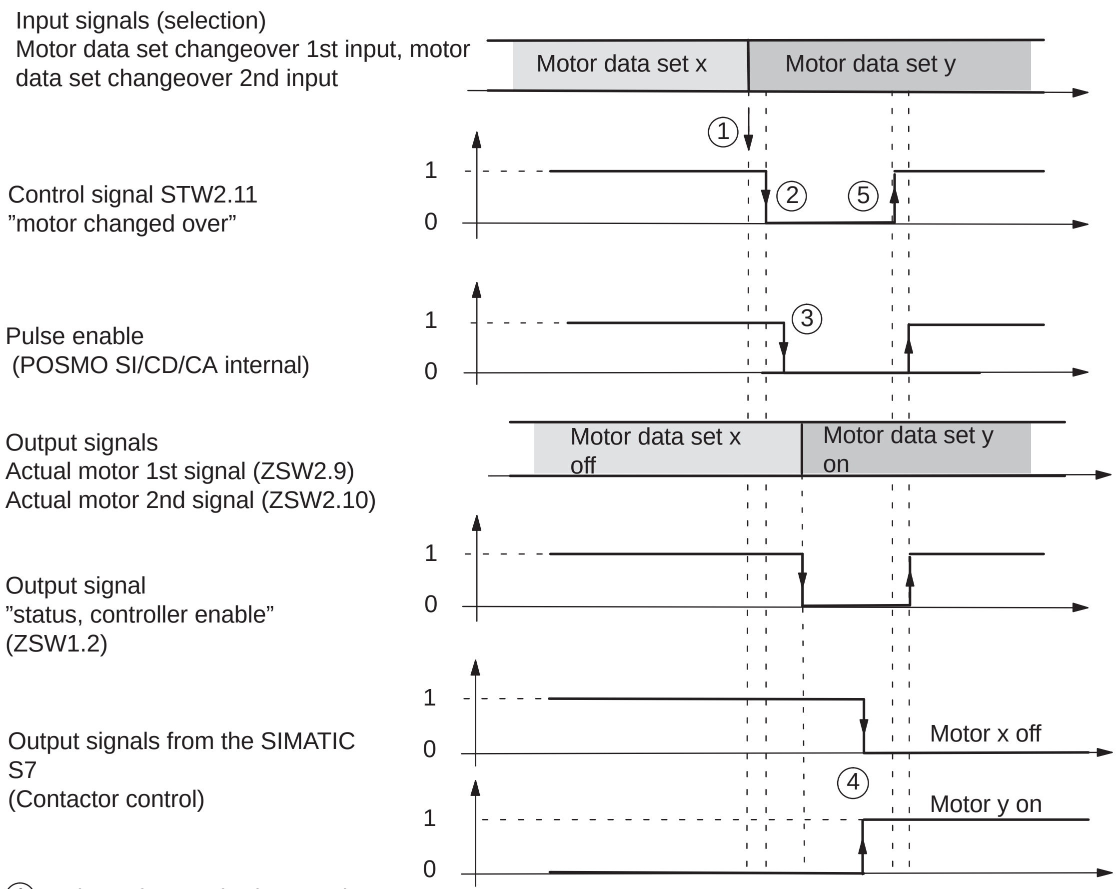
Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Motor changed over	–	x	–	STW2.11

For P1249 = 1 motor changeover is controlled via this input signal.

1 signal	Initial status
1/0 signal	Pulse enable is withdrawn
0 signal	Initial status, selecting a motor corresponding to the motor data set
0/1 signal	Enable the pulses



1. Selects the required motor data set
2. Signal to POSMO SI/CD/CA: The pulse enable is internally withdrawn after STW2.11 = 0
3. The motors are only changed over when the pulses have been canceled (switched-in a no-current condition)
4. Selects the motor corresponding to the motor data set
5. Signal to POSMO SI/CD/CA: enable the pulses (STW2.11 edge 0 – 1)

Note:

The ”motor changeover” function is described in Chapter 6.9.

Table 6-40 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Master sign-of-life	**–**	**x**	**x**	**STW2.12 STW2.13 STW2.14 STW2.15**
For the "motion control with PROFIBUS" function, these control signals are used as master sign-of-life (M-SoL) (4-bit counter). The sign-of-life counter is incremented from 1 to 15 and then starts again with the value 1. **Note:** The "motion control with PROFIBUS" function is described in Chapter 5.8.				

6

6.4.3 Digital outputs that can be freely parameterized (output terminals)

Description

There are a maximum of two freely parameterizable digital output terminals.

- Where are the digital output terminals connected?

  At the PROFIBUS unit via X24 (refer to Chapter 2.4).

- How are the digital output terminals parameterized?

  A digital output terminal is parameterized by entering the appropriate function number into the assigned parameter.

  Which function numbers are available? —> Refer to Chapter 6.4.4

  P0699 is used to define as to whether the output signal is output, inverted, or not inverted.

Notice

The digital output terminals may only be parameterized when the pulses are canceled.

Warning

Digital outputs can assume non-definable states while the module boots, the module is being initialized, for a computation time overflow or processor crash. This can result in a safety risk at the machine which must be completely eliminated using the appropriate external resources!

Overview of the terminals and parameters

There is the following assignment between terminals and parameters:

Table 6-41 Overview for freely-parameterizable output terminals

Terminal		Parameter						
		No.	**Name**	**Min.**	**Stan-dard**	**Max.**	**Units**	**Effec-tive**
O0.A	X24.4	0680	Signaling function, output terminal O0.x	0	33	82	–	Imme-diately
O1.A	X24.2	0681	Signaling function, output terminal O1.x	0	2	82	–	Imme-diately
–	–		A function can be assigned to each output terminal using these parameters. The function number from the list of output signals is entered (refer to Chapter 6.4.4). **Note:** The status of the output terminals is displayed in P0698 for diagnostics (refer to Chapter 4.4).					
–	–	0699	Inversion Output terminal signals	0	0	FFF	Hex	Imme-diately
–	–		The output terminal signals can be inverted using this parameter.					

6

6.4.4 List of output signals

Reader's note

The drive "signals" the output signals, listed in Tables 6-42 and 6-43 either through an output terminal (max. two output terminals) or as status bit to PROFIBUS.
All of the output signals can be found in the Index under Output signal... .

For output signals, which are assigned to terminals, an inversion can be parameterized. In this list, these output signals are represented as **not inverted**.
If an output signal inversion has been parameterized, then this must be appropriately taken into account when representing the signal.

The following must be specified for each signal:

- Fct. No.:
  The function number is required to parameterize the output terminal.
- Operating mode (P0700):
  This specifies in which operating mode the signal is available
  (x: Available, –: Not available).
  n-set: "Speed setpoint" mode
  pos: "Positioning" mode
- PROFIBUS bit:
  The bit name is required to read the signal via PROFIBUS (refer to Chapter 5.6.1).
  Example: ZSW2.10 —> that means, status 2 bit 10

Table 6-42 Overview of the output signals

		Operating mode		
Signal name, description	**Fct. No.**	**n-set**	**pos**	**PROFIBUS bit**
Inactive	0	x	x	–
$\mid n_{act} \mid < n_{min}$	1	x	x	MeldW.2
Ramp-up completed	2	x	x[1)]	MeldW.0
$\mid M \mid < M_x$	3	x	x[1)]	MeldW.1
$\mid n_{act} \mid < n_x$	4	x	x	MeldW.3
Motor overtemperature pre-warning	5	x	x	MeldW.6
Power module temperature pre-warning	6	x	x	MeldW.7
Electronics temperature pre-warning	–	x	x	MeldW.9
Variable signaling function	7	x	x	MeldW.5
Open-loop torque controlled mode	–	x	x	ZSW1.14
Integrator inhibit, speed controller	–	x	x	ZSW2.6
Parameter set 1st input/2^0 2nd input/2^1 3rd input/2^2	 – – –	 x x x	 x x x	 ZSW2.0 ZSW2.1 ZSW2.2
Motor 1 selected Motor 2 selected Motor 3 selected Motor 4 selected	11 12 13 14	x x x x	– – – –	– – – –
Status, fixed speed setpoint 1st output/2^0 2nd output/2^1 3rd output/2^2 4th output/2^3	 15 16 17 18	 x x x x	 – – – –	 – – – –
$n_{set} = n_{act}$	20	x	–	ZSW1.8
		x	x[1)]	MeldW.8
Spindle positioning on (from SW 5.1)	28	x	–	ZSW1.15
Warning present/no warning present	29	x	x	ZSW1.7
DC link monitoring $V_{DC\ link} > V_x$	30	x	x	MeldW.4
Fault present/no fault present	31	x	x	ZSW1.3
Status, controller enable	32	x	x	ZSW1.2
Ready or no fault	33	x	x	ZSW1.1
Parking axis selected	34	x	x	ZSW2.7
Open holding brake (from SW 4.1)	35	x	x	ZSW2.5
Pulses enabled	36	x	x	MeldW.13
Power module current not limited	37	x	x	MeldW.10

1) The signal can only be used under certain conditions in the pos operting mode.

Table 6-42 Overview of the output signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n-set	pos	
Control via PROFIBUS	38	x	x	PZD ”DIG_OUT”
Pulsed resistor not overloaded (only for POSMO CA)	39	x	x	MeldW.11
Status, block selection 1st output/2^0	50	x	x	AktSatz.0
2nd output/2^1	51	x	x	AktSatz.1
3rd output/2^2	52	x	x	AktSatz.2
4th output/2^3	53	x	x	AktSatz.3
5th output/2^4	54	x	x	AktSatz.4
6th output/2^5	55	x	x	AktSatz.5
Ready to be powered-up/not ready to be powered-up	–	x	x	ZSW1.0
No OFF 2 present/OFF 2 present	–	x	x	ZSW1.4
No OFF 3 present/OFF 3 present	–	x	x	ZSW1.5
Power-on inhibit/no power-on inhibit	–	x	x	ZSW1.6
No following error/following error	58	–	x	ZSW1.8
Spindle position reached (from SW 5.1)	59	x	–	MeldW.15
Control requested/no control possible	–	x	x	ZSW1.9
Comparison value reached/comparison value not reached	–	x	–	ZSW1.10
Reference position reached/outside reference position	60	–	x	ZSW1.10
		x	–	MeldW.14
Reference point set/no reference point set	61	–	x	ZSW1.11
Setpoint acknowledge	62	–	x	ZSW1.12
Teach-in executed (from SW 4.1)	64	–	x	PosZsw.15
Drive stationary/drive moving	–	–	x	ZSW1.13
Function generator active (from SW 6.1)	–	x	–	ZSW1.13
First speed setpoint filter inactive	–	x	x	ZSW2.3
Ramp-function gen. inactive	–	x	x	ZSW2.4
Actual motor 1st signal	–	x	–	ZSW2.9
2nd signal	–	x	–	ZSW2.10
Motor being changed over	–	x	–	ZSW2.11
Slave sign-of-life	–	x	x	ZSW2.12... ZSW2.14
Suppress fault 608 active	–	x	x	ZSW2.8
Travel to fixed stop active	66	–	x	PosZsw.14
External block change (from SW 7.1)	67	–	x	AktSatz.14

6

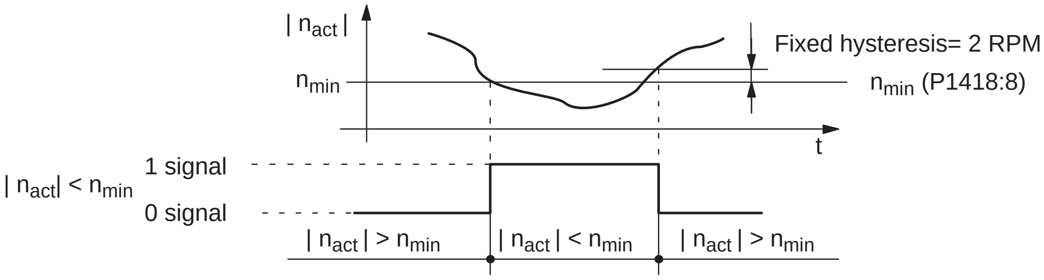
Table 6-42 Overview of the output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Fixed endstop reached	68	–	x	PosZsw.12
Request passive referencing (from SW 5.1)	69	–	x	ZSW1.15
Tracking mode active	70	–	x	PosZsw.0
In synchronism (from SW 4.1)	71	–	x	PosZsw.3
Setpoint static	72	–	x	PosZsw.2
Fixed stop, clamping torque reached	73	–	x	PosZsw.13
Axis moves forwards	74	–	x	PosZsw.4
Axis moves backwards	75	–	x	PosZsw.5
Minus software limit switch actuated	76	–	x	PosZsw.6
Plus software limit switch actuated	77	–	x	PosZsw.7
Cam switching signal 1	78	–	x	PosZsw.8
Cam switching signal 2	79	–	x	PosZsw.9
Direct output 1 via the traversing block	80	–	x	PosZsw.10
Direct output 2 via the traversing block	81	–	x	PosZsw.11
Velocity limiting active	82	–	x	PosZsw.1
MDI active (from SW 7.1)	83	–	x	AktSatz.15
Block processing inactive (from SW 8.1)	87	x	x	AktSatz.10
Feedback signal, drive ready (from SW 9.1)	–	x	x	MeldW.12

Table 6-43 List of output signals

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Inactive</td><td>0</td><td>x</td><td>x</td><td>–</td></tr>
<tr><td colspan="5">An output with this function is ”disabled”, i.e. a signal is not output (continuously 0 V).
The output terminal can still be connected-up, but it is not evaluated.
Application:
To start-up a drive (commission a drive) the ”disturbing outputs” are first switched-out, and then are subsequently activated to be commissioned.</td></tr>
</table>

Table 6-43 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>$| n_{act} | < n_{min}$</td><td>1</td><td>x</td><td>x</td><td>MeldW.2</td></tr>
<tr><td colspan="5">This output signal is used to display whether the absolute actual speed ($| n_{act} |$) is less than or greater than the selected threshold speed (n_{min}, P1418:8).


Application:
The gearbox stage is only mechanically changed-over if the speed is less than that set in P1418:8, in order to reduce the stressing on the mechanical system.</td></tr>
<tr><td>Ramp-up completed</td><td>2</td><td>x</td><td>x¹⁾</td><td>MeldW.0</td></tr>
<tr><td colspan="5">The end of a ramp-up operation is displayed after the speed setpoint has been changed, using this output signal.
1 signal — Ramp-up has been completed
1/0 signal — Ramp-up starts
The start-up is identified, if
– the speed setpoint changes
and
– the defined tolerance bandwidth (P1426) is exited.
0 signal — Ramp-up runs
0/1 signal — Ramp-up has been completed
The end of ramp-up is identified, if
– the speed setpoint is constant
and
– the speed actual value is within the tolerance bandwidth around the speed setpoint
and
– the delay time has expired (P1427).
Note:
Detailed information on the ramp-function generator is provided in Chapter 6.1.3.
1) IIn the pos operatimg mode, the signal can only be used under certain conditions because the speed setpoint ist controlled and no ramp-function generator is provided.</td></tr>
</table>

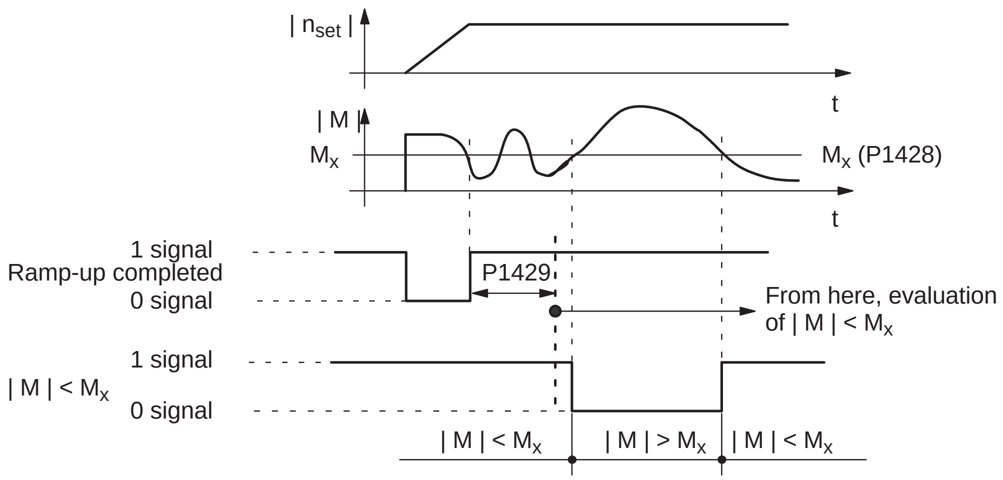
Table 6-43 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>| M | < M_x</td><td>3</td><td>x</td><td>x</td><td>MeldW.1</td></tr>
<tr><td colspan="5">

This output signal indicates whether the absolute torque | M | is less than or greater than the selected torque (M_x, P1428). The value refers to the actual torque limiting when motoring including all limits (refer to Chapter 6.1.8, Fig. 6-6).

The evaluation | M | < M_x is only realized in the n-set mode, if

- The ”ramp-up completed” status is signaled and
- The delay time in P1429 has expired.



Application:

This signal can be used to recognize whether the motor is overloaded, so that an appropriate response can be initiated (e.g. the motor stopped or the load reduced).

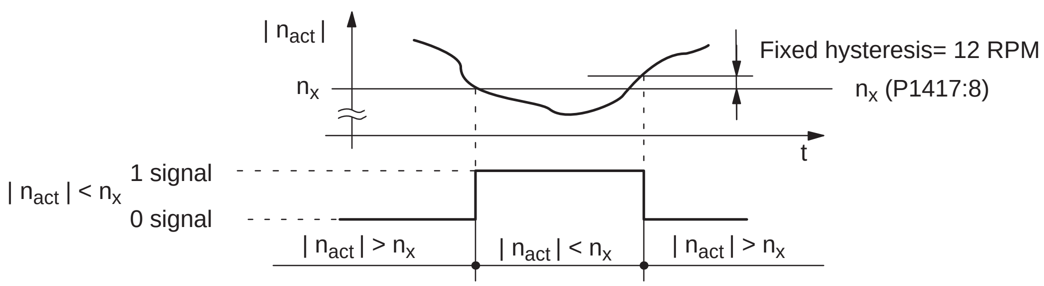
Note:

In the pos mode, the ”ramp-up completed” state is always signaled, i.e. the delay time in P1429 has already expired. The signal | M | < M_x immediately changes the signal state. Only when the delay time in P1429 changes, is the signal | M | < M_x output delayed by this time.

In the pos operatimg mode, the signal can only be used under certain conditions because the speed setpoint ist controlled and no ramp-function generator is provided.

</td></tr>
<tr><td>| n_{act} | < n_x</td><td>4</td><td>x</td><td>x</td><td>MeldW.3</td></tr>
<tr><td colspan="5">

This output signal is used to display as to whether the absolute actual speed (| n_{act} |) is less than or greater than the selected threshold speed (n_x, P1417:8).

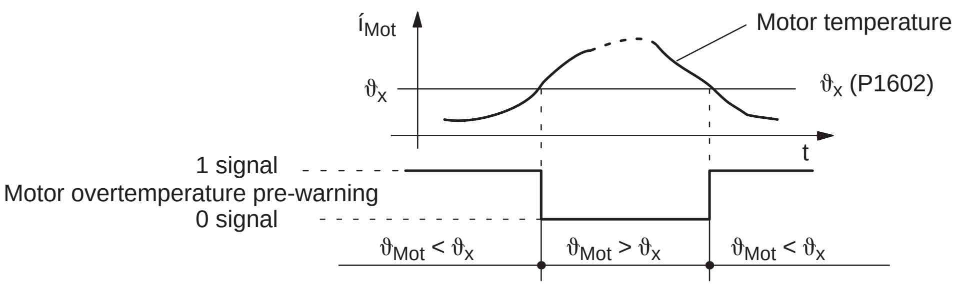


Application:

Speed monitoring

</td></tr>
</table>

Table 6-43 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Motor overtemperature pre-warning</td><td>5</td><td>x</td><td>x</td><td>MeldW.6</td></tr>
<tr><td colspan="5">This output signal is used to display whether the motor temperature (ϑ_{Mot}) is less than or greater than the selected motor temperature (ϑ_X, P1602) warning threshold.
Note:
• If the motor temperature warning threshold is exceeded, initially, ”only” an appropriate signal is output. When the warning threshold is fallen below, the signal is automatically withdrawn.
• If the overtemperature remains for a time longer than that set in P1603, then an appropriate fault is output.
• The motor temperature monitoring function can be disabled/enabled using P1601.14.


Application:
The user can respond to this message by reducing the load, thereby preventing the motor from shutting down with the ”Motor temperature exceeded” fault after the set time has elapsed.</td></tr>
<tr><td>Power module temperature pre-warning</td><td>6</td><td>x</td><td>x</td><td>MeldW.7</td></tr>
<tr><td colspan="5">This signal is used to display whether the temperature of the power module heatsink has been exceeded.
The temperature threshold cannot be parameterized.
1 signal — No power module temperature pre-warning
The temperature is within the permissible range.
0 signal — Power module temperature pre-warning
The temperature is outside the permissible range.
If the excessive temperature remains, then the drive is powered down after approx. 20 s (tripped).</td></tr>
<tr><td>Electronics temperature pre-warning</td><td>–</td><td>x</td><td>x</td><td>MeldW.9</td></tr>
<tr><td colspan="5">This output signal is used to display whether the permissible electronics temperature has been exceeded.
1 signal — No electronics temperature pre-warning
The temperature is within the permissible range.
0 signal — Electronics temperature pre-warning
The temperature is outside the permissible range.
If the excessive temperature remains, then the drive is powered down after approx. 20 s (tripped).
Note:
The user can respond to this pre-warning by checking and improving the drive cooling. This will prevent the drive being powered down due to fault 516.</td></tr>
</table>

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Variable signaling function	**7**	**x**	**x**	**MeldW.5**

This output signal indicates whether any selected internal quantity has been fallen below or exceeded a selectable threshold value.
A hysteresis (P1624) can be specified for the threshold value and a time for the pull-in or drop-out delay (P1625, P1626) can be specified for the signal output.
The quantity to be monitored can either be selected by entering a signal number (P1621) or by entering an address (P1620.1 and P1622).

P1620.0 1: active
0: not active

P1620.1 1: address range Y
0: address range X

P1620.2 1: comparison with the sign
0: comparison without the sign

P1621 Signal number, variable signaling function
The signal number from the signal selection list for test outputs must be entered here (refer to Chapter 7.3.3 under Table 7-6). If the signal number = 1 (physical address), then the address must be entered into P1620.1 of the address range and in P1622, the address (this is only relevant for Siemens service activities).

P1622 Address, variable signaling function

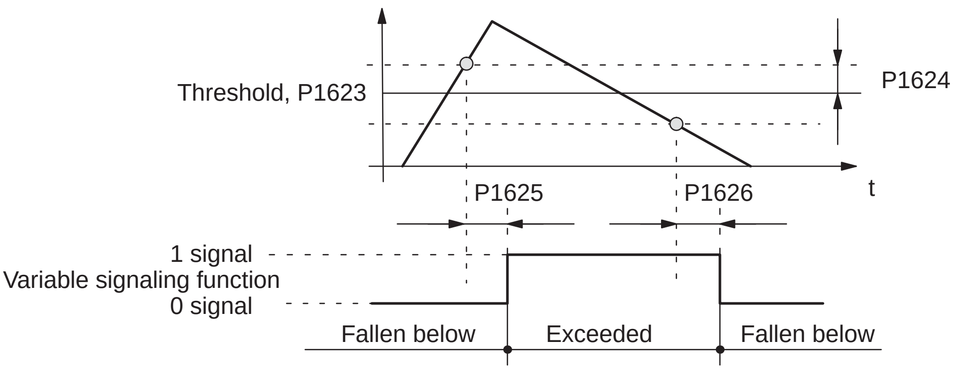
P1623 Threshold, variable signaling function

P1624 Hysteresis, variable signaling function

Note: The threshold and hysteresis are obtained from the signals specified in the normalization P1621. The normalization is defined in Chapter 7.3.3 under Table 7-6 and can be partially read-out of the parameters.

P1625 Pull-in delay variable signaling function

P1626 Drop-out delay variable signaling function



Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
Integrator inhibit, speed controller	**–**	**x**	**x**	**ZSW2.6**

This output signal is used to signal whether the integral component of the speed controller is inhibited or enabled.

1 signal Integrator inhibit, speed controller
0 signal The speed controller integrator is not inhibited

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Parameter set				
1st input/2^0	–	x	x	**ZSW2.0**
2nd input/2^1	–	x	x	**ZSW2.1**
3rd input/2^2	–	x	x	**ZSW2.2**

These 3 output signals are used to output the selected parameter set.

Parameter set	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1st input/weighting 2^0	0	1	0	1	0	1	0	1
2nd input/weighting 2^1	0	0	1	1	0	0	1	1
3rd input/weighting 2^2	0	0	0	0	1	1	1	1

Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
Motor 1 selected	11	x	–	–
Motor 2 selected	12	x	–	–
Motor 3 selected	13	x	–	–
Motor 4 selected	14	x	–	–

The motor changeover contactors are controlled via these output terminal signals.

1 signal Motor 1, 2, 3 or 4 is selected

0 signal The motor has not been selected

Note:

- The motor changeover version and therefore the behavior of the terminal, is selected using P1013 (motor changeover).
- To select the motors or motor data sets, input terminal signals are available with function numbers 5 and 6 (motor data set changeover 1st input/2nd input).
- Motor changeover is described in Chapter 6.9.

Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
Status, fixed speed setpoint				
1st output/2^0	15	x	–	–
2nd output/2^1	16	x	–	–
3rd output/2^2	17	x	–	–
4th output/2^3	18	x	–	–

These output signals are used to display which fixed setpoint is selected via the input signals, and which parameters specify the speed setpoint.

Fixed speed setpoint		**1**	**2**	**3**	**4**	**5**	**...**	**15**
1st output/weighting 2^0	0	1	0	1	0	1	...	1
2nd output/weighting 2^1	0	0	1	1	0	0	...	1
3rd output/weighting 2^2	0	0	0	0	1	1	...	1
4th output/weighting 2^3	0	0	0	0	0	0	...	1
Effective fixed speed setpoint	–	P0641:1	P0641:2	P0641:3			to	P0641:15

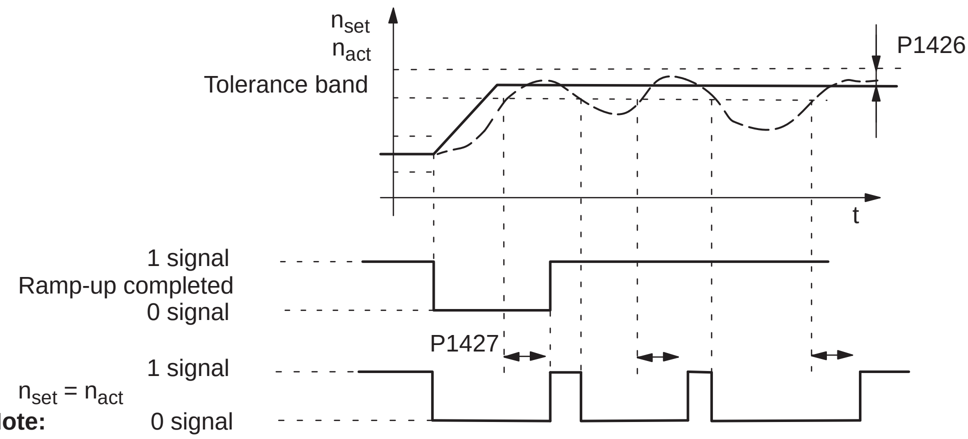
Note:

- The ”fixed speed setpoint” function is described in Chapter 6.1.6.
- Refer to the ”Fixed speed setpoint 1st to 4th input” output signal in Chapter 6.4.2.
- For POSMO SI/CD/CA, there are a maximum of two freely programmable digital output terminals.

6

Table 6-43 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td rowspan="2">$n_{set} = n_{act}$</td><td rowspan="2">20</td><td>x</td><td>–</td><td>ZSW1.8</td></tr>
<tr><td>x</td><td>x</td><td>MeldW.8</td></tr>
<tr><td colspan="5">This output signal is used to display whether the speed actual value (n_{act}) has entered the tolerance bandwidth (P1426), and has remained in this tolerance bandwidth for at least a time (P1427).



Note:
When spindle positioning is selected (P0125=1), ZSW1.8 behaves/responds just the same as Fct. No. 58 (positioning mode)
In the pos operatimg mode, the signal can only be used under certain conditions because the speed setpoint ist controlled.</td></tr>
<tr><td>Spindle positioning on (from SW 5.1)</td><td>28</td><td>x</td><td>–</td><td>ZSW1.15</td></tr>
<tr><td colspan="5">This signal displays as to whether the ”spindle positioning” function has been activated.
1 signal ”Spindle positioning” function is active
0 signal Function is not active
Note:
• Refer under the index entry ”Input signal – spindle positioning on”
• The ”spindle positioning” function is described in Chapter 6.13 (from SW 5.1).</td></tr>
<tr><td>Warning present/no warning present</td><td>29</td><td>x</td><td>x</td><td>ZSW1.7</td></tr>
<tr><td colspan="5">The output signal indicates whether the drive is signaling at least one warning.
1 signal Warning present
Which warning(s) is(are) present?
This can be identified by evaluating P0953 to P0960 (Warnings 800 to 927) (refer to Chapter 5.9).
0 signal Warning not present</td></tr>
<tr><td>DC link monitoring $V_{DC\ link} > V_x$</td><td>30</td><td>x</td><td>x</td><td>MeldW.4</td></tr>
<tr><td colspan="5">This output signal is used to display whether the DC link voltage ($V_{DC\ link}$) is less than or greater than the selected DC link undervoltage warning threshold (V_x, P1604).

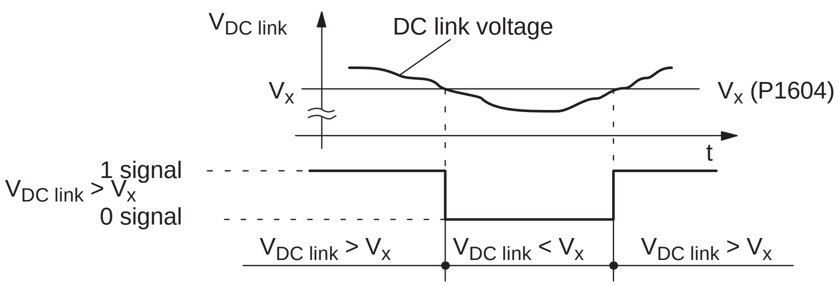

</td></tr>
</table>

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Fault present/no fault present	**31**	**x**	**x**	**ZSW1.3**
This output signal indicates whether the POSMO SI/CD/CA drive signals at least one fault. 1 signal: Fault present There is at least one fault present. The cause of the fault or faults which is (are) present, must be removed and the fault then acknowledged. 0 signal: No fault present **Note:** Refer to Chapter 7 for information on the faults as well as their acknowledgment.				
Status, controller enable	**32**	**x**	**x**	**ZSW1.2**
This output signal is used to display whether the speed controller is active and is ready to accept speed setpoints. 1 signal: The speed controller is active and setpoints can be accepted 0 signal: The speed controller is not active				
Ready or no fault	**33**	**x**	**x**	**ZSW1.1**
Depending on P1012.2, this output signal indicates whether • The drive is ready (—> ”Ready” message”) • No faults present (—> ”No fault” message) if P1012.2 = **”1”,** the following is valid: / if P1012.2 = **”0”**, the following is valid: Signal: **”Ready”** / **”No fault”** 1 signal: Drive is ready / There is no fault present 0 signal: Not ready / There is at least one fault Conditions: No faults are present and the terminal ”pulse enable” is available (terminal IF = ”1”) and the following PROFIBUS control signals STW1.0 = ”1” (ON/OFF 1) STW1.1 = ”1” (Operating condition/OFF 2) STW1.2 = ”1” (Operating condition/OFF 3) / No faults are present independent of terminal IF independent of the control signals are available: **Note:** • The ”no fault” message is also transferred to the line infeed module (NE module, terminals 72, 73, 74). • From SW 6.1 and for P1012.12=1 a fault can also be acknowledged without STW1.0=0. The drive then remains in the ”Power-on inhibit”state (refer to Chapter 5.5 ”Forming the power-on inhibit”; Fig. 5-8).				
Parking axis selected	**34**	**x**	**x**	**ZSW2.7**
This output signal is used to indicate whether the axis ”parks”. For a ”parking axis”, all of the encoder-specific monitoring and evaluation functions are disabled. This allows the encoder to be withdrawn without initiating an alarm. 1 signal: Parking axis selected 0 signal: Parking axis not selected				

6

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n-set	pos	
Open holding brake (from SW 4.1)	**35**	**x**	**x**	**ZSW2.5**
A motor holding brake can be controlled using an external auxiliary contactor via an output with this function. The brake sequence control then runs in POSMO SI/CD/CA. 1 signal The auxiliary contactor for the motor holding brake is energized 0 signal The auxiliary contactor is not energized **Note:** For POSMO SI/CD/CA, only an external holding brake can be controlled. Refer to Chapter 6.5 for information on the motor holding brake.				
Pulses enabled	**36**	**x**	**x**	**MeldW.13**
This output signal is used to display whether the motor control pulses for this drive are enabled or inhibited. 1 signal The motor control pulses are enabled 0 signal The pulses are inhibited **Application:** An armature short-circuit contactor may only be energized when the pulses are inhibited. This signal can be evaluated as one of several conditions to control an armature short-circuit contactor.				
Feedback signal, drive ready (from SW 9.1)	**–**	**x**	**x**	**MeldW.12**
This bit can be used for an additional, higher-level monitoring. 1 signal Drive is ready 0 signal Drive ready is inhibited				
Open-loop torque controlled mode	**–**	**x**	**–**	**ZSW1.14**
This output signal is used to signal whether closed-loop speed controlled or open-loop torque controlled operation has been selected (STW1.14). 1 signal Open-loop torque controlled operation (M_{set} mode) 0 signal Closed-loop speed controlled operation (n_{set} mode) **Note:** For the ”travel to fixed stop” function (positioning mode), after the fixed stop was reached, the position controller goes into the state ”open-loop torque controlled mode”. The signal ZSW1.14 is then also set to 1 in the pos-mode.				

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Power module current not limited	**37**	**x**	**x**	**MeldW.10**

This output signal is used to display whether the power module current is limited via the i^2t power module limiting.

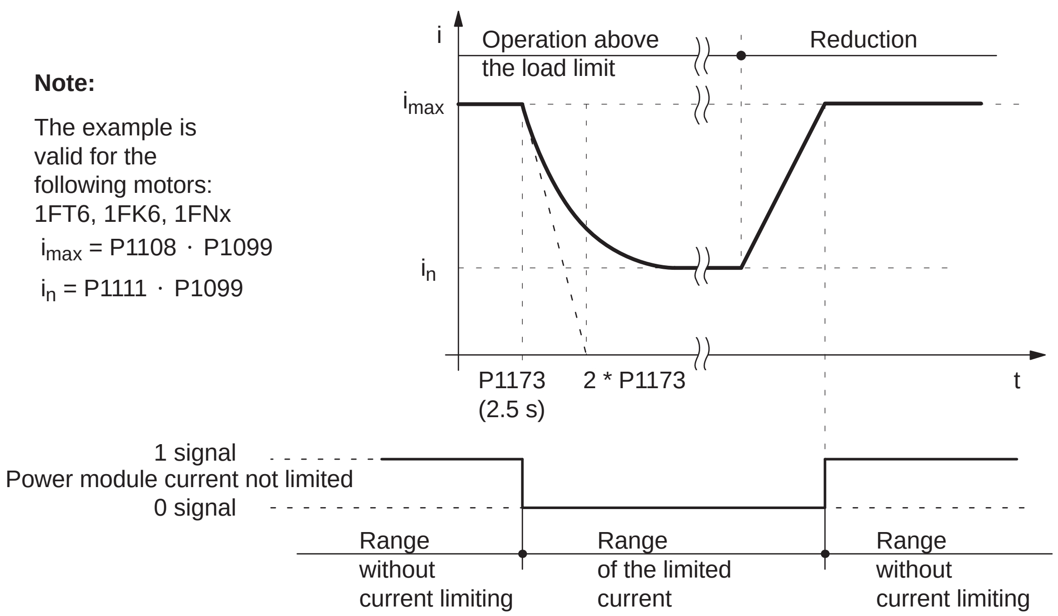
1 signal	Power module current not limited
0 signal	Power module current is limited

Note:

The example is valid for the following motors: 1FT6, 1FK6, 1FNx

i_{max} = P1108 · P1099

i_n = P1111 · P1099



Note:

- The "i^2t power module limiting" function is described in Chapter A.2.
- P1173 Highest load time, power module

Signal name, description	Fct. No.	n-set	pos	PROFIBUS bit
Control via PROFIBUS	**38**	**x**	**x**	**PZD "DIG_OUT"**

The output terminal with this function can be controlled via PROFIBUS.

In this case, the process data must be configured and the PZD to be controlled should be assigned signal ID 50107 in the setpoint telegram (digital outputs, terminal O0.A and O1.A, DIG_OUT).

The following definitions apply:

Assigning the function to the terminal	Parameterizing	Control using
• Term. O0.A	—> P0680 = 38	Bit 0 of PZD "DIG_OUT"
• Term. O1.A	—> P0681 = 38	Bit 1 of PZD "DIG_OUT"

Note:

- P0699 (inverting output terminals) can be used to set the output signal inversion by the drive.
- Refer to Chapter 5.6.5 for information on configuring process data.

Table 6-43 List of output signals, continued

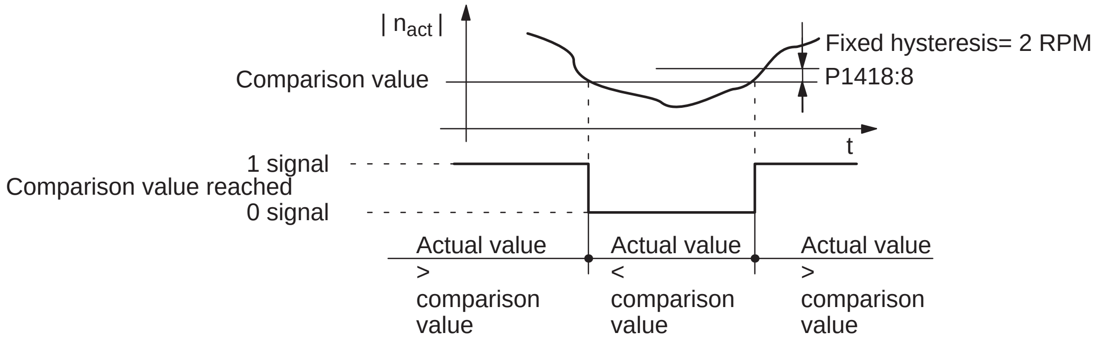
<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Pulsed resistor not overloaded
(only for POSMO CA)</td><td>39</td><td>x</td><td>x</td><td>MeldW.11</td></tr>
<tr><td colspan="5">This output signal is used to display whether the pulsed resistor is overloaded. If braking is continued, the DC link voltage could continue to rise so that the DC link voltage monitoring would respond (refer to Chapter 6.1.7).
1 signal Normal status, i.e. the pulsed resistor is not overloaded
0 signal The pulsed resistor is overloaded
Note:
Warning 821 is output for simplified diagnostics via SimoCom U.</td></tr>
<tr><td>Status, block selection 1st output/2^0
2nd output/2^1
3rd output/2^2
4th output/2^3
5th output/2^4
6th output/2^5</td><td>50
51
52
53
54
55</td><td>x
x
x
x
x
x</td><td>x
x
x
x
x
x</td><td>AktSatz.0
AktSatz.1
AktSatz.2
AktSatz.3
AktSatz.4
AktSatz.5</td></tr>
<tr><td colspan="5">These output signals are used to display which traversing block is being presently processed.
<table>
<tr><th>Block number</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>...</th><th>31</th><th>...</th><th>63</th></tr>
<tr><td>1st output/weighting 2^0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>...</td><td>1</td><td>...</td><td>1</td></tr>
<tr><td>2nd output/weighting 2^1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>...</td><td>1</td><td>...</td><td>1</td></tr>
<tr><td>3rd output/weighting 2^2</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>...</td><td>1</td><td>...</td><td>1</td></tr>
<tr><td>4th output/weighting 2^3</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>...</td><td>1</td><td>...</td><td>1</td></tr>
<tr><td>5th output/weighting 2^4</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>...</td><td>1</td><td>...</td><td>1</td></tr>
<tr><td>6th output/weighting 2^5</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>...</td><td>0</td><td>...</td><td>1</td></tr>
</table>
Note:
• 64 traversing blocks can only be displayed via PROFIBUS. When using the terminals to display (max. 2), then the maximum number of traversing blocks which can be displayed is restricted to 4.</td></tr>
<tr><td>Ready to be powered-up/not ready to be powered-up</td><td>–</td><td>x</td><td>x</td><td>ZSW1.0</td></tr>
<tr><td colspan="5">The output signal indicates whether the drive is ready to be powered-up.
1 signal Ready to be powered-up
In order that the drive goes into this state, the following conditions must be fulfilled:
– the two operating conditions are available via STW1 (xxxx xxxx xxxx x11x)
– the following enable signal is available: Terminal IF
– there is no fault
– there is no power-on inhibit
0 signal Not ready to be powered-up
The drive is not ready to be powered-up.</td></tr>
<tr><td>No OFF 2 present/OFF 2 present</td><td>–</td><td>x</td><td>x</td><td>ZSW1.4</td></tr>
<tr><td colspan="5">1 signal No OFF 2 present
0 signal OFF 2 present</td></tr>
<tr><td>No OFF 3 present/OFF 3 present</td><td>–</td><td>x</td><td>x</td><td>ZSW1.5</td></tr>
<tr><td colspan="5">1 signal No OFF 3 present
0 signal OFF 3 present</td></tr>
</table>

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Power-on inhibit/no power-on inhibit	**–**	**x**	**x**	**ZSW1.6**
1 signal — Power-on inhibit It is only possible to power up the drive again via OFF 1 followed by ON (STW1.0). 0 signal — No power-on inhibit **Note:** The ”power-on inhibit” function can be disabled via P1012.12.				
No following error/following error	**58**	**–**	**x**	**ZSW1.8**
When the axis is traversed, closed-loop position controlled, using a model, the theoretically permissible following error is calculated from the instantaneous traversing velocity and the selected Kv factor. A following error window can be defined using P0318, which defines the permissible relative deviation from this calculated value. This output signal specifies whether the actual following error is within the following error window, defined using P0318. 1 signal — No following error The actual following error is within the defined following error window. 0 signal — Following error The actual following error of the axis is outside the defined following error window. **Note:** Refer under the index entry ”Following error monitoring”.				
Spindle position reached (from SW 5.1)	**59**	**x**	**–**	**MeldW.15**
This signal displays as to whether the target position has been reached. 1 signal — The spindle has reached the target position within the tolerance window (P0134). 0 signal — The spindle has not reached the target position or alarms 131, 134 and 135 have occurred. **Note:** • The ”spindle positioning” function is described in Chapter 6.13 (from SW 5.1).				
Control requested/no control possible	**–**	**x**	**x**	**ZSW1.9**
The status of the DP slave is signaled to the DP master using this output signal. 1-signal — Control requested The DP master is requested to accept control. **Recommendation:** As a result of this output signal, the DP master should accept control and control bit STW1.10 ”Control requested/not control requested” should be set to ”1”. 0 signal — Control not possible The DP master is signaled that control is not possible. This is, for example, the case for the following states: – the ”DP slave POSMO SI/CD/CA” has still not run-up – the ”SimoCom U” tool has accepted the master control – the clock-cycle synchron. PROFIBUS no longer operates with clock cycle synchronism – for slave-to-slave communications, not all of the links have been established to the publisher (from SW 4.1)				

6

Table 6-43 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Comparison value reached/comparison value not reached</td><td>–</td><td>x</td><td>–</td><td>ZSW1.10</td></tr>
<tr><td colspan="5">The output signal indicates whether the comparison value, set using P1418:8, has been fallen below.
1 signal actual value > comparison value (P1418:8)
0 signal actual value < comparison value (P1418:8)


Note:
• The output signal corresponds to the $| n_{act} | < n_{min}$ signal with inverted logic.
• In n-set operation, this signal occupies the PROFIBUS bit ZSW1.10 if spindle positioning has not been selected (from SW 5.1) (P0125=0). For the ”spindle positioning” function (from SW 5.1), the ”reference position reached/outside reference position” signal occupies ZSW1.10 (P0125=1), refer to output signal Function No. 60.</td></tr>
<tr><td rowspan="2">Reference position reached/outside reference position</td><td rowspan="2">60</td><td>–</td><td>x</td><td>ZSW1.10</td></tr>
<tr><td>x</td><td>–</td><td>MeldW.14</td></tr>
<tr><td colspan="5">This output signal is used to display, in the positioning mode (ZSW1.10), whether the axis has reached the end of the traversing block (position reference value = target position) and the position actual value lies within the positioning window (P0321).
In the n-set mode, MeldW.14 indicates that the reference position has been reached when positioning the spindle.
1 signal Reference position reached
The axis/spindle is at the end of a traversing task within the positioning window (P0321).
0 signal Outside the reference position
The axis/spindle is outside the positioning window.
Note:
• The signal is not set when the axis stops, if
– the axis is in the closed-loop speed controlled jogging mode
– an ongoing traversing block is interrupted or canceled using ”intermediate stop” or ”stop” which means that the target position has not been reached
• The signal remains set, until
– a new traversing block is started
– the axis is traversed in the jogging mode
– a reference point approach is started
– a fault (alarm) occurs (e.g. one of the monitoring windows P0318, P0321 or P0326) has been exceeded
• The signal remains set if a traversing block is re-started and there is no difference between the target position and the previous position.</td></tr>
</table>

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Reference point set/no reference point set	**61**	**–**	**x**	**ZSW1.11**

The output signal indicates whether an axis is referenced.
When referencing, the incremental measuring system of the axis is synchronized with the drive.

1 signal Reference point set
The axis has a valid reference point.

0 signal Reference point set
The axis does not have a valid reference point.

Note:

The following functions are not effective for an axis which is not referenced:

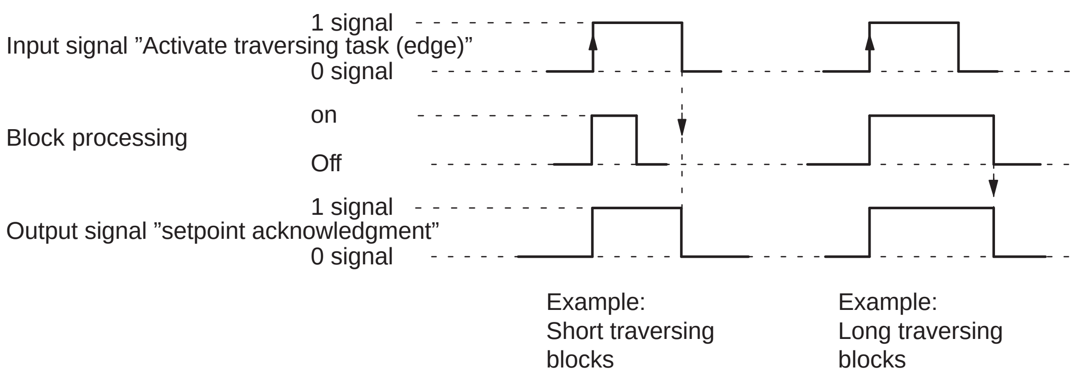
- Software limit switches
- Backlash compensation
- Start the traversing blocks

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Setpoint acknowledge	**62**	**–**	**x**	**ZSW1.12**

Using this output signal, the drive indicates that a new traversing tasks was accepted with the input signal ”activate traversing task (edge)” and when this traversing task was executed.

1 signal The traversing task is processed
The signal is set as soon as the traversing task in the drive is started with the ”Activate traversing task” input signal.

0 signal A traversing task is not processed
The output signal is reset again after the traversing task has been completed and the ”activate traversing task (edge)” input signal has been reset.
A new traversing task may be started via the ”Activate traversing task (edge)” input signal.



Note:

Refer to the input signal ”Activate traversing task (edge)” in Chapter 6.4.2.

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Teach-in executed (from SW 4.1)	**64**	**–**	**x**	**PosZsw.15**

This signal indicates whether the ”teach-in” function was successfully executed after activation.

1 signal ”Teach-in” function executed

0 signal Function not executed

Note:

- Refer under the index entry ”Input signal – activate teach-in (edge)”
- The ”teach-in” function is described in Chapter 6.11.

6

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
Drive stationary/drive moving	**–**	**–**	**x**	**ZSW1.13**
The output signal provides information about the actual operating status of the axis. 1 signal — Drive stationary The absolute actual speed is less than or equal to the threshold speed (n_{min}, P1418). 0 signal — Drive is traversing The absolute actual speed is greater than the threshold speed (n_{min}, P1418). **Note:** • The function of the output signal $\mid n_{act} \mid < n_{min}$ corresponds to this signal. • This output signal cannot be used to identify whether the drive is crawling.				
Function generator active (from SW 6.1)	**–**	**x**	**–**	**ZSW1.13**
The output signal provides information about the status of the function generator or the measuring function. 1 signal — The function generator or the measuring function in the drive is active. 0 signal — The function generator or the measuring function in the drive is not active.				
First speed setpoint filter inactive	**–**	**x**	**x**	**ZSW2.3**
The output signal specifies whether the first speed setpoint filter is active/inactive. 1 signal — First speed setpoint filter is inactive —> Low-pass filter is disabled 0 signal — First speed setpoint filter is active —> Low-pass filter is enabled **Note:** The first speed setp. filter can be enabled/disabled using the ”first speed setpoint filter off” input signal.				
Ramp-function gen. inactive	**–**	**x**	**x**	**ZSW2.4**
The output signal specifies whether the ramp-function generator is active. The ramp-function generator can be switched-in/switched-out, e.g. using the input signal ”Ramp-up time zero”. 1 signal — Ramp-function generator inactive 0 signal — Ramp-function generator active **Note:** If the input signal STW2.4 = 0 is selected, then ZSW2.4 remains at 1 as long as the motor is stationary. ZSW2.4 only goes to zero when the motor is moving.				
Actual motor 1st signal **2nd signal**	**–** **–**	**x** **x**	**–** **–**	**ZSW2.9** **ZSW2.10**
These 2 status signals can be used to identify which motor/motor data set is selected.				

Motor data set	1	2	3	4
1st signal/ZSW2.9	0	1	0	1
2nd signal/ZSW2.10	0	0	1	1

Note:
- Motor changeover is described in Chapter 6.9.
- If, for P1249 = 1 a motor changeover was initiated via the input signals ”motor data set changeover 1st input or 2nd input” and these output signals did not change, then P1013 (motor changeover) was incorrectly parameterized.

Table 6-43 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Motor being changed over</td><td>–</td><td>x</td><td>–</td><td>ZSW2.11</td></tr>
<tr><td colspan="5">The output signal indicates whether the motor is being changed over.
1 signal The motor is being changed over
During this time, the drive pulses are canceled.
0 signal Otherwise
Note:
The ”motor changeover for induction motors” function is described in Chapter 6.9.</td></tr>
<tr><td>Slave sign-of-life</td><td>–</td><td>x</td><td>x</td><td>ZSW2.12
ZSW2.13
ZSW2.14
ZSW2.15</td></tr>
<tr><td colspan="5">For the ”motion control with PROFIBUS” function, these status signals are used as slave sign-of-life (S-SoL) (4-bit counter).
The sign-of-life counter is incremented from 1 to 15 and then starts again with the value 1.
It only starts to count, if:
• The clock-cycle synchronous PROFIBUS operates in clock-cycle synchronism
• For slave-to-slave communications, all of the links between the publisher and subscriber have been established (from SW 4.1)
Note:
The ”Motion Control with PROFIBUS” function is described in Chapter 5.8.
The ”slave-to-slave communications” function is described in Chapter 5.10 (from SW 4.1).</td></tr>
<tr><td>Suppress fault 608 active</td><td>–</td><td>x</td><td>x</td><td>ZSW2.8</td></tr>
<tr><td colspan="5">This output signal is the feedback signal after suppress fault 608 has been activated via the ”suppress fault 608” input signal.
1 signal Suppressing fault 608 is active (speed controller output limited)
0 signal Suppressing fault 608 is not active
Note:
• Suppressing fault 608 (speed controller output limited) can be activated as follows:
– via an input terminal with function number 26
– Using the PROFIBUS control signal STW2.8
• Refer to the index entry ”Input signal – Suppress fault 608”</td></tr>
<tr><td>Travel to fixed stop active</td><td>66</td><td>–</td><td>x</td><td>PosZsw.14</td></tr>
<tr><td colspan="5">This output signal is used to display whether the ”travel to fixed stop” function is active.
1 signal Block with the FIXED STOP command is being processed
The ”travel to fixed stop” function has been selected.
0 signal No block with the FIXED STOP command is being processed
The ”travel to fixed stop” function has been canceled.
Note:
• The ”travel to fixed stop” function is described in Chapter 6.10.</td></tr>
</table>

6

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n-set	Operating mode pos	PROFIBUS bit
External block change (from SW 7.1)	**67**	**–**	**x**	**AktSatz.14**
This output signal is used to display whether the ”External block change” function is active. 1 signal The ”external block change” function is selected. 0 signal The ”external block change” function is canceled. **Note:** • This output signal is an image of the input signal ”External block change” (Fct. No. 67 and STW1.13). • When the edge of this output signal changes, this indicates that a block change has taken place, i.e. especially in the MDI mode, a new MDI block may now be entered via PZD and/or default block (refer to Chapter 6.2.12).				
Fixed stop reached	**68**	**–**	**x**	**PosZsw.12**
This output signal is used to display whether the drive is in the ”fixed stop reached” status. 1 signal The drive is in the ”fixed stop reached” status 0 signal The drive is not in the ”fixed stop reached” status **Note:** • The ”fixed stop reached” status is assumed, dependent on the setting in P0114 (fixed stop, configuration 2). • The ”travel to fixed stop” function is described in Chapter 6.10.				
Request passive referencing (from SW 5.1)	**69**	**–**	**x**	**ZSW1.15**
The master drive requests passive referencing for the slave drive, using this output signal. To realize this, this output signal must be logically combined with the input signal ”activate passive referencing” for the slave drive. 1 signal The master drive has detected its zero mark This means that for the slave drive, the reference cam and zero mark search are activated While the signal is set, the slave axis must move over a zero mark otherwise an appropriate fault is signaled. 0 signal The master drive has reached its reference point **Note:** • The ”request passive referencing” output signal is always output at the reference point approach when the zero mark has been recognized. • The ”passive referencing” function is described in Chapter 6.3.				
Tracking mode active	**70**	**–**	**x**	**PosZsw.0**
This output signal is a checkback signal that the tracking mode has been activated via the ”tracking mode” input signal. 1 signal Tracking mode active 0 signal Tracking mode not active **Note:** If the tracking mode is active as internal response to an error/fault, then this is also displayed using this input signal.				

Table 6-43 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>In synchronism (from SW 4.1)</td><td>71</td><td>–</td><td>x</td><td>PosZsw.3</td></tr>
<tr><td colspan="5">This output signal is used to display whether the slave drive is in synchronism with the master drive.
1 signal The slave drive is in synchronism with the master drive
0 signal The slave drive is not in synchronism
Note:
• When is a drive in synchronism
If, for an active axis coupling, the following error is less than the following error tolerance set in P0318:8.
—> refer under the index entry ”Dynamic following error monitoring”
• For axis couplings in the ”positioning” mode, the signal is not influenced by superimposed axis motion as a result of traversing blocks.
• The ”axis coupling” function is described in Chapter 6.3.</td></tr>
<tr><td>Setpoint static</td><td>72</td><td>–</td><td>x</td><td>PosZsw.2</td></tr>
<tr><td colspan="5">This output signal indicates the processing status of a traversing block on the setpoint side.
1 signal The axis is stationary as far as the setpoint is concerned,
i.e. the interpolator outputs the velocity setpoint 0.
0 signal A traversing block is being processed in the interpolator,
i.e. a velocity setpoint $\neq$ 0 is output.
Note:
• Together with the ”status block selection” output signal, it can be defined as to which traversing block is being processed.
• This output signal is also supplied for the ”Jogging, incremental” function.
• Refer under the index entry ”Positioning monitoring”</td></tr>
<tr><td>Fixed stop, clamping torque reached</td><td>73</td><td>–</td><td>x</td><td>PosZsw.13</td></tr>
<tr><td colspan="5">This output signal displays whether the drive is in the ”fixed stop reached” status and whether the programmed clamping torque has been reached.
1 signal The drive has provided the programmed clamping torque
0 signal The drive provides less torque than the clamping torque
Note:
• The ”behavior, clamping torque not reached” can be set using P0113.1.
• The ”travel to fixed stop” function is described in Chapter 6.10.</td></tr>
<tr><td>Axis moves forwards</td><td>74</td><td>–</td><td>x</td><td>PosZsw.4</td></tr>
<tr><td>Axis moves backwards</td><td>75</td><td>–</td><td>x</td><td>PosZsw.5</td></tr>
<tr><td colspan="5">The actual direction of motion of the axis for an active traversing block is displayed using these output signals.
1 signal The axis moves forwards or backwards
0 signal The axis does not move forwards or does not move backwards
Note:
If both signals = ”0”, then no axis movement is active.</td></tr>
</table>

6

Table 6-43 List of output signals, continued

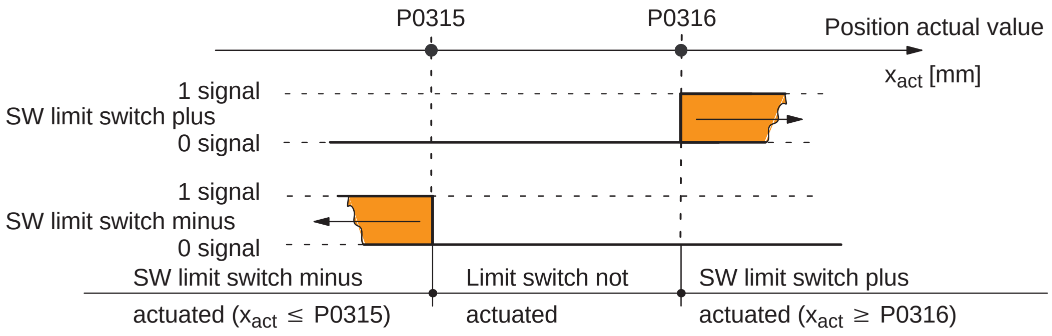
Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n-set	pos	
Minus software limit switch actuated	**76**	**–**	**x**	**PosZsw.6**
Plus software limit switch actuated	**77**	**–**	**x**	**PosZsw.7**

The axis traversing range can be defined with the plus (P0316) and minus P0315) software limit switches (refer to the index entry ”Software limit switch).

The output signals indicate whether the appropriate software limit switch has been actuated.

1 signal The plus or minus software limit switch has been actuated

0 signal Neither the plus nor minus software limit switch has been actuated



Note:

The software limit switches only become active after the axis has been referenced.

Table 6-43 List of output signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n-set	pos	
Cam switching signal 1	**78**	**–**	**x**	**PosZsw.8**
Cam switching signal 2	**79**	**–**	**x**	**PosZsw.9**

For the ”position-related switching signals (cams)” function, the simulated cam signal is output via these output signals.

Cam switching signal 1

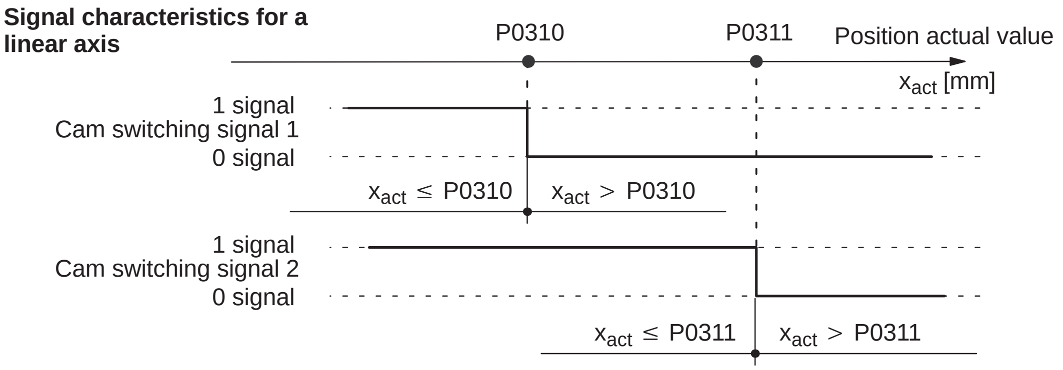
1 signal Position actual value $x_{act} \leq$ cam switching position 1 (P0310)

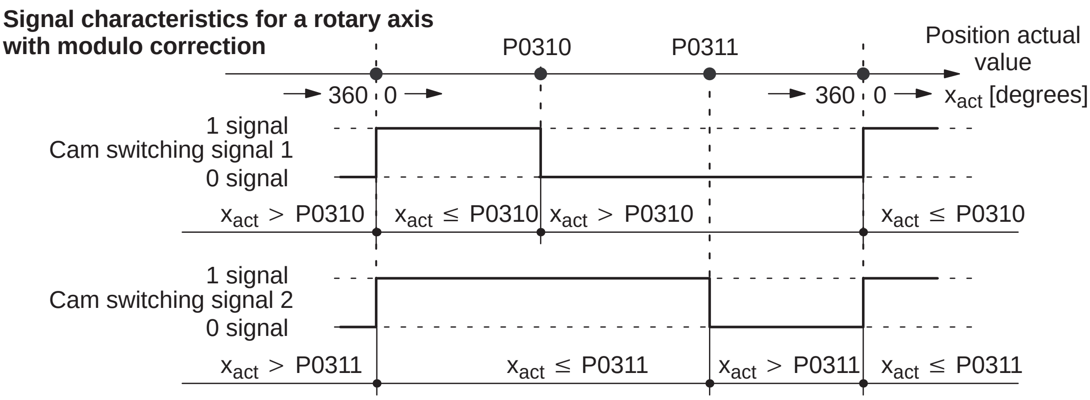
0 signal Position actual value $x_{act} >$ cam switching position 1 (P0310)

Cam switching signal 2

1 signal Position actual value $x_{act} \leq$ cam switching position 2 (P0311)

0 signal Position actual value $x_{act} >$ cam switching position 2 (P0311)

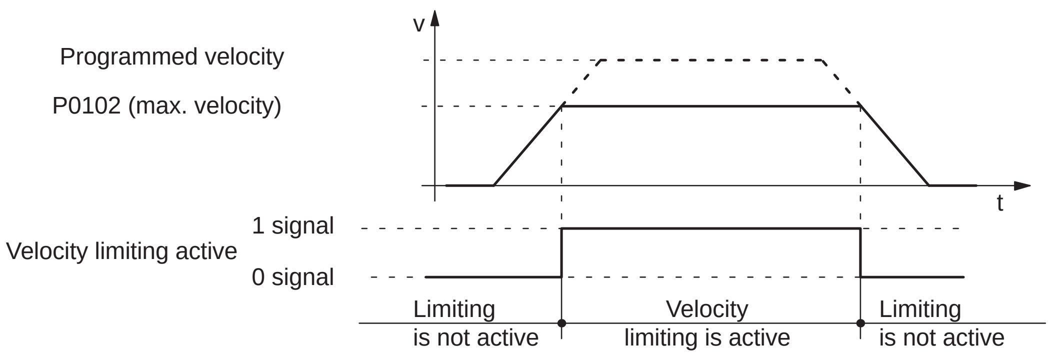




Note:

- Only after the axis has been referenced can it be guaranteed that the cam switching signals have a ”true” position reference when they are output.
  This is the reason that an external AND logic operation must be established between the output signal ”reference point set/no reference point set” and the output signals ”cam switching signals 1, 2” (e.g. using an external PLC).
- The function ”position-related switching signals (cams)” is described in Chapter 6.2.3.

Table 6-43 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n-set</th><th>pos</th></tr>
<tr><td>Direct output 1 via the traversing block</td><td>80</td><td>–</td><td>x</td><td>PosZsw.10</td></tr>
<tr><td>Direct output 2 via the traversing block</td><td>81</td><td>–</td><td>x</td><td>PosZsw.11</td></tr>
<tr><td colspan="5">• For output terminals:
If an output is parameterized with this function, then this output can be set or reset from the traversing block using the SET_O or RESET_O command.
• For PROFIBUS:
The status signals can be set or reset from the traversing block using the SET_O or RESET_O command.
Note:
• The following commands are used to set and reset output signals:
SET_O/RESET_O command and command parameter = 1 —> set/reset direct output 1
SET_O/RESET_O command and command parameter = 2 —> set/reset direct output 2
SET_O/RESET_O command and command parameter = 3 —> set/reset both signals
• Programming traversing blocks is described in Chapter 6.2.10.</td></tr>
<tr><td>Velocity limiting active</td><td>82</td><td>–</td><td>x</td><td>PosZsw.1</td></tr>
<tr><td colspan="5">The output signal indicates whether the velocity is limited.
The limiting is, for example, active if the programmed velocity is greater than the maximum velocity (P0102), taking into consideration the override.
1 signal Velocity is limited
0 signal Velocity is not limited


Note:
This signal is not output when jogging via velocity!</td></tr>
<tr><td>MDI active (from SW 7.1)</td><td>83</td><td>–</td><td>x</td><td>AktSatz.15</td></tr>
<tr><td colspan="5">The output signal indicates whether the MDI function is operational.
1 signal The MDI function is active.
0 signal The MDI function is not active.</td></tr>
<tr><td>Block processing inactive (from SW 8.1)</td><td>87</td><td>x</td><td>x</td><td>AktSatz.10</td></tr>
<tr><td colspan="5">The output signal indicates whether a traversing block has been processed.
1 signal A traversing block has been completely processed.
0 signal A traversing block is still being processed – even if the override is zero and motion has stopped.</td></tr>
</table>

6.5 Motor holding brake

Description

For axes, which must secured against undesirable movement when powered down, the brake sequence control of SIMODRIVE POSMO SI/CD/CA can be used to control the motor holding brake.

From SW 4.1, an auxiliary contactor for the motor holding brake can be controlled using a freely parameterizable digital output

- Holding brake for SIMODRIVE POSMO CD/CA

  SIEMENS motors are optionally available with a motor holding brake.

Reader's note

Technical data, refer to Chapter 1.3.1.

- Holding brake for SIMODRIVE POSMO SI

  There is an optional integrated holding brake for SIMODRIVE POSMO SI.

  An external holding brake can always be used. In this case, the brake is controlled using an appropriately parameterized digital output.

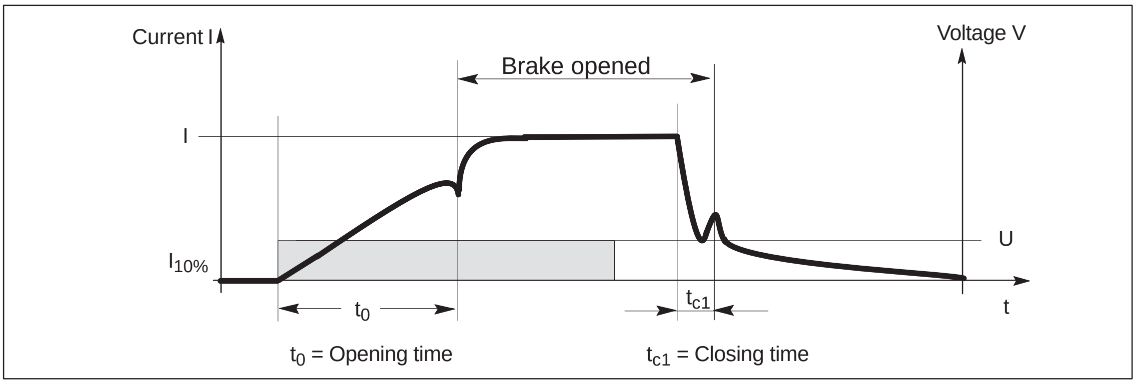


Fig. 6-43 Terminology (time) for holding operation

When the system is first commissioned, it is automatically recognized if there is a motor holding brake and P0850 (not however, P0851...P0854) is appropriately preset:

P0850 = 0: No brake available

P0850 = 1: Brake available

P0850 = 2: The brake is always opened
As an alternative, the motor holding brake can be manually opened by connecting an external 24 V to X25.1/X25.5 (refer to Fig. 6-47).

If an external holding brake is to be connected without there being a motor holding brake, then the following must be carefully observed:

- P0850 must be explicitly set to 1; this is because it is set to zero as default as there is no motor holding brake.
- Fault 622 (motor holding brake defective) must be suppressed.

Danger

It is not permissible to use the motor holding brake as working brake, as it is generally only designed for a limited number of emergency braking operations.

Only qualified service personnel may open (release) the brake using an external 24 V.

It is not permitted that the brake is continuously open, because if the drive is powered down, the axis could behave differently (e.g. hanging axis and open motor holding brake).

Axial forces may not be applied to the shaft – both when installing and operating the system!

Connecting the motor holding brake

The brake sequence control operates with the ”open holding brake” output signal. The signal can be output as follows:

- Using freely parameterizable digital outputs (output terminal)

  The required digital output at X24 must be assigned function number 35 for the motor holding brake by appropriately parameterizing it.

  Digital output at X24
  O0.A and O1.A (parameterization, refer to Chapter 6.4.3)

  Using P0699, each digital output can be set as to whether the signal is output inverted.

  The auxiliary contactor for the motor holding brake is connected at the parameterized digital output.
- Via status signal for PROFIBUS-DP

  The DP master must process the status signal ”open holding brake” (ZSW2.5). The signal must be connected to the digital output of the master, to which the relay for the motor holding brake is connected.

Parameter overview (refer to Chapter A.1)

The following parameters are used for the motor holding brake:

- P0850 Activates the brake control
- P0851 Brake opening time
- P0852 Speed, close holding brake (SRM, ARM)
  Motor velocity, close holding brake (SLM)
- P0853 Brake delay time
- P0854 Controller inhibit time

Note

Regarding the controller enable:
Enabling and disabling the controller depends on the ON/OFF1 control signal.

Open brake

When ”controller enable” is issued, the speed controller becomes active and controls with $n_{set} = 0$.

Speed setpoints can only be accepted after the brake opening time has expired.

This is signaled using the ”status, controller enable” output signal.

Objective when setting the brake opening time

The brake opening time should be selected, so that after the ”controller enable” is issued, the speed controller becomes active when the motor holding brake opens.
For all other settings, the control acts against the brake.

The following applies:
Brake opening time (P0851) $\geq$ time to open the holding brake

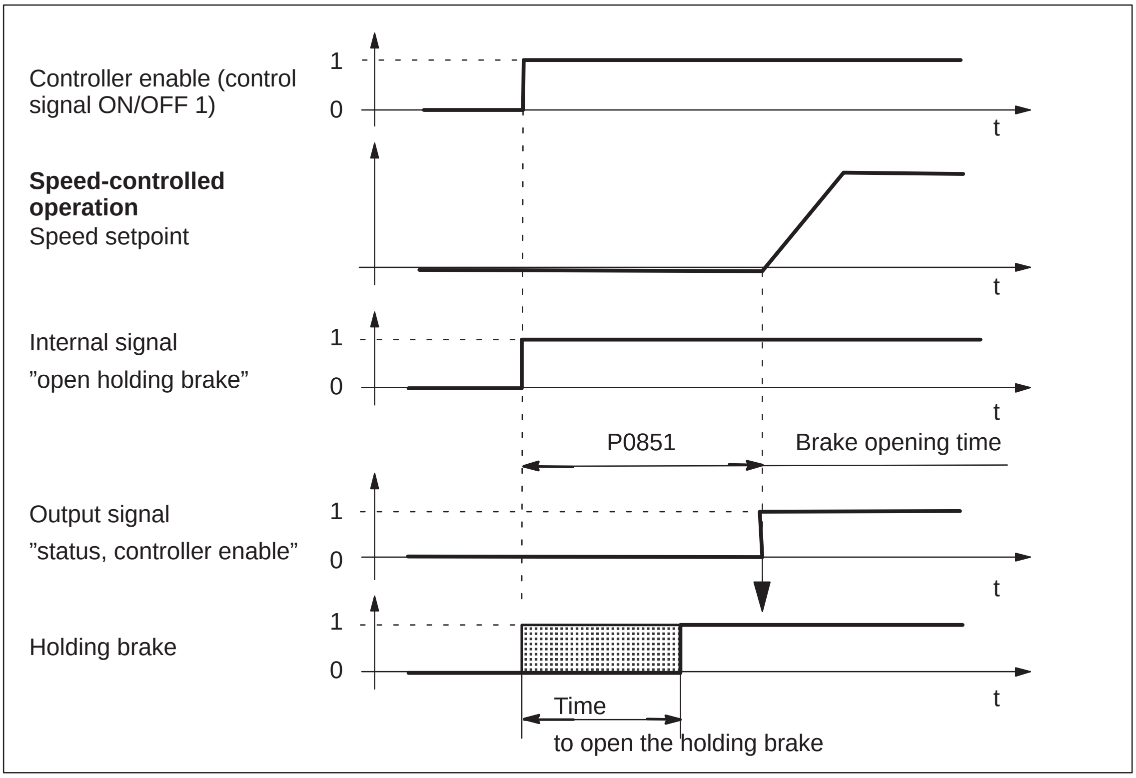


Fig. 6-44 Opening the brake: Characteristics when issuing ”controller enable”

Closing the brake when withdrawing the ”controller enable”

The axis is actively braked when the ”controller enable” is withdrawn. The brake delay time (P0853) is started when the ”controller enable” signal drops-out, i.e. at nset = 0.

At n = $n_{holding\ brake}$ (P0852), the following is valid:

- The ”open holding brake” internal signal is deleted
  Note:
  After the brake delay time (P0853) has expired, the internal signal ”open holding brake” is always canceled.

Objective for this setting

The time required to close the holding brake should be adjusted so that the control is only withdrawn after the brake has closed. This prevents an axis from possibly sagging.

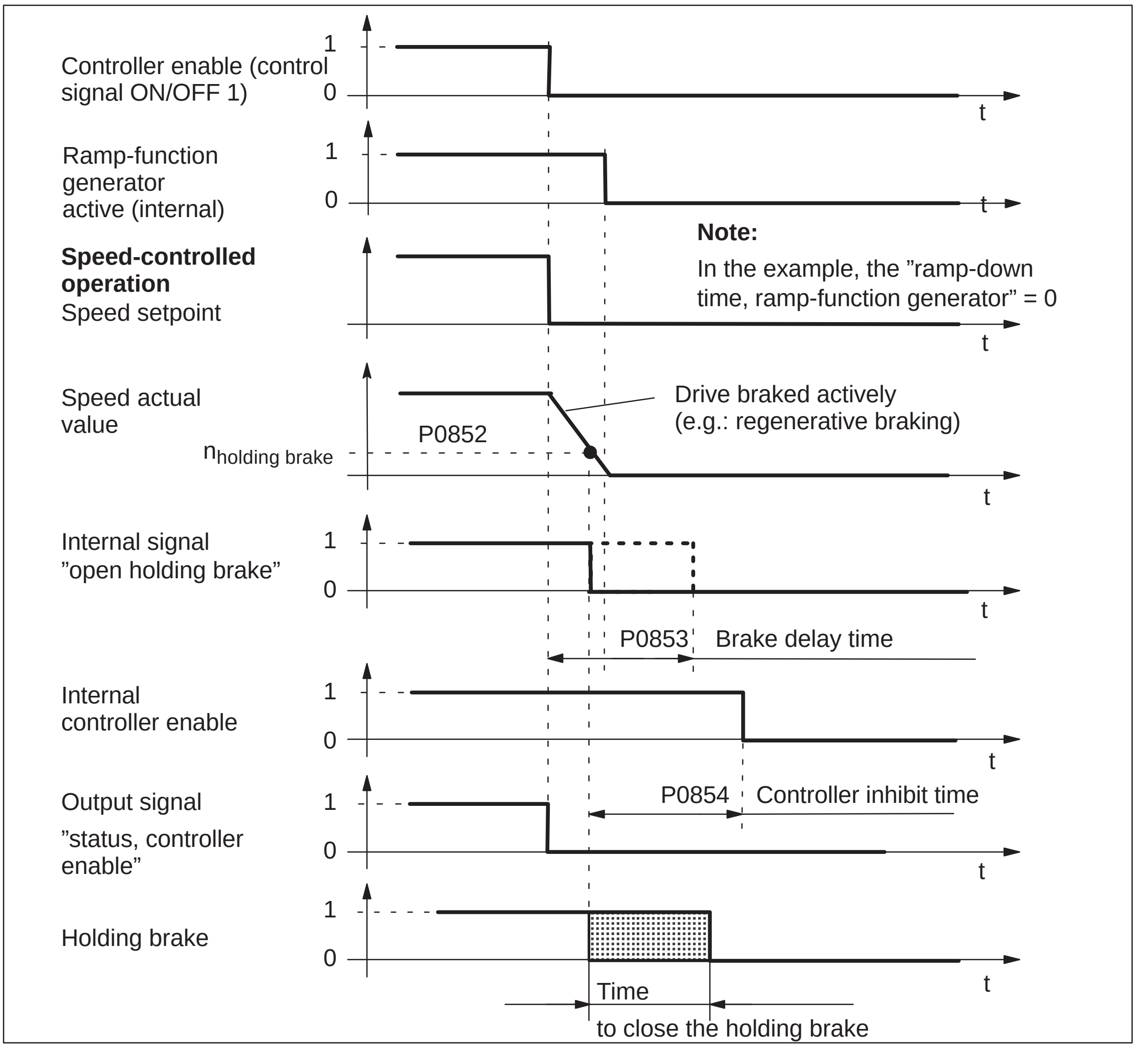


Fig. 6-45 Closing the brake: Behavior when withdrawing ”controller enable”

Note

The signals designated as internal signals (e.g. ”open holding brake”) differ from the corresponding digital inputs and outputs and PROFIBUS signals due to additional
internal run times and logic operations.

Closing the brake when the ”pulse enable” is withdrawn

When the pulse enable is withdrawn, the drive coasts down and the ”open holding brake” internal signal is canceled. After the time taken for the brake to close, the drive is braked by the motor holding brake.

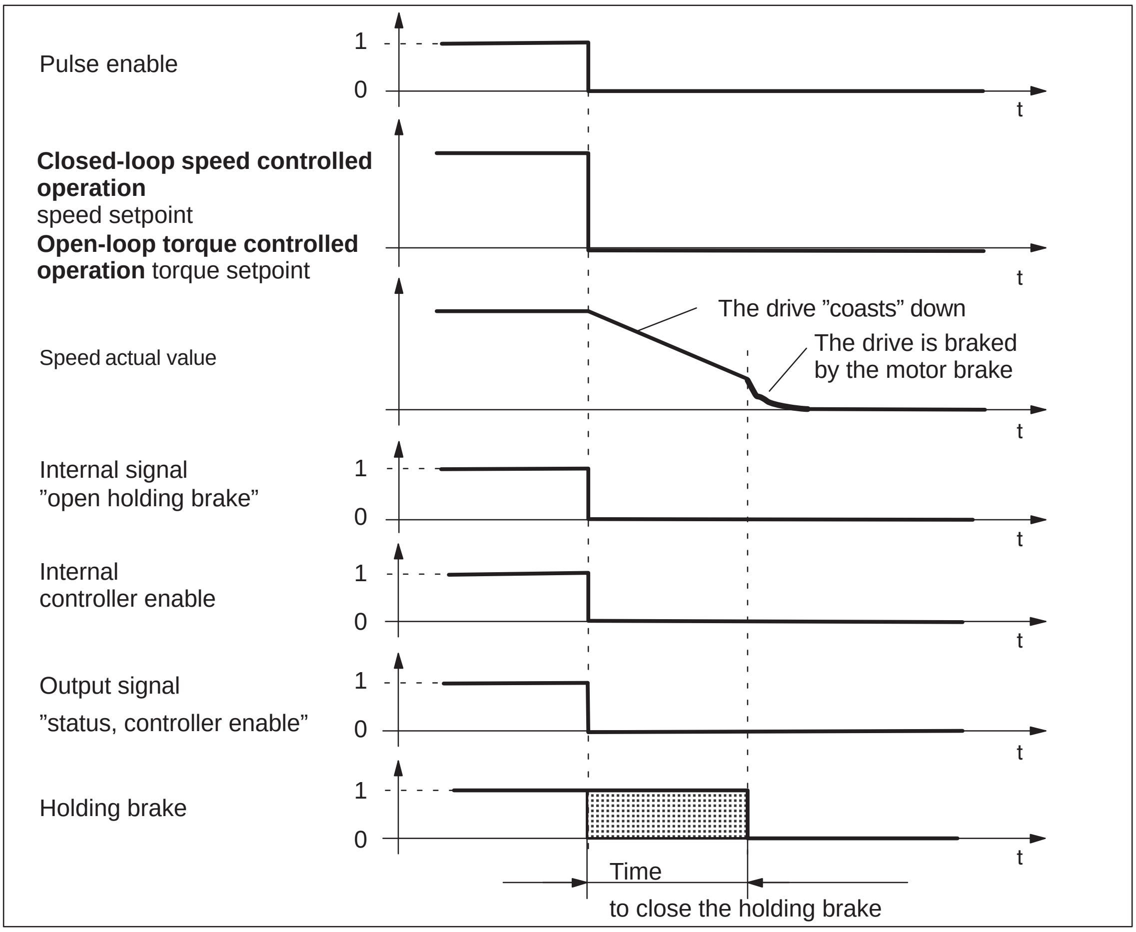


Fig. 6-46 Closing the brake: Behavior when withdrawing ”pulse enable”

Example motor holding brake

Task description, assumptions:

A motor with a holding brake for a hanging axis is connected to the drive. The motor holding brake is to be set.

What other settings are required?

1. Connect-up the external brake control through X25 so that the motor holding brake, when necessary, can be manually opened (refer to Fig. 6-47).
2. Activate the brake sequence control in the drive (P0850 = 1).
3. Set the parameters to open the holding brake.

   P0851 (brake opening time)
   This time must be set, so that it is equal to or greater than the time to open the holding brake.
4. Set the parameters to close the holding brake when the controller enable (control signal ON/OFF 1) is withdrawn.

   P0852 (speed, close holding brake).

   P0853 (brake delay time)
   The brake delay time (P0853) must be harmonized with the speed at which the holding brake closes (P0852).

   P0854 (controller inhibit time)
   The controller inhibit time must be harmonized with the time that it takes to close the brake so that the drive cannot drop.

   Example of determining the controller inhibit time:
   Mark the position of the axis and initiate an alarm that withdraws the controller enable.
   Does the axis sag? If yes, then increase the controller inhibit time

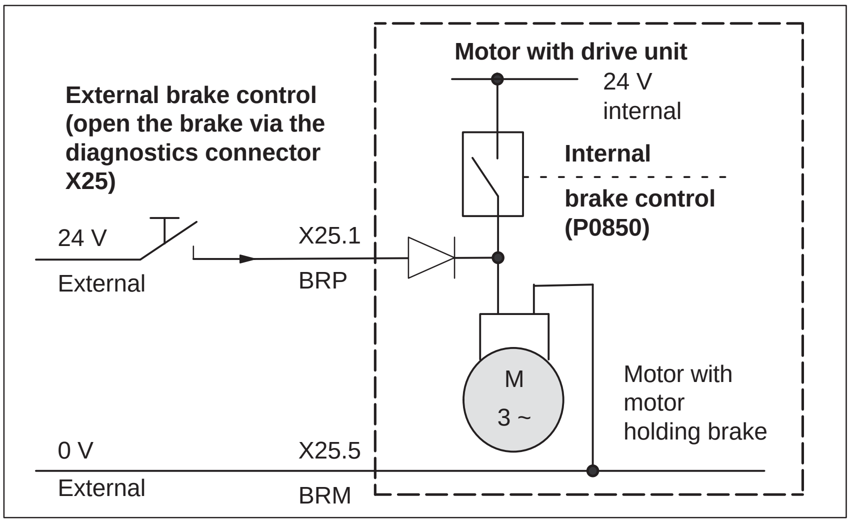


Fig. 6-47 Example: Controlling the motor holding brake via the diagnostics connector X25

6.6 Pulsed resistor (only for POSMO CA, from SW 4.1)

Description

The non-regenerative feedback capable line infeed for POSMO CA requires, when braking, a pulsed resistor to dissipate the mechanical energy.

This pulsed resistor is located at the outer side of the enclosure (next to the heatsink) and may not be overloaded.

Technical data:

- Max. braking power (P_{max}):
  - At rated voltage 400 V (P1171 = 0): 16.3 kW
  - At rated voltage 480 V (P1171 = 1): 22.2 kW
- Max. braking energy (W_{max}): 1000 Ws
- Continuous braking energy ($P_{continuous}$): 150 W
- Load duty cycle:

$$T_{On} = \frac{\text{Max. braking energy}}{\text{Required braking power}}$$

$$T_{Off} = T_{On} \bullet \left(\frac{\text{Required braking power}}{\text{Continuous braking power}} - 1\right)$$

Example: A machine with 750 W is to be braked. What does the maximum load duty cycle look like?

$$T_{On} = \frac{1000\ \text{Ws}}{750\ \text{W}} = 1.33\ \text{s}$$

$$T_{Off} = 1.33\ \text{s} \bullet \left(\frac{750\ \text{W}}{150\ \text{W}} - 1\right) = 5.32\ \text{s}$$

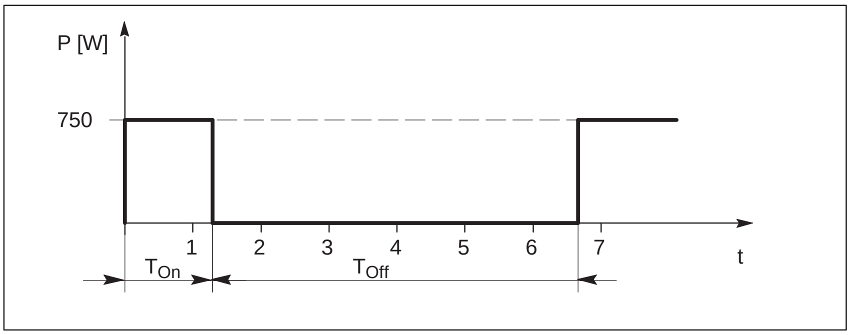


Fig. 6-48 Example, load duty cycle

Pulsed resistor management

P1267 specifies the actual pulsed resistor utilization. The following is output for an 80 % utilization:

- Warning 821, pulsed resistor in i^2t limiting
- PROFIBUS status word MeldW11, pulsed resistor overloaded

It is not possible to externally connect an additional pulsed resistor.

The thresholds for the pulsed resistor management are preset for a 400 V line supply voltage. For 480 V line supplies, the thresholds can be increased using parameter P1171 (refer to Chapter 2.2.5).

Warning

When the pulsed resistor is shutdown due to overload, the drive can no longer brake. The drive is shutdown with an overvoltage signal if it is further overloaded.

Parameter overview (refer to Chapter A.1)

The following parameters are used for the "pulsed resistor management" function:

- P1171 Line supply voltage 480 V (switch-in and switch-out threshold for the pulsed resistor)
- P1267 Pulsed resistor: Actual utilization factor

6.7 Armature short-circuit brake (only for POSMO CA)

When a fault condition develops, an attempt is always made to stop POSMO CA in a controlled fashion. If this is not possible due to a critical defect, then the motor can be braked by short-circuiting the armature.

The armature short-circuit brake management is realized using internal switching operations.

Using armature short-circuit braking, for POSMO CA,
the response to faults 500 to 523 and 600 to 623 can be parameterized with the STOP 0 extension
(refer to Chapter 7.1).

6.8 Parameter set changeover

Description

By selecting parameter sets, the appropriate parameter set-dependent parameters become effective.
This means that parameters can be adapted to various requirements, e.g.

- Dynamic adaptations
- Gearbox stage changeover (high or low speed)

It is possible to toggle between a maximum of 8 parameter blocks (parameter blocks 0 to 7) via the appropriate input signals.

Parameters that are independent and dependent on the parameter set

For POSMO SI/CD/CA, the following parameter types are available, referred to the parameter set changeover:

- Parameter set-independent parameters

  These parameters only have one parameter value, and are effective, independent of the selected parameter set.

  Example:
  P0660 Function, input terminal I0.A
  (x = A for POSMO SI/CD/CA)

- Parameter set-dependent parameters

  These parameters have, for every parameter set, a parameter value which is effective, dependent on the selected parameter set.

  Example:
  P1407:8 P gain, speed controller (ARM, SRM)
  P gain, velocity controller (SLM)
  P1407:0 is effective, if parameter set 0 is selected (standard)
  ...
  P1407:7 is effective, if parameter set 7 is selected

6

Table 6-44 Parameter set-dependent parameters

Parameters for parameter set				Operating mode		
0	1	...	7	n_{set}	pos	Description
0115:0	0115:1	...	0115:7	–	x	Fixed stop, maximum following error
0116:0	0116:1	...	0116:7	–	x	Fixed stop, monitoring window
0200:0	0200:1	...	0200:7	x[1)]	x	Kv factor (position loop gain)
0204:0	0204:1	...	0204:7	–	x	Factor, speed pre-control
0205:0	0205:1	...	0205:7	x[1)]	x	Balancing filter, speed pre-control (dead time)
0206:0	0206:1	...	0206:7	x[1)]	x	Balancing filter, speed pre-control (PT1)
0210:0	0210:1	...	0210:7	x[1)]	x	Time constant, position reference value filter
0237:0	0237:1	...	0237:7	x[1)]	x	Encoder revolutions

Table 6-44 Parameter set-dependent parameters, continued

Parameters for parameter set				Operating mode		
0	**1**	**...**	**7**	**n_{set}**	**pos**	**Description**
0238:0	0238:1	...	0238:7	x[1)]	x	Load revolutions
0318:0	0318:1	...	0318:7	x[1)]	x	Dynamic following error monitoring tolerance
1123:0	1123:1	...	1123:7	x	x	Load moment of inertia (ARM, SRM) Load mass (SLM)
1200:0 to 1225:0	1200:1 to 1225:1	... ...	1200:7 to 1225:7	x	x	Current setpoint filter
1230:0	1230:1	...	1230:7	x	x	1st torque limit value (ARM, SRM) 1st force limit value (SLM)
1233:0	1233:1	...	1233:7	x	x	Regenerative limiting
1235:0	1235:1	...	1235:7	x	x	1st power limit value
1240:0	1240:1	...	1240:7	x	x	Offset, torque setpoint (speed controlled) (ARM, SRM) Offset, force setpoint (speed-controlled) (SLM)
1256:0	1256:1	...	1256:7	x	–	Ramp-function generator, ramp-up time
1257:0	1257:1	...	1257:7	x	–	Ramp-function generator, ramp-down time
1401:0	1401:1	...	1401:7	x	x	Speed for max. useful motor speed (ARM, SRM) Velocity for max. useful motor velocity (SLM)
1405:0	1405:1	...	1405:7	x	x	Monitoring speed, motor (ARM, SRM) Monitoring velocity, motor (SLM)
1407:0	1407:1	...	1407:7	x	x	P gain, speed controller (ARM, SRM) P gain, velocity controller (SLM)
1408:0	1408:1	...	1408:7	x	x	P gain, upper adaptation speed (ARM, SRM) P gain, upper adaptation velocity (SLM)
1409:0	1409:1	...	1409:7	x	x	Integral action time, speed controller (ARM, SRM) Integral action time, velocity controller (SLM)
1410:0	1410:1	...	1410:7	x	x	Integral action time, upper adaptation speed (ARM, SRM) Integral action time, upper adaptation velocity (SLM)
1414:0	1414:1	...	1414:7	x	x	Natural frequency, reference model, speed (ARM, SRM) Natural frequency, reference model, velocity (SLM)
1415:0	1415:1	...	1415:7	x	x	Damping, reference model, speed (ARM, SRM) Damping, reference model, velocity (SLM)
1417:0	1417:1	...	1417:7	x	x	n_x for ”n_act < n_x” signal
1418:0	1418:1	...	1418:7	x	x	n_min for ”n_act < n_min” signal
1421:0	1421:1	...	1421:7	x	x	Time constant, integrator feedback (speed controller)
1426:0	1426:1	...	1426:7	x	x	Tolerance bandwidth for ”n_set = n_act” signal
1428:0	1428:1	...	1428:7	x	x	Threshold torque M_x (ARM, SRM) Threshold force F_x (SLM)

Table 6-44 Parameter set-dependent parameters, continued

Parameters for parameter set				Operating mode		
0	**1**	**...**	**7**	**n_{set}**	**pos**	**Description**
1451:0	1451:1	...	1451:7	x	x	P gain, speed controller IM (ARM)
1453:0	1453:1	...	1453:7	x	x	Integral action time, speed controller IM (ARM)
1500:0 to 1521:0	1500:1 to 1521:1	... ...	1500:7 to 1521:7	x	x	Speed setpoint filter (ARM, SRM) Velocity setpoint filter (SLM)
Note: x: The parameter is available in this operating mode –: The parameter is not available in this operating mode x[1)] for spindle positioning (from SW 5.1)						

Note

Only parameter set 0 is parameterized using this SimoCom U parameterizing and start-up tool via the interactive dialog operation.

Parameter sets 1 to 7 must be parameterized using the expert list.

How can you toggle between parameter sets?

It is possible to toggle between parameter sets 0 and 7 - using the following input signals (refer to Chapter 6.4.2):

- Input signal ”parameter set changeover 1st input”
- Input signal ”parameter set changeover 2nd input”
- Input signal ”parameter set changeover 3rd input”

Note

The signals to change over the parameter set can be entered, as standard via PROFIBUS (refer to Chapter 6.4.2 or under the index entry ”Input signal parameter set changeover”). In individual cases, it is also possible to change over parameter sets using the input terminal.

For a parameter set changeover in the positioning mode (P0700 = 3), for the same gear set ratios, the reference point is lost. This is not the case if P0239 = 1.

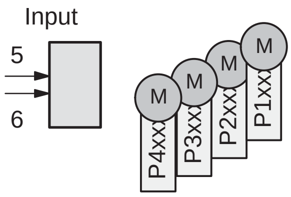
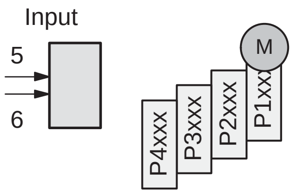
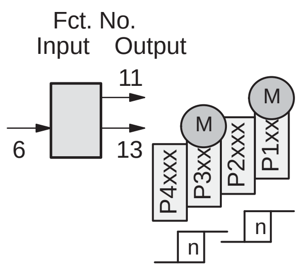
6.9 Motor changeover for induction motors (only POSMO CD/CA)

6.9.1 General information on motor changeover

Motor changeover versions

The following changeover functions can be implemented depending on the setting in P1013 (motor changeover):

Table 6-45 Motor changeover versions

P1013	Changeover	Description	Reference
0	none	**Properties:** Motor data set 1 (P1xxx) is always selected.	–
1	Max. 4 motors each with 1 motor data set 	**Features:** • The motor data sets are changed over using freely-parameterizable input terminals. • At changeover, the pulses are cancelled. **Application:** • Up to 4 motors can be operated with a POSMO CD/CA (only possible with PROFIBUS; it is possible to changeover between 2 motors using input/output terminals)	Refer to Chapter 6.9.2
2	1 motor with max. 4 motor data sets 	**Features:** • The motor data sets are changed over using freely-parameterizable input terminals. • The pulses are **not** canceled at changeover. **Application:** • Adaptation of the motor and controller data (e.g. pulse frequency changeover)	Refer to Chapter 6.9.3
3	Max. 2 motors each with 2 motor data sets 	**Features:** • The motor data sets can be changed over via the freely parameterizable input terminal and via speed thresholds. • If an input terminal is used to change over, the pulses are canceled. • The pulses are not canceled if changeover is realized using speed thresholds. **Application:** • Speed-dependent adaptation of the motor and controller data (e.g. pulse frequency changeover) for – one motor – two motors – star/delta operation	Refer to Chapter 6.9.4

1) Encoder changeover is not possible.
2) Only 1 motor can be used with encoder.

Motor data sets

For SIMODRIVE POSMO CD/CA, there are data sets for a maximum of 4 induction motors.

Note

The currently effective motor data set is displayed in P0599 (motor display).

Motor changeover can only be enabled in the operating mode ”speed setpoint” mode (P0700 = 1).

Before motor changeover can be selected, the motor data must be entered into the associated parameters 2xxx, 3xxx and/or 4xxx. For motors with code No., it is sufficient to make the entry in Px102. After this, in both cases, it is necessary to initiate a ”calculate controller data” using Px080=1.

Table 6-46 Motor data set-dependent parameters

Motor data set				Meaning
1	2	3	4	
1100	2100	3100	4100	Frequency, pulse-width modulation
1102	2102	3102	4102	Motor code number (99 is entered for non-catalog motors) **Note:** • When using several catalog motors, the motor data is only valid after first entering the appropriate motor code, followed by data save and POWER ON. • For a motor changeover with ”gap” (e.g. from motor 1 to 3), a motor code number (dummy code) must be entered in the intermediate motor data set, i.e. the appropriate parameter may not have the value 0. • After manually changing the motor code number, the following parameters must be checked, and if required, set to practical values: – P1401, P2401, P3401 or P4401 (speed for the maximum useful motor speed) – P1147, P2147, P3147 or P4147 (speed limiting)
1103	2103	3103	4103	Rated motor current
1117	2117	3117	4117	Motor moment of inertia
1119	2119	3119	4119	Inductance of the series reactor
1120	2120	3120	4120	P gain, current controller
1121	2121	3121	4121	Integrator time of current controller
1123:8	2123:8	3123:8	4123:8	Load moment of inertia
1125	2125	3125	4125	Ramp-up time 1 for V/Hz operation

Table 6-46 Motor data set-dependent parameters, continued

Motor data set				Meaning
1	2	3	4	
1127	2127	3127	4127	Voltage at f = 0, V/Hz operation
1129	2129	3129	4129	cos phi power factor
1130	2130	3130	4130	Rated motor power
1132	2132	3132	4132	Rated motor voltage
1134	2134	3134	4134	Rated motor frequency
1135	2135	3135	4135	Motor no-load voltage
1136	2136	3136	4136	Motor no-load current
1137	2137	3137	4137	Stator resistance, cold
1138	2138	3138	4138	Rotor resistance, cold
1139	2139	3139	4139	Stator leakage reactance
1140	2140	3140	4140	Rotor leakage reactance
1141	2141	3141	4141	Magnetizing reactance
1142	2142	3142	4142	Speed at the start of field weakening
1145	2145	3145	4145	Stall (standstill) torque reduction factor
1146	2146	3146	4146	Maximum motor speed
1147	2147	3147	4147	Speed limiting
1148 [1)]	2148 [1)]	3148 [1)]	4148 [1)]	Speed at the start of the stall power
1150	2150	3150	4150	P gain, flux controller
1151	2151	3151	4151	Integral action time, flux controller
1160	2160	3160	4160	Speed at the start of flux sensing
1180	2180	3180	4180	Lower current limit adaptation
1181	2181	3181	4181	Upper current limit adaptation
1182	2182	3182	4182	Factor, current controller adaptation
1230:8	2230:8	3230:8	4230:8	1st torque limit value
1233:8	2233:8	3233:8	4233:8	Regenerative limiting
1235:8	2235:8	3235:8	4235:8	1st power limit value
1238	2238	3238	4238	Current limit value
1240:8	2240:8	3240:8	4240:8	Offset, torque setpoint (speed controlled)
1241:8	2241:8	3241:8	4241:8	Normalization, torque setpoint
1242:8	2242:8	3242:8	4242:8	Offset, torque setpoint (torque controlled)
1243:8	2243:8	3243:8	4243:8	Normalization, torque/power reduction
1245	2245	3245	4245	Threshold, speed-dependent Mset smoothing
1246	2246	3246	4246	Hysteresis, speed-dependent Mset smoothing
1256:8	2256:8	3256:8	4256:8	Ramp-function generator, ramp-up time
1257:8	2257:8	3257:8	4257:8	Ramp-function generator, ramp-down time

Table 6-46 Motor data set-dependent parameters, continued

Motor data set				Meaning
1	2	3	4	
1400	2400	3400	4400	Rated motor speed
1401:8	2401:8	3401:8	4401:8	Speed for the max. useful motor speed
1403	2403	3403	4403	Shutdown speed, pulse cancellation
1405:8	2405:8	3405:8	4405:8	Monitoring speed, motor
1407:8	2407:8	3407:8	4407:8	P gain, speed controller
1408:8	2408:8	3408:8	4408:8	P gain, upper adaptation speed
1409:8	2409:8	3409:8	4409:8	Integral action time, speed controller
1410:8	2410:8	3410:8	4410:8	Integral action time, upper adaptation speed
1411	2411	3411	4411	Lower adaptation speed
1412	2412	3412	4412	Upper adaptation speed
1413	2413	3413	4413	Select adaptation, speed controller
1417:8	2417:8	3417:8	4417:8	nx for ”nact < nx” signal
1418:8	2418:8	3418:8	4418:8	nmin for ”nact < nmin” signal
1426:8	2426:8	3426:8	4426:8	Tolerance bandwidth for ”nset = nact” signal
1451:8	2451:8	3451:8	4451:8	P gain, IM speed controller
1453:8	2453:8	3453:8	4453:8	Integral action time, speed controller IM
1458	2458	3458	4458	Current setpoint, open-loop controlled range IM
1459	2459	3459	4459	Torque smoothing time constant IM
1465	2465	3465	4465	Changeover speed, MSD/IM
1466	2466	3466	4466	Changeover speed, closed-loop/open-loop control IM
1602	2602	3602	4602	Warning threshold, motor overtemperature
1607	2607	3607	4607	Shutdown limit, motor temperature
1608	2608	3608	4608	Fixed temperature
1712 [1)]	2712 [1)]	3712 [1)]	4712 [1)]	Weighting, rotor flux representation
1713 [1)]	2713 [1)]	3713 [1)]	4713 [1)]	Weighting, torque representation
1725 [1)]	2725 [1)]	3725 [1)]	4725 [1)]	Normalization, torque setpoint

1) These parameters are read-only.

6

Selecting motor data sets and motors input/output signals

The following input and output signals are used to select the motor data set and the associated motor:

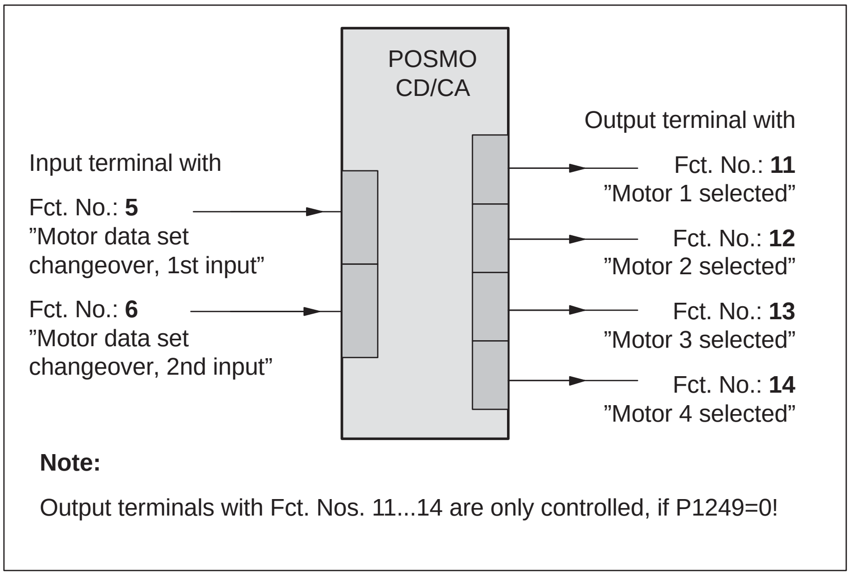


Fig. 6-49 Input/output signals: freely-parameterizable terminals

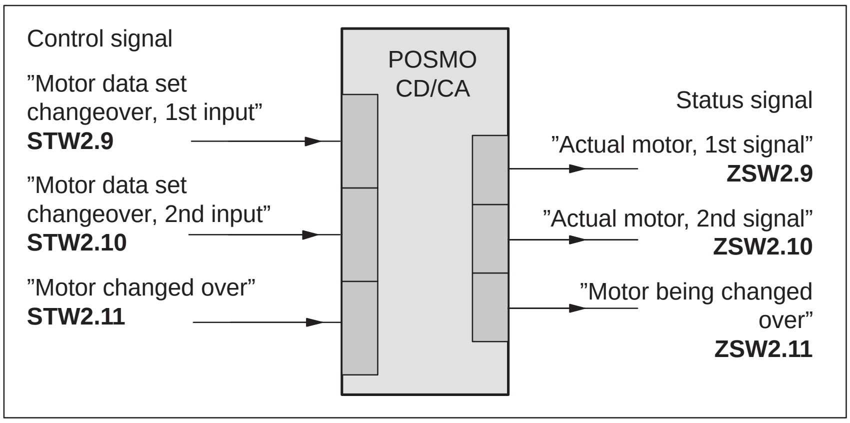


Fig. 6-50 Input/output signals: PROFIBUS signals

Reader’s note

- Input signals: refer under the index entry ”Input signal...”
  Output signals: refer under the index entry ”Output signal ...”
- The input/output terminal wiring (digital inputs/outputs) is described in Chapter 2.4.3.
- The parameterization of the input/output terminals is described: in Chapter 6.4.1 and 6.4.3

Pulse frequency changeover

A dedicated power module pulse frequency (P1100) can be parameterized for each motor data set.

The speed requirement of the motor can be better adapted by changing over the pulse frequency. With a higher pulse frequency, higher speeds can be achieved.

The following applies to the pulse frequency, it must be at least approx. 6x the instantaneous motor frequency.

High pulse frequencies mean high switching losses and therefore poor utilization.
At a pulse frequency of 8 kHz, only 55% of the current that can be used at 4 kHz is available.

6.9.2 Changeover, max. 4 motors each with 1 data set (P1013 = 1)

Description

For this changeover version (P1013 = 1), a maximum of 4 motors each with 1 associated motor data set can be changed over.

Note

The pulses are canceled at each changeover.

Input/output signals for changeover

The following 2 input and 4 output signals are available to changeover a maximum of 4 motors/motor data sets:

Table 6-47 Input/output terminal signals

Input with function No.		Effective motor data set	Output with function No.			
6	5		14	13	12	11
0	0	P1xxx	0	0	0	1
0	1	P2xxx	0	0	1	0
1	0	P3xxx	0	1	0	0
1	1	P4xxx	1	0	0	0

Note

The number of contactors which can be controlled for motor changeover is limited by the number of output terminals.

Output terminals 11, 12, 13 and 14 are not controlled, if P1249 = 1.

How does a changeover work?

POSMO CD/CA receives a request to change over a motor if the signal status at one of the two input terminals for the motor data set changeover has changed.

A changeover is then realized automatically as follows:

1. The pulses are canceled and the motor selection outputs are reset
2. Time t_1 starts (this is set to 320 ms)
3. After time t_1 expires, the "correct" output terminal is set to select the motor
4. Time t_2 starts (this is set to 160 ms)
5. After time t_2 expires, the pulses are enabled

Application example

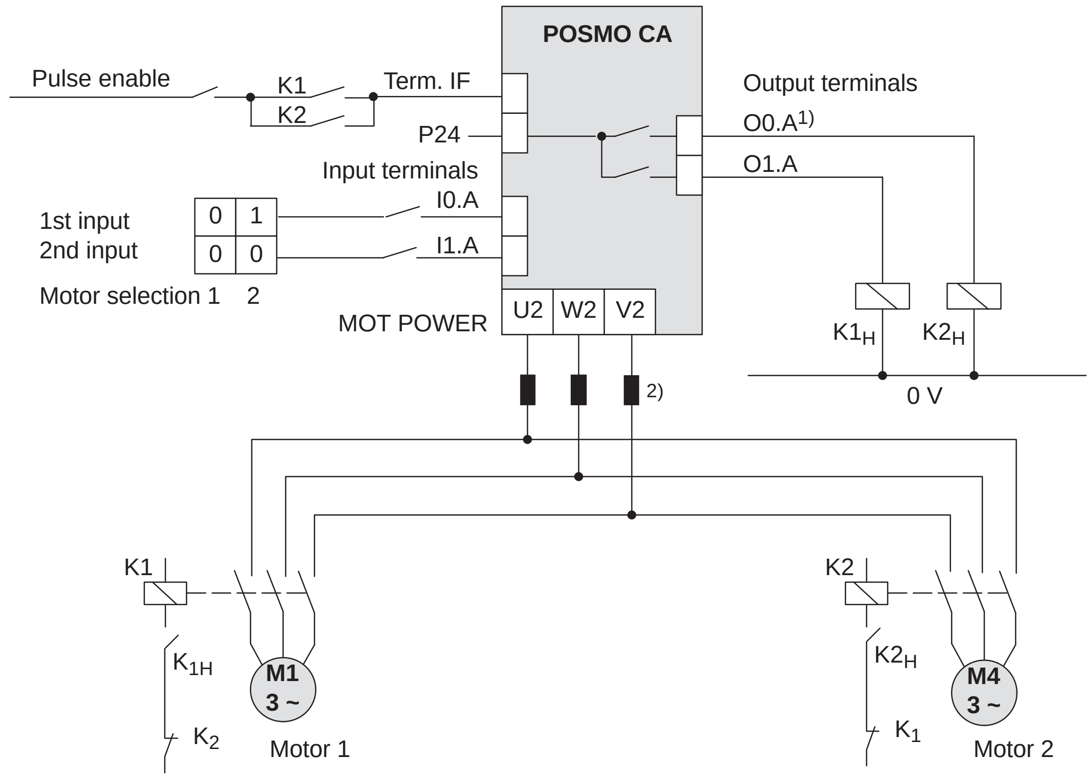
2 motors are to be operated from POSMO CA.

Assumptions for the example:

- The changeover is realized via the following input/output terminals:

  I0.A (X23.4) P0660 (function input terminal I0.A) = 5
  I1.A (X23.2) P0661 (function input terminal I1.A) = 6

  O0.A (X24.4) P0680 (signaling function, output terminal O0.A) = 11
  O1.A (X24.2) P0681 (signaling function, output terminal O1.A) = 12



1) Several motors cannot be simultaneously selected as this is interlocked per software. The recommended contactor interlocking additionally guarantees that only one motor can be operated at any one time.

2) Only necessary for special high-speed motors.

Fig. 6-51 Recommended circuit: Changing over 2 motors, each with one motor data set

6.9.3 Changeover, 1 motor with max. 4 data sets (P1013 = 2)

Description

For this changeover version (P1013 = 2) for one motor, a maximum of 4 motor data sets can be changed over.

Note

The pulses are **not** canceled at changeover, i.e. the changeover is made with the pulses enabled.

This version can be used to adapt the motor and controller data.

Input/output signals

The following input/output signals are used for this changeover version:

Table 6-48 Input/output terminal signals

Input terminal with function No.		Effective motor data set	Output terminal with function No.			
6	**5**		**14 1)**	**13 1)**	**12 1)**	**11 1)**
0	0	P1xxx	0	0	0	0
0	1	P2xxx	0	0	0	0
1	0	P3xxx	0	0	0	0
1	1	P4xxx	0	0	0	0

1) The output terminals with function numbers 11 to 14 are not energized.

6.9.4 Changeover, max. 2 motors each with 2 data sets (P1013 = 3)

Description

For this changeover version (P1013 = 3) a maximum of 2 motors each with 2 associated motor data sets can be changed over.

The changeover is realized using the input terminal with function number 6 and using the appropriately selected speed thresholds in P1247 or P1248. At changeover, the absolute speed value is considered.

Changeover is also possible during operation. When changing over between star and delta operation, it is possible to additionally select between eight drive parameter sets [0...7].

Input/output signals

The following input/output signals are used for this changeover version:

Table 6-49 Input/output terminal signals

Input terminal with function No.		Speed threshold 3)	Effective motor data set	Output terminal with function No.			
6 1)	5 2)			14 4)	13	12 4)	11
0	–	n < P1247	P1xxx	0	0	0	1
		n > P1247	P2xxx	0	0	0	1
1	–	n < P1248	P3xxx	0	1	0	0
		n > P1248	P4xxx	0	1	0	0

1) If the input terminal is used to change over the motor, then the pulses are canceled at the changeover.
2) The input terminal with function number 5 is inactive for this changeover version.
3) The pulses are not canceled if changeover is realized using speed thresholds.
4) Output terminals with function numbers 12 and 14 are not energized.

Note

Output terminals 11 and 13 are not energized, if P1249 = 1.

6

Application example: Star/delta changeover Version P1013=3

Motors with star/delta changeover permit a wide constant power range.

At lower speeds, the motor is operated in the star circuit configuration (high torque) and at higher speeds, in the delta circuit configuration (high stall torque).

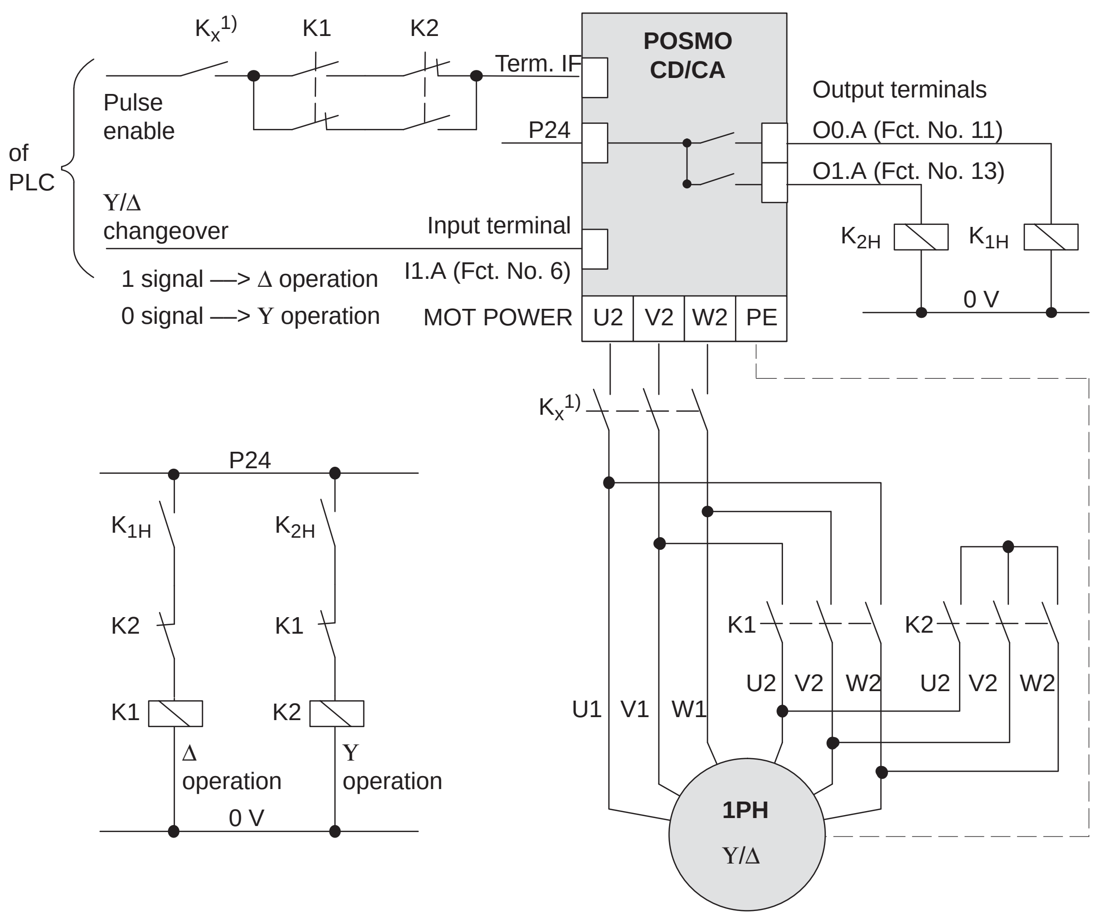
Assumptions for the example:

- The changeover is realized via the following input/output terminals:

  I1.A (X23.2) P0661 (function input terminal I1.A) = 6

  O0.A (X24.4) P0680 (signaling function, output terminal O0.A) = 11
  O1.A (X24.2) P0681 (signaling function, output terminal O1.A) = 13

- P1247 = 700
  i.e. 0 < n < 700 —> motor in the star mode
  n > 700 —> motor in the delta mode



1) A safe operating stop is not guaranteed by just opening K1 and K2.
This is the reason that for safety-related reasons, contactor
K_x should be used to provide electrical isolation. This contactor may only be switched-in the no-current condition, i.e. the pulse enable must be withdrawn 40 ms before the contactor is opened (de-energized).

Fig. 6-52 Recommended circuit: Changing over a motor in star/delta operation

Notice

Main contactors K1 and K2 must be switched in the no-current condition.

If this is not observed, the drive converter and contactors could be destroyed.

6.9.5 Parameters for motor changeover

Parameter overview

The following parameters are available for motor changeover:

Table 6-50 Parameters for motor changeover

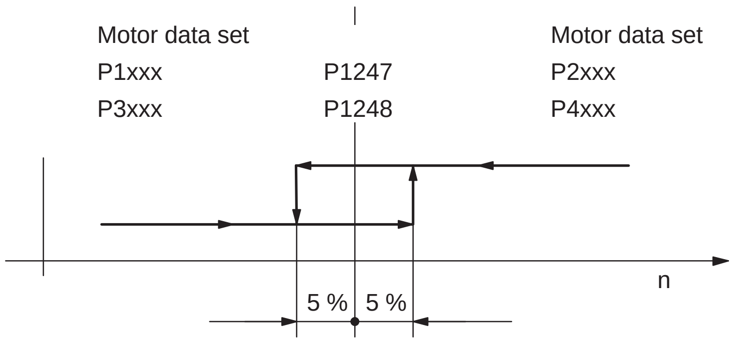
Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1013	Enable, motor changeover (ARM)	0	0	3	–	PO
	... the motor changeover is enabled or the motor changeover type is selected Value Description 0 Motor changeover inhibited 1 Motor changeover with pulse cancellation 2 Motor changeover without pulse cancellation (data set changeover) 3 Motor changeover using speed thresholds (P1247, P1248) **Note:** It is only possible to enable motor changeover in the ”speed/torque setpoint” mode (P0700 = 1).					
1247	Speed threshold, changeover motor 1/2 (ARM)	100.0	100 000.0	100 000.0	RPM	Immedi-ately
1248	Speed threshold, changeover motor 3/4 (ARM)	100.0	100 000.0	100 000.0	RPM	Immedi-ately
	... the speed thresholds for the motor changeover are defined with speed threshold (P1013 = 3). P1247: Below P1247 minus 5% hysteresis, the first motor data set is selected (P1xxx). Above P1247 plus 5% hysteresis, the second motor data set is selected (P2xxx). P1248: Below P1248 minus 5% hysteresis, the third motor data set is selected (P3xxx). Above P1248 plus 5% hysteresis, the fourth motor data set is selected (P4xxx). 					

Table 6-50 Parameters for motor changeover, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1249	External contactor control motor changeover (ARM)	0	0	1	–	Immedi-ately
	... specifies whether the contactors for motor changeover are controlled from the drive or from an external control. 1 Motor changeover via external control The contactor control for the motor changeover is realized using an external control via the ”motor changeover” input signal (STW2.11). The output terminals with function numbers 11, 12, 13 and 14 are not energized. 0 Motor changeover via drive The contactors to change over the motor are controlled from the drive via the output terminals with function numbers 11, 12, 13 and 14. **Note:** The contactors used to change-over the motor must be switched in a no-current condition. If an external control is used to changeover the motor, and it is ”incorrectly” changed over (e.g. the pulses are present), it is possible that the power/line infeed module will be destroyed. Recommendation: Motor changeover should be realized using the drive output terminals (P1249 = 0).					

6

6.10 Travel to fixed stop (positioning mode)

Description

A linear or rotary axis can be traversed in the ”positioning” mode by specifying a target position and a maximum possible torque using the ”travel to fixed stop” function. The defined torque/force is established when the fixed stop is reached.

This property can be used, e.g. for the following tasks:

- To clamp workpieces (e.g. to press the spindle sleeve against the workpiece)
- Approaching the mechanical reference point
- Carry out simple measuring operations (e.g. with a low torque)

The function is programmed using the FIXED STOP command. The clamping torque must also be specified in this traversing block. The following applies:

Drive	Value range and units for the clamping torque/clamping force
• Rotating	1 – 65 535 [0.01 Nm]
• Linear	1 – 65 535 [0.01 N]

A selectable fixed stop monitoring window prevents the drive from continuing after the fixed stop has been reached (e.g. when the fixed stop breaks-off)

Note

When jogging (closed-loop speed control), travel to fixed stop is also possible by suppressing fault 608 (speed controller output limited) using the ”suppress fault 608” input signal.

The ”travel to fixed stop” function may not be used for coupled axes.

Application example

The following applies to axes with incremental measuring system:

After a traversing block has been executed with the ”fixed stop” command and the block change enable END, the axis can be re-referenced at the fixed stop using the ”set reference point” function.

Flowchart

The following sequence applies for the ”travel to fixed stop” function:

- How is this function started?

  The function is started when executing a traversing block with the FIXED STOP command.

  The same data as for a positioning set should be made in this traversing block and, in addition, also the clamping torque in [0.01 Nm] or the clamping force in [N] (refer under the index entry ”Command-dependent block information”).

  In order that the fixed stop (workpiece) can be reached at all, it must be located between the start and target positions. The target position must be selected a considerable distance behind the fixed stop.

- How is the axis moved after start?
  - After starting the block, the axis travels in the direction of the target position with the programmed velocity.
  - The clamping torque/clamping force, programmed in this block, already becomes effective from the starting position, i.e. the axis moves to the fixed stop with the reduced torque limit/force limit.
  - The dynamic following error monitoring is not effective when traveling to the fixed stop.

- What happens if ...
  - ... the fixed stop is reached before the target position is reached (standard case)?

    —> refer to ”What happens if the fixed stop is reached?”
  - ... the fixed stop is not reached, but the target position is approached?

    —> refer to ”What happens if the fixed stop is not reached?”
  - ... the programmed clamping torque is not reached.

    —> refer to ”What happens if the fixed stop is reached but the programmed clamping torque is not reached?”
  - ... the axis is first at the fixed stop and then leaves this position, i.e. has the fixed stop broken off?

    —>then the fixed stop monitoring becomes effective, i.e. the axis then moves by the distance, set in P0116:8 (fixed stop monitoring window) plus the braking ramp.

    —> refer to ”fixed stop” monitoring window

6

What happens if the fixed stop is reached?

If the axis moves to a fixed stop, then the behavior is as follows:

- The closed-loop drive control increases the torque for the axis up to the programmed clamping torque, and then keeps it constant.
- The ”fixed stop reached” status is reached as follows, depending on P0114 (fixed stop, configuration 2):

Table 6-51 Behavior, if the fixed stop is reached

If	the following is valid for the ”fixed stop reached” status:
P0114 = 0 (Standard)	The status is automatically reached, if the following error exceeds the theoretically calculated following error by the value entered in P0115:8. **Note:** Refer under the index entry ”Dynamic following error monitoring”
P0114 = 1	The status is only reached, if it is recognized via the ”sensor, fixed stop” input signal.

- The following applies after the ”fixed stop reached” status has been recognized:
  - The distance to go is deleted
  - The position reference value is tracked
  - The fixed stop monitoring is activated
  - the controller enable (control signal ON/OFF 1) remains active
  - The ”fixed stop reached” output signal is set
  - Is the programmed clamping torque reached?

    Yes —> the output signal ”fixed stop, clamping torque reached” is set

    No —> the behavior is dependent on P0113.1

Table 6-52 Behavior, if the clamping torque is not reached

If	Then the following is valid:
P0113.1 = 0 (Standard)	Warning 889 is signaled The block change enable is only realized, as programmed in the block, only after the clamping torque has been reached.
P0113.1 = 1	Warning 889 is signaled and a block change is made The block change enable is realized as programmed in the block.
Note: The block change enable CONTINUE FLYING, behaves just like the block change enable CONTINUE WITH STOP.	

– The clamping torque remains, if ...

subsequently, e.g. blocks are processed with the commands WAIT, GOTO, SET_O or RESET_O

There is no subsequent block, i.e. the traversing program has been completed

– the position can be read in P0002 (actual traversing block – position)

What happens if the fixed stop is not reached?

If, for a traversing block, the axis moves to the brake initiation point with the FIXED STOP command, without detecting the status ”fixed stop reached”, then the following behavior applies, dependent on P0113.0:

Table 6-53 Behavior, if the fixed stop is not reached

If	Then the following is valid:
P0113.0 = 0 (Standard)	Fault 145 is signaled The torque limiting is automatically disabled. The axis is braked and comes to a standstill in front of the programmed target position. The deviation from the reference position depends on: • Positioning velocity • Acceleration • Deceleration
P0113.0 = 1	A block change is made The torque limiting is automatically disabled. The block change enable is realized as programmed in the block.

Canceling the ”travel to fixed stop” function

The ”travel to fixed stop” function is interrupted, and if warning 889 is present it is acknowledged, if one of the following occurs:

- The next block is processed with the POSITIONING command
- If interrupted using the input signal ”operating condition/reject traversing task” and the jogging mode was selected
- The controller enable is withdrawn (—> fault 147)
- Pulse enable is withdrawn (—> fault 147)

Interrupting or exiting the ”travel to fixed stop” function

The following applies for a traversing block with the FIXED STOP command:

- Interrupt and continue
—> using the ”operating condition/intermediate stop” input signal
- Exit
—> using the ”operating condition/reject traversing task” input signal

In all of these cases, the drive is correspondingly braked.

Interruption at the fixed stop:
The drive remains at the fixed stop, and can be moved away from it either in the jog mode, or by starting a new traversing block.

- Abort
  —>while ”travel to fixed stop”

  The drive brakes and maintains this position with a reduced torque as ”traverse to fixed stop” is still active The position is monitored using P0326. Fault 145 is signaled when the tolerance window in P0326 is exceeded.

Fixed stop monitoring window

If the axis travels by more than the monitoring window, set in P0116:8 when it reaches the ”fixed stop reached” status, then the ”travel to fixed stop” function is canceled as a result of fault 146 (fixed stop, axis outside the monitoring window), and the axis is stopped.

The following applies for the fixed stop monitoring window:

- Set using P0116:8 (fixed stop monitoring window).
- The monitoring window generally applies for a drive, which means, in order to adapt it for an individual traversing block, P0116:8 must be correspondingly re-written into before the block starts.
- The value in P0116:8 is valid both in the positive as well as the negative travel directions.
- The window setting must be selected, so that a fault is only initiated if the endstop breaks.

Hanging axis without mechanical weight equalization

For a hanging axis without mechanical weight equalization, when programming the clamping torque and when defining the fixed stop monitoring window, it must be taken into consideration as to whether the electronic weight equalization is set via P1240:8.

The clamping torque, effective for ”travel to fixed stop” is made up as follows:

- Programmed clamping torque in the traversing block

  and

- P1240:8 (offset, torque setpoint speed-controlled)

The following applies when programming the clamping torque for a hanging axis without mechanical weight equalization:

Table 6-54 Clamping torque for a hanging axis

If	Then
A torque offset is not entered (P1240:8 = 0)	Take into account the weight equalization when programming the clamping torque.
A torque offset is entered (P1240:8 $\neq$ 0)	The weight equalization is not taken into account when programming the clamping torque

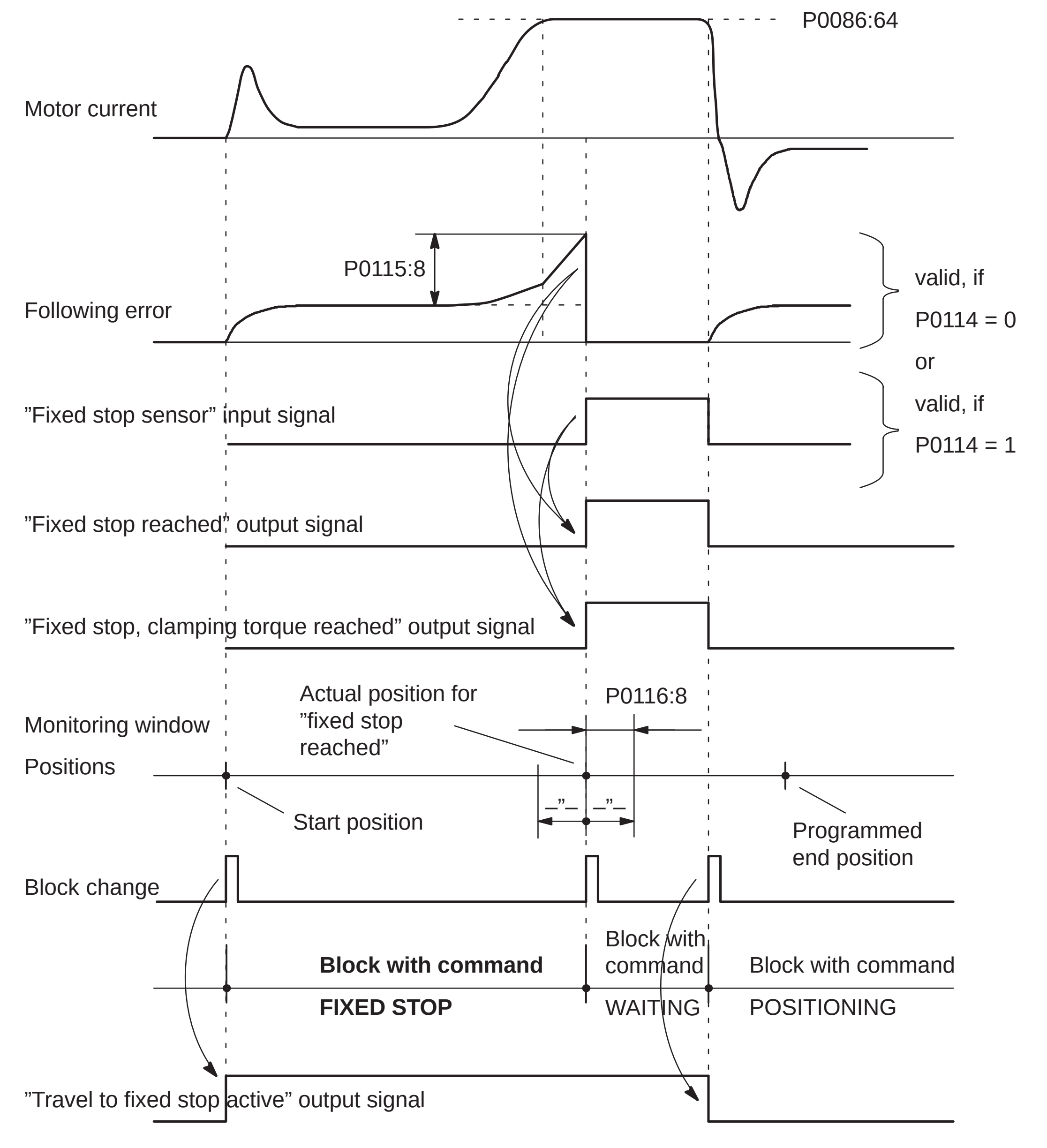
Diagnostics for "travel to fixed stop"

The following diagnostics are available for the activated function:

- Display via "travel to fixed stop active" output signal

Signal characteristics

The motor current, following error, input/output signals and positions for the "travel to fixed stop" function are illustrated in the following diagram.



P0086:64	Command parameter – clamping torque
P0114	Fixed stop, configuration 2
P0115:8	Fixed stop, maximum following error
P0116:8	Fixed stop, monitoring window

Fig. 6-53 Signal timing for the "travel to fixed stop" function

Travel to fixed stop and EMERGENCY OFF

Caution

It must be ensured, that after the ”travel to fixed stop” function is withdrawn as a result of EMERGENCY OFF, the machine cannot go into a potentially hazardous state (e.g. the clamped workpiece drops out of the clamping mechanism after EMERGENCY OFF).

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”travel to fixed stop” function:

- P0113 Fixed stop, configuration 1
- P0114 Fixed stop, configuration 2
- P0115:8 Fixed stop, maximum following error
- P0116:8 Fixed stop, monitoring window
- P1240:8 Offset, torque setpoint (speed controlled)
  Offset, force setpoint (speed controlled)

Input/output signals

The following signals are used for the function ”traverse to fixed stop”:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - ”Fixed stop sensor” input signal

    —> using an input terminal with function number 68

    —> via the PROFIBUS control signal PosStw.3
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - ”Fixed stop reached” output signal

    —> using an output terminal with function number 68

    —> using the PROFIBUS status signal PosZsw.12
  - ”Fixed stop, clamping torque reached” output signal

    —> using an output terminal with function number 73

    —> using the PROFIBUS status signal PosZsw.13
  - ”Travel to fixed stop active” output signal

    —> using an output terminal with function number 66

    —> using the PROFIBUS status signal PosZsw.14

6.11 Teach-in (from SW 4.1)

Description

Using this function, an approached axis position can be directly entered into a specific traversing block as position reference value.

The axis can be traversed to the required position e.g. using ”jogging” and/or ”incremental jogging.

The ”teach-in” function is activated using the ”activate teach-in (edge)” input signal in the ”positioning” mode.

It is not possible to activate ”teach-in” while a traversing program is running.

Table 6-55 Overview of teach-in

Question?	Parameter	Description
In which traversing block is the position value be written?	Teach-in block	
	P0120 = –1 (Standard)	The position value (actual position reference value) is written into the traversing block which is selected either via digital input signals (Fct. No. 50 to 55) or the PROFIBUS control signal SatzAnw.0 – .5.
	P0120 ≥ 0	The position value (actual position reference value) is written into the traversing block which is specified using P0120.
How does the teach-in block become a complete traversing block?	Teach-in standard block	
	P0121 = –1 (Standard)	When activating ”Teach-in”, only the position value is written into the selected block (the actual position reference value). All other data must be manually entered to make it a complete traversing block.
	P0121 ≥ 0	For ”teach-in”, the block, defined using P0121, is transferred into the selected block and the position value (actual position reference value) is overwritten. P0087 is not completely transferred, but only the position mode and the block enable condition. Information as to whether the block is suppressed or not is not transferred into the new block.
What are the various configuration possibilities?	Teach-in configuration	
	P0124.0 = 1	Automatically increase the block number (P0120 ≥ 0) In this mode, after each successful ”teach-in”, the teach-in block in P0120 is automatically increased. In this case, the teach in blocks are overwritten. If the teach-in block is selected using an input signal (P0120 = –1) and the ”automatically increase block number” function is enabled, then the following applies: • The first teach-in block is selected via input signals • Additional teach-in blocks are defined using P0120
	P0124.1	The block number is automatically searched for = 1: In this mode, for ”teach-in”, a search is made for the block in P0120. If an invalid block is selected via P0120, then this block is generated in the memory at the first position where there is still no block. A complete block is generated (although P0121 = –1). = 0: If the block in P0120 or the block selected via the input signals is not available, then fault 183 is output.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”teach-in” function:

- P0120 Teach-in block
- P0121 Teach-in standard block
- P0124 Teach-in configuration

Input/output signals (refer to Chapter 6.4)

The following signals are used for the ”teach-in” function:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - Input signal ”activate teach-in (edge)”

    —> using an input terminal with function number 64

    —> via the PROFIBUS control signal ”PosStw.6”
  - Input signal ”block selection 1st to 6th input”

    —> using an input terminal with function number 50 – 55

    —> using PROFIBUS control signal SatzAnw.0 – .5
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - Output signal ”teach-in successful”

    —> using an output terminal with function number 64

    —> using the PROFIBUS status signal ”PosZsw.15”

Note

The positions with teach-in are only transferred into the RAM memory. Data is manually saved using the ”SimoCom U” parameterizing and start-up tool with
”Save in the drive (FEPROM)”.

6.12 Dynamic Servo Control (DSC, from SW 4.1)

Description

The ”Dynamic Servo Control” (DSC) is a closed-loop control structure which is computed in a fast speed controller clock cycle and is supplied with setpoints by the control in the position controller clock cycle.

This allows higher position controller gain factors to be achieved.

Prerequisite

The following prerequisites are necessary to use Dynamic Servo Control:

- n-set mode
- Isochronous PROFIBUS-DP
- The position controller gain factor (KPC) and the system deviation (XERR) must be included in the PROFIBUS-DP setpoint telegram (refer to P0915)
- The position actual value must be transferred to the master in the actual value telegram of PROFIBUS-DP via the encoder interface Gx_XIST1 (refer to Chapter 5.6.4)
- When DSC is activated, the speed setpoint N_SOLL_B from the PROFIBUS telegram is used as speed pre-control value
- The internal quasi-position controller uses the position actual value from the motor measuring system (G1_XIST1)

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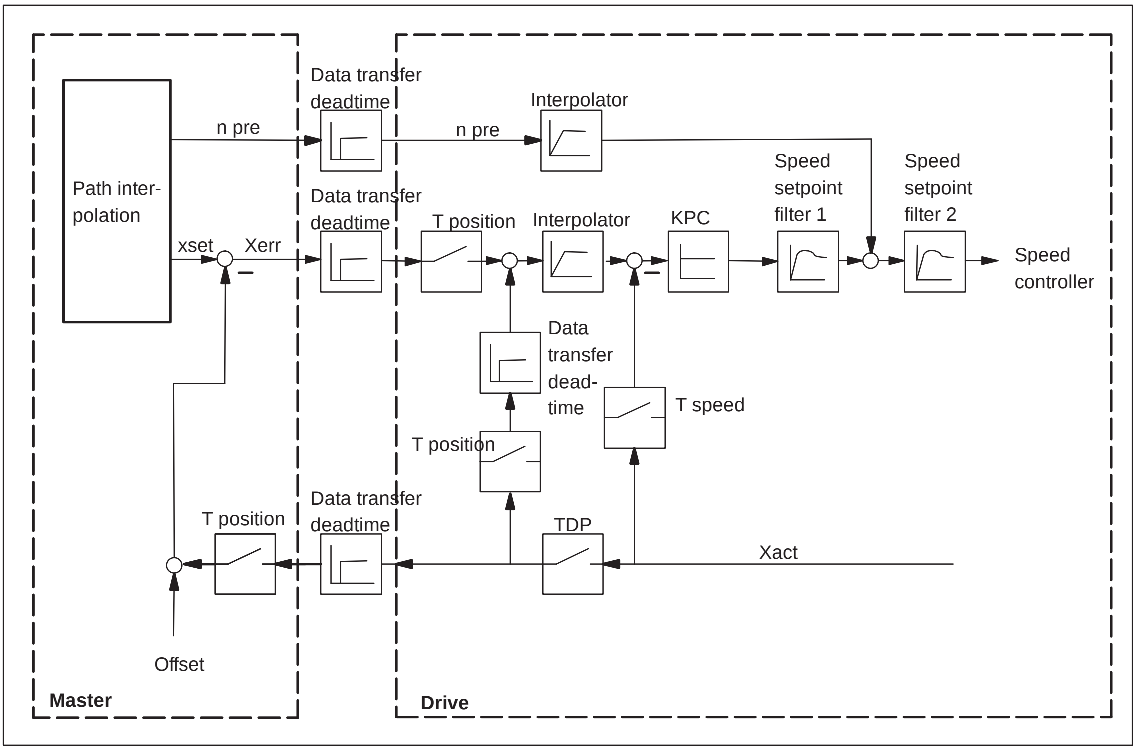


Fig. 6-54 Principle of Dynamic Servo Control; the speed setpoint is used for speed precontrol

Activating

If the prerequisites for DSC have been fulfilled, the function is activated by transferring a value for KPC > 0 in the PROFIBUS telegram.

When DSC is activated, the position controller gain in the master should be set again.

If the PROFIBUS control words XERR (system deviation, DSC) and KPC (position controller gain factor, DSC) are activated in the PROFIBUS telegram the closed-loop control structure is also activated. This means that the ramp function generator, for example, is no longer active.

Deactivating

The DSC function is de-activated by setting KPC = 0. Then, only the speed pre-control is effective.

Higher gain factors can be set using DSC. This is the reason that the control loop can become unstable when DSC is disabled. Before disabling DSC (e.g. for optional tests) the KV factor must be reduced in the master.

Speed setpoint filter

When using DSC, a speed setpoint filter is no longer required to round-off the speed setpoint stages.

When using the DSC function, it only makes sense to use speed setpoint filter 1 to support the position controller, e.g. to suppress resonance effects.

6.13 Spindle positioning (from SW 5.1)

Description

Using the ”spindle positioning” function, in the ”n-set” mode, the spindle can be traversed to a specific position and then held there.

Activating

The function is activated in the ”n-set” mode (P0700 = 1) via the input signal ”spindle positioning on” or via PROFIBUS-DP (STW1.15), if P0125 = 1 (spindle positioning active).

Note

If the ”spindle positioning” function is carried-out using NC functionality (e.g. SINUMERIK 802D), then P0125 must be set to 0 (spindle positioning de-activated).

In addition, a traversing block number must be entered via a terminal or PROFIBUS-DP. If a bit is not selected for the traversing block number, then data in traversing block 0 is used.

The following is mainly defined in the traversing block:

- The target position (also via PROFIBUS-DP control word XSP is possible, being prepared)
- The search velocity, and
- How the axis approaches the target position

The target position can be approached as follows:

- With the actual direction of rotation
- With a defined direction of rotation (clockwise, counter-clockwise)

6

Position actual value sensing

- With a motor encoder (sin/cos 1 Vpp)
- With a motor encoder (sin/cos 1 Vpp) and external zero (BERO) at the spindle when the gearbox stage is being changed-over
- With a direct measuring system (spindle encoder, sin/cos 1 Vpp) via encoder connection DIR MEASRG (direct measuring system, POSMO CD/CA)

Limitations/ secondary conditions

- Spindle positioning only with motor 1.
- If spindle positioning has been selected, then the encoder information for PROFIBUS-DP (G1_STW, G1_ZSW) is no longer precisely transferred.
- If ”spindle positioning on” is selected using a terminal or PROFIBUS-DP (for P0125 = 1), then the ”relative” positioning mode (P0087:64) may no longer be programmed in the currently selected traversing block.
- When spindle positioning is selected, it is not possible to change over the motor via PROFIBUS-DP.
- Spindle positioning is not supported in conjunction with absolute and distance-coded measuring systems.

Positioning

If the drive has still not be referenced, then it is automatically referenced after activating the ”spindle positioning” function.

The positioning operation is executed via the position controller and is carried-out in several phases:

1. Selecting the ”spindle positioning on” function via terminal or PROFIBUS-DP in the ”n-set” mode
2. Traversing to the search velocity
3. Traversing with search velocity and searching for the zero mark (BERO)
4. Braking to the 1st target position (angle)

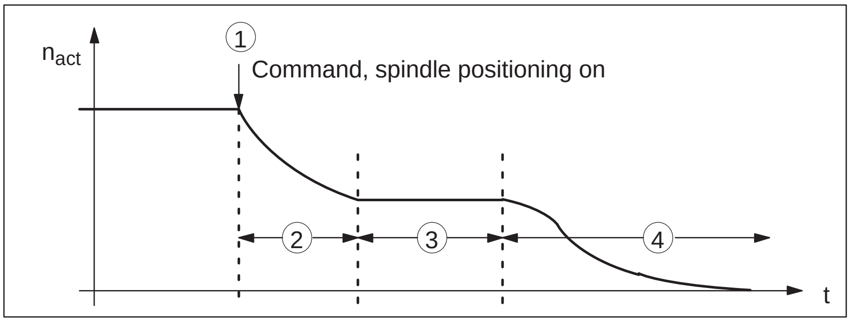


Fig. 6-55 Example, spindle positioning

If the drive is at the 1st target position, then the additional target positions can be approached immediately by selecting another traversing block.

In order to guarantee a defined changeover to the next position (via terminals), only one bit should be changed when selecting the traversing block.

If, when the controller is inhibited, the spindle is pushed (pressed) out of a parameterized tolerance window (P0131), then the position actual value is corrected (tracked). If the controller is then re-enabled, the spindle remains at that particular position. It is only re-positioned again if ”spindle positioning” is activated.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”spindle positioning” function:

- P0080 Block number (traversing blocks)
- P0081 Position reference value (traversing blocks)
- P0082 (Search) velocity (traversing blocks)
- P0083 Acceleration override
- P0084 Deceleration override
- P0087 (Spindle) positioning mode
- P0102 Maximum velocity
- P0103 Maximum acceleration
- P0104 Maximum deceleration
- P0125 Spindle positioning active
- P0126 Spindle positioning, zero mark tolerance window
- P0127 Spindle positioning, setting the internal zero mark
- P0128 Spindle positioning, offset, zero mark

- P0129 Spindle positioning, tolerance, search velocity
- P0130 Spindle positioning, lowest search velocity
- P0131 Spindle positioning, motion window
- P0133 Spindle positioning, max. search velocity
- P0174 Referencing mode - position measuring system
- P0200 Kv factor (position loop gain)
- P0231 Position act. value inversion
- P0232 Position reference value inversion
- P0237 Encoder revolutions
- P0238 Load revolutions
- P0242 Modulo range, rotary axis
- P0250 Activating the direct measuring system

The following diagnostic parameters are available for the "spindle positioning" function:

- P0001 Actual traversing block – block number
- P0002 Actual traversing block – position
- P0003 Actual traversing block – velocity
- P0004 Actual traversing block – acceleration override
- P0005 Actual traversing block – deceleration override
- P0008 Actual traversing block – mode
- P0020 Position reference value
- P0021 Position actual value
- P0024 Velocity actual value
- P0132 Spindle positioning, zero mark difference (BERO)
- P0136 Spindle positioning, active/inactive
- P0137 Spindle positioning, status

Setting values for the position actual value monitoring:

- P0134 Spindle positioning, positioning window reached
- P0318 Dynamic following error monitoring tolerance
- P0320 Positioning monitoring time
- P0321 Positioning window (reference position reached)
- P0326 Standstill window

Warning

When the monitoring is disabled via parameters P0318, P0321 and P0326, it should be noted that under fault conditions, the drive can accelerate up to the max. speed.

Approaching the target position using the traversing block parameters

The target position approach is defined using the parameters of the selected traversing block.

Table 6-56 Parameters for "spindle positioning"

<table>
<tr><th>Parameter</th><th>Parameter text</th><th colspan="3">Value and description</th></tr>
<tr><td>P0080:N</td><td>Block number</td><td colspan="3">0... 63</td></tr>
<tr><td>P0081:N</td><td>Item</td><td colspan="3">Target position in degrees</td></tr>
<tr><td>P0082:N</td><td>Velocity</td><td colspan="3">Search velocity in degrees/min. The velocity is always referred to the load side, i.e. for a ratio of 4:1 (motor/load), the motor rotates 4 x faster.</td></tr>
<tr><td>P0083:N</td><td>Acceleration override</td><td colspan="3">This allows the acceleration to be influenced, referred to P0103.</td></tr>
<tr><td>P0084:N</td><td>Deceleration override</td><td colspan="3">This allows the deceleration to be influenced, referred to P0104.</td></tr>
<tr><td rowspan="6">P0087:N</td><td rowspan="6">Mode</td><td colspan="3">$\underline{U}0\underline{W}0_{Hex}$
U = target position input
0: Input via traversing block (P0081:N)
1: Input via PROFIBUS-DP; control word XSP (Signal No. 50109)
W = Positioning mode
The behavior when approaching the target position is defined in parameter P0087. The behavior depends on whether the "spindle positioning" function is already active and the 1st position was approached or not.</td></tr>
<tr><td></td><td>Behavior for nset active</td><td>Behavior if the 1st target position has already been reached</td></tr>
<tr><td>W = 0 ABSOLUTE (Standard)</td><td>The position is approached with the actual direction of rotation</td><td>The new target position is approached through the shortest distance</td></tr>
<tr><td>W = 1 RELATIVE</td><td>not supported</td><td>The new position is incrementally approached.</td></tr>
<tr><td>W = 2 ABS_POS</td><td>The position is approached in the positive direction.</td><td>The new target position is approached in absolute terms and in the positive direction (clockwise rotation)</td></tr>
<tr><td>W = 3 ABS_NEG</td><td>The position is approached in the negative direction.</td><td>The new target position is approached in absolute terms and in the negative direction (counter-clockwise).</td></tr>
</table>

Structure of the traversing block

No. (P0080)	Command	Mode (P0087 W	Position (P0081)	Velocity (P0082) degrees/min	Acceleration- (referred to P0103)	Deceleration (referred to P0104)
0	Positioning1)	ABSOLUTE	0°	72000	100 %	100 %
1	Positioning1)	ABS_POS	90°	3600	100 %	100 %

1) only this entry is possible

Fig. 6-56 Example: Programming the traversing block

If no bit is selected when selecting the block with the ”spindle positioning on” command, then traversing block 0 is automatically selected. The axis then positions with the values from traversing block 0.

In the example, Fig. 6-56 (Standard setting) the drive moves to the position value 0 degrees from the actual speed and direction of rotation, at a search velocity of 72000 degrees/min (200 RPM).

If bit 0 is set in this state, when selecting the traversing block (via terminal or PROFIBUS-DP), then the drive rotates according to the ABS_POS mode in the clockwise sense with the max. velocity of 3600 degrees/min and remains stationary at the 90 degrees position.

After bit 0 is switched-out, the axis moves from 90 degrees to 0 degrees.

The ”spindle positioning on” command must always be present. If the command is switched-out, then the axis rotates at the speed of the currently effective speed setpoint.

Search rate

The search velocity depends on the initial velocity at the instant that the ”spindle positioning” function is activated at n-set (refer to Fig. 6-57).

In this case, the following parameters are effective:

P0082 Velocity

P0083 Acceleration override

P0084 Deceleration override

P0103 Max. acceleration

P0104 Max. deceleration

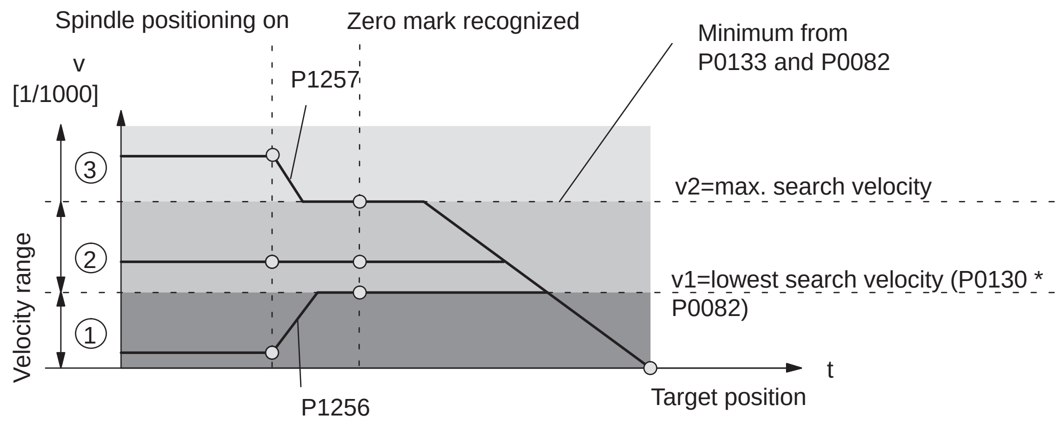
P0129 Spindle positioning, tolerance, search velocity

P0130 Spindle positioning, lowest search velocity

P0133 Spindle positioning max. reference velocity

P1256 Ramp-function generator, ramp-up time

P1257 Ramp-function generator, ramp-down time



1. In this velocity range, the **drive accelerates** to the search velocity v1. The drive traverses to the target position if the zero mark is recognized.
2. In this velocity range (search velocity), the **drive traverses without changing its velocity** until the zero mark has been recognized. The drive then traverses to the target position.
3. In this velocity range, the **drive brakes** to the search velocity v2. The drive traverses to the target position if the zero mark is recognized.

Condition: The maximum velocity P0102 must be greater than v2.

Fig. 6-57 Spindle positioning at n-set, if the axis was previously referenced

Spindle positioning, zero mark offset

Procedure to shift the zero mark and set it to a specific value:

Possibilities:

1st possibility:

– Enter the zero mark offset directly into P0128.

2nd possibility:

– Traverse the spindle to the required position, e.g. manually rotate

– Set P0127 to 1. This means that the actual position value is transferred into P0128. P0127 automatically changes to 0.

Encoder configuration

P0250 and P0174 must be set to the existing measuring system.

Table 6-57 Encoder configuration for spindle positioning

	P0250	P0174
Indirect measuring system (motor encoder) with encoder zero mark In addition, the gearbox ratio must be entered into P0237 (encoder revolutions) and P0238 (load revolutions)	0	1
Indirect measuring system (motor encoder) with external zero mark In addition, the gearbox ratio must be entered into P0237 (encoder revolutions) and P0238 (load revolutions)	0	2
Direct measuring system with encoder zero mark	1	1

It is possible to select position actual value inversion using parameter P0231.

6

Spindle drive with gearbox (BERO)

For spindle drives with gearboxes, an external zero mark (BERO) should be provided as reference point if the spindle has to be positioned.

For multi-stage gearboxes, the gearbox stage ratios must be taken into account. The ratios must be entered via parameter P0237 (gearbox revolutions) and P0238 (load revolutions). For parameter set 0, the ratio of the first gearbox stage can be defined using SimoCom U in the menu screen ”Mechanical system” (1:1 is the basic setting).

Additional gearbox stage ratios must be entered using the Expert list (P0237:x, P0238:x; x = 1 to 7).

Example:

If a changeover gearbox with a ratio of 1:1 or 1:4 is used, for the 1st gearbox stage, parameters P0237:0 and P0238:0 remain unchanged (because 1:1) and for the ratio 1:4, the following values are entered into parameters P0237:1 = 1 and P0238:1 = 4. These values become valid after ”Power on”.

The ratio can be checked using parameter P0132. In this case, the distance between two zero marks is displayed in degrees. If the values which are displayed deviate from 360 degrees, then the gear-up/gear-down ratio was not correctly parameterized.

Input/output signals (refer to Chapter 6.4)

The following signals are used for the ”spindle positioning” function:

- Input signals
  (refer under the index entry ”Input signal, digital – ...)
  - Input signal, ”spindle positioning on”

    —> via an input terminal with function number 28 or

    —> via PROFIBUS control signal ”STW1.15”
  - Input of traversing blocks

    —> via an input terminal, or

    —> via PROFIBUS-DP

    When the traversing block selection is changed (number), the position is immediately changed to the position specified in the traversing block.
- Output signals
  (refer under the index entry, ”output signal, digital – ...)

  The output signals are only effective when selecting ”spindle position on”.
  - Output signal, ”spindle positioning on”

    —> using an output terminal with function number 28

    —> using the PROFIBUS status signal ”ZSW1.15”
  - Output signal ”spindle position reached”

    —> setting a window with P0134

    —> using an output terminal with function number 59

    —> using PROFIBUS status signal ”MeldW.15”
  - Output signal ”reference position reached/outside reference position”

    —> setting values with P0320, P0321

    —> using an output terminal with function number 60

    —> using PROFIBUS status signal ”MeldW.14”

6

Short commissioning (example)

Hardware structure: Encoder signals and zero pulse from the motor encoder

Software prerequisites:

- Software release ≥ SW 5.1
- The spindle positioning program must be activated via SimoCom U or P0125 =1.
- Select the ”spindle positioning on” function via terminal (Fct. No. 28) or PROFIBUS-DP (STW1.15). (e.g. ”spindle positioning on ” via terminal I2.A).

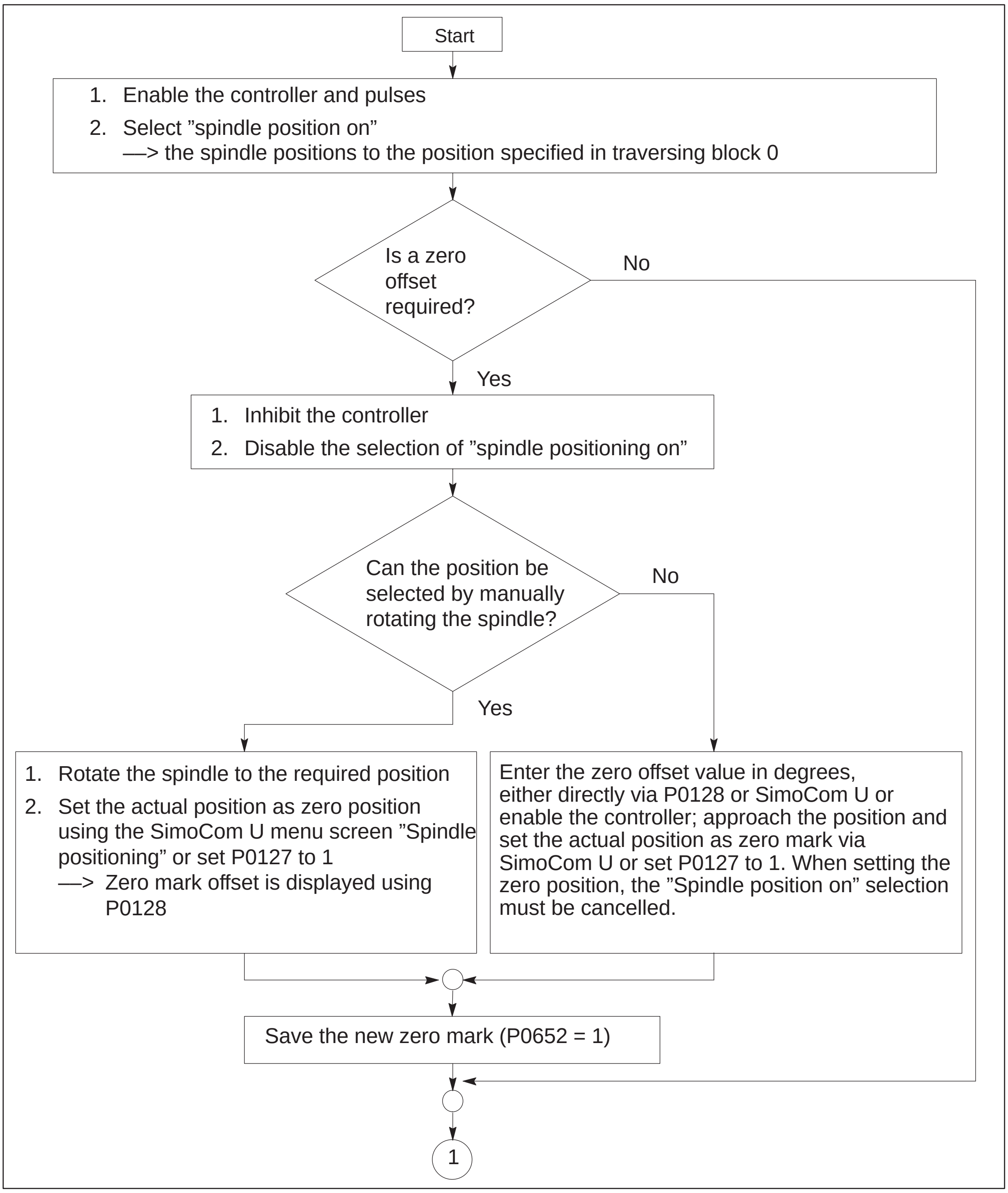


Fig. 6-58 Commissioning example, spindle positioning

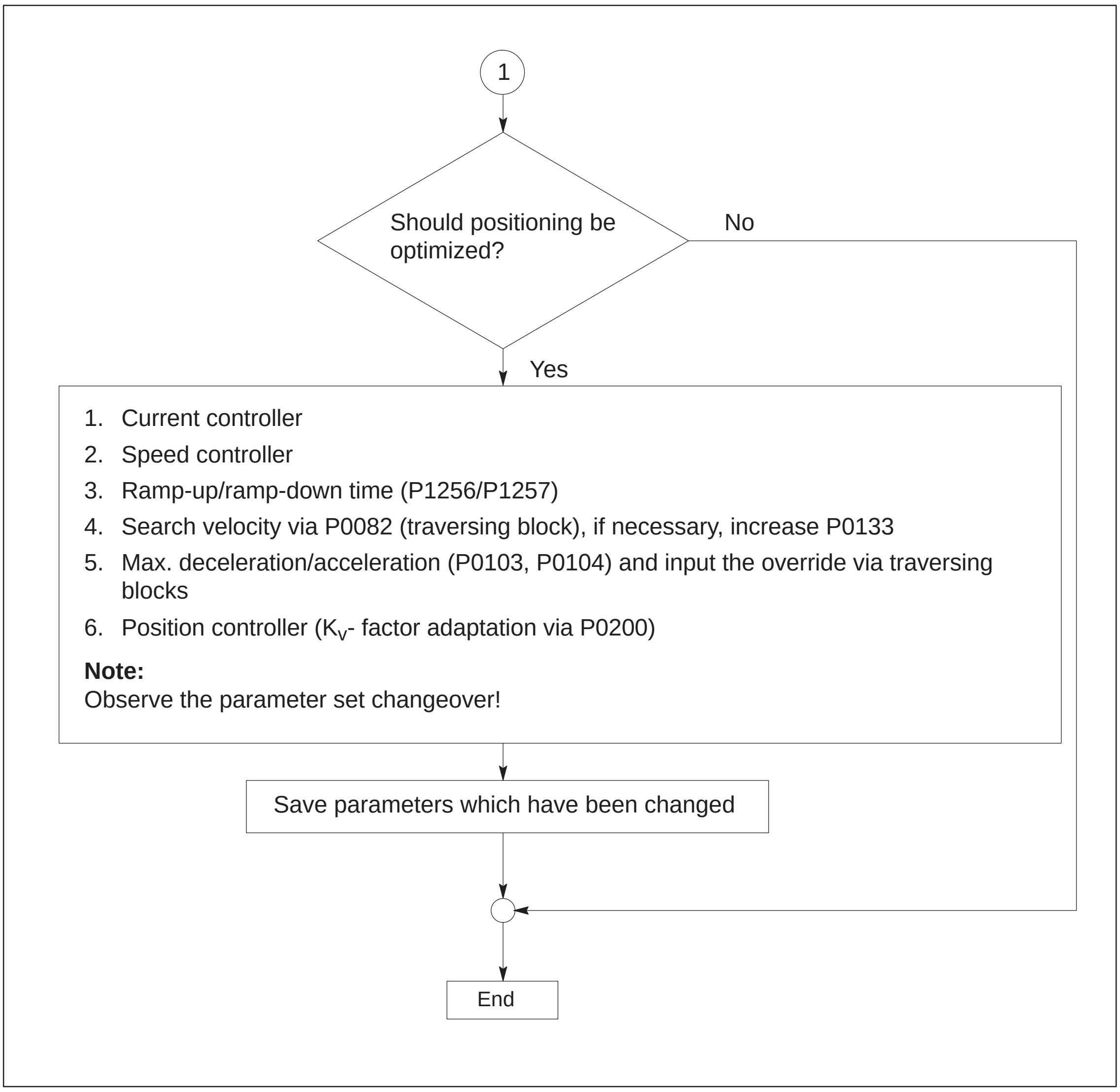


Fig. 6-59 Commissioning example, spindle positioning, continued

6.14 Rotor position identification/pole position identification

Note

Terminology change:
Rotor position identification (RLI), corresponds to the pole position identification (PLI)!

Description

Drive converters with field-orientated closed-loop control impress the current into permanent-magnet synchronous motors to establish the magnetic flux in the motor.
At power-on, the rotor position identification (RLI) automatically determines the absolute rotor position using the maximum of the magnetic flux.

The rotor position identification is used for:

- Determining the rotor position (coarse synchronization and fine synchronization)
- Supports commissioning when determining the commutation angle offset

Two techniques can be used for the rotor position identification routine:

- A technique based on saturation (P1075 = 1)
- Motion-based technique (P1075 = 3) (from SW 6.1)

The particular technique can be selected using parameter P1075.

Coarse synchronization

Determining the rotor position

The rotor position identification routine automatically determines the motor rotor position. This means that the motor encoder does not require any additional position information from the encoder (C/D track). For linear motors, Hall sensors are not required if the limitations and secondary conditions are maintained.

Fine synchronization

- with zero marks: P1011.13 = 0

  For the fine synchronization (P1011.13 = 0), the commutation offset is transferred when passing the zero mark.

  Advantages:

  – The fine synchronization with zero mark guarantees a consistent and optimum and force and torque utilization.
  – An increase in robustness thanks to renewed encoder monitoring (absolute information and internal pole position).

  Parameter P1016 must be appropriately set.

Notice

When replacing the motor/encoder, the commutation angle (P1016) must be re¿determined.

- with pole position identification: P1011.13 = 1

  For P1011.13 = 1, fine synchronization is replaced by the pole position identification. P1016 is not effective.

6

Equivalent of the encoder adjustment

Encoder adjustment is not required if the rotor position identification routine is used for coarse and fine synchronization.

Configuration, actual value sensing motor encoder

In P1011, bit 12 (identify coarse position) is set in order that the rotor position identification technique is initiated when powering-up the drive. If bit 13 is set (fine position identification), a rotor position identification is executed independently of bit 12.

Parameter overview (refer to Chapter A.1)

The following parameters are used for the rotor position synchronization/rotor position identification:

- P1011 IM configuration, actual value sensing
- P1016 Angular commutation offset
- P1017 Commissioning support
- P1019 Current, rotor position identification
- P1020 Maximum rotation, rotor position identification (SRM)
  Maximum movement, rotor position identification (SLM)
- P1075 Technique, rotor position identification (SRM, SLM)
- P1076 Load moment of inertia RLI (SRM)
  Load mass RLI (SLM)
- P1523 Time constant, speed actual value filter (PT1) RLI (ARM SRM SLM) (from SW 9.1)

The following diagnostics parameters are used rotor position synchronization/rotor position identification:

- P1734 Diagnostics, rotor position identification
- P1736 Test, rotor position identification
- P1737 Difference, rotor position identification

Limitations/ secondary conditions

The following limitations/secondary conditions apply for the technique based on both saturation and movement:

For the technique based on saturation (P1075=1)

- This technique can be used for both braked and non-braked motors.
- The technique cannot be used for motors which are moving.
- The current which is entered must be adequate in order to generate a significant measuring signal.
- The technique can only be started when the controller and pulses are enabled as current must flow through the motor.
- When using an absolute motor measuring system, the rotor position identification can only be used to determine the commutation angle offset (P1016).
- The measurement and evaluation take approx. 250 ms.

Warning

When the motors are not braked, the motor rotates or moves as a result of the current impressed during the measurement. The magnitude of the motion depends on the magnitude of the current and the moment of inertia of the motor and load.

For the technique based on motion (P1075=3, from SW 6.1)

- Due to the different mechanical designs, for the motion-based rotor position identification technique, the result must be checked once when the drive system is first commissioned. The deviation of measured rotor position should be < 10° electrical.
- The measuring system must stiffly mounted.
- The axis stiction must be low in comparison to the rated motor torque. An excessively high stiction can have a significant negative impact on the accuracy of the rotor position identification and, under certain circumstances, make it impossible to execute the rotor position identification with motion.
- The technique may only be used for horizontal axes which can freely move and which do not have a brake.
- During the rotor position identification run, it is not permissible that external forces are applied to the motor.
- If the previous secondary conditions/limitations are not fulfilled, then 1FN3 motors can only be operated with Hall sensor boxes or with absolute measuring systems.
- When using an absolute motor measuring system, the rotor position identification can only be used to determine the commutation angle offset (P1016).
- The technique can only be started when the controller and pulses are enabled as current must flow through the motor.
- When this technique is used, under worst case condition, movement in the range of ± 10 mm can occur.
- Until the identification has been completed, the axis to be identified must be set in the tracking mode in order to suppress fault 135 during the identification routine (standstill monitoring).
- When starting the rotor position identification routine via P1736 as a test:
  - For a test start, fault 135 (standstill monitoring) can be output, which must be acknowledged with RESET.
  - For coupled axes, the test start for rotor position identification is not permitted

6

Parameterization for the motion-based technique (from SW 6.1)

For the parameterization of the rotor position identification for the motion-based technique, initially, a rotor position identification run must be made with a standard parameterization.

The noise which is generated should be heard as a sequence of soft surges.

The following should be done if faults occur:

- Fault 611 (inadmissible motion):
  —> Increase the parameterized load mass (P1076), check the maximum permissible motion (P1020) and if required, increase.
- Fault 610 (rotor position identification unsuccessful) and P1734 = –4 (current rise too low):
  —> The motor is not correctly connected
  —> The motor power connections must be checked.
- Fault 610 (rotor position identification unsuccessful) and P1734 = –6 (max. permissible duration exceeded):
  —> This can be due to the following reasons:
  – external forces have faulted the identification routine (e.g. coupled axes have not been opened, surges, etc.),
  – if the drive emits an excessive noise (a loud whistling sound) during the identification routine, then the identification technique has become unstable:
    —> 1076 must be reduced,
    from SW 9.1 also possible in the negative range
  – extremely low encoder resolution:
    —> use an encoder with a higher resolution
  – encoder mounting is not stiff enough:
    —> improve the mounting.
- Fault 610 (rotor position identification unsuccessful) and P1734 = –7 (no clear rotor position has been found:
  —> This can be due to the following reasons:
  – the axis cannot freely move (e.g. the motor rotor is locked)
  – external forces have disturbed the identification routine (refer above)
  – the axis has an extremely high friction:
    —> the identification current (P1019) must be increased

If the rotor position identification routine was successful, the rotor position which was found should be checked. This test function can determine the difference between the determined rotor position angle and the rotor position angle used by the closed-loop control.

The following procedure should be applied several times:

1. Start the test function using P1736 = 1.
2. Evaluate the difference in P1737 – a spread of the measured values of less than 10 degrees is acceptable. If this is not the case, then a higher current must be used for the identification routine (P1019).

Schritte zur Inbetriebnahme

1. Step: Determine the pole position

   – Incremental measuring system (with zero mark)

     Set P1011.12 = 1
     Set P1011.13 = 0
     Carry¿out a HW-RESET
     Set P1017.0 = 1
     Switch-in the pulse and controller enable signals
     Move the axis over the zero mark (e.g. enter low nset)
     —> The angular offset is automatically entered into P1016
     —> Fault 799 is displayed
     (Save to FEPROM and HW-RESET required)
     Save to FEPROM and carry-out a HW-RESET

   – Absolute measuring system (with CD track)

     Power-up with the controller and pulses disabled
     Set P1017.0 = 1
     Switch-in the controller and pulse enable
     —> The angular offset is automatically entered into P1016
     —> Fault 799
     (Save to FEPROM and HW-RESET required) is displayed
     Save to FEPROM and carry-out a HW-RESET

2. Step: Check the pole position

   To check the rotor position identification, using a test function, you can determine the difference between the calculated rotor angle position and that actually used by the closed-loop control. Proceed as follows:

   – Start the test function several times and evaluate the difference
     Start Set P1736 (test rotor position identification) to 1
     Difference P1737 (difference, rotor position identification)

     = _ _ _ _ , _ _ _ _ , _ _ _ _ , _ _ _ _ , _ _ _ _

   – Is the spread of the measured values less than 2 degrees electrical?
     Yes:: OK
     No: Increase P1019 (e.g. by 10 %)
     and repeat the measurements
     If OK after having repeated the measurements, then the angular commutation offset can be re-determined:
     For an incremental measuring system:
     as for Point 2. (determining the angular commutation offset)

For an absolute measuring system:
Power-down the drive (POWER ON-RESET)
Power-up the drive with the pulse or controller enable signals switched¿out
Set P1017.0 to 1
Switch-in the pulse and enable signals
—> The angular offset is automatically entered into P1016
—> Fault 799 (Save to FEPROM and HW-RESET required) is displayed
Save to FEPROM and carry-out a HW-RESET

Supplement from SW 9.1

Measuring systems with coarser encoder resolution are being increasingly used. This is the reason that when carrying-out a rotor position identification routine, method 3 (P1075 = 3), it is possible to enter a time constant for the speed actual value filtering using P1523 during the rotor position identification routine. In this case, P1522 is not effective.

6.15 Electrical braking when the encoder fails (from SW 9.1)

Description

For a feed drive with synchronous motor (SRM, SLM), if the encoder fails, without encoder information being available, then the drive is braked to the changeover speed/velocity parameterized in P1466.

Activating

The function ”electrical braking when the encoder fails” is activated with P1049 = 1. The standard setting (default setting) is P1049 = 0.

Braking sequence

If P1049 = 1, then braking is carried-out in the following steps:

- Initially, the pulse inhibit is suppressed.
- The speed controller enable to initiate braking is simultaneously withdrawn.
- The drive brakes down to the changeover speed/velocity parameterized in P1466. The pulses are only inhibited then and the motor costs down.
- If, at the instant that the encoder fails, the motor speed/velocity is below the changeover speed/velocity defined in P1466, then the pulses are immediately inhibited and the motor coasts down.

Limitations/ secondary conditions

- The timer for pulse cancellation in P1404 should be greater than the duration of the braking operation.
- The shutdown speed/velocity P1403 should be less than the value of the changeover speed/velocity in P1466.
- The maximum torque for a regenerative stop is always reduced with P1097.
- The function to monitor whether the speed controller is at its endstop is always disabled (P1096.1 = 1).
- The following criteria always apply for the use, otherwise fault 722 is output:
  - Rotating motors (SRM) P1466 > 40000/P1114
  - Linear motors (SLM): P1466 > 1386/P1114

  When commissioning a motor, P1466 is automatically set to this limit.

6

Note

This type of braking can absorb a high percentage of the kinetic energy from the system and the motor coasts down at the end with a low amount of energy. This is the reason that the machinery construction OEM may have to provide additional protective measures depending on the
particular application and the selected motors.

Parameter overview (refer to Chapter A.1)

The following parameters are used for ”electrical braking when the encoder fails”:

- P1049 Activate EMF brake (SRM SLM)
- P1097 Red. max. torque for regen. stop
- P1403 Shutdown speed, pulse cancellation (ARM SRM)
  Shutdown speed, pulse cancellation (SLM)
- P1404 Timer, pulse cancellation
- P1466 Changeover speed, closed-loop/open-loop control (ARM)
  Changeover speed closed-loop control/pulse cancellation (SRM)
  Changeover velocity/closed-loop control/pulse cancellation (SLM)

■

Fault Handling and Diagnostics

7

7.1 Overview of faults and warnings

For POSMO SI/CD/CA, faults and warnings can be exclusively displayed at the higher-level master via PROFIBUS.

Fault and warning numbers

Faults and warnings are assigned an appropriate number that is displayed via PROFIBUS.

Table 7-1 Overview of faults and warnings

<table>
<tr><th colspan="2">Type</th><th>Section</th><th>Description</th></tr>
<tr><td rowspan="2">Alarms</td><td>Fault

have the numbers < 800</td><td>1
...
799</td><td>**When faults occur**
• The fault No. is output on PROFIBUS
• An appropriate stop response is initiated
Properties
• They are displayed in the sequence in which they occurred
• Faults with/without supplementary information
– without supplementary information
The cause of the fault is only defined by the fault number.
– with supplementary information
The cause of the fault is defined by the fault number and supplementary information.
• Faults have a higher priority than the warnings
Removing faults
• Remove the cause of the fault
• Acknowledge the fault (is specified for every fault)</td></tr>
<tr><td>Warning

have the numbers ≥ 800</td><td>800
...
927</td><td>**When warnings occur**
• The warning No. is output on PROFIBUS
Properties
• If several warnings are present, there is no relationship between the time which they occurred and their display
Removing warnings
• Warnings are self-acknowledging,
i.e. they automatically reset themselves once the condition is no longer fulfilled</td></tr>
</table>

Remedy

Measures, which can be used to remove/resolve the faults/warnings are provided in the list of faults and warnings (refer to Chapter 7.2).

For POSMO SI, it is possible to either replace the complete motor or just the drive module (drive unit).

- Replacing the motor for POSMO SI
  —> refer to Chapter 8.6
- Replacing the drive unit for POSMO SI
  —> refer to Chapter 8.5

Alarm log

The ”SimoCom U” parameterizing and start-up tool enters the alarms and warnings that have occurred into an alarm log file together with date and time that is saved in the ”SIMOCOMU installation path” under .../user/AlarmLog.txt.

Note:
If ”SimoCom U” is connected to a drive that is already operational, then for the warnings that have occurred up until then, neither date nor time is specified in the log file. If the alarm log file size exceeds 50 KB, then after closing the ”SimoCom U” parameterizing and start-up tool, the contents of the log file are transferred into the AlarmLog.bak file and AlarmLog.txt is set-up again.

Acknowledgement

In the list of faults and warnings (refer to Chapter 7.2), for each fault, it is specified how it must be acknowledged after the cause has been removed.

Acknowledging faults with POWER ON

Faults, which are to be acknowledged with POWER ON, can be alternatively acknowledged as follows:

1. Carry-out a POWER-ON
   (power down/power up the POSMO SI/CD/CA)
2. POWER-ON RESET with the ”SimoCom U” tool

The processor runs up again, all of the faults are acknowledged, and the fault buffer is re-initialized.

Acknowledging faults with RESET FAULT MEMORY

Faults, which are to be acknowledged with RESET FAULT MEMORY, can be alternatively acknowledged as follows:

!

Important

Prerequisites when acknowledging:

- **Set the PROFIBUS control signal STW1.0 to ”0”**

  From SW 6.1 and for P1012.12=1, the fault can also be acknowledged without this prerequisite. However, the drive then remains in the ”Power-on inhibit” state (refer to Chapter 5.5 ”Forming the power-on inhibit”; Fig.5-8).

  or

- **De-energize the terminal ”pulse enable”**

1. Carry-out POWER-ON acknowledgment
   In addition to the POWER-ON faults, all of the faults, which can be acknowledged with RESET FAULT MEMORY, are also acknowledged.
2. Via PROFIBUS: Set STW1.7 (reset fault memory) to ”1”.
3. For the ”SimoCom U” tool press the ”reset fault memory” button in the ”alarm protocol” dialog box.

4. From SW 9.1:
   The fault buffer is cleared with parameter P0952 = 0 and the faults are acknowledged if the causes were resolved.

If a fault is acknowledged, before the cause has been removed – e.g. overtemperature, DC link under voltage, etc., then the fault message is de-activated later at that instant when the cause is no longer present. The fault memory does not have to be reset again.

Stop responses

In the list of faults and warnings, for each fault and warning, it is specified under "stop" which stop response and the effect it has. —> Refer to Chapter 7.2

Note

Handling faults in the master and slave drive for coupled axes, refer to Chapter 6.3.2.

Table 7-2 Stop responses and their effect

Stop	Stopping via...	Effect
STOP 0 (only POSMO CA)	Armature short-circuit	• The drive is braked using an armature short-circuit.
STOP I	Internal pulse inhibit	• Immediate pulse cancellation. • The drive "coasts down".
STOP II	Internal control inhibit	• Speed controlled operation – By immediately entering $n_{set} = 0$ the drive is braked along the down ramp. – If the speed actual value falls below the value in P1403 (shutdown speed, pulse cancellation), or if the time in P1404 (timer stage, pulse cancellation) has expired, then the pulses are canceled. • Torque control mode – The drive does not actively brake. – If the speed actual value falls below the value in P1403 (shutdown speed, pulse cancellation), or if the time in P1404 (timer stage, pulse cancellation) has expired, then the pulses are canceled. • Torque-/force limiting for setpoint 0 (only nset operation, from SW 8.3) – P1096 can be used to activate torque limit reduction when regeneratively braking. – P1097 can be used to parameterize the factor to reduce the torque limit when regeneratively braking.

Table 7-2 Stop responses and their effect, continued

Stop	Stopping via...	Effect
STOP III	$n_{set} = 0$	• The axis is braked, closed-loop speed controlled with the maximum deceleration (P0104). • The drive remains in the closed-loop controlled mode.
STOP IV	Interpolator (P0104)	• The axis is braked closed-loop position controlled with the maximum deceleration (P0104). • The drive remains in the closed-loop controlled mode. • The axes remain coupled.
STOP V	Interpolator (P0104 • P0084:64)	• The axis is braked closed-loop position controlled using the programmed deceleration (P0104 • deceleration override in P0084:64). • The drive remains in the closed-loop controlled mode.
STOP VI	End of block	• Standstill after the end of a block. • The drive remains in the closed-loop controlled mode.
STOP VII	none	• No effect. • Acknowledgment is not required. • That is a warning
STOP VIII (from SW 9.2)	STOP I (ARM) STOP II (SRM, SLM)	Digital outputs are switched to 0 V and cyclic PROFIBUS communications are interrupted. **Notice:** Depending on the extent of the processor overload that occurs, it cannot always be guaranteed that all software modules, which initiate responses, are executed. This means that some responses may not be initiated.

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Table 7-2 Stop responses and their effect, continued

Stop	Stopping via...	Effect
Can be para- meterized	P1600 and P1601 Refer to Chapter A.1	Faults that can be suppressed This means: These faults can be de-activated. • Which faults can be suppressed? The faults, specified in P1600 and P1601 can be suppressed. e.g. faults 508, 509, 608 etc. • How can they be suppressed? By setting the parameter bit assigned to the fault via P1600 and P1601. Example: Fault 608 is to be suppressed. —> set P1601.8 to 1
	P1612 and P1613 Refer to Chapter A.1	Faults which can be set This means: For these faults, STOP I or the evaluation of the setting in P1640 or P1641 can be set as stop response. • Which faults can be set? The faults, specified in P1612 and P1613, can be set. e.g. faults 504, 505, 607 etc. • How can these be set? By setting the parameter bit assigned to the fault via P1612 and P1613. Example: The setting in P1641 should be the response to fault 608. —> set P1613.8 to 0
	P1640 and P1641 Refer to Chapter A.1 (only for POSMO CA)	Faults which can be set This means: STOP 0 or STOP II can be set as shutdown response for these faults. • Which faults can be set? Responses for those faults specified in P1640 and P1641 can be set. e.g. faults 504, 505, 607 etc. • How can these be set? By setting the parameter bit assigned to the fault using P1640 and P1641. Example: STOP II should be initiated as response to fault 608. —> set P1641.8 to 0

7.2 List of faults and warnings

7.2.1 Fault without any fault display

Fault **After the controller enable, the motor is stationary at $n_{set} \neq 0$**

Cause
- P1401:8 is set to zero
- Power-on inhibit is present for PROFIBUS operation
  Remove the power-on inhibit using
  the control bit STW1.0 (ON / OFF 1)
  or
  set bit 12 of parameter 1012 to zero

Fault **After the controller has been enabled, the motor briefly moves**

Cause
- Defective power module

Fault **After the controller has been enabled, the motor rotates at max. 50 RPM at n_{set} > 50 RPM or the motor oscillates at n_{set} < 50 RPM**

Cause
- Motor phase sequence is incorrect (interchange 2 phase connections)
- The entered encoder pulse number was too high

Fault **After the controller is enabled, the motor accelerates to a high speed**

Cause
- Encoder pulse number too small
- Open-loop torque controlled mode selection?

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7.2.2 Error with fault/warning number

Reader's note

- In some instances, the space retainers (e.g. \%u) are specified for the texts of the individual faults and warnings.
  In online operation with SimoCom U instead of a space retainer, an appropriate value is displayed.
- The faults and alarms listed in the following are applicable for all software releases of POSMO SI/CD/CA.
  The complete list is updated according to the Edition of this documentation (refer to the Edition in the headers) and corresponds to the software release of POSMO SI/CD/CA documented here.
  The individual faults/alarms are not designated as a function of the software release.

Version: 09.02.04

000 **Alarm diagnostics not possible**

Cause
– Communications to the drive have been interrupted.
– Different versions of the "SimoCom U" start-up and parameterizing tool and the drive.

Remedy
– Check the communications to the drive (cable, interfaces, ...)
– The V_DEZA<Version>.acc file on the hard disk of the PG/PC should be adapted to the drive as follows:
  – Exit "SimoCom U"
  – Delete the V_DEZA<Version>.acc file (search and delete the file)
  – Restart "SimoCom U" and go online
  The V_DEZA<Version>.acc file is now re-generated and is harmonized
  to the drive version.
Never delete the file V000000.acc!

001 **The drive does not have firmware**

Cause
No drive firmware on the memory module.

Remedy
– Load the drive firmware via SimoCom U
– Insert the memory module with firmware

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

002 Computation time overflow. Suppl. info: \%X

Cause
The computation time of the drive processor is no longer sufficient for the selected functions in the specified cycle times.
Supplementary information: only for siemens-internal error diagnostics

Remedy
Disable functions which take up a lot of computation time, e.g.:
– Variable signaling function (P1620)
– Trace function
– Start-up with FFT or analyzing the step response
– Speed feedforward control (P0203)
– Min/Max memory (P1650.0)
– DAC output (max. 1 channel)
Increase cycle times:
– Current controller cycle (P1000)
– Speed controller cycle (P1001)
– Position controller cycle (P1009)
– Interpolation cycle (P1010)

Acknowledgement
POWER ON

Stop response
STOP VIII

003 NMI due to watchdog. Suppl. info: \%X

Cause
The watchdog timer on the control module has expired. The cause is a hardware fault in the time basis on the control module.
Supplementary information: only for siemens-internal error diagnostics

Remedy
– Replace drive module

Acknowledgement
POWER ON

Stop response
STOP VIII

004 Stack overflow. Suppl. info: \%X

Cause
The limits of the internal processor hardware stack or the software stack in the data memory have been violated. The cause is probably a hardware fault on the control module.
Supplementary information: only for siemens-internal error diagnostics

Remedy
– Power down/power up drive module
– Replace drive module

Acknowledgement
POWER ON

Stop response
STOP VIII

005 Illegal Opcode, Trace, SWI, NMI (DSP). Suppl. info: \%X

Cause
The processor has detected an illegal command in the program memory.
Supplementary information: only for siemens-internal error diagnostics

Remedy
– Replace drive module

Acknowledgement
POWER ON

Stop response
STOP VIII

006	**Checksum test error. Suppl. info: \%X**
Cause	During the continuous check of the checksum in the program/data memory, a difference was identified between the reference and actual checksum. The cause is probably a hardware fault on the control module. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Replace drive module
Acknowledgement	POWER ON
Stop response	STOP VIII
007	**Error when initializing. Supplementary info: \%X**
Cause	An error occurred when loading the firmware from the memory module. Cause: Data transfer error, FEPROM memory cell defective Supplementary information: only for siemens-internal error diagnostics
Remedy	Carry-out RESET or POWER-ON. If a download was not successful after several attempts, the memory module must be replaced. If this is also not successful, the drive module is defective and must be replaced.
Acknowledgement	POWER ON
Stop response	STOP VIII
020	**NMI due to cycle failure**
Cause	Basic cycle has failed. Possible causes: EMC faults, hardware fault, control module
Remedy	– Check the plug-in connections – Implement noise suppression measures (screening, check ground connections) – Replace drive module
Acknowledgement	POWER ON
Stop response	STOP VIII
025	**SSI interrupt**
Cause	An illegal processor interrupt has occurred. An EMC fault or a hardware fault on the control module could be the reason.
Remedy	– Check the plug-in connections – Replace control module
Acknowledgement	POWER ON
Stop response	STOP VIII

026 SCI interrupt

Cause	An illegal processor interrupt has occurred. An EMC fault or a hardware fault on the control module could be the reason.
Remedy	– Check the plug-in connections – Replace drive module
Acknowledgement	POWER ON
Stop response	STOP VIII

027 HOST interrupt

Cause	An illegal processor interrupt has occurred. An EMC fault or a hardware fault on the control module could be the reason.
Remedy	– Check the plug-in connections – Replace drive module
Acknowledgement	POWER ON
Stop response	STOP VIII

028 Actual current sensing during power-up

Cause	When the current actual value sensing runs up, or in cyclic operation at pulse inhibit, a 0 current is expected. The drive system then identifies that no currents are flowing (excessive deviation to the theoretical center frequency). It is possible that the hardware for the current actual value sensing is defective. The fault is also signaled, if the DC link voltage is switched-out.
Remedy	– Check the plug-in connections – Power-up the DC link voltage – Replace drive module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

029 Incorrect measuring circuit evaluation. Suppl. info: \%X

Cause	A motor encoder with voltage output was not detected.
Remedy	– Check the plug-in connections – Implement noise suppression measures (screening, check ground connections, ...) – Ensure that a motor encoder with voltage output is used. – Replace drive module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

030	**S7 communication error. Supplementary info: \%X**
Cause	A fatal communication error was identified, or the drive software is no longer consistent. The cause is erroneous communications or a hardware fault on the control module. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Implement noise suppression measures (screening, check ground connections, ...) – Replace drive module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
031	**Internal data error. Suppl. info: \%X**
Cause	Error in the internal data, e.g. errors in the element/block lists (incorrect formats, ...). The drive software is no longer consistant. The cause is propably a hardware fault on the control module. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Re-load drive software – Replace drive module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
032	**Incorrect number of current setpoint filters**
Cause	An illegal number of current setpoint filters was entered (> 4) (maximum number = 4).
Remedy	Correct number of current setpoint filters (P1200).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
033	**Incorrect number of speed setpoint filters**
Cause	An inadmissible number of speed setpoint filters (> 2) was entered (max. number = 2).
Remedy	Correct number of speed setpoint filters (P1500)
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

035	**Error when saving the user data. Supplementary info: \%X**
Cause	An error occurred when saving the user data in the FEPROM on the memory module. Cause: Data transfer error, FEPROM memory cell defective Note: The user data which was last saved, is still available as long as a new data backup was unsuccessful. Supplementary information: only for siemens-internal error diagnostics
Remedy	Initiate another data backup. If data backup is still unsuccessful after several attempts, then the memory module must be replaced. If the user data, valid up to the error, is to be used in the new memory module, then it must be read out via SimoCom U before the memory module is replaced, and loaded again after it has been replaced.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
036	**Error when downloading the firmware. Suppl. info: \%X**
Cause	An error occurred when loading a new firmware release. Cause: Data transfer error, FEPROM memory cell defective Note: As the previously used firmware was erased when downloading, the drive expects a new firmware download after RESET or POWER ON. Supplementary information: only for siemens-internal error diagnostics
Remedy	Execute RESET or POWER ON. If a download was not successful after several attempts, the memory module must be replaced. If this is also not successful, the drive module is defective and must be replaced.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
037	**Error when initializing the user data. Supplementary info: \%X**
Cause	An error occurred when loading the user data from the memory module. Cause: Data transfer error, FEPROM memory cell defective Supplementary information: only for siemens-internal error diagnostics
Remedy	Execute POWER ON. If a download was not successful after several attempts, the memory module must be replaced. If this is also not successful, the drive module is defective and must be replaced.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

038 Error when reading the power module data. Supplementary info: \%X

Cause	An error occurred when reading the power module data or the read power module data is not valid. Supplementary information 1 = An error occurred when reading the power module data. 2 = The read power module data is invalid.
Remedy	– Execute RESET or POWER ON
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

039 Error during power section identification. Supplementary info: \%X

Cause	Supplementary information 0x100000: More than 1 power section type was identified. 0x200000: No power section type was identified, although it would have been possible. 0x30xxxx: The identified power module differs from the entered PM (P1106). To xxxx: the code of the identified PM is entered here.
Remedy	– Execute RESET or POWER ON
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

040 Expected option module is not available.

Cause	Parameterization P0875=1 is not permissible.
Remedy	– Correct P0875 to 4
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

041 The firmware does not support the option module. Suppl. info: \%u

Cause
Supplementary info = 1:
Value in P0875 is illegal
Supplementary info = 2:
SIMODRIVE 611 universal E only supports the option module DP3 (P0872/P0875 = 4).
Supplementary info = 3:
From firmware version 4.1, the PROFIBUS option module DP1 (P0872) is no longer supported.

Remedy
Supplementary info = 1:
– Upgrade the firmware
– Use a legal option module
– Cancel the option module with P0875 = 0
Supplementary info = 2:
– Use a permissible option module (DP3)
– Cancel the option module with P0875 = 0
Supplementary info = 3:
– Replace the option module hardware DP1 by option module DP2 or DP3, without changing the drive parameters and the master configuring. The parameter for the expected option module remains at P0875 = 2.

Acknowledgement POWER ON

Stop response STOP II (SRM, SLM) STOP I (ARM)

042 Internal software error. Supplementary info \%u

Cause
There is an internal software error.
Supplementary information: only for siemens-internal error diagnostics

Remedy
– Execute POWER-ON RESET
– Re-load the software into the memory module (execute software update)
– Contact the Hotline
– Replace drive module

Acknowledgement POWER ON

Stop response STOP II (SRM, SLM) STOP I (ARM)

044 Connection to the option module failed. Supplementary info \%X

Cause
The BUS coupling has failed.

Remedy
– Check the PROFIBUS unit union connection
– Replace drive module

Acknowledgement POWER ON

Stop response STOP II (SRM, SLM) STOP I (ARM)

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046 Internal initialization error

Cause: Hardware fault.

Remedy:
– Execute POWER-ON RESET
– Check the PROFIBUS unit screw connection
– Replace drive module

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

047 Error when reading the Profibus address

Cause: The Profibus address was not able to be read-in.

Remedy:
– Execute POWER-ON RESET
– Check the PROFIBUS unit screw connection
– Replace drive module

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

048 Illegal status PROFIBUS hardware

Cause: An illegal status of the PROFIBUS controller was recognized.

Remedy:
– Execute POWER-ON RESET
– Check the PROFIBUS unit screw connection
– Replace drive module

Acknowledgement: POWER ON

Stop response: STOP II

101 Target position block \%n < plus software limit switch

Cause: The target position specified in this block lies outside the range limited by P0316 (plus software limit switch).

Remedy:
– Change the target position in the block
– Set the software limit switches differently

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP VI

102 Target position block \%n < minus software limit switch

Cause: The target position specified in this block lies outside the range limited by P0315 (minus software limit switch).

Remedy:
– Change the target position in the block
– Set the software limit switches differently

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP VI

103 **Block number \%n: Direct output function not possible**

Cause: For the SET_O or RESET_O command, an illegal value was entered in P0086:64 (command parameter).

Remedy: Enter value 1, 2 or 3 in P0086:64 (command parameter).

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP V

104 **Block \%n: There is no jump target**

Cause: A jump is programmed to a non-existent block number in this traversing block.

Remedy: Program the existing block number.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP VI

105 **Illegal mode specified in block \%n**

Cause: Illegal data is in P0087:64/P0097 (mode). A data position in P0087:64/P0097 has an inadmissible value.
For the commands SET_O and RESET_O, the CONTINUE EXTERNAL block change enable is not permissible.
For MDI: The configuration of the external block change P0110 is incorrect. The external block change is only permissible with P0110 = 2 or 3. Block change enable only with ”END” or ”CONTINUE EXTERNAL”.
For axis couplings: For COUPLING_IN/COUPLING_OUT via a traversing block (P0410 = 3, 4 or 8), a block change enable with CONTINUE FLYING is not possible.

Remedy: Check and correct P0087:64/P0097.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP VI

106 **Block \%n: ABS_POS mode not possible for linear axis**

Cause: For a linear axes, the positioning mode ABS_POS was programmed (only for rotary axes).

Remedy: Change P00987:64/P0097 (mode).

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP VI

107 Block \%n: ABS_NEG mode not possible for a linear axis

Cause	For a linear axes, the positioning mode ABS_NEG was programmed (only for rotary axes).
Remedy	Change P00987:64/P0097 (mode).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

108 Block number \%n available twice

Cause	There are several traversing blocks with the same block number in the program memory. The block numbers must be unique over all traversing blocks.
Remedy	Assign unique block numbers.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

109 External block change not requested in block \%n

Cause	External block change was not requested for a traversing block with block step enable CONTINUE EXTERNAL and P0110 (configuration of external block change) = 0.
Remedy	Eliminate the cause for the missing edge at the input terminal resp. at the PROFIBUS control signal STW1.13.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

110 Selected block number \%n does not exist

Cause	A block number was selected which is not available in the program memory or has been suppressed.
Remedy	Select the existing block number. Program the traversing block with the selected block number.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

111 GOTO in block number \n not permissible

Cause	The step command GOTO may not be programmed for this block number.
Remedy	Program another command.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

112 Activate traversing task and start referencing simultaneously

Cause: For the ”activate traversing task” and ”start referencing” input signals, a positive edge was simultaneously identified.
At power-on or POWER-ON RESET, if both input signals have a ”1” signal, then for both signals a 0/1 edge (positive edge) is simultaneously identified.

Remedy: Reset both input signals, and re-start the required function after the fault has been acknowledged.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP IV

113 Activate the traversing task and jog simultaneously

Cause: For the input signals ”activate traversing task” and ”jog 1”, ”jog 2” a positive edge was simultaneously detected.
At power-on or POWER-ON RESET, if both input signals have a ”1” signal, then for both signals a 0/1 edge (positive edge) is simultaneously identified.

Remedy: Reset both input signals, and re-start the required function after the fault has been acknowledged.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP IV

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114 Block change enable END in block number \%n expected

Cause: The traversing block with the highest block number does not have END as block step enable.

Remedy:
– Program this traversing block with block step enable END.
– Program the GOTO command for this traversing block.
– Program additional traversing blocks with higher block number and program the block step enable END (highest block number) in the last block.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP VI

115 Traversing range start reached

Cause: The axis has moved to the traversing range limit in a block with the command ENDLOS_NEG (–200 000 000 MSR).

Remedy:
– Acknowledge fault
– Move away in the positive direction (e.g. jog)

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP V

116	**Traversing range end reached**
Cause	The axis has moved to the traversing range limit in a block with the command ENDLOS_POS (200 000 000 MSR).
Remedy	– Acknowledge fault – Move away in the negative direction (e.g. jog)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V
117	**Target position block \%n < start of the traversing range**
Cause	The target position specified in this block lies outside the absolute traversing range (–200 000 000 MSR).
Remedy	Change the target position in the block
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI
118	**Target position block \%n < end of the traversing range**
Cause	The target position specified in this block lies outside the absolute traversing range (200 000 000 MSR).
Remedy	Change the target position in the block
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI
119	**PLUS software limit switch actuated**
Cause	For a block with the ENDLOS_POS command, the axis has actuated the plus software limit switch (P0316) for absolute or relative positioning. The behavior for software limit switch reached, can be set using P0118.0.
Remedy	– Acknowledge fault – Move away in the negative direction, jog mode
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V
120	**MINUS software limit switch actuated**
Cause	For a block with the ENDLOS_NEG command, the axis has actuated the minus software limit switch (P0315) for absolute or relative positioning. The behavior for software limit switch reached, can be set using P0118.0.
Remedy	– Acknowledge fault – Move away in the positive direction, jog mode
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

121 Jog 1 and Jog 2 simultaneously active

Cause	The ”Jog 1” and ”Jog 2” input signals were simultaneously activated.
Remedy	– Reset both input signals – Acknowledge the fault – Activate the required input signal
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

122 Parameter \%u: value range limits violated

Cause	The value range limit of the parameter was violated when the dimension system was changed over from inches to millimeters.
Remedy	Place the parameter value within the value range.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

123 Linear encoder for the selected dimension system illegal

Cause	For a linear encoder, the dimension system was set to degrees.
Remedy	Change the dimension system setting (P0100).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

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124 Referencing and jog simultaneously started

Cause	For the ”start referencing” and ”Jog 1” and ”Jog 2” input signals, a positive edge was simultaneously identified.
Remedy	Reset both input signals, and re-start the required function after the fault has been acknowledged.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

125 Falling edge of the reference cam not identified

Cause	When moving away from the reference cams, the traversing range limit was reached, as the 1/0 edge of the reference cam was not identified.
Remedy	Check the ”reference cam” input signal and repeat the reference point approach.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

126	**Block \%n: ABS_POS for rotary axis, is not possible without modulo conversion**
Cause	The ABS_POS positioning mode is only permitted for a rotary axis with activated module conversion (P0241 = 1).
Remedy	Use the valid positioning mode for this axis type.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI
127	**Block \%n: ABS_NEG for rotary axis is not possible without modulo conversion**
Cause	The ABS_NEG positioning mode is only permitted for a rotary axis with activated modulo conversion (P0241 = 1).
Remedy	Use the valid positioning mode for this axis type.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI
128	**Block \%n: Target position lies outside the modulo range**
Cause	The programmed target position (P0081:64/P0091) is outside the selected modulo range (P0242).
Remedy	Program valid target position.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI
129	**Maximum velocity for a rotary axis with modulo conversion too high**
Cause	The programmed maximum velocity (P0102) is too high to correctly calculate the modulo offset. The maximum velocity may only be so high, that 90% of the modulo range (P0242) can be traveled through within one interpolation cycle (P1010).
Remedy	Reduce maximum velocity (P0102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

130 Controller or pulse enable withdrawn in motion

Cause

Possible causes are:
– One of the following enable signals was withdrawn while traversing: Terminal ”Pulse enable” (terminal IF), PROFIBUS enable signals, PC enable from SimoCom U
– Another fault has occurred, which causes the controller or pulse enable to be withdrawn
– The drive is in the power-on inhibit state

Remedy

– Set the enable signals or check the cause of the first fault which occurred and remove
– Withdraw the power-on inhibit using a signal edge (0 —> 1) at control word STW1.0 or terminal ”pulse enable” (terminal IF).

Acknowledgement

RESET FAULT MEMORY

Stop response

STOP II

131 Following error too high

Cause

Possible causes are:
– The torque or acceleration capability of the drive is exceeded
– Position measuring system fault
– The position control sense is not correct (P0231)
– Mechanical system blocked
– Excessive traversing velocity or excessive position setpoint differences

Remedy

Check the above causes and remove.

Acknowledgement

RESET FAULT MEMORY

Stop response

STOP II

132 Drive located after the minus software limit switch

Cause

The axis was moved to the minus software limit switch (P0315), jog mode.
The fault can also occur if the software limit switches are inactive if the position actual value falls below the limit value of –200 000 000 MSR, that corresponds to 555 revolutions for a rotary axis.

Remedy

Return the drive into the traversing range using jog button 1 or 2. Then acknowledge the fault.

Acknowledgement

RESET FAULT MEMORY

Stop response

STOP III

133	**Drive located after the plus software limit switch**
Cause	The axis was moved to the plus software limit switch (P0316), jog mode. The fault can also occur if the software limit switches are inactive if the position actual value exceeds the limit value of 200 000 000 MSR, that corresponds to 555 revolutions for a rotary axis.
Remedy	Return the drive into the traversing range using jog button 1 or 2. Then acknowledge the fault.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP III
134	**Positioning monitoring has responded**
Cause	The drive has not yet reached the positioning window (P0321) after the positioning monitoring time (P0320) has expired. Possible causes: – Positioning monitoring time (P0320) parameters too low – Positioning window (P0321) parameters too low – Position loop gain (P0200) too low – Position loop gain (P0200) too high (instability/tendency to oscillate) – Mechanical block
Remedy	Check above parameters and correct.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II
135	**Standstill monitoring has responded**
Cause	The drive has left the standstill window (P0326) after the standstill monitoring time (P0325) has expired. Possible causes are: – Position actual value inversion (P0231) incorrectly set – Standstill monitoring time (P0325) parameters too low – Standstill window (P0326) parameters too low – Position loop gain (P0200) too low – Position loop gain (P0200) too high (instability/tendency to oscillate) – Mechanical overload – Check connecting cable motor/converter (phase missing, exchanged)
Remedy	Check above parameters and correct.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

136	**Conv.factor,feedforward contr.speed,parameter set \%d,cannot be represented**
Cause	The conversion factor in the position controller between velocity and speed cannot be displayed. This factor depends on the following parameters: – Spindle pitch (P0236), for linear axes – Gearbox ratio (P0238:8 / P0237:8).
Remedy	Check the above mentioned parameters and correct.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II
137	**Conv.factor,pos.contr.output,parameter set \%d,cannot be represented**
Cause	The conversion factor in the position controller between the following error and the speed setpoint cannot be displayed. This factor depends on the following parameters: – Spindle pitch (P0236) (for linear axes) – Gearbox ratio P0238:8 / P0237:8 – Position control loop gain P0200:8
Remedy	Check the above mentioned parameters and correct.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II
138	**Conversion factor between the motor and load too high**
Cause	The conversion factor between the motor and load is greater than 2 to the power of 24 or less than 2 to the power of –24.
Remedy	Check the following parameters and correct: P0236, P0237, P0238, P1005, P1024
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)
139	**Modulo range and ratio do not match**
Cause	For multi-turn absolute value encoders, the ratio between the encoder and load must be selected so that the complete encoder range is an integer multiple of the modulo range. The following condition must be fulfilled: P1021 * P0238:8 / P0237:8 * 360 / P0242 must be integer numbers.
Remedy	– Check and correctP1021, P0238:8, P0237:8 – Adapt the modulo range (P0242)
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

140 Minus hardware limit switch

Cause	A 1/0 edge was identified at the "Minus hardware limit switch" input signal.
Remedy	Return the drive into the traversing range using jog button 1 or 2. Then acknowledge the fault.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP III

141 Plus hardware limit switch

Cause	A 1/0 edge was identified at the "Plus hardware limit switch" input signal.
Remedy	Return the drive into the traversing range using jog button 1 or 2. Then acknowledge the fault.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP III

142 Input I0.x not parameterized as equivalent zero mark

Cause	When entering an external signal as equivalent zero mark (P0174 = 2), input I0.x must be assigned "equivalent zero mark" function (Fct. No.:79).
Remedy	– P0660 = 79
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

143 Endless traversing and external block change in block \%n

Cause	The block change enable CONTINUE_EXTERNAL for the ENDLESS_POS or ENDLESS_NEG command is only permitted with P0110 = 0 or 1.
Remedy	Block change enable or change P0110.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

144 Switching-in/switching-out MDI erroneous

Cause	In the active traversing program, MDI was switched-in or, in the active MDI block, MDI was switched-out.
Remedy	Acknowledge fault Change P0110
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

145 Fixed endstop not reached

Cause	In a traversing block with the FIXED ENDSTOP command, the fixed endstop was not reached. The fixed endstop lies outside the position programmed in this block. After interrupting the traverse to fixed endstop function, the drive was forced out of the position (support position).
Remedy	Check programming Increase kP0326 if the drive was forced out of the position.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

146 Fixed endstop, axis outside the monitoring window

Cause	In the ”Fixed endstop reached” status, the axis has moved outside the defined monitoring window.
Remedy	– Check P0116:8 (fixed endstop, monitoring window) – Check mechanical system
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

147 Enable signals withdrawn at the fixed endstop

Cause	Possible causes are: – One of the following enable signals was withdrawn while traversing to the fixed endstop: Terminal ”Pulse enable” (terminal IF), PROFIBUS enable signals, PC enable from SimoCom U – Another fault has occurred, which causes the controller or pulse enable to be withdrawn
Remedy	Set the enable signals and check the cause of the first fault and remove.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

148 Velocity in block \%n outside the range

Cause	The velocity, specified in this block lies outside the range (1 000 to 2 000 000 000 c*MSR/min).
Remedy	Change the velocity in the block
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

149	**Incorrect data for modulo axis with absolute encoder. Supplementary info \%u**
Cause	Data error for modulo drive with absolute encoder and any gear factor. – Data was not able to be saved after power-on. – Absolute position was not able to be read-out of the encoder. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Adjust the drive by setting the absolute value. – Check the switching threshold in P1162 > 380 V (minimum DC link voltage). – Check the hysteresis of the DC link voltage monitoring in P1164. – Check that the fixed DC link voltage is deactivated (P1161 = 0).
Acknowledgement	POWER ON
Stop response	STOP V
150	**External position reference value < max. traversing range suppl. info \%u**
Cause	The external position reference value has exceeded the upper traversing range limit. Supplementary info = 0: Limit exceeded after the coupling factors P0401/P0402 identified, i.e. P0032 > 200 000 000 MSR. Supplementary info = 1: Limit exceeded after the coupling factors P0401/P0402 identified, i.e. P0032 * P0402 / P0401 > 200 000 000 MSR.
Remedy	Return the external position reference value to the value range. Then acknowledge the fault.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II
151	**External position reference value < min. traversing range suppl. info \%u**
Cause	The external position reference value has fallen below the lower traversing range limit. Supplementary info = 0: Limit fallen below after the coupling factors P0401/P0402 identified, i.e. P0032 < – 200 000 000 MSR. Supplementary info = 1: Limit fallen below after the coupling factors P0401/P0402 identified, i.e. P0032 * P0402 / P0401 < – 200 000 000 MSR.
Remedy	Return the external position reference value to the value range. Then acknowledge the fault.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

152 Pos.ref.val. and act.val. output via the bus interf. limited. Suppl. info \%X

Cause

The output of the position reference value, position actual value or position offset value is parameterized via PROFIBUS. However, the value to be output can no longer be represented in 32 bits and was therefore limited to the maximum values 0x7fffffff or 0x80000000.
The traversing range which can be displayed is given by
Lower limit: – 2147483648 * P896 / P884
Upper limit: + 2147483647 * P896 / P884
The supplementary information explains which process data has violated the lower or upper limit:

Supplementary info	process data	Violation
xx1	Position reference value Xset (No. 50208)	Upper limit exceeded
xx1	Position reference value Xset (No. 50208)	Lower limit fallen below
x1x	Position actual value Xact (No. 50206)	Upper limit exceeded
x2x	Position actual value Xact (No. 50206)	Lower limit fallen below
1xx	Position corr.n value dxKorr (No. 50210)	Upper limit exceeded
2xx	Position corr. value dxKorr (No. 50210)	Lower limit fallen below

Remedy

– Move drive back e.g. by jogging in the representable traversing range.
– Adapt the lower and upper limit to the required traversing range using P884 and P896.

Acknowledgement RESET FAULT MEMORY

Stop response STOP III

7

160 Reference cam not reached

Cause

After starting the reference point approach, the axis moves through the distance in P0170 (max. distance to the reference cam) without finding the reference cam.

Remedy

– Check the ”reference cam” signal
– Check P0170
– If it is an axis without reference cam, then set P0173 to 1

Acknowledgement RESET FAULT MEMORY

Stop response STOP V

161 Reference cams too short

Cause

When the axis moves to the reference cam, and does not come to a standstill at the cam, then this error is signaled, i.e. the reference cam is too short.

Remedy

– Set P0163 (reference point approach velocity) to a lower value
– Increase P0104 (maximum deceleration)
– Use larger reference cam

Acknowledgement RESET FAULT MEMORY

Stop response STOP V

162 No zero reference pulse present

Cause
– After the reference cam has been left, the axis has moved through the distance in P0171 (max. distance between the reference cam/zero pulse), without finding a zero pulse.
– For distance-boded measuring system (from SW 8.3 onwards):
The maximum permissible distance (clearance) between two reference marks was exceeded.

Remedy
– Check the encoder with reference to the zero mark
– Set P0171 to a higher value

Acknowledgement RESET FAULT MEMORY

Stop response STOP V

163 Encoderless operation and operating mode do not match

Cause Encoderless operation was parameterized (P1006) and the ”Positioning” mode selected.

Remedy Set operating mode ”speed/torque setpoint” (P0700 = 1)

Acknowledgement POWER ON

Stop response STOP V

164 Coupling released during the traversing job.

Cause The coupling was disconnected while a traversing task was running

Remedy First exist the traversing task and then disconnect the coupling.

Acknowledgement RESET FAULT MEMORY

Stop response STOP III

165 Absolute positioning block not possible

Cause Traversing blocks with absolute position data are not permitted while the axis coupling is activated.

Remedy Correct traversing block

Acknowledgement RESET FAULT MEMORY

Stop response STOP IV

166 Coupling not possible

Cause
– No coupling can be established in the actual operating status.
– For P0891=2 or 3, it is not possible to couple using the input signal ”Activate coupling through I0.x” (fast input).

Remedy – Check the coupling configuration (P0410)

Acknowledgement RESET FAULT MEMORY

Stop response STOP VI

167 Activate coupling signal present

Cause	– The input signal ”Activate coupling” is present. An edge of the input signal is necessary to activate the coupling. – In the jog mode, while traversing, the input signal ”coupling on” was entered. – The ”coupling in” input signal was entered in handwheel operation.
Remedy	Reset ”Activate coupling” input signal Acknowledge fault Set the input signal again to switch-in the coupling
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

168 Overflow, buffer memory

Cause	Occurs for couplings with queue functionality. A maximum of 16 positions can be saved in P0425:16.
Remedy	Ensure that maximum 16 positions are saved.
Acknowledgement	POWER ON
Stop response	STOP IV

169 Coupling trigger missed

Cause	Occurs for couplings with queue functionality. Synchronizatin is requested using the KOPPLUNG_ON command and it is identified that the position at which the coupling is switched-in, has already bee passed.
Remedy	Ensure that the slave drive was stationary for at least 1 IPO clock cycle (P1010), before the coupling for the next element in the position memory must be switched-in.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

170 Coupling switched-out during the traversing program

Cause	While the drive was executing a traversing program, the ”Activate coupling” input signal was reset.
Remedy	Only switch-out the coupling if the traversing program has been completed.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

171 Coupling not possible

Cause	While the drive was executing a traversing program, the ”Active coupling” input signal was set.
Remedy	Only switch-in the coupling if the traversing program has been completed.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

172 External block change for coupling not possible

Cause
If there is an existing coupling, traversing blocks with external block enable are only permitted if P0110 = 2.

Remedy
Correct traversing program
Change P0110 (configuration, external block change)

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP IV

173 Coupling and traverse to endstop simultaneously

Cause
Not possible to simultaneously couple and traverse to the endstop.

Remedy
Correct traversing program

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP V

174 Passive referencing not possible

Cause
The ”Positioning” operating mode must be set for passive referencing.

Remedy
– Set the ”Positioning” mode (P0700)

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP IV

175 Passive referencing not realized. Supplementary info: \%u

Cause
While the master drive corrects the zero mark offset, the slave drive must pass over a zero mark.
Supplementary information
0 = reference cam not found
1 = Reference cam not left
2 = Zero reference pulse not found

Remedy
Ensure that the cam of the slave drive is located between the cam and the reference point of the master drive. Appropriately shift the cam and/or increase the reference point offset (P0162) at the master drive. If the zero pulse is not found, the reference point offset (P0162) must also be increased at the master drive.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP IV

176 Absolute encoder must be adjusted

Cause
Passive referencing with absolute encoders (e.g. EnDat encoders) is only possible after the encoder has been adjusted.

Remedy
Adjust the drive by setting the absolute value.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP IV

177 Start-up passive referencing P179 not possible

Cause	The start-up help for passive referencing determines the reference point offset in P0162 in the slave drive. The following prerequisites must be available: – (permanent) position coupling exists to the master drive – Master drive must be precisely at its reference point – Slave drive has passed the zero mark.
Remedy	– Establish a coupling at the slave drive: PosStw.4 or input terminal function 72 – Reference the master drive: STW1.11 or input terminal function 65 at the master drive – ”Wiring” check: The requirement for passive referencing must be transferred from the master to the slave drive: – Master drive: Output via ZSW1.15, QZSW.1 or output terminal function 69 – Slave drive: Reading-in via STW1.15, QSTW.1 or input terminal function 69
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

180 Teach-in without reference point

Cause	Teach-in only possible for a referenced axis.
Remedy	Request reference axis and teach in
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

181 Teach-in block invalid

Cause	The specified teach-in block is invalid.
Remedy	Specify the valid and existing traversing block.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

182 Teach-in standard block invalid

Cause	The specified teach-in standard block is invalid.
Remedy	Specify the valid and existing traversing block.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

183 Teach-in block not found

Cause	The specified teach-in block is not found.
Remedy	Select the valid and existing traversing block. Activate ”Automatically search for block numer” function.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

184 Teach-in standard block not found

Cause	The specified teach-in standard block is not found.
Remedy	Generate the required standard block for the specified block number Enter the correct block number.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

185 Positioning mode invalid

Cause	For the ”Spindle positioning” function, the positioning mode (P0087) is not valid.
Remedy	Program traversing block positioning as absolute, absolute positive or absolute negative.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

186 Spindle cannot be referenced, supplementary info \%d

Cause	For the ”Spindle positioning” function, an error has occurred while positioning. Suppl. info Significance 0 The distance between the last two zero marks was not correct. 1 For two revolutions a zero mark was no longer detected, which was in a tolerance bandwidth of P0126.
Remedy	Check cable and connections.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

187 Conversion factor spindle pos. cannot be represented, supplementary info \%d

Cause	Conversion factors for spindle positioning was not able to be intialized Supplementary info, ones and tens position: 00: Conversion factor, velocity to speed too small 01: Conversion factor, velocity to speed too high 02: Conversion factor, adaptation filter too low (–> increase P0210) 03: Conversion factor, adaptation filter too high (–> reduce P0210) 04: Conversion factor, pre-bontrol balancing filter too low (–> increase P0206) 05: Conversion factor, pre-bontrol balancing filter too high (–> reduce P0206) 06: Conversion factor, sum delay too small 07: Conversion factor, sum delay too large 08: Conversion factor, following error model too small 09: Conversion factor, following error model too large The hundreds position of the supplementary info contains the parmeter set involved.
Remedy	Check and correct specified parameters.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

188 Spindle positioning: P\%d illegal

Cause	Spindle positioning requires the following parameteriation: P0241 = 1 P0100 = 3
Remedy	Correct the specified parameter or cancel spindle positioning by setting P0125 to 0.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

189 Jogging, incremental invalid

Cause	1. Jogging incremental is not valid in this mode. 2. An attempt was made to move an axis away from a software limit switch using incremental jogging – however the axis is not at the software limit switch, but behind it. 3. An attempt was made while executing one or several traversing blocks (also via an axis coupling) to activate incremental jogging.
Remedy	1. Commission the drive in the positioning mode. 2. Move back with jog key 1 or 2 with velocity. 3. Interrupt traversing blocks with the operating condition, reject traversing task.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

190 Actual firmware does not support spindle positioning

Cause	This firmware does not support the spindle positioning function.
Remedy	Set parameter P0125 to 0
Acknowledgement	POWER ON
Stop response	STOP II

191 Zero mark setting unsuccessful

Cause	It is not possible to set the internal zero mark, if 1. Input signal ”Spindle positioning on” is set, or 2. Still no zero mark found.
Remedy	Maintain the following sequence: 1. Execute spindle positioning —> zero mark found 2. Withdraw input signal ”spindle positioning on” 3. Set the internal zero mark (P0127=1).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

192 Max. search velocity too high

Cause	The maximum search velocity for spindle positioning is greater than the maximum motor speed.
Remedy	Reduce parameter P0133 or reduce the velocity in the traversing block.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

193 Zero mark not found

Cause	The zero mark (encoder or equivalent zero mark, e.g. BERO) was not found. Gearbox ratio (mechanical system) was not correctly parameterized using parameter P0237/P0238.
Remedy	– Check the equivalent zero mark (BERO) function, if required, replace the BERO – Readjust the clearance when using BERO – Check the cabling – Correctly parameterize the gearbox ratio (mechanical system) using parameter P0237/P0238
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

194 Spindle positioning is only possible with motor 1

Cause	Spindle positioning is only possible with motor 1.
Remedy	Activate motor data set 1 before the spindle positioning command.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

195 Speed pre-bontrol not permissible

Cause	Speed pre-bontrol is not permissible with spindle positioning.
Remedy	Cancel the speed pre-bontrol (P0203)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

196 Illegal combination of input signals (warning \%u)

Cause	An illegal combination of signals is present at the inputs or at the Profibus control words. The detailed cause of the fault can be taken from the help text associated with the warning, which is entered as supplementary information. This fault can be activated or suppressed using Parameter P338. Supplementary information: Warning number
Remedy	Change the input signals or suppress the fault using P338.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

501 Measuring circuit error, absolute current

Cause	1. The smoothed absolute current (P1254, current monitoring time constant) is greater than 120 % of the permissible power section current (P1107). 2. For an active rotor position identification, the permissible current threshold was exceeded. 3. The P gain of the controller (P1120) has been set too high.
Remedy	– Motor/controller data not correct – For active rotor position identification P1019 (current, rotor position identification) check and if required reduce – Reduce the P gain of current controller (P1120), check the current controller adaptation (P1180, P1181, P1182) – Replace drive module
Acknowledgement	POWER ON
Stop response	parameterizable

504 Measuring circuit error, motor measuring system

Cause	The encoder signal level is too low, faulted (incorrect shielding), or the cable breakage monitoring function has responded.
Remedy	– Use the original Siemens pre-assembled encoder cables (better screening) – Check for sporadic interruptions (loose contact, e.g. when the drag cable is being moved) – For toothed-wheel encoders, check the clearance between the too thed wheel and sensor – Check the encoder, encoder cables and connector between the motor and drive module – Replace the encoder cables and the drive modules – Exchange the encoder or motor For synchronous motors: Replace the complete motor (including the motor measuring system, as the encoder can only be adjusted in the factory) For induction motors: Only one encoder has to be replaced For linear motors: – Check the signal level. The measuring tape may be dirty if the measuring system is open. – Check the scanning head adjustment. – Check the screen connection of the motor temperature cable.
Acknowledgement	POWER ON
Stop response	parameterizable

505 Meas.circ.error motor meas.syst.abs.track

Cause
1. The motor absolute track (CD track) is monitored for an interrupted conductor. For optical encoders, the absolute track supports the evaluation of the mechanical position within one motor revolution.
2. For absolute encoders with EnDat interface, this fault displays an initialization error.

Note:
Additional information on the reason for the fault is included in P1023 (IM diagnostics).

Remedy
– Incorrect encoder cable type
– Check for sporadic interruptions (loose contact, e.g. when the drag cable is being moved)
– Remove noise which is coupled in due to inadequate screening of the cable by replacing the encoder cable
– Incorrect encoder type configured (e.g. ERN instead of EQN)
– Check the encoder, encoder cables and connector between the motor and drive module
– Replace drive module
– Replace encoder

For synchronous motors:
Replace the complete motor (including the motor measuring system, as the encoder can only be adjusted in the factory)
For induction motors:
Only one encoder has to be replaced

Acknowledgement POWER ON

Stop response parameterizable

507 Synchronization error rotor position

Cause
The difference between the actual rotor position and the new rotor position, which was determined by fine synchronization is greater than 45 degrees electrical.
When commissioning a linear motor with rotor position identification (e.g. linear motor, 1FE1 motor), the fine synchronization was not adjusted.

Remedy
– Adjust the fine synchronization using P1017 (commissioning help function)
– Check encoder cable, encoder cable connection and grounding (possibly EMC problems)
– Replace drive module
– Exchange the encoder or motor

For linear motors:
– Check the adjustment of the angular commutation offset
– Check the screen connection of the motor temperature cable
– For distance-boded reference marks in the dialog box ”Measuring system/encoder”, was the ”Incremental – several zero marks” point selected?

Acknowledgement POWER ON

Stop response parameterizable

508 Zero mark monitoring, motor measuring system

Cause: The measured rotor position fluctuates between 2 encoder zero marks (encoder lines may have been lost).
Note:
The encoder monitoring function can be disabled using P1600.8.

Remedy:
– Use the original Siemens pre-assembled encoder cables (better screening)
– Check for sporadic interruptions (loose contact, e.g. due to cable drag movements)
– For toothed-wheel encoders, check the clearance between the toothed wheel and sensor
– Check the encoder, encoder cables and connector between the motor and drive module
– Replace the encoder cables and the drive modules
– Replace drive module
– Exchange the encoder or motor

For synchronous motors:
Replace the complete motor (including the motor measuring system, as the encoder can only be adjusted in the factory)
For induction motors:
Only one encoder has to be replaced
For linear motors:
– For the RGH22B measuring system from Renishaw, the ”BID” signal must be connected with 0 V (reference mark in one direction).
– Check the screen connection of the motor temperature cable.
– For distance-boded reference marks in the dialog box ”Measuring system/encoder”, was the ”Incremental – several zero marks” point selected?

Acknowledgement: POWER ON

Stop response: parameterizable

509 Drive converter limiting frequency exceeded

Cause: The speed actual value has exceeded the maximum permissible value.

Remedy:
– Encoder pulse number is too low, enter the actual encoder pulse number in P1005
– Stop the belt slipping in open-loop torque controlled mode (the belt slips)
– Check P1400 (rated motor speed)
– Check P1146 (maximum motor speed)
– Check P1147 (speed limiting)
– Check P1112 (motor pole pair number)
– Check P1134 (rated motor frequency)

Acknowledgement: RESET FAULT MEMORY

Stop response: parameterizable

512 Measuring circuit error, direct measuring system

Cause	The encoder signal level is too low, faulted (incorrect shielding), or the cable breakage monitoring function has responded.
Remedy	– Use the original Siemens pre-assembled encoder cables (better screening) – Check for sporadic interruptions (loose contact, e.g. due to cable drag movements) – For toothed-wheel encoders, check the clearance between the toothed wheel and sensor – Check the encoder, encoder cables and connector between the encoder and drive module – Replace the encoder cables and the drive modules – Replace encoder for linear encoders: – Check the signal level. The measuring tape may be dirty if the measuring system is open. – Check the scanning head adjustment.
Acknowledgement	POWER ON
Stop response	parameterizable

513 Measuring circuit error, direct measuring system absolute track

Cause	For absolute encoders with EnDat interface, this fault indicates an initialization error. Note: Additional information on the reason for the fault is included in P1033 (DM diagnostics).
Remedy	– Incorrect encoder cable type – Check for sporadic interruptions (loose contact, e.g. when the drag cable is being moved) – Remove noise which is coupled in due to inadequate screening of the cable by replacing the encoder cable – Incorrect encoder type configured (e.g. ERN instead of EQN) – Check the encoder, encoder cables and connector between the encoder and drive module – Replace drive module – Replace encoder
Acknowledgement	POWER ON
Stop response	parameterizable

514 Zero mark monitoring, direct measuring system

Cause	A fluctuation in the measured values has occurred between 2 encoder zero marks (encoder pulses may have been lost). Note: The encoder monitoring can be disabled using P1600.14.
Remedy	– Use the original Siemens pre-assembled encoder cables (better screening) – Check for sporadic interruptions (loose contact, e.g. due to cable drag movements) – For toothed-wheel encoders, check the clearance between the toothed wheel and sensor – Check the encoder, encoder cables and connector between the motor and drive module – Replace the encoder cables and the drive modules – Replace encoder for linear encoders: – For the RGH22B measuring system from Renishaw, the ”BID” signal must be connected with 0 V (reference mark in one direction). – For distance-boded reference marks in the dialog box ”Measuring system/encoder”, was the ”Incremental – several zero marks” point selected?
Acknowledgement	POWER ON
Stop response	parameterizable

515 Power module temperature, exceeded

Cause	The power section temperature is sensed using a temperature sensor on the heatsink. The drive is immediately shut down 20 seconds after the heatsink temperature alarm in order to prevent the power section being thermally destroyed (regenerative stop).
Remedy	Improve the drive module cooling, e.g. using: – Higher airflow in the switching cabinet, possibly cool the ambient air of the drive modules – Avoid many acceleration and braking operations which follow quickly one after the other – Check that the power section for the axis/spindle is adequate, otherwise use a higher-rating module – Ambient temperature too high (refer to the Configuration Manual) – Permissible installation altitude exceeded (refer to the Configuration Manual) – Pulse frequency too high (refer to the Configuration Manual) – Check fan, if required, replace – Maintain the minimum clearance above and below the power section (refer to the Configuration Manual)
Acknowledgement	POWER ON
Stop response	parameterizable

516 Electronics temperature exceeded

Cause	The pre-alarm for the control electronics overtemperature has already been present for too long.
Remedy	Ensure improved ventilation or replace POSMO
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

517 Hardware defect, terminal pulse enable

Cause	When canceling the pulses, it was recognized that POSMO has a hardware defect.
Remedy	Replace POSMO
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

592 Spindle positioning: Pos. contr. not equal to master application clock cycle

Cause	The ”spindle positioning” function requires, for the clock-bycle synchronous PROFIBUS, that the position controller clock cycle of the master coincides with parameterized position controller clock cycle (P1009). The position controller clock cycle of the master is obtained from the DP clock cycle (Tdp) multiplied by the time grid Tmapc.
Remedy	For the clock-bycle synchronous PROFIBUS, the clock cycles from the bus configuring (parameterization) are aligned with the position controller clock cycle P1009.
Acknowledgement	POWER ON
Stop response	STOP II

596 PROFIBUS: Connection to the publisher \%u interrupted

Cause	Cyclic data transfer between this slave and a slave-to-slave communications publisher was interrupted as cyclic telegrams were missing. Examples: – Bus connection interrupted – Publisher failure – Master runs up again – The response monitoring (Watchdog) for this slave was de-activated via the parameterizing telegram (SetPrm) (Diagnostics: P1783:1 bit 3 = 0). Supplementary info: PROFIBUS address of the publisher
Remedy	Check the publisher and bus connections to the publisher, to the master and between the master and publisher. If the watchdog is de-activated, activate the response monitoring for this slave via Drive ES. As soon as cyclic data transfer runs again, the fault can be acknowledged.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

597 PROFIBUS: Drive not in synchronism. Supplementary information: \%X

Cause	Supplementary information 0x01: The master sign-of-life (STW2, bits 12–15) has more consecutive failures than permitted. The permissible sign-of-life error is specified using P0879 bit 2–0 (PROFIBUS configuration). 0x02: The Global Control Telegram to synchronize the clock cycles in operation has consecutively failed over several consecutive DP clock cycles, or has violated the time grid, specified by the parameterizing telegram (refer to times Tdp and Tpllw) over several consecutive DP clock cycles. If the complete DP communications continuously fails, in addition, fault 599 is output, at the latest after the watchdog monitoring time specified when the bus was configured.
Remedy	– Check whether communications is briefly or continuously interrupted. – Check whether the PROFIBUS master can operate in clock cycle synchronism and the Global Control Telegrams, required for clock cycle synchronous operation, are output in the equidistant DP clock cycle. – Check whether clock synchronism has been activated in the bus configuration, although it is not controlled by the master used. – Check whether the master sign-of-life (STW2, bits 12–15) is received and is incremented in the parameterized clock cycle.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

598 **PROFIBUS: Synchronization error. Supplementary info: \%X**

Cause
Supplementary information
0x01:
The expected 1st global control clock cycle display did not occur within the waiting time.
0x02:
PLL synchronization unsuccessful
0x03:
When synchronizing to the clock cycle, the global control clock cycle had more consecutive failures than are permitted.
0x06:
The data frames w. the process data (setpoint direction) were only received after the time (To–125 µs) in the slave has expired.

Remedy
– Check whether the PROFIBUS master can operate in synchronism with the clock cycle, and that the necessary global-bontrol frames are output for operation in synchronism with the clock cycle.
– Check whether clock synchronism has been activated in the bus configuration, although it is not controlled by the master used.
– Check whether the equidistant DP clock cycle, transferred with the parameterizing telegram, was actually set and activated at the master.
– Check whether the time Tdx, defined in the master software, corresponds to the actual data transfer time to all of the slaves and is less than the configured time (To–125 µs).

Acknowledgement RESET FAULT MEMORY

Stop response STOP II

599 **PROFIBUS: Cyclic data transfer was interrupted**

Cause
The cyclic data transfer between the master and slave was interrupted due to the fact that cyclic frames were missing, or due to the reception of a parameterizing or configuring frame.
Examples:
– Bus connection interrupted
– Master runs up again
– Master has changed into the ’Clear’ state
For a passive axis, fault cannot be acknowledged using ”RESET FAULT MEMORY”.

Remedy
Check the master and bus connection to the master. As soon as cyclic data transfer runs again, the fault can be acknowledged.
Set P0875 to 0 in the passive axis.

Acknowledgement RESET FAULT MEMORY

Stop response STOP II

602 Open-loop torque controlled oper. w/o encoder is not perm.

Cause	In the IM mode, open-loop torque-bontrolled operation was selected via the input terminal or via PROFIBUS-DP.
Remedy	Deselect the torque-bontrolled operation or leave the IM mode (changeover speed P1465).
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

603 Changeover to non-parameterized motor data set

Cause	An attempt was made to change over to a motor data set which was not parameterized.
Remedy	Parameterizing motor data set
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

604 Motor encoder is not adjusted

Cause	For an EnDat motor measuring system, it was identified that the serial number does not match that saved, i.e. the encoder has still not run with this drive.
Remedy	1FN3 linear motors (if P1075=1): Measure the rotor position offset to the EMF of the U_R phase and add to P1016 as the commutation angle offset. Then set P1017 to –1 in order to save the serial number of the EnDat encoder. otherwise: To determine commutation angle offset in P1016, initiate the rotor position identification routine via P1017=1. The rotor position identification routine is executed by acknowledging the fault and setting the enable signals. Note: also refer to description of P1017
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

605 Position controller output limited

Cause	The speed setpoint requested from the position controller lies above the max. motor speed. Possible causes: – Programmed velocity (P0082:64) too high – Max. acceleration (P0103) or deceleration (P0104) too high – Axis is overloaded or blocked
Remedy	– Check and correct the above parameter
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

606 Flux controller output limited

Cause
The specified flux setpoint cannot be realized, although maximum current is input.
– Motor data are incorrect
– Motor data and motor connection type (star/delta) do not match
– Motor has stalled because motor data are extremely inaccurate
– Current limit is too low for the motor (0.9 * P1238 * P1103 < P1136)
– Power section is too small

Remedy
– Correct the motor data
– If required use a larger power section

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

607 Current controller output limited

Cause
The entered setpoint cannot be impressed in the motor, although the maximum voltage has been entered. The cause could be that the motor is not connected, or a phase is missing.

Remedy
– Check the connecting cable, motor/drive converter (phase missing)
– Check the motor contactor
– DC link voltage present?
– Replace drive module

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

7

608 Speed controller output limited

Cause
The speed controller is at its limit for an inadmissibly long time (torque or current limit). The permissible time is defined in P1605, the upper speed limit when the monitoring responds, in P1606.
Synchronous motor:
In correct operation, the correctly optimized axis drive should never reach its current limit, not even with large speed changes (changing from rapid traverse in the positive direction to rapid traverse in the negative direction).
P1605 = 200 ms
P1606 = 8000 rev/min
Induction motor:
Acceleration and braking with the maximum torque/current are usual in operation, only a stalled drive (0 speed) is monitored.
P1605 = 200 ms
P1606 = 30 rev/min
1. At the first commissioning, after the software has been replaced or the software has been upgraded, after the parameters have been entered the ”calculate motor data” or ”calculate controller data” function was not executed. The drive then keeps the default values (for the values to be calculated this is zero) which can, under certain circumstances, result in this fault (P1605 and P1606 should be adapted to the mechanical and dynamic capabilities of the axis).
2. A high torque reduction was unintentionally entered via the analog inputs or via PROFIBUS. For PROFIBUS, this effect especially occurs when changing from the positioning mode to operation with speed set-

point input (check whether a torque reduction was entered. Diagnostics via P1717, 0%: No torque, 100%: Full torque).

Remedy

– Check connecting cable motor/converter (phase missing, exchanged)
– Check the motor contactor
– Check the torque reduction (P1717)
– DC link voltage present?
– Check the DC link voltage (check that the screws are tight)
– Unblock the motor
– Is the motor encoder connected?
– Check the motor encoder cable screen
– Is the motor grounded (PE connection)?
– Check the encoder pulse number (P1005)
– Does the encoder cable fit to the encoder type?
– Check the direction of rotation of the encoder tracks (e.g. toothed-wheel encoder, P1011)

Adapt parameters P1605 and P1606 to the mechanical and dynamic capabilities of the axis. Check whether a torque reduction has been entered (diagnostics via P1717, 0%: no torque, 100%: full torque).
For linear motors:
– Check actual value inversion
– Check the reduction in the maximum motor current (P1105) and if required increase the value
– Check the power cable connection
– For the parallel circuit configuration, are the motors correctly assigned and electrically connected?
– Replace drive module

Acknowledgement RESET FAULT MEMORY

Stop response parameterizable

609 Encoder limit frequency exceeded

Cause

The speed actual value exceeds the encoder frequency.
– Incorrect encoder
– P1005 does not correspond to the no. of encoder pulses
– Encoder defective
– Motor cable defective or not properly attached
– Shield on motor encoder cable is not connected
– Drive module defective

Remedy

– Enter correct encoder data/replace encoder
– Check the encoder pulse number (P1005)
– Attach motor cable correctly or replace
– Connect the motor encoder cable screen
– Reduce the speed setpoint input (P1401)
– Replace drive module

Acknowledgement RESET FAULT MEMORY

Stop response parameterizable

610 Rotor position identification has failed

Cause	if P1075=1 (technique based on saturation) A rotor position could not be determined from the measurement signals (motor current), as no significant saturation effects occurred. Also refer to parameter P1734 for detailed diagnostics. if P1075=3 (motion-based technique) 1. Current increase too low. 2. Maximum permissible duration exceeded. 3. No clear rotor position found.
Remedy	if P1075=1 – Increase current via P1019 – Check armature inductance (P1116) and if required, increase – Check the connecting cable, motor/drive converter (phase missing) – Check the motor contactor – DC link voltage present? – Replace drive module if P1075=3 To 1. – The motor is not correctly connected – The motor power connection must be checked To 2. – Remove disturbing external forces (e.g. axis couplings which are not released) – Identification technique must remain stable (P1076 must be reduced) – Use an encoder with higher resolution – Improve the encoder mounting (it is not stiff enough) To 3. – Remove disturbing external forces (e.g. axis couplings which are not released) – The axis must be able to freely move (e.g. the motor rotor may not be locked) – Reduce the high axis friction (increase P1019)
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

611	**Illegal motion during rotor position identification**
Cause	During the rotor position identification (motor current measurement), the motor rotated more than the value entered in P1020. The rotation could be caused by having powered on with the motor already rotating, or caused by the identification routine itself.
Remedy	if P1075=1 – If the interchange was caused by the identification itself and if the error occurs again, then reduce P1019 or increase P1020. – Lock the motor rotor during the identification routine. if P1075=3 – Increase the parameterized load mass (P1076) – Check the maximum permissible motion (P1020) and if required, increase – Reduce the current, rotor position identification (P1019) If the current and speed controller clock cycle have low values (62.5 microseconds), then it maybe necessary to increase P1019.
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable
612	**Illegal current during rotor position identification**
Cause	1. Current was >= 1.2 * 1.05 * P1107 while rotor position identification was active 2. Current was >= P1104 while rotor position identification was active
Remedy	With the rotor position identification (P1011.12 and P1011.13) activated, if required, check and reduce P1019 (current, rotor position identification)
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

613 Shutdown limit, motor overtemperature (P1607) exceeded

Cause
The motor temperature (sensed via the temperature sensor KTY 84 and fed to the module via the motor encoder cable) has exceeded the temperature limit in P1607.

Remedy
– Avoid many acceleration and braking operations which follow one another quickly.
– Motor overload?
– Check whether the motor output is sufficient for the drive, otherwise use a more powerful motor, possibly together with a higher-rating power section.
– Check the motor data. The current could be too high due to incorrect motor data.
– Check the temperature sensor.
– Check the motor fan.
– Check the motor encoder cable.
– Motor encoder defective?
– Check and possibly reduce P1230 or P1235.
The motor temperature monitoring can be disabled with P1601 bit 13 = 1.
For linear motors:
– Check the parameters for the motor temperature monitoring
P1602 (alarm threshold, motor overtemperature) = 120 degrees C
P1603 (timer, motor temperature alarm) = 240 s
P1607 (shutdown limit, motor temperature) = 155 degrees C
P1608 (fixed temperature) = 0 degrees C
P1608 = 0 —> Temperature sensing active
P1608 > 0 —> Fixed temperature active
– If the temperature monitoring is exclusively realized using an external PLC, a fixed temperature must be entered into P1608 (e. g. 80 degrees C). This disables the drive temperature monitoring.
– Check the power connector at the motor
– Check the connection of the temperature sensor coupling cable at the end of the power cable; approximately 580 ohm must be measured at 20 degrees C
– With the measuring system connector withdrawn (X411 for 611U or MOT ENCODR for POSMO), is approx. 580 Ohm at 20 Degrees C measured between PIN 13 (611U) or 20 (POSMO) and PIN 25 (611U) or 21 (POSMO) of the encoder cable?
– Check the measuring system connector at the drive (X411 or MOT ENCODR) to ensure that it is correctly inserted
– Only KTY may be connected for drives connected in parallel
– If the temperature switch and temperature sensor are connected in series, the temperature sensor (NC contact) may have responded, or the temperature switch is defective

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

614 Delayed shutdown for motor overtemperature (P1602/P1603)

Cause

The motor temperature (sensed via the temperature sensor KTY 84 and fed to the module via the motor encoder cable) has exceeded the temperature in P1602 for a time longer than in P1603.

Remedy

– Avoid many acceleration and braking operations which follow one another quickly.
– Motor overload?
– Check whether the motor output is sufficient for the drive, otherwise use a more powerful motor, possibly together with a higher-rating power section.
– Check the motor data. The current could be too high due to incorrect motor data.
– Check the temperature sensor.
– Check the motor fan.
– Check the motor encoder cable.
– Motor encoder defective?
– Check and possibly reduce P1230 or P1235.

The motor temperature monitoring can be disabled with P1601 bit 14 = 1.

For linear motors:

– Check the parameters for the motor temperature monitoring
P1602 (alarm threshold, motor overtemperature) = 120 degrees C
P1603 (timer, motor temperature alarm) = 240 s
P1607 (shutdown limit, motor temperature) = 155 degrees C
P1608 (fixed temperature) = 0 degrees C
P1608 = 0 temperature sensing active
P1608 > 0 fixed temperature active
– If the temperature monitoring is exclusively realized using an external PLC, a fixed temperature must be entered into P1608 (e. g. 80 degrees C). This disables the drive temperature monitoring.
– Check the power connector at the motor
– Check the connection of the temperature sensor coupling cable at the end of the power cable; approximately 580 ohm must be measured at 20 degrees C
– With the measuring system connector withdrawn (X411 for 611U or MOT ENCODR for POSMO), is approx. 580 Ohm at 20 Degrees C measured between PIN 13 (611U) or 20 (POSMO) and PIN 25 (611U) or 21 (POSMO) of the encoder cable?
– Check the measuring system connector at the drive (X411 or MOT ENCODR) to ensure that it is correctly inserted
– Only KTY may be connected for drives connected in parallel
– If the temperature switch and temperature sensor are connected in series, the temperature sensor (NC contact) may have responded, or the temperature switch is defective

Acknowledgement RESET FAULT MEMORY

Stop response parameterizable

615 DM encoder limiting frequency exceeded

Cause
The speed actual value of the direct measuring system exceeds the permissible encoder limiting frequency.
– Incorrect encoder
– P1007 does not coincide with the encoder pulse number
– Encoder defective
– Defective encoder cable or not correctly retained
– Encoder cable shield is not connected
– Drive module defective

Remedy
– Enter correct encoder data/replace encoder
– Check encoder pulse number (P1007)
– Correctly retain encoder cable/replace
– Connect encoder cable shield
– Reduce speed setpoint input
– Replace drive module

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

616 DC link undervoltage

Cause
The DC link voltage has exceeded the permissible lower limit P1162.

Remedy
– Check whether the line supply voltage is available
– Check whether the pulsed resistor is overloaded

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

617 DC link overvoltage

Cause
The DC link voltage has exceeded the permissible upper limit P1163. The upper limit is internally limited to 800V (P1171 = 1) or 710V (P1171 = 0)
The fault can also occur for SIMODRIVE POSMO CA if the pulsed resistor is in i2t limiting (warning 821).

Remedy
– Check whether the line supply voltage is available
– Reduce load duty cycle
– Check P1163
– Check P1171

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

618 Sum of the phase currents not equal to zero

Cause
The sum of the phase currents $|i_r + i_s + i_t|$ was greater than 10 percent of the power module rated transistor current P1107.

Remedy
– Check for ground fault

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

619	**Measuring circuit error absolute current (hardware)**
Cause	A phase current has exceeded 1.5 x of P1107, transistor limit current.
Remedy	– Check for ground fault – Check for motor short-bircuit
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable
620	**24V electronics power supply too low**
Cause	The 24V electronics power supply has fallen below the lower limit of 22V.
Remedy	– Replace drive module
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable
621	**24V electronics power supply too high**
Cause	The 24V electronics power supply has exceeded the upper limit of 26V.
Remedy	– Replace drive module
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable
622	**Motor holding brake defective**
Cause	P0850 is used to parameterize whether the motor holding brake is either controlled by the brake sequence control (P0850 = 1) or is continuously open (P0850 = 2). A defect was recognized, which could have the following causes: – Wire breakage – Overload – Short-bircuit – Control switch short-bircuited – Brake defective – no brake connected Note: If the brake sequence control is to be used for an external brake, then this fault can be suppressed using P1601 bit 22 = 1.
Remedy	– Test motor holding brake via digital input X25 signal BRP/BRM – Check motor cable and if required, replace – Replace motor – Replace drive module
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

623 Brake sequence control inactive

Cause
With the motor being used, the brake sequence control is de-activated via P0850 = 0, although there is a motor holding brake. There is a danger that the motor will try to run with the brake closed.

Remedy
– Set P0850 to 1 (activate brake sequence control) or 2 (brake continuously open)

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

680 Illegal motor code number

Cause
A motor code was entered in P1102 for which no data is available.

Remedy
– Commission the system again and enter the correct motor code number (P1102).
– The ”SimoCom U” parameterizing and start-up tool includes motors that are still not known in this particular drive version. Either upgrade the drive version or enter the motor as non-listed motor.

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

681 Illegal power section code number

Cause
The firmware does not support the power module.

Remedy
– Upgrade firmware

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

682 Illegal encoder code number in P\%u

Cause
An encoder code was entered in P1006 or P1036, for which there is no data.
The direct measuring system (P0250/P0879.12) is activated, although an encoder was not specified in P1036.

Remedy
Enter the correct encoder code or the code for third-party encoders (99) in P1006 or P1036.
De-activate direct measuring system (P0250/P0879.12).

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

683 Calculate controller data was unsuccessful at first start-up (\%d)

Cause
An error occurred at the first start-up with ”calculate controller data”. Under fault conditions, the parameters for the current controller, flux controller and speed controller could not be optimally assigned.

Remedy
Read out the detailed error cause from P1080 and remove the cause. Then initiate ”calculate controller data” again with P1080 = 1. Repeat this operation, until no error is displayed in P1080. Then save in the FEPROM and execute a POWER ON-RESET.
Error coding in the supplementary info and P1080:
–15 Magnetizing reactance (P1141) = 0
–16 Leakage reactance (P1139/P1140) = 0
–17 Rated motor frequency (P1134) = 0
–18 Rotor resistance (P1138) = 0
–19 Motor moment of inertia (P1117) = 0
–21 Threshold speed for field weakening (P1142) = 0
–22 Motor standstill current (P1118) = 0
–23 The ratio between the maximum motor current (P1104) and the motor stall current (P1118) is greater than the maximum value for the torque limit (P1230) and the power limit (P1235).
–24 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is inadmissible (pole pair number).

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

703 Invalid current controller cycle

Cause
An illegal value was entered in P1000.

Remedy
Only the setting P1000 = 2 is permissible

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

704 Invalid speed controller cycle

Cause
An illegal value was entered in P1001.

Remedy
Enter a valid value in P1001.
Permissible values for P1001 are 2 (62.5 µs), 4 (125 µs), 8 (250 µs), 16 (500 µs).

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

705 Invalid position controller cycle

Cause	The monitoring function identified a position controller cycle (P1009) outside the permissible limits.
Remedy	Enter a valid value in P1009. Permissible values for P1009 lie between 32 (1 ms) and 128 (4ms). Further, the position control cycle must be a integral multiple of the speed control cycle.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

706 Invalid interpolation cycle

Cause	The monitoring has identified an interpolation cycle (P1010) outside the permissible limits, or an illegal ratio between the interpolation cycle and the position controller cycle (P1009).
Remedy	Enter a valid value in P1010 or correct P1009. Permissible values for P1010 lie between 128 (4ms) and 640 (20ms) or, only for the 1-axis version, also 64 (2ms) if P1009 is also 64 (2ms). Further, the interpolation cycle must be an integral multiple of the position controller cycle.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

7

716 Invalid torque constant

Cause	The ratio between the rated torque and rated current (torque constant [Nm/A]) in P1113 is incorrect (less than/equal to zero) or the ratio P1113/P1112 is greater than 70.
Remedy	Enter the valid torque/current ratio for the motor used in P1113 or enter a permissible ratio of P1113/P1112. Third-party motor: The torque constant should be determined from the motor data sheet. Siemens motor: The torque constant is defined by the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

719 Motor not parameterized for delta operation

Cause	When the star-delta changeover is activated using P1013, the motor is not parameterized for delta operation (motor 2).
Remedy	Check and enter the parameters for delta operation (motor 2).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

720	**Invalid maximum motor speed**
Cause	Due to the high maximum motor speed in P1401 and the speed controller cycle in P1001, high partial speeds can occur which can result in a format overflow.
Remedy	Check and correct P1401 and P1001. The drive software is designed for large reserve margins, so that the displayed alarm can only occur as a result of a parameterizing error. Example: For a speed controller cycle time of 125 microseconds, a motor speed of 480 000 RPM can still be processed correctly!
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)
721	**Spindle speed too high**
Cause	As a result of the high spindle speed and the interpolation clock cycle (P1010), the modulo value can no longer be correctly taken into account. The alarm is initiated, if jerky equalization motion occurs – e.g. due to incorrect parameter values.
Remedy	Shorten the interpolation clock cycle. If possible, increase the modulo range of the rotary axis (P0242). Calculating the spindle speed limit [RPM] = 7 / IPO clock cycle[ms] x 60 x 1000 (for the modulo range, 360 degrees = 1 spindle revolution) Example: IPO clock cycle = 4 ms, for max. 7 revolutions (up to 7 x modulo range) – a maximum spindle speed of 105000 RPM is obtained per IPO clock cycle.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)
722	**Changeover speed/velocity too low**
Cause	For the selected setting of P1466, the induced voltage is too low in the lower speed range in order to be able to reliably guarantee sensorless operation. The induced voltage must be at least 40 Volt (phase-to-phase, RMS) at the particular speed.
Remedy	The following should be ensured: Induction motor : P1466 >= 150 U/min Rotary synchronous motor: P1466 > 40000 / P1114 Linear motor: P1466 > 1386 / P1114
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

724 Invalid motor pole pair number

Cause

Synchronous motors:
– The pole pair number in P1112 is zero or negative.
– Encoder with CD track (P1027.6 = 0): The pole pair number in P1112 is greater than 6.
– Encoder without CD track or with Hall sensors (P1027.6 = 1): The motor pole pair number is dependent on the encoder pulse number (max. 4096 for P1005 >= 32768).
Induction motors:
– An invalid pole pair number was determined from P1134 and P1400.
Motor with resolver:
– The maximum motor pole pair number for the modules 6SN1118–*NK01–0AA0 or 6SN1118–*NJ01–0AA0 is 64, otherwise 4 or 6.

Remedy

Synchronous motors:
– Check P1112, P1027 and P1014.
Induction motors:
– Determine and correctly enter rated speed and/or rated frequency.

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

725 Invalid encoder pulse number

Cause

The encoder pulse number of the motor measuring system (P1005) is set to zero.

Remedy

Harmonize the encoder pulse number of the motor measuring system in P1005 to the encoder used. The indirect motor measuring system must always be configured for synchronous and induction motors (exception: Induction motor operation).
Standard setting: 2 048 increments/revolution

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

726 Invalid voltage constant

Cause

The voltage constant of the motor in P1114 is set to zero.

Remedy

Determine the voltage constant of the motor used, and enter in P1114. The voltage constant is measured as induced voltage (EMF) under no-load conditions at n = 1 000 RPM as RMS valued at the motor terminals (phase to phase).
Third-party motor:
The voltage constant should be determined from a motor data sheet.
Siemens motor:
The voltage constant is determined from the motor code (P1102).

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

727 Invalid combination of power section and synchronous motor

Cause	The drive module has not been released for synchronous motors.
Remedy	– Use a valid drive module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

728 Torque/current adaptation factor too high

Cause	The adaptation factor between the setpoint torque and the torque generating current (Iq) in the speed controller is too high.
Remedy	Check P1103, P1107 and P1113 and if required, enter correct values. Third-party motor: The values should be determined from a motor data sheet. Siemens motor: The values are determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

729 Invalid motor stall current

Cause	The motor stall current (P1118) is less than or equal to zero.
Remedy	Determine the stall current of the motor used and enter in P1118. Third-party motor: The stall current should be determined from a motor data sheet. Siemens motor: The stall current is determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

731 Invalid rated output

Cause	The rated motor output (P1130) of the motor is less than or equal to zero.
Remedy	Determine the rated motor output of the motor used and enter in P1130. Third-party motor: The rated motor output should be determined from a motor data sheet. Siemens motor: The rated motor output is determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

732 Invalid rated speed

Cause	The rated motor speed (P1400) of the motor is less than or equal to zero.
Remedy	Determine the rated motor speed of the motor used and enter in P1400. Third-party motor: The rated motor speed should be determined from a motor data sheet. Siemens motor: The rated motor speed is determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

742 V/f operation: Drive frequency, motor \%d not permissible

Cause	In V/f operation, only drive converter frequencies of 4 or 8 kHz are permissible.
Remedy	Change P100 or cancel V/f operation (P1014). When operating with several motors/motor data sets, also set P2100/P3100/P4100 to 4 or 8 kHz.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

743 Function is not possible using this control board

Cause	An attempt was made to parameterize a gearbox ratio not equal to 2^n for a control module with an FEPROM version A or B.
Remedy	– For modulo rotary axes, change the gearbox ratio, or – Use a control module with FEPROM version C or higher.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

744 Motor changeover only permissible for the closed-loop speed controlled mode

Cause	Motor changeover (P1013) may only be activated in the closed-loop speed controlled mode (P0700 = 1).
Remedy	– Inhibit motor changeover (P1013 = 0) – Change over into the closed-loop speed controlled mode (P0700 = 1)
Acknowledgement	POWER ON
Stop response	STOP I

749 Speed measuring range is not sufficient

Cause	– Not relevant
Remedy	– Not relevant
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

751 Speed controller gain too high

Cause	P gain, speed controller for the lower speed range (P1407) and the upper speed range (1408) were selected to be too high.
Remedy	Reduce the P gain of the speed controller. Only optimized with the adaption disabled (P1413 = 0). The P gain (P1407) is then effective over the complete speed range. After the optimum setting has been found, adaption can be re-enabled (P1413 = 1) and the P gain optimized for the upper speed range (P1408).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

753 Current, rotor position identification less than the min. value

Cause	A current was parameterized in P1019 (current, rotor position identification) which is less than the minimum value permissible for the motor.
Remedy	Enter a current in P1019, which is not less than the permissible minimum value for the motor (40% for third-party synchronous linear motor). It may be necessary to use a larger power module. If permissible for the motor used, suppress the fault by setting P1012, bit 5. Caution: For motors with weak saturation effects (e.g. 1FN3 linear motors), as a result of the low identification current, orientation may be erroneous, thus resulting in uncontrolled motion.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

756 Invalid speed hysteresis of the current setpoint smoothing

Cause	The hysteresis of the speed for the current setpoint smoothing (P1246) may not be greater than the threshold speed of the hysteresis (P1245), as otherwise a ”negative” lower speed would be obtained.
Remedy	P1246 (standard value: 50 [RPM]) must be entered lower than the threshold for the speeddependent setpoint smoothing (P1245, standard value: 4 000 [RPM]).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

757 PZD config.: illegal frame no. in P0922

Cause	The frame number set in P0922 is illegal or impermissible for the operating mode currently selected via P0700.
Remedy	Check P0922 and enter valid value.
Acknowledgement	POWER ON
Stop response	STOP II

758 Setpoint source incorrectly parameterized. Supplementary info \%u

Cause	The selected setpoint source in P0891 is invalid. 1 Internal coupling not possible for POSMO or single-axis module 2 Internal coupling not possible for drive A 3 Coupling via PROFIBUS DP selected, but no PB option module inserted
Remedy	Check P891 and enter a valid value.
Acknowledgement	POWER ON
Stop response	STOP II

759 Encoder/motor types do not match

Cause	A linear motor was selected, and no linear scale configured (P1027.4 = 0). A rotating motor was selected and a linear scale configured (P1027.4 = 1).
Remedy	Parameterize the encoder type corresponding to the motor type and the drive module.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

760 Pole pair width/scale graduations cannot be represented internally

Cause
For linear motors, the equivalent (internal) pole pair number and (internal) encoder pulse number are calculated from the pole pair width and grid division. In this case, the encoder pulse number must be an integer multiple of one or x pole pair widths. This error message is output if the pole pair width/grid division * x (up to x=4096) is not an integer multiple or if an internal encoder pulse number which was calculated is too high. A result with a tolerance of +/– 0.001 absolute is interpreted to be an integer.

Remedy
Long travel paths:
A linear measuring system with an encoder mark number that is an integral divisor of x* pole pair widths should be used.
Short travel paths:
For short travel, only a low error can accumulate which has hardly any effect on the maximum achievable force and on the temperature rise, if the encoder pulse number fits with a deviation of more than +/–0.001 in the pole pair width. We then recommend that the pole pair width is slightly changed.

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

766 Blocking frequency > Shannon frequency

Cause
The bandstop frequency of a speed setpoint filter is greater than the Shannon sampling frequency from the sampling theorem.

Remedy
The bandstop frequency for P1514, filter 1 or P1517 for filter 2 must be less than the inverse value of two speed controller clock cycles 1/ (2 * P1001 * 31.23 microseconds).

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

767 Natural frequency > Shannon frequency

Cause
The natural frequency of a speed setpoint filter is greater than the Shannon sampling frequency from the sampling theorem.

Remedy
The natural frequency of a speed setpoint filter must be lower than the reciprocal of two speed controller cycles.
Speed setpoint filter 1:
P1520 * 0.01 * P1514 < 1 / (2 * P1001 * 31.25 microseconds)
Speed setpoint filter 2:
P1521 * 0.01 * P1517 < 1 / (2 * P1001 * 31.25 microseconds)

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

768 Numerator bandwidth > twice the blocking frequency

Cause
The numerator bandwidth of a current or speed setpoint filter is greater than twice the bandstop frequency.
This alarm is only generated for the general bandstop, if the following is valid:
Speed setpoint filter 1: P1516 > 2 * P1514 or P1520 <> 100.0
Speed setpoint filter 2: P1519 > 0.0 or P1521 <> 100.0
Current setpoint filter 1: P1212 > 0.0
Current setpoint filter 2: P1215 > 0.0
Current setpoint filter 3: P1218 > 0.0
Current setpoint filter 4: P1221 > 0.0

Remedy
The numerator bandwidth must be less than twice the bandstop frequency.
Current setpoint filter 1: P1212 <= 2 * P1210
Current setpoint filter 2: P1215 <= 2 * P1213
Current setpoint filter 3: P1218 <= 2 * P1216
Current setpoint filter 4: P1221 <= 2 * P1219
Speed setpoint filter 1: P1516 <= 2 * P1514
Speed setpoint filter 2: P1519 <= 2 * P1517

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

769 Denominator bandwidth > twice the natural frequency

Cause
The denominator bandwidth of a current or speed setpoint filter is greater than twice the natural frequency.
This alarm is only generated for the general bandstop, if the following is valid:
Speed setpoint filter 1: P1516 > 2 * P1514 or P1520 <> 100.0
Speed setpoint filter 2: P1519 > 0.0 or P1521 <> 100.0
Current setpoint filter 1: P1212 > 0.0
Current setpoint filter 2: P1215 > 0.0
Current setpoint filter 3: P1218 > 0.0
Current setpoint filter 4: P1221 > 0.0

Remedy
The denominator bandwidth of a current or speed setpoint filter must be less than twice the natural frequency.
Speed setpoint filter 1: P1515 <= 2 * P1514 * 0.01 * P1520
Speed setpoint filter 2: P1518 <= 2 * P1517 * 0.01 * P1521
Current setpoint filter 1: P1211 <= 2 * P1210
Current setpoint filter 2: P1214 <= 2 * P1213
Current setpoint filter 3: P1217 <= 2 * P1216
Current setpoint filter 4: P1220 <= 2 * P1219

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

770 Format error

Cause
The calculated bandstop filter coefficients cannot be represented in the internal format.

Remedy
Change filter setting.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

771 Induction motor oper.: drive converter frequency motor \%d not permissible

Cause
In induction motor operation (selected by P1465 < P1146), drive converter frequencies of 4 or 8 kHz are permissible.

Remedy
– Change P1100
– Cancel induction motor operation (P1465 > P1146)

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

772 Induction motor oper.: speed controller gain, motor \%d too high

Cause
The P gain of the speed controller (P1451) is too high.

Remedy
For the speed controller, enter a lower value for the P gain (P1451).

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

774 Induction motor oper.: changeover speed motor \%d not permissible

Cause
For mixed operation (with/without encoder) P1465 > 0, only closed-loop controlled induction motor operation is permissible (P1466 <= P1465).

Remedy
Eliminate error by selecting pure induction motor operation (P1465 = 0) or by canceling induction motor open-loop controlled operation (P1465 > P1466).

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

775 SSI encoder incorrectly parameterized. Supplementary info \%u

Cause
Incorrect parameterization of the SSI absolute value encoder.
Supplementary info = 0x1, 0x11 (indirect, direct measuring system):
—> The single-turn resolution cannot be 0.
Supplementary info = 0x2, 0x12 (indirect, direct measuring system):
—> The number of parameterized bits is greater than the telegram length.
Supplementary info = 0x3, 0x13 (indirect, direct measuring system):
—> For linear encoders, it is not possible to have multi-turn resolution.

Remedy
For supplementary info 1 or 11:
Check P1022 and P1032
For supplementary info 2 or 12:
Check P1021, P1022, P1027.12 and P1027.14 with respect to P1028 and check P1031, P1032, P1037.12 and P1037.14 with respect to P1041
For supplementary info 3 or 13:
Check P1021 and P1031

Acknowledgement
POWER ON

Stop response
STOP I

777	**Current for the rotor position identification too high**
Cause	A current was parameterized in P1019, which is greater than the current which is permissible for the motor and the power section used.
Remedy	Reduce the current via P1019.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
779	**Motor moment of inertia, motor \%d invalid**
Cause	The motor moment of inertia (P1117) is incorrect (less than/equal to zero).
Remedy	Enter the valid motor moment of inertia for the motor used, in P1117. Third-party motor: The motor moment of inertia should be determined from a motor data sheet. Siemens motor: The characteristic motor data should be determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)
780	**No-load current, motor > rated motor current (motor \%d)**
Cause	The motor no-load current (P1136) has been parameterized greater than the rated motor current (P1103).
Remedy	Enter the valid currents for the motor used in P1136 and P1103. Third-party motor: The required currents should be determined using a motor data sheet. Siemens motor: The currents are determined using the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

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781 No-load current, motor \%d > rated power section current

Cause	The motor no-load current (P1136) has been set to higher values than the rated power section current. The following applies: Rated module current = P1111 * P1099
Remedy	– Enter the valid current for the motor used in P1136. Third-party motor: The required currents should be determined using a motor data sheet. Siemens motor: The currents are determined using the motor code (P1102). – Reduce the power section pulse frequency P1100. – Use a larger drive module (re-bommission)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

782 Reactance motor \%d invalid

Cause	The stator leakage reactance (P1139) or the rotor leakage reactance (P1140) or the magnetizing reactance (P1141) of the motor is incorrect (less than/equal to zero).
Remedy	Determine the stator, rotor leakage reactance and magnetizing reactance of the motor used and enter in P1139, P1140 and P1141. Third-party motor: The values should be determined from a motor data sheet. Siemens motor: The values are determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

783 Rotor resistance, motor \%d invalid

Cause	The rotor resistance (P1138, cold) of the motor is zero or there was a format overflow for an internal conversion.
Remedy	The following parameters can have incorrect values: P1001 (speed controller cycle) P1134 (rated motor frequency) P1138 (rotor resistance) P1139 (leakage stator reactance) P1140 (leakage rotor reactance) P1141 (magnetizing field reactance) Check the parameter, and if required, correct using the motor data sheet. The following condition must be fulfilled: 16 * P1001 * 0.00003125 * P1138 * 2PI * P1134 / (P1140 + P1141) < 1
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

784 No-load voltage, motor \%d invalid

Cause	Error in no-load voltage P1135: – P1135 <= 0 or – P1135 > P1132 or – P1135 * P1142 / P1400 + Vser.react. > 450V. With Vser.react. = 0.181 * P1136 * P1142 * P1119
Remedy	Determine the no-load voltage of the installed motor and enter this in P1135. Third-party motor: The following parameters may have incorrect values: P1119 (inductance of the series reactor) P1132 (rated motor voltage) P1135 (no-load motor voltage) P1400 (rated motor speed) P1142 (threshold speed for field weakening) P1136 (no-load motor current) Check parameters and if required correct using a motor data sheet. Siemens motor: The no-load voltage is determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

785 No-load current, motor \%d invalid

Cause	The no-load current (P1136) of the motor (ARM) is incorrect (less than/ equal to zero).
Remedy	Determine the no-load current of the motor used (ARM) and enter into P1136. Third-party motor: The no-load current should be determined from a motor data sheet. Siemens motor: The no-load current is determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

786 Field-weakening speed, motor \%d invalid

Cause	The threshold speed for field weakening for induction motors (P1142) is incorrect (less than/equal to zero).
Remedy	Determine the threshold speed for field weakening for the motor used and enter in P1142. Third-party motor: The field weakening speed should be determined from a motor data sheet. Siemens motor: The field weakening speed is determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

787 Induction motor oper.: feedforward control gain motor \%d cannot be displayed

Cause	The feedforward control gain for induction motors cannot be represented in the internal numerical format if the motor moment of inertia and rated motor torque were unfavorably selected.
Remedy	Operation without encoder: Reduce the encoder pulse number (P1005), as this is used in the internal numerical format. Operation with encoder: Reduce the speed controller cycle (P1001).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

789 Setpoint transfer SimoCom U ==> drive interrupted

Cause	The setpoint transfer from SimoCom U to the drive was interrupted, i.e. there is no longer an online connection. The Master Control was returned to the drive. Communication between the two communication partners was faulty. When traversing the drive via SimoCom U, other functions were executed on the PG/PC (e.g. open online help, open file), so that the drive can only be irregularly supplied from SimoCom U.
Remedy	– Check whether SimoCom U is still operating correctly, if required, re-start – Check whether the communication connection is OK, if required, replace the connecting cable – When in the online mode, do not select any time-intensive functions
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

790	**Illegal operating mode. Supplementary info: \%u**
Cause	The selected operating mode (P0700) is not permitted for this module or axis. Supplementary info = 0x1: Operating mode ==0 selected on the 1st axis Supplementary info = 0x2: ”Positioing” operating mode selected for the Nset control module Supplementary info = 0x3: Operating mode is not possible with this firmware release Supplementary info = ”External position reference value” operating mode no longer possible.
Remedy	For supplementary info 1: Select valid operating mode (P0700 > 0) For supplementary info 2: Select Nset operating mode or use a positioning module. For supplementary info 3: Use a firmware release which supports this operating mode. For supplementary info 4: Select ”Positioning” operating mode.
Acknowledgement	POWER ON
Stop response	STOP I
792	**Direct measuring system incorrectly parameterized. Supplementary info: \%u**
Cause	It is not permitted to parameterize the direct measuring system. Supplementary info = 0x1: A direct measuring system cannot be used using this board. Supplementary info = 0x3: The direct measuring system is active and drive A is set for encoder-less operation (P1027 bit 5 = 1).
Remedy	For supplementary info 1: Use the required board. For supplementary info 3: – De-activate the direct measuring system for drive A (P0250/P0879.12 = 0) or – Commission the motor measuring system for drive A
Acknowledgement	POWER ON
Stop response	STOP I

796	**Measured temperature-reference frequency \%u kHz inadmissible**
Cause	The reference frequency measurement to sense the motor, power module and electronics temperature resulted in a value outside the permissible range of 64 to 96 kHz.
Remedy	Replace the drive unit.
Acknowledgement	POWER ON
Stop response	STOP II
797	**Error in center frequency measurement**
Cause	The speed was too high during the center frequency measurement (current calibration). The center frequency is measured automatically at run-up, or when the pulses are inhibited.
Remedy	Power up the drive converter if the motor runs at a reduced speed.
Acknowledgement	POWER ON
Stop response	STOP I
798	**Measured value memory active**
Cause	The measured-value memory was active during power-up.
Remedy	Run up again.
Acknowledgement	POWER ON
Stop response	STOP I
799	**FEPROM backup and HW Reset required**
Cause	Parameters were re-balculated. Parameters must be saved and the module run up again after this new calculation.
Remedy	The newly calculated data should be saved in the FEPROM. The new parameters become effective the next time that the module runs up!
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
800	**Minus hardware limit switch**
Cause	A 1/0 edge was identified at the ”Minus hardware limit switch” input signal.
Remedy	– In the pos mode: Return the drive to the traversing range using jog key 1 or 2. – In the n-set mode: Enter a setpoint that opposes the approach direction.
Acknowledgement	not required
Stop response	STOP VII

801 Plus hardware limit switch

Cause	A 1/0 edge was identified at the ”Plus hardware limit switch” input signal.
Remedy	– In the pos mode: Return the drive to the traversing range using jog key 1 or 2. – In the n-set mode: Enter a setpoint that opposes the approach direction.
Acknowledgement	not required
Stop response	STOP VII

804 Controller enable or on/off 1(edge) or on/off 2/3 missing

Cause	When starting a traversing block, the controller enable has not been set, or the controller enable is missing during a traversing program when re-starting the axis from standstill. Controller enable missing, i.e. one of the following signals missing: – PROFIBUS control signals (STW1.0: ON/OFF 1 (edge), STW1.1: OC/OFF2, STW1.2: OC/OFF 3, STW1.3: Enable inverter/pulse inhibit) – PC enable (SimoCom U) – Terminal ”pulse enable” (terminal IF)
Remedy	Set the missing signal, and re-start the traversing block or enter a signal edge via PROFIBUS.
Acknowledgement	not required
Stop response	STOP VII

805 Pulse enable missing

Cause	When starting a traversing block, the pulse enable is not set, or the pulse enable is missing during a traversing program when re-starting the axis from standstill. Pulse enable missing, i.e. one of the following signals missing: – PROFIBUS control signals (STW1.1: OC/OFF 2, STW1.3: Enable inverter/pulse inhibit) – Terminal ”pulse enable” (terminal IF)
Remedy	Set the missing enable signal and then re-start the traversing block.
Acknowledgement	not required
Stop response	STOP VII

806 OC/reject traversing task missing

Cause	When starting a traversing block, the ”operating condition/reject traversing task” input signal is not set.
Remedy	Set the ”operating condition/reject traversing task” input signal and then re-start the traversing block.
Acknowledgement	not required
Stop response	STOP VII

807	**OC/intermediate stop missing**
Cause	When starting a traversing block the ”operating condition/intermediate stop” input signal is not set.
Remedy	Set the ”operating condition/intermediate stop” input signal and then re-start the traversing block.
Acknowledgement	not required
Stop response	STOP VII
808	**Reference point not set**
Cause	When starting a traversing block, a reference point is not set.
Remedy	Execute referencing or set a reference point using the ”set reference point” input signal.
Acknowledgement	not required
Stop response	STOP VII
809	**Parking axis selected**
Cause	When starting a traversing block or when starting referencing, the ”parking axis” function is selected.
Remedy	Cancel the ”parking axis” function and then re-start the required function.
Acknowledgement	not required
Stop response	STOP VII
813	**Electronics temperature, pre-alarm**
Cause	The electronics temperature has exceeded the permissible temperature alarm threshold. Note: The electronics temperature is displayed via P1751.
Remedy	– Improve the ambient conditions for the drive module. – Check fan.
Acknowledgement	not required
Stop response	STOP VII

814 Motor temperature, pre-alarm

Cause
The motor temperature is sensed via a temperature sensor (KTY84) and evaluated on the drive side. This alarm is output if the motor temperature reaches the alarm threshold motor overtemperature (P1602).

Remedy
– Avoid many acceleration and braking operations which follow one another quickly.
– Check whether the motor output is sufficient for the drive, otherwise use a higher output motor, possibly in conjunction with a higher-rating power section.
– Check the motor data. The motor current could be too high due to incorrect motor data.
– Check the temperature sensor.
– Check the motor fan.

Acknowledgement
not required

Stop response
STOP VII

815 Power module temperature, pre-alarm

Cause
The heatsink temperature of the power section is sensed using a thermosensor on the main heatsink. If the overtemperature condition remains, then the drive shuts down after approx. 20 s.

Remedy
Improve the drive module cooling, e.g. using:
– Higher airflow in the switching cabinet, possibly cool the ambient air of the drive modules
– Avoid many acceleration and braking operations which follow quickly one after the other
– Check that the power section for the axis/spindle is adequate, otherwise use a higher-rating module
– Ambient temperature too high (refer to the Configuration Manual)
– Permissible installation altitude exceeded (refer to the Configuration Manual)
– Pulse frequency too high (refer to the Configuration Manual)
– Check fan, if required, replace
– Maintain the minimum clearance above and below the power section (refer to the Configuration Manual)

Acknowledgement
not required

Stop response
STOP VII

817 Internal fan failed

Cause
The internal fan has failed.
Over a period of time, the temperature monitoring can respond and shutdown the drive.

Remedy
– Replace drive module.

Acknowledgement
not required

Stop response
STOP VII

818	**External fan failed**
Cause	The external fan has failed. Over a period of time, the temperature monitoring can respond and shutdown the drive.
Remedy	Replace the external fan.
Acknowledgement	not required
Stop response	STOP VII
819	**Ramp-up held until the DC link is charged**
Cause	The board does not run-up until the DC link voltage is switched-in.
Remedy	– Switch-in DC link voltage
Acknowledgement	not required
Stop response	STOP VII
820	**Power module in i2t limiting**
Cause	The power module is being operated too long above the permissible load limit.
Remedy	– Avoid many acceleration and braking operations which follow quickly one after the other – Check that the power section for the axis/spindle is adequate, otherwise use a higher-rating module – Pulse frequency too high (refer to the Configuration Manual)
Acknowledgement	not required
Stop response	STOP VII
821	**Pulsed resistor in i2t limiting**
Cause	The pulsed resistor is operated too long above the permissible load limit.
Remedy	– Avoid many braking operations which follow one another quickly
Acknowledgement	not required
Stop response	STOP VII

829 PROFIBUS: Illegal parameterization received. Reason: \%u

Cause
An illegal parameterizing frame was received via PROFIBUS. Cyclic data transfer cannot start.
Reasons:
8 = The parameterizing telegram has an illegal length
9 = The length data in the equidistant block is illegal
10 = A block header has an unknown ID.
11 = The basis time Tbasedp is not permissible (not equal to 125 µs.
12 = The DP clock cycle Tdp is not permissible (less than 1ms or greater than 32ms).
13 = The time Tmapc is less than 1*Tdp or greater than 14*Tdp.
14 = The base time Tbaseio is not permissible (not equal to 125 µs).
15 = Time Ti is greater than the DP clock cycle (Tdp).
16 = Time To is greater than the DP clock cycle (Tdp).
17 = For active Data Exchange, a new parameterization was received with different contents.
18 = Clock cycle synchronous operation was selected without a suitable option module having been activated (refer to P0875).
19 = IsoM_Req (state 3, bit 4) is requested in the DPV1 header without there being an isochron block (ID 0x04).
20 = Fail_Safe (state 1, bit 6), IsoM_Req (state 3, bit 4) or Prm_Structure (state 3, bit3) missing in the DPV1 header although an isochron block (ID 0x04) is available.
21 = The time Tdx is greater than (To – 125us) or greater than (Tdp – 250 µs).
22 = The time Tpllw is greater than 1us.
23 = Slave-to-slave communication access target address and length do not conform to word boundary.
24 = Maximum number (3 external + 1 internal) of slave-to-slave communication links has been exceeded.
25 = Maximum number (8) of accesses per link has been exceeded.
26 = Unknown version ID in the slave-to-slave communications block.
27 = The maximum overall length of the filter table has been exceeded.
31 = The permitted maximum length of the parameterizing telegram for the option module has been exceeded.
32 = The option module firmware does not support slave-to-slave communications

Remedy
Check the bus configuration at the master, and if required correct the parameterization.
If required, insert (reason 18) a suitable option module and activate.
If required, (reason 31 or reason 32) upgrade the option module firmware to a version greater than or equal to 04.01.

Acknowledgement
not required

Stop response
STOP VII

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830 PROFIBUS: Illegal configuration received. Reason: \%u

Cause

An illegal configuration frame was received via PROFIBUS. Cyclic data transfer cannot start.
Reasons:
1 = In the master, more axes are configured than are physically present in the power module.
2 = The number of the axes configured in the master is not equal to the number axes where the PROFIBUS DP option module is switched active via P0875. Note: Communications with axis B are not automatically de-activated even when switching axis B into a passive state.
3 = Configuration incomplete (too short) for one of the PPL types (only for vor P875 = 2).
4 = No PPO type detected (only for P875 = 2).
5 = Length calculation different between firmware and option module.
6 = For active data exchange, a new configuration was received with different length.
7 = Configuration contained unknown S7 ID.
19 = More PZD's have been configured than the maximum permissible.
20 = The configurtion contains an unknown special character (only axis separators are permitted).
22 = Target offset of slave-to-slave communications access exceeds the maximum number of PZDs
28 = Number of slave-to-slave communication IDs differs from the number of accesses in the parameterizing telegram.
29 = Setpoint PZDs are not uniformly supplied by the master or slave (drive) publisher.
30 = The permitted maximum length of the configuration telegram for the option module has been exceeded.

Remedy

Check the bus configuring at the master and if required correct.
If required, using P875, activate the option module PROFIBUS-DP, which are previously configured in the PROFIBUS Master for the number of axes involved.

Acknowledgement

not required

Stop response

STOP VII

831 PROFIBUS is not in the data transfer condition

Cause
The PROFIBUS is not in a data transfer status (data exchange) or data transfer was interrupted.
Causes:
– The master has not yet run up, or has not yet established a connection to the slave.
– The bus addresses differ in the master configuring and slave parameterization.
– The bus connection has been physically interrupted.
– The master is still in the clear condition.
– An illegal parameterization or configuration was received.
– A PROFIBUS address was assigned several times.

Remedy
Master, check the assignment of bus addresses and bus connection.

Acknowledgement
not required

Stop response
STOP VII

832 PROFIBUS not clock-synchronous with the master

Cause
The PROFIBUS is in a data transfer status (data exchange) and has been selected via the parameterizing frame of synchronous operation. It could not yet be synchronized to the clock preset by the master resp. to the master sign-of-life.
Causes:
– The master does not send an equidistant global control frame although clock synchronism has been selected via the bus configuration.
– The master uses another equidistant DP clock cycle than was transferred to the slave in the parameterizing telegram.
– The master increments its sign-of-life (STW2 Bits 12–15) not in the configured time frame Tmapc.

Remedy
Check master application and bus configuration
Check the consistency between the clock cycle input for the slave configuring and the clock cycle setting at the master.
If the master (e.g. SIMATIC S7) does not transfer a sign-of-life, the sign-of-life evalution can also be suppressed using P0879 bit 8.

Acknowledgement
not required

Stop response
STOP VII

833 PROFIBUS: No connection to the publisher \%u

Cause	Cyclic data transfer between this slave and a slave-to-slave communications publisher was still not started or was interrupted. Examples: – Bus connection interrupted – Publisher failure – Master runs up again – The response monitoring (Watchdog) for this slave was de-activated via the parameterizing telegram (SetPrm) (Diagnostics: P1783:1 bit 3 = 0). Supplementary info: PROFIBUS address of the publisher
Remedy	Check the publisher and bus connections to the publisher, to the master and between the master and publisher. if the watchdog is de-activated, activate the response monitoring for this slave via Drive ES.
Acknowledgement	not required
Stop response	STOP VII

840 Teach-in for running traversing program

Cause	Teach-in was requested during a running traversing program.
Remedy	Exit the traversing program and re-request teach-in.
Acknowledgement	not required
Stop response	STOP VII

841 Teach-in for relative block

Cause	The traversing block as ”teach in block” is relative instead of absolute.
Remedy	Change the traversing block mode ”teach in block” from relative to absolute.
Acknowledgement	not required
Stop response	STOP VII

842 Teach-in for a relative standard block

Cause	The traversing block as ”teach in standard set”, is relative instead of absolute.
Remedy	Change the traversing block mode ”teach in standard block” from relative to absolute.
Acknowledgement	not required
Stop response	STOP VII

843	**Search velocity too high**
Cause	The search velocity for spindle positioning is too high for the selected maximum deceleration.
Remedy	Reduce search velocity P0082:64 or increase the maximum deceleration P0104.
Acknowledgement	not required
Stop response	STOP VII
845	**Jogging not effective for active coupling**
Cause	Jogging is not possible while a coupling is closed.
Remedy	Release the coupling and re-activate jogging.
Acknowledgement	not required
Stop response	STOP VII
849	**PLUS software limit switch actuated**
Cause	For a block with the ENDLOS_POS command, the axis has actuated the plus software limit switch (P0316) for absolute or relative positioning. The behavior for software limit switch reached, can be set using P0118.0.
Remedy	– Move away in the negative direction, jogging. – Move away in the negative direction using the traversing block.
Acknowledgement	not required
Stop response	STOP VII
850	**MINUS software limit switch actuated**
Cause	For a block with the ENDLOS_NEG command, the axis has actuated the minus software limit switch (P0315) for absolute or relative positioning. The behavior for software limit switch reached, can be set using P0118.0.
Remedy	– Move away in the positive direction, jogging. – Move away in the positive direction using the traversing block.
Acknowledgement	not required
Stop response	STOP VII
864	**Parameterization error in speed controller adaptation**
Cause	The upper adaption speed (P1412) was parameterized with a lower value than the lower adaption speed (P1411).
Remedy	P1412 must contain a higher value than P1411.
Acknowledgement	not required
Stop response	STOP VII

865	**Invalid signal number**
Cause	The signal number for the analog output is not permissible. An analog value can be output for diagnostic, service and optimization tasks AQ1, AQ2
Remedy	Enter valid signal number (refer to the User Manual SIMODRIVE POSMO SI, CD, CA)
Acknowledgement	not required
Stop response	STOP VII
866	**Parameterizing error, current controller adaption**
Cause	For the current controller adaption, the upper current limit (P1181) was parameterized with a lower value than the lower current limit (P1180). Adaption is de-activated when the parameterizing error is output.
Remedy	P1181 must contain a higher value than P1180.
Acknowledgement	not required
Stop response	STOP VII
867	**Generator mode: Response voltage > shutdown threshold**
Cause	The sum of the values in P1631 + P1632 is greater than the value in P1633.
Remedy	Appropriately change P1631, P1632 and P1633. Note: P1631 to P1633 being prepared
Acknowledgement	not required
Stop response	STOP VII
868	**Generator mode: Response voltage > monitoring threshold**
Cause	The input value for the threshold voltage (P1631) is greater than the value in P1630.
Remedy	Change the drive parameters. Note: P1630 and P1631 being prepared
Acknowledgement	not required
Stop response	STOP VII

869 Reference point coordinate limited to modulo range

Cause	The reference point coordinate is internally limited to the modulo range.
Remedy	Enter a value in P0160 which lies within the modulo range (P0242).
Acknowledgement	not required
Stop response	STOP VII

870 Jerk: jerk time is limited

Cause	When calculating the jerk time T from the acceleration a and the jerk r, the result was an excessively high jerk time, so that the time is limited internally. The following is valid: T = a/r, where a: Acceleration (higher value from P0103 and P0104) r: Jerk (P0107)
Remedy	– Increase jerk (P0107) – Reduce maximum acceleration (P0103) or maximum deceleration (P0104)
Acknowledgement	not required
Stop response	STOP VII

871 Induction motor operation: drive converter frequency motor not permissible

Cause	In induction motor operation (selected by P1465 < P1146), drive converter frequencies of 4 or 8 kHz are permissible.
Remedy	– Change P1100 – Cancel induction motor operation (P1465 > P1146)
Acknowledgement	not required
Stop response	STOP VII

875 Axial deviations in fixed voltage

Cause	For the axes of a drive module, an unequal fixed voltage (P1161) has been set. As a fixed voltage <> 0 replaces the DC link voltage measured value, but the DC link voltage is only measured once for all drives of a drive module, the fixed voltage on all module axes must be equal, before it is accepted.
Remedy	Set the same fixed voltage (P1161) on all module axes.
Acknowledgement	not required
Stop response	STOP VII

7

876	**Terminal function \%u in the actual mode illegal**
Cause	The function number, used as input terminal or distributed input (P0888) may not be used in the actual mode.
Remedy	Change P0700 (operating mode) or enter a suitable function number in P0888 or P0660, P0661 etc.
Acknowledgement	not required
Stop response	STOP VII
877	**Output function \%u not permissible in the actual operating mode**
Cause	The function number, used as output, may not be used in the actual operating mode.
Remedy	Change P0700 (operating mode) or enter a suitable function number in P0680, P06981, etc.
Acknowledgement	not required
Stop response	STOP VII
878	**Input I0.x not parameterized as equivalent zero mark**
Cause	When entering an external signal as equivalent zero mark (P0174 = 2), input I0.x must be assigned ”equivalent zero mark” function (Fct. No.:79).
Remedy	– P0660 = 79
Acknowledgement	not required
Stop response	STOP VII
879	**Time constant deadtime, speed feedforward control (P0205:\%u) too high**
Cause	P0205:8 may not be greater than two position controller clock cycles. Higher values are internally limited.
Remedy	Reduce P0205:8 to max. two position controller clock cycles (P1009). Parameterize an addition delay via P0206:8.
Acknowledgement	not required
Stop response	STOP VII

881 PZD configuring: Signal number in P0915:\%u invalid

Cause	An undefined or illegal signal number in the current operating mode (P0700) was identified for the process data software. P0915:1 is not equal to 50001 (STW1). The process data for encoder 1 has been configured although encoderless operation is activated (P1011.5). The process data for encoder 2 were configured although the direct measuring system is not activated (P0879.12).
Remedy	Correct P0915:17
Acknowledgement	not required
Stop response	STOP VII

882 PZD configuring: Double word signal number in P0915:\%u invalid

Cause	For signals with double words (length = 32 bits), the corresponding signal identifier must be configured twice for adjacent process data. The following subparameter must therefore also be parameterized with the same signal number.
Remedy	Correct P0915:17
Acknowledgement	not required
Stop response	STOP VII

7

883 PZD configuring: Signal number in P0916:\%u invalid

Cause	An undefined or illegal signal number in the current operating mode (P0700) was identified for the process data software. P0916:1 is not equal to 50002 (ZSW1). The process data for encoder 1 has been configured although encoderless operation is activated (P1011.5). The process data for encoder 2 were configured although the direct measuring system is not activated (P0879.12).
Remedy	Correct P0916:17
Acknowledgement	not required
Stop response	STOP VII

884 PZD configuring: Double word signal number in P0916:\%u ivalid

Cause	For signals with double words (length = 32 bits), the corresponding signal identifier must be configured twice for adjacent process data. The following subparameter must therefore also be parameterized with the same signal number.
Remedy	Correct P0916:17
Acknowledgement	not required
Stop response	STOP VII

888 Armature short-bircuit not possible

Cause	Armature short-bircuit as stop response in case of a fault is only possible for POSMO CA. In this case, this is replaced by a STOP I (pulse cancellation).
Remedy	Set P1640, P1641 and P1642 to zero.
Acknowledgement	not required
Stop response	STOP VII

889 Fixed endstop, axis has not reached the clamping torque

Cause	The axis has reached the fixed endstop, but was not able to establish the programmed clamping torque.
Remedy	Check the parameters for the limits.
Acknowledgement	not required
Stop response	STOP VII

890 Acceleration – deceleration override incorrect

Cause	The acceleratino override or the deceleration override is not in the range from 1% to 100%. if the value > 100%, then it is limited to 100%. If the value < 1%, then limited to 1%. The traversing block is not interrupted.
Remedy	Check the programming of the acceleration override and deceleration override.
Acknowledgement	not required
Stop response	STOP VII

891 PLUS software limit switch actuated coupled

Cause	With the actual master drive velocity, this coupling axis will probably reach or pass the PLUS software limit switch. This warning is output if the coupled axis has fallen below 200% of the braking travel up to the PLUS software limit switch.
Remedy	Traverse the master drive so that this coupling axis goes into the permissible traversing range.
Acknowledgement	not required
Stop response	STOP VII

892 MINUS software limit switch actuated coupled

Cause	With the actual master drive velocity, this coupling axis will probably reach or pass the MINUS software limit switch. This warning is output if the coupled axis has fallen below 200% of the braking travel up to the MINUS software limit switch.
Remedy	Traverse the master drive so that this coupling axis goes into the permissible traversing range.
Acknowledgement	not required
Stop response	STOP VII

7.3 Commissioning functions

Overview

The commissioning functions and support tools help during start-up, during service, when optimizing the drive, and troubleshooting.

For POSMO SI and POSMO CD/CA, the following commissioning and help functions are available:

- Function generator (FG) refer to Chapter 7.3.1
- Trace function (refer to Chapter 7.3.2)
- Test sockets (DAU1, DAU2) refer to Chapter 7.3.3
- Measuring function (refer to Chapter 7.3.4)

Caution

Setpoints and speeds which are entered via PROFIBUS are added when the function generator starts.

Commissioning functions and SimoCom U Tool

The ”SimoCom U” parameterizing and start-up tool, in the online mode, can start the ”function generator” and ”measuring function” commissioning functions with the master control for the PG/PC.

Note

If the online mode between ”SimoCom U” and POSMO SI/CD/CA is interrupted while commissioning functions are running, then the particular commissioning function is exited and an appropriate fault is displayed.

7.3.1 Function generator (FG)

Overview

Using the function generator:

- The influence of the higher-level control loops can be specifically disabled.
- The dynamic performance can be compared for coupled drives.
- A simple characteristic (traversing profile) can be selected as setpoint and repeated, without having to program a traversing program.

The function generator generates various types of setpoints (square-wave, staircase, delta, PRBS or sinusoidal), and enters this setpoint, corresponding to the selected mode, as current setpoint, disturbing torque or as speed setpoint.

Danger

If the function generator is active, then traversing motion is not monitored.

Starting the function generator

The following must be observed when starting the function generator:

- The function generator is started as follows
  - Setting P1800 = 1
    The function generator is immediately started.
  - Setting P1800 = 2 (from SW 8.1)
    Synchronous start of the function generator, e.g. for gantry axes, if in the n-set mode, the PROFIBUS control word STW1.8 is 1. From SW 9.1 onwards, also with PROFIBUS control word PosStw.15 in the pos mode or with the digital input terminal function No. 41 ”activate function generator (signal edge)”.
- The following starting conditions and enable signals must be available:

Table 7-3 Starting conditions for the function generator

Starting conditions	Operating mode, FG P1804 = 1 = 3 (only V/Hz operation)	Operating mode FG P1804 = 2 = 3 (without V/Hz operation)
Speed controlled operation on		x
Controller enable	x	x
Pulse enable	x	x
Internal regenerative stop inactive	x	x
Ramp-function generator enable	x	x
x: Start condition must be fulfilled		

Fault

If a fault is identified when starting or during operation, then the function generator is exited, and the reason for the fault is displayed by entering a negative value in P1800.

Stopping the function generator

The function generator can be stopped as follows:

- Stopped via P1800 = 1 → 0

  If the function generator is stopped using this parameter, then the drive is braked with the deceleration set in P1813.

- Stopping is possible via STW1.8=0 for P1800 = 2 (from SW 8.1) From SW 9.1 also with PROFIBUS control word PosStw.15 in the pos mode or with digital input terminal functions No. 41 ”activate function generator (signal edge)”.

  If the function generator is stopped using this PROFIBUS control word, then the drive is braked with the deceleration set in P1813.

  After stopping, the value –23 appears in P1800.

- Abort

  As soon as one of the function generator starting conditions is no longer fulfilled, the drive is braked along the current limit or ”coasts down” when the pulse enable is withdrawn.
  Further, the function generator is stopped, if incorrect parameterization is executed during operation.

Note

The control structure of the drive is re-established each time that the function generator is stopped or aborted.
While the function generator runs, e.g. in the mode ”current setpoint” (P1804 = 1), all of the higher-level control loops are open. The control loops are re-closed when the function generator is either stopped or canceled.

Parameter overview

The following parameters are used to parameterize the function generator:

Table 7-4 Parameters for the function generator

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1800	Function generator control	–40	0	2	–	Immediately
	... starts, exits the function generator and if a fault/error is present, displays the reason. = 2 Synchronous start of the function generator (from SW 8.1) = 1 Starts the function generator. The FG is again terminated with P1800 = 1 → 0. = 0 Function generator is inactive = –1 The commissioning function was started; but was possibly already running on another drive = –2 Inadmissible mode or the mode was changed while the FG was active = –4 The period is 0 or too high = –6 The absolute amplitude is too high = –7 The offset lies outside the permitted range = –8 The limit is greater than permitted = –9 Incorrect waveform or the waveform was changed while the FG was active = –10 The pulse width is negative or greater than the period = –11 The bandwidth is less than 1 Hz or greater than the maximum possible bandwidth (for a sampling time of 0.125 ms, the maximum possible bandwidth is 4000 Hz) = –15 The 2nd amplitude for the ”staircase” waveform is too high = –16 The commissioning function was not started or was aborted due to an active internal regenerative stop = –17 The commissioning function was not started or was aborted due to the missing pulse enable = –18 The commissioning function was not started or was aborted due to the missing speed controller enable = –19 The commissioning function was not started or was aborted due to the missing ”speed controlled mode” enable = –20 The commissioning function was not started or was aborted due to the missing ramp-function generator enable = –21 The commissioning function was not started due to a traversing axis (e.g. active traversing block) =–23 The commissioning function was canceled because the synchronous start enable was withdrawn					

7

Table 7-4 Parameters for the function generator, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1804	Function generator operating mode	1	3	5	–	Immediately
	... specifies at which input the generated setpoint is entered. = 1 Current setpoint The current control loop is closed, all of the higher-level control loops are open. The function generator output is the current setpoint in the current controller clock cycle. = 2 Disturbing torque The speed control loop is closed, all of the higher-level control loops are open. The function generator output is the current setpoint in the speed controller clock cycle. When starting and stopping, the acceleration/deceleration is limited by the ramp-function generator of the function generator. = 3 Speed setpoint The speed control loop is closed, all of the higher-level control loops are open. The function generator output is the speed setpoint in the speed controller clock cycle. When starting and stopping, the acceleration/deceleration is limited by the ramp-function generator of the function generator. = 4 Disturbing torque with ramp-function generator The speed control loop is closed, but all of the higher-level control loops are open. The function generator output is the current setpoint in the speed controller clock cycle. When starting and stopping the ramp-function generator of the function generator or the ramp-function generator in the speed setpoint channel limits the acceleration/deceleration. The maximum value from the ramp-up/ramp-down time (P1256/P1257) of the RFG in the speed setpoint channel and the time of the ramp-function generator of the function generator (P1813) is always used. = 5 Speed setpoint with ramp-function generator The speed control loop is closed, but all of the higher-level control loops are open. The function generator output is the speed setpoint in the controller clock cycle. When starting and stopping the ramp-function generator of the function generator or the ramp-function generator in the speed setpoint channel limits the acceleration/deceleration. The maximum value from the ramp-up/ramp-down time (P1256/P1257) of the RFG in the speed setpoint channel and the time of the ramp-function generator of the function generator (P1813) is always used. When moving along the characteristic, the ramp-up and ramp-down time of the ramp-function generator in the speed setpoint channel is taken into account. **Note:** When a parameter is changed with the function generator active, this causes the system to crash.					

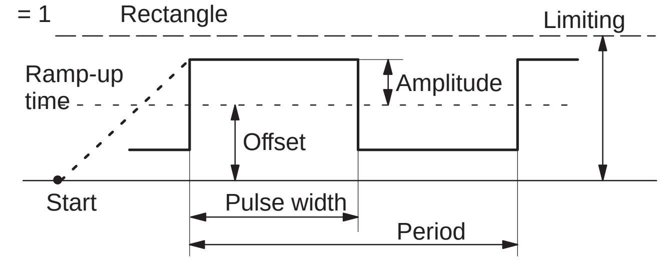
Table 7-4 Parameters for the function generator, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1805	Function generator, waveform	1	1	5	–	Immediately

... specifies which function generator waveform should be output.

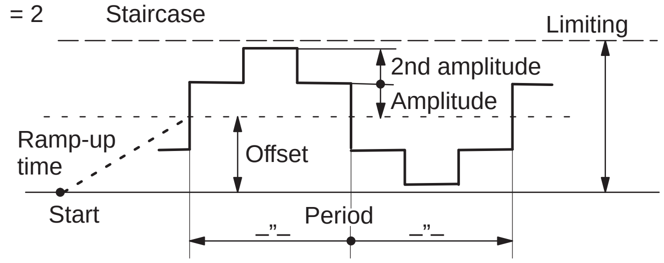
Note: When a parameter is changed with the function generator active, this causes the system to crash.

= 1 Rectangle



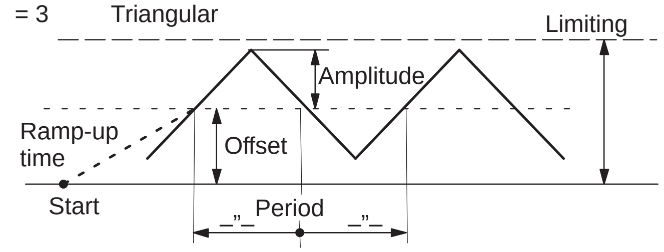
Parameter list
Offset: P1807
Amplitude: P1806
Pulse width: P1811
Period: P1810
Limit: P1808
Ramp-up time: P1813

= 2 Staircase



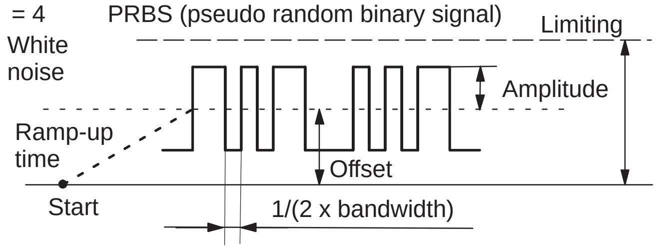
Parameter list
Offset: P1807
Amplitude: P1806
2nd amplitude: P1809
Period: P1810
Limit: P1808
Ramp-up time: P1813

= 3 Triangular



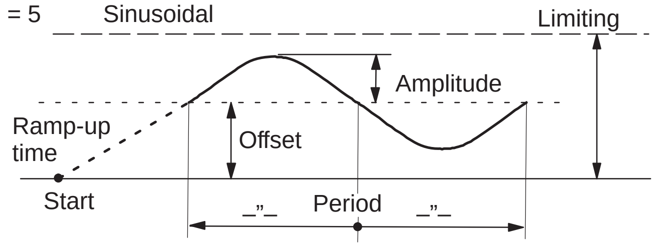
Parameter list
Offset: P1807
Amplitude: P1806
Period: P1810
Limit: P1808
Ramp-up time: P1813

= 4 PRBS (pseudo random binary signal)



Parameter list
Offset: P1807
Amplitude: P1806
Bandwidth: P1812
Limit: P1808
Ramp-up time: P1813

= 5 Sinusoidal



Parameter list
Offset: P1807
Amplitude: P1806
Period: P1810
Limit: P1808
Ramp-up time: P1813

7

Table 7-4 Parameters for the function generator, continued

Parameter						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1806	Start-up function, amplitude	–1 600.0	5.0	1 600.0	%	Immediately
	... specifies the amplitude of the signal to be output. The units are dependent on P1804. if then P1804 = 1, 2, 4 The units are referred to P1103 (rated motor current) P1804 = 3, 5 the units are referred to P1400 (rated motor speed)					
1807	Start-up function, offset	–1 600.0	0.0	1 600.0	%	Immediately
	... defines the offset of the signal to be output. The units are dependent on P1804. if then P1804 = 1 the unit is referred to P1103 (rated motor current) P1804 = 2, 3, 4, 5 The units are referred to P1400 (rated motor speed) **Note:** For P1804 = 2 (”fault torque” mode), the offset does not affect the current setpoint, but the speed setpoint, to compensate for the effects of backlash (play).					
1808	Function generator limiting	0.0	100.0	1 600.0	%	Immediately
	... defines the limit of the signal to be output. The units are dependent on P1804. if then P1804 = 1, 2, 4 The units are referred to P1103 (rated motor current) P1804 = 3, 5 the units are referred to P1400 (rated motor speed) **Note:** The limit is effective, symmetrically around the zero point. For P1804 = 2 (”disturbance torque” mode), the limit only acts on the current setpoint, but not on the speed setpoint (= offset).					
1809	Function generator 2nd amplitude (only for P1805 = 2, staircase)	–1 600.0	7.0	1 600.0	%	Immediately
	... specifies the 2nd amplitude for the ”staircase” waveform. The units are dependent on P1804. if then P1804 = 1, 2, 4 The units are referred to P1103 (rated motor current) P1804 = 3, 5 the units are referred to P1400 (rated motor speed)					
1810	Function generator period (not for P1805 = 4, PRBS)	1	1 000	65 535	ms	Immediately
	... defines the period of the signal to be output.					
1811	Function generator pulse width (only for P1805 = 1, squarewave)	0	500	65 535	ms	Immediately
	... defines the pulse width of the ”squarewave” waveform.					
1812	Commissioning function, bandwidth (FFT), (only for P1805 = 4, PRBS)	1	4 000	8 000	Hz	Immediately
	... defines the bandwidth in the PRBS mode.					

Table 7-4 Parameters for the function generator, continued

Parameter						
No.	Description	Min.	Stan-dard	Max.	Units	Effective
1813	Start-up function, ramp-up time to P1400 (only for P1804 = 2, 3, 4, 5 —> closed speed control loop)	0.0	32.0	100 000.0	ms	Immedi-ately
	... specifies the time in which the drive accelerates or decelerates (brakes) to the required speed. In this case, the parameter refers to P1400 (rated speed).					
	The following applies: $P1813 = \frac{P1400}{\text{required speed}}$ x required ramp-up time Example: Rated speed n_{rated} = 3000 RPM (P1400) The drive should accelerate up to 500 RPM in 20 ms —> P1813 = (3000 / 500) * 20 ms = 120 ms					

Additional waveforms

Additional waveforms are available using the appropriate parameterization.
Example:
For the ”triangular” waveform, a triangular waveform without peak is obtained by appropriately parameterizing the limit.

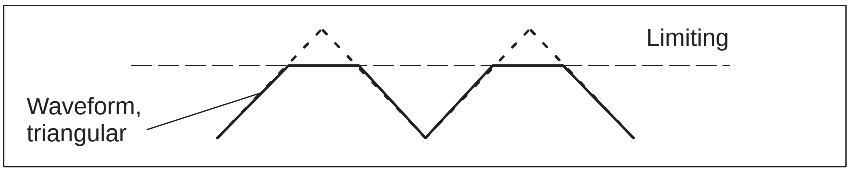


Fig. 7-1 ”Triangular” waveforms with no peak

Details of the ”staircase” waveform

The ”staircase” waveform is especially significant when optimizing the speed controller.
Depending on how the amplitude is parameterized, the following interesting possibilities are obtained:

- Amplitude = 0 (P1806 = 0)

  Benefits:
  - Reversing is possible
  - The axis stops at the end points

  Disadvantages:
  - There is play and stiction if there is no offset
  - With offset, the axis continually distances itself from the starting point

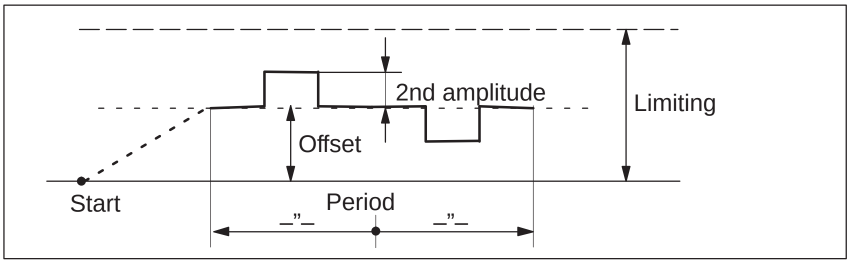


Fig. 7-2 ”Staircase” waveform with amplitude = 0 and offset > amplitude 2

- Amplitude $\neq$ 0 (P1806 $\neq$ 0)

  Benefits:
  - Reversing is possible
  - A higher (2nd amplitude) is selected from a basic velocity (amplitude)
  - The traversing profile periodically repeats itself.
    This means that when optimizing the control loop, the effect can be immediately monitored, e.g. using an oscilloscope connected to test sockets DAU1/DAU2.
  - The axis always moves through the same distance in each direction

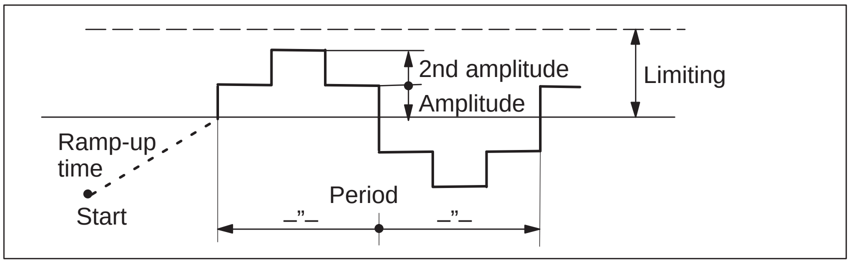


Fig. 7-3 ”Staircase” waveform with amplitude > 0 and offset = 0

7.3.2 Trace function

Description

Using the trace function, selected measuring quantities in the drive can be measured, corresponding to the specified measuring parameters, and graphically displayed using ”SimoCom U”.

Function overview

The trace function has the following properties and features:

- 4 trace buffers with up to 2048 measured values

  The actual number of possible measured values is dependent on whether the measuring signal is 24 or 48 bit.
- Freely-selectable measuring signals

  The required signal is selected from a signal selection box.
- Triggering
  - without triggering (the trace starts immediately after START)
  - with triggering to an additional trigger signal with signal edge/signal level/bit pattern triggering and trigger delay/pre-Trigger
  - trigger is initiated by a change in the bit mask (from SW 5.1)
    A trigger is initiated as soon as one of the bits in the bit mask changes.
- X/Y scaling: Automatic and selectable

  Using the scaling, a sub-range can be specified for the abscissa (x axis) and ordinate (y axis), so that a section can be displayed.
  It is possible to zoom in using an appropriately set scaling factor.
- Signal measurement via cursor

  This means that the signals can be analyzed using the X cursor (time axis) and/or Y cursor.
- From SW 5.1, individual bits of a signal can be evaluated.

  One or several bits can be selected in the ”SimoCom U” in the ”trace” input mask using the ”bit masking” button. The bit masking can be set, independently for each channel and can be recognized by the units of the associated signal.

Reader’s note

The trace function can only be used in conjunction with the ”SimoCom U” parameterizing and start-up tool, i.e. ”SimoCom U” is used to control the trace function and display the measured values.

Additional information on the trace function is available in the online help for ”SimoCom U”.

7

7.3.3 Test sockets (DAU1, DAU2)

Description

For POSMO SI/CD/CA there are 2 test outputs to output analog signals via connector X25 on the PROFIBUS unit; these have the following features:

- Resolution of the DAU 8 bit
- Voltage range 0 V to +5 V
- Measuring clock cycle Current controller clock cycle
- Shift factor (refer to Figs. 7-6 and 7-7)

  The resolution is 8 bit. Thus, only an 8 bit section can be output from a 24/48 bit signal. The shift factor defines how finely the selected signal is quantized.
- Signal selection list

  The signals, which can be output via the test sockets, should be taken from the signal selection list for the test outputs (refer to Table 7-6).

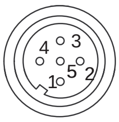
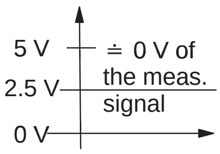
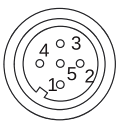
Note

The test sockets are only provided for test purposes during commissioning or for service.

Parameter overview

The following parameters are used to parameterize the test outputs:

Table 7-5 Parameter overview for test outputs

Connector Designation	Parameter No.	Name	Min.	Standard	Max.	Units	Effective
Speed actual value, motor drive (standard) ↑ **Test socket 1: AQ1 (DAU1)** X25 Diagnostics 1: BRP 2: AQ2 3: M 4: AQ1 5: BRM  	1820	Signal number, test socket 1	0	8	530	–	Immediately
		... defines which signal is output via the test socket. The signal number, from the signal selection list for test outputs, must be entered (refer to Table 7-6).					
	1821	Shift factor, test socket 1	0	6	47	–	Immediately
		... defines the shift factor, with which the output signal is manipulated. Only an 8 bit output window can be output from a 24/48 bit signal due to the 8-bit resolution. The shift factor can be used to define which 8 of the 24/48 bits are located in the output window and should be output.					
	1822	Offset, test socket 1	–128	0	127	–	Immediately
		... specifies the offset, which is added to the 8-bit output signal. The signal to be output is shifted by 5/256 V (19,5 mV) by changing the offset by 1 digit. P1822 = –128 ≐ 0 V, P1822 = 0 ≐ +2.5 V, P1822 = 127 ≐ +5V					
	1826	Status, test socket 1	0	1	1	–	Immediately
		... defines the status of the test socket for this drive. = 0 Test socket is inactive = 1 Test socket is active					
X25 Diagnostics 1: BRP 2: AQ2 3: M 4: AQ1 5: BRM  **Test socket 2: AQ2 (DAU2)** ↓ Drive active power (as standard)	1830	Signal number, test socket 2	0	14	530	–	Immediately
		Description, refer to that for P1820.					
	1831	Shift factor, test socket 2	0	12	47	–	Immediately
		Description, refer to that for P1821.					
	1832	Offset, test socket 2	–128	0	127	–	Immediately
		Description, refer to that for P1822.					
	1836	Status, test socket 2	0	1	1	–	Immediately
		Description, refer to that for P1826.					

Signal selection list for analog output

Table 7-6 Signal selection list for test outputs

Signal No.	Signal Designation	Operating mode n-set	Operating mode pos	Reference	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
0	No signal	x	x	–	–	–	–	–
1	Physical address	x	x	–	0	24	–	–
2	Current actual value, phase U	x	x	–	4	24	μA_{pk}	P1710
3	Current actual value, phase V	x	x	–	4	24	μA_{pk}	P1710
4	Field-generating current actual value I_d	x	x	–	4	24	μA_{pk}	P1710
5	Torque-generating current actual value I_q	x	x	–	4	24	μA_{pk}	P1710
6	Current setpoint I_q (limited after the filter)	x	x	–	4	24	μA_{pk}	P1710
7	Current setpoint I_q (in front of the filter)	x	x	–	4	24	μA_{pk}	P1710
8	Speed actual value, motor (SRM, ARM) Velocity actual value, motor (SLM)	x	x	–	6	24	RPM m/min	P1711
9	Speed setpoint (SRM, ARM) Velocity setpoint (SLM)	x	x	–	6	24	RPM m/min	P1711
10	Speed setpoint, reference model (SRM, ARM) Velocity setpoint, reference model (SLM)	x	x	–	6	24	RPM m/min	P1711
11	Torque setpoint (speed controller output) (SRM, ARM) Force setpoint (speed controller output) (SLM)	x	x	–	4	24	μNm μN	P1713
12	Torque setpoint limit (pos.) (SRM, ARM) Force setpoint limit (pos.) (SLM)	x	x	–	4	24	μNm μN	P1713
13	Motor utilization max (M_{set}/M_{max}, p_{set}/p_{max})	x	x	–	8	16	%	8000H ≙ 100%
14	Active power	x	x	–	12	16	kW	0.01 kW
15	Rotor flux setpoint	x	x	–	1	24	μVs	P1712
16	Rotor flux actual value	x	x	–	1	24	μVs	P1712
17	Quadrature voltage V_q	x	x	–	11	24	V	P1709 × $V_{DC\ link}/2$
18	Direct-axis voltage V_d	x	x	–	11	24	V	P1709 × $V_{DC\ link}/2$
19	Current setpoint I_d	x	x	–	4	24	μA_{pk}	P1710
20	Motor temperature	x	x	–	13	24	°C	0.1 °C

Table 7-6 Signal selection list for test outputs, continued

Signal		Operating mode		Refer-ence	Shift fac-tor	Bit width	Units	Normal-ization (corre-sponds to LSB)
No.	**Designation**	**n-set**	**pos**					
21	DC link voltage at the NE module	x	x	–	13	24	V	1 V
22	Zero mark signal, motor measuring system	x	x	–	17	16	–	–
23	Bero signal	x	x	–	12	16	–	–
24	Absolute speed actual value (SRM, ARM) Absolute velocity actual value (SLM)	x	x	–	6	24	RPM m/min	P1711
25	Slip frequency setpoint	x	x	–	8	24	1/s	$\frac{2000 \times 2\Pi}{800000H \times 1s}$
26	Zero mark signal, direct measuring system	x	x	–	17	24	–	–
27, 28	Reserved	–	–	–	–	–	–	–
29	Actuator voltage, Q input	x	x	–	11	24	V	P1709 $\times$ $V_{DC\ link}/2$
30	Actuator voltage, D input	x	x	–	11	24	V	P1709 $\times$ $V_{DC\ link}/2$
31	Normalized, electrical rotor position (10 000 hex = 360°)	x	x	–	7	24	De-grees	–
32	Absolute voltage setpoint	x	x	–	11	24	V	P1709
33	Absolute current actual value	x	x	–	4	24	μA_{pk}	P1710
34 to 39	Reserved	–	–	–	–	–	–	–
40	Speed setpoint from PROFIBUS PPO (SRM, ARM) Velocity setpoint from PROFIBUS PPO (SLM)	x	x	–	6	24	RPM m/min	P1711
41	Rotor position, finely/coarsely syn-chronized (from SW 5.1) 0: Still not synchronized 1: Coarsely synchronized 3: Coarsely and finely synchronized	x	x	–	21	16	–	–
42	Input terminals (refer to P0678) (from SW 5.1)	x	x	–	7	16	–	–
43	Torque setpoint limit (neg.) (SRM, ARM) Force setpoint limit (neg.) (SLM) (from SW 7.1)	x	x	–	4	24	μNm μN	P1713

Table 7-6 Signal selection list for test outputs, continued

Signal No.	Signal Designation	Operating mode n-set	Operating mode pos	Refer-ence	Shift fac-tor	Bit width	Units	Normal-ization (corre-sponds to LSB)
44 to 49	Reserved	–	–	–	–	–	–	–
50	Power module temperature	x	x	P1750	13	24	°C	0.1 °C
51	Electronic temperature	x	x	P1751	13	24	°C	0.1 °C
52	Current actual value, phase W	x	x	–	4	24	μA_{pk}	P1710
53	Sum of the phase currents	x	x	–	8	24	μA_{pk}	P1710
54 to 69	Reserved	–	–	–	–	–	–	–
70	Position controller output (SRM, ARM) (SLM)	x	x	–	6		RPM m/min	P1711
71	Pre-control speed (SRM, ARM) (SLM)	–	x	–	6	24	RPM m/min	P1711
72	System deviation, position controller input	x	x	–	27	48	MSR	MSR x 2^{-11}
73	Position actual value	x	x	–	19	48	MSR	MSR x 2^{-11}
74	Position setpoint	x	x	–	19	48	MSR	MSR x 2^{-11}
75	Velocity setpoint IPO	x[4)]	x	–	30	48	MSR/s	P1743
76	Following error	x	x	–	27	48	MSR	MSR x 2^{-11}
77	Following error, dynamic model	x	x	–	27	48	MSR	MSR x 2^{-11}
78	External position reference value (from SW 4.1)	–	x	P0032	19	48	MSR	MSR • P0403/P0404 • 2^{-11}
79	External velocity setpoint (from SW 4.1)	–	x	–	30	48	MSR	P1744
80	DSC system deviation (from SW 4.1)	x	–	P0915	4	32	–	P1745
81	DSC pre-control speed, motor DSC pre-control velocity, motor (from SW 4.1)	x	–	P0915	6	32	RPM	P1711
82	DSC system deviation from PROFIBUS PPO (from SW 7.1)	x	–	P0915	6	32	RPM	P1711

Table 7-6 Signal selection list for test outputs, continued

Signal		Operating mode		Reference	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
No.	**Designation**	**n-set**	**pos**					
83 to 85	Reserved	–	–	–	–	–	–	–
499 3)	PROFIBUS PKW task (request) identification (from SW 5.1)	x	x	P1786: 1	8	16	–	–
500 3)	PROFIBUS PKW response ID (from SW 5.1)	x	x	P1787: 1	8	16	–	–
501 3)	PROFIBUS control word 1 (STW1) (from SW 5.1)	x	x	P1788: x1)	8	16	–	–
502 3)	PROFIBUS status word 1 (ZSW1) (from SW 5.1)	x	x	P1789: x2)	8	16	–	–
503 3)	PROFIBUS control word 2 (STW2) (from SW 5.1)	x	x	P1788: x1)	8	16	–	–
504 3)	PROFIBUS status word 2 (ZSW2) (from SW 5.1)	x	x	P1789: x2)	8	16	–	–
505 3)	PROFIBUS encoder 1 control word (G1_STW) (from SW 5.1)	x	–	P1788: x1)	8	16	–	–
506 3)	PROFIBUS encoder 1 status word (G1_ZSW) (from SW 5.1)	x	–	P1789: x2)	8	16	–	–
507 3)	PROFIBUS encoder 2 control word (G2_STW) (from SW 5.1)	x	–	P1788: x1)	8	16	–	–
508 3)	PROFIBUS encoder 2 status word (G2_ZSW) (from SW 5.1)	x	–	P1789: x2)	8	16	–	–
509 3)	PROFIBUS distributed inputs (DezEing) (from SW 5.1)	x	x	P1788: x1)	8	16	–	–
510 3)	PROFIBUS message word (MeldW) (from SW 5.1)	x	x	P1789: x2)	8	16	–	–
511 3)	PROFIBUS digital outputs, terminals O0.x to O3.x (DIG_OUT) (from SW 5.1)	x	x	P1788: x1)	19	16	–	–
512 3)	PROFIBUS digital inputs Terminals I0.x to I3.x (DIG_IN) (from SW 5.1)	x	x	P1789: x2)	19	16	–	–
513 3)	PROFIBUS block selection (SatzAnw) (from SW 5.1)	x	x	P1788: x1)	17	16	–	–
514 3)	PROFIBUS currently selected block (AktSatz) (from SW 5.1)	x	x	P1789: x2)	17	16	–	–
515 3)	PROFIBUS position control word (PosStw) (from SW 5.1)	–	x	P1788: x1)	8	16	–	–
516 3)	PROFIBUS positioning status word (PosZsw) (from SW 5.1)	–	x	P1789: x2)	8	16	–	–

Table 7-6 Signal selection list for test outputs, continued

Signal No.	Signal Designation	Operating mode n-set	Operating mode pos	Reference	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
517 3)	PROFIBUS control word slave-to-slave communications (QStw) (from SW 5.1)	–	x	P1788: x1)	22	16	–	–
518 3)	PROFIBUS status word, slave-to-slave communications (QZsw) (from SW 5.1)	–	x	P1789: x2)	22	16	–	–
519 3)	PROFIBUS encoder 1 position actual value 1 (G1_XIST1) (from SW 7.1)	x	–	P1789: x1)	8	32	–	–
520 3)	PROFIBUS encoder 1 position actual value 2 (G1_XIST2) (from SW 7.1)	x	–	P1789: x1)	8	32	–	–
522 3)	PROFIBUS encoder 2 position actual value 1 (G2_XIST1) (from SW 7.1)	x	–	P1789: x1)	8	32	–	–
523 3)	PROFIBUS encoder 2 position actual value 2 (G2_XIST2) (from SW 7.1)	x	–	P1789: x1)	8	32	–	–

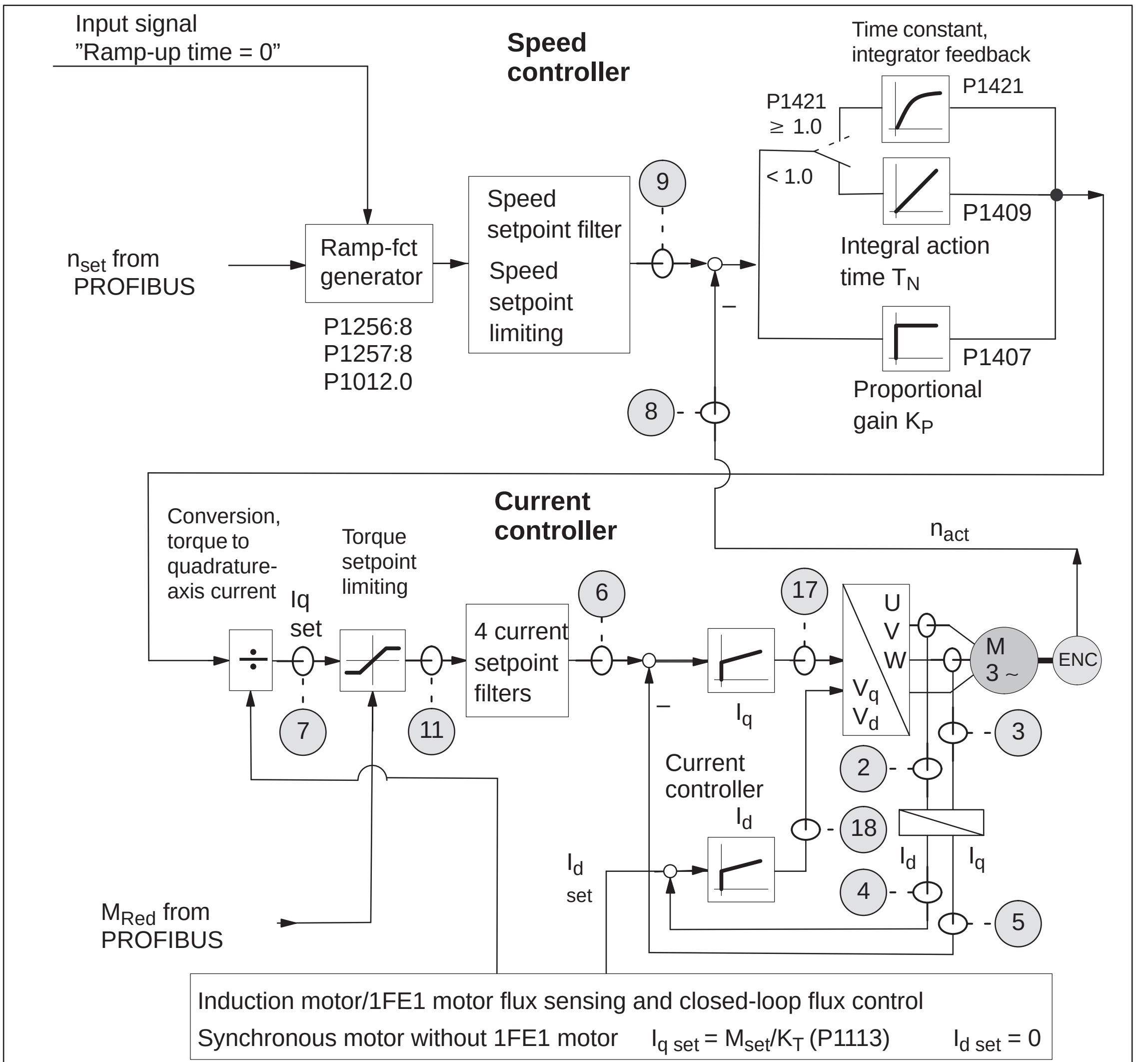
Note:

- Abbreviations
  - rms: rms value
  - pk: Peak value
  - LSB: Least Significant Bit
  - MSR: Dimension system grid
- Signal marking?
  - Not marked: For SimoCom U, the signal is available as standard
  - Marked in gray: For SimoCom U, the signal is only available when the expert mode is activated

1) Dependent on the assignment in P0915:17
2) Dependent on the assignment in P0916:17
3) PROFIBUS signal only supplies a value, if it is set in P0915 or P0916.
4) This only applies for spindle positioning

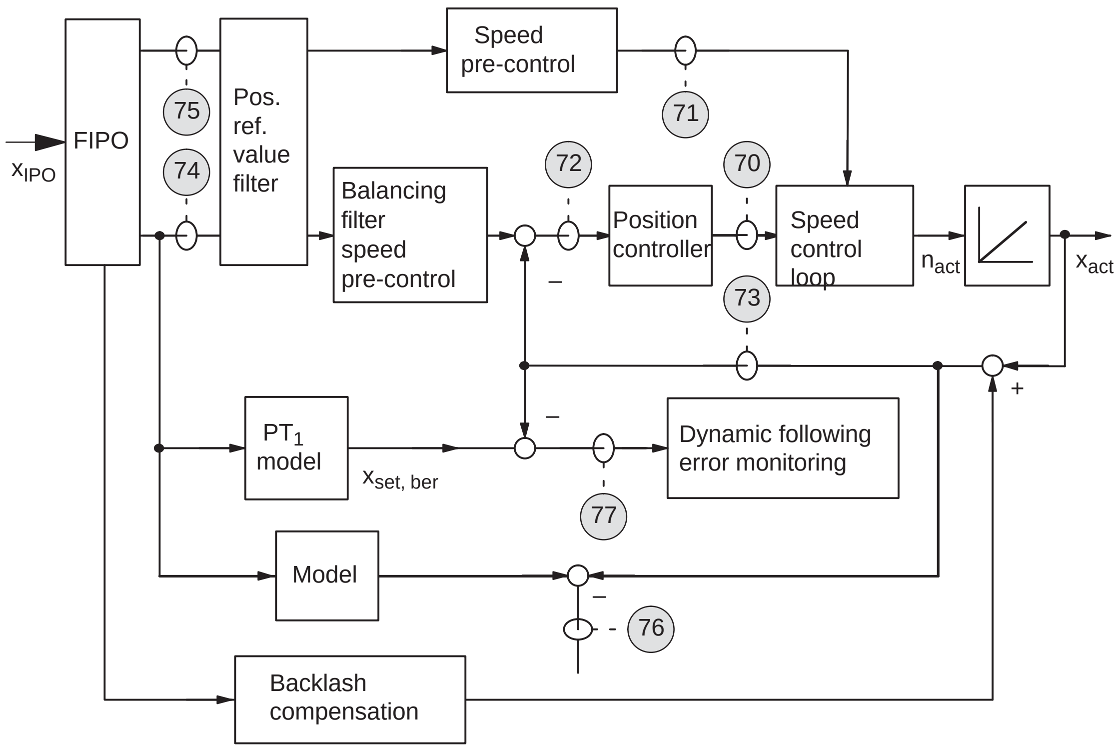
Where are the signals taken from?

The most important measuring signals of the current and speed controller and the position controller are shown in Figs. 7-4 and 7-5 using the controller structures.



Signal No.	Signal name
2	Current actual value, phase U
3	Current actual value, phase V
4	Field-generating current actual value I_d
5	Torque generating current actual value I_q
6	Current setpoint I_q (in front of the filter)
7	Current setpoint I_q (limited after the filter)
8	Speed actual value motor (SRM, ARM), velocity actual value motor (SLM)
9	Speed setpoint (SRM, ARM), velocity setpoint (SLM)
11	Torque setpoint (SRM, ARM), force setpoint (SLM)
17	Quadrature-axis voltage V_q
18	Direct-axis voltage V_d

Fig. 7-4 Measuring signals for the current and speed control loop



Signal No.	Signal name
70	Output, position controller
71	Pre-control speed
72	System deviation, position controller input
73	Position actual value
74	Position reference value
75	Velocity setpoint IPO
76	Following error
77	Following error, dynamic model

Fig. 7-5 Measuring signals for the position control loop

Shift factor

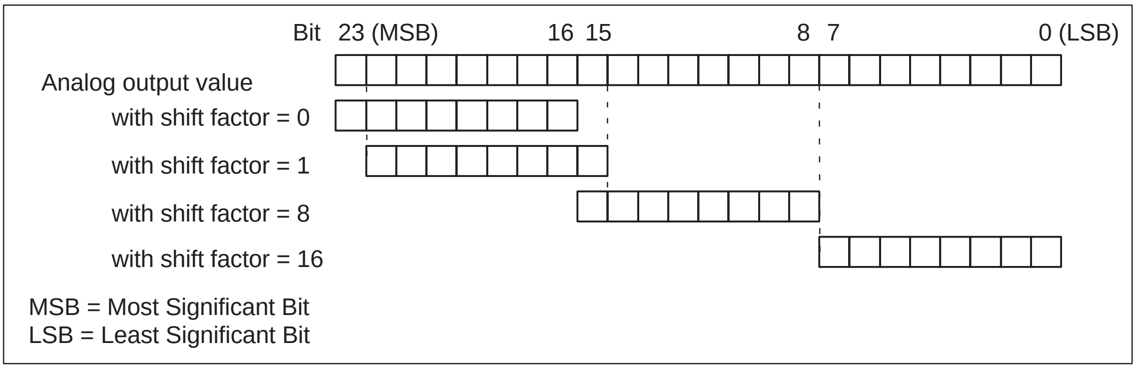


Fig. 7-6 Shift factor for analog output of 24-bit signals

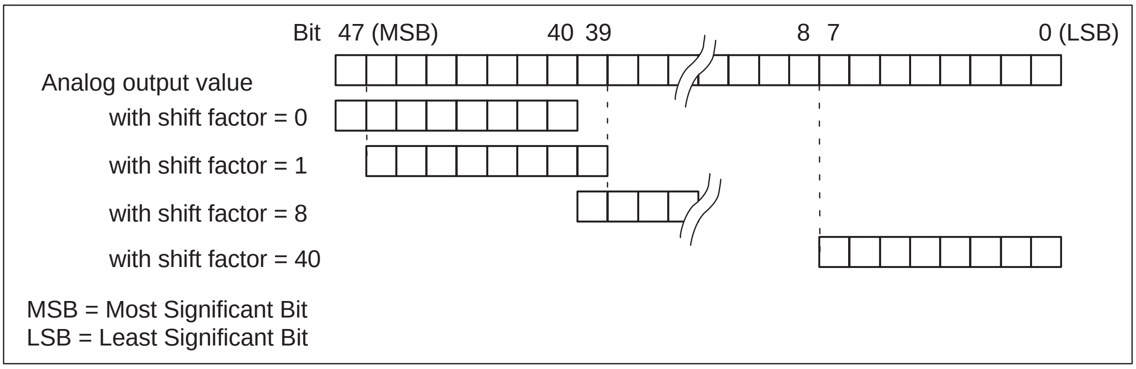


Fig. 7-7 Shift factor for analog output of 48-bit signals

Voltage range

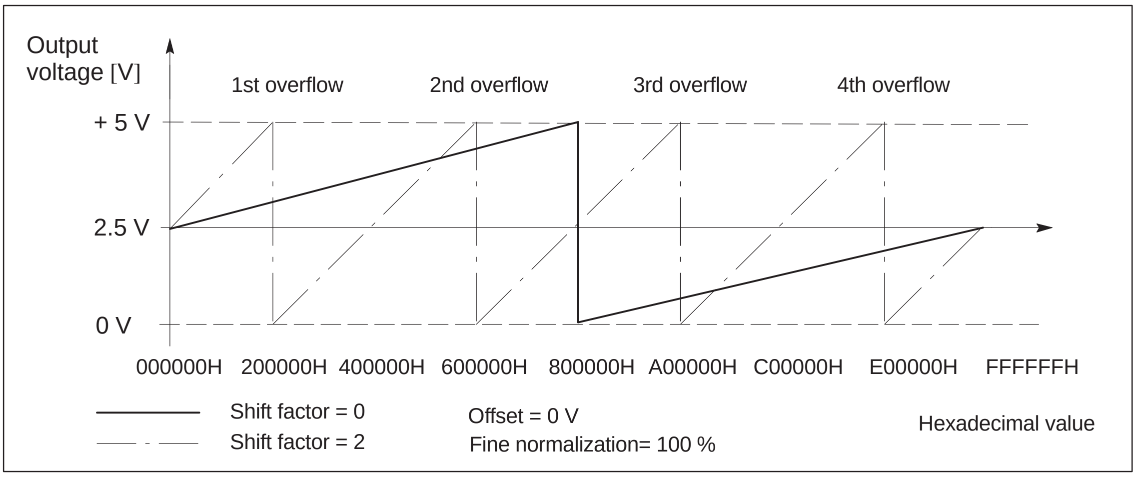


Fig. 7-8 Voltage range for test sockets

7

7.3.4 Measurement function

Overview

Using the measuring function, by using simple parameterization, the influence of higher-level control circuits can be disabled and the dynamic performance of the individual drives can be displayed without using any external measuring equipment.
This means that it is possible to evaluate and analyze important quantities of the current and speed control loop in the time and frequency domains.

Measuring principle

Test signals with a selectable time interval are input into the drives to determine the measured values for graphic display of the time and frequency characteristics of drives and closed-loop control functions.

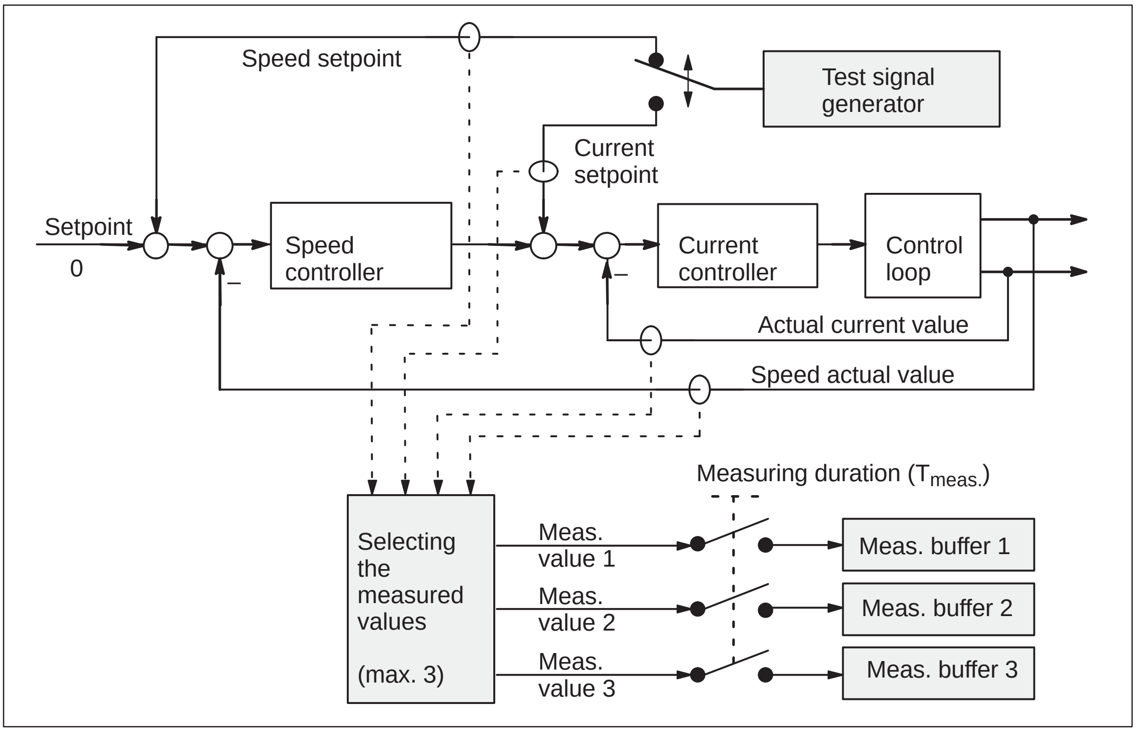


Fig. 7-9 Block diagram of the drive optimization (schematic)

Reader's note

The measuring function can only be used in conjunction with the "SimoCom U" parameterizing and start-up tool, i.e. "SimoCom U" is used to control the measuring function and display the measured values.

Additional information on the measuring function is available in the online help for "SimoCom U".

7.4 V/Hz operation (diagnostics function; only for POSMO CD/CA)

Description

V/Hz operation allows the following motors to be used:

- Induction motors without encoder evaluation
- 1FK6/1FT6 feed motors without encoder evaluation

Note

The V/Hz operation is exclusively provided for diagnostics purposes for synchronous (SRM) and induction motors (ARM).

V/Hz operation may only be used for drive converter switching (operating) frequencies (P1100) of 4 or 8 kHz. After changing P1100, ”calculate controller data” must be re-executed.

For operation with encoder, the speed actual value from the measuring system is displayed, and for operation without encoder, a calculated speed actual value.

7

7.4.1 V/Hz operation with induction motors (ARM)

Commissioning

For V/Hz operation, it is first necessary to carry-out the standard commissioning for an induction motor with motor selection to obtain practical pre-assignment values (default values) for all of the parameters.
If a motor measuring system is not used, then ”no encoder” must be selected as the encoder type.

As ”unlisted motors” are generally used, for simple sensorless (no encoder) operation, the rating plate data should be entered and **the ”calculate equivalent circuit diagram data”** and **”calculate controller data” functions** executed.

V/Hz operation is then activated using P1014 = 1.

Parameters for V/Hz operation with induction motors (ARM)

For V/Hz operation with induction motors, the following parameters are available:

Table 7-7 Parameters for V/Hz operation with ARM

Parameter	Name
P1014	Activating V/Hz operation
P1125	Ramp-up time 1 for V/Hz operation
P1127	Voltage at f = 0, V/Hz operation
P1132	Rated motor voltage

Table 7-7 Parameters for V/Hz operation with ARM, continued

Parameter	Name
P1134	Rated motor frequency
P1146	Maximum motor speed
P1103	Rated motor current
P1238	Current limit value
P1400	Rated motor speed
P1401	Speed for the max. useful motor speed
P1405	Monitoring speed, motor

V/Hz characteristic ARM

The speed setpoint is converted into the frequency to be used as reference, taking into account the pole pair number, which is determined from the rated motor frequency and rated motor speed.
This means the synchronous frequency, associated with the speed setpoint, is output (no slip compensation)

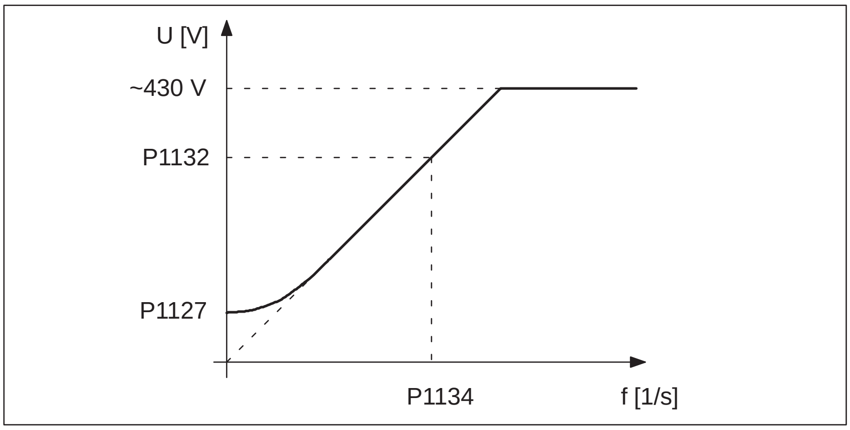


Fig. 7-10 V/Hz characteristic ARM

Ramp-up time

The ramp-up time can be set via P1125.

7.4.2 V/Hz operation with synchronous motors (SRM)

Commissioning

For synchronous motors, V/Hz operation is only used for diagnostic purposes.

In this case, the standard commissioning must first be executed with motor selection, to obtain practical pre-assignment values for all of the motor data.

V/Hz operation is then activated using P1014 = 1.

Parameters for V/Hz operation with synchronous motors (SRM)

For V/Hz operation with synchronous motors, the following parameters are available:

Table 7-8 Parameter V/Hz operation with 1FK6/1FT6 motors (SRM)

Parameter	Name
P1014	Activating V/Hz operation
P1104	Maximum motor current
P1105	Reduced maximum motor current
P1112	Motor pole pair number
P1114	Voltage constant
P1125	Ramp-up time 1 for V/Hz operation
P1400	Rated motor speed
P1401	Speed for the max. useful motor speed
P1405	Monitoring speed, motor

V/Hz characteristic SRM

The speed setpoint conversion into the frequency to be used as reference is obtained from the pole pair number.

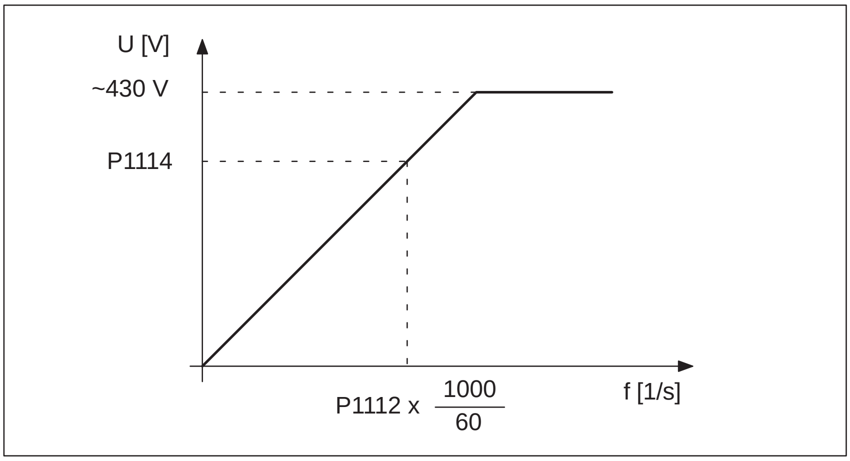


Fig. 7-11 V/Hz characteristic SRM

Generally, only speeds up to approx. 25% of the rated speed can be reached due to the strong tendency for synchronous motors to oscillate in the V/Hz mode.

Ramp-up times

The ramp-up time can be set via P1125.

7

7.4.3 Parameters for V/Hz operation

Parameter overview

The following parameters are available for V/Hz operation:

Table 7-9 Parameter overview for V/Hz operation

Parameter						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1014	Activating V/Hz operation	0	0	1	–	PO
	... V/Hz operation for this drive is activated/de-activated. = 1 V/Hz operation is activated = 0 V/Hz operation is de-activated					
1125	Ramp-up time 1 for V/Hz operation	0.01	5.0	100.0	s	Immediately
	When V/Hz operation is activated, this is the time in which the speed setpoint is changed from 0 to the maximum motor speed (P1146).					
1127	Voltage at f = 0 V/Hz operation (ARM)	0.0	2.0	20.0	V(pk)	Immediately
	When V/Hz operation is activated, and at 0 frequency, the voltage which is output is increased by the value in this parameter. **Note:** The parameter is preset when carrying-out the "calculate controller data" function.					

■

8 Installation and Service

8.1 Diagnostics

Diagnostics LED

There is a two-color LED on the PROFIBUS unit for diagnostics which signals the following statuses coded (refer to Table 8-1):

Table 8-1 What does an LED mean when it is bright?

Status of the LED display	Communications possible?	What status does the drive have? What are the fault possibilities?
Off	no	• The unit is powered down
Red steady light	no	• Fatal HW defect, CPU has failed • Briefly after power-on, even if the unit is OK and it then goes dark after the unit has completely run up
Red flashing light	yes	• Fault present, drive is not ready • Read out the fault number (refer to Chapter 7.2.2)
Red/yellow alternating flashing light	no	• PROFIBUS interface in the module has failed
Fast red/green alternating flashing light	yes	• Memory module requires a firmware upgrade
Red/green alternating flashing light	yes	• No connection to an active PROFIBUS node, Class 1
Green steady light	yes	• Connection to an active PROFIBUS node, Class 1
Green flashing light	no	• Transient status at run-up, bus being initialized (baud rate adjustment, wait for parameterizing and configuration telegram) • If this status is not exited: – Check the bus cables – Check the PROFIBUS address (refer to Chapter 2.4.6) – Check why a parameterizing telegram is not sent
Yellow steady light	yes	• Incorrect configuration telegram was received at run-up, send a corrected configuration telegram (see Chapter 5.7)
Yellow flashing light	yes	• Incorrect parameterizing telegram was received at run-up, send a corrected parameterizing telegram (see Chapter 5.7)
Yellow/green alternating flashing light	yes	• Transient status, in which a task (request) of an active PROFIBUS node, Class 2 is being processed

8.2 Replacing the memory board

General information

For POSMO SI and POSMO CD/CA, the memory board should be used in the same way.

A flash EPROM is mounted on the memory board, in which the drive firmware and machine data are saved.

When POSMO SI/CD/CA has to be replaced, the memory board can be transferred from the old POSMO SI/CD/CA to the new unit.

This means that the system software can be transferred over with the user files without requiring any other resources.

The parameters must be reloaded if the memory board is defective. This is realized via PROFIBUS, either from the central control or from a PC/PG.

The memory board is already installed when shipped from the factory.

How is the memory board replaced?

A memory board is inserted/replaced as follows:

Warning

The PROFIBUS unit may only be withdrawn and inserted when the power feed has been completely disconnected. The 24 V external power supply for the electronics is kept in order to maintain PROFIBUS communications to other nodes (stations).

The ESDS measures must be observed when installing/removing the memory module.

1. Remove the PROFIBUS unit
   ⇒ Release the three retaining screws and withdrawn the PROFIBUS
   unit (refer to Figs. 8-1 and 8-2)
   ⇒ Only POSMO SI: Remove the adhesive foil from the memory module!
   – Screwdriver for the PROFIBUS unit Size 4 (1.0 x 6.5)
2. Release the two retaining screws of the memory board and remove the memory board from the guide rails.
   – Screwdriver for the memory module Size 2 (0.6 x 4.0)
3. Insert the new memory board and retain using the two screws.
   ⇒ Only POSMO SI: Re-attach the adhesive foil
4. Mount the PROFIBUS unit in the reverse sequence (for screws: max. tightening torque =1.8 Nm).

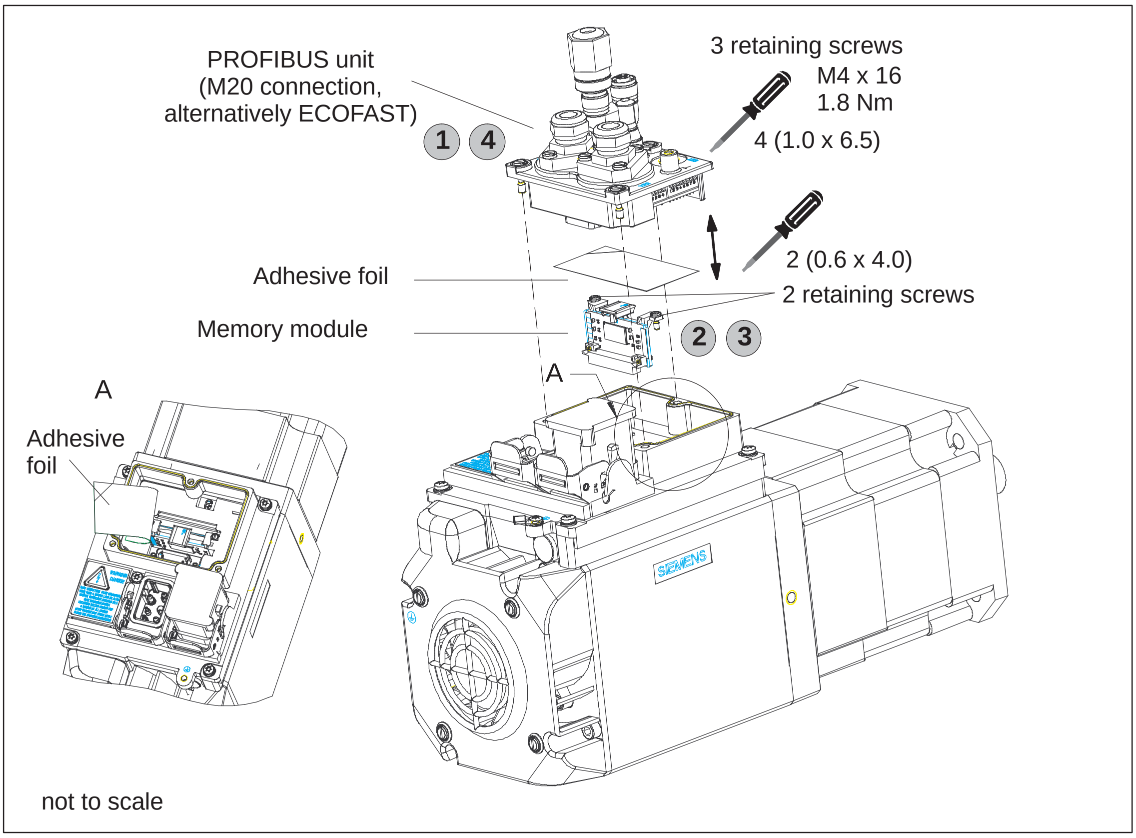


Fig. 8-1 Replacing the memory board for POSMO SI

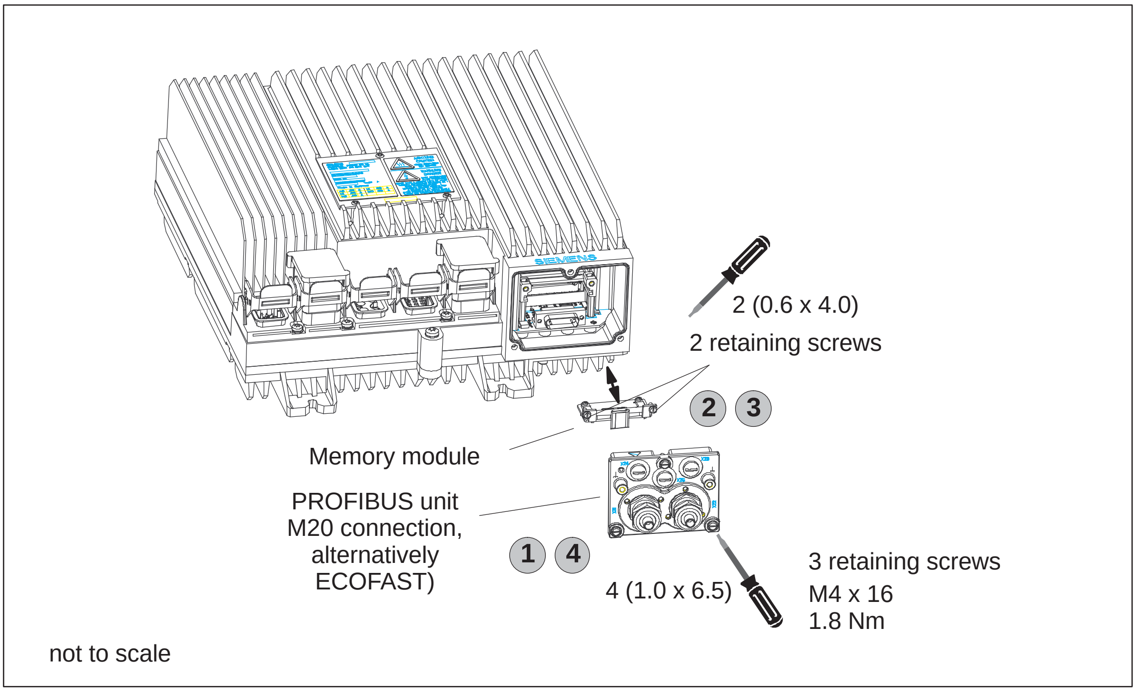


Fig. 8-2 Replacing the memory board for POSMO CD and POSMO CA

8

8.3 Replacing the PROFIBUS unit

Order No. (MLFB)

The spare part PROFIBUS unit has the following Order No.:

- Spare part, PROFIBUS unit CU-PG: 6SN2414–1AA00–0AA1
- Spare part, PROFIBUS unit ECOFAST: 6SN2414–1AB00–0AA1

What is required when replacing the units?

The following are required to replace the PROFIBUS unit:

1. Tools
   – Screwdriver for the PROFIBUS unit Size 4 (1.0 x 6.5)
2. New PROFIBUS unit

What is the procedure when replacing?

For POSMO SI/CD/CA, the sequence when replacing the PROFIBUS unit is as follows:

Warning

It is not permissible to withdraw and insert the PROFIBUS unit as well as the power cable under voltage. The reason for this is that the line must first have been brought into a no-voltage condition before replacing the PROFIBUS unit.

Warning

Protect open drives against any dirt.

1. Switch the drive line into a no-voltage condition.
2. Withdraw the power supply and encoder cable.
3. Release the three screws retaining the PROFIBUS unit to the drive unit and remove the PROFIBUS unit
   – Screwdriver for the PROFIBUS unit Size 4 (1.0 x 6.5)
   – POSMO SI —> refer to Fig. 8-1
   – POSMO CD/CA —> refer to Fig. 8-2
4. Replacing the PROFIBUS unit
5. Insert the new PROFIBUS unit and the power supply cable in the inverse sequence.
   (For screws: max. tightening torque =1.8 Nm).

Note

Before the new PROFIBUS unit is mounted, the PROFIBUS address must be set, and if required, the PROFIBUS terminating resistor —> see Chapter 2.4.6.

8.4 Replacing POSMO CD/CA

What has to be observed when replacing the drive unit?

When replacing the unit, the memory board from the unit being replaced can be used. The prerequisite is that the memory board is intact. This means that the unit can be replaced without having to use any equipment (PC or PG).

If the memory module is defective, this can be replaced according to Chapter 8.2. The machine parameters must be re-loaded. This can either be realized via PROFIBUS, either from the central control or from a PC/PG.

Warning

It is not permissible to withdraw and insert the PROFIBUS unit as well as the power and motor cables under voltage. The reason for this is that the line must have been brought into a no-voltage condition before replacing a drive.

What is required when replacing the units?

The following are required to replace the POSMO CD/CA:

1. Tools
   – Screwdriver for the unit
   – Screwdriver for the PROFIBUS unit Size 4 (1.0 x 6.5)
   – Screwdriver for the memory module Size 2 (0.6 x 4.0)
2. New POSMO CD/CA
3. Parameter set of the old POSMO CD/CA if the memory module is defective (save and keep ready)

8

What is the procedure when replacing?

To replace the POSMO CD/CA proceed as follows:

Warning

Protect open drives against any dirt.

---

1. Switch the drive line into a no-voltage condition.
2. Withdraw the power supply and encoder cable.
3. Release the three screws retaining the PROFIBUS unit to the drive and remove the PROFIBUS unit (refer to Chapter 8.2).
   – Tool Screwdriver, Size 4 (1.0 x 6.5)
4. Release the two retaining screws for the memory module and withdraw the memory module from the guide rails (refer to Chapter 8.2).
   – Tool Screwdriver, Size 2 (0,6 x 4,0)
5. Replace the unit.
6. Re-insert the memory module into the new unit, mount the PROFIBUS unit and insert the cables.
   (For screws: max. tightening torque =1.8 Nm).

Addresses to return POSMO CD/CA

Refer to Chapter 8.6, under ”Addresses to return POSMO SI” for the address of your regional spare parts department.

8.5 Replacing the drive unit for POSMO SI

Order No. (MLFB)

The spare drive unit has the following Order No.:

Table 8-2 Spare part, POSMO SI drive unit

Order No. of the spare drive unit	Weight	Belongs to POSMO SI
6SN2414–2DE00–0BA1	3.9 kg	6SN2460–2□F00–0G□□
		6SN2463–2□F00–0G□□
6SN2414–2DF00–0BA1	5.2 kg	6SN2480–2□F00–0G□□
		6SN2483–2□F00–0G□□
6SN2414–2DG00–0CA1		6SN2500–2□F00–0G□□

What has to be observed when replacing the drive unit?

When replacing the drive unit, the memory board from the unit to be replaced can be used. The prerequisite is that the memory board is intact. This means that the unit can be replaced without having to use any equipment (PC or PG).

If the memory module is defective, this can be replaced according to Chapter 8.2. The machine parameters must be re-loaded. This can either be realized via PROFIBUS, either from the central control or from a PC/PG.

8

Warning

It is not permissible to withdraw and insert the PROFIBUS unit as well as the power cable under voltage, as the line must be switched into a no-voltage condition when replacing the PROFIBUS unit.

What is required when replacing the units?

The following are required to replace the drive unit:

1. Tools
   – Screwdriver for the PROFIBUS unit Size 4 (1.0 x 6.5)
   – Screwdriver for the memory module Size 2 (0.6 x 4.0)
   – Allen key SW 5
2. New drive unit
3. Parameter set of the old drive unit if the memory module is defective (save and keep ready)

What is the procedure when replacing?

The drive unit is replaced as follows:

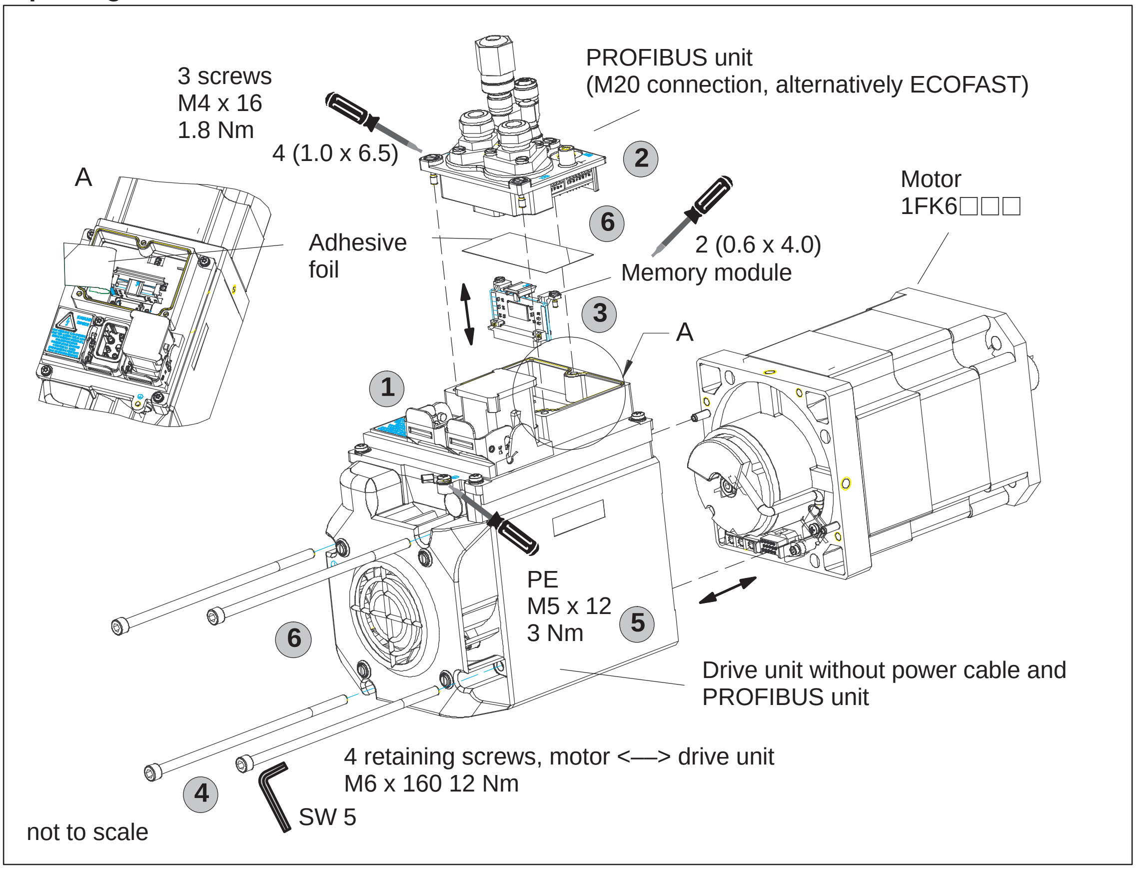


Fig. 8-3 Replacing the POSMO SI drive unit

1. Switch the drive line into a no-voltage condition. Remove the power supply cable.
2. Release the three screws retaining the PROFIBUS unit to the drive unit and remove the PROFIBUS unit
   – Tool Screwdriver, Size 4 (1.0 x 6.5)
3. Remove the adhesive foil from the memory module. Release the two retaining screws of the memory board and remove the memory board from the guide rails.
   – Tool Screwdriver, Size 2 (0,6 x 4,0)

Note

The appropriate ESDS measures must be carefully observed!

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4. Release the four screws between the drive unit and 1FK6□□□ motor.
   – Tool Allen key SW 5
5. Replace the drive unit.
6. Re-assemble the new drive unit with 1FK6□□□ motor and insert the memory module (then re-attach the foil), the PROFIBUS unit and power supply cable.
   – Tool Allen key SW 5
   – Tool Screwdriver, Size 4 (1.0 x 6.5)
   – Tool Screwdriver, Size 2 (0,6 x 4,0)
   – Tighten the screws alternating diagonally
   – When screwing the drive unit to the 1FK6□□□ motor: Tightening torque of the screws 12 Nm ± 1 Nm

Addresses to return the drive unit

Refer to Chapter 8.6, under ”Addresses to return POSMO SI” for the address of your regional spare parts department.

8.6 Replacing the motor for a POSMO SI unit

If the 1FK6 motor is defective, then the complete POSMO SI must be replaced.

When mounting a new POSMO SI, refer to Chapter 2.1.2 and 2.2.

Addresses to return POSMO SI

You can also obtain the address of your local regional spare parts center at the following Internet address

When completely replacing the POSMO SI proceed as follows.

Return the defective POSMO SI to:

- Address: Refer under http://www.siemens.com/automation/partner
- Product group: SIMODRIVE

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8.7 Replacing the integrated fan for POSMO SI

Order No. (MLFB)

The spare integrated fan has the following Order No.:

Order No. (MLFB): 6SN2414–2EE00–0AA0

Warning

The fan may only be replaced if the power supply is powered down and the fan is no longer rotating!

What is required when replacing the units?

The following are required to replace the drive unit:

1. Tools
   – Screwdriver Size 4 (1.0 x 6.5)
2. New, integrated fan

What is the procedure when replacing?

The integrated fan is replaced as as follows:

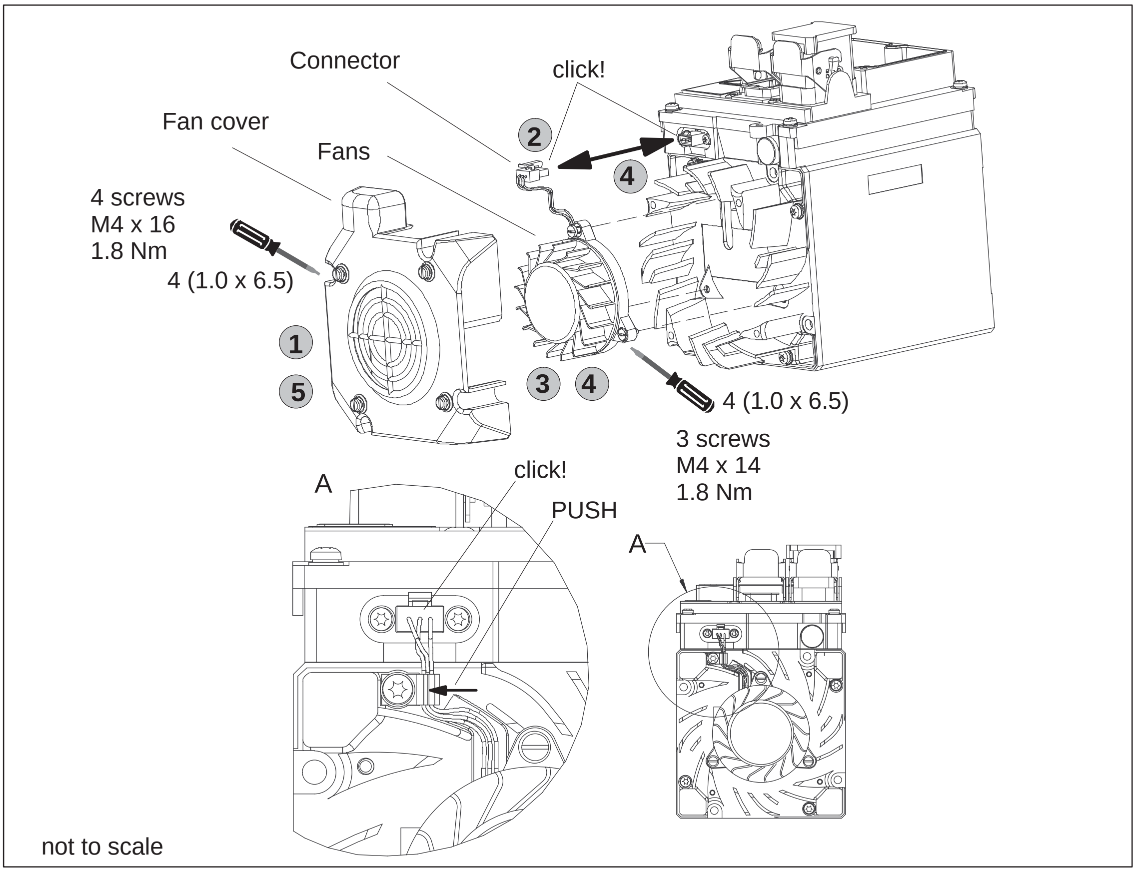

Fig. 8-4 Replacing the integrated fan for POSMO SI

Warning

Protect open drives against any dirt.

1. Release the four screws from the fan cover and remove the fan cover.
   – Tool Screwdriver, Size 4 (1.0 x 6.5)
2. Release the fan electrical connection (release the plug connector).
3. Release the three screws from the fan and remove the fan.
   Remove any accumulated dirt from parts on the equipment side.
   – Tool Screwdriver, Size 4 (1.0 x 6.5)
4. Install the new fan in the inverse sequence and connect-up.
5. Remount the cover using the four screws
   (for screws: max. tightening torque =1.8 Nm).

8.8 Checking the dc link capacitors of SIMODRIVE Power Modules

Caution

The dc link capacitors have to be reformed when the units have been operated for more than two years. If this is omitted, the units may be damaged when being switched on.

The date of manufacture is specified as ident number on the namepla-te.

Note

Please note that the storage time is calculated beginning with the date of manufacture instead of the delivery date.

Procedure

Pleae contact your local Siemens service manager.

■

Lists

A

A.1 Parameter list

General information on the parameter list

The parameters are listed as follows:

	Significance (examples)
P1400	Parameter 1400 without sub-parameter
P1401:8	Parameter 1401 with sub-parameter
	:8 Sub-parameter for parameter sets
P0081:64	Parameter 0081 with sub-parameter
	:64 Sub-parameter for traversing blocks

	Valid for ... motors
none	all
SRM	rotating synchronous
ARM	rotating induction
SLM	synchronous linear

Parameter numbers — Parameter text — Motor dependency

xxxx word_word word_word word_word (yyy)

Min	Standard	Max	Units	Data type	Effective	(yyy)
xx	xx	xx	yy	zz	uu	

Units

- MSR: Dimension system grid

  1 MSR = 0.001 mm for P0100 = 1
  1 MSR = 0.0001 inch for P0100 = 2
  1 MSR = 0.001 degrees for P0100 = 3

- c * MSR

  c = 1: for a dimension system mm or inch
  c = 10: for a dimension system, degrees

Example:

P0082:64 = 50 000 [c*MSR/min]

	Dimens. system	Significance
—>	mm	50 mm/min
—>	inch	5 inch/min
—>	degrees	500 degrees/min

- RO (Read Only) can only be read
- immed. is effective immediately when changed
- PO POWER ON when changed, becomes effective after POWER ON
- PrgE End of program is effective if none of the programs (block processing) are active
- Vsoll_0 Velocity setpoint zero Effective for a velocity setpoint = 0

Information on effective
In order that a parameter "immediately" becomes effective after a change, it may be necessary to execute the associated function (e.g. P0160 (reference point coordinates) a reference point approach must be carried out).

Fig. A-1 Parameter list

Parameter list The following parameters are available for SIMODRIVE POSMO SI/CD/CA:

Version: 09.02.04

0001 Actual traversing block – block number

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Integer16	RO

... in the ”Positioning” mode and for the ”spindle positioning” function it specifies the block number of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0080:64

0002 Actual traversing block – position

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”Positioning” mode and for the ”spindle positioning” function it specifies the programmed position of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0081:64

0003 Actual traversing block – velocity

Min	Standard	Max	Unit	Data type	Effective
–	–	–	c*MSR/min	Unsigned32	RO

... in the ”Positioning” mode and for the ”spindle positioning” function it specifies the programmed velocity of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0082:64

0004 Actual traversing block – acceleration override

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Unsigned16	RO

... in the ”Positioning” mode and for the ”Spindle positioning” function it specifies the programmed acceleration override of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0083:64

0005 Actual traversing block – deceleration override

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Unsigned16	RO

... in the ”Positioning” mode and for the ”Spindle positioning” function it specifies the programmed deceleration override of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0084:64

0006 Actual traversing block – command

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... in the ”Positioning” mode specifies the programmed command of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0085:64

0007 Actual traversing block – command parameter

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... in the ”Positioning” mode specifies the programmed command parameter of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0086:64

0008 Actual traversing block – mode

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... in the ”Positioning” mode and for the ”Spindle positioning” function it specifies the programmed mode of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0087:64

0020 Position setpoint

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual absolute reference position.

0021 Position actual value

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual system deviation (reference value – actual difference) at the absolute actual position.

0022 Distance to go

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... indicates the distance to go in the operating mode ”positioning” and for the function ”spindle positioning”.
The distance to go is the difference up to the end of the actual traversing block (P0001).

0023 Velocity setpoint

Min	Standard	Max	Unit	Data type	Effective
–	–	–	c*MSR/min	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual system deviation (reference value – actual difference) at the actual setpoint – traversing velocity.

0024 Actual velocity

Min	Standard	Max	Unit	Data type	Effective
–	–	–	c*MSR/min	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual traversing velocity.

0025 Effective override

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... in the ”Positioning” mode displays the actual, effective velocity override.
Note:
The currently effective override can differ from the specified override due to limits (e. g. P0102 (maximum velocity)).

0026 Position actual value, external block change

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... displays, in the ”Positioning” mode, the position actual value displayed when an edge is detected at the ”External block change” input signal.
Note:
The parameter is reset when starting a traversing block with the block change enable CONTINUE EXTERNAL.
refer to the index entry ”block step enable – CONTINUE EXTERNAL”

0029 Following error

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual following error.
The following error is the difference between the position setpoint (before the position setpoint filter, interpolator output) and the position actual value.
Note: refer to the index entry ”Kv factor” or ”Analog signals for the position control loop”

0030 Control deviation, position controller input

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual system deviation (reference value – actual difference) at the position controller input.
Note: refer to the index entry ”Kv factor” or ”Analog signals for the position control loop”

0031 Actual Kv factor (position loop gain)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	1000/min	Floating Point	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actually available (measured) Kv factor.
Example:
A Kv factor = 1 is set in P0200:8.
When traversing the axis, the current (measured) Kv factor is calculated and displayed in this parameter.
Note:
The actual Kv factor display (P0031) can have large values at low velocities due to the rounding-off errors.
At standstill, the selected (required) Kv factor (P0200:8) is displayed.

0032 Position reference value, external (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... displays the externally entered position reference value.
Note:
The quantities of P0895 to P0897 are incorporated in P0032.
refer under the index entry ”axis couplings”

0079 Reformat memory

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... the memory can be reformated for the traversing blocks, i.e. re-segmented.
0 inactive, initial status
0 –> 1 Re-format memory is initiated
Advantages of a re-formatted memory:
When displaying the blocks via SimoCom U, the blocks are located at the beginning of the memory, are sorted according to increasing block numbers, and there are no gaps.
Note:
The parameter is automatically reset to 0 when reformating has been completed.

0080:64 Block number

Min	Standard	Max	Unit	Data type	Effective
–1	–1	63	–	Integer16	PrgE

A traversing block must be assigned a valid block number, so that it can be started.
–1 invalid block number
0 to 63 valid block number
The block change enable itself is saved in the traversing block in P0087:64 (mode block change enable).
Several blocks (e. g. for blocks with the block step enable CONTINUE FLYING) are processed in the increasing sequence of the block numbers.
The block number must be unique over all traversing blocks.
Note: refer to the index entry ”Traversing blocks”

0081:64 Position

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	PrgE

... specifies the target position in the traversing block.
The target position is approached dependent on P0087:64 (mode positioning mode).
Note: refer to the index entry ”Traversing blocks”

0082:64 Velocity

Min	Standard	Max	Unit	Data type	Effective
1000	600000	2000000000	c*MSR/min	Unsigned32	PrgE

... defines the velocity, with which the target position is approached.
Note: refer to the index entry ”Traversing blocks”

0083:64 Acceleration override

Min	Standard	Max	Unit	Data type	Effective
1	100	100	%	Unsigned16	PrgE

... specifies which override has an effect on the maximum acceleration (P0103).
Note: refer to the index entry ”Traversing blocks”

0084:64 Deceleration override

Min	Standard	Max	Unit	Data type	Effective
1	100	100	%	Unsigned16	PrgE

... specifies which override has an effect on the maximum deceleration (P0104).
Note: refer to the index entry ”Traversing blocks”

0085:64 Command

Min	Standard	Max	Unit	Data type	Effective
1	1	10	–	Unsigned16	PrgE

Each traversing block must contain precisely one command for execution.

Value	Command
1	POSITIONING
2	ENDLESSTRAVERSING_POS
3	ENDLESSTRAVERSING_NEG
4	WAIT
5	GOTO
6	SET_O
7	RESET_O
8	FIXED ENDSTOP
9	COUPLING_IN (from SW 4.1)
10	COUPLING_OUT (from SW 4.1)

Depending on the command, additional block information is required in a traversing block.
Note:
refer to the index entry "Traversing blocks" or "Command-dependent block information"

0086:64 Command parameter

Min	Standard	Max	Unit	Data type	Effective
0	1	65535	–	Unsigned16	PrgE

... specifies the supplementary block information required for the following commands.

Command	Additional information
WAIT	Waiting time in ms
GOTO	Block number
SET_O	1, 2, 3: Set direct output 1, 2 or 3 (both signals)
RESET_O	1, 2, 3: Reset direct output 1, 2 or 3 (both signals)
FIXED ENDSTOP	Clamping torque or clamping force Rotary drive: 1 – 655 35 [0.01 Nm] Linear drive: 1 – 65 535 [N]

Note:
refer to the index entry "Traversing blocks" or "Command-dependent block information"

0087:64 Mode

Min	Standard	Max	Unit	Data type	Effective
0	0	1331	Hex	Unsigned16	PrgE

... specifies the following additional information for several commands.
P0087:64 = UVWX
U
Bit 0 Target position source for spindle positioning (from SW 5.1)
= 0 Target position via traversing block (P0081)
= 1 Target position via PROFIBUS (STW XSP, being prepared)
V Block step enable function
= 0 END (standard)
= 1 CONTINUE WITH STOP
= 2 CONTINUE FLYING
= 3 CONTINUE EXTERNAL
W Positioning mode
= 0 ABSOLUTE (standard)
= 1 RELATIVE
= 2 ABS_POS (only for modulo rotary axis)
= 3 ABS_NEG (only for modulo rotary axis)
X Identifications
= 1 Suppress block
Note: refer to the index entry ”Traversing blocks”

0091 MDI position (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	Vsoet_0

... specifies the target position in the MDI traversing block.
The value, entered here, is used if the position is not entered as cycle process data (refer to P0915) via PROFIBUS.
The target position is approached dependent on P0097 (mode – positioning modoe).
Note:
The parameter is not effective for Vset_0 if P0110 = 3 and P0097 = U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

A

0092 MDI velocity (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
1000	3000	2000000000	c*MSR/min	Unsigned32	Vsoet_0

... defines the velocity with which the MDI target position is approached.
The value, entered here, is used if the velocity is not entered as cycle process data (refer to P0915) via PROFIBUS.
Note:
The parameter is not effective for Vset_0 if P0110 = 3 and P0097 = U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

0093 MDI acceleration override (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
1	100	100	%	Unsigned16	Vsoet_0

... specifies which override is effective for the MDI block at the maximum acceleration (P0103). The value, entered here, is used if the acceleration override is not entered as cycle process data (refer to P0915) via PROFIBUS
Note:
The parameter is not effective for Vset_0 if P0110 = 3 and P0097 = U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

0094 MDI deceleration override (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
1	100	100	%	Unsigned16	Vsoet_0

... specifies which override is effective for the MDI block at the maximum deceleration (P0103). The value, entered here, is used if the acceleration override is not entered as cycle process data (refer to P0915) via PROFIBUS
Note:
The parameter is not effective for Vset_0 if P0110 = 3 and P0097 = U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

0097 MDI mode (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
0	310	330	Hex	Unsigned16	Vsoet_0

... for several commands, for the MDI block it provides the following additional information.
P0097 = VMX
V Block step enable function
= 0 END
= 3 CONTINUE EXTERNAL (Standard)
W Positioning mode
= 0 ABSOLUTE
= 1 RELATIVE (standard)
= 2 ABS_POS (only for modulo rotary axis)
= 3 ABS_NEG (only for modulo rotary axis)
X Identifications
not relevant
Note:
The parameter is not effective for Vset_0 if P0110 = 3 and P0097 = U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

0100 Dimension system

Min	Standard	Max	Unit	Data type	Effective
1	1	3	–	Unsigned16	PO

... specifies the measuring system grid pattern (MSR) which is being used.
1 —> 1 MSR = 1/1000 mm
2 —> 1 MSR = 1/10000 inch
3 —> 1 MSR = 1/1000 degrees
Example: P0100 = 1 —> 345123 MSR = 345.123 mm
Note: refer to the index entry ”Dimension system”

0101 Actual dimension system

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays the currently active measuring system.
If at POWER ON it is identified that P0100 is not equal to P0101, then a measuring system changeover is automatically executed.
Note: refer to the index entry ”Dimension system”

0102 Maximum motor velocity

Min	Standard	Max	Unit	Data type	Effective
1000	30000000	2000000000	c*MSR/min	Unsigned32	immed.

... defines the maximum traversing velocity of the axis, in the mode ”Positioning” and ”n-set, when selecting spindle positioning”
Note: Refer under the index entry ”Closed-loop position control” and ”Spindle positioning ”

0103 Maximum acceleration

Min	Standard	Max	Unit	Data type	Effective
1	100	999999	$1000MSR/s^2$	Unsigned32	Vsoet_0

... defines the maximum acceleration acting on the axis/spindle when approaching.
The effective acceleration can be programmed in the traversing block via an override (P0083:64).
Note: refer to the index entry ”Position control”

0104 Maximum deceleration

Min	Standard	Max	Unit	Data type	Effective
1	100	999999	$1000MSR/s^2$	Unsigned32	Vsoet_0

... defines the maximum deceleration on the axis/spindle when braking.
The effective deceleration can be programmed in the traversing block via an override (P0084:64).
Note: refer to the index entry ”Position control”

0107 Jerk limiting

Min	Standard	Max	Unit	Data type	Effective
0	0	100000000	$1000MSR/s^2$	Unsigned32	Vsoet_0

... defines an increase (jerk) in the form of a ramp for acceleration and deceleration, so that approach and deceleration are ”smooth” (jerk-limited).
The duration of the acceleration ramp (jerk time) is calculated from the higher value of maximum acceleration (P0103) resp. maximum deceleration (P0104) and the jerk limitation set (P0107).
0 Jerk limiting off
> 0 Jerk limiting on, the set value is effective
Note:
– The calculated jerk time which is currently effective is displayed in P1726 (calculated jerk time).
– The jerk time is limited internally to 200 ms.
– refer to the index entry ”jerk limitation”

0108 Velocity setpoint jog 1

Min	Standard	Max	Unit	Data type	Effective
–2000000000	–300000	2000000000	c*MSR/min	Integer32	immed.

... defines which setpoint is used for jogging 1.
Note: refer to the input signal ”Jog 1 ON/Jog 1 OFF”

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0109 Velocity setpoint jog 2

Min	Standard	Max	Unit	Data type	Effective
–2000000000	300000	2000000000	c*MSR/min	Integer32	immed.

... defines which setpoint is used for jogging 2.
Note: refer to the input signal ”Jog 2 ON/Jog 2 OFF”

0110 Configuration, external block change

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	PrgE

... defines the behavior of the ”external block change”.

0
If the signal is not available up to start of braking, then the axis stops in front of the target position and a fault is output (standard).
1
If the signal is not available up to the start of braking, then a flying block change is executed.
2
A signal is only expected at the end of block, and a block change is only made after this has been identified.
3
If the signal is not present up to the end of the block, then the system waits for the signal and when this is identified, the block is changed (from SW 5.1).

Note:
A change made to P0110 is not accepted after v_set=0, but only at the end of the program when the traversing program is restarted.
refer to the index entry ”block step enable – CONTINUE EXTERNAL”

0113 Fixed endstop, configuration 1

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	immed.

... defines the behavior for fixed end stop/clamping torque not reached.

Bit 0 Behavior for fixed end stop not reached
Bit 0 = 1 Block change is executed
The torque limiting is automatically withdrawn. The block step enable is realized as programmed in the block.
Bit 0 = 0 Fault 145 is signaled
The axis is braked and stops in front of the programmed target position.

Bit 1 Characteristics for the clamping torque not reached
Bit 1 = 1 Warning 889 is signaled and a block change executed
The block step enable is realized as programmed in the block.
Bit 1 = 0 Warning 889 is signaled
The block step enable changes as programmed in the block only when the clamping torque has been reached.

Note:
Fault 145 (fixed endstop not reached)
Warning 889 (fixed endstop, axis has not reached the clamping torque)
refer to the index entry ”Travel to endstop”

0114 Fixed endstop, configuration 2

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... defines how the system can switch into the status ”fixed endstop”.

0 above following error
The status is automatically reached if the following error exceeds the value set in P0115:8.

1 via input signal
The status is only reached, if it is identified via the input signal ”Fixed endstop sensor”.

Note:
refer to the index entry ”Travel to endstop”

0115:8 Fixed endstop, maximum following error

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000000	MSR	Integer32	immed.

... defines at which following error the ”fixed endstop reached” status is recognized.
The ”fixed endstop reached” status is automatically reached, if the following error exceeds the theoretically calculated following error by the value entered in P0115:8.

Note:
Prerequisite: P0114 = 0
refer to the index entry ”Travel to endstop”

0116:8 Fixed endstop, monitoring window

Min	Standard	Max	Unit	Data type	Effective
0	100	200000000	MSR	Integer32	immed.

... Defines the monitoring window for the ”fixed endstop reached” status. If the axis exits the positioning window an appropriate fault is signaled.
Note:
refer to the index entry ”Travel to endstop”

0118 Software limit switch configuration (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... defines which fault/warning is signaled if the axis comes to a standstill precisely at the software limit switch.

Bit 0 Behavior for software limit switch reached
Bit 0 = 1 Software limit switch reached with warning 849/850
Move away jogging in the opposite direction or via a traversing block
Bit 0 = 0 Software limit switch reached with fault 119/120
Move away in the opposite direction jogging, and acknowledge the fault.

0120 Teach-in block (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–1	–1	63	–	Integer16	immed.

... specifies whether the block number for the teach in block is entered via input signals or via P0120.
–1 Enter a block number via input signals
0 to 63 Enter the block number via P0120
Note:
refer under the index entry ”Teach-in”

A

0121 Teach-in standard block (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–1	–1	63	–	Integer16	immed.

... specifies which traversing block is used as teach in in the standard block
The standard block contains additional block data, which are not contained for teach-in.
–1 Not a standard block
Only the position value is transferred into the teach-in block.
0 to 63 Standard block
This block is transferred into the teach-in block and the position value overwritten.
Note:
refer under the index entry ”Teach-in”

0122 Jogging 1 increments (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000000	MSR	Integer32	immed.

... specifies the number of increments traversed for incremental jogging 1.
Note:
refer under the index entry ”Jogging – incremental”

0123 Jogging 2 increments (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000000	MSR	Integer32	immed.

... specifies the number of increments traversed for incremental jogging 2.
Note:
refer under the index entry ”Jogging – incremental”

0124 Teach-in configuration (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	Hex	Unsigned16	immed.

... specifies in which mode teach in is executed.

Bit 0 Automatic block change enable
In this mode, after each successful ”teach-in”, the teach-in block in P0120 is automatically increased.
Bit 0 = 1 On
Bit 0 = 0 Off

Bit 1 Automatic block search
In this mode at ”teach-in” a search is made for the block in P0120.
Bit 1 = 1 On
The block, entered in P0120 or the block selected via the input signals, is re-generated.
Bit 1 = 0 Off
A fault is initiated if the block in P0120 or the block selected via the input signals is not available.

Note:
refer under the index entry ”Teach-in”

0125 Spindle positioning active (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	PO

... switches the ”spindle positioning” function into the mode ”n-set” on/off.
0 De-activate spindle positioning
1 Activate spindle positioning
Note:
refer under the index entry ”Spindle positioning”

0126 Spindle positioning, zero mark tolerance window (BERO) (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	7200	360000	MSR	Unsigned32	immed.

... specifies the zero tolerance window in degrees, which is monitored by the spindle positioning, in order to secure, in conjunction with a BERO, the zero mark consistency. If the zero mark is not recognized, or if uneven zero mark clearances are measured which are outside the tolerance, then alarm message 186 or 193 is output, e.g. if the encoder cable is, for example, interrupted.
0 De-activate zero mark monitoring
>0 Zero mark monitoring is activated
Note:
refer under the index entry ”Spindle positioning”

0127 Spindle positioning, setting the internal zero mark (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed.

By setting bit 0 to 1, the zero mark offset to the hardware zero mark is entered into P0128. After this, 0 is written back into P0127.
Note:
refer under the index entry ”Spindle positioning”

0128 Spindle positioning offset, zero (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
–2147483647	0	2147483647	MSR	Integer32	immed.

Difference to the hardware zero mark is entered and displayed in degrees

0129 Spindle positioning, tolerance search velocity (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	1000000	2147483647	c*MSR/min	Unsigned32	immed.

This means that a tolerance in degrees/min (+/–) is specified, which must be reached in order to synchronize or to change-over to closed-loop position control
Note:
refer under the index entry ”Spindle positioning”

0130 Spindle positioning, lowest search velocity (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	100	100	%	Unsigned16	immed.

... is used to enter a percentage value referred to the specified minimum search velocity (P0082), which must be reached, so that the spindle can be positioned.
Note:
refer under the index entry ”Spindle positioning”

0131 Spindle positioning, motion window (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	2000	20000	MSR	Unsigned32	immed.

If, when the controller is inhibited, the spindle is pushed out of this tolerance window in Degrees, the position actual value is corrected/tracked. If the controller is then re-enabled, the spindle remains stationary at that position. A new positioning operation is only executed if ”spindle positioning” is activated (as defined in the traversing block). If the spindle remains in the motion window, then positioning is executed through the shortest path as soon as only the controller enable is re-set again.
Note:
refer under the index entry ”Spindle positioning”

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0132 Spindle positioning, zero mark difference (BERO) (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... indicates the clearance between two consecutive BERO zero marks in degrees.
Note:
refer under the index entry ”Spindle positioning”

0133 Spindle positioning, max. search velocity (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
1000	36000000	2147483647	c*MSR/min	Unsigned32	immed.

... defines the maximum reference velocity in degrees/min.
Note:
refer under the index entry ”Spindle positioning”

0134 Spindle positioning, positioning window reached (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	2000	20000	MSR	Unsigned32	immed.

... defines the tolerance range in degrees for the ”Spindle position reached” output signal (Fct. No. 59 or PROFIBUS-DP MeldW.15). The position reference value is compared with the position actual value.
Note:
refer under the index entry ”Spindle positioning”

0136 Spindle positioning active/inative (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... indicates whether the ”spindle positioning” function is active or inactive.
0 Spindle positioning is not active
1 Spindle positioning is active
Note:
refer under the index entry ”Spindle positioning”

0137 Spindle positioning status (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... indicates the actual status for spindle positioning.
0 Spindle positioning is not activated
1 Status after the spindle positioning command
2 reserved
3 Approach to search velocity, if necessary, the zero mark is searched for
4 Position controller is switched-in
5 Positioning starts
6 Target position is reached
7 Pulse inhibit
Note:
refer under the index entry ”Spindle positioning”

0160 Reference point coordinate

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... specifies the position value which is set as the actual axis position after referencing or adjustment.
Note:
The range for an absolute value encoder is limited to +–2048 revolutions. The value which was entered into P0160, is limited to this value and after POWER ON is overwritten with another value (remainder of division by 2048).
refer under the index entry ”Referencing/adjusting”

0161 Stopping at marks (–> 8.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PrgE

... defines the behavior when stopping at marks.
0 The reference point approach (homing) is not interrupted at marks (standard).
1 The reference point approach (homing) remains stationary if the first or, for distance-coded measuring systems, the second zero mark was found.

0162 Reference point offset

Min	Standard	Max	Unit	Data type	Effective
–200000000	–2000	200000000	MSR	Integer32	PrgE

For incremental measuring systems, after the reference zero pulse has been detected, the axis is moved through this distance. At this position the axis has reached the reference point and accepts the reference points coordinates (P0160) as new actual value.
Note: refer to the index entry ”Reference point approach”

0163 Reference point approach velocity

Min	Standard	Max	Unit	Data type	Effective
1000	5000000	2000000000	c*MSR/min	Unsigned32	PrgE

The axes moves with this velocity after starting reference point approach, towards the reference cam.
The velocity must be set, so that after the reference cam has been reached, and subsequent braking, the following conditions are fulfilled:
– the axis must come to a standstill direct at the reference cam
– when braking it is not permissible that the HW limit switch is reached
Note: refer to the index entry ”Reference point approach”

0164 Reference point creep speed

Min	Standard	Max	Unit	Data type	Effective
1000	300000	2000000000	c*MSR/min	Unsigned32	PrgE

Between identifying the reference cam and synchronization with the first zero pulse, the axis moves with this velocity (zero reference pulse).
Note: refer to the index entry ”Reference point approach”

0165 Reference point entry velocity

Min	Standard	Max	Unit	Data type	Effective
1000	300000	2000000000	c*MSR/min	Unsigned32	PrgE

Between synchronizing with the first zero pulse (zero reference pulse) and reaching the reference point, the axis moves with this velocity.
Note: refer to the index entry ”Reference point approach”

0166 Reference cam approach direction

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PrgE

... defines in which direction the reference cam (for axes with reference cams, P0173 = 0) or the zero pulse (for axes without reference cams, P0173 = 1) is approached/searched.
1 Negative direction
0 Positive direction
Note: refer to the index entry ”Reference point approach”

0167 Invert, reference cams

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... the switching characteristics of the reference cam signal (input terminal with function number 78) is adapted.
1 Inverted
0 Not inverted
Note: refer to the index entry ”Reference point approach” and ”Invert reference cam signal”

0170 Maximum distance to the reference cam

Min	Standard	Max	Unit	Data type	Effective
0	10000000	200000000	MSR	Unsigned32	PrgE

... specifies the max. distance the axis can travel from starting the reference point approach in order to find the reference cam.
Note: refer to the index entry ”Reference point approach”

0171 Max. distance up to the zero pulse

Min	Standard	Max	Unit	Data type	Effective
0	20000	200000000	MSR	Unsigned32	PrgE

... specifies the maximum distance that the axis can traverse from leaving the reference (homing) cam or from the start, in order to find the zero pulse.
Note:
For distance-coded measuring system (from SW 8.3):
The maximum permissible distance between the start and up to the 2nd zero pulse. Recommended setting: Select the basic distance (clearance) between two fixed reference marks.
Refer under the index entry ”Reference point approach”

0172 Distance up to the zero pulse

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Unsigned32	RO

... the distance moved from leaving the reference cam or from the start up to reaching the zero pulse is entered.
The parameter supports, at start-up, reference cam adjustments.
Note: refer to the index entry ”Reference point approach” and ”Reference cam adjustment”

0173 Reference point approach without reference cams

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PrgE

0 Reference cam available
1 No reference cam available
Note: refer to the index entry ”Reference point approach”

0174 Referencing mode, position measuring system

Min	Standard	Max	Unit	Data type	Effective
1	1	2	–	Unsigned16	immed.

1 Incremental measuring system available
2 Incremental measuring system with equivalent zero mark available (e. g. BERO at input terminal I0.x)
Note: refer to the index entry ”Referencing/adjustment”

0175 Adjustment status – absolute position measuring system

Min	Standard	Max	Unit	Data type	Effective
0	0	4	–	Integer16	immed.

... displays the status when adjusting the absolute value encoder.
–1 Error occured when adjusting
0 Absolute value encoder is not adjusted (pre-setting at the first start-up)
1 Absolute value encoder has not yet been adjusted (encoder adjustment has been initiated)
3 Absolute value encoder IM has been adjusted
4 Absolute value encoder DM has been adjusted
Note: refer to the index entry ”Adjusting the absolute value encoder”

0179 mode, passive referencing (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

... specifies the mode for passive referencing.
0 Accept reference point coordinate (P0160)
1 Initiate start-up help for passive referencing
2 Value after initiating the start-up help
Move through the offset (P0162) and accept the reference point coordinate (P0160)
Note:
For a rigid mechanical coupling between the master and slave axis, it is not permissible that P0179 is set to 2 if the slave drive is equipped with an absolute value encoder. Otherwise, the slave drive would move to an absolute position as specified in P0160.
refer to the index entry ”Passive referencing”

A

0200:8 Kv factor (position loop gain)

Min	Standard	Max	Unit	Data type	Effective
0.0	1.0	300.0	1000/min	Floating Point	immed.

... defines at which traversing velocity of the axis/spindle which following error is obtained.
Kv factor Significance
Low: Slow response to a setpoint-actual value difference, following error is high
High: Fast response to a setpoint-actual value difference, following error is low
Note:
The following diagnostic parameters are available:
– P0029 (following error)
– P0030 (system deviation, position controller input)
– P0031 (actual Kv factor (position loop gain))
refer to the index entry ”Kv factor” or ”Diagnostics of the motion status”

0201 backlash compensation

Min	Standard	Max	Unit	Data type	Effective
–20000	0	20000	MSR	Integer32	immed.

... switches the backlash compensation in/out and defines the backlash amount for a positive or negative backlash.

0 backlash compensation is disabled
> 0 positive backlash (normal case)
< 0 negative backlash

Note: refer to the index entry ”Backlash compensation”

0203 speed feedforward control mode

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

1 speed feedforward control active
0 feedforward control inactive

Note: refer to the index entry ”speed feedforward control”

0204:8 speed feedforward control factor

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

... the additionally entered speed setpoint is weighted.
If the axis control loop has been optimally set, and the equivalent time constant of the speed control loop has been precisely determined, the pre-control factor is 100%.
Note: refer to the index entry ”speed feedforward control”

0205:8 Balancing filter, speed feedforward control (deadtime)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	10.0	ms	Floating Point	immed.

... allows the time characteristics of the closed speed control loop to be simulated using a deadtime.
The entered value is limited to two position controller cycles (P1009).
Note: refer to the index entry ”speed feedforward control”

0206:8 Balancing filter, speed feedforward control (PT1)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	ms	Floating Point	immed.

... permits, in addition to P0205:8, the closed speed control loop to be simulated using a PT1 filter (low pass).
Note: refer to the index entry ”speed feedforward control”

0210:8 Time constant, position setpoint filter

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1000.0	ms	Floating Point	immed.

... is the time constant of the PT1 position setpoint filter.
The effective Kv factor (position loop gain) can be reduced using the filter.
Note: refer to the index entry ”speed feedforward control”

0231 Position actual value inversion

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... the control sense of the position controller is established.
1 Position actual value inversion
0 No position actual value inversion
If the position controller control sense is not OK, then the position actual value must be inverted. The direction of motion is set using P0232 (position setpoint inversion).
Note: refer to the index entry ”Direction adaptation”

0232 Position setpoint inversion

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... the required motion direction is set.
1 Position setpoint inversion
0 No position setpoint inversion
Note:
The control direction of the position controller remains unaffected, i.e. it is internally taken into account (refer to the index entry ”Direction adaptation”).

0236 Spindle pitch

Min	Standard	Max	Unit	Data type	Effective
1	10000	8388607	MSR/rev	Unsigned32	PO

Note: refer to the index entry ”Encoder adaptation”

0237:8 Encoder revolutions

Min	Standard	Max	Unit	Data type	Effective
1	1	8388607	–	Unsigned32	PO

... specifies the ratio (Ü) between the encoder and load.
Ü = P0237:8 / P0238:8
Note: refer to the index entry ”Encoder adaptation”

0238:8 Load revolutions

Min	Standard	Max	Unit	Data type	Effective
1	1	8388607	–	Unsigned32	PO

... specifies the ratio (Ü) between the encoder and load.
Ü = P0237:8 / P0238:8
Note: refer to the index entry ”Encoder adaptation”

0239 Re-reference or re-adjust only if necessary (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

0 Referencing or adjustment is withdrawn when changing the parameter set (standard)
1 Referencing or adjustment is only withdrawn when the parameter set is changed if the mechanical ratio (Ü = P0237:8 / P0238:8) changes.
Note: refer under the index entry ”Referencing or adjustment”

0241 Activating, modulo conversion, rotary axis (SRM ARM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO (SRM ARM)

1 Modulo conversion activated, modulo correction is executed according to P0242
0 Modulo conversion de-activated
Note:
refer to the index entry ”rotary axis with modulo offset”

0242 Modulo range, rotary axis (SRM ARM)

Min	Standard	Max	Unit	Data type	Effective
1	360000	100000000	MSR	Unsigned32	PO (SRM ARM)

... defines the modulo range of the rotary axis.
Practical modulo range values are: n * 360 degrees with n = 1, 2, ...
Note:
refer to the index entry ”rotary axis with modulo offset”

0250 Activate direct measuring system (SRM ARM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO (SRM ARM)

... the direct measuring system is activated/de-activated at connector DIR MEASRG.
1 Direct measuring system activated (only POSMO CD/CA)
0 Direct measuring system deactivated
Note:
refer to the index entry ”Direct measuring system”

0310 Cam switching position 1

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... the cam switching position 1 is set.
Note: refer to the index entry ”Position-related switching signals (cams)”

0311 Cam switching position 2

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... the cam switching position 2 is set.
Note: refer to the index entry ”Position-related switching signals (cams)”

0314 Activating software limit switch

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PrgE

1 Software limit switch active
0 Software limit switch inactive (e.g. necessary for a rotary axes)
Note:
With P0314=0, for a linear axis, the software limit switch monitoring remains active. Only the limits are set to +–200000000.

0315 Minus software limit switch

Min	Standard	Max	Unit	Data type	Effective
–200000000	–200000000	200000000	MSR	Integer32	PrgE

... the position for the software limit switch is set to minus.
Note:
P0315 (minus software limit switch) < P0316 (plus software limit switch)

0316 Plus software limit switch

Min	Standard	Max	Unit	Data type	Effective
–200000000	200000000	200000000	MSR	Integer32	PrgE

... the position for the software limit switch is set to plus.
Note:
P0315 (minus software limit switch) < P0316 (plus software limit switch)

0318:8 Dynamic following error monitoring tolerance

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000000	MSR	Unsigned32	immed.

... defines the maximum deviation between the measured and the calculated position actual value before an error is output.
>= 1 The dynamic following error monitoring is active with this value
0 Monitoring is de-activated
Note: refer to the index entry ”Dynamic following error monitoring”

0320 Position monitoring time

Min	Standard	Max	Unit	Data type	Effective
0	1000	100000	ms	Floating Point	immed.

... defines the time after which the following error must be within the positioning window (P0321).
Note: refer to the index entry ”Positioning monitoring”

0321 Positioning window

Min	Standard	Max	Unit	Data type	Effective
0	40	20000	MSR	Unsigned32	immed.

... defines the positioning window, within which the position actual value must be located after the position monitoring time has expired (P0320).
>= 1 The position monitoring is active with this value
0 Monitoring is de-activated
Note: refer to the index entry ”Positioning monitoring”

0325 Standstill monitoring time

Min	Standard	Max	Unit	Data type	Effective
0	400	100000	ms	Floating Point	immed.

... defines the time after which the following error must be within the standstill window (P0326).
Note: refer to the index entry ”Standstill monitoring”

0326 Standstill window

Min	Standard	Max	Unit	Data type	Effective
0	200	20000	MSR	Unsigned32	immed.

... defines the standstill window, in which the position actual value must be after the standstill monitoring time has expired (P0325).
>= 1 The standstill monitoring is active with this value
0 Monitoring is de-activated
Note: refer to the index entry ”Standstill monitoring”

0338 Fault response, illegal input signals (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
0	1	2	Hex	Unsigned16	immed.

... defines the fault response which is initiated for an illegal combination of input signals.
Example: When starting a traversing block, the input signal ”Operating conditions/reject traversing task” is not set.
0 No output
1 A warning is output
2 Fault 196 is output with the warning number as supplementary information
This involves signal combinations, which result in warnings 804,805,806,807,808,809,840,845.

A

0401 Coupling factor, master drive revolutions (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
1	1	8388607	–	Unsigned32	PO

... defines the coupling factor between the master and slave drive.

0402 Coupling factor slave drive revolutions (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
1	1	8388607	–	Unsigned32	PO

... defines the coupling factor between the master and slave drive.

0410 Configuration, coupling which can be switched-in (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
1	1	8	–	Unsigned16	PO

... defines the switch-on and type coupling.

1 Coupling via digital input signal, speed-synchronous
2 Coupling via digital input signal, position-synchronous + P0412
3 Coupling via traversing program, speed-synchronous
4 Coupling via traversing program, position-synchronous +P0412
5 Coupling via traversing program with queue functionality speed-synchronous (being prepared)
6 Coupling via traversing program with queue functionality position synchronous + P0412 (being prepared)
7 Coupling via digital input signal to absolute position of the master drive + P0412
8 Coupling via traversing program to absolute position of the master drive + P0412

Note:
refer under the index entry ”axis couplings”

0412 Synchronous offset position (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... defines an offset between the slave drive and the synchronous position to the master drive.
Note:
If P0412 is changed, it becomes effective the next time that the coupling is switched-in.
refer under the index entry ”axis couplings”

0413 Offset, synchronous velocity (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
1000	30000000	2000000000	MSR	Integer32	immed.

... defines with which additional velocity the slave drive corrects the following error, built-up during the synchronization phase, and the synchronous offset position P0412.
Note:
refer under the index entry ”axis couplings”

0420 Pos. differ., meas. probe to the zero point, slave drive (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	PO

... for couplings with queue functionality, specifies the clearance between the measuring probe and the zero point of the slave drive.
Note:
refer under the index entry ”axis couplings”

0425:16 Coupling positions (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

The following is valid for couplings without queue functionality:
The position of the master drive, at which the coupling was requested, is located in P0425:0.
For couplings with queue functionality the following is valid:
The measured distances to the actual slave drive position are entered into P0425:16.
Note:
refer under the index entry ”axis couplings”

0599 Active motor data set

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays whether the motor changeover has been enabled, and which motor data set is active.

0 Motor changeover inhibited (P1013 = 0)
1 Motor data set 1 (P1xxx) active
2 Motor data set 2 (P2xxx) active
3 Motor data set 3 (P3xxx) active
4 Motor data set 4 (P4xxx) active

Note: refer to the index entry ”Motor changeover”

0601 Motor speed setpoint (ARM SRM) Velocity setpoint, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	m/min	Floating Point	RO	(SLM)
–	–	–	rpm	Floating Point	RO	(SRM ARM)

... is used to display the unfiltered summed setpoint for speed or velocity of the motor.

0602 Actual motor speed (ARM SRM) Velocity actual value, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	m/min	Floating Point	RO	(SLM)
–	–	–	rpm	Floating Point	RO	(SRM ARM)

... is used to display the unfiltered actual value for speed or velocity of the motor.

0603 Motor temperature

Min	Standard	Max	Unit	Data type	Effective
–	–	–	°C	Integer16	RO

... displays the motor temperature measured via the temperature sensor.
Note:
The display is invalid if a fixed temperature was entered in P1608.

0604 Utilization, motor

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

This parameter is used to display the motor utilization.
The ratio between the ”Torque setpoint M” and ”Actual torque limit Mmax” or ”Force setpoint F” and ”Actual force limit Fmax” is displayed.
Values of less than 100% indicate the system reserve.
Note:
The motor utilization display is smoothed using a PT1 filter (P1251).

0641:16 Fixed speed setpoint (ARM SRM)
Fixed velocity setpoint (SLM)

Min	Standard	Max	Unit	Data type	Effective
–100000.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
–100000.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

... is used to set the fixed speed setpoints 1 to 15. The required fixed setpoint is selected via the ”fixed speed setpoint 1st to 4th input” input signals.
The following is valid:
P0641:0 no meaning
P0641:1 Fixed setpoint 1, selection via input signals
P0641:2 Fixed setpoint 2, selection via input signals, etc.

0649 Delete parameters, drives A and B

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... all parameters (user data) can be erased in the FEPROM memory module. After they have been erased, the POSMO SI/CD/CA status when supplied is re-established.

0 Standard value
1 All of the parameters are to be erased (establish the status when initially supplied)

Proceed as follows to delete all of the parameters:
– Pulse and controller enable (e.g. control signal ON/OFF1)
– Activate erasion of all parameters in the FEPROM (P0649 = 1)
– Starting writing into the FEPROM (P0652 = 1)
– Execute a HW POWER-ON RESET
After run-up, the board is set to the status when it was first supplied.
Note:
As single-axis operation is only possible with POSMO SI/CD/CA, it is not possible to erase parameters for drive B.
POSMO SI is first commissioned in the factory.

0652 Transfer to FEPROM

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... the parameter values from the RAM can be transferred into the FEPROM.
0 –> 1 The values in the RAM are written into the FEPROM
1 Data backup runs, other parameters cannot be selected
Note:
The parameter is automatically set to 0 at the end of data backup.

0653 Image, input signals, Part 1

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected input signals (terminal and PROFIBUS signals).

Bit 0 ON/OFF 1
Bit 1 Operating condition/OFF 2
Bit 2 Operating condition/OFF 3
Bit 3 Enable inverter/pulse inhibit
Bit 4 Ramp-function generator enable <—> operating condition/reject traversing task
Bit 5 Start ramp-function generator/stop <—> operating condition/intermediate stop
Bit 6 Enable setpoint <—> activate traversing task (edge)
Bit 7 Reset fault memory
Bit 8 Jog 1 ON/OFF
Bit 9 Jog 2 ON/OFF
Bit 10 Control requested/no control requested
Bit 11 Start referencing/cancel referencing
Bit 12 Open holding braking as test/do no open
Bit 13 Ramp-up time zero for controller enable <—> external block change
Bit 14 Torque-controlled operation
Bit 15 Spindle positioning on <—> request passive referencing
Bit 18 Signal status, terminal IF
Bit 21 Equivalent zero mark
Bit 22 Flying measurement/length measurement
Bit 24 Activate the function generator (signal edge)
Note:
<—>: Signal in ”speed/torque setpoint” <—> in ”positioning”
/: 1 signal/0 signal

A

0654 Image, input signals, Part 2

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected input signals (terminal and PROFIBUS signals).
Bit 0 Parameter set changeover, 1st input
Bit 1 Parameter set changeover, 2nd input
Bit 2 Parameter set changeover, 3rd input
Bit 3 First speed setpoint filter out
Bit 4 Ramp-up time zero
Bit 5 Reserved for Siemens (smooth running monitoring)
Bit 6 Integrator inhibit, speed controller
Bit 7 Select parking axis
Bit 8 Suppress fault 608
Bit 9 Motor data set changeover, 1st input
Bit 10 Motor data set changeover, 2nd input
Bit 11 Motor changed-over
Bit 12 Tracking operation
Bit 13 Set reference point
Bit 14 Reference cams
Bit 15 Fixed end stop, sensor
Bit 16 Hardware limit switch, plus
Bit 17 Hardware limit switch, minus
Bit 18 Fixed speed setpoint, 1st input <—> block selection, 1st input
Bit 19 Fixed speed setpoint, 2nd input <—> block selection, 2nd input
Bit 20 Fixed speed setpoint, 3rd input <—> block selection, 3rd input
Bit 21 Fixed speed setpoint, 4th input <—> block selection, 4th input
Bit 22 Block selection, 5th input
Bit 23 Block selection, 6th input
Note:
<—>: Signal in ”speed/torque setpoint” <—> in ”positioning”

0655 Image, input signal Part 3

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected input signals (terminal and PROFIBUS signals).
Bit 0 Activate coupling
Bit 1 Jogging incremental
Bit 2 Activate teach-in
Bit 17 Activate MDI (from SW 7.1)

0656 Image, output signals, Part 1

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected output signals (terminal and PROFIBUS signals).
Bit 0 Ready to power-on/not ready to power-on
Bit 1 Ready or no fault
Bit 2 Status controller enable
Bit 3 Fault present/fault not present
Bit 4 No OFF 2 present/OFF 2 present
Bit 5 No OFF 3 present/OFF 3 present
Bit 6 Power-on inhibit/no power-on inhibit
Bit 7 Alarm present/no alarm present
Bit 8 n_set = n_act <—> no following error/following error
Bit 9 Control request/control not possible
Bit 10 Comparison value reached <—> reference position reached
Bit 11 Reference point set/no reference point set
Bit 12 Setpoint acknowledgement (edge)
Bit 13 Function generator active <—> drive stationary/drive moves
Bit 14 Torque-controlled operation <—> External block change
Bit 15 Spindle positioning on <—> request passive referencing
Note:
<—>: Signal in ”speed/torque setpoint” <—> in ”positioning”
/: 1 signal/0 signal

0657 Image, output signals, Part 2

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected output signals (terminal and PROFIBUS signals).
Bit 0 Status, parameter set, 1st output
Bit 1 Status parameter set, 2nd output
Bit 2 Status parameter set, 3rd output
Bit 3 First speed setpoint filter inactive
Bit 4 Ramp-function generator inactive
Bit 5 Open holding brake
Bit 6 Integrator inhibit, speed controller
Bit 7 Parking axis selected
Bit 8 Suppress fault 608 active
Bit 9 Actual motor, 1st signal
Bit 10 Actual motor, 2nd signal
Bit 11 Motor being changed-over
Bit 14 Block processing inactive
Bit 17 MDI active (from 7.1)
Bit 18 Status, block selection, 1st output
Bit 19 Status block selection, 2nd output
Bit 20 Status, block selection, 3rd output
Bit 21 Status, block selection, 4th output
Bit 22 Status block selection, 5th output
Bit 23 Status, block selection, 6th output

0658 Image, output signals, Part 3

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected output signals (terminal and PROFIBUS signals).
Bit 0 Ramp-up completed
Bit 1 |M| < M_x (P1428:8, P1429)
Bit 2 |n_act| < n_min (P1418:8)
Bit 3 |n_act| < n_x (P1417:8)
Bit 4 V_DC link < V_x (P1604)
Bit 5 Variable signaling function
Bit 6 Motor temperature alarm (P1602)
Bit 7 Heatsink temperature pre-alarm
Bit 8 n_set = n_act (P1426, P1427)
Bit 9 Fixed end stop reached
Bit 10 Fixed end stop, clamping torque reached
Bit 11 Traverse to fixed endstop active
Bit 12 Tracking mode active
Bit 13 Velocity limiting active
Bit 14 Setpoint is zero
Bit 15 Synchronized
Bit 16 Axis moves forwards
Bit 17 Axis moves backwards
Bit 18 Minus software limit switch actuated
Bit 19 Plus software limit switch actuated
Bit 20 Cam switching signal 1
Bit 21 Cam switching signal 2
Bit 22 Direct output 1 via traversing block
Bit 23 Direct output 2 via traversing block
Bit 24 Electronics temperature OK.
Bit 25 Power module current not limited
Bit 26 Pulsed resistor not overloaded (only for POSMO CA)
Bit 27 Pulse/start inhibit OK
Bit 28 Pulses enabled
Bit 29 Position reached
Bit 30 Spindle position 2 reached
Bit 31 Teach In executed

0659 Bootstrap loading

Min	Standard	Max	Unit	Data type	Effective
0	0	4	–	Unsigned16	PO

... it is possible to toggle between the initialization and normal condition.
0 Establish initialized condition
0 –> 1 Initialize
1 Normal condition
2, 3, 4 Internal Siemens
Note:
Only the most important parameters can be selected and changed (e.g. motor code, power section code) in the initialized condition.
In the normal condition, the motor code and power section code are write-protected.
When starting-up for the first time using ”Load file”, P0659 remains at 2 (internal siemens).

0660 Function of input terminal I0.x

Min	Standard	Max	Unit	Data type	Effective
0	35	86	–	Unsigned16	immed. (ARM)
0	0	86	–	Unsigned16	immed. (SRM SLM)

... defines the function of the input terminal I0.A at connector X23.
The function number from the ”List of input signals” is entered.
Note:
refer under the index entry ”Terminals I0.A to I2.A” or ”List of input signals”

0661 Function of input terminal I1.x

Min	Standard	Max	Unit	Data type	Effective
0	7	86	–	Unsigned16	immed. (ARM)
0	0	86	–	Unsigned16	immed. (SRM SLM)

... defines the function of the input terminal I1.A at connector X23.
The function number from the ”List of input signals” is entered.
Note:
refer under the index entry ”Terminals I0.A to I2.A” or ”List of input signals”

0662 Function of input terminal I2.x (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	86	–	Unsigned16	immed.

... defines the function of the terminal O1.A at connector X24 re-parameterized as input.
The function number from the ”List of input signals” is entered.
Note:
P0677 = 0: Terminal O1.A is an output (Standard).
P0677 = 1: Terminal O1.A is an input (—> terminal I2.A)
refer under the index entry ”Terminals I0.A to I2.A” or ”List of input signals”

0677 O1.x as input I2.x (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... defines whether terminal O1.A at X24 should be used as output or input.
P0677 = 0 —> Terminal O1.A is an output (Standard)
P0677 = 1 —> Terminal O1.A is an input (—> terminal I2.A)
Note:
The function of input terminal I2.A is defined using P0662.

0678 Image of the input terminals

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The signal statuses of the input terminals are displayed using these parameters.
Bit 14 (term. IF), bit 2 (term. I2.A), bit 1 (term. I1.A), bit 0 (term. I0.A)

Bit x = ”1” —> input terminal has signal status ”1”
Bit x = ”0” —> input terminal has signal status ”0”

Note:
Non-assigned bits are displayed with ”0”.

A

0680 Signaling function of output terminal O0.x

Min	Standard	Max	Unit	Data type	Effective
0	33	87	–	Unsigned16	immed.

... defines the function of the output terminal O0.A at connector X24.
The function is entered from the ”List of output signals”.
Note:
refer under the index entry ”Terminals T. O0.A and O1.A” or ”List of output signals”

0681 Signaling function of output terminal O1.x

Min	Standard	Max	Unit	Data type	Effective
0	2	87	–	Unsigned16	immed.

... defines the function of the output terminal O1.A at connector X24.
The function is entered from the ”List of output signals”.
Note:
refer under the index entry ”Terminals T. O0.A and O1.A” or ”List of output signals”

0698 Image of the output terminals

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The signal statuses of the output terminals are displayed using these parameters.
Bit 1 (term. O1.A), bit 0 (term. O0.A)

Bit x = ”1” —> output terminal has signal status ”1”
Bit x = ”0” —> output terminal has signal status ”0”

Note:
Non-assigned bits are displayed with ”0”.

0699 Inversion output terminal signals

Min	Standard	Max	Unit	Data type	Effective
0	0	3	Hex	Unsigned16	immed.

This parameter is used to define which output terminal signals are to be output inverted.
Bit 1 (term. O1.A), bit 0 (term. O0.A)

Bit x = ”1” —> output terminal is inverted
Bit x = ”0” —> output terminal is not inverted

Example: P0699 = 0003 —> term. O1.A and O0.A are output inverted
Note:
Non-assigned bits are displayed with ”0”.

0700 Operating mode

Min	Standard	Max	Unit	Data type	Effective
1	1	3	–	Unsigned16	PO

1 Speed/torque setpoint
The drive can be operated as follows in this operating mode:
– Closed-loop speed controlled operation (n-set operation)
– Open-loop torque controlled mode (M setpoint operation)
– Torque reduction (M reduction)
Note:
Operation is possible via terminals, via PROFIBUS or mixed.
2 invalid
3 Positioning
The drive can be operated as follows in this operating mode:
– Programming, selecting and starting traversing blocks
– Enter velocity override
– Torque reduction (M reduction)
Note:
Operation is possible via terminals, via PROFIBUS or mixed.

0701 Actual operating mode

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

1 Speed/torque setpoint
– Closed-loop speed controlled operation (n-set operation)
– Open-loop torque controlled mode (M setpoint operation)
– Torque reduction (M reduction)
2 invalid
3 Positioning

0730:700 Saved parameters (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

...includes all of the parameters taken into account when saving the drive configuration (save parameter in a file).
The following steps are necessary for a series start-up without using the SimoCom U start-up tool:
1. Signal the motor type (write into P1102 = motor code)
2. Writing 4 into P0659 (drive carries-out defaults)
3. Write into all of the parameters listed in parameter P0731
4. Write 2 into P0659 (pre-assign motor/ LT data, calculate controller data)
5. Write into all parameters listed in parameter P0730 (minus the parameters listed in P0731)

0731:250 Parameters required before start-up (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

...contains all parameters which must be written into before commissioning.
The following steps are necessary for a series start-up without using the SimoCom U start-up tool:
1. Signal the motor type (write into P1102 = motor code)
2. Writing 4 into P0659 (drive carries-out defaults)
3. Write into all of the parameters listed in parameter P0731
4. Write 2 into P0659 (pre-assign motor/ LT data, calculate controller data)
5. Write into all parameters listed in parameter P0730 (minus the parameters listed in P0731)

0828:128 Warning value (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

The supplementary information of the warnings, displayed using P0953 – P0960, is entered in this parameter.
The following is valid:
P0828:0 Supplementary information, warning 800 (P0953 bit 0)
P0828:1 Supplementary information, warning 801 (P0953 bit 1)
...
P0828:127 Supplementary information, warning 927 (P0960 bit 15)

0850 Activate brake control

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

... activates/de-actives the brake sequence control for this axis.
0 Brake sequence control is de-activated, holding brake is continuously closed
1 Brake sequence control is activated
2 Brake sequence control is de-activated, holding brake is continuously opened
Note:
The pulse suppression control via P1403 (creep speed pulse suppression) and P1404 (timer pulse suppression) is ineffective when the motor holding brake is activated.
refer to the index entry ”Motor holding brake”

0851 Brake release time

Min	Standard	Max	Unit	Data type	Effective
10.0	600.0	10000.0	ms	Floating Point	immed.

The setpoint transfer after ”Controller enable” is delayed by this time.
During this time, the speed control is internally already active with n-set = 0, so that the axis does not move while the brake is opening.
After the time has expired, the closed-loop speed control is active and setpoints can be transferred.
Note: refer to the index entry ”Motor holding brake”

0852 Speed, close holding brake (ARM SRM) Motor velocity, close holding brake (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	500.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

Note: refer to P0853

0853 Brake delay time

Min	Standard	Max	Unit	Data type	Effective
10.0	400.0	600000.0	ms	Floating Point	immed.

P0852 and P0853 form the criteria for withdrawing the internal signal ”open holding brake” to close the motor holding brake.
After ”Controller enable” is withdrawn, the drive brakes with n-set = 0.
When the brake sequence control is active, the internal ”Open holding brake” signal is reset, if the following applies:
– |n-act| < n holding brake (P0852)
or
– The brake delay time (P0853) has expired
Note: refer to the index entry ”Motor holding brake”

0854 Controller disable time

Min	Standard	Max	Unit	Data type	Effective
10.0	600.0	10000.0	ms	Floating Point	immed.

If the internal ”open holding brake” signal is withdrawn, then the drive is actively controlled (internal controller enable) with n-set = 0 until after the controller inhibit time has expired (P0854). In order that the brake has time to close, the closing time is bypassed to prevent a hanging axis, for example, from sagging. The pulses are only canceled after this time.
Note: refer to the index entry ”Motor holding brake”

0870 Module type

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter indicates which POSMO SI/CD/CA type and firmware are available.
P0870 = UVWX

U	= 1	Drive type is ”SIMODRIVE POSMO SI/CD/CD”
	= x	reserved for another drive type
V	= 1	Firmware for positioning
W		reserved
X	= 1	POSMO CD
	= 2	POSMO CA
	= 3	POSMO SI

Note: The module version is displayed in P0871.

0871 Module version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... displays the version of the particular module.

0875 Expected option module type

Min	Standard	Max	Unit	Data type	Effective
0	0	255	–	Unsigned16	PO

... indicates how the drive should behave on PROFIBUS.

0 Switch-out the ”DP slave POSMO” and therefore the setpoint entered from the master. The drive is now moved via the terminals.
Note:
P1012.12 must be set to 0 to remove the power-on inhibit
4 Operation on PROFIBUS DP (clock cycle synchronous or not clock cycle synchronous) with setpoint input from the DP master.

A

0878 PROFIdrive configuration (–> 8.2)

Min	Standard	Max	Unit	Data type	Effective
0	0	15	Hex	Unsigned16	immed.

... several behavioral features are activated in order to achieve conformance with the PROFIdrive profile.

Bit 0	Axis addressing according to PROFIdrive
Bit 0 = 0	For a non-cyclic access via the DPV1 parameter channel axis A is addressed with index 1 (this is in conformance with the profile)
Bit 0 = 0	For a non-cyclic access via the DPV1 parameter channel axis A is addressed with index 0 (this is not in conformance with the profile)
Bit 1	P915/P916 cannot be changed for P922 > 0
Bit 1 = 0	P915/P916 cannot be written into if P922 is greater than 0 (this is in conformance with the profile)
Bit 1 = 0	P915/P916 can also be written into if P922 is greater than 0 (this is not in conformance with the profile)
Bit 2	No. of Value = Length for string variables
Bit 2 = 1	For string variables, in the ”DPV1 parameter response” the length of bytes is transferred under ”No. of Values” (in conformance with the profile)
Bit 2 = 0	For string variables, in the ”DPV1 parameter response” the number of values are transferred under ”No. of Values” (this is not in conformance with the profile)

Note:
The following parameters should be set to ensure conformance with the PROFIdrive profile:
P0878 bit 0 = 1, bit 1 = 1, bit 2 = 1
P0879 bit 0 = 1, bit 1 = 0, bit 2 = 0, bit 9 = 1
P1012 bit 12 = 1, bit 13 = 1, bit 14 = 0, bit 15 = 1

0879 PROFIBUS configuration

Min	Standard	Max	Unit	Data type	Effective
0	1	FFFF	Hex	Unsigned16	PO

... defines several types of behavior for operation with PROFIBUS-DP.

Bit 2, 1, 0 Permissible sign-of-life error
... specifies in how many subsequent cycles (Tmapc) a sign-of-life error may occur without a fault being signaled.

Bit 8	Operation with/without master sign-of-life monitoring
Bit 8 = 1	without sign-of-life monitor Starting (synchronization) and operation of the clock cycle synchronous PROFIBUS is realized without monitoring the master sign-of-life. The master must still change the sign-of-life in STW1–12 tp STW2–15. of Tmapc > Tdp.
Bit 8 = 0	with sign-of-life monitor
Bit 9	Data types, profile parameters according to PROFIdrive
Bit 9 = 1	For PROFIdrive profile parameters, data types are interpreted as they are implemented in the drive
Bit 9 = 0	For PROFIdrive profile parameters, data types are interpreted according to PROFIdrive
Bit 10	reserved
Bit 11	PKW area: Sub-index in the high/low byte from IND
Bit 11 = 1	Sub-index in the high byte (PROFIDRIVE compatible)
Bit 11 = 0	Sub-index in the low byte (standard for SIMODRIVE)
Bit 12	Activate the direct measuring system for clock cycle-synchronous PROFIBUS
Bit 13	Incr. motor measuring system with/without equivalent zero mark
Bit 13 = 1	Incremental motor measuring system with equivalent zero mark available (e. g. BERO at input terminal I0.x)
Bit 13 = 0	Incremental motor measuring system available
Bit 14	Incr. direct measuring system with/without equivalent zero mark
Bit 14 = 1	Incremental direct measuring system with equivalent zero mark available (e. g. BERO at input terminal I0.x)
Bit 14 = 0	Incremental direct measuring system available
Bit 15	reserved

0880 Speed evaluation, PROFIBUS (ARM SRM)
Motor velocity evaluation, PROFIBUS (SLM)

Min	Standard	Max	Unit	Data type	Effective
–100000.0	16384.0	100000.0	m/min	Floating Point	immed. (SLM)
–100000.0	16384.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

... defines the normalization of the speed or velocity when using PROFIBUS-DP. When entering a negative value, in addition, the motor direction of rotation is inverted.
Note:
4000hex or 16384dec in control word NSET_A corresponds to the speed or velocity in P0880.
refer to the index entry ”Control words NSET_A or NSET_B”

A

0881 Eval. torque/power reduction PROFIBUS (ARM SRM) Evaluation force/power reduction PROFIBUS (SLM) (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0.0	16384.0	16384.0	%	Floating Point	immed. (SLM)
0.0	16384.0	16384.0	%	Floating Point	immed. (SRM ARM)

... defines the normalization of the torque/power de-rating or the force/power de-rating when traversing with PROFIBUS-DP.
Note:
4000Hex or 16384 dec in the MomRed control board corresponds to a reduction of the percentage specified in P0881.
refer under the index entry ”Control word MomRed”

0882 Evaluation, torque setpont PROFIBUS (ARM SRM) Evaluation, force setpoint PROFIBUS (SLM) (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–16384.0	800.0	16384.0	%	Floating Point	immed. (SLM)
–16384.0	800.0	16384.0	%	Floating Point	immed. (SRM ARM)

... defines the normalization of the torque and force setpoint when using PROFIBUS-DP.
Note:
P0882 is a percentage value referred to the rated motor torque. The parameter affects the process data MsetExt (external torque setpoint in the input direction) and Mset (torque setpoint in the output direction).
4000Hex or 16384 dec in the control word corresponds to the percentage entered in P0882.
refer under the index entry ”control word MsollExt”, ”Status word Msoll”

0883 Override evaluation PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
0.0	16384.0	16384.0	%	Floating Point	immed.

... defines the normalization of the override when entered via PROFIBUS-DP.
Note:
4000Hex or 16384dec in the PROFIBUS-PPO corresponds to the override in P0883 (refer under the index entry ”control word over”).

0884 Pos. output evaluation PROFIBUS – no. of increments (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
1	10000	8388607	–	Unsigned32	PO

... together with P0896, defines the format for the output of positions via PROFIBUS-DP.
Note:
refer to P0896
refer under the index entry ”axis couplings”

0888:16 Function, distributed input (PROFIBUS) (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	83	–	Unsigned16	immed.

... defines which function a signal has which is read-in via the PROFIBUS-PZD for distributed inputs (DezEing).
The function number from the ”list of input signals” is entered. The following applies for the individual indices of P0888:
0 Function DezEing bit 0
1 Function DezEing bit 1
2 etc.

0891 Source, external position reference value (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–1	–1	4	–	Integer16	PO

... defines the source for the external position reference value.
–1 not an external position reference value
1 reserved
2 reserved
3 reserved
4 PROFIBUS DP
Note:
refer under the index entry ”axis couplings”

0895 External position reference value – no. of increments (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
1	10000	8388607	–	Unsigned32	PO

... together with P0896, defines, for couplings, the ratio between the input increments and dimension system grids.
Note:
—> Setpoint input from P0895 corresponds to P0896 MSR
refer to P0896
refer under the index entry ”axis couplings”

A

0896 Ext. position ref. value – no. of dimension system grids (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
1	10000	8388607	MSR	Unsigned32	PO

... together with P0895, defines for couplings, the ratio between the input pulse periods (or input bit) and the measuring system grid.
Note:
refer to P0895
refer under the index entry ”axis couplings”

0897 Invert external position reference value (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... defines whether the position reference value is entered externally and therefore the direction should be inverted.
1 position setpoint inversion
0 Not inverted
Note:
refer under the index entry ”axis couplings”

0898 Modulo range master drive (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	100000000	MSR	Unsigned32	PO

... informs the slave drive about the selected modulo range for the master drive.
Note:
The following applies: P0242 (master drive) = P0898 (slave drive)
The value 0 switches-out the modulo correction.
refer under the index entry ”axis couplings”

0915:17 PZD setpoint value assignment PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	immed.

... serves for allocating the signals to the process data in the setpoint frame.

The following applies:

P0915:0	no meaning
P0915:1	PZD1, unable to configure (standard setting)
P0915:2	PZD2, Configuring and display of the signal ID (refer to P0922)
P0915:3	PZD3, etc.

ID	Significance (abbreviation)
0	No signal (NIL)
50001	Control word 1 (STW1) (assignment n-set operation)
50001	Control word 1 (STW1) (assignment pos operation)
50003	Control word 2 (STW2)
50005	Speed setpoint A (NSET_A, nset-h) (n-set operation)
50007	Speed setpoint B (NSET_B, nset-(h+l)) (n-set operation)
50009	Encoder 1, control word (G1_STW) (n-set operation)
50013	Encoder 2 control word (G2_STW) (n-set operation)
50025	System deviation DSC (XERR) (n set operation, from SW 4.1)
50026	Position controller gain factor DSC (KPC) (n set operation, from SW 4.1)
50101	Torque reduction (MomRed)
50107	Digital outputs term. O0.x and O1.x (DIG_OUT)
50109	Target position for spindle positioning (XSP) (n set operation, from SW 5.1)
50111	Distributed inputs (DezEing) (from SW 4.1)
50113	External torque setpoint (MsollExt) (n set operation, from SW 4.1)
50117	Control word, slave-to-slave communications (QStw) (pos operation, from SW 4.1)
50201	Block selection (SatzAnw)
50203	Positioning control word (PosStw) (pos operation)
50205	Override (over) (pos operation)
50207	External position reference value (Xext) (pos operation, from SW 4.1)
50209	Correction, external position reference value (XcorExt) (pos operation, from SW 4.1)
50221	MDI position (MDIPos) (pos mode, from SW 7.1)
50223	MDI velocity (MDIVel) (pos mode, from SW 7.1)
50225	MDI acceleration override (MDIAcc) (pos mode, from SW 7.1)
50227	MDI deceleration override (MDIDec) (pos mode, from SW 7.1)
50229	MDI mode (MDIMode) (pos mode, from SW 7.1)

Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
Operating mode not specified —> possible in every operating mode
refer to the index entry ”Configuring the process data”

0916:17 PZD actual value assignment PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	immed.

... serves for allocating the signals to the process data in the actual value frame.

The following applies:

P0916:0	no meaning
P0916:1	PZD1, unable to configure (standard setting)
P0916:2	PZD2, Configuring and display of the signal ID (refer to P0922)
P0916:3	PZD3, etc.

ID	Significance (abbreviation)
0	No signal (NIL)
50002	Status word 1 (ZSW1) (assignment, n-set operation)
50002	Status word 1 (ZSW1) (assignment pos operation)
50004	Status word 2 (ZSW2)
50006	Speed actual value A (NACT_A, nact-h)
50008	Speed actual value B (NACT_B, nact-(h+l))
50010	Encoder 1 status word (G1_ZSW) (n-set operation)
50011	Encoder 1 position actual value 1 (G1_XACT1) (n-set operation)
50012	Encoder 1 position actual value 2 (G1_XACT2) (n-set operation)
50014	Encoder 2 status word (G2_ZSW) (n-set operation)
50015	Encoder 2 position actual value 1 (G2_XIST1) (n-set operation)
50016	Encoder 2 position actual value 2 (G2_XIST2) (n-set operation)
50102	Message word (MeldW)
50108	Digital inputs term. I0.x and I1.x (DIG_IN)
50110	Utilization (util)
50112	Active power (Pactive)
50114	Smoothed torque setpoint (Mset)
50116	Smoothed torque-generating current Iq (IqGl)
50118	Status word, slave-to-slave communications (QZsw) (pos operation, from SW 4.1)
50119	DC link voltage (VDClink1) (from SW 8.3)
50202	Currently selected block (AktSatz)
50204	Positioning status word (PosZsw) (pos operation)
50206	Position actual value (positioning operation) (XistP) (pos operation)
50208	Position reference value (positioning operation) (XsollP) (pos operation, from SW 4.1)
50210	Correction position reference value (Xcor) (pos opertion, from SW 4.1)

Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
Operating mode not specified —> possible in every operating mode
refer to the index entry ”Configuring the process data”

0918 PROFIBUS node address

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... specifies the address of the drive as DP slave on PROFIBUS.
Note:
The address is set via the DIL switch at the lower side of the PROFIBUS unit.
Every node connected to PROFIBUS must have a unique address.

0922 PROFIBUS frame selection

Min	Standard	Max	Unit	Data type	Effective
0	101	110	–	Unsigned16	PO

... is used to set the free configurability or to select a standard telegram.
0 The frame can be freely configured (see P0915:17, P0916:17)
1 Standard frame 1, n-set interface 16 bits
2 Standard frame 2, n-set interface 32 bits without encoder
3 Standard telegram 3, n set interface 32 bit with encoder 1
4 Standard telegram 4, n-set interface 32 bit with encoder 1 and encoder 2
5 Standard telegram 5, n set interface 32 bit with DSC and encoder 1 (from SW 4.1)
6 Standard telegram 6, n set interface 32 bit with DSC and encoder 1 and encoder 2 (from SW 4.1)
101 Standard telegram 101, n-set/pos interface
102 Standard frame 102, n-set interface with encoder 1
103 Standard telegram 103, n-set interface with encoder 1 and encoder 2
105 Standard telegram 105, n-set interface with DSC and encoder 1 (from SW 4.1)
106 Standard telegram 106, n-set interface with DSC and encoder 1 and encoder 2 (from SW 4.1)
108 Standard telegram 108, master drive for the position reference value coupling (from SW 4.1)
109 Standard telegram 109, slave drive for the position reference value coupling (from SW 4.1)
110 Standard telegram 110, positioning in the MDI mode (from SW 7.1)
Note: refer to the index entry ”Process data configuring”

0923:300 List of PROFIBUS standard signals

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

This parameter can be read in order to define which PROFIdrive standard signals (signals 1...99) and manufacturer-specific signals are supported and which device-specific signal ID this signal represents.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0930 PROFIBUS selector switch operating mode

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

This parameter cannot be changed and corresponds to P0700.
0 Drive inactive
1 Closed-loop speed controlled operation
0x8000 positioning mode

0944 Fault message counter (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

This parameter corresponds to the fault message counter. It is incremented each time that the fault buffer changes.
This means that it can be ensured that the fault buffer can be consistently read-out
Note:
This parameter is reset at POWER ON.
refer to the index entry ”PROFIBUS-DP – evaluate faults”

0945:65 Fault code

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

The fault code, i. e. the number of the fault which occurred, is entered in this parameter.
The faults which occurred are entered as follows into the fault buffer:
first fault which has occurred —> parameter with index 1 (with index 0 for the PROFIdrive profile)
To
eighth fault which has occurred—> parameter with index 8 (with index 7 for the PROFIdrive profile)
Note:
The following is associated with a fault: Fault code (P0945:65), fault number (P0947:65), fault time (P0948:65) and fault value (P0949:65).
For ”reset fault memory” the fault code, previously entered into P0945, is shifted by 8 indices.
The description of the faults, how they can be acknowledged as well as a list of all the faults is provided in Section ”Fault handling/diagnostics”.
This parameter is reset at POWER ON.
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
refer to the index entry ”PROFIBUS-DP – evaluate faults”

0946:901 Fault code list (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

This parameter contains the fault code list.
In the fault code list, every fault code, defined in the unit, is assigned a fault number.
Note:
The fault number is a consecutive number. The actual value is coded in the fault code to indicate which fault has occurred.
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
This means that here, the fault code (e. g. 130) cannot be found in the sub-index (in the example 64) corresponding to the fault number, but instead in the following sub-index (in the example 65).
refer to the index entry ”PROFIBUS-DP – evaluate faults”

0947:65 Fault number

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

The fault number is entered into this parameter.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
refer to the index entry ”PROFIBUS-DP – evaluate faults”

A

0948:65 Fault time

Min	Standard	Max	Unit	Data type	Effective
–	–	–	ms	Unsigned32	RO

This parameter specifies at which relative system time the fault occurred.
Note:
This parameter is set to zero at POWER ON, and the time is then started.
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
refer to the index entry ”PROFIBUS-DP – evaluate faults”

0949:65 Fault value

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

The supplementary information about a fault which has occurred is entered into this parameter.
Note:
The description of the faults, how they can be acknowledged as well as a list of all the faults is provided in Section ”Fault handling/diagnostics”.
This parameter is reset at POWER ON.
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
refer to the index entry ”PROFIBUS-DP – evaluate faults”

0951:301 Fault number list (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

Note: This parameter has no significance.

0952 Number of faults

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	–	Unsigned16	immed.

The parameter specifies the number of faults which occurred after POWER ON.
From SW 9.1 onwards, the parameter can be reset with p0952 = 0.
When the parameter is reset, the fault buffer is cleared and the faults are acknowledged if the causes were resolved.
Note:
This parameter is reset at POWER ON.
refer to the index entry ”PROFIBUS-DP – evaluate faults”

0953 Warnings 800–815

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 815) ... Bit 0 (warning 800)
Note:
Bit x = 1 alarm yyy present
Bit x = 0 the alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”

0954 Warnings 816–831

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 831) ... Bit 0 (warning 816)
Note:
Bit x = 1 alarm yyy present
Bit x = 0 the alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”

0955 Warnings 832–847

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 847) ... Bit 0 (warning 832)
Note:
Bit x = 1 alarm yyy present
Bit x = 0 the alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”

0956 Warnings 848–863

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 863) ... Bit 0 (warning 848)
Note:
Bit x = 1 alarm yyy present
Bit x = 0 the alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”

0957 Warnings 864–879

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 879) ... Bit 0 (warning 864)
Note:
Bit x = 1 alarm yyy present
Bit x = 0 the alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”

0958 Warnings 880–895

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 895) ... Bit 0 (warning 880)
Note:
Bit x = 1 alarm yyy present
Bit x = 0 the alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”

0959 Warnings 896–911

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 911) ... Bit 0 (warning 896)
Note:
Bit x = 1 alarm yyy present
Bit x = 0 the alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”

0960 Warnings 912–927

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 927) ... Bit 0 (warning 912)
Note:
Bit x = 1 alarm yyy present
Bit x = 0 the alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”

0963 Baud rate PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... contains the actual PROFIBUS baud rate.

0	9.6 kbit/s
1	19.2 kbit/s
2	93.75 kbit/s
3	187.5 kbit/s
4	500 kbit/s
6	1500 kbit/s
7	3000 kbit/s
8	6000 kbit/s
9	12000 kbit/s
10	31.25 kbit/s
11	45.45 kbit/s

0964:11 Equipment identification (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... includes all data for the device identification and provides this to the Identify Utility.
Indices:

1	Company	Siemens = 42d
2	Drive type	Product type
3	Firmware version	xxyy (without patch number)
4	Firmware date (year)	yyyy (decimal)
5	Firmware date (day/month)	ddmm (decimal)
6	Number of axes	
7	Patch number of the FW version	

Product type:

1301 SIMODRIVE POSMO CA, with 1Vpp encoder interface, positioning, LT63 (9/18A), without DM
1302 SIMODRIVE POSMO CA, with 1Vpp encoder interface, positioning, LT63 (9/18A), with DM
1303 SIMODRIVE POSMO CA, with 1Vpp encoder interface, positioning, LT64 (9/18A with line filter), without DM
1304 SIMODRIVE POSMO CA, with 1Vpp encoder interface, positioning, LT64 (9/18A with line filter), with DM
1401 SIMODRIVE POSMO CD, with 1Vpp encoder interface, positioning, LT54 (9/18A), without DM
1402 SIMODRIVE POSMO CD, with 1Vpp encoder interface, positioning, LT54 (9/18A), with DM
1403 SIMODRIVE POSMO CD, with 1Vpp encoder interface, positioning, LT55 (18/36A), without DM
1404 SIMODRIVE POSMO CD, with 1Vpp encoder interface, positioning, LT55 (18/36A), with DM
1501 SIMODRIVE POSMO SI, with 1Vpp encoder interface, positioning, LT43 (8.5/17A), motor 2202
11502 SIMODRIVE POSMO SI, with 1Vpp encoder interface, positioning, LT43 (8.5/17A), motor 2203
1503 SIMODRIVE POSMO SI, with 1Vpp encoder interface, positioning, LT44 (11/22A), motor 2204
1504 SIMODRIVE POSMO SI, with 1Vpp encoder interface, positioning, LT44 (11/22A), motor 2205
1505 SIMODRIVE POSMO SI, with 1Vpp encoder interface, positioning, LT45 (18/36A), motor 2206

Note:
DM direct measuring system
Power module, the specified currents correspond to the rated currents when using a synchronous motor (star/delta)
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0965 Profile number, PROFIdrive (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... the profile ID is saved here. Byte 1 contains profile number 3.
The bits 0 to 3 from byte 2 identify versions 1 to 15.

0967 PROFIBUS control word

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter is the image of control word STW1.
Note:
Bit assignment, refer to Section ”Communications via PROFIBUS-DP”

0968 PROFIBUS status word

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

This parameter is the image of status word ZSW1.
Note:
Bit assignment, refer to Section ”Communications via PROFIBUS-DP”

0969 Current time difference

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFFFF	ms	Unsigned32	immed.

... contains the relative system time since the last time that the drive was powered-up or the last reset of the parameter or since the last counter overflow.
The counter only increments in real time after booting has been completed (Alarm 819 inactive).
Note:
This parameter can only be read and reset, i.e. only a value of 0 can be written into it.

0972 Request POWER-ON RESET

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

... a POWER-ON RESET can be requested on the control board.
0 Output status
1 Request POWER-ON RESET
2 Request preparation for POWER-ON RESET
The DP master can check as follows, whether the power-on reset was executed:
– write 2 into P0972 and read-back the value
– write 1 into P0972 —> POWER-ON RESET is requested
Read P0972 after communications have been established:
P0972 = 0? —> the POWER-ON RESET was executed
P0972 = 2? —> the POWER-ON RESET was not executed
Note:
After P0972=1, the link between the drive and SimoComU is interrupted with the following message: ”Reading from the interface was interrupted due to time overflow”. The link is re-established when SimoCom U is re-started.

0979:32 Encoder format

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... specifies the encoder properties.
Sub-indices:

1	Header
2	Encoder type (encoder 1)
3	Encoder resolution (encoder 1)
4	Shift factor for signal G1_XIST1 (encoder 1)
5	Shift factor for absolute values in G1_XIST2 (encoder 1)
6	Resolution can be parameterized (encoder 1)
7 to 11	reserved
12	Encoder type (encoder 2)
13	Encoder resolution (encoder 2)
14	Shift factor for signal G2_XIST1 (encoder 2)
15	Shift factor for absolute values in G2_XIST2 (encoder 2)
16	Resolution can be parameterized (encoder 2)
17 to 31	reserved

Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
Refer under the index entry ”Encoder interface”

0980:999 Number list_1 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

A

0981:2 Number list_2 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0982:2 Number list_3 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0983:2 Number list_4 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0984:2 Number list_5 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0985:2 Number list_6 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0986:2 Number list_7 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0987:2 Number list_8 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0988:2 Number list_9 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0989:2 Number list_10 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

1000 Current controller cycle

Min	Standard	Max	Unit	Data type	Effective
2	2	2	31.25µs	Unsigned16	PO

Current controller clock cycle = P1000 x 31.25 microseconds
Note:
refer to the index entry ”Clock cycles”

A

1001 Speed controller cycle

Min	Standard	Max	Unit	Data type	Effective
2	4	16	31.25µ	Unsigned16	PO

Speed controller cycle = P1001 x 31.25 microseconds
Note:
Current controller clock cycle <= speed controller clock cycle
refer to the index entry ”Clock cycles”

1004 Structure configuration

Min	Standard	Max	Unit	Data type	Effective
0	100	315	Hex	Unsigned16	PO

... allows the closed-loop control structure to be configured.

Bit 4	Integrator control
Bit 4 = 1	Integrator control in the speed controller inactive The integrator is not held, but its absolute value is limited to twice the torque limit.
Bit 4 = 0	Integrator control in the speed controller active The integrator is held, if the speed controller, current controller or the voltage has reached its limit.
Bit 8	Fine interpolation in the positioning mode (P0700 = 3)
Bit 8 = 1	Type II fine interpolation is active (standard)
Bit 8 = 0	Type I fine interpolation is active
Bit 9	Deadtime adjustment position ref. value coupling via PROFIBUS-DP (from SW 4.1)
Bit 9 = 1	Same deadtime behavior as the slave drive (standard from SW 4.1) Prerequisite: Drive is not a slave drive (P891 = –1) Output of position reference value XsollP (50208).
Bit 9 = 0	Minimum deadtime behavior (standard before SW 4.1)

1005 IM encoder pulse number (SRM ARM)

Min	Standard	Max	Unit	Data type	Effective	
0	2048	65535	–	Unsigned16	PO	(SRM ARM)

Note:
IM —> Indirect measuring system (motor encoder)
If the encoder pulse number cannot be divided by 10 or 16 without a remainder, the zero mark monitoring is internally disabled.

1006 IM encoder code number

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

The encoder number defines the connected measuring system.
Note:
IM —> Indirect measuring system (motor encoder)
refer to the index entry ”Encoder code”

1007 DM encoder pulse number (SRM ARM)

Min	Standard	Max	Unit	Data type	Effective	
0	0	8388607	–	Unsigned32	PO	(SRM ARM)

Note:
DM —> Direct measuring system
Encoder pulses for indirect measuring system (IM, motor encoder) —> refer to P1005
If the encoder pulse number cannot be divided by 10 or 16 without a remainder, the zero mark monitoring is internally disabled.

1008 IM encoder phase error correction

Min	Standard	Max	Unit	Data type	Effective
–20.0	0.0	+20.0	Degree	Floating Point	immed.

Phase position of track A with respect to track B can be corrected using this parameter.
Note:
IM —> Indirect measuring system (motor encoder)
Track A must have a 90 degree offset to track B

1009 Position controller cycle

Min	Standard	Max	Unit	Data type	Effective
32	32	128	31.25µ	Unsigned16	PO

Position controller clock cycle time (TLR) = P1009 x 31.25 microseconds
Note:
The position controller clock cycle must be an integer multiple of the speed controller clock cycle.
refer to the index entry ”Clock cycles”

1010 Interpolation cycle

Min	Standard	Max	Unit	Data type	Effective
64	128	640	31.25µs	Unsigned16	PO

Interpolation clock cycle time (TIPO) = P1010 x 31.25 microseconds
Note:
The interpolation clock cycle must be an integer multiple of the position controller clock cycle.
refer to the index entry ”Clock cycles”

A

1011 IM configuration, actual value sensing

Min	Standard	Max	Unit	Data type	Effective
0	0	F003	Hex	Unsigned16	PO

... allows the actual value sensing to be configured for an indirect measuring system.

Bit 0 Invert speed actual value
Bit 0 = 1 Inversion, speed actual value
Bit 0 = 0 No inversion

Bit 1 Encoder phase failure correction
Bit 1 = 1 Encoder phase failure correction
Bit 1 = 0 No encoder phase error compensation

Bit 12 Coarse position identification
Bit 12 = 2 Identify rough position
Bit 12 = 0 No coarse position identification
Note:
This bit has no significance for EnDat encoders.
For encoders without hall sensors and without C/D track (e. g. ERN 1387), the rotor position identification replaces the coarse synchronization. The zero mark must still be adjusted (shift or via P1017).

Bit 13 Fine position identification
Bit 13 = 1 Identify fine position (with pole position identification)
Bit 13 = 0 No fine position identification (fine synchronization with zero mark)
Note:
This bit has no significance for EnDat encoders.
The rotor position identification replaces the coarse synchronization using Hall sensors or a C/D track. The zero mark neither has to be present nor does it have to be adjusted.
If the rotor position identification does not offer satisfactory results, then the zero mark must be adjusted.

Bit 14 Data transfer rate EnDat, bit 0

Bit 15 Transmission rate EnDat, Bit 1
Note:
Bits 14 and 15 are set as follows in the factory:
Bit 15, 14 = 00 —> 100 kHz (standard)
Bit 15, 14 = 01 —> 500 kHz (setting possible)
Bit 15, 14 = 10 —> 1 MHz (setting, Siemens-internal)
Bit 15, 14 = 11 —> 2 MHz (setting, Siemens-internal)

IM —> Indirect measuring system (motor encoder)
refer to the index entry ”List of encoders”

1012 Function switch

Min	Standard	Max	Unit	Data type	Effective
0	A185	F1F5	Hex	Unsigned16	immed. (ARM)
0	A105	F1F5	Hex	Unsigned16	immed. (SRM SLM)

... allows the closed-loop control functions to be activated/de-activated.
Note:
Standard value for PROFIBUS operation:
B185 (ARM)
B105 (SRM SLM)

Bit 0 Ramp-function generator tracking
Bit 0 = 1 active
Bit 0 = 0 inactive
Note: refer to the index entry ”Ramp-function generator”

Bit 2 Ready or no fault (at the output signal)

Bit 2 = 1 ”Ready” signal
Bit 2 = 0 ”No fault” message
Note: refer to the index entry ”output signal ready or no fault”

Bit 5 Suppress fault 753

Bit 7 IM speed actual value after pulse inhibit
Bit 7 = 1 Speed actual value is zero
The drive brakes the motor towards 0 speed and accelerates to the setpoint speed present.
Bit 7 = 0 Speed actual value is the speed setpoint
The drive direct accelerates the motor to the setpoint speed present.

Bit 8 Average value filter, speed setpoint
Bit 8 = 1 Average value filter on
The avg.val.filter to adapt the pos.contr.clock cyc. to the sp. contr. clock cyc. is active in the speedsetpoint branch.
Bit 8 = 0 Average value filter off
The avg.val.filter to adapt the pos.contr.clock cyc. to the sp. contr. clock cyc. is inactive in the speedsetpoint branch.

Bit 12 Power-on inhibit for alarm and OFF2/OFF3
Bit 12 = 1 Power-on inhibit for alarm or OFF2/OFF3 or withdrawing terminal IF
Note:
The switch-on inhibit is removed by withdrawing the PROFIBUS control signal STW1.0 (ON/OFF1).
Bit 12 = 0 No power-on inhibit

Bit 13 Status signals (ZSW1) according to the PROFIdrive profile (only PROFIBUS operation)
Bit 13 = 1 Power-on inhibit signal is formed independently of the status of the ready signal (PROFIdrive definition)
The power-up inhibit signal is only set when the pulses have been cancelled after the braking phase.
The ready signal remains set during OFF1 and OFF3 until the pulses have been cancelled after the braking phase.
The ready to power-up signal remains set during OFF3 until the pulses have been cancelled after the braking phase.
Bit 13 = 0 The power-on inhibit signal is only set from 0 to 1 if the ready signal is set
The power-up inhibit signal is also set if the pulses have still not been deleted while the drive is braking.
The ready signal is immediately cancelled at OFF1 or OFF3, even if the drive is still braking.
The ready to power-up signal is immediately deleted for OFF3, even if the drive is still braking.
Note: The power-up inhibit is only effective for bit 12 = 1.

Bit 14 No power-on inhibit with simultaneous enable signals
Bit 14 = 1 Deviating from the PROFIdrive profile, a power-on inhibit is not initiated if OFF2/OFF3 and OFF are simultaneously withdrawn
Bit 14 = 0 The power-on inhibit is generated when OFF2/OFF3 and OFF1 are simultaneously withdrawn
Note: Bit 14 is only effective for bit 13 = 1.

Bit 15 ”Reset fault memory” is not saved (no latching effect)
Bit 15 = 1 Corresponding to the PROFIdrive profile, a positive edge of the signal ”reset fault memory” is not saved. It is only possible to acknowledge a fault after the cause of the fault has been removed.
Bit 15 = 0 A positive edge of the signal ”reset fault memory” is saved and results in the fault being acknowledged even if the problem is only resolved afterwards.
Note: The positive signal edge is only saved as long as a fault is present.

A

1013 Enable motor changeover (ARM)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	PO (ARM)

... the motor changeover is enabled or the motor changeover type is set.
0 Motor changeover inhibited
1 Motor changeover with pulse suppression
2 Motor changeover without pulse suppression (data set changeover)
3 Motor changeover with speed thresholds (P1247, P1248)
Note:
It is only possible to enable motor changeover in the ”Speed/torque setpoint” mode (P0700 = 1) (refer to the index entry ”Motor changeover”).

1014 Activate V/f operation

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... the V/f operation is activated/de-activated for this drive.
1 V/f operation is activated
0 V/f operation is de-activated
Note: refer to the index entry ”V/f operation”

1015 Activate PE-MSD (SRM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO (SRM)

... the permanently excited spindle (PE spindle, 1FE1 motor) is activated/de-activated for this drive.
1 permanently excited spindle is activated
0 PE spindle is de-activated
Note:
For synchronous motors, field-weakening operation can be switched-in using P1015.
Refer under index entry ”Permanent-magnet spindle”

1016 Commutation angle offset (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
–360.0	0.0	360.0	Degree	Floating Point	PO (SRM SLM)

... provides information about the rotor position.
To electrically commutate a synchronous motor, the closed-loop drive control must have data regarding the absolute rotor position (position of the magnets with respect to the stator or secondary part). This data (commutation angle) is determined at synchronization.
Incremental measuring system:
... specifies the offset for a zero mark.
Note:
If the zero mark to the rotor position was already adjusted in the factory, a 0 is located in P1016.
Absolute measuring system (EnDat encoder):
... specifies the angular offset to the position actual value of the EnDat encoder.
Note:
The angular offset is read out each time the drive runs up.

1017 Start-up support (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
–1	0	1	–	Integer16	immed. (SRM SLM)

1: Determine the commutation angular offset
0: Function is de-activated (normal status)
–1: EnDat encoder: Serial numbers are read-in in P1025/P1026
The angular commutation offset is automatically determined during start-up:
Incremental measuring system with a zero mark:
– Set P1017 to 1
– Move the axis over the zero mark (e. g. with inching 1)
– –> the angular offset is automatically entered into P1016
– –> fault 799 (save parameters in FEPROM and HW-RESET required) is displayed
– Save parameters in the FEPROM (P0652 = 1)
– Carry-out a HW_RESET
Absolute measuring system (EnDat encoder) (also 1FN3 linear motors, if P1075=3)
– De-activate controller and pulse enable
– Set P1017 to 1 (note: If, for 1FN1, the EnDat serial number, read from the measuring system, is not equal to P0125/P1026, P1017 is automatically set to 1.)
– Switch in the controller and pulse enable
– –> The angular offset is automatically entered into P1016 and the encoder serial number of the encoder into P1025 and P1026
– –> fault 799 (save parameters in FEPROM and HW-RESET required) is displayed
– Save parameters in the FEPROM and carry out a HW-RESET
Absolute measuring system (EnDat encoder) with 1FN3 linear motor if a rotor position identification technique is not used:
– Determine the rotor position difference between the normalized electrical rotor position and EMF_V using the appropriate measuring techniques.
– Add rotor position difference to P1016
– Set P1017 to –1
– –> fault 799 (save parameters in FEPROM and HW-RESET required) is displayed
– Save parameters in the FEPROM and carry out a HW-RESET

Note: refer under the index entry ”Rotor position identification”, ”PE spindle” or ”linear motor”

1019 Current, rotor position ID (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	40.0	100.0	%	Floating Point	immed. (SLM)
0.0	12.0	100.0	%	Floating Point	immed. (SRM)

... defines the current with which the rotor position identification is executed. P1019 refers to the maximum motor current (P1104) and only represents an approximate value, which is exceeded or fallen short off during the identification, dependent on the iron saturation and the accuracy of P1116 (armature inductance).
If a value is entered in P1019 which is too low, then the rotor position identification routine is incorrect (fault 610). If the value is too high, the maximum permissible current can be exceeded (fault 501 or 612) or an inadmissibly high movement can occur (refer to P1020 and fault 611).
The optimum setting for P1019 can be determined by starting the function several times as test via P1736.
Note: Also refer under the index entry ”PE spindle” or ”Linear motor”

1020 Maximum rotation, rotor position identification (SRM) Maximum movement, rotor position identification (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	5.0	30.0	mm	Floating Point	immed. (SLM)
0.0	10.0	90.0	Degree	Floating Point	immed. (SRM)

... defines the distance which has been traveled during rotor position identification without a fault being signaled.
Note:
If the distance is greater than the value entered in P1020, fault 611 is signaled (illegal movement during rotor position identification).
Angle (electrical) = angle (mechanical) * pole pair number (P1112)

1021 IM multi-turn resolution, absolute value encoder

Min	Standard	Max	Unit	Data type	Effective
0	4096	65535	–	Unsigned16	PO

Number of revolutions which can be resolved.
Note:
IM —> Indirect measuring system (motor encoder)

1022 IM single-turn resolution, absolute value encoder

Min	Standard	Max	Unit	Data type	Effective
0	8192	4294967295	–	Unsigned32	PO

Resolution of the absolute value encoder in measuring pulses per revolution.
Note:
IM —> Indirect measuring system (motor encoder)

1023 IM diagnostics

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

Bit 0 Light source failed
Bit 1 Signal amplitude too low
Bit 2 Code connection erroneous
Bit 3 Overvoltage
Bit 4 Undervoltage
Bit 5 Overcurrent
Bit 6 Battery must be changed
Bit 7 Control check error
Bit 8 EnDat encoder cannot be used
Bit 9 CD track for ERN1387 encoder erroneous or
EQN encoder connected, or
incorrectly parameterized (not on EQN, P1027.3)
Bit 10 Protocol cannot be exited
Bit 11 No encoder connected, or
incorrect encoder cable
Bit 12 TIMEOUT for measured value read
Bit 13 CRC error or parity error
Bit 15 Defective measuring encoder
Note:
IM —> Indirect measuring system (motor encoder)
Bit 7 and 13 = 1 —> Incremental and absolute track do not match
ERN: incremental encoder system
EQN: absolute encoder system

1024 IM Grid spacing (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	20000	8388607	nm	Unsigned32	PO (SLM)

Note:
IM —> Indirect measuring system (motor encoder)

1025 IM serial number, low part (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO (SRM SLM)

Note:
IM —> Indirect measuring system (motor encoder)

1026 IM serial number, high part (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO (SRM SLM)

Note:
IM —> Indirect measuring system (motor encoder)

1027 IM configuration, encoder

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO

... allows the encoder evaluation to be configured for an indirect measuring system.
Bit 3 Absolute encoder (EnDat interface)
Bit 4 Linear measuring system
Bit 5 Operation without motor measuring system
Bit 6 Coarse synchronous track, electrical revolution
Bit 7 Distance-coded reference scale (from SW 4.1)
Bit 8 Zero mark selection, fine synchronization using the position controller
Note:
IM —> Indirect measuring system (motor encoder)

1029 Delayed measurement, rotor position identification (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	ms	Floating Point	immed. (SRM SLM)

... determines the additional delay time between the individual 60 measuring pulses for rotor position identification.
Note: Also refer under the index entry ”PE spindle” or ”Linear motor”

1030 DM actual value sensing configuration

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO

... allows the actual value sensing to be configured for a direct measuring system.

Bit 14 Data transfer rate EnDat, bit 0

Bit 15 Transmission rate EnDat, Bit 1
Note:
Bits 14 and 15 are set as follows in the factory:
Bit 15, 14 = 00 —> 100 kHz (standard)
Bit 15, 14 = 01 —> 500 kHz (setting possible)
Bit 15, 14 = 10 —> 1 MHz (setting, Siemens-internal)
Bit 15, 14 = 11 —> 10 MHz (setting, Siemens-internal)

DM —> Direct measuring system (motor encoder)
refer to the index entry ”List of encoders”

A

1031 DM multi-turn resolution, absolute value encoder

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

Number of revolutions which can be resolved.
Note:
DM —> Direct measuring system
Revolutions which can be resolved for indirect measuring system (IM, motor encoder) —> refer to P1021

1032 DM single-turn resolution, absolute value encoder

Min	Standard	Max	Unit	Data type	Effective
0	0	4294967295	–	Unsigned32	PO

Resolution of the absolute value encoder in measuring pulses per revolution.
Note:
DM —> Direct measuring system
Single-turn resolution for indirect measuring system (IM, motor encoder) —> refer to P1022

1033 DM diagnostics

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

Bit 0 Light source failed
Bit 1 Signal amplitude too low
Bit 2 Code connection erroneous
Bit 3 Overvoltage
Bit 4 Undervoltage
Bit 5 Overcurrent
Bit 6 Battery must be changed
Bit 7 Control check error
Bit 8 EnDat encoder cannot be used
Bit 9 CD track for ERN1387 encoder erroneous or
EQN encoder connected, or
incorrectly parameterized (not on EQN, P1027.3)
Bit 10 Protocol cannot be exited
Bit 11 No encoder connected, or
incorrect encoder cable
Bit 12 TIMEOUT for measured value read
Bit 13 CRC error, parity bit
Bit 15 Defective measuring encoder
Note:
DM —> Direct measuring system
Diagnostics for indirect measuring system (IM, motor encoder) —> refer to P1023
Bit 7 and 13 = 1 —> Incremental and absolute track do not match
ERN: incremental encoder system
EQN: absolute encoder system

1034 DM grid spacing

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	nm	Unsigned32	PO

Note:
DM —> Direct measuring system

1036 DM encoder code number

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

The encoder number defines the connected measuring system.
Note:
DM —> Direct measuring system
Encoder code for indirect measuring system (IM, motor encoder) —> refer to P1006
refer to the index entry ”Encoder code”

1037 DM encoder configuration

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO

... allows the encoder evaluation to be configured for a direct measuring system.
Bit 3 Absolute encoder (EnDat interface)
Bit 4 Linear measuring system
Bit 5 Operation without direct measuring system
Bit 7 Distance-coded measuring system (from SW 4.1)
Bit 9 Reserved

Note:
DM —> Direct measuring system
Configuration of the indirect measuring system (IM, motor encoder) —> refer to P1027

1038 DM serial number, low part (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective	
0	0	FFFF	Hex	Unsigned16	PO	(SRM SLM)

Note:
DM —> Direct measuring system

1039 DM serial number, high part (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective	
0	0	FFFF	Hex	Unsigned16	PO	(SRM SLM)

Note:
DM —> Direct measuring system

A

1042 Encoder 1 fine resolution G1_XIST1

Min	Standard	Max	Unit	Data type	Effective
0	11	11	–	Unsigned16	PO

... defines how many fine resolution bits are transferred for the PROFIBUS encoder interface.
This parameter applies for the following:
– Fine resolution for process data G1_XIST1
– Fine resolution for G1_XIST2 for reference mark or flying measurement

1043 Encoder 1 fine resolution, absolute track G1_XIST2

Min	Standard	Max	Unit	Data type	Effective
0	9	11	–	Unsigned16	PO

... defines how many fine resolution bits are transferred for the PROFIBUS encoder interface.
This parameter applies for the fine resolution of process data G1_XIST2 when reading the absolute value.
Note:
The parameter is only valid for the absolute track of the absolute value encoder.
The fine resolution for the value display for reference mark or flying measurement is defined in P1042.

1044 Encoder 2 fine resolution G2_XIST1

Min	Standard	Max	Unit	Data type	Effective
0	11	11	–	Unsigned16	PO

... defines how many fine resolution bits are transferred for the PROFIBUS encoder interface.
This parameter applies for the following:
– Fine resolution for process data G2_XIST1
– Fine resolution for G2_XIST2 for reference mark or flying measurement

1045 Encoder 2 fine resolution, absolute track G2_XIST2

Min	Standard	Max	Unit	Data type	Effective
0	9	11	–	Unsigned16	PO

... defines how many fine resolution bits are transferred for the PROFIBUS encoder interface.
This parameter applies for the fine resolution of process data G2_XIST2 when reading the absolute value.
Note:
The parameter is only valid for the absolute track of the absolute value encoder.
The fine resolution for the value display for reference mark or flying measurement is defined in P1044.

1049 Active EMF brake (SRM SLM) (–> 9.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO (SRM SLM)

...enables the electric brake when the encoder fails.
Note:
For a detailed description refer under the index entry ”Electrical braking when the encoder fails”

1050 IM reference mark clearance for distance-coded scales (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	µm	Unsigned32	PO

...specifies the basic clearance between two fixed reference marks. If the closed-loop identifies that the distance between each second reference mark is different and is therefore incorrect, the axis remains stationary. Fault 508 (zero mark monitoring, motor measuring system) is signaled.
Note:
IM —> Indirect measuring system (motor encoder)
This monitoring is only activated if P1050/P1024*1000 can either be divided by 16 or by 10.

1051 IM ref. mark clearance for distance-coded rot. encoders (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	mDegree	Unsigned32	PO

...specifies the basic clearance between two fixed reference marks. If the closed-loop identifies that the distance between each second reference mark is different and is therefore incorrect, the axis remains stationary. Fault 508 (zero mark monitoring, motor measuring system) is signaled.
Note:
IM —> Indirect measuring system (motor encoder)
This monitoring is only activated, if P1051/1000*P1005/360 can either be divided by 16 or by 10.

1052 DM reference mark distance for distance-coded scales (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	µm	Unsigned32	PO

...specifies the basic clearance between two fixed reference marks. If the closed-loop identifies that the distance between each second reference mark is different and is therefore incorrect, the axis remains stationary. Fault 514 (zero mark monitoring, direct measuring system) is signaled.
Note:
DM —> Direct measuring system
This monitoring is only activated, if P1052/P1034*1000 can either be divided by 16 or by 10.

1053 DM ref. mark distance for distance-coded rotary enc. (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	mDegree	Unsigned32	PO

... specifies the basic distance between two fixed reference marks. If the control recognizes that the distance between each second reference mark differs, and is therefore incorrect, the axis remains stationary. Fault 514 (zero mark monitoring, direct measuring system) is signaled.
Note:
This monitoring is only activated, if P1053/1000*P1007/360 can either be divided by 16 or by 10.

1054 IM difference for distance-coded encoders (–> 8.3)

Min	Standard	Max	Unit	Data type	Effective	
0.0	20.0	500000.0	µm	Floating Point	PO	(SLM)
0.0	20.0	450000.0	mDegree	Floating Point	PO	(SRM ARM)

... specifies the distance between two reference marks for distance-coded encoders, indirect measuring system (motor measuring system).

1055 DM difference for distance-coded encoders (–> 8.3)

Min	Standard	Max	Unit	Data type	Effective	
0.0	20.0	500000.0	µm	Floating Point	PO	(SLM)
0.0	20.0	450000.0	mDegree	Floating Point	PO	(SRM ARM)

... specifies the distance between two reference marks for distance-coded encoders, direct measuring system.

A

1075 Rotor position identification technique (SRM SLM) (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
1	1	3	–	Unsigned16	immed. (SRM SLM)

...defines the rotor position identification technique.

1 Rotor position identification based on the saturation technique

3 Rotor position identification using the motion-based technique

P1075 is pre-assigned as follows at each ”calculate controller data”:

—> 1FN3 motors: P1075 = 3

—> all other motors: P1075 = 1

If the rotor position identification is successful, the contents of P1075 are copied into P1734 for diagnostics.

Note:

P1075 is immediately effective. However, if the drive is waiting for enable signals in order to carry-out a rotor position identification routine, a change made to P1075 only becomes effective at the next attempt (the identification routine is already running in the wait state).

For a detailed description refer under the index entry ”Rotor position identification” or ”pole position identification”

1076 Load moment of inertia RLI (SRM) Load mass RLI (SLM) (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–10000.0	0.0	10000.0	kg	Floating Point	immed. (SLM)
–500.0	0.0	500.0	kgm^2	Floating Point	immed. (SRM)

...defines the additional moment of inertia (SRM) or additional mass (SLM) which is used to set the controller parameters for the motion-based rotor position identification.

1077 Integral action time, RLI controller (SRM SLM) (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
0.0	3.7	500.0	ms	Floating Point	immed. (SRM SLM)

...defines the integral action time of the controller for the rotor position identification. If P1077 is set to 0, then the I component of the controller is displayed. For ”Calculate controller data”, P1077 is re-calculated and pre-assigned.

1078 Max. duration, rotor position identification. (SRM SLM) (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
100.0	800.0	10000.0	ms	Floating Point	immed. (SRM SLM)

...defines the maximum time of an individual measurement for the rotor position identification. If this time is exceeded for an individual measurement, then fault 610 (rotor position identification not successful) is signaled and P1734 is set to –6.

1080 Calculate controller data

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed.

Suitable settings for the control parameters are calculated from the motor parameters and several other parameters using this function.

0 –> 1 Controller data are being calculated, function is active
0 Function inactive or completed correctly

Error codes
–15 Magnetizing reactance (P1141) = 0
–16 Leakage reactance (P1139/P1140) = 0
–17 Rated motor frequency (P1134) = 0
–18 Rotor resistance (P1138) = 0
–19 Moment of inertia (P1117+P1123) <= 0
–21 threshold speed for field weakening (P1142) = 0
–22 Motor stall current (P1118) = 0
–23 The ratio between the maximum motor current (P1104) and the motor stall current (P1118) is greater than the maximum value for the torque limit (P1230) and the power limit (P1235).
–24 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is inadmissible (pole pair number)

Note:
Recommendation: Execute this function using SimoCom U because the calculated parameters are displayed and are only accepted and overwritten after confirmation.
At the end of the calculation, the parameters are automatically reset to 0 or an error code is written into it.
When an error occurs, the parameters for the current controller, flux controller and speed controller could not be optimally pre-assigned. The standard values were entered.
After the cause of the error is resolved, the function can be re-started.

1081 Calculate equivalent circuit diagram data (ARM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed. (ARM)

Procedure for third-party motor:
– Select ”third-party motor” for the first start-up (refer to the index entry ”Motor code”)
– Enter all rating plate data
– calculate the equivalent circuit diagram data via P1081 = 1

Note:
After the ”Calculate equivalent circuit diagram data”, a ”Calculate third-party motor” should be carried out (P1082).
A 0 or another error code is automatically written into the parameter at the end of the calculation.

0 –> 1 Equivalent circuit diagram data are being calculated, function is active
0 Function inactive or completed correctly

Error codes
–51 Rated motor output (P1130) = 0
–52 Rated motor voltage (P1132) = 0
–53 Rated motor current (P1103) = 0
–54 Cos phi (P1129) = 0 or > 0.996
–55 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is inadmissible (pole pair number)
–56 Warning: The threshold speed for field weakening (P1142) < rated motor speed (P1400)
–57 The function is only permissible for third-party motors (P1102 = 99)

Note:
In the case of an error, no equivalent circuit diagram data were changed (exception: code –56).

A

1082 Calculate third-party motor

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed.

... the ”Calculate unlisted motor” function is started. Parameters P1105 (only SRM), P1147, P1241, P1401 are pre-assigned, the ”calculate controller data” function executed and the appropriate unlisted motor code entered into P1102.
By entering the third-party motor code in P1102, at the next POWER ON, possibly changed motor data will no longer be overwritten by the catalog motor data (previous motor code).
0 –> 1 Third-party motor is being calculated, function is active
0 Function in inactive
Procedure for third-party motor:
Are all of the equivalent circuit diagram data known?
– if no: Calculate the equivalent circuit diagram data via P1081
– if yes: Enter all of the equivalent circuit diagram data and set P1082 to 1
Note:
At the end of the calculation, the parameter is automatically reset to 0 or an error code is written into it (refer to P1080).

1083 Function selection, motor data optimization (ARM)

Min	Standard	Max	Unit	Data type	Effective
1	1	4	–	Unsigned16	immed. (ARM)

... the function number for motor data optimization is entered.
1 Calculate leakage inductance and rotor resistance
2 Calculate no-load current and magnetizing reactance
3 Calculate field-weakening speed
4 Calculate moment of inertia

Perform motor data optimization:
Step 1
P1083 = 1 and start with P1084 = 1 (if it is not 0, evaluate error code)
Calculated and written parameters: P1136, P1137, P1138, P1139, P1140, P1141
Step 2
P1083 = 2 and start with P1084 = 1 (if it is not 0, evaluate error code)
Calculated and written parameters: P1136, P1141
Step 3
P1083 = 3 and start with P1084 = 1 (if it is not 0, evaluate error code)
Calculated and written parameters: P1142
Step 4
P1083 = 4 and start with P1084 = 1 (if it is not 0, evaluate error code)
Calculated and written parameters: P1117
Note:
For a detailed description, please refer to the index entry ”Motor data optimization”.

1084 Start motor data optimization (ARM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed. (ARM)

The function is selected with P1083 and started by setting P1084 = 1.
A 0 or another error code is automatically written into the parameter at the end of the calculation.

1 Function is active
0 Function inactive or completed correctly

Error codes
–2 Pulse frequency (P1100) of 4 kHz or 8 kHz required
–3 Controller/pulse enable missing
–4 Speed setpoint <> 0
–5 Motor changeover is currently active
–6 Error when determining the leakage inductance (result < 0)
–7 V/f operation is active
–8 The incorrect motor was selected by the motor changeover
–9 Parameterized maximum speed is too low for the measurement
–10 Power-up inhibit
–11 Changeover speed open-loop/closed-loop control is too large (P1466)
–12 Speed range too low (P1466 or P1160 too large)
–13 Ramp-function generator enable missing
–14 Open-loop torque-controlled operation is selected
–15 Motor data optimization for catalog motor is not permissible
–16 If the current is too high, it is limited by the i2t power module model

1096 Red. max. torque for regenerative stop active (–> 9.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	immed.

... configures the torque reduction for a speed setpoint of zero.
Bit 0 The torque limit is reduced for regenerative braking
Bit 0 = 1 The limit torque is reduced for a regenerative stop with a speed setpoint of zero.
Note:
For EMF brakes, the torque is always reduced with P1097.
Bit 0 = 0 Inactive

Bit 1 Disable monitoring speed controller at its limit monitoring function, so that for a longer regenerative stop, due to the reduced torque, the pulses are not cancelled by the monitoring function.
Note:
For EMF brakes, the speed controller at its limit monitoring function is always disabled.

Bit 1 = 1 not active
Bit 1 = 0 Monitoring, speed controller at its limit for torque reduction

Bit 2 – 15 Reserved
Note: Refer under index entry ”Faults, stop responses”

1097 Red. max. torque for regenerative stop (–> 9.1)

Min	Standard	Max	Unit	Data type	Effective
0	80	100	%	Integer16	immed.

... specifies the torque reduction for a speed setpoint of zero.
Note: Refer under index entry ”Faults, stop responses”

A

1099 Limiting factor, power section currents

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... indicates the limit factor for power module currents (P1108, P111) as a function of the pulse frequency (P1100).
Note: refer to the index entry ”Power section currents”

1100 Pulse width modulation frequency

Min	Standard	Max	Unit	Data type	Effective	
2000.0	3200.0	8000.0	Hz	Floating Point	PO	(ARM)
2000.0	4000.0	8000.0	Hz	Floating Point	PO	(SRM SLM)

... defines the clock frequency of the inverter.
We recommend the following frequencies: 2000, 2666, 3200, (4000), 5333, 6400 and (8000) Hz.
It is practical to increase the switching frequency for low leakage or higher-speed third-party motors (motor frequency > 500 Hz).
Further, it may make sense to change the switching frequency to reduce motor noise.
Note:
The frequencies specified in brackets are preferred values – intermediate values can also be set.
For IM operation (ARM without encoder), only frequencies 4000 and 8000 Hz are permissible.
The current rating of the drive converter is reduced when the frequency is increased. This must already be taken into account when dimensioning the power section (refer to the de-rating characteristic).

1101 Calc. deadtime current control loop

Min	Standard	Max	Unit	Data type	Effective
0	1	124	µs	Integer16	PO

Note: Internal Siemens
Firmware checks the setting at run-up and is automatically changed.

1102 Motor code number

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

The motor code number describes the connected motor according to a table.
Note:
refer to the index entry ”Motor code”

1103 Rated motor current

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	A(rms)	Floating Point	PO

1104 Maximum motor current (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective	
0.0	0.04	500.0	A(rms)	Floating Point	PO	(SRM SLM)

1105 Reduction in maximum motor current (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective	
0	100	100	%	Integer16	immed.	(SRM SLM)

... reduces the maximum motor current (P1104) to the specified percentage.
Note:
If the motor current is at its limit, the monitoring intervenes with P1605/P1606.

1106 Power section code number

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

At the first start-up, the power section code of the permanently installed power module is automatically entered in P1106
if the value in P1106 and the value of the detected power section in P1110 differ when the drive runs-up, then an appropriate fault is output.

Power module Order No. [MLFB] power module code

6SN246x–2CFx0–0Gxx	43
6SN248x–2CFx0–0Gxx	44
6SN2500–2CFx0–0Gxx	45
6SN2703–2AA0x–0BA1	54
6SN2703–2AA0x–0CA1	55
6SN2703–3AA0x–0BA1	63
6SN2703–3AA1x–0BA1	64

1107 Transistor limiting current

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(pk)	Floating Point	RO

... specifies the maximum transistor limiting current of the power section as peak value.
Important:
This parameter is used as normalization basis for the current actual value sensing.
Note: refer to the index entry ”Power section currents”

1108 Limiting current, power section (RMS)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

... displays the power section limiting current (I max in A RMS) for the standard pulse frequency setting (P1100). The reduction factor for higher pulse frequencies is displayed in P1099.
Note: refer to the index entry ”Power section currents”

1110 Power section version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays which power section was identified at run-up.
The code of the identified power section is in P1110 and must coincide with the code entered into P1106 (power section code number).
Note: Assignment, power module code number, refer to P1106

1111 Rated current, power section (RMS)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

... displays the rated current of the power section (I-rated in A RMS) for the standard pulse frequency setting (P1100). The reduction factor for higher pulse frequencies is displayed in P1099.
Note: refer to the index entry ”Power section currents”

1112 No. of pole pairs of motor (SRM)

Min	Standard	Max	Unit	Data type	Effective
0	0	4096	–	Unsigned16	PO (SRM)

A

1113 Torque constant (SRM) Force constant (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	2000.0	N/A	Floating Point	PO (SLM)
0.0	0.0	300.0	Nm/A	Floating Point	PO (SRM)

SRM:
The torque constant (kT) is the quotient of rated torque/rated current (RMS) for synchronous motors with permanent excitation.
SLM:
The force constant is the quotient of the rated force/rated current (RMS) for linear permanent-magnet synchronous motors.

1114 Voltage constant (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	10000.0	Vs/m	Floating Point	PO (SLM)
0.0	0.0	10000.0	V(RMS)	Floating Point	PO (SRM)

SRM:
The voltage constant is measured as induced voltage (EMF) under no load conditions at n = 1000 RPM as RMS value between the motor terminals (phase-to-phase).
SLM:
The voltage constant is measured as induced voltage (EMF) under no load conditions at v = 1 m/s as RMS value between the motor terminal and star point (phase).

1115 Armature resistance (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	999.999	Ohm	Floating Point	PO (SRM SLM)

... specifies the ohmic resistance of the armature winding (phase value) of a phase at 20 degrees.
For 1FN1 and 1FN3 linear motors, the resistance value at 120 degrees (operating temperature) is entered.
The winding is in the star circuit configuration.

1116 Armature inductance (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	300.0	mH	Floating Point	PO (SRM SLM)

Inductance in the armature circuit for the single–phase equivalent circuit diagram.

1117 Moment of inertia of motor (ARM SRM) Motor mass (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.001	9.99999	kgm^2	Floating Point	immed. (ARM)
0.0	0.0	500.0	kg	Floating Point	immed. (SLM)
0.0	0.0	9.99999	kgm^2	Floating Point	immed. (SRM)

SRM, ARM: Moment of inertia of the motor rotor
SLM: Weight of the primary section

1118 Motor zero-speed current (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	A(rms)	Floating Point	PO (SRM SLM)

... corresponds to the thermally permissible continuous current when the motor is at a standstill with an overtemperature (temperature rise) of 100 Kelvin.

1119 Series reactor inductance (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	65.0	mH	Floating Point	PO (ARM)

1120 Current controller P gain

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	10000.0	U/A	Floating Point	immed.

1121 Current controller reset time

Min	Standard	Max	Unit	Data type	Effective
0.0	3000.0	8000.0	μs	Floating Point	immed. (ARM)
0.0	2000.0	8000.0	μs	Floating Point	immed. (SRM SLM)

1122 Motor current limit (SRM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.04	500.0	A(rms)	Floating Point	PO (SRM)

1123:8 Load moment of inertia (ARM SRM) Load weight (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	kg	Floating Point	immed. (SLM)
0.0	0.0	9.99999	kgm^2	Floating Point	immed. (SRM ARM)

Additional moment of inertia (SRM, ARM) and additional weight (SLM), which is caused by coupling a load to the motor. The contents of P1123:8 are added to the contents of P1117 for the speedtorque feedforward control in induction motor operation and for the ”calculate controller data” function.

1124 Symmetrizing reference model current

Min	Standard	Max	Unit	Data type	Effective
0.0	0.5	1.0	–	Floating Point	immed.

Note: Internal Siemens

1125 Ramp-up time 1 for V/f operation

Min	Standard	Max	Unit	Data type	Effective
0.01	5.0	100.0	s	Floating Point	immed.

When V/f operation is selected (P1014), this is the time, in which the speed setpoint is changed from 0 to the maximum motor speed (P1146).

A

1127 Voltage at f = 0 V/f operation (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	2.0	20.0	V(pk)	Floating Point	immed. (ARM)

1128 Optimum load angle (SRM)

Min	Standard	Max	Unit	Data type	Effective
90.0	90.0	135.0	Degree	Floating Point	immed. (SRM)

For synchronous motors with non-symmetrical rotors in the rotational axis, the additional reluctance torque can be used to increase the torque.
The optimum load angle specifies at which load angle the torque reaches its maximum value at 150% rated current.
Note:
Refer to P1149 (reluctance torque constant)
Synchronous motors with non-symmetrical rotor in the rotational axis: e.g. 1FE motors
Traverse with reluctance torque: P1128 and P1149 not equal to the standard value
Traverse without reluctance torque: P1128 and P1149 equal to the standard value

1129 Cosine Phi power factor (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.8	1.0	–	Floating Point	PO (ARM)

1130 Rated motor power (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1500.0	kW	Floating Point	PO (ARM)

1132 Rated motor voltage (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	380.0	5000.0	V(RMS)	Floating Point	PO (ARM)

1134 Rated motor frequency (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	50.0	3000.0	Hz	Floating Point	PO (ARM)

1135 Motor no-load voltage (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	V(RMS)	Floating Point	immed. (ARM)

1136 Motor no-load current

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	A(rms)	Floating Point	immed.

P1136 (motor short-circuit current) —> this is the parameter name for SRM
P1136 (no-load motor current) —> this is the parameter name for ARM

1137 Stator resistance cold (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	120.0	Ohm	Floating Point	immed. (ARM)

1138 Rotor resistance cold (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	120.0	Ohm	Floating Point	immed. (ARM)

1139 Stator leakage reactance (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	Ohm	Floating Point	immed. (ARM)

1140 Rotor leakage reactance (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	Ohm	Floating Point	immed. (ARM)

1141 Magnetizing reactance (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	999.999	Ohm	Floating Point	immed. (ARM)

1142 Threshold speed field weakening (ARM SRM) Motor threshold speed for field weakening (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

1145 Stall torque reduction factor

Min	Standard	Max	Unit	Data type	Effective
5.0	100.0	1000.0	%	Floating Point	immed.

1146 Maximum motor speed (ARM SRM) Maximum motor velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective	
0.0	1500.0	100000.0	rpm	Floating Point	PO	(ARM)
0.0	0.0	100000.0	m/min	Floating Point	PO	(SLM)
0.0	0.0	100000.0	rpm	Floating Point	PO	(SRM)

... specifies the maximum motor speed/maximum motor velocity defined by the motor manufacturer.
Note:
Refer under the index entry ”Limits”

1147 Speed limitation (ARM SRM) Velocity limiting, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective	
0.0	8000.0	100000.0	rpm	Floating Point	immed.	(ARM)
0.0	120.0	100000.0	m/min	Floating Point	immed.	(SLM)
0.0	7000.0	100000.0	rpm	Floating Point	immed.	(SRM)

... specifies the maximum permissible motor speed or motor velocity (refer under the index entry ”Limits”).

1148 Threshold speed stall power (ARM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	rpm	Floating Point	RO	(ARM)

The rated output is reduced from the ”Threshold speed of the stall power”.

1149 Reluctance torque constant (SRM)

Min	Standard	Max	Unit	Data type	Effective	
0.0	0.0	300.0	mH	Floating Point	immed.	(SRM)

For synchronous motors with non-symmetrical rotors in the rotational axis, the additional reluctance torque can be used to increase the torque.
The reluctance torque constant, multiplied by the torque- and field-generating current, gives the torque increase due to the reluctance torque.
Note:
Refer to P1128 (optimum load angle)
Synchronous motors with non-symmetrical rotor in the rotational axis: e.g. 1FE motors
Traverse with reluctance torque: P1128 and P1149 not equal to the standard value
Traverse without reluctance torque: P1128 and P1149 equal to the standard value

1150 P-gain flux controller

Min	Standard	Max	Unit	Data type	Effective
0.0	400.0	99999.9	A/Vs	Floating Point	immed.

1151 Reset time flux controller

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	500.0	ms	Floating Point	immed.

1160 Threshold speed flux sensing (ARM)

Min	Standard	Max	Unit	Data type	Effective	
200.0	1500.0	100000.0	rpm	Floating Point	immed.	(ARM)

A

1161 Fixed DC link voltage

Min	Standard	Max	Unit	Data type	Effective
0	0	700	V(pk)	Unsigned16	immed.

... a fixed DC link voltage can be entered.
> 0 Fixed DC link voltage, the measurement in P1701 (DC link voltage) is inactive
0 The measurement in P1701 is active
The fixed DC link reference is calculated in instead of the measurement:
– DC link adaption
– Flux sensing (ARM)
– Field weakening and stall torque (ARM)

1162 Min. DC link voltage

Min	Standard	Max	Unit	Data type	Effective
380	380	800	V(pk)	Unsigned16	immed.

... defines the permissible DC link voltage lower limit. Fault 616 is output if this limit is fallen below.

1163 Max. DC link voltage

Min	Standard	Max	Unit	Data type	Effective
0	800	800	V(pk)	Unsigned16	immed.

... defines the permissible DC link voltage upper limit. Fault 617 is output if this limit is exceeded.
Note:
The upper limit is internally limited to 800 V (P1171 = 1) or 710 V (P1171 = 0).

1164 Hysteresis, DC link monitoring (–> 8.1)

Min	Standard	Max	Unit	Data type	Effective
0	50	600	V(pk)	Unsigned16	immed.

... defines the hysteresis for the DC link voltage monitoring. This parameter refers to parameter 1162.

1170 Pole pair width (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	72.0	1000.0	mm	Floating Point	PO (SLM)

The pole pair width of a linear drive corresponds to the length from a north and south pole of the magnet.

1171 Line supply voltage 480 V

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... defines the line supply voltage.
0 400V
1 480V
The line supply voltage includes the following quantities:
– Response threshold for fault 617, DC link overvoltage (POSOMO CD, CA, SI)
– Switch-in and switch-out threshold for the pulsed resistor (POSMO CA)

1173 Highest load time, power module

Min	Standard	Max	Unit	Data type	Effective
–	–	–	s	Floating Point	RO

... specifies the maximum length of time that the power module can provide the limiting current (P1108).
Note: Refer under the index entry ”Power module”

1180 Lower current limit adaption (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	%	Floating Point	immed. (SRM SLM)

The P gain of the current controller (P1120) can be reduced as a function of the current, using the current controller adaption (P1180, P1181, P1182).
P1180 defines the lower current value, from which the adaption linearly decreases the P gain up to the upper current value (P1181). The adaption straight line is defined, in addition to current values P1180 and P1181, by P1182. (current controller adaption factor).
The following value pairs are obtained:
First value pair: P1180/100%
Second value pair: P1181/P1182
Note:
P1180, P1181—> Percentage values referred to P1104 (maximum current)
P1182 —> Percentage value, referred to P1120 (P gain, current controller)
The following is valid: P1180 (lower current limit adaption) < P1181 (upper current limit adaption)
(refer under the index entry ”Current controller adaption”)

1181 Upper current limit adaption (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	100.0	%	Floating Point	immed. (SRM SLM)

Note: Description, refer to P1180.

1182 Factor, current controller adaption (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed. (SRM SLM)

Note: Description, refer to P1180.

1185 Start-up factor P_IREG (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	10000.0	%	Floating Point	PO (ARM)

P1185 was introduced for 1PM4/1PM6 motors. For ”calculate controller data” the current controller P gain is multiplied by the factor in P1185 and entered into P1120.

1200:8 No. of current setpoint filters

Min	Standard	Max	Unit	Data type	Effective
0	1	4	–	Unsigned16	immed.

... specifies the number of current setpoint filters.
The filter type (bandstop or low pass) is set using P1201:8.
0 No current setpoint value filter
1 Filter 1 active
2 Filters 1 and 2 active
3 Filters 1, 2 and 3 active
4 Filters 1, 2, 3 and 4 active
Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

A

1201:8 Current setpoint filter type

Min	Standard	Max	Unit	Data type	Effective
0	0	800F	Hex	Unsigned16	immed.

... specifies the type of the 4 current setpoint filters.

Bit 0 Filter 1
= 1 Bandstop (filter parameters: P1210:8, P1211:8, P1212:8)
= 0 Low pass (filter parameters: P1202:8, P1203:8)
Bit 1 Filter 2
= 1 Bandstop (filter parameters: P1213:8, P1214:8, P1215:8)
= 0 Low pass (filter parameters: P1204:8, P1205:8)
Bit 2 Filter 3
= 1 Bandstop (filter parameters: P1216:8, P1217:8, P1218:8)
= 0 Low pass (filter parameters: P1206:8, P1207:8)
Bit 3 Filter 4
= 1 Bandstop (filter parameters: P1219:8, P1220:8, P1221:8)
= 0 Low pass (filter parameters: P1208:8, P1209:8)
Bit 15 Bandstop, transformation type
= 1 Z transformation
= 0 Bilinear transformation (standard)

Note:
Before parameterizing the filter type, the appropriate filter parameters must be assigned.
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1202:8 Natural frequency current setp. filter 1

Min	Standard	Max	Unit	Data type	Effective
0.0	2000.0	8000.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1203:8 Damping, current setp. filter 1

Min	Standard	Max	Unit	Data type	Effective
0.05	0.7	5.0	–	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1204:8 Natural frequency current setp. filter 2

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	8000.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1205:8 Damping, current setp. filter 2

Min	Standard	Max	Unit	Data type	Effective
0.05	1.0	5.0	–	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1206:8 Natural frequency current setp. filter 3

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	8000.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1207:8 Damping, current setp. filter 3

Min	Standard	Max	Unit	Data type	Effective
0.05	1.0	5.0	–	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1208:8 Natural frequency current setp. filter 4

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	8000.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1209:8 Damping, current setp. filter 4

Min	Standard	Max	Unit	Data type	Effective
0.05	1.0	5.0	–	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1210:8 Blocking freq. current setp. filter 1

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

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1211:8 Bandwidth, current setp. filter 1

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1212:8 Numerator, bandwidth current setpoint filter 1

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1213:8 Blocking freq. current setp. filter 2

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1214:8 Bandwidth, current setp. filter 2

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1215:8 Numerator, bandwidth current setpoint filter 2

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1216:8 Blocking freq. current setp. filter 3

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1217:8 Bandwidth, current setp. filter 3

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1218:8 Numerator, bandwidth current setpoint filter 3

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1219:8 Blocking freq. current setp. filter 4

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1220:8 Bandwidth, current setp. filter 4

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1221:8 Numerator, bandwidth current setpoint filter 4

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1222:8 BSF natural frequency, current setpoint filter 1

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1223:8 BSF natural frequency, current setpoint filter 2

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1224:8 BSF natural frequency, current setpoint filter 3

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1225:8 BSF natural frequency, current setpoint filter 4

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1230:8 1st torque limit value (ARM SRM)
1st force limit value (SLM)

Min	Standard	Max	Unit	Data type	Effective
5.0	100.0	900.0	%	Floating Point	immed.

The parameter value refers to the stall torque (SRM), rated motor torque (ARM) and stall force (SLM) of the motor.
Note: refer to the index entry ”Limits”

1233:8 Generative limitation

Min	Standard	Max	Unit	Data type	Effective
5.0	100.0	100.0	%	Floating Point	immed.

The setting refers to the parameter value in P1230.

A

1235:8 1st power limit

Min	Standard	Max	Unit	Data type	Effective
5.0	100.0	900.0	%	Floating Point	immed.

The parameter value refers to the motor output (SRM) and the rated motor output (ARM).
Note: refer to the index entry ”Limits”

1237 Maximum generative power

Min	Standard	Max	Unit	Data type	Effective
0.1	100.0	500.0	kW	Floating Point	immed.

... allows the regenerative power for the rectifier/regenerative feedback module to be limited. An appropriately lower value must be entered here especially when using a non-controlled NE module.
Note: refer to the index entry ”Limits”

1238 Current limit value (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	150.0	400.0	%	Floating Point	immed. (ARM)

The parameter value refers to the rated motor current (P1103).
Note: refer to the index entry ”Limits”

1240:8 Torque setpoint offset (speed-contr.) (ARM SRM) Force setpoint offset (speed-contr.) (SLM)

Min	Standard	Max	Unit	Data type	Effective
–50000.0	0.0	50000.0	N	Floating Point	immed. (SLM)
–50000.0	0.0	50000.0	Nm	Floating Point	immed. (SRM ARM)

This parameter value is added to the torque setpoint and force setpoint (SLM) if the closed-loop speed control is active (pos operation and nset operation with speed setpoint input). The parameter has no effect if, in the nset mode, open-loop torque controlled operation was selected.
Note: refer under the index entry ”weight compensation”

1245 Threshold, speeddependent M_set smoothing (ARM SRM) Threshold, velocity-dependent F_set smoothing (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

Note:
... is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1246 Hysteresis, speeddependent M_set smoothing (ARM SRM) Hysteresis, velocity-dependent F_set smoothing (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	3.0	1000.0	m/min	Floating Point	immed. (SLM)
0.0	50.0	1000.0	rpm	Floating Point	immed. (SRM ARM)

Note:
... is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1247 Speed threshold, motor changeover 1/2 (ARM)

Min	Standard	Max	Unit	Data type	Effective
100.0	100000.0	100000.0	rpm	Floating Point	immed. (ARM)

... the speed threshold for the motor changeover is defined with speed threshold (P1013 = 3) to change over the motor data sets P1xxx to P2xxx.
Note: refer to the index entry ”Motor changeover”

1248 Speed threshold, motor changeover 3/4 (ARM)

Min	Standard	Max	Unit	Data type	Effective
100.0	100000.0	100000.0	rpm	Floating Point	immed. (ARM)

... the speed threshold for the motor changeover is defined with the speed threshold (P1013 = 3) to change over the motor data sets P3xxx to P4xxx.
Note: refer to the index entry ”Motor changeover”

1249 External contactor control, motor changeover (ARM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed. (ARM)

... specifies whether the contactor control for the motor changeover is defined by the drive or from an external control.
1 Motor changeover via external control
The contactor control for motor changeover is determined via an external control via the ”Motor changed over” input signal (STW2.11).
0 Motor changeover via the drive
The contactor control for motor changeover is determined by the drive via output terminals with function numbers 11, 12, 13 and 14.

Note:
refer to the index entry ”Motor changeover”
The contactors for motor changeover must be switched to a no-current condition. If motor changeover is executed using an external control, and changed over with ”Fault” (e. g. with drive pulses present), the power/supply infeed module could be destroyed.
Recommendation:
Change over the motor using the drive output terminals (P1249=0).
The output terminals 11, 12, 13 and 14 are not energized if P1249 = 1.

A

1250 Frequency limit, act. current smoothing

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	8000.0	Hz	Floating Point	immed.

PT1 filter for the current actual value display
The parameter is used to smooth the following displays:
– P1708 (torque-generating current Iq)
– P1718 (Torque-generating current Iq (A))
– PROFIBUS status word IqG1 (smoothed torque-generating current Iq)
Note:
< 1 Hz —> the filter is inactive
This parameter has no effect on the closed-loop control.

1251 Time constant (smoothing) motor utilization

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	1000.0	ms	Floating Point	immed.

Smoothing to display the motor utilization (P0604).

1252 Frequency limit, torque setpoint smoothing (ARM SRM) Frequency limit, force setpoint smoothing (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	8000.0	Hz	Floating Point	immed.

PT1 filter for the torque setpoint display (smoothing for P1716, analog output of signal number 36).
Note:
< 1 Hz —> the filter is inactive
This parameter has no effect on the closed-loop control.

1254 Time constant current monitoring

Min	Standard	Max	Unit	Data type	Effective
0.0	0.5	2.0	ms	Floating Point	immed.

Note: Internal Siemens

1256:8 Ramp-function generator ramp-up time

Min	Standard	Max	Unit	Data type	Effective
0.0	2.0	600.0	s	Floating Point	immed. (ARM)
0.0	0.0	600.0	s	Floating Point	immed. (SRM SLM)

During ramp-up, the setpoint is increased from zero to the maximum permissible actual speed.
Note:
Max. permissible actual speed for synchronous motors: Minimum from 1.1 (1.05 from SW 7.1 onwards with ”SIMODRIVE 611 universal HR/HRS”, resolver) x P1400 and P1147
Max. permissible actual speed for induction motors: Minimum from P1146 and P1147
Max. permissible actual speed for linear motors: From P1147
refer to the index entry ”Ramp-function generator”

1257:8 Ramp-function generator ramp-down time

Min	Standard	Max	Unit	Data type	Effective
0.0	2.0	600.0	s	Floating Point	immed. (ARM)
0.0	0.0	600.0	s	Floating Point	immed. (SRM SLM)

During ramp-down, the setpoint is reduced from the maximum permissible actual speed to zero.
Note:
Max. permissible actual speed for synchronous motors: Minimum from 1.1 (1.05 from SW 7.1 onwards with ”SIMODRIVE 611 universal HR/HRS”, resolver) x P1400 and P1147
Max. permissible actual speed for induction motors: Minimum from P1146 and P1147
Max. permissible actual speed for linear motors: From P1147
refer to the index entry ”Ramp-function generator”

1259 Torque/power reduction mot./gen. (ARM SRM) Force/power reduction mot./gen. (SLM) (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	Hex	Unsigned16	immed.

... defines if the torque/power de-rating or force/power de-rating depends on whether the drive is motoring/generating.

Bit 0 Torque/power reduction, only when motoring
Bit 0 = 1 Reduction is only effective when motoring
Bit 0 = 0 Reduction is effective when motoring and regenerating

Bit 1 Motoring/regenerating limiting dependent on Nset
Bit 1 = 1 The torque limits when motoring are used if the product of torque and speed setpoint is positive and the speed setpoint is not equal to 0
Bit 1 = 0 The torque limits when motoring are used if the product of torque and speed actual value is positive or the absolute speed actual value is less than 10 RPM

Note: Refer under index entry ”Torque/power reduction”

1262 i2t time in limiting

Min	Standard	Max	Unit	Data type	Effective
–	–	–	s	Floating Point	RO

... for the i2t power section limit, this is used to display the time during which the power section is being limited.
Note:
The parameter is reset for value overflow and for POWER ON.
refer to the index entry ”i2t power section limiting”

1263 i2t actual limiting factor

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... for the i2t power section limit, this is used to display the actual current limit referred to i-max.
Note:
i-max = P1108 (limiting power section current) x P1099 (limiting factor, power section currents)
refer to the index entry ”i2t power section limiting”

A

1264 i2t actual utilization factor (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... is used for the i2t power section limiting to display the actual utilization. The difference to 100 % specifies how much reserve is available. The current limit is reduced for a utilization of 100%.
Note:
refer to the index entry ”i2t power section limiting”

1267 Pulsed resistor: Actual utilization factor (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... specifies the actual utilization of the SIMODRIVE POSMO CA pulsed resistor. For 80% utilization, Alarm 821 is output, pulsed resistor in i2t limiting. The pulsed resistor can then no longer be switched-in which can result in fault message 617 (DC link overvoltage).
Note:
only relevant for SIMODRIVE POSMO CA.

1400 Rated motor speed (ARM SRM) Rated motor velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective	
0.0	1450.0	100000.0	rpm	Floating Point	PO	(ARM)
0.0	0.0	100000.0	m/min	Floating Point	PO	(SLM)
0.0	0.0	100000.0	rpm	Floating Point	PO	(SRM)

1401:8 Speed for max. useful motor speed (ARM SRM) Velocity for max. useful motor velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–100000.0	0.0	100000.0	m/min	Floating Point	immed.	(SLM)
–100000.0	0.0	100000.0	rpm	Floating Point	immed.	(SRM ARM)

The parameter specifies the maximum useful motor speed or the useful motor velocity for closed-loop speed controlled operation.
Note:
The maximum useful motor speed, set via P1401:8, is not exceeded, independent of whether the setpoint is entered via terminal or PROFIBUS.
refer to the index entry ”speed-controlled operation”

1403 Creep speed pulse suppression (ARM SRM) Creep speed, pulse suppression (SLM)

Min	Standard	Max	Unit	Data type	Effective	
0.0	6.0	7200.0	rpm	Floating Point	immed.	(ARM)
0.0	0.0	7200.0	m/min	Floating Point	immed.	(SLM)
0.0	0.0	7200.0	rpm	Floating Point	immed.	(SRM)

After withdrawing the controller enable (e.g. via terminal, or in an error/fault case), the drive brakes along the torque limit.
If the absolute speed actual value or the absolute velocity value falls below the specified shutdown speed or creep speed, during the power-off sequence, the pulse enable is withdrawn, and the drive ”coasts down”.
The pulses are previously cancelled if the timer stage, set in P1404 has expired. When the ramp-function generator is active, the timer stage only starts to run when a speed setpoint of zero is reached at the ramp-function generator output.
0 P1403 is inactive, pulses are exclusively canceled via P1404
Note:
The functionality of P1403 is required, if an overshoot occurring when reaching zero speed has to be suppressed, after withdrawing the controller enable.
The pulse suppression control via P1403 and P1404 is ineffective when the motor holding brake is activated (P0850 = 1)

1404 Timer pulse suppression

Min	Standard	Max	Unit	Data type	Effective	
0.0	5000.0	100000.0	ms	Floating Point	immed.	(ARM)
0.0	100.0	100000.0	ms	Floating Point	immed.	(SRM SLM)

After the controller enable has been withdrawn and after this delay, the gating pulses of the power transistors are canceled on the drive side. If the ramp-function generator is active, the delay only starts when zero speed setpoint has been reached at the ramp-function generator output.
Note:
The pulses will be canceled beforehand, if the threshold, set in P1403, is fallen short off.
The pulse suppression control via P1403 and P1404 is ineffective when the motor holding brake is activated (P0850 = 1)

1405:8 Monitoring speed, motor (ARM SRM)
Monitoring velocity, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective
100.0	110.0	110.0	%	Floating Point	immed.

Percentage input of the maximum permissible setpoint referred to P1401.
Note:
If the setpoint is exceeded, the value in P1405 is used as limit.

1407:8 Speed controller P gain (ARM SRM)
Velocity controller P gain (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	2000.0	999999.0	Ns/m	Floating Point	immed. (SLM)
0.0	0.3	999999.0	Nm*s/rad	Floating Point	immed. (SRM ARM)

Note: refer to the index entry ”Speed controller optimization”

1408:8 P gain, upper adaption speed (ARM SRM)
P gain, upper adaption velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	2000.0	999999.0	Ns/m	Floating Point	immed. (SLM)
0.0	0.3	999999.0	Nm*s/rad	Floating Point	immed. (SRM ARM)

Note: Refer under the index entry ”Speed controller adaption”

1409:8 Speed controller reset time (ARM SRM)
Velocity controller reset time (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	500.0	ms	Floating Point	immed.

Note: refer to the index entry ”Speed controller optimization”

1410:8 Integral action time, upper adaption speed (ARM SRM)
Integral action time, upper adaption velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	500.0	ms	Floating Point	immed.

Note: Refer under the index entry ”Speed controller adaption”

A

1411 Lower adaptation speed (ARM SRM)
Lower adaption velocity, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

Note: Refer under the index entry ”Speed controller adaption”

1412 Upper adaptation speed (ARM SRM)
Upper adaption speed, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

Note: Refer under the index entry ”Speed controller adaption”

1413 Select speed controller adaptation (ARM SRM)
Select velocity control adaption (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	1	1	–	Unsigned16	immed. (ARM)
0	0	1	–	Unsigned16	immed. (SRM SLM)

Note: Refer under the index entry ”Speed controller adaption”

1414:8 Natural frequency, reference model speed (ARM SRM) Natural frequency, reference model velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	8000.0	Hz	Floating Point	immed.

Note:
The reference model is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1415:8 Damping, reference model speed (ARM SRM) Damping, reference model velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.5	1.0	5.0	–	Floating Point	immed.

Note:
The reference model is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1416 Balancing, reference model, speed (ARM SRM) Balancing, reference model, velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1.0	–	Floating Point	immed.

Note:
The reference model is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1417:8 n_x for ’n_act < n_x’ signal

Min	Standard	Max	Unit	Data type	Effective
0.0	120.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	6000.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

The threshold speed or the threshold velocity (SLM) for the output signal ”n_act < n_x” is defined using this parameter.

1418:8 n_min for ’n_act < n_min’ signal

Min	Standard	Max	Unit	Data type	Effective
0.0	0.3	100000.0	m/min	Floating Point	immed. (SLM)
0.0	5.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

The threshold speed or the threshold velocity (SLM) for the output signal ”n_act < n_min” is defined using this parameter.

1421:8 Time constant, integrator feedback (n controller)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1000.0	ms	Floating Point	immed.

The integrator of the speed controller is re-parameterized via a feedback element to a PT1 filter (1st order lowpass characteristics). The PT1 filter time constant can be set via P1421.
The following is valid:
P1421 < 1.0 —> the PT1 filter is not active, the pure integrator is effective
P1421 >= 1.0 —> the PT1 filter is active and has replaced the pure integrator
Applications:
Movement at zero setpoint with a dominant stiction can be suppressed but with the disadvantage that a setpoint-actual value difference remains. This can result in, for example, an oscillation of a position-controlled axis at standstill (stick-slip effect) or overshoot with micrometer steps.
Prevents excessive stress for axes which are mechanically rigidly coupled (e.g. for synchronous spindles, master-slave axes).

1426:8 Toler.bandwidth f.’n_set = n_act’ signal

Min	Standard	Max	Unit	Data type	Effective
0.0	1.0	10000.0	m/min	Floating Point	immed. (SLM)
0.0	20.0	10000.0	rpm	Floating Point	immed. (SRM ARM)

The tolerance bandwidth for the ”n_set = n_act” output signal is defined using this parameter.

1427 Delay time ’n_set = n_act’ signal

Min	Standard	Max	Unit	Data type	Effective
0.0	200.0	500.0	ms	Floating Point	immed.

The parameter defines the time which is started if the speed actual value or the velocity actual value (SLM) has reached the tolerance bandwidth around the setpoint.
The time is used for the output signal ”Ramp-function generator ended” and for the output signal ”n_set = n_act”.
Note:
refer to the index entry ”Output signal ramp-up completed” or ”Output signal n_set is equal to n_act”

1428:8 Threshold torque M_x (ARM SRM) Threshold force F_x (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	90.0	100.0	%	Floating Point	immed.

The threshold torque or the threshold force (SLM) for the output signal ”M < M_x” is defined using this parameter.
Note: refer to the index entry ”Output signal M less than M_x”

1429 Delay time ’M < M_x’ signal (ARM SRM) Delay time ’F < F_x’ signal (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	800.0	1000.0	ms	Floating Point	immed.

The parameter defines the time after which the evaluation for the output signal ”M < M_x” is started after run-up.
Note: refer to the index entry ”Output signal M less than M_x”

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1451:8 P gain speed controller AM

Min	Standard	Max	Unit	Data type	Effective
0.0	0.3	9999.999	Nm*s/rad	Floating Point	immed.

... the P gain of the speed controller is set in IM operation (operation without encoder).

1453:8 Reset time speed controller AM

Min	Standard	Max	Unit	Data type	Effective
0.0	140.0	6000.0	ms	Floating Point	immed.

... the integral action time of the speed controller in IM operation (operation without encoder).

1458 Current setpoint, controlled range IM

Min	Standard	Max	Unit	Data type	Effective
0.0	90.0	150.0	%	Floating Point	immed.

Current setpoint for the currentfrequency open-loop control referred to the rated motor current.

1459 Torque smoothing time constant IM

Min	Standard	Max	Unit	Data type	Effective
0.0	4.0	100.0	ms	Floating Point	immed.

Torque setpoint smoothing (initial rounding-off).

1465 Switching speed MSD/AM

Min	Standard	Max	Unit	Data type	Effective
0.0	100000.0	100000.0	rpm	Floating Point	immed.

Threshold speed for the changeover from the MSD to induction motor (IM) control.

1466 Changeover speed, open-loop/closed-loop ctr. IM (ARM SRM) Changeover velocity closed-loop/open-loop control IM (SLM)

Min	Standard	Max	Unit	Data type	Effective
3.000000	20.000000	100000.0	m/min	Floating Point	immed. (SLM)
5.0	300.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

MSD:
Threshold speed for changing over between closed-loop and open-loop control for induction motor operation.

Note:
When accelerating, condition P1466 >=150 RPM is checked. If this is not the case, then fault 722 is signaled.

FD,SLM:
When the electric brake (P1049 = 1) is enabled, when the encoder fails without encoder information the drive is braked up to the changeover speed/velocity saved in parameter P1466. The pulses are then inhibited and the motor coasts down.
If the motor speed/velocity at the instant that the encoder fails is below the changeover speed/velocity defined in P1466, then the pulses are immediately inhibited and the motor coasts down.

Note
The following criteria apply when using the function ”Electrical braking when the encoder fails”:
Rotating motor: P1466 > 40000/P1114
Linear motor: P1466 > 1386/P1114
If this limit is incorrectly parameterized, then fault message 722 is output ”changeover speed/velocity too low.”

1500:8 No. of speed setpoint filters (ARM SRM) No. of velocity setpoint filters (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

... specifies the number of speed setpoint filters.
The filter type (bandstop or low pass PT1/PT2) is set using P1501:8.
0 No speed setpoint filter active
1 Filter 1 active
2 Filters 1 and 2 active
Note:
If filter 1 is parameterized as low pass filter, (PT1 or PT2, P1501:8), it can be switched out/switched in using the ”First speed setpoint filter off” input signal. When parameterized as bandstop filter, the input signal has no effect.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1501:8 Type of speed setpoint filter (ARM SRM)
Type of velocity setpoint filter (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	8303	Hex	Unsigned16	immed.

... specifies the type of the 2nd speed setpont filter

Bit 0 Filter 1: Low pass/bandstop
= 1 Bandstop (filter parameters: P1514:8, P1515:8, P1516:8)
= 0 Low pass (filter parameters: P1502:8, P1506:8, P1507:8)
Bit 1 Filter 2: Low pass/bandstop
= 1 Bandstop (filter parameters: P1517:8, P1518:8, P1519:8)
= 0 Lowpass (filter parameters: P1503:8, P1508:8, P1509:8)
Bit 8 Filter 1: Low pass PT1/PT2
= 1 PT1 low pass (filter parameter: P1502:8)
= 0 PT2 low pass (filter parameters: P1506:8, P1507:8)
Bit 9 Filter 2: Low pass PT1/PT2
= 1 PT1 low pass (filter parameter: P1503:8)
= 0 PT2 low pass (filter parameter: P1508:8, P1509:8)
Bit 15 Bandstop, transformation type
= 1 Z transformation
= 0 Bilinear transformation (standard)

Note:
Before parameterizing the filter type, the appropriate filter parameters must be assigned.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1502:8 Time constant, speed setpoint filter 1 (ARM SRM)
Time constant, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	ms	Floating Point	immed.

Note:
The filter can be switched out/switched in via the ”First speed setpoint filter off” input signal.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

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1503:8 Time constant, speed setpoint filter 2 (ARM SRM)
Time constant, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	ms	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1506:8 Natural frequency, speed setpoint filter 1 (ARM SRM)
Natural frequency, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
10.0	2000.0	8000.0	Hz	Floating Point	immed.

Note:
The filter can be switched out/switched in via the ”First speed setpoint filter off” input signal.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1507:8 Damping, speed setpoint filter 1 (ARM SRM) Damping, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.2	0.7	5.0	–	Floating Point	immed.

Note:
The filter can be switched out/switched in via the ”First speed setpoint filter off” input signal.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1508:8 Natural frequency, speed setpoint filter 2 (ARM SRM) Natural frequency, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
10.0	2000.0	8000.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1509:8 Damping, speed setpoint filter 2 (ARM SRM) Damping, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.2	0.7	5.0	–	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1514:8 Blocking frequency, speed setpoint filter 1 (ARM SRM) Blocking frequency, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1515:8 Bandwidth, speed setpoint filter 1 (ARM SRM) Bandwidth, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1516:8 Numerator, bandwidth speed setpoint filter 1 (ARM SRM) Numerator, bandwidth velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1517:8 Blocking frequency, speed setpoint filter 2 (ARM SRM) Blocking frequency, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1518:8 Bandwidth, speed setpoint filter 2 (ARM SRM) Bandwidth, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1519:8 Numerator, bandwidth speed setpoint filter 2 (ARM SRM) Numerator, bandwidth velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1520:8 BSP natural frequency, speed setpoint filter 1 (ARM SRM) BSF natural frequency velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	141.0	%	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1521:8 BSP natural frequency, speed setpoint filter 2 (ARM SRM) BSP natural frequency, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	141.0	%	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1522 Time constant, speed actual value filter (PT1) (ARM SRM) Time constant, velocity actual value filter (PT1) (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	ms	Floating Point	immed.

Encoder with sin/cos 1 Vpp: Default corresponding to the appropriate encoder
– Single absolute value encoder (EQI, 16 pulses/revolution): 1 ms
– Single absolute value encoder (EQI, 32 pulses/revolution): 1 ms
– Toothed-wheel encoder (SIZAG 2, 256/512 pulses/revolution): 1 ms
– Absolute value encoder for SRM (shaft height 28/26, 512 pulses/revolution): 1 ms
– Absolute value encoder (EQN, 2048 pulses/revolution): 0 ms
– Incremental encoder (ERN, 2048 pulses/revolution): 0 ms
Note: refer to the index entry ”Encoder adaptation”

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1523 Time constant, speed act. val. filter (PT1) RLI (ARM SRM) (–> 9.1) Time constant, velocity actual value filter (PT1) RLI (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	ms	Floating Point	immed.

Time constant of the speed actual value filtering during the rotor position identification routine, traversing 3
<0.05 ms: internally, P1522 is used for the calculation
>=0.05 ms: internally, P1523 is used for the calculation
Note: Pre-assignment (default) refer to P1522

1600 Suppressible faults 1

Min	Standard	Max	Unit	Data type	Effective
0	0	27FFF	Hex	Unsigned32	immed.

The following faults can be suppressed using these bits.
Bit 4 Measuring circuit, motor measuring system (fault 504)
Bit 5 Monitoring absolute track (fault 505)
Bit 7 Synchronizing error, rotor position (fault 507)
Bit 8 Zero mark monitoring, motor measuring system (fault 508)
Bit 9 Converter limiting frequency too high (fault 509)
Bit 12 Measuring circuit, direct measuring system (Fault 512)
Bit 13 Monitoring, absolute track, direct measuring system (fault 513)
Bit 14 Zero mark monitoring, direct measuring system (fault 514)
Bit 17 Defective hardware, ”Pulse enable” terminal (term. IF) (Fault 517)
Note:
When suppressing the zero mark monitoring with P1600.8 or P1600.14, only faults 508 or 514 are suppressed; however, the internal monitoring functions still remain active.
Bit x = ”1” —> Fault is suppressed, i.e. de-activated
Bit x = ”0” —> Fault is activated

1601 Suppressible faults 2

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

The following faults can be suppressed using these bits.
Bit 5 Position controller output limited (fault 605)
Bit 6 Flux controller at its limit (fault 606)
Bit 7 Currrent controller at its limit (fault 607)
Bit 8 Speed controller at its limit (fault 608)
Bit 9 Encoder frequency exceeded (fault 609)
Bit 13 Immediate shutdown for motor overtemperature (P1607) (fault 613)
Bit 14 Delayed shutdown for motor overtemperature (P1602 and P1603) (fault 614)
Bit 15 Direct measuring system, encoder limiting frequency exceeded (fault 615)
Bit 18 Sum of the phase currents not equal to zero (Fault 618)
Bit 19 Measuring circuit fault, absolute current hardware (Fault 619)
Bit 20 24V electronics power supply too low (Fault 620)
Bit 21 24V electronics power supply too high (Fault 621)
Bit 22 Defective motor holding brake (Fault 622)
Bit 23 Brake sequence control inactive (Fault 623)
Note:
Bit x = ”1” —> Fault is suppressed, i.e. de-activated
Bit x = ”0” —> Fault is activated

1602 Alarm threshold, motor overtemperature

Min	Standard	Max	Unit	Data type	Effective
0	120	200	°C	Unsigned16	immed.

... specifies the thermal steady-state permissible motor temperature and is appropriately pre-assigned when the motor code is entered.
Note:
When this temperature alarm threshold is exceeded, ”only” an appropriate alarm is output which disappears when the temperature threshold is fallen short off.
If the overtemperature condition remains longer than the time set in P1603, then this results in fault 614.
The monitoring function can be enabled/disabled via P1601.14.
The temperature monitoring functions with/without pre-alarm (P1602 + P1603 or P1607) are not mutually restricted, i. e. P1607 < P1602 is permissible.
Refer under the index entry ”Monitoring functions”

1603 Motor temperature alarm timer

Min	Standard	Max	Unit	Data type	Effective
0	240	600	s	Unsigned16	immed.

When the temperature alarm threshold (P1602) is exceeded, this timer is started. If the timer expires, and the temperature has not fallen below alarm threshold, fault 614 is output.
Note:
The monitoring function can be enabled/disabled via P1601.14.
Refer under the index entry ”Monitoring functions”

1604 DC link undervoltage warning threshold

Min	Standard	Max	Unit	Data type	Effective
0	200	680	V(pk)	Unsigned16	immed.

... defines the alarm threshold for the DC link monitoring.
The ”V_dc link > V_x (P1604)” output signal (DC link voltage greater than the DC link undervoltage alarm threshold) is set, if the DC link voltage is greater than the selected alarm threshold.
Note:
The output terminal signals can be inverted via parameter P0699 ”Inversion, output terminal signals”.

1605 Timer n controller at stop

Min	Standard	Max	Unit	Data type	Effective
20.0	200.0	10000.0	ms	Floating Point	immed.

... specifies how long the speed controller or velocity controller output can be at its limit without fault 608 being output.
Important:
If P1605 < P1404, then regenerative braking can be exited with fault 608, whereby the drive then ”coasts down”.
Note: refer to the index entry ”Monitoring functions”

1606 Threshold n controller at stop

Min	Standard	Max	Unit	Data type	Effective
0.0	30.0	100000.0	rpm	Floating Point	immed. (ARM)
0.0	500.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	90000.0	100000.0	rpm	Floating Point	immed. (SRM)

... specifies up to which speed or velocity the torque setpoint or force setpoint monitoring is active, i. e. up to this value, fault 608 can be output (speed controller at the endstop).
Note:
In the case of PE spindles (P1015=1), the standard assignment will be as with ARM (30.0 rpms).
refer under index entry ”Monitoring functions”

1607 Shutdown limit motor temperature

Min	Standard	Max	Unit	Data type	Effective
0	155	200	°C	Unsigned16	immed.

... defines the shutdown limit for the motor temperature monitoring without pre-alarm.
When this temperature threshold is exceeded, the drive is shut down, the pulses canceled and fault 613 output.
Note:
The monitoring function can be enabled/disabled via P1601.13.
The temperature monitoring functions with/without pre-alarm (P1602 + P1603 or P1607) are not mutually restricted, i. e. P1607 < P1602 is permissible.
Refer under the index entry ”Monitoring functions”

1608 Fixed temperature

Min	Standard	Max	Unit	Data type	Effective
0	0	200	°C	Unsigned16	immed.

If a value > 0 is entered, then the rotor resistor is adapted, temperature-dependent, with this fixed temperature.
Note:
The measured temperature is then no longer monitored and parameters 1602, 1603 and 1607 are then no longer effective.
A fixed temperature can, e. g. be required, if a motor does not have a temperature sensor.
Thus, e.g. the temperature monitoring of linear motors is disabled for the case where the monitoring is realized via an external PLC.
Refer under the index entry ”Monitoring functions”

1610 Diagnostic functions

Min	Standard	Max	Unit	Data type	Effective	
0	1	3	Hex	Unsigned16	PO	(ARM)
0	0	3	Hex	Unsigned16	PO	(SRM SLM)

Note: Internal Siemens

1611 Response threshold dn/dt

Min	Standard	Max	Unit	Data type	Effective
0	300	1600	%	Unsigned16	immed.

Note: Internal Siemens

1612 Shutdown response, faults 1

Min	Standard	Max	Unit	Data type	Effective
0	1F3B2	3FFFF	Hex	Unsigned32	immed. (ARM)
0	F3B2	3FFFF	Hex	Unsigned32	immed. (SRM SLM)

... defines how the system responds to the listed faults.
Bit 1 Measuring circuit fault, absolute current (fault 501)
Bit 4 Measuring circuit fault, motor measuring system (fault 504)
Bit 5 Measuring circuit fault, motor measuring system, absolute track (fault 505)
Bit 7 Synchronizing error, rotor position (fault 507)
Bit 8 Zero mark monitoring, motor measuring system (fault 508)
Bit 9 Drive converter limiting frequency exceeded (fault 509)
Bit 12 Measuring circuit error, direct measuring system (fault 512)
Bit 13 Measuring circuit fault, direct measuring system absolute track (fault 513)
Bit 14 Zero mark monitoring, direct measuring system (fault 514)
Bit 15 Heatsink temperature exceeded (fault 515)
Bit 16 Electronics temperature exceeded (Fault 516)
Bit 17 Defective hardware, ”Pulse enable” terminal (term. IF) (Fault 517)

Note:
Bit x = ”1” —> STOP 1 is executed (internal pulse cancellation)
Bit x = ”0” —> P1640 is evaluated
If bit 1 is disabled, then this can destroy the power module (SIMODRIVE 611).

1613 Shutdown response, faults 2

Min	Standard	Max	Unit	Data type	Effective
0	3F7FCC	FFFFFF	Hex	Unsigned32	immed. (ARM)
0	3F0100	FFFFFF	Hex	Unsigned32	immed. (SRM SLM)

... defines how the system responds to the listed faults.
Bit 2 Open-loop torque controlled operation w/o encoder not permissible (fault 602)
Bit 3 Changeover to a non-parameterized motor data set (fault 603)
Bit 5 Position controller output limited (fault 605)
Bit 6 Flux controller output limited (fault 606)
Bit 7 Current controller output limited (Fault 607)
Bit 8 Speed controller output limited (fault 608)
Bit 9 Encoder limiting frequency exceeded (fault 609)
Bit 10 Rotor position identification has failed (Fault 610)
Bit 11 Illegal motion during rotor position identification (fault 611)
Bit 12 Illegal current during rotor position identification (fault 612)
Bit 13 Shutdown limit, motor overtemperature (P1607) exceeded (fault 613)
Bit 14 Delayed shutdown for motor overtemperature (P1602 and P1603) (fault 614)
Bit 15 Direct measuring system, encoder limiting frequency exceeded (fault 615)
Bit 16 DC link undervoltage (Fault 616)
Bit 17 DC link overvoltage (Fault 617)
Bit 18 Sum of the phase currents not equal to zero (Fault 618)
Bit 19 Measuring circuit fault, absolute current hardware (Fault 619)
Bit 20 24V electronics power supply too low (Fault 620)
Bit 21 24V electronics power supply too high (Fault 621)
Bit 22 Defective motor holding brake (Fault 622)
Bit 23 Brake sequence control inactive (Fault 623)
Note:
Bit x = ”1” —> STOP 1 is executed (internal pulse cancellation)
Bit x = ”0” —> P1641 is evaluated
If bit 9 is disabled, then this can destroy the power module (SIMODRIVE 611).

1615 Tolerance rotational accuracy monitor

Min	Standard	Max	Unit	Data type	Effective
0.0	0.2	100.0	m/min	Floating Point	immed. (SLM)
0.0	2.0	100.0	rpm	Floating Point	immed. (SRM ARM)

Note: Internal Siemens

1616 Diagnosis, actual speed value

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

When continuously increased by several increments, there is an increased noise level (the speed actual value is faulty).

1620 Bits for variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	7	Hex	Unsigned16	immed.

... defines the behavior of variable message function.

Bit 0 Variable message function
Bit 0 = 1 active
Bit 0 = 0 inactive

Bit 1 Segment, variable message function
Bit 1 = 1 Address space Y
Bit 1 = 0 Address space X

Bit 2 Comparison, signed
Bit 2 = 1 Comparison with sign
Bit 2 = 0 Comparison without sign

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1621 Signal number, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	530	–	Unsigned16	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1622 Address, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1623 Threshold, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
FF000001	0	FFFFFF	Hex	Integer32	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1624 Hysteresis, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1625 Pull-in delay, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	10000	ms	Unsigned16	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1626 Drop-out delay, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	10000	ms	Unsigned16	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1640 Armature short-circuit, fault 1

Min	Standard	Max	Unit	Data type	Effective
0	0	3FFFF	Hex	Unsigned32	immed.

... defines how the system responds to the listed faults.
Bit 1 Measuring circuit fault, absolute current (fault 501)
Bit 4 Measuring circuit fault, motor measuring system (fault 504)
Bit 5 Measuring circuit fault, motor measuring system, absolute track (fault 505)
Bit 7 Synchronizing error, rotor position (fault 507)
Bit 8 zero mark monitoring, motor measuring system (fault 508)
Bit 9 Drive converter limiting frequency exceeded (fault 509)
Bit 12 Measuring circuit error, direct measuring system (fault 512)
Bit 13 Measuring circuit fault, direct measuring system absolute track (fault 513)
Bit 14 Zero mark monitoring, direct measuring system (fault 514)
Bit 15 Heatsink temperature exceeded (fault 515)
Bit 16 Electronics temperature exceeded (Fault 516)
Bit 17 Defective hardware, ”Pulse enable” terminal (term. IF) (Fault 517)

Note:
Bit x = ”1” —< STOP 0 is executed
Bit x = ”0” —> STOP II is executed
Bit x can only be set, if, for P1612, the appropriate bit x is set to 0.
Only valid for POSMO CA

A

1641 Armature short-circuit, fault 2

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

... defines how the system responds to the listed faults.
Bit 2 Open-loop torque controlled operation w/o encoder not permissible (fault 602)
Bit 3 Changeover to a non-parameterized motor data set (fault 603)
Bit 5 Position controller output limited (fault 605)
Bit 6 Flux controller output limited (fault 606)
Bit 7 Current controller output limited (Fault 607)
Bit 8 Speed controller output limited (fault 608)
Bit 9 Encoder frequency exceeded (fault 609)
Bit 10 Rotor position identification has failed (Fault 610)
Bit 11 Illegal motion during rotor position identification (fault 611)
Bit 12 Illegal current during rotor position identification (fault 612)
Bit 13 Shutdown limit, motor overtemperature (P1607) exceeded (fault 613)
Bit 14 Delayed shutdown for motor overtemperature (P1602 and P1603) (fault 614)
Bit 15 Direct measuring system, encoder limiting frequency exceeded (fault 615)
Bit 16 DC link undervoltage (Fault 616)
Bit 17 DC link overvoltage (Fault 617)
Bit 18 Sum of the phase currents not equal to zero (Fault 618)
Bit 19 Measuring circuit fault, absolute current hardware (Fault 619)
Bit 20 24V electronics power supply too low (Fault 620)
Bit 21 24V electronics power supply too high (Fault 621)
Bit 22 Defective motor holding brake (Fault 622)
Bit 23 Brake sequence control inactive (Fault 623)

Note:
Bit x = ”1” —< STOP 0 is executed
Bit x = ”0” —> STOP II is executed
Bit x can only be set, if, for P1613, the appropriate bit x is set to 0.
Only valid for POSMO CA

1642 Shutdown response, various faults

Min	Standard	Max	Unit	Data type	Effective
0	0	1	Hex	Unsigned32	immed.

... defines how the system responds to the listed faults.
Bit 0 NMI due to Watchdog (Fault 003)

Note.
Bit x = ”1” —< STOP 0 is executed
Bit x = ”0” —> STOP I is executed
Only valid for POSMO CA

1650 Diagnostics control

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	immed.

... allows the diagnostic functions to be configured.

Bit 0 Min/max memory
Bit 0 = 1 Enable the ”Min/Max memory” function
Bit 0 = 0 Disable the ”min/max memory” function

Bit 1 Segment, min/max memory
Bit 1 = 1 Segment Y: (min/max memory)
Bit 1 = 0 Segment X: (Min/Max memory)

Bit 2 Comparison, signed
Bit 2 = 1 Comparison signed (min/max memory)
Bit 2 = 0 Comparison unsigned (absolute value)(Min/Max memory)

Bit 15 Cyclically display the parameter number
Bit 15 = 1 Cyclic display is inactive
Bit 15 = 0 Cyclic display is active (seven-segment display)
While a parameter value is being displayed, the associated parameter number or subparameter number is displayed every 10 seconds for one second.

1651 Signal number, min/max memory

Min	Standard	Max	Unit	Data type	Effective
0	0	530	–	Unsigned16	immed.

Note: refer to the index entry ”Signal selection list for analog output”

1652 Memory location min/max memory

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

1653 Minimum value Min/Max memory

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

Displays the min. value in the min/max memory.

1654 Maximum value Min/Max memory

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

Displays the max. value in the min/max memory.

1655 Segment memory location monitor

Min	Standard	Max	Unit	Data type	Effective
0	0	1	Hex	Unsigned16	immed.

Select the segment for the monitor function.
0 Segment X: (Monitor)
1 Segment Y: (Monitor)

1656 Address memory location monitor

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Select the address for the monitor function.

1657 Value display monitor

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

Displays the contents of the address in P1655/P1656.

1658 Value input monitor

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

1659 Value acceptance monitor

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

Note: Internal Siemens

1701 DC link voltage

Min	Standard	Max	Unit	Data type	Effective
–	–	–	V(pk)	Unsigned16	RO

... is used for continuous display (measurement) of the DC link voltage.
Note:
If a value > 0 V is in P1161 (fixed DC link voltage), then this display is not valid.

1703 Lead time, motor measuring system conversion

Min	Standard	Max	Unit	Data type	Effective
–	–	–	µs	Unsigned16	RO

Note: Internal Siemens

1705 Voltage setpoint (rms)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	V(RMS)	Floating Point	RO

Displays the phase-to-phase voltage.

1708 Torque-generating current Iq

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... displays the torque-generating current Iq RMS.
Note:
The display of the torque generating current actual value is smoothed using a PT1 filter (P1250).
The smoothed current actual value is displayed as an absolute percentage, whereby 100% corresponds to the maximum POSMO SI/CD/CA current (e.g. for POSMO CD 9A —> 100 % = 18 A RMS).

1709 Significance, voltage representation

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Floating Point	RO

Note: Internal Siemens

1710 Significance, current representation

Min	Standard	Max	Unit	Data type	Effective
–	–	–	µA(pk)	Floating Point	RO

Note: Internal Siemens

1711 Significance, speed representation (ARM SRM) Significance, velocity representation (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	m/min	Floating Point	RO	(SLM)
–	–	–	rpm	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1712 Significance, rotor flux representation (ARM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	µVs	Floating Point	RO	(ARM)

Note: Internal Siemens

1713 Significance torque representation (ARM SRM) Significance, force representation (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	µN	Floating Point	RO	(SLM)
–	–	–	µNm	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1716 Torque setpoint (ARM SRM) Force setpoint (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	N	Floating Point	RO	(SLM)
–	–	–	Nm	Floating Point	RO	(SRM ARM)

... displays the actual torque setpoint or force setpoint (SLM).
Note:
The torque/force setpoint display is smoothed using a PT1 filter (P1252).

1717 Limiting factor for torque/power (ARM SRM) Limiting factor for force/power (SLM)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... displays the actual limiting factor for torque/power or force/power (SLM).
Note:
refer to the index entry ”Torque/power reduction”

1718 Torque-generating current Iq (A)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

... displays the torque-generating current Iq as RMS value.
Note:
The display of the torque-generating current actual value is smoothed using a PT1 filter (P1250).

1719 Actual absolute current (rms)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

Displays the motor phase current RMS.

1723 Diagnosis, ramp-up time

Min	Standard	Max	Unit	Data type	Effective
–	–	–	ms	Unsigned16	RO

Note: Internal Siemens

A

1724 Diagnosis, rotational accuracy monitor

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

Note: Internal Siemens

1725 Normalization of torque setpoint (ARM SRM) Normalization of force setpoint (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	N	Floating Point	RO	(SLM)
–	–	–	Nm	Floating Point	RO	(SRM ARM)

... specifies the reference value for the status word Mset for PROFIBUS.
The following applies before SW 4.1: The value corresponds to 800% of the rated motor torque.
From SW 4.1 the following applies: The value corresponds to P0882 * rated motor torque.

1726 Calculated jerk time

Min	Standard	Max	Unit	Data type	Effective
–	–	–	ms	Floating Point	RO

... displays the calculated jerk time which is currently effective.
Note: refer to the index entry ”Jerk limitation”

1729 Actual rotor position (electrical)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Degree	Floating Point	RO

...displays the actual electrical rotor position.

1731 Image ZK1_PO register

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

Note: Internal Siemens

1732 Image ZK1_RES register

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

Note: Internal Siemens

1734 Diagnostics, rotor position identification (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Integer16	RO (SRM SLM)

... indicates the result of the last rotor position identification. When a fault condition occurs, negative values indicate the fault cause.

0 Function was not selected or was not exited
1, 2 Function was successfully executed (saturation-based technique)
3 Function was successfully executed (motion-based traversing, from SW 6.1)

Error codes
–1 Measurement has not provided any significant result
Remedy: Increase current (P1019)
–2 Current was not able to be reduced again in time during the measurement
Remedy: Check armature inductance (P1116) and if required, increase
–3 The motor moved during the measurement more than permitted in P1020
Remedy: Increase permissible rotation (P1020) or reduce current (P1019)
–4 Current rise is too low, the motor is possibily not correctly connected
Remedy: Check motor terminals
–5 The current limit of the motor or the power module was exceeded
Remedy: Check current limits or reduce armature inductance (P1116)
–6 Longest permissible time RLI exceeded. Within the permissible time, no continuous rotor position value was achieved (from SW 6.1).
Remedy: refer under the index entry ”Rotor position identification”
—> ”Parameterization for motion-based traversing”
–7 No clear rotor position found. It appears that the motor cannot be freely moved (e.g. it is locked, at its end stop).
Remedy: refer under the index entry ”Rotor position identification”
—> ”Parameterization for motion-based traversing”

Note:
refer to P1736 or under the index entry ”Rotor position identification”, ”PE spindle” or ”Linear motor”

1735 Processor utilization

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Unsigned16	RO

... continuously displays (online) the processor utilization and provides information about the available computation time reserves of the processor.
Processor loading is essentially dependent on the mode and clock cycle setting.
P1735 > 90 %
If, after start-up (optimization), this is displayed as ”normal status”, then there is a high danger that if additional computation time-intensive functions are selected, the processor will be overloaded (e.g. measuring function).
Note:
If processor utilization is too high it can be reduced by increasing the clock cycles (refer to the index entry ”cycles”).
P1735 < 90 %
From experience, there are no problems here, so that later (e.g. when troubleshooting), supplementary functions (e.g. measuring functions, trace functions) can be temporarily activated.

A

1736 Test, rotor position identification (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed. (SRM SLM)

To check the rotor position identification, using this test function, the difference between the calculated rotor position angle, and that currently used by the control, can be determined.

1 The rotor position identification test has been activated
—> the difference is entered in P1737

0 The test has been completed (initial status)

Note:
refer under the index entry ”Rotor position identification”, ”PE spindle” or ”Linear motor”

1737 Difference, rotor position identification (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Degree	Floating Point	RO (SRM SLM)

Note:
also referfor P1736 and under the index entry ”PE spindle” or ”linear motor”
The rotor position identification is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DM1

1738 No. of data backup operations in the FEPROM

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

Note: Internal Siemens

1739 You must save in the FEPROM

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays that at least one parameter was written into and the value was not yet saved in the non-volatile memory (FEPROM).

1 Must be saved in the FEPROM because parameters have been changed

0 Need not be saved in the FEPROM

1743 Significance, velocity representation

Min	Standard	Max	Unit	Data type	Effective
–	–	–	c*MSR/min	Floating Point	RO (SLM)
–	–	–	c*MSR/min	Floating Point	RO (SRM ARM)

Note: Internal Siemens

1744 Weighting, velocity representation, external

Min	Standard	Max	Unit	Data type	Effective
–	–	–	c*MSR/min	Floating Point	RO (SLM)
–	–	–	c*MSR/min	Floating Point	RO (SRM ARM)

Note: Internal Siemens

1745 Weighting following error representation DSC

Min	Standard	Max	Unit	Data type	Effective
–	–	–	mm	Floating Point	RO (SLM)
–	–	–	Degree	Floating Point	RO (SRM ARM)

Note: Internal Siemens

1750 Power module temperature

Min	Standard	Max	Unit	Data type	Effective
–	–	–	°C	Integer16	RO

... indicates the measured power module temperature.

1751 Electronics temperature

Min	Standard	Max	Unit	Data type	Effective
–	–	–	°C	Integer16	RO

... indicates the measured drive electronics temperature.

1781:17 Setpoint source, process data PROFIBUS (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... indicates the source of the process data received via PROFIBUS.
The high byte includes a reference to the source device (0xFF for the master, DP address for a Publisher) and the low byte, the offset within the telegram
(Counting in bytes, starting with 1).
The following is valid:
P1781:0 Number of valid entries
P1781:1 Source of process data 1 (STW1)
P1781:2 Source of process data 2 (PZD2), etc.
Note: refer to the index entry "Process data"

1782:17 Target offset PROFIBUS process data (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... indicates which offset the process data have in the telegrams sent to the master or the subscribers via the PROFIBUS
(Counting in bytes, starting with 1).
The following is valid:
P1782:0 Number of valid entries
P1782:1 Target offset, process data 1 (ZSW1)
P1782:2 Target offset, process data 2 (PZD2), etc.
Note: refer to the index entry "Process data"

1783:97 PROFIBUS parameterization data received

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the parameterizing data received by the DP slave.
The sub-parameter
with index 0 contains the number of valid bytes of the parameterization frame
= 0 —> no parameterizing data available
with index 1, the 1st byte includes the parameterizing data
with index 2, the 2nd byte includes the parameterizing data, etc.

1784:97 PROFIBUS configuration data received

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the configuration data received by the DP slave.
The sub-parameter
with index 0 contains the number of valid bytes of the configuration frame
= 0 —> no configuration data available
with index 1, the 1st byte includes the configuration data
with index 2, the 2nd byte includes the configuration data, etc.

A

1785:13 Expanded PROFIBUS diagnostics

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... contains diagnostic information for PROFIBUS operation. For the individual indices of P1785, the following applies:
:0 Error, master sign-of-life since POWER ON
:1 Clock cycle-synchronous operation selected
:2 Interpolation clock cycle (Tipo) in µs
:3 Position controller clock cycle (Tlr) in µs
:4 Master application cycle time (Tmapc) in µs
:5 DP cycle time (Tdp) in µs
:6 Data Exchange time (Tdx) in µs
:7 Instant of the setpoint sensing (To) in µs
:8 Instant of the actual value sensing (Ti) in µs
:9 PLL window (Tpllw) in 1/12 µs
:10 PLL delay time (Tplld) in 1/12 µs
:11 External slave-to-slave communication links
:12 Internal slave-to-slave communication links

1786:5 PKW data received, PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the PKW data received by the DP slave.
The sub-parameter
with index 0 contains the number of valid words
= 0 —> no PKW data available
= 4 —> PKW data available
with index 1 of the PKE word (PKE: Parameter identification)
with index 2 of the IND word (IND: Sub-index, sub-parameter number, array index)
with index 3 of the most significant PWE word (PWE: Parameter value)
with index 4 of the least-significant PWE word
Note: refer to the index entry ”PKW area”

1787:5 PKW data sent, PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the PKW data sent to the DP master.
The sub-parameter
with index 0 contains the number of valid words
= 0 —> no PKW data available
= 4 —> PKW data available
with index 1 of the PKE word (PKE: Parameter identification)
with index 2 of the IND word (IND: Sub-index, sub-parameter number, array index)
with index 3 of the most significant PWE word (PWE: Parameter value)
with index 4 of the least-significant PWE word
Note: refer to the index entry ”PKW area”

1788:17 Processed data received via PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the process data received by the DP slave (control words).
The sub-parameter
with index 0 contains the number of valid words,
with index 1, the process data 1 (control word 1), with index 2, the process data 2 (PZD2), ...
Note: refer to the index entry ”Process data”

1789:17 Process data sent via PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the process data sent to the DP master (status words).
The sub-parameter
with index 0 contains the number of valid words,
with index 1, process data 1 (status word 1), with index 2, process data 2 (PZD2), ...
Note: refer to the index entry ”Process data”

1790 Meas. circ. type indirect meas. system

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Integer16	RO

... displays which measuring system type is used.
0 Encoder with sin/cos 1 Vpp signals
16 EnDat encoder (absolute value encoder)

1792 Active measuring system

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... indicates the measuring system which the drive control uses.
0 No measuring system
1 Motor measuring system
2 Direct measuring system

A

1794 Option module (PROFIBUS): Version initial program loader

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

... indicates which version of the initializer is on the option module.
Example: P1794 = 10104 —> V01.01.04 is available

1796 Initializer version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

... displays which version of the initializer is available on the memory module.
Example: P1796 = 10104 —> V01.01.04 is available

1798 Firmware date

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

Internal Siemens
... displays when the firmware release (P1799) was generated.
Note: yyyymmdd —> yyyy = year, mm = month, dd = day

1799 Firmware version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

... displays the firmware version on the memory module.
Example: P1799 = 10103 —> V01.01.03 is available

1800 Function generator control

Min	Standard	Max	Unit	Data type	Effective
–40	0	2	–	Integer16	immed.

Note: refer to the index entry ”Function generator”

1804 Function generator operating mode

Min	Standard	Max	Unit	Data type	Effective
1	3	5	–	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1805 Function generator curve shape

Min	Standard	Max	Unit	Data type	Effective
1	1	5	–	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1806 Start-up function amplitude

Min	Standard	Max	Unit	Data type	Effective
–1600.0	5.0	1600.0	%	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1807 Start-up function offset

Min	Standard	Max	Unit	Data type	Effective
–1600.0	0.0	1600.0	%	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1808 Function generator limitation

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	1600.0	%	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1809 Function generator 2nd amplitude (staircase)

Min	Standard	Max	Unit	Data type	Effective
–1600.0	7.0	1600.0	%	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1810 Function generator period

Min	Standard	Max	Unit	Data type	Effective
1	1000	65535	ms	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1811 Function generator, pulse width (squarewave)

Min	Standard	Max	Unit	Data type	Effective
0	500	65535	ms	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1812 Start-up function, bandwidth (FFT)

Min	Standard	Max	Unit	Data type	Effective
1	4000	8000	Hz	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1813 Start-up function, ramp-up time to P1400

Min	Standard	Max	Unit	Data type	Effective
0.0	32.0	100000.0	ms	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1814 Measuring function meas. type

Min	Standard	Max	Unit	Data type	Effective
1	1	8	–	Unsigned16	immed.

Note: refer to the index entry ”Measuring function”

1815 Measuring function meas. period (step change)

Min	Standard	Max	Unit	Data type	Effective
1	100	2000	ms	Unsigned16	immed.

Note: refer to the index entry ”Measurement function”

1816 Measuring function settling time

Min	Standard	Max	Unit	Data type	Effective
0	100	65535	ms	Unsigned16	immed.

Note: refer to the index entry ”Measurement function”

1817 Measuring function no. of averaging ops. (FFT)

Min	Standard	Max	Unit	Data type	Effective
1	16	1000	–	Unsigned16	immed.

Note: refer to the index entry ”Measurement function”

1820 Signal number test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	8	530	–	Unsigned16	immed.

The parameter defines which signal is output via test socket 1.
The signal number from the signal selection list for analog outputs must be entered.
Note: refer to the index entry ”Test sockets”

1821 Shift factor test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	6	47	–	Unsigned16	immed.

... defines the shift factor, with which the analog signal is manipulated.
An 8 bit window of the 24/48 bit signal can be represented via the test socket, thus, the shift factor must be used to define which window of the internal 24/48 bits is to be displayed.

1822 Offset test socket 1

Min	Standard	Max	Unit	Data type	Effective
–128	0	127	–	Integer16	immed.

The parameter specifies the offset value which is added to the 8-bit output signal.
Note: refer to the index entry ”Test sockets”

1823 Segment address test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

Note: Internal Siemens

1824 Offset address test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

1826 Status test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	1	1	–	Unsigned16	immed.

This parameter defines the status of test socket 1 for this drive.

0 test socket is inactive
1 test socket is active

1830 Signal number test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	14	530	–	Unsigned16	immed.

Description, refer to that for P1820.

1831 Shift factor test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	12	47	–	Unsigned16	immed.

Description, refer to that for P1821.

1832 Offset test socket 2

Min	Standard	Max	Unit	Data type	Effective
–128	0	127	–	Integer16	immed.

Description, refer to that for P1822.

1833 Segment address test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

Note: Internal Siemens

1834 Offset address test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

1836 Status test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	1	1	–	Unsigned16	immed.

Description, refer to that for P1826.

A.2 Power module list

Power module identification

The permanently installed power module is automatically identified when the drive system is commissioned for the first time.
The appropriate code is entered into P1106 (power module code number) and P1110 (power module version).

Table A-1 List of power modules

Designation What power modules are available for which drive?	Power module code P1106	Current rating I_n/I_{max} [A(rms)][1)] P1111/P1108
6SN2460–2CF□0–0G□□ 6SN2463–2CF□0–0G□□	43	8,5/17
6SN2480–2CF□0–0G□□ 6SN2483–2CF□0–0G□□	44	11/22
6SN2500–2CF□0–0G□□	45	18/36
6SN2703–2AA0□–0BA0	54	9/18
6SN2703–2AA0□–0CA0	55	18/36
6SN2703–3AA0□–0BA0 (without filter)	63	9 18
6SN2703–3AA1□–0BA0 (with filter)	64	9/18

Note:

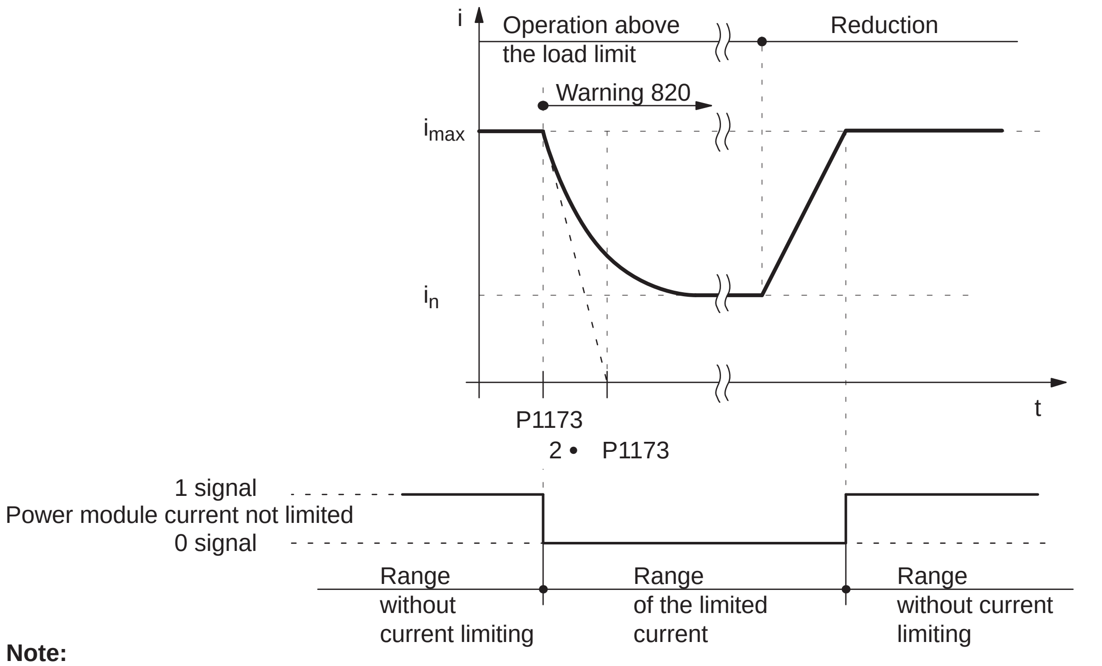
rms	rms value of the sinusoidal motor current
pk:	Peak value
SH	Shaft height
I_n	Continuous current
I_{max}	Peak current
1)	At higher pulse frequencies (P1100 $\neq$ standard value), I_n and I_{max} are reduced to protect the power module. The display using P1108 and P1111 corresponds to the values in this table. The limit factor is displayed in P1099 (limit factor, power module currents). Example: P1111 = 9 A, P1099 = 80 % —> reduced rated current I_n = 9 A • 80 % = 7.2 A

i^2t power module limitation

This limit protects the power module from continuous overload.

The power module current is limited according to a characteristic if the drive converter operates for an excessive time above the permissible load limit. The load limit is set per parameter.

The limit is removed step-by-step if the power module is no longer being operated above the load limit.



Note:

i_{max} = P1108 (current limit, power module) • P1099 (limit factor, power module currents)

i_n = P1111 (rated current, power module) • P1099 (limit factor, power module currents)

Fig. A-2 Behavior when operation is continued at the current limit

Output signals (refer to Chapter 6.4.3 and 6.4.4)

The following signals are available for the "i^2t power module limiting" function:

- Output terminal signal —> function number 37 (power module current not limited)
- PROFIBUS status signal —> MeldW.10 (power module current not limited)

Load duty cycle calculation I^2t

How do I check whether the selected power module is suitable for my load duty cycle?

The following two secondary conditions must be maintained in order to ensure that a power module is suitable for a specific load duty cycle:

- **Secondary condition 1 (continuous load capability)**

  I_N=rated current, power module

  t_n=duration of the individual load cycles

  i_n=amplitude of the individual load currents

  $\Sigma\,(i_n^2 - I_N^2) \cdot\ t_n \leq 0$

  Example: POSMO CA 9A, rated current I_N= 9A

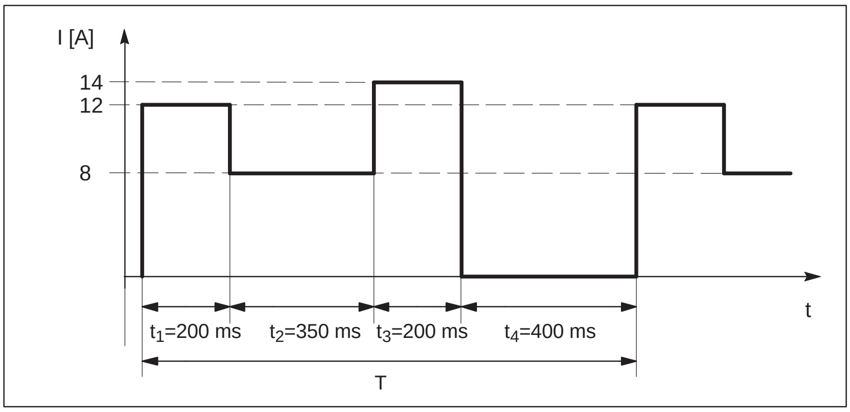


Fig. A-3 Example, load duty cycle calculation (continuous load capability)

$\Sigma\ (i_n^2 - I_N^2) \bullet t_n \leq 0$

$((12A)^2 - (9A)^2) \bullet\ 200ms + ((8A)^2 - (9A)^2) \bullet\ 350ms + ((14A)^2 - (9A)^2) \bullet\ 200ms + ((0A)^2 - (9A)^2) \bullet\ 400ms \leq 0$

$\longrightarrow -2.75A^2s \leq 0$

- **Secondary condition 2 (overload capability)**

The power module may have a maximum output current of $2 \bullet I_N$..

The following equation is decisive:

$E_{max} \geq \Sigma\ (i_n^2 \bullet\ t_n)$

The E_{max} values of the individual power modules are shown in the following table:

Table A-2 E_{max} values, power module

Power module	Emax [A^{2s}]
POSMO SI 8.5 A	722
POSMO SI 11 A	1210
POSMO SI/CD 18 A	3240
POSMO CD/CA 9 A	810

Example: POSMO CA 9A, rated current I_N= 9A (refer to Fig. A-3)

$E_{max} \geq \Sigma\ (i_n^2 \bullet\ t_n)$

$810\ A^2s \geq (12A)^2 \bullet 200ms + (8A)^2 \bullet 350ms + (14A)^2 \bullet 200ms + (0A)^2 \bullet 400ms$

$810\ A^2s \geq 90.4\ A^2s$

Conclusion:

Both secondary conditions are maintained for the specific load duty cycle. This means that the power module is operated within the i^2t characteristic and therefore none of the limits are reached.

Parameter overview for the power module (refer to Chapter A.1)

The following parameters are used for the power module:

- P1099 Limit factor, power module currents
- P1106 Power module code number
- P1108 Power module limiting current (rms)
- P1100 Frequency, pulse width modulation
- P1110 Power module version
- P1111 Power module rated current (rms)
- P1173 Highest load time, power module

The following parameters are used for diagnostics for the function ”i^2t power module limiting”:

- P1262 i2t time in limiting
- P1263 actual i2t limit factor
- P1264 i2t actual utilization factor (from SW 4.1)

Interrelationship between parameters:

P1262	Constant	Running
P1263	100 %	<100 %
P1264	<100 %	100 %
—> Limiting?	No	Yes

A.3 List of motors

Reader’s note

General information about the motors can be found in

Reference: SIMODRIVE 611/MASTERDRIVES MC Configuration Manuals
/PJAL/ General Part for Synchronous Motors
/ASAL/ General Part for Asynchnonous Motors

Note

The following motors in the motor list can be selected from the Siemens motors saved in SimoCom U.

The motor – POSMO CD/CA assignment is configured using the actual current demand.

A.3.1 List of the rotating synchronous motors

Reader’s note

Information about the motors can be found in

Reference: SIMODRIVE 611/MASTERDRIVES MC Configuration Manuals
/PFK6/ AC Servomotors 1FK6
/PFK7/ Synchronous Motors 1FK7
/PFT6/ Synchronous Motors 1FT6
/PFT7/ Synchronous Motors 1FT7

A

Motor code for rotating synchronous motors (SRM)

Table A-3 Motor code for rotating synchronous motors (SRM)

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FK6032–6AK7x–xxxx	2401	6000	1.1	1.70
1FK6033–7AK7x–xxxx	2315	6000	1.3	2.20
1FK6040–6AK7x–xxxx	2402	6000	1.6	2.80
1FK6042–6AF7x–xxxx	2201	3000	3.2	2.80
1FK6043–7AH7x–xxxx	2311	4500	3.1	4.50
1FK6043–7AK7x–xxxx	2314	6000	3.1	6.40

Table A-3 Motor code for rotating synchronous motors (SRM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FK6044–7AF7x–xxxx	2211	3000	4.0	4.50
1FK6044–7AH7x–xxxx	2312	4500	4.0	6.30
1FK6060–6AF7x–xxxx	2202	3000	6.0	4.30
1FK6061–7AF7x–xxxx	2212	3000	6.4	6.10
1FK6061–7AH7x–xxxx	2313	4500	6.4	8.00
1FK6063–6AF7x–xxxx	2203	3000	11.0	7.90
1FK6064–7AF7x–xxxx	2213	3000	12.0	11.00
1FK6064–7AH7x–xxxx	2214	4500	12.0	15.00
1FK6080–6AF7x–xxxx	2204	3000	8.0	5.80
1FK6082–7AF7x–xxxx	2215	3000	14.0	10.60
1FK6083–6AF7x–xxxx	2205	3000	16.0	10.40
1FK6085–7AF7x–xxxx	2216	3000	22.0	22.50 1)
1FK6100–8AF7x–xxxx	2206	3000	18.0	12.20
1FK6101–8AF7x–xxxx	2207	3000	27.0	17.50
1FK6103–8AF7x–xxxx	2208	3000	36.0	23.50 1)
1FK7022–5AK7x–xxxx	2538	6000	0.85	1.80
1FK7032–5AK7x–xxxx	2539	6000	1.15	1.70
1FK7033–7AK7x–xxxx	2560	6000	1.3	2.20
1FK7040–5AK7x–xxxx	2540	6000	1.6	2.25
1FK7042–5AF7x–xxxx	2500	3000	3.0	2.20
1FK7042–5AK7x–xxxx	2541	6000	3.0	4.40
1FK7043–7AH7x–xxxx	2561	4500	3.1	4.50
1FK7043–7AK7x–xxxx	2562	6000	3.1	6.40
1FK7044–7AF7x–xxxx	2563	3000	4.0	4.50
1FK7044–7AH7x–xxxx	2564	4500	4.0	6.30
1FK7060–5AF7x–xxxx	2501	3000	6.0	4.50
1FK7060–5AH7x–xxxx	2520	4500	6.0	6.20
1FK7061–7AF7x–xxxx	2565	3000	6.4	6.10
1FK7061–7AH7x–xxxx	2566	4500	6.4	8.00
1FK7063–5AF7x–xxxx	2502	3000	11.0	8.00
1FK7063–5AH7x–xxxx	2521	4500	11.0	12.00
1FK7064–7AF7x–xxxx	2567	3000	12.0	11.00
1FK7064–7AH7x–xxxx	2568	4500	12.0	15.00
1FK7080–5AF7x–xxxx	2503	3000	8.0	4.80
1FK7080–5AH7x–xxxx	2522	4500	8.0	7.40

Table A-3 Motor code for rotating synchronous motors (SRM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FK7082–7AF7x–xxxx	2569	3000	14.0	10.60
1FK7083–5AF7x–xxxx	2504	3000	16.0	10.40
1FK7083–5AH7x–xxxx	2523	4500	16.0	15.00
1FK7085–7AF7x–xxxx	2570	3000	22.0	22.50[1)]
1FK7100–5AF7x–xxxx	2505	3000	18.0	11.20
1FK7101–5AF7x–xxxx	2506	3000	27.0	19.00[1)]
1FK7103–5AF7x–xxxx	2507	3000	36.0	27.50[1)]
1FT6021–6AK7x–xxxx	1411	6000	0.4	1.25
1FT6024–6AK7x–xxxx	1412	6000	0.8	1.25
1FT6031–xAK7x–xxxx	1401	6000	1.0	1.40
1FT6034–xAK7x–xxxx	1402	6000	2.0	2.60
1FT6041–xAF7x–xxxx	1201	3000	2.6	1.90
1FT6041–xAK7x–xxxx	1403	6000	2.6	3.00
1FT6044–xAF7x–xxxx	1202	3000	5.0	3.00
1FT6044–xAK7x–xxxx	1404	6000	5.0	5.90
1FT6061–xAC7x–xxxx	1101	2000	4.0	1.90
1FT6061–xAF7x–xxxx	1203	3000	4.0	2.70
1FT6061–xAH7x–xxxx	1301	4500	4.0	4.00
1FT6061–xAK7x–xxxx	1405	6000	4.0	5.00
1FT6062–xAC7x–xxxx	1102	2000	6.0	2.70
1FT6062–xAF7x–xxxx	1204	3000	6.0	4.10
1FT6062–xAH7x–xxxx	1302	4500	6.0	5.70
1FT6062–xAK7x–xxxx	1406	6000	6.0	7.60
1FT6062–xWF7x–xxxx	1270	3000	10.2	6.90
1FT6062–xWH7x–xxxx	1370	4500	10.2	9.70
1FT6062–xWK7x–xxxx	1470	6000	10.2	12.90
1FT6064–xAC7x–xxxx	1103	2000	9.5	4.20
1FT6064–xAF7x–xxxx	1205	3000	9.5	6.10
1FT6064–xAH7x–xxxx	1303	4500	9.5	9.00
1FT6064–xAK7x–xxxx	1407	6000	9.5	12.00
1FT6064–xWF7x–xxxx	1272	3000	16.2	10.30
1FT6064–xWH7x–xxxx	1372	4500	16.2	15.40
1FT6064–xWK7x–xxxx	1472	6000	16.2	20.50[1)]
1FT6081–xAC7x–xxxx	1104	2000	8.0	3.90

A

Table A-3 Motor code for rotating synchronous motors (SRM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FT6081–xAF7x–xxxx	1206	3000	8.0	5.80
1FT6081–xAH7x–xxxx	1304	4500	8.0	6.90
1FT6081–xAK7x–xxxx	1408	6000	8.0	11.10
1FT6082–xAC7x–xxxx	1105	2000	13.0	6.60
1FT6082–xAF7x–xxxx	1207	3000	13.0	9.60
1FT6082–xAH7x–xxxx	1305	4500	13.0	14.80
1FT6082–xAK7x–xxxx	1409	6000	13.0	17.30
1FT6084–xAC7x–xxxx	1106	2000	20.0	8.80
1FT6084–xAF7x–xxxx	1208	3000	20.0	13.20
1FT6084–xAH7x–xxxx	1306	4500	20.0	19.80[1)]
1FT6084–xAK7x–xxxx	1410	6000	20.0	24.10[1)]
1FT6084–xSF7x–xxxx	1258	3000	26.0	18.20[1)]
1FT6084–xSH7x–xxxx	1356	4500	26.0	26.00[1)]
1FT6084–xSK7x–xxxx	1460	6000	26.0	35.00[1)]
1FT6084–xWF7x–xxxx	1283	3000	35.0	24.50[1)]
1FT6084–xWH7x–xxxx	1381	4500	35.0	37.00[1)]
1FT6084–xWK7x–xxxx	1485	6000	35.0	47.00[1)]
1FT6086–xAC7x–xxxx	1107	2000	27.0	11.30
1FT6086–xAF7x–xxxx	1209	3000	27.0	16.40[1)]
1FT6086–xAH7x–xxxx	1307	4500	27.0	23.30[1)]
1FT6086–xSF7x–xxxx	1259	3000	35.0	25.00[1)]
1FT6086–xSH7x–xxxx	1357	4500	35.0	38.00[1)]
1FT6086–xSK7x–xxxx	1461	6000	35.0	44.00[1)]
1FT6086–xWF7x–xxxx	1284	3000	47.0	34.00[1)]
1FT6086–xWH7x–xxxx	1382	4500	47.0	52.00[1)]
1FT6086–xWK7x–xxxx	1486	6000	47.0	59.00[1)]
1FT6102–xAB7x–xxxx	1001	1500	27.0	8.70
1FT6102–xAC7x–xxxx	1108	2000	27.0	12.10
1FT6102–xAF7x–xxxx	1210	3000	27.0	16.90[1)]
1FT6102–xAH7x–xxxx	1308	4500	27.0	24.10[1)]
1FT6105–xAB7x–xxxx	1002	1500	50.0	16.00
1FT6105–xAC7x–xxxx	1109	2000	50.0	21.40[1)]
1FT6105–xAF7x–xxxx	1211	3000	50.0	32.00[1)]
1FT6105–xSB7x–xxxx	1139	1500	65.0	21.90[1)]
1FT6105–xSC7x–xxxx	1159	2000	65.0	30.00[1)]

Table A-3 Motor code for rotating synchronous motors (SRM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FT6105–xSF7x–xxxx	1261	3000	65.0	42.00 1)
1FT6105–xSH7x–xxxx	1351	4500	65.0	59.00 1)
1FT6105–xWC7x–xxxx	1184	2000	85.0	58.00 1)
1FT6105–xWF7x–xxxx	1286	3000	85.0	83.00 1)
1FT6108–xAB7x–xxxx	1003	1500	70.0	22.30 1)
1FT6108–xAC7x–xxxx	1110	2000	70.0	29.00 1)
1FT6108–xAF7x–xxxx	1213	3000	70.0	41.00 1)
1FT6108–xSB7x–xxxx	1140	1500	90.0	31.00 1)
1FT6108–xSC7x–xxxx	1160	2000	90.0	41.00 1)
Unlisted motors	2000	–		

Note:

x: Space retainer for the Order No.

1): This motor cannot be fully utilized to delta T=100 K winding temperature.

A

Parameters for unlisted motors (SRM)

Table A-4 Parameters for unlisted motors (SRM)

Parameter			
No.	**Name**	**Units**	**Value**
1102	Motor code number	–	1999
1103	Rated motor current	A(rms)	
1104	Maximum motor current	A(rms)	
1112	Motor pole pair number	–	
1113	Torque constant	Nm/A	
1114	Voltage constant	V(rms)	
1115	Armature resistance	Ω	
1116	Armature inductance	mH	
1117	Motor moment of inertia	kgm^2	
1118	Motor standstill current	A(rms)	
1122	Motor limiting current	A(rms)	
1136	Motor no-load current	A(rms)	
1142	Speed at the start of field weakening	RPM	
1145	Stall (standstill) torque reduction factor	%	
1146	Maximum motor speed	RPM	
1180	Lower current limit, current controller adaptation	%	
1181	Upper current limit, current controller adaptation	%	
1182	Factor, current controller adaptation	%	
1400	Rated motor speed	RPM	
1602	Warning threshold, motor overtemperature	°C	

A.3.2 List of permanent-magnet synchronous motors with field weakening (1FE1, PE spindle)

Reader's note

Information about the motors can be found in

Reference: SIMODRIVE 611 Configuration Manual
/PJFE/ AC Motors for Main Spindle Drives
Synchronous Built-In Motors 1FE1

Motor code for permanent–magnet synchronous motors with field-weakening

Table A-5 Motor code for 1FE1 motors, PE spindle

Order No. (MLFB)	Motor code P1102	n_{max} [RPM]	n_{rated} [RPM]	P_{rated} [kW]	I_{rated} (100 K) [A(rms)]
1FE1041–6WM10–xxxx	2773	20000	15800	4.5	13.0
1FE1041–6WN10–xxxx	2755	18000	14000	4.5	12.0
1FE1041–6WU10–xxxx	2750	13000	8500	4.5	8.0
1FE1051–4WL11–xxxx	2813	30000	10300	6.5	13.5
1FE1051–4WL51–xxxx	2814	30000	10300	6.5	13.5
1FE1051–4WN11–xxxx	2875	30000	9500	6.5	13.0
1FE1051–6WN00–xxxx	2877	12000	6000	7.5	11.0
1FE1051–6WN10–xxxx	2804	12000	6000	10.0	15.0
1FE1051–6WN20–xxxx	2817	12000	6000	7.5	11.0
1FE1051–6WN30–xxxx	2818	12000	6000	10.0	15.0
1FE1052–6WY10–xxxx	2812	6000	3000	18.0	13.5
1FE1055–6LU00–xxxx	2878	6000	4000	9.0	8.0
1FE1055–6LX00–xxxx	2879	4200	2300	9.0	4.5
1FE1061–6LW00–xxxx	2880	7000	4100	8.0	8.0
1FE1061–6WY10–xxxx	2839	30000	3000	13.0	8.0
1FE1091–6WS10–xxxx	2835	4000	2000	30.0	15.0
1FE1098–6WT11–xxxx	2770	4300	1000	85.0	17.5
Unlisted motors	2000	–	–	–	–
Note:					
x: Space retainer for the Order No.					

Parameters for unlisted motors (PE spindle)

Table A-6 Unlisted motor: Parameters for permanent-magnet synchronous motors with field weakening

Parameter			
No.	**Name**	**Units**	**Value**
1015	Activate PE-MSD 1 = activated, 0 = de-activated	–	1
1102	Motor code number	–	1999
1103	Rated motor current	A(rms)	
1104	Maximum motor current	A(rms)	
1112	Motor pole pair number	–	
1113	Torque constant	Nm/A	
1114	Voltage constant	V(rms)	
1115	Armature resistance (phase value) (rotating field inductance: $L_{rotating\ field} = 1.5 \bullet L_{phase}$)	Ω	
1116	Armature inductance	mH	
1117	Motor moment of inertia	kgm^2	
1118	Motor standstill current	A(rms)	
1128	Optimum load angle	Degrees	
1136	Motor locked-rotor current	A(rms)	
1142	Speed at the start of field weakening	RPM	
1145	Stall (standstill) torque reduction factor	%	
1146	Maximum motor speed	RPM	
1149	Reluctance torque constant	mH	
1180	Lower current limit, current controller adaptation	%	
1181	Upper current limit, current controller adaptation	%	
1182	Factor, current controller adaptation	%	
1400	Rated motor speed	RPM	

A.3.3 List of permanent-magnet synchronous motors without field weakening, torque built-in motors (1FW6, from SW 6.1)

Reader's note

Information about the motors can be found in

Reference: SIMODRIVE 611 Configuration Manual
/PJTM/ Built-In Torque Motors 1FW6

Motor code for permanent–magnet synchronous motors without field weakening (1FW6)

Table A-7 Motor code for 1FW6 motors (torque built-in motors)

Order No. (MLFB)	Motor code P1102	n_{max} [RPM]	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_{rated} (100 K) [A(rms)]
1FW6190–xxB07–2Axx 1)	1862	59	59	732.0	17.8
Unlisted motors	1999	–	–	–	–

Note:

x: Space retainer for the Order No.

1) on request

A

Parameters for unlisted motors (1FW6I)

Table A-8 Unlisted motor: Parameters for permanent-magnet synchronous motors without field weakening

Parameter			
No.	**Name**	**Units**	**Value**
1102	Motor code number	–	1999
1103	Rated motor current	A(rms)	
1104	Maximum motor current	A(rms)	
1112	Motor pole pair number	–	
1113	Torque constant	Nm/A	
1114	Voltage constant	V(rms)	
1115	Armature resistance (phase value) (rotating field inductance: $L_{rotating\ field} = 1.5 \bullet L_{phase}$)	Ω	
1116	Armature inductance	mH	
1117	Motor moment of inertia	kgm^2	
1118	Motor standstill current	A(rms)	
1122	Motor limiting current	A(rms)	
1128	Optimum load angle	Degr.	
1136	Motor locked-rotor current	A(rms)	
1142	Speed at the start of field weakening	RPM	
1145	Stall (standstill) torque reduction factor	%	
1146	Maximum motor speed	RPM	
1180	Lower current limit, current controller adaptation	%	
1181	Upper current limit, current controller adaptation	%	
1182	Factor, current controller adaptation	%	
1400	Rated motor speed	RPM	

A.3.4 List of linear synchronous motors

Reader's note

Information about the motors can be found in

Reference: SIMODRIVE 611 Linear Motor 1FN
Configuration Manual

- 1FN1 motors
- 1FN3-type peak-load motors
- Continuous Load Motors of the 1FN3 Product Family

Motor code for linear synchronous motors (SLM)

Table A-9 Motor code for linear synchronous motors (SLM)

Order No. (MLFB)	Motor code P1102	v_{max} [m/min]	I_{max} [A]	F_{max} [N]
1FN1072–3xF7x–xxxx[1)]	3031	200	14.0	1720
1FN1076–3xF7x–xxxx[1)]	3032	200	28.0	3450
1FN1122–5xC7x–xxxx[1)]	3003	145	22.4	3250
1FN1122–5xF7x–xxxx[1)]	3021	200	28.0	3250
1FN3050–2WC0x–xxxx[1)]	3401	373	8.15	550
1FN3100–1WC0x–xxxx[1)]	3441	322	6.5	490
1FN3100–2WC00–xxxx[1)]	3402	131	13.5	1100
1FN3100–2WE0x–xxxx[1)]	3403	497	21.5	1100
1FN3100–3WC0x–xxxx[1)]	3442	277	19.1	1650
1FN3100–3WE0x–xxxx[1)]	3404	497	32.2	1650
1FN3100–4WC0x–xxxx[1)]	3405	297	27.0	2200
1FN3100–5WC0x–xxxx[1)]	3407	255	29.5	2750
1FN3150–1WC0x–xxxx[1)]	3408	321	9.5	825
1FN3150–1WE0x–xxxx[1)]	3409	605	17.0	825
1FN3150–2WC0x–xxxx[1)]	3410	282	19.1	1650
1FN3150–3WC0x–xxxx[1)]	3411	282	28.6	2470
1FN3300–1WC0x–xxxx[)]	3443	309	20.0	1720
1FN3300–2WB0x–xxxx[1)]	3414	176	24.7	3450
1FN3450–2WA5x–xxxx[1)]	3444	112	25.3	5180
1FN3600–2WA5x–xxxx[1)]	3446	120	36.0	6900
2 • 1FN1072–3xF7x–xxxx[1)]	3231	200	28.0	3440
2 • 1FN3050–2WC0x–xxxx[1)]	3601	373	16.3	1100
2 • 1FN3100–2WC0x–xxx[1)]	3602	297	27.0	2200

Table A-9 Motor code for linear synchronous motors (SLM), Fortsetzung

Order No. (MLFB)	Motor code P1102	v_{max} [m/min]	I_{max} [A]	F_{max} [N]
2 • 1FN3150–1WC0x–xxxx[1)]	3608	282	19.1	1650
2 • 1FN3150–1WE0x–xxxx[1)]	3609	534	34.2	1650
Unlisted motors	3999	–	–	–

Note:
x: Space retainer for the Order No.
1) on request

Parameters for unlisted motors (SLM)

The following applies for 2 ”identical” linear motors connected in parallel: The value for the individual motor is handled, as specified in column ”2 (parallel)” thus obtaining the value for the parallel circuit.

Table A-10 Parameters for unlisted motors (SLM)

Parameter				No. of motors	
No.	Name	Units	Value	1	2 (parallel)
1102	Motor code number	–	3999	–	–
1103	Rated motor current	A(rms)		I_0	$2 \cdot I_0$
1104	Max. motor current	A(rms)		I_{max}	$2 \cdot I_{max}$
1113	Force constant	N/A		F	$2 \cdot F$
1114	Voltage constant	Vs/m		k_E	k_E
1115	Armature resistance	Ω		R_A	$0.5 \cdot R_A$
1116	Armature inductance	mH		L_A	$0.5 \cdot L_A$
1117	Motor weight	kg		m_M	$2 \cdot m_M$
1118	Motor standstill current	A(rms)		I_0	$2 \cdot I_0$
1146	Maximum motor velocity	m/min		v_{max}	v_{max}
1170	Pole pair width	mm (in)		$2\tau_p$	$2\tau_p$
1180	Lower current limit, current controller adaptation	%		%	%
1181	Upper current limit, current controller adaptation	%		%	%
1182	Factor, current controller adaptation	%		%	%
1400	Rated motor velocity	m/min		v_0	v_0

Danger

It is only permissible to connect temperature sensor cables with PELV or SELV voltage (refer to EN 60204–1 Chapter 6.4)

A.3.5 List of induction motors

Reader's note

Information about the motors can be found in

Reference: SIMODRIVE 611 Configuration Manuals
/APH2/ AC Induction Motors 1PH2
/APH4/ Induction Motors 1PH4
/APH7/ Induction Motors 1PH7
/PPM/ Hollow-Shaft Motors for Main Spindle Drives 1PM6/1PM4

Motor code for rotating induction motors (ARM)

Table A-11 Motor code for rotating induction motors (ARM)

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	P_{rated} [kW]	I_{rated} [A(rms)]
1PH7101–xxFxx–xLxx	460	1500	3.7	10.0
1PH7101–xNF4x–xxxx	426	1500	3.7	10.0
1PH7103–xxDxx–xLxx	461	1000	3.7	9.6
1PH7103–xxDxx–xxxx	430	1000	3.7	9.6
1PH7103–xxFxx–xLxx	462	1500	5.5	13.0
1PH7103–xNG4x–xxxx	427	2000	7.0	17.5
1PH7103–xxFxx–xxxx	431	1500	5.5	13.0
1PH7103–xxGxx–xLxx	463	2000	7.0	17.5
1PH7105–xxFxx–xLxx	464	1500	7.0	17.5
1PH7105–xNF4x–xxxx	428	1500	7.0	17.5
1PH7107–xxDxx–xLxx	465	1000	6.3	17.1
1PH7107–xxDxx–xxxx	432	1000	6.3	17.1
1PM4101–xxF8x (L37)–Y	638	1500	3.7	13.0
1PM4101–xxF8x (L37)–D	639	4000	3.7	13.0
1PM4101–xxF8x–xxxx–Y	600	1500	3.7	13.0
1PM4101–xxF8x–xxxx–D	601	4000	3.7	13.5
1PM4101–xxW2x (L37)	640	1500	5.0	18.0
1PM4101–xxW2x–xxxx	620	1500	5.0	18.0
1PM6101–xxF8x–(L37)	622	1500	3.7	13.0
1PM6101–xxF8x–(L37)	623	4000	3.7	13.5
1PM6101–xxF8x–xxxx–Y	608	1500	3.7	13.0
1PM6101–xxF8x–xxxx–D	609	4000	3.7	13.5
Unlisted motors	99	–	–	–

Note:
x: Space retainer for the Order No.

Parameters for unlisted motors (ARM)

Table A-12 Parameters for unlisted motors (ARM)

Parameter			
No.	**Name**	**Units**	**Value**
1102	Motor code	–	99
1103	Rated motor current	A(rms)	
1117	Motor moment of inertia	kgm^2	
1119	Inductance of the series reactor	mH	
1129	cos phi power factor	–	
1130	Rated motor power	kW	
1132	Rated motor voltage	V	
1134	Rated motor frequency	Hz	
1135	Motor no-load voltage	V	
1136	Motor no-load current	A(rms)	
1137	Stator resistance, cold	Ω	
1138	Rotor resistance, cold	Ω	
1139	Stator leakage reactance	Ω	
1140	Rotor leakage reactance	Ω	
1141	Magnetizing reactance	Ω	
1142	Speed at the start of field weakening	RPM	
1146	Maximum motor speed	RPM	
1400	Rated motor speed	RPM	
1602	Warning threshold, motor overtemperature	°C	

A.4 List of encoders

A.4.1 Encoder code

The motor encoder being used is identified by its encoder code in P1006.
If encoder systems are used which are not marketed by SIEMENS (third-party encoder, encoder code = 99), then additional parameters must be appropriately and manually set according to the measuring system manufacturer (refer to the following table).

Table A-13 Encoder code for motor encoders

Rough classification		Encoder code P1006	Motor The Order No. (MLFB) defines the encoder code	Encoder	Additional parameters
Encoder with sin/cos 1Vpp	Incremental encoder integrated	1	1PH4xxx–xxxxx–xNxx[1] 1PH6xxx–xxxxx–xNxx 1PH7xxx–xxxxx–xNxx	ERN 1381/ERN 1387[2] Voltage signals sin/cos 1Vpp 2048 pulses/revolution	–
		2	1FT6xxx–xxxxx–xAxx 1FK6xxx–xxxxx–xAxx	ERN 1387[2] Voltage signals sin/cos 1Vpp 2048 pulses/revolution C/D track	–
	Incremental encoder mounted	30	1PH2 1FE1	SIZAG 2 6FX2001–8RA03–1B/–1C/–1F[3] Voltage signals sin/cos 1Vpp 256 pulses/revolution	P1011 P1008
		31	1PH2 1FE1	SIZAG 2 6FX2001–8RA03–1D/–1E/–1G[3] Voltage signals sin/cos 1Vpp 512 pulses/revolution	P1011 P1008
		32	1PH2 1FE1	SIMAG H 6FX2001–6RB01–4xx0[3] Voltage signals sin/cos 1Vpp 256 pulses/revolution	P1011 P1008
		33	1PH2 1FE1	SIMAG H 6FX2001–6RB01–5xx0[3] Voltage signals sin/cos 1Vpp 400 pulses/revolution	P1011 P1008
		34	1PH2 1FE1	SIMAG H 6FX2001–6RB01–6xx0[3] Voltage signals sin/cos 1Vpp 512 pulses/revolution	P1011 P1008
	Absolute encoder integrated	10	1FT6xxx–xxxxx–xExx 1FK6xxx–xxxxx–xExx	EQN 1325[2] Voltage signals sin/cos 1Vpp EnDat, 2048 pulses/revolution, 4096 revolutions which can be differentiated between	–

A

Table A-13 Encoder code for motor encoders, continued

Rough classification			Encoder code P1006	Motor The Order No. (MLFB) defines the encoder code	Encoder	Additional parameters
Encoder with sin/cos 1Vpp	Absolute encoder integrated		15	1FT6xxx–xxxxx–xGxx 1FK6xxx–xxxxx–xGxx	EQI 1324[2] Voltage signals sin/cos 1Vpp EnDat, 32 pulses/revolution, 4096 revolutions which can be differentiated between	–
			70 (from SW 9.1)	1FK702x–xxxxx–xJxx 1FK703x–xxxxx–xJxx	EQI 1125[2] Voltage signals sin/cos 1Vpp EnDat, 16 pulses/revolution, 4096 revolutions which can be differentiated between	–
Linear encoders	absolute		80 (from SW 9.1)	–	LC 182[2]	–
Special cases	Without encoder		98	1LAx	–	–
	Unlisted encoder with sin/cos 1Vpp		99	–	–	P1011 P1005 P1027
	Linear encoders	Incremental		1FN1 1FN3	e.g. LS 186/LS 484[2]	P1011 P1024 P1027
		absolute			e.g. LC 181[1]	
	Distance-boded measuring system			–	e.g. ERA 780C/RON 785C[2]	P1027 P1050 P1051 P1037 P1037 P1052 P1053

1) x: Space retainer for the Order No.
2) Heidenhain is the manufacturer.
Compatible encoders from other measuring system (encoder) manufacturers can be used.
3) Order No. (MLFB) of the measuring wheel, as this is decisive for the number of pulses/revolution.

Reader's note

Additional information on encoder systems is provided in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter "Indirect and direct position sensing"

A.4.2 Encoder adaptation

Encoder types

POSMO SI/CD/CA supports the following encoder types:

- sin/cos 1Vpp (incremental encoders)
- Absolute value encoder with EnDat protocol

Note

From SW 9.2:
Linear scales with resolution <100 nm can also be used as motor measuring system (indirect measuring system)!

Parameterizing an indirect measuring system

An indirect measuring system is commissioned by entering a code number into P1006. If an encoder is used which is not saved in the firmware, then the data according to Table 4-11 must be entered.

Refer to the parameter overview Chapter A.1 for the significance of parameters P1005, P1021, P1022 and P1024.

- P1005 Enc. pulse no., motor meas. system (SRM ARM)
- P1021 Multi-turn resolution, absolute value encoder motor
- P1022 Single-turn resolution, absolute value encoder
- P1024 Grid division, motor measuring system (SLM)

A

Parameterizing a direct measuring system

For POSMO CD/CA, a direct measuring system can be additionally connected. The appropriate parameterization is required.

The direct measuring system is commissioned by entering a code number into P1036. If an encoder is used which is not saved in the firmware, then the data according to Table A-15 must be entered and P1036 set to 99.

Table A-14 Parameters for the encoder adaptation

No.	Name	Min.	Standard	Max.	Units	Effective
1007	Encoder pulse number, direct measuring system	0	0	2^{32}–1	decimal	PO
	Encoder increments of the direct measuring system per revolution (incremental tracks). Only relevant for rotary encoders with incremental tracks (P1037, bit 4 = 0). sin/cos 1Vpp: Input is required EnDat: Display.					
1030	Configuration 1, actual value sensing DM	0	0	2^{16}–1	Hex	PO
	Configuration of the direct measuring system (part independent of the encoder): Bit 0: Encoder tracks are inverted Bit 14: Data transfer rate, EnDat protocol, bit 0 Bit 15: Data transfer rate, EnDat protocol, bit 1.					
1031	Multi-turn resolution, absolute value encoder DM	0	4096	2^{16}–1	decimal	PO
	Number of rotations of the direct measuring system which can be represented. This is only relevant for rotary absolute value encoders (P1037, bit 3 = 1, bit 4 = 0): EnDat: Display.					
1032	Single-turn resolution DM	0	8192	2^{31}–1	decimal	PO
	Resolution of the direct measuring system in measuring pulses per revolution (single-turn). This is only relevant for absolute value encoders (P1037, Bit 3 = 1): Linear measuring system (P1037, bit 4 =1): Input is required: EnDat					

Table A-14 Parameters for the encoder adaptation, continued

No.	Name	Min.	Standard	Max.	Units	Effective
1033	Diagnostics, direct measuring system	–	–	–	Hex	Can only be read
	Bit 0: Lighting system failed Bit 1: Signal amplitude too low Bit 2: Incorrect code connection Bit 3: Overvoltage Bit 4: Undervoltage Bit 5: Overcurrent Bit 6: Battery must be changed Bit 7: Control check error Bit 8: EnDat encoder cannot be used Bit 9: CD track for the ERN1387 encoder is incorrect, or an EQN encoder is connected or is incorrectly parameterized (not at EQN/EQI, P1027.3) Bit 10: Protocol cannot be canceled Bit 11: Reserved Bit 12: Timeout when reading measured values Bit 13: CRC error Bit 14: Reserved Bit 15: Defective measuring encoder Note: ERN: Incremental encoder system; EQN/EQI: Absolute measuring system					
1034	Grid division, direct measuring system	0	20000	$2^{32}–1$	$10^{–9}$ m	PO
	Grid division, direct measuring system. Only relevant for linear encoders with incremental tracks (P1037, bit 4 = 1): sin/cos 1 Vpp: Input is required EnDat: Display.					
1036	Encoder code number, direct measuring system	0	98	65535	–	PO
	The encoder code number describes the encoder which is connected, and can be determined from a table.					
1037	Configuration 2, actual value sensing DM	0	0	65535	–	PO
	Direct measuring system configuration (encoder-dependent part): Bit 3: Absolute encoder (EnDat protocol) Bit 4: Linear measuring system					

A

Parameters for unlisted encoders

Table A-15 Unlisted encoders: Which data are required for which encoder type?

Parameter		name	Encoder pulse number	Absolute encoder (EnDat–SS)	Linear measuring system	Data transmission rate	Multiturn resolution, abs. enc.	Single–turn resolution, abs. enc.	Grid spacing
		for indirect measuring system (IM)	P1005	P1027.3	P1027.4	P1027.14/15	P1021	P1022	P1024
		for direct measuring system (DM)	P1007	P1037.3	P1037.4	P1037.14/15	P1031	P1032	P1034
Encoder type	Incremental	Rotary	x	0	0	–	–	–	–
		Linear	–	0	1	–	–	–	x
	Absolute (EnDat)	Rotary	A	1	0	x	A	A	–
		Linear	–	1	1	x	–	A	–

Note:

x: Input required

–: No input required

A: Display

0 or 1: The parameter bit must be set like this

For an absolute value encoder (P1037.3 = 1), the drive can automatically recognize the protocol being used (EnDat).

Reader's note

Additional information on encoder systems is provided in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter "Indirect and direct position sensing"

List of Abbreviations

B

1FK6	Rotating synchronous motor (1FK6)
1FN	Linear synchronous motor (1FN1. 1FN3)
1FT6	Rotating synchronous motor (1FT6)
1PH	Rotating induction motor (1PH2, 1PH4, 1PH7)
ABS	Absolute
AC	Alternating Current
ADC	Analog Digital Converter
AIE	Angular incremental encoder
AK	Task or response ID
AktSatz	Actual block number: Part of the status signals
AO	Analog Output
ARM	Rotating induction motor
ASCII	American Standard Code for Information Interchange American Standard Code for Information Interchange
Being prepared	Being prepared: This feature is presently not available
CE	Controller enable
ChkCfg	Abbreviation for the configuration telegram (Check Config.): this is sent from the master to the slave when establishing the bus
COM	Communications Module
CP	Communications processor
CPU	Central Processing Unit
CTS	Clear To Send: Signal that it is clear to send for serial data interfaces
DAC	Digital Analog Converter
DC	Direct Current
Dec	Abbreviation for decimal number
DIL	Dual In-Line
DM	Direct measuring system (encoder 2)
DP	Distributed Periphery (I/O)

DPMC1, DPMC2	DP master, Class 1 or Class 2
DPR	Dual Port RAM
DRAM	Dynamic memory (non-buffered)
DRF	Differential Resolver Function
DRIVE ES Basic	Software, which is linked in to the HW Config engineering tool of SIMATIC S7 for a special slave.
DSC	Dynamic Servo Control
DSP	Digital Signal Processor
DSR	Dynamic Servo Control (DSR) Dynamic Servo Control (DSC)
DSR	Data Send Ready: Signals that data is ready to be sent from the serial data interfaces
DXB	Data eXchange Broadcast: DXB-Req is a task (request) which initiates a slave (publisher) to send its actual values as broadcast
EGB	Modules/components that can be destroyed by electrostatic discharge
EMC	Electro-Magnetic Compatibility
EMK	Electromotive force
EnDat	Encoder-Data-Interface: Bidirectional synchronous-serial interface **Note:** The abbreviation EnDat refers to the descriptions provided in the User’s Guide for EnDat 2.1 encoders from Heidenhain. EnDat 2.2 encoders with incremental interface are supported in the EnDat 2.1 mode.
EPROM	Program memory with fixed program
ET200	Peripheral devices (I/O) from the SIMATIC range which can be coupled via PROFIBUS
FD	Feed drive
FEPROM	Flash-EPROM: Memory which can be read and written into
FFT	Fast Fourier Transformation
FG	Function generator
FIPO	Fine InterPOlator
FOC	Fiber-optic cable
FW	Firmware
GSD	Master device file: describes the features of a DP slave
HEX	Abbreviation for a hexadecimal number
HLG	Ramp-function generator
HW	Hardware

HWE	Hardware limit switch
I	Input
IBN	Commissioning
Id	Field-generating current
IEC	International Electrotechnical Commission: International standard in electrical technology
IF	Pulse enable
IM	Induction motor without encoder (IM operation)
IM	Indirect measuring system (motor measuring system)
IND	Sub-index, sub-parameter number array index: Part of a PKW
IPO	Interpolator
Iq	Torque-generating current
I/RF	Infeed/regenerative feedback unit
Kv	Position loop gain (Kv factor)
LED	Light Emitting Diode
LSB	Least Significant Bit
MAV	Main actual value: Part of the PZD
MPI	Multi Point Interface: Multi-point serial interface
MS	Line infeed (Mains supply)
MS	Main setpoint: Part of the PZD
MSB	Most Significant Bit
MSCY_C1	Master Slave Cycle Class 1: Cyclic communications between the master (Class 1) and the slave
MSD	Main Spindle Drive
MSR	Dimension system grid: Smallest position unit
NC	Numerical Control
nact	Speed actual value
nset	Speed setpoint
O	Output
OC	Operating Condition
OLP	Optical Link Plug: Bus connector for fiber-optic cables
Order No. [MLFB]	Machine Readable Product Designation: Order No.
OW	Output word
P	Parameter

B

PCMCIA	Personal Computer Memory Card International Association
PD	Programming device
PEH	Position reached and stop
PELV	Protective extra low voltage
PKE	Parameter identification: Part of a PKW
PKW	Parameter identification value: Parameterizing part of a PPO
PLC	Programmable Logic Controller
PLI	Pole position identification
PO	POWER ON
PosAnw	Position selection
POSMO CA	Positioning Motor Compact DC: Complete drive unit with integrated power, control module, position control and program memory for AC
POSMO CD	Positioning Motor Compact DC: Complete drive unit with integrated power, control module, position control and program memory for DC
POSMO SI	Positioning Motor Servo Integrated: Positioning motor
PosZsw	Positioning status word
PPO	Parameter process data object: Cyclic data telegram when transferring data using PROFIBUS-DP and the ”variable-speed drives” profile
PNO	PROFIBUS User Organization
PRBS	Pseudo Random Binary Signal: White noise
PROFIBUS	Process Field Bus: Serial data bus
PTP	Point To Point
PWE	Parameter value: Part of a PKW
PWM	Pulse Width Modulation
PZD	Process data: Process data section of a PPO
RAM	Program memory which can be read and written into
REL	Relative
RF	Controller enable
RLI	Rotor position identification, corresponds to the pole position identification (PLI)
RO	Read Only
SERCOS	Standard bus system for drives
SetPrm	Abbreviation for the parameterizing telegram (set param): this is sent from the master to the slave when establishing the bus
SF	Shift factor

SLM	Synchronous linear motor
SRM	Rotating synchronous motor
SS	Interface
SSI	Synchronous serial interface
STS	Gating unit
STW	Control word: Part of a PZD
Software	Software
SWE	Software limit switches
Term.	Terminal
UI	Uncontrolled infeed
VDI	Verein Deutscher Ingenieure [Association of German Engineers]
VPM	VP module, module to limit the DC link voltage when a fault condition occurs (VPM: Voltage Protection Module)
Vpp	Peak-to-peak voltage
VS	Power supply voltage
WZM	Machine tools
xact	Position actual value
xset	Position setpoint value
ZK	DC link
ZSW	Status word

■

Notes

References

C

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Version 3.1, July 2002
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76131 Karlsruhe
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76131 Karlsruhe;
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/PDP/ PROFIBUS Installation Guidelines
Installation Guidelines for PROFIBUS-FMS/DP
Installation and Wiring Recommendation for RS 485 Transmission
Version 1.0, Order No. 2.111 (German); 2.112 (English)

Manufacturer/Service Documentation

/poscd_mf/ SIMODRIVE **POSMO SI/CD/CA** (08.03 Edition)
Installation Instructions, Interference Suppression Filter
Order No.: On request

/poscd_mfe/ SIMODRIVE **POSMO SI/CD/CA** (03.03 Edition)
Installation Instructions, Interference Suppression Filter ECOFAST
Order No.: On request

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Installation Instructions, Replacing PROFIBUS unit
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Installation Instructions, Replacing PROFIBUS unit ECOFAST
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/poss_m/ SIMODRIVE **POSMO SI** (07.06 Edition)
Installation Instructions (included with every SIMODRIVE POSMO SI)
Order No.: On request

/poss_mtl/ SIMODRIVE **POSMO SI** (07.05 Edition)
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Manual: STEP 7, **Reference Manuals**, V. 3.1
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Distributed ET 200X
Manual EWA 4NEB 780 6016–01 04
Part of the package with Order No.
6ES7 198–8FA01–8BA0

A list of additional documents, updated on a monthly basis, is available on the Internet for the available languages at:
http://www.siemens.com/motioncontrol
Select ”Support”, —> ”Technical Documentation” —> ”Overview of publications”.

■

Dimension Drawings

D

Contents

This chapter includes the following dimension drawings:

D

D.1 Dimension drawings POSMO SI

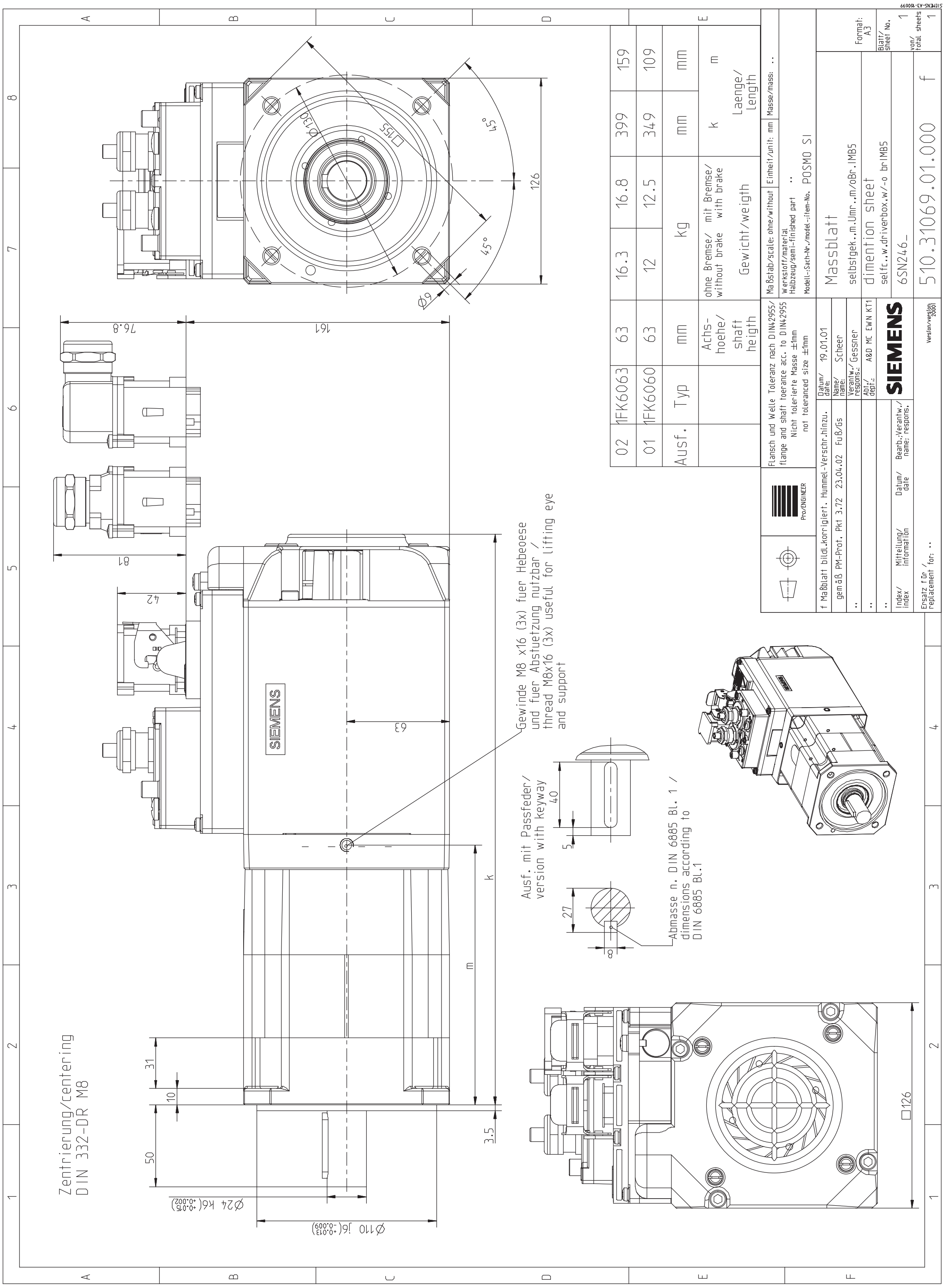


Fig. D-1 Dimension drawing POSMO SI 6SN246□–2CF00–0G□□

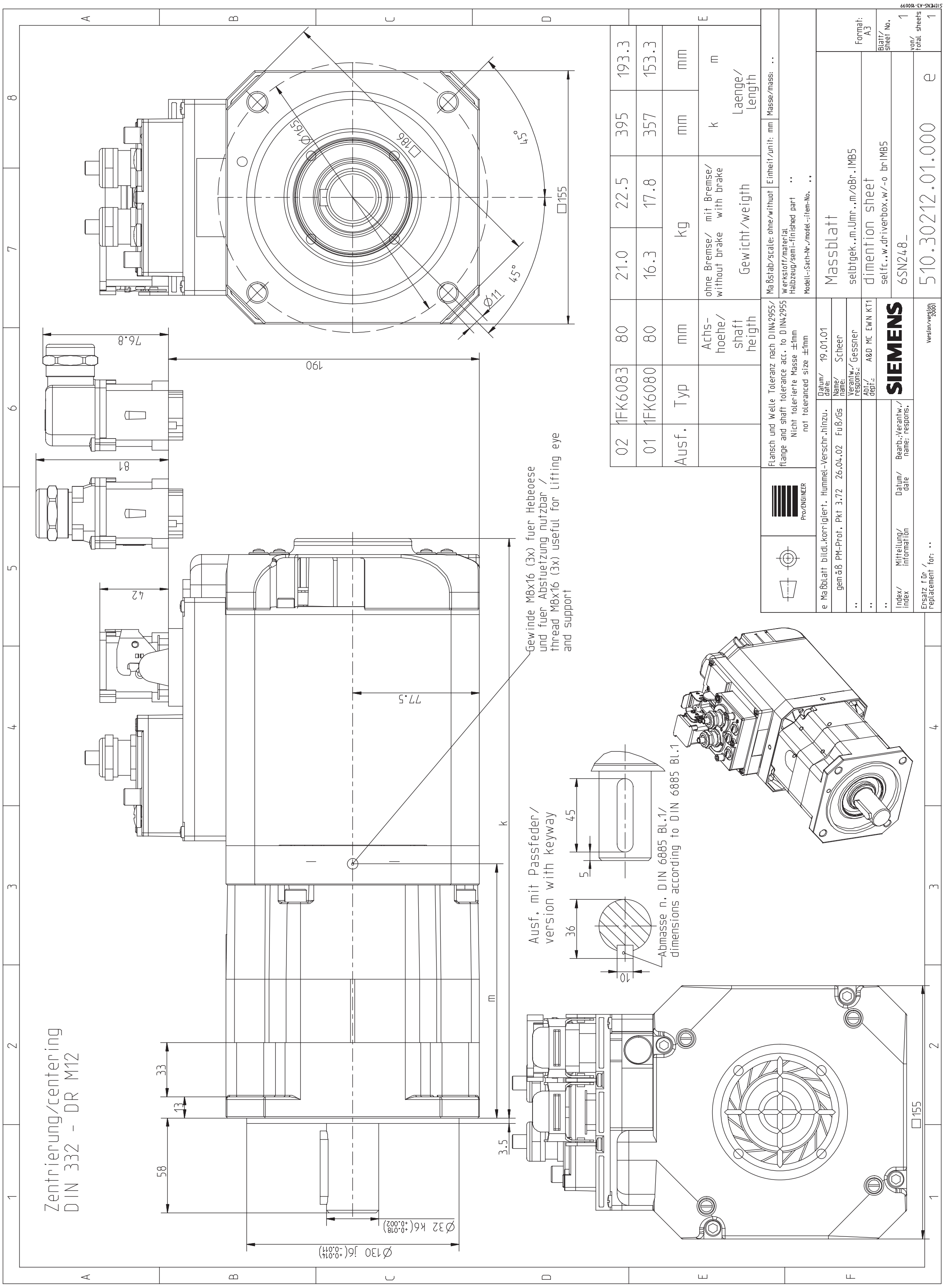


Fig. D-2 Dimension drawing POSMO SI 6SN248□–2CF00–0G□□

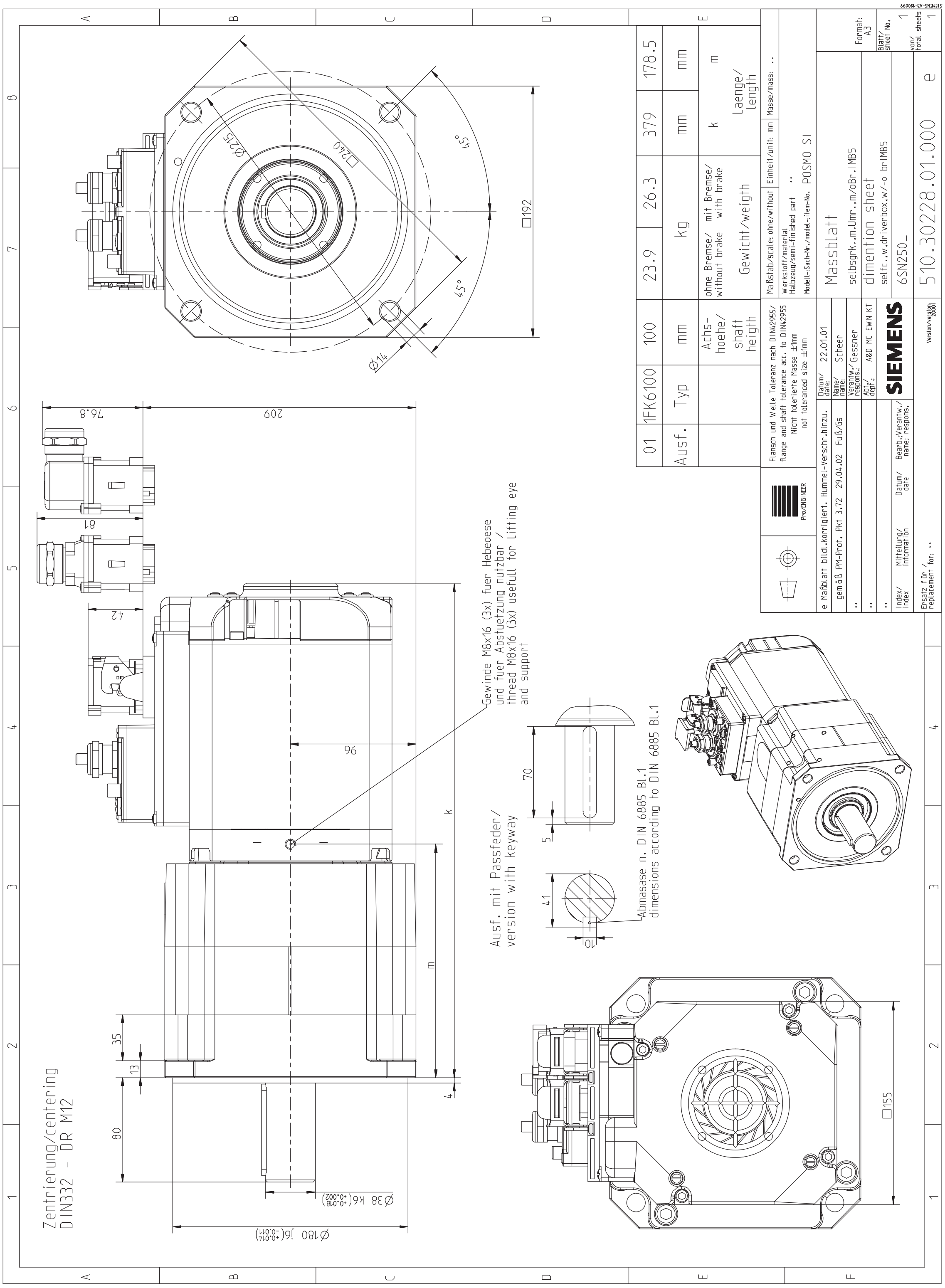


Fig. D-3 Dimension drawing POSMO SI 6SN2500–2CF00–0G☐☐

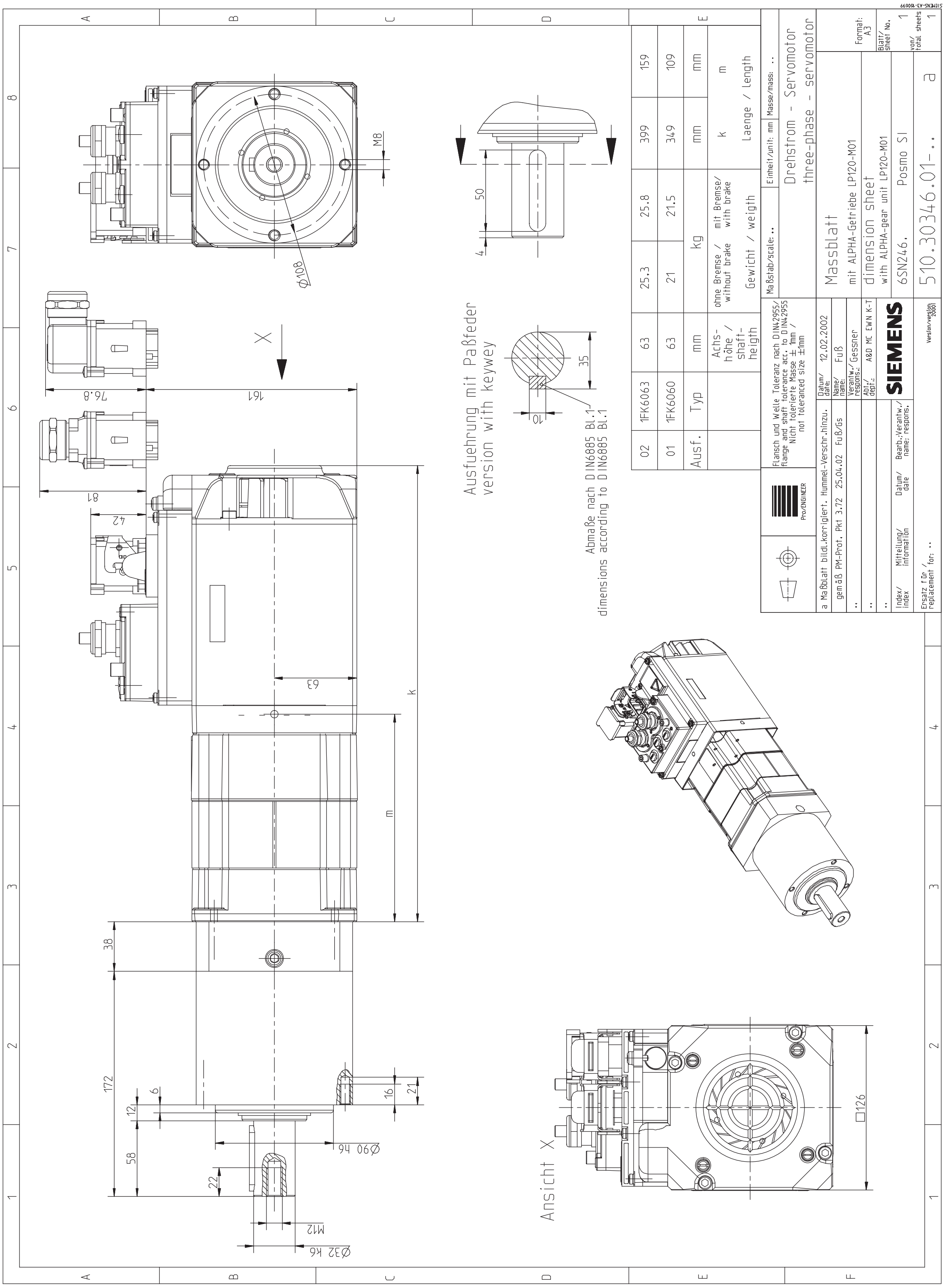


Fig. D-4 Dimension drawing POSMO SI 6SN246□–2CF00–0G□□ with gearbox LP120–M01

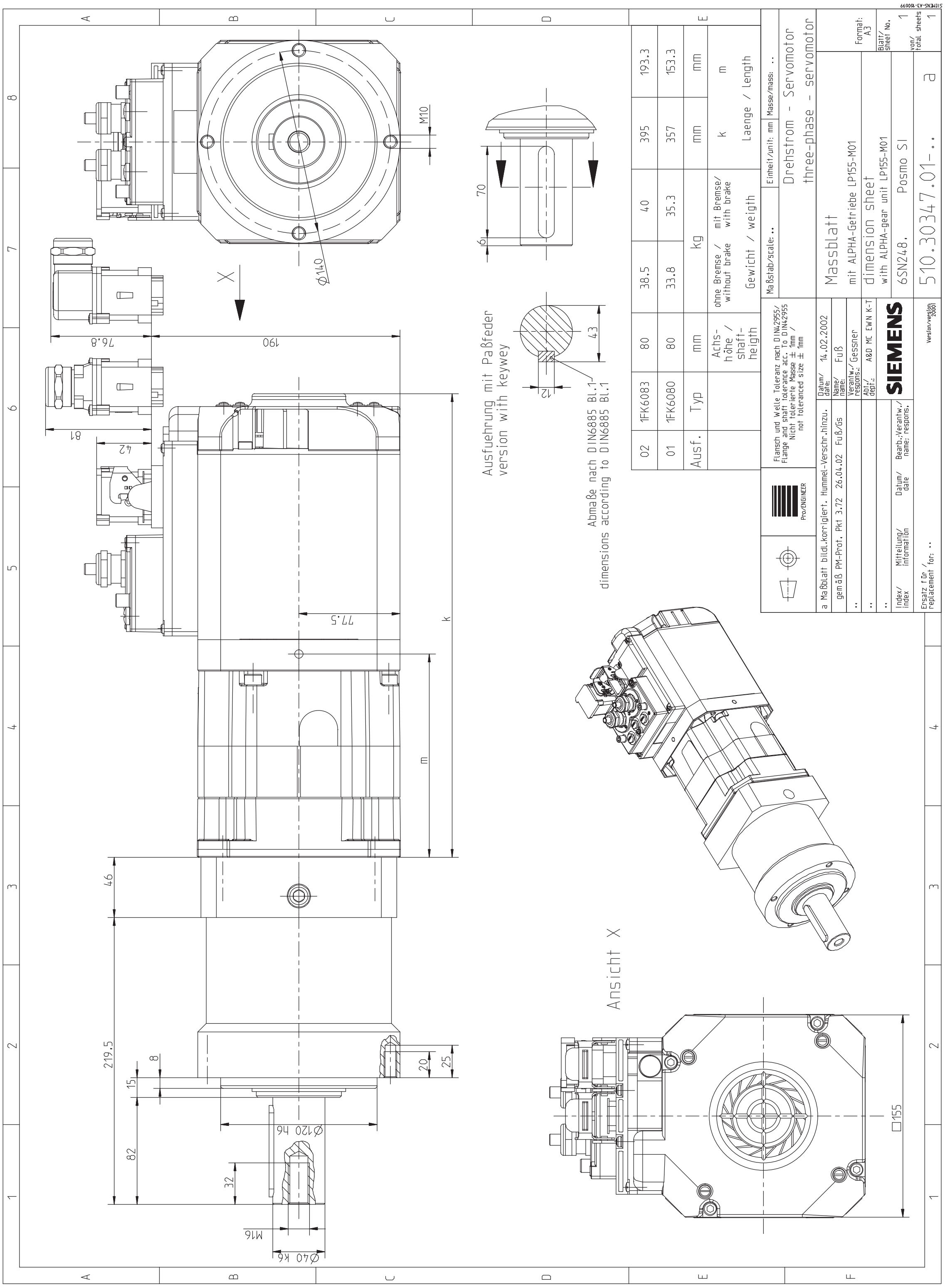


Fig. D-5 Dimension drawing POSMO SI 6SN248□–2CF00–0G□□ with gearbox LP155–M01

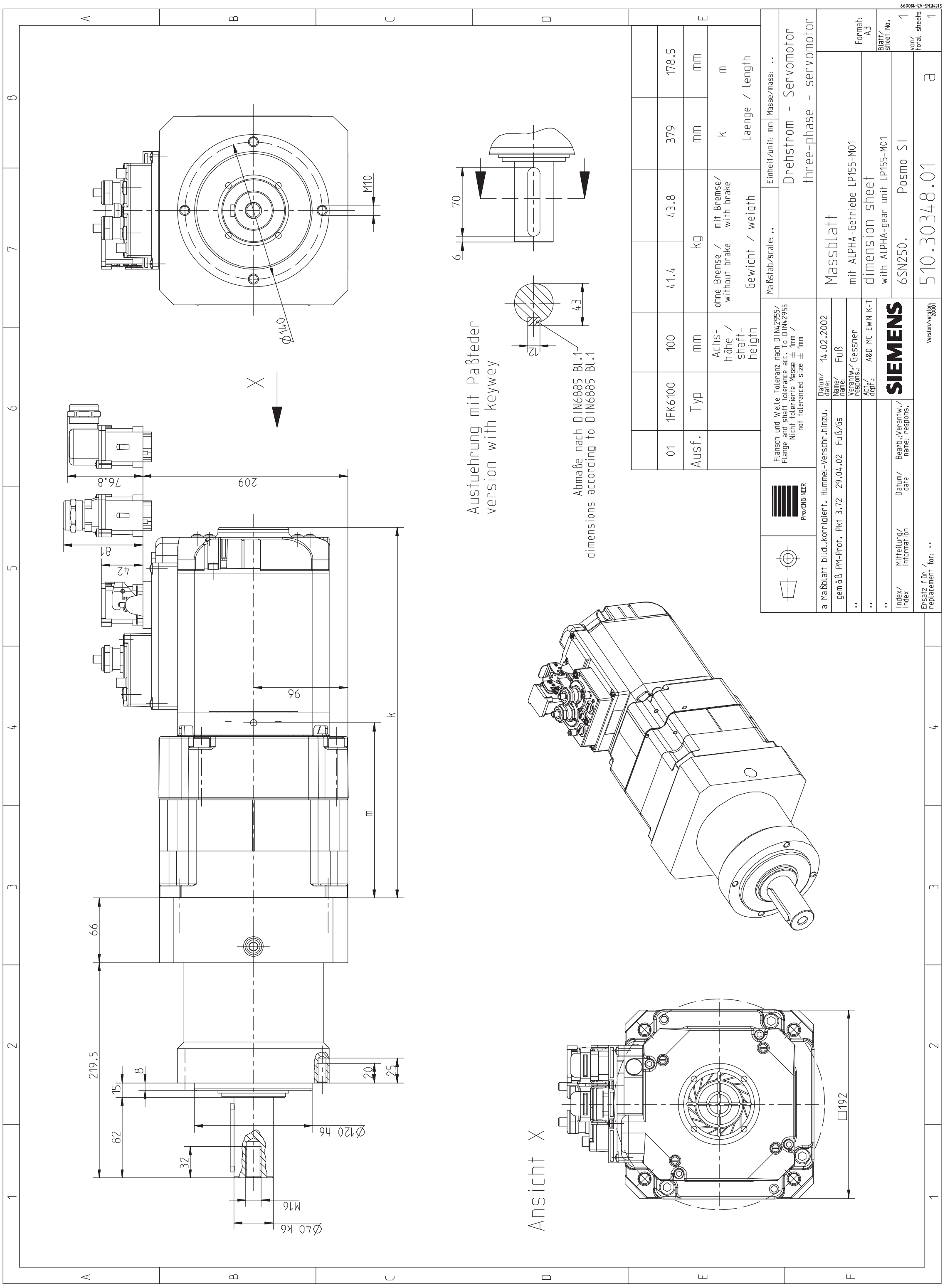


Fig. D-6 Dimension drawing POSMO SI 6SN2500–2CF00–0G☐☐ with gearbox LP155–M01

D.2 Dimension drawings POSMO SI ECOFAST

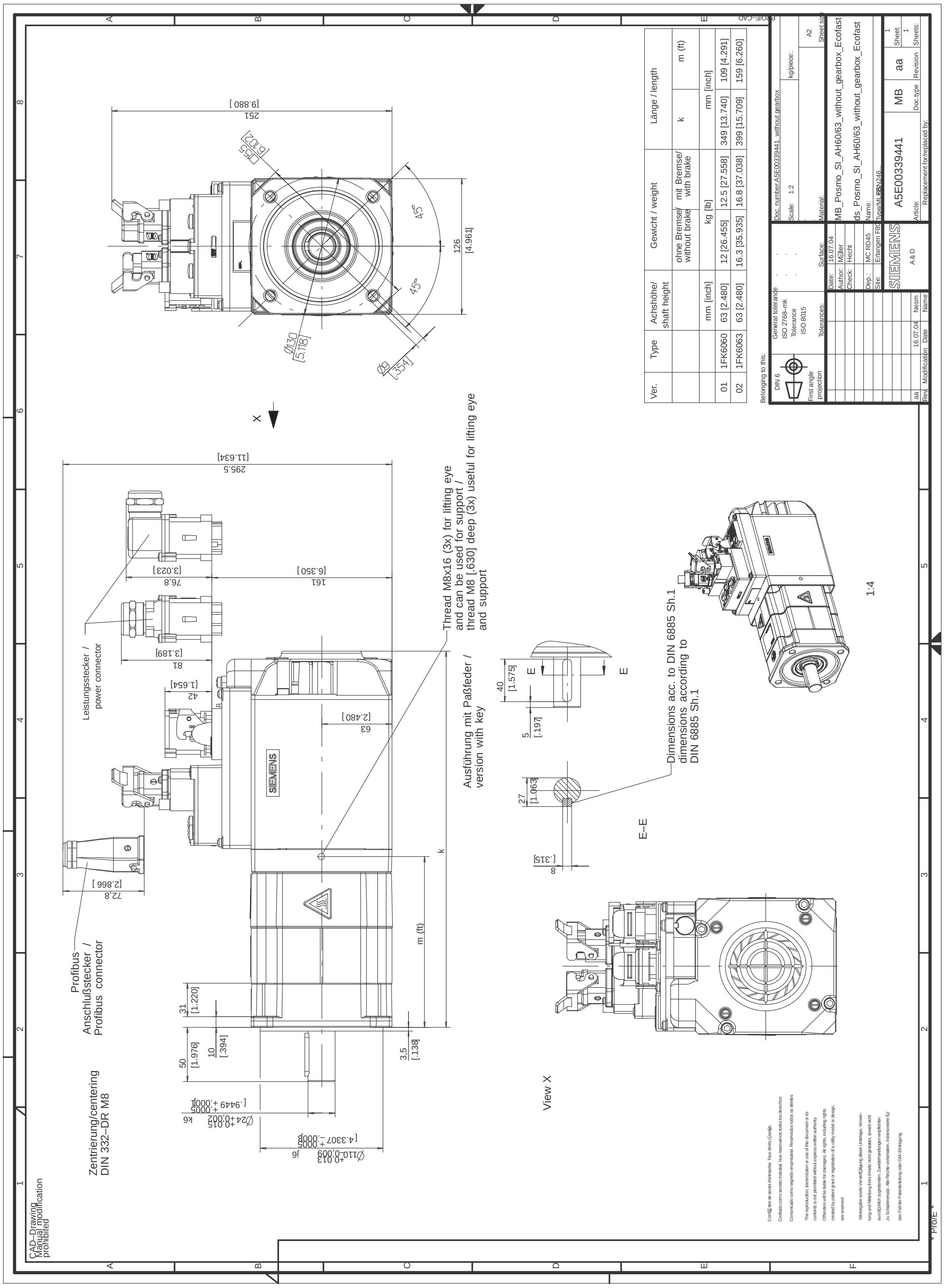


Fig. D-7 Dimension drawing POSMO SI ECOFAST 6SN246□–2CF□0–1G□□

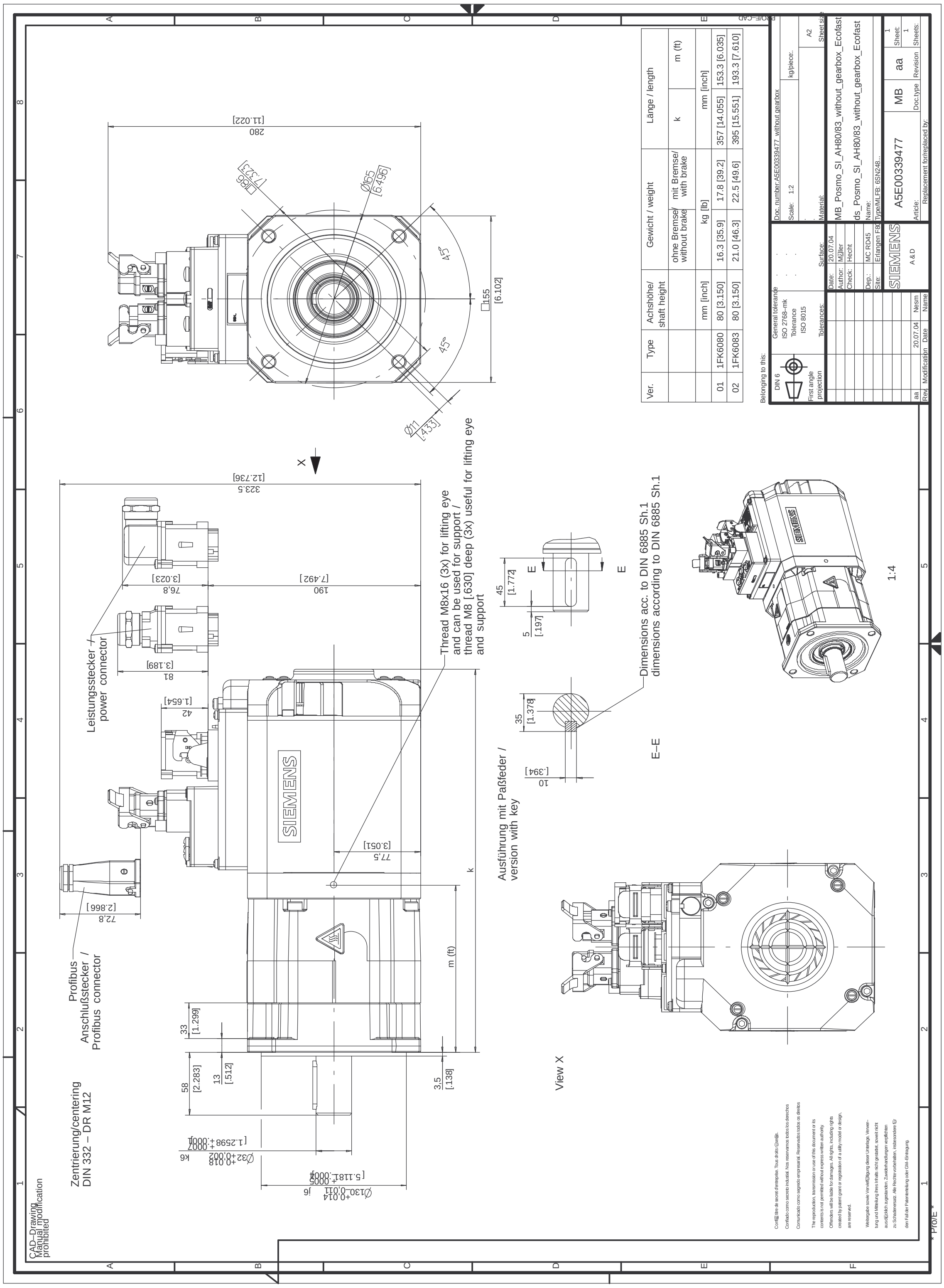


Fig. D-8 Dimension drawing POSMO SI 6SN248□–2CF□0–1G□□

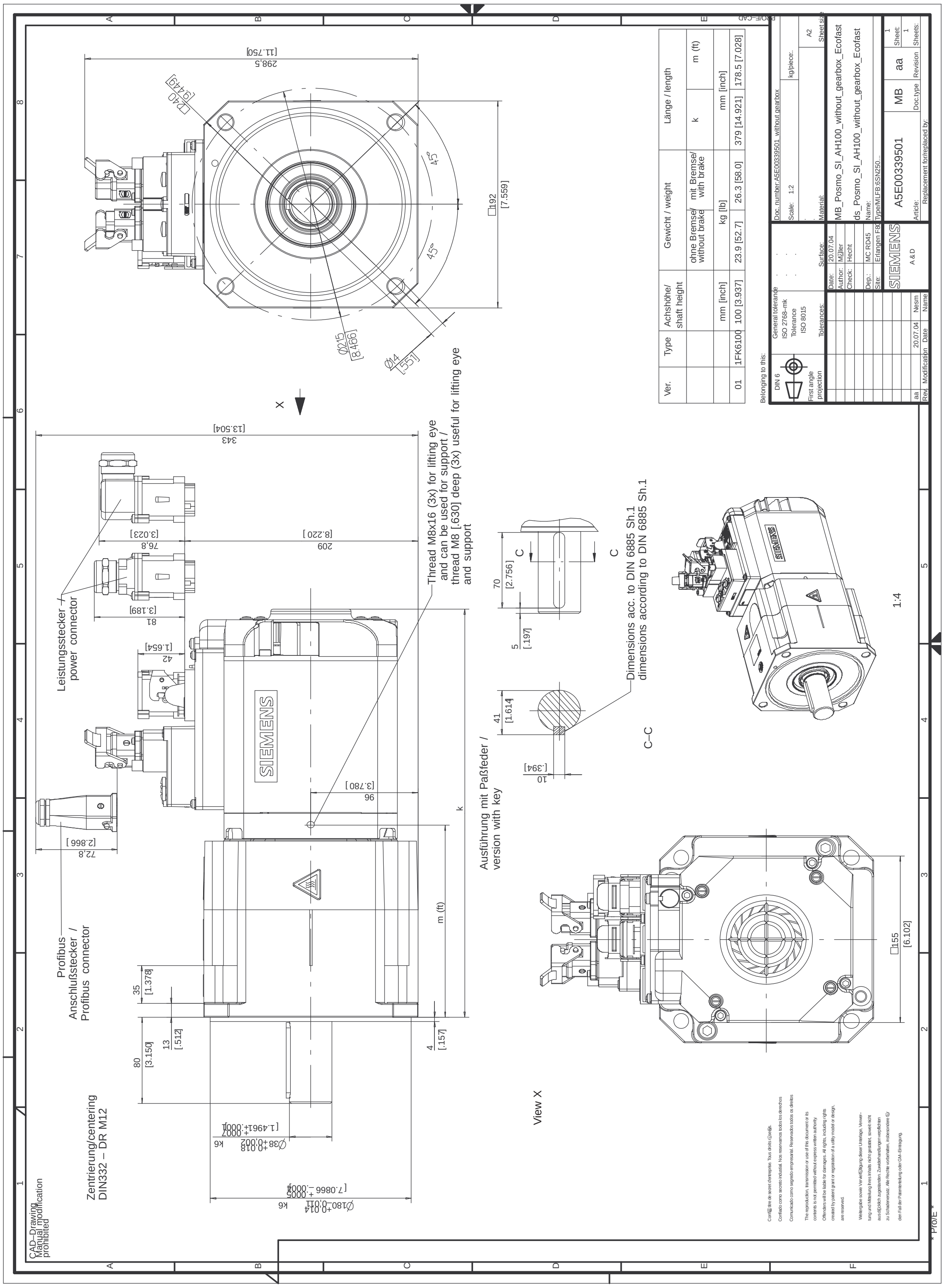


Fig. D-9 Dimension drawing POSMO SI 6SN2500–2CF□0–1G□□

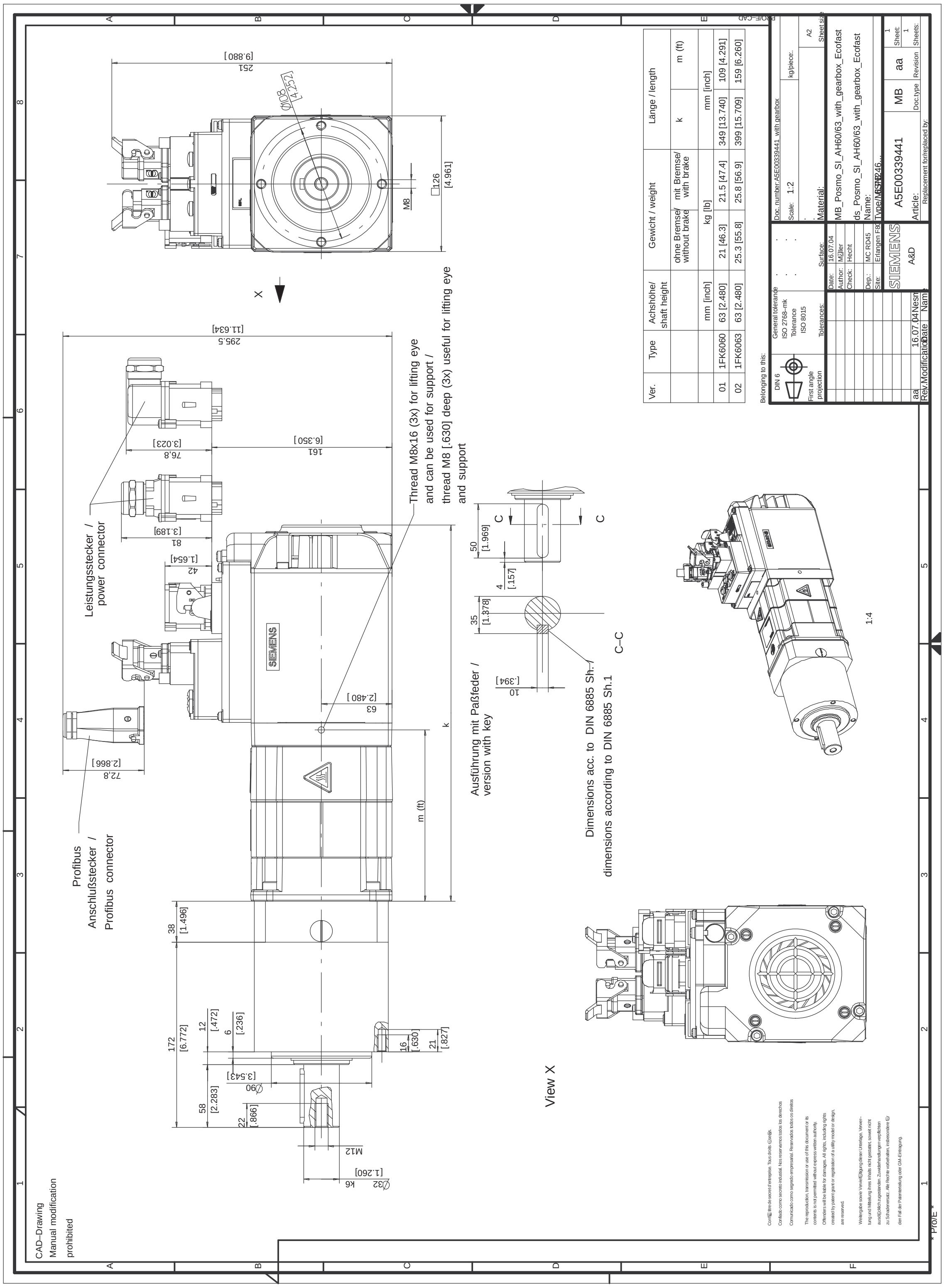


Fig. D-10 Dimension drawing POSMO SI 6SN246□–2CF□0–1G□□ with gearbox LP120–M01

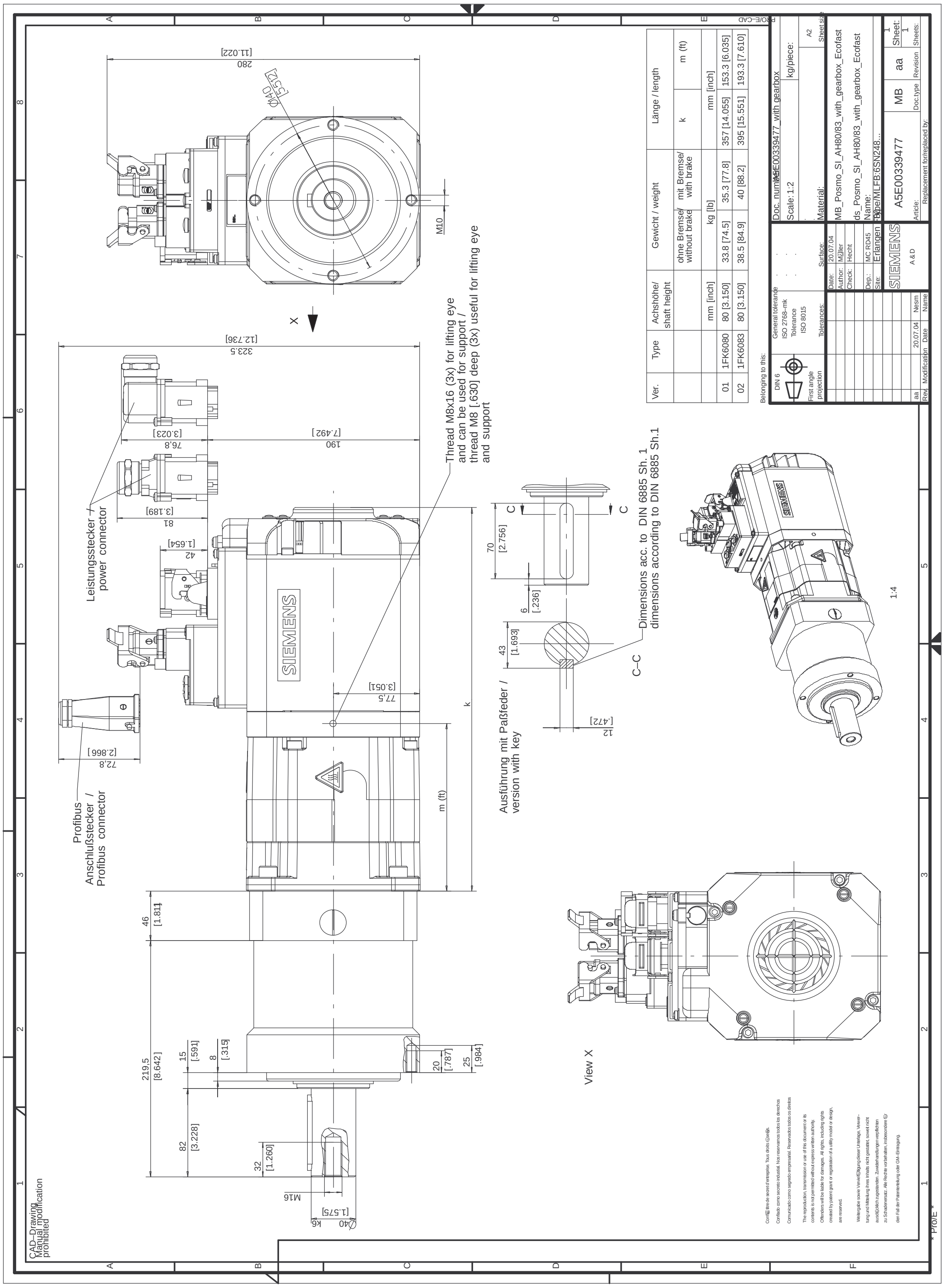


Fig. D-11 Dimension drawing POSMO SI 6SN248□–2CF□0–1G□□ with gearbox LP155–M01

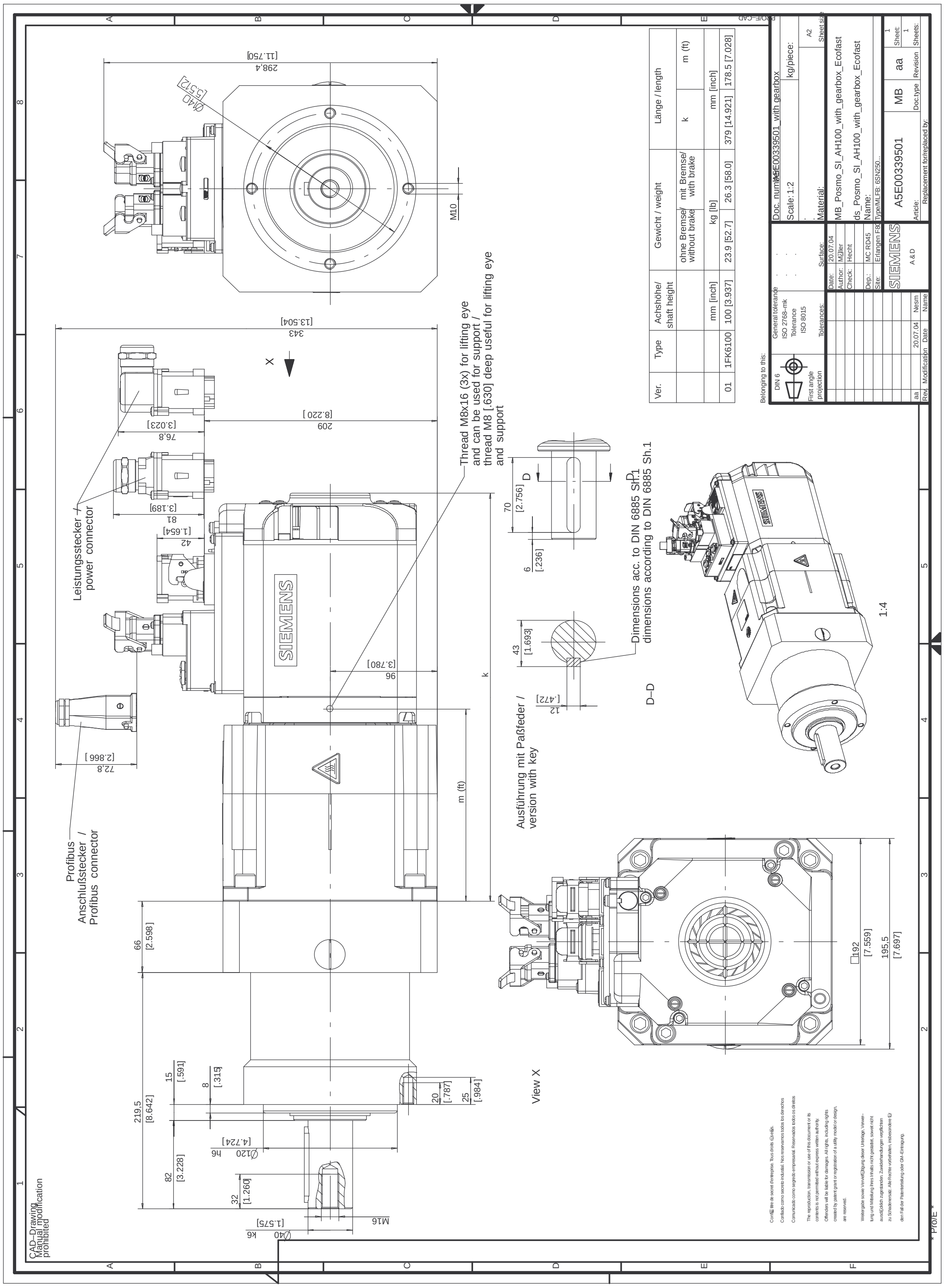
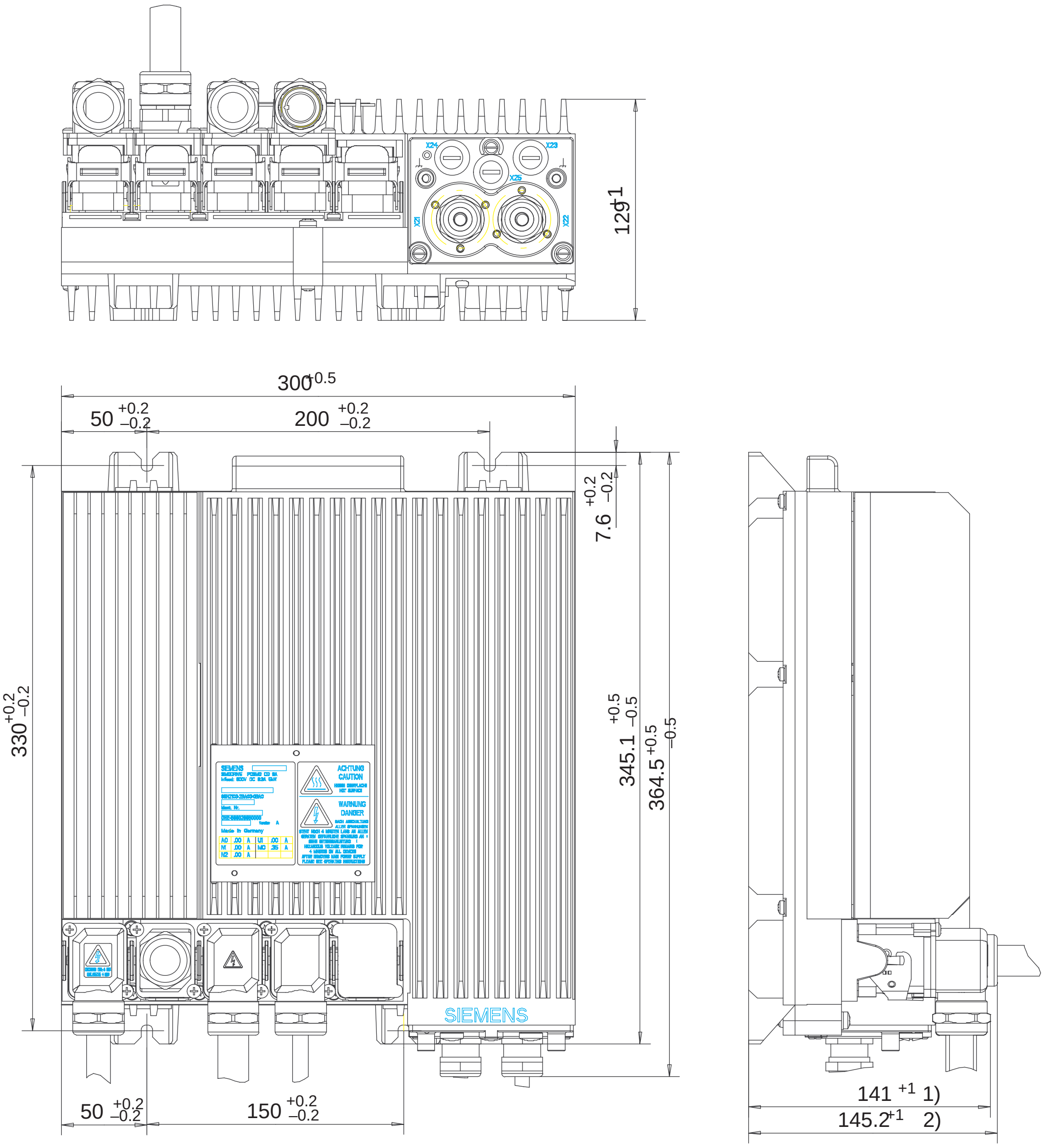


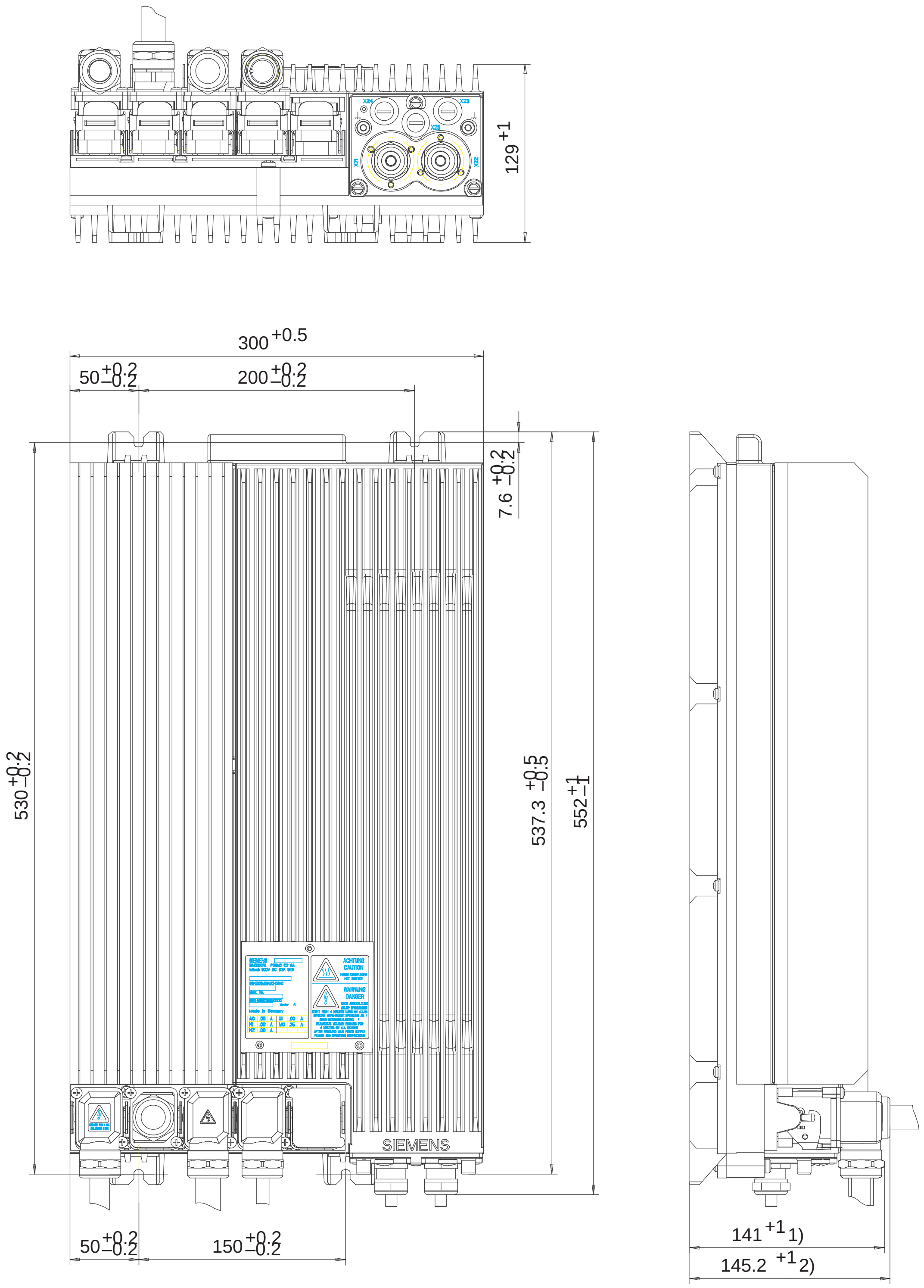
Fig. D-12 Dimension drawing POSMO SI 6SN2500–2CF□0–1G□□ with gearbox LP155–M01

D.3 Dimension drawings POSMO CD/CA



1) Angled device connector
2) Straight device connector

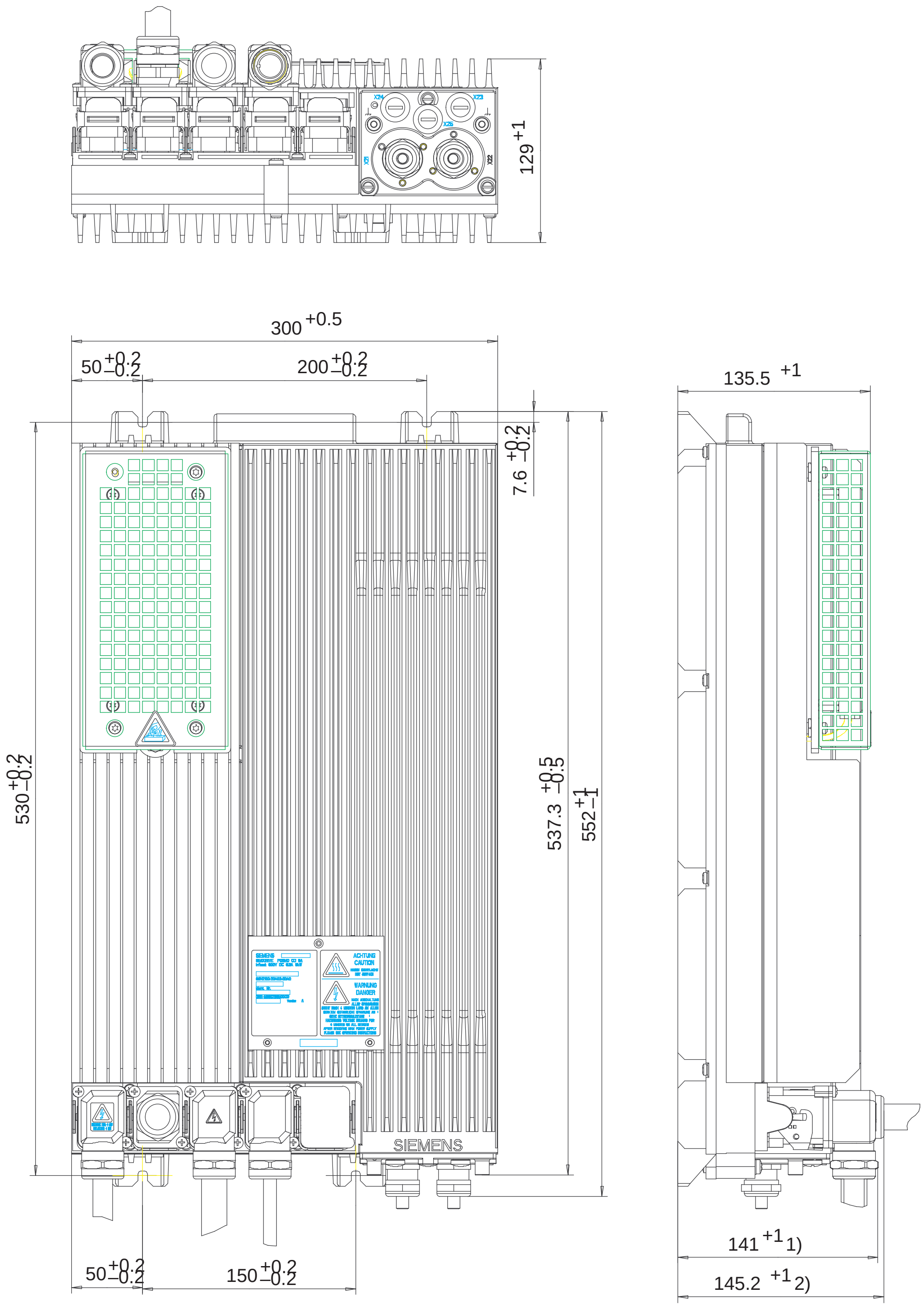
Fig. D-13 Dimension drawing POSMO CD 9 A, 6SN2 703-2AA0□-0BA1



1) Angled device connector

2) Straight device connector

Fig. D-14 Dimension drawing POSMO CD 18 A, 6SN2 703-2AA0□-0CA1



1) Angled device connector
2) Straight device connector

Fig. D-15 Dimension drawing POSMO CA 9 A, 6SN2 703-3AA1□-0BA1

D.4 Dimension drawings POSMO CD/CA ECOFAST

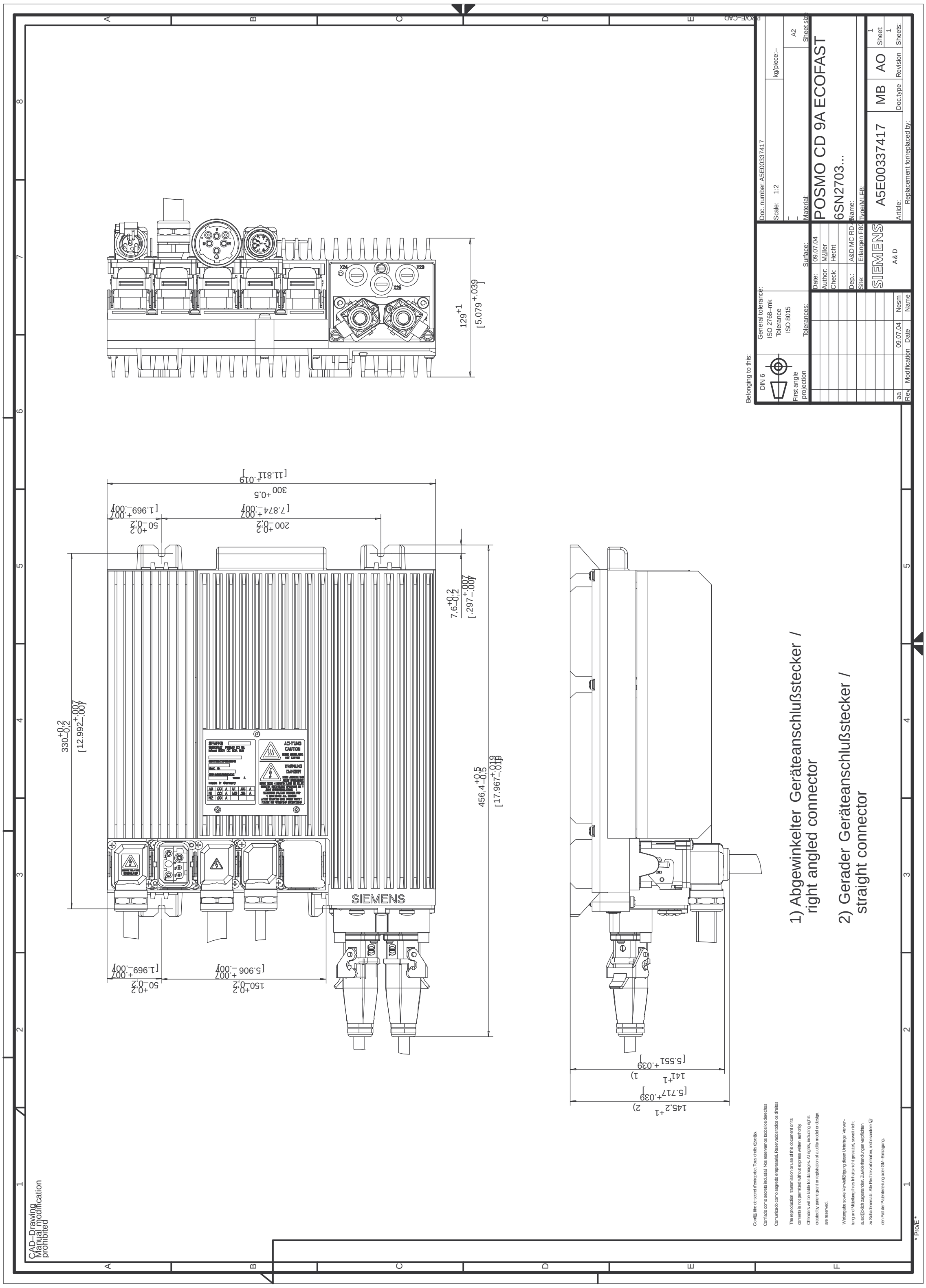


Fig. D-16 Dimension drawing POSMO CD 9 A ECOFAST

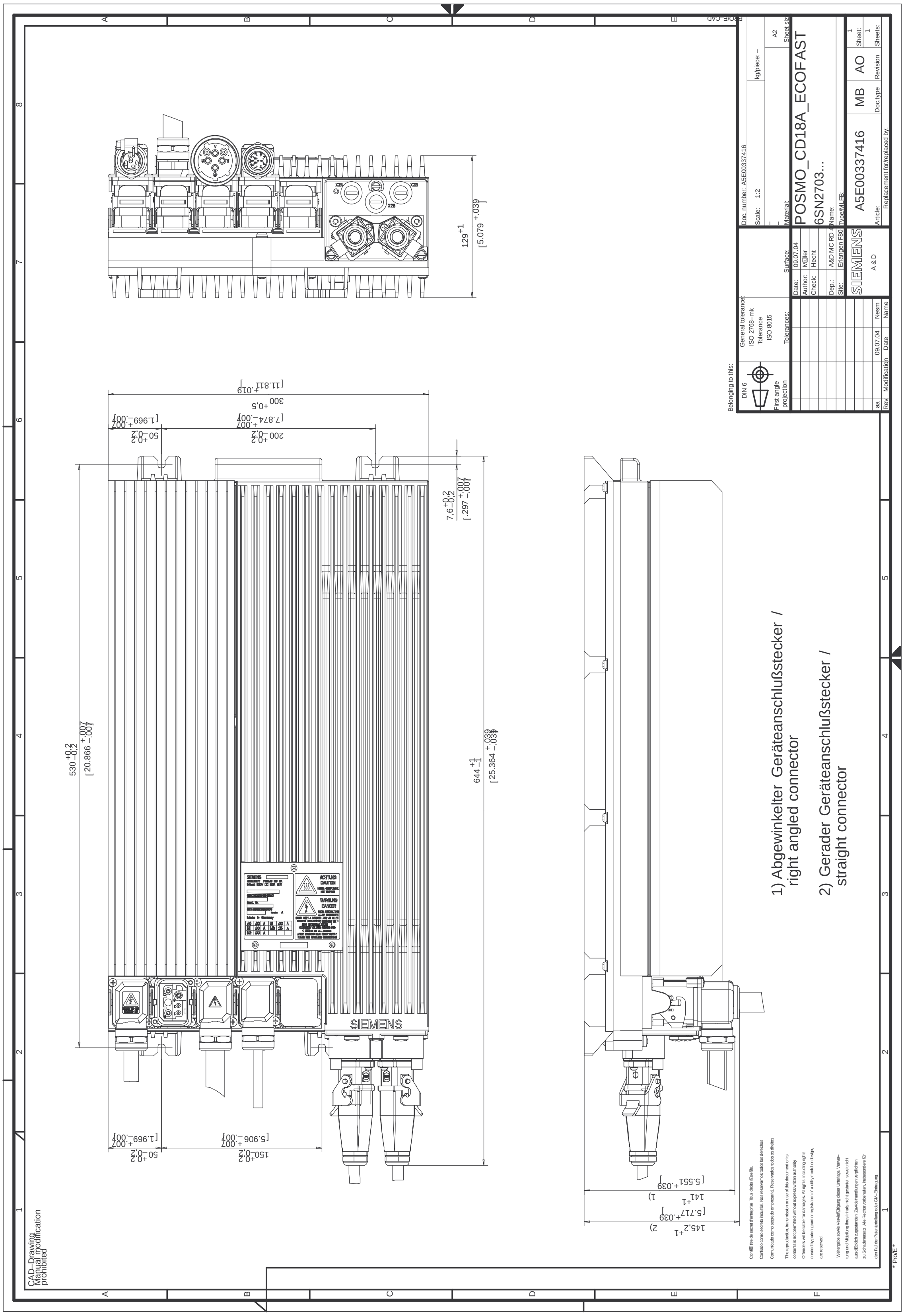


Fig. D-17 Dimension drawing POSMO CD 18 A ECOFAST

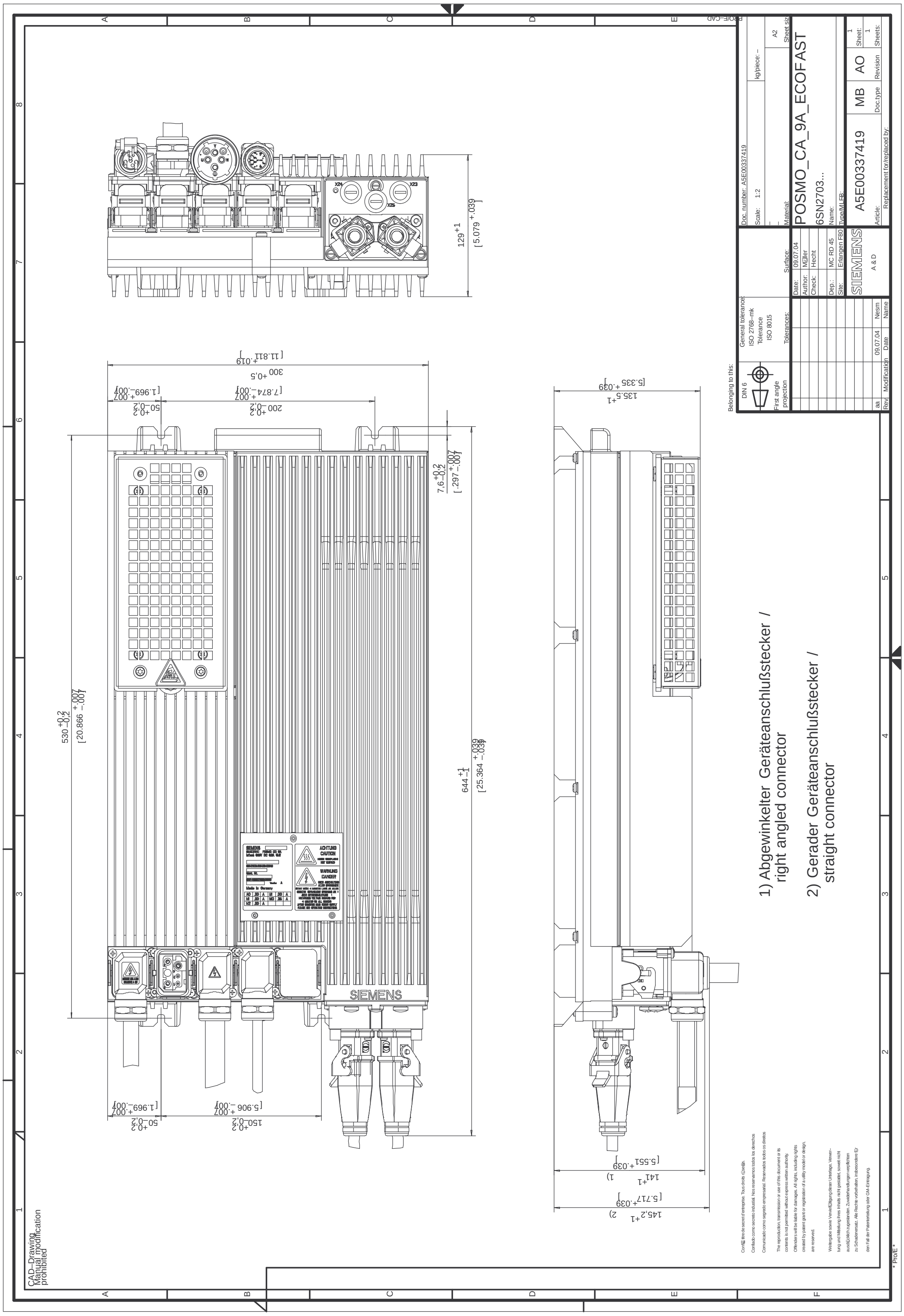


Fig. D-18 Dimension drawing POSMO CA 9 A ECOFAST

Notes

EC Declaration of Conformity

E

Note

An excerpt from the EC Declaration of Conformity for SIMODRIVE POSMO SI/CD/CA is provided in the following.

The complete EC Declaration of Conformity can be found as follows:

Reference: /EMV/ EMC Guidelines

E

SIEMENS

EG-Konformitätserklärung

EC Declaration of Conformity

No. E002 Version 05/03/11

Hersteller: SIEMENS AG
Manufacturer:

Anschrift: SIEMENS AG; A&D MC
Address: Frauenauracherstraße 80

91056 Erlangen

Produkt-bezeichnung: *Product description*	**SINUMERIK**	802D, 802S, 805, 805SM-P, 805SM-TW, 810, 810D 820, 840C, 840CE, 840D, 840DE, 840Di, 840D sl, FM NC
	SIMOTION	C230-2, P350, D4_ _, CX32, E510
	SIMATIC	FM 353, FM 354, FM 357
	SIROTEC	RCM1D, RCM1P
	SIMODRIVE	610, 611, MCU, FM STEPDRIVE, POSMO A / SI / CA / CD
	SINAMICS	S120

Die bezeichneten Produkte stimmen in den von uns in Verkehr gebrachten Ausführungen mit den Vorschriften folgender Europäischer Richtlinie überein:
The products described above in the form as delivered is in conformity with the provisions of the following European Directives:

89/336/EWG Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit
(geändert durch 91/263/EWG, 92/31/EWG, 93/68/EWG und 93/97/EWG).
Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility (amended by 91/263/EEC, 92/31/EEC, 93/68/EEC and 93/97/EEC).

Die Einhaltung dieser Richtlinie setzt einen EMV-gerechten Einbau der Produkte gemäß EMV-Aufbaurichtlinie (Best. Nr. 6FC 5297- AD30-0AP) in die Gesamtanlage voraus. Anlagenkonfigurationen, bei der die Einhaltung dieser Richtlinie nachgewiesen wurde, sowie angewandte Normen, siehe:
For keeping the directive, it is required to install the products according to "EMC Mounting regulation" (Order No. 6FC 5297-1AD30-0BP0). For details of the system configurations, which meet the requirements of the directives, as well as for the standards applied see:

- **Anhang A (Anlagenkonfigurationen)** - *Annex A (system configurations)* : **Version 05/03/11**
- **Anhang B (Komponenten)** - *Annex B (components)* : **Version 00/01/14**
- **Anhang C (Normen)** - *Annex C (standards)* : **Version 05/03/11**

Erlangen, den / *the* 11.03.2005

Siemens AG

R. Müller Entwicklungsleitung	K. Krause Qualitätsmanagement
Name, Funktion / *Name, function* — Unterschrift / *signature*	Name, Funktion / *Name, function* — Unterschrift / *signature*

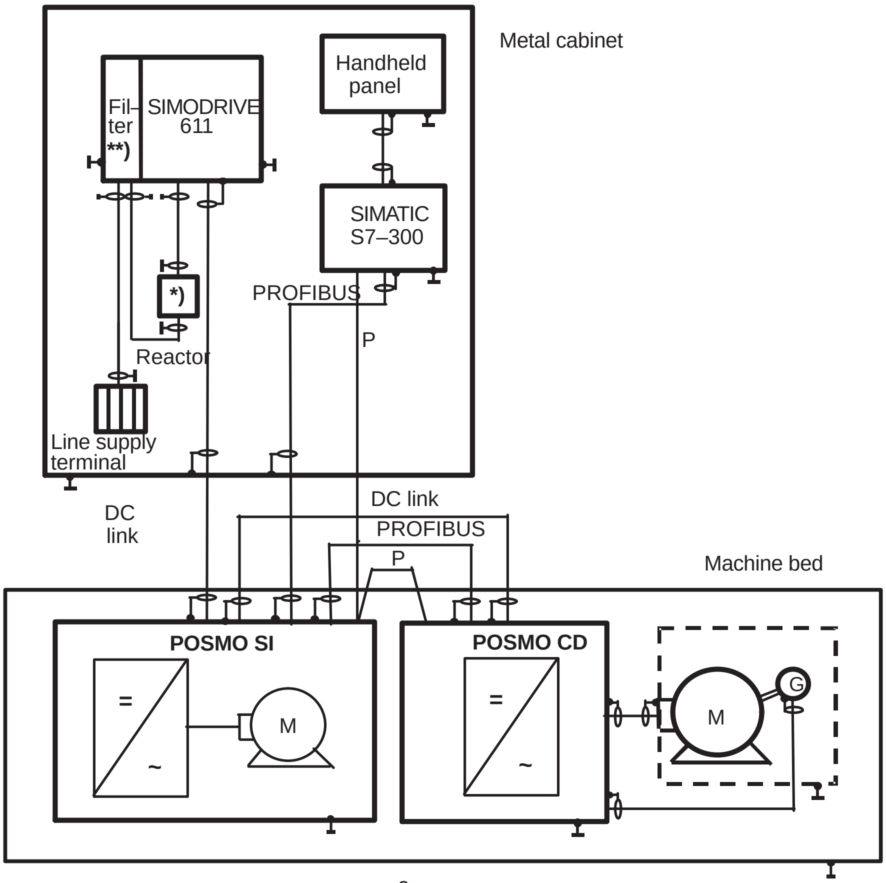
Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.

Fig. E-1 EC Declaration of Conformity

Annex A to the EC Declaration of Conformity No. E002

A20: Typical system configuration

SIMODRIVE POSMO SI and POSMO CD



P = Potential bonding conductor ≥ 4mm2
(PROFIBUS and P as close together as possible)

*) for I/R module and UI module 28 kW
**) Filter in the module group or separate

- All components that acc. to the ordering docum. are permitted for systems comprising POSMO SI and POSMO CD fulfill, as a system, Directive 89/336/EEC
- For conformity with standards, refer to Appendix C

Note:

In the schematic of the system configuration, only the basic measures to be in compliance with Directive 89/336/EEC of a typical system configuration are shown.
In addition, especially when deviating from this system configuration, the instruction information/instructions for a correct EMC system configuration and of the product EMC Design Guidelines (Order No.: 6FC5297– □AD30–0BP□) must be observed.

 Version 05/03/11
konf/erkl/002/anh_a A–20/27

Fig. E-2 Appendix A to the Declaration of Conformity (excerpt)

E

Appendix C to the EC Conformity Declaration No. E002

Die Übereinstimmung der Produkte mit der Richtlinie des Rates 89 / 336 / EWG inklusive Änderungen 91 / 263 / EWG, 92 / 31 / EWG, 93 / 68 / EWG und 93 / 97 / EWG wurde durch Überprüfung gemäß nachfolgender Produktnorm, Fachgrundnormen und der darin aufgelisteten Grundnormen nachgewiesen. Für die Produktkategorien SINUMERIK, SIMOTION, SIMATIC, SIROTEC und SIMODRIVE gelten unterschiedliche Normenanforderungen.

C1 Produktkategorie SINUMERIK (außer 810D), SIMOTION, SIMATIC, SIROTEC:

Fachgrundnorm Störaussendung / Industriebereich: EN 50081-2 1)

Grundnormen:	Prüfthema:	
EN 55011 + A1 + Bbl. 1	2)	Funkstörungen

Fachgrundnorm Störfestigkeit / Industriebereich: EN 61000-6-2 3)

Grundnormen:	Prüfthema:	
EN 61000-4-2 + A1	4)	Statische Entladung
EN 61000-4-3 +A1	5)	Hochfrequente Einstrahlung (amplitudenmoduliert)
EN 61000-4-4	6)	Schnelle Transienten (Burst)
EN 61000-4-6	7)	HF-Bestromung auf Leitungen
EN 61000-4-8	8)	Magnetfelder mit energietechnischen Frequenzen
EN 61000-4-11	9)	Spannungseinbrüche und Spannungsunterbrechungen

C2 Produktkategorie SIMODRIVE, SINUMERIK 810D:

Produktnorm:	Prüfthema:	
EN 61800-3 + A11	10)	Drehzahlveränderbare elektrische Antriebe; EMV-Produktnorm einschließlich spezieller Prüfverfahren

C3 Miterfüllte Normen:

1) VDE 0839 Teil 81-2

2) VDE 0875 Teil 11 + Bbl. 1
IEC / CISPR 11 + A1 + 28

3) VDE 0839 Teil 6-2
IEC 61000-6-2

4) VDE 0847 Teil 4-2 +A1
IEC 61000-4-2 + A1

5) VDE 0847 Teil 4-3
IEC 61000-4-3 + A1

6) VDE 0847 Teil 4-4
IEC 61000-4-4

7) VDE 0847 Teil 4-6
IEC 61000-4-6

8) VDE 0847 Teil 4-8
IEC 61000-4-8

9) VDE 0847 Teil 4-11
IEC 61000-4-11

10) VDE 0160 Teil 100
IEC 61800-3

 Version 00/11/27

konf/erkl/002/anh_c C-1/1

Fig. E-3 Appendix C to the EC Declaration of Conformity (excerpt)

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SIMODRIVE POSMO A

General Documentation/Catalogs

SINUMERIK SIMODRIVE

Catalog DA 65.4
SIMODRIVE 611 universal and POSMO

Catalog NC 60
Automation Systems for Machine Tools

Catalog

SL 01	System Solutions
IK PI	Industrial Communication and Field Devices
CA 01	Components for Automation & Drives

Catalog

KT 10.1	Power supplies SITOP power
ST 70	SIMATIC
ST 80	SIMATIC HMI

Manufacturer/Service Documentation

SIMODRIVE
POSMO A

User Manual

SIMODRIVE
POSMO A

Mounting Instructions

75 W motor
300 W motor

(supplied with each drive)

SINUMERIK SIROTEC SIMODRIVE

EMC Design Guidelines

SINUMERIK
SIROTEC
SIMODRIVE

Manual

Distributed I/O System ET200 (PROFIBUS Configuring Guidelines)

Electronic Documentation

SINUMERIK SIMODRIVE Motors

DOC ON CD

DOCONWEB