SIMATIC
Control Systems

Catalog ST DA · 2005

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Catalog ST DA · 2003

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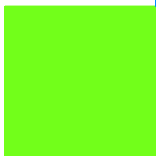
SIEMENS

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Welcome to
Automation and Drives

We would like to welcome you to Automation and Drives and our comprehensive range of products, systems, solutions and services for production and process automation and building technology worldwide.

With Totally Integrated Automation and Totally Integrated Power, we deliver solution platforms based on standards that offer you a considerable savings potential.

Discover the world of our technology now. If you need more detailed information, please contact one of your regional Siemens partners.
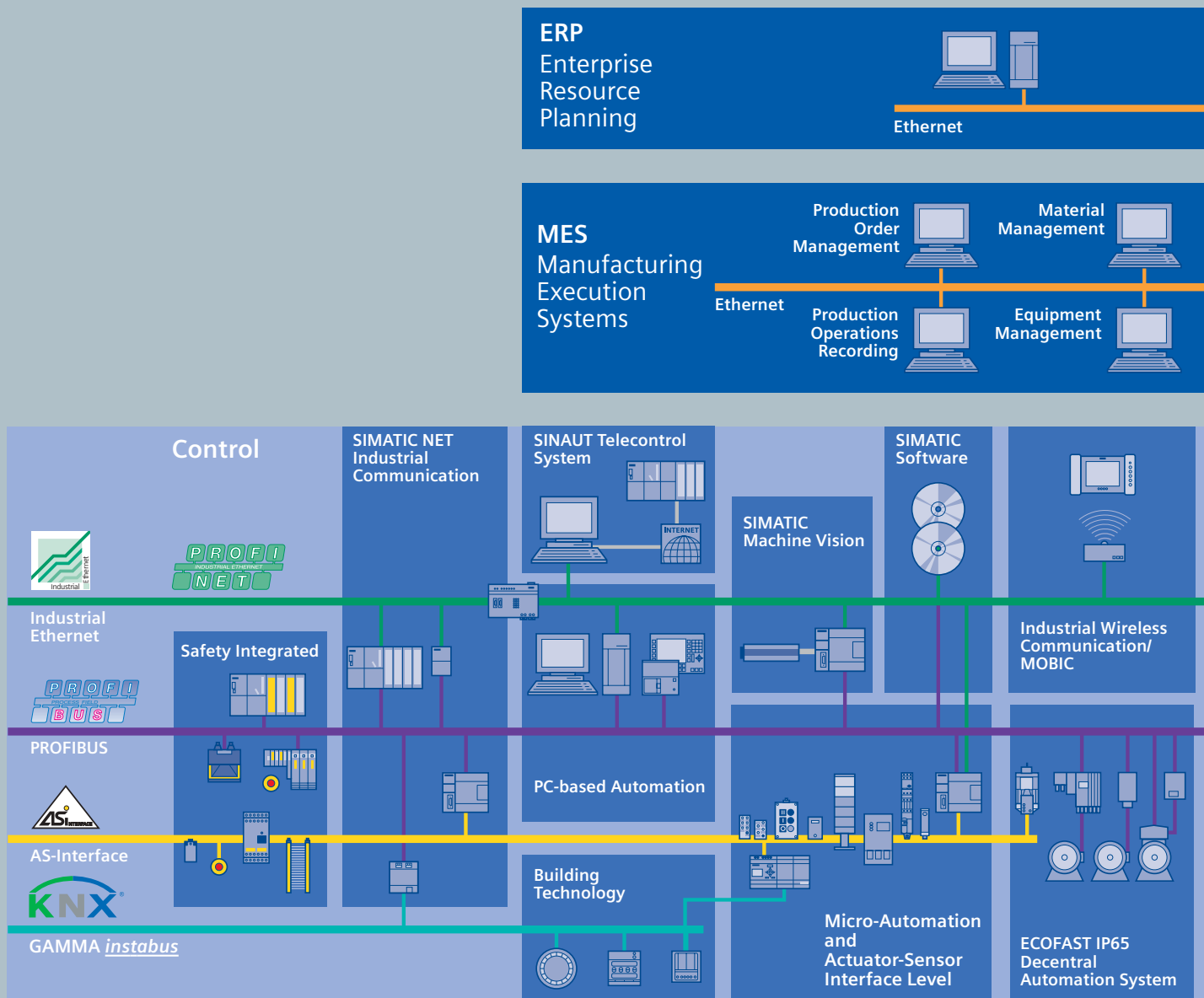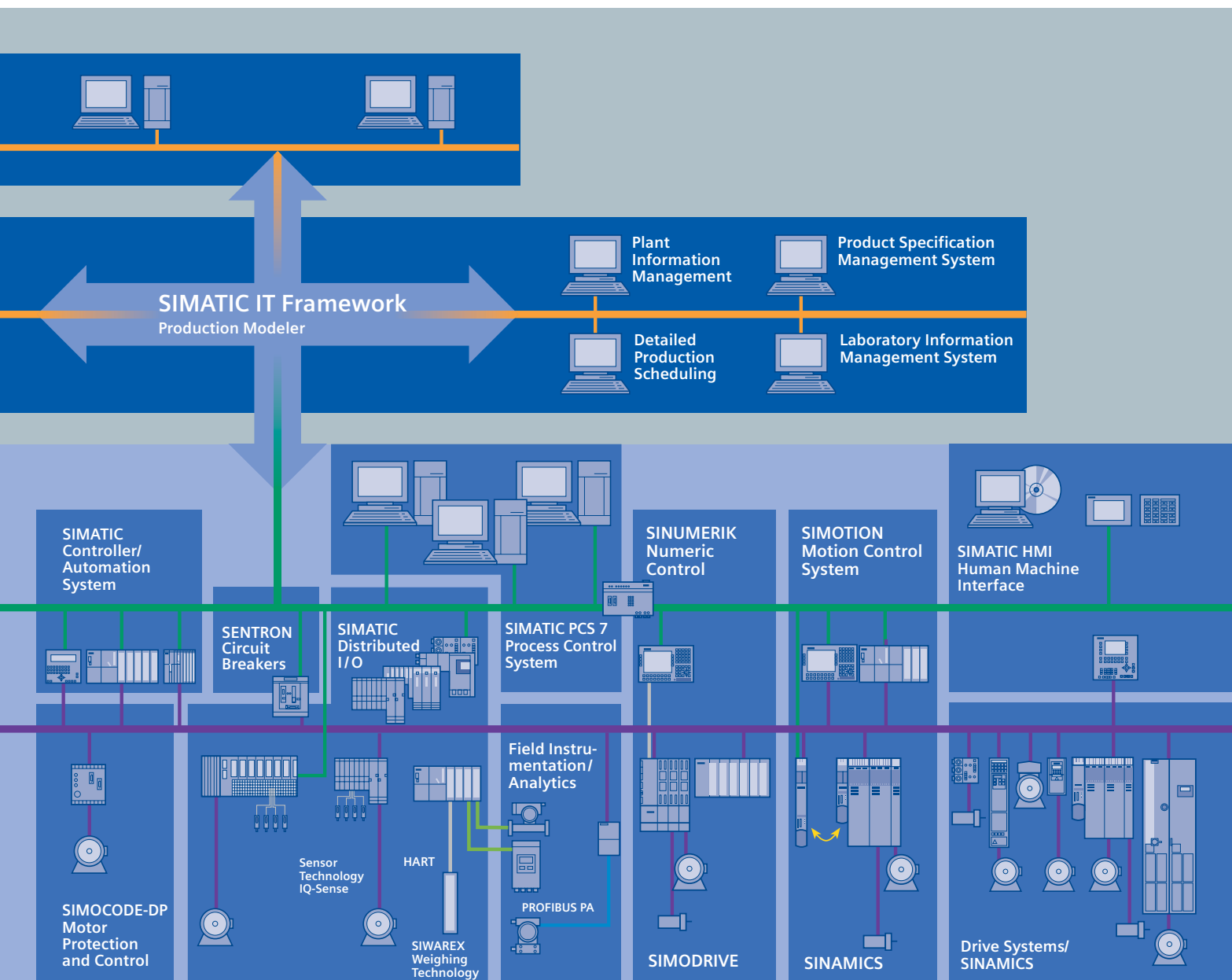They will be glad to assist you.

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With the launch of Totally Integrated Automation, we were the first ones on the market to consistently implement the trend from equipment to an integrated automation solution, and have continuously improved the system ever since. Whether your industry is process- and production-oriented or a hybrid, Totally Integrated Automation is a unique "common solution" platform that covers all the sectors.
Totally Integrated Automation is an integrated platform for the entire production line - from receiving to technical processing

ERP
Enterprise Resource Planning

Ethernet

MES
Manufacturing Execution Systems

Ethernet

Production Order Management

Material Management

Production Operations Recording

Equipment Management

Control

SIMATIC NET Industrial Communication

SINAUT Telecontrol System

SIMATIC Software

SIMATIC Machine Vision

INTERNET

Industrial Ethernet

Safety Integrated

Industrial Wireless Communication/ MOBIC

PROFIBUS

PC-based Automation

AS-Interface

Building Technology

KNX

GAMMA *instabus*

Micro-Automation and Actuator-Sensor Interface Level

ECOFAST IP65 Decentral Automation System

and production areas to shipping. Thanks to the system-oriented engineering environment, integrated, open communications as well as intelligent diagnostics options, your plant now benefits in every phase of the life cycle.
In fact, to this day we are the only company worldwide that can offer a control system based on an integrated platform for both the production and process industry.

SIMATIC IT Framework
Production Modeler

Plant Information Management

Product Specification Management System

Detailed Production Scheduling

Laboratory Information Management System

SIMATIC Controller/ Automation System

SINUMERIK Numeric Control

SIMOTION Motion Control System

SIMATIC HMI Human Machine Interface

SENTRON Circuit Breakers

SIMATIC Distributed I/O

SIMATIC PCS 7 Process Control System

Field Instru- mentation/ Analytics

Sensor Technology IQ-Sense

HART

PROFIBUS PA

SIMOCODE-DP Motor Protection and Control

SIWAREX Weighing Technology

SIMODRIVE

SINAMICS

Drive Systems/ SINAMICS

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Totally Integrated Power™ by Siemens offers integrated solutions for energy distribution in functional and industrial buildings covering everything from medium-high voltage to power outlets.

Totally Integrated Power™ is based on integration in planning and configuration as well as coordinated products and systems. In addition, it features communications and software modules for connecting power distribution systems to industrial automation and building automation, thereby offering a substantial savings potential.

Communications

Process/production automation

| HMI | Load management | Graphs | Prognoses |

Products and systems

≤ 110 kV

Planning and configuration
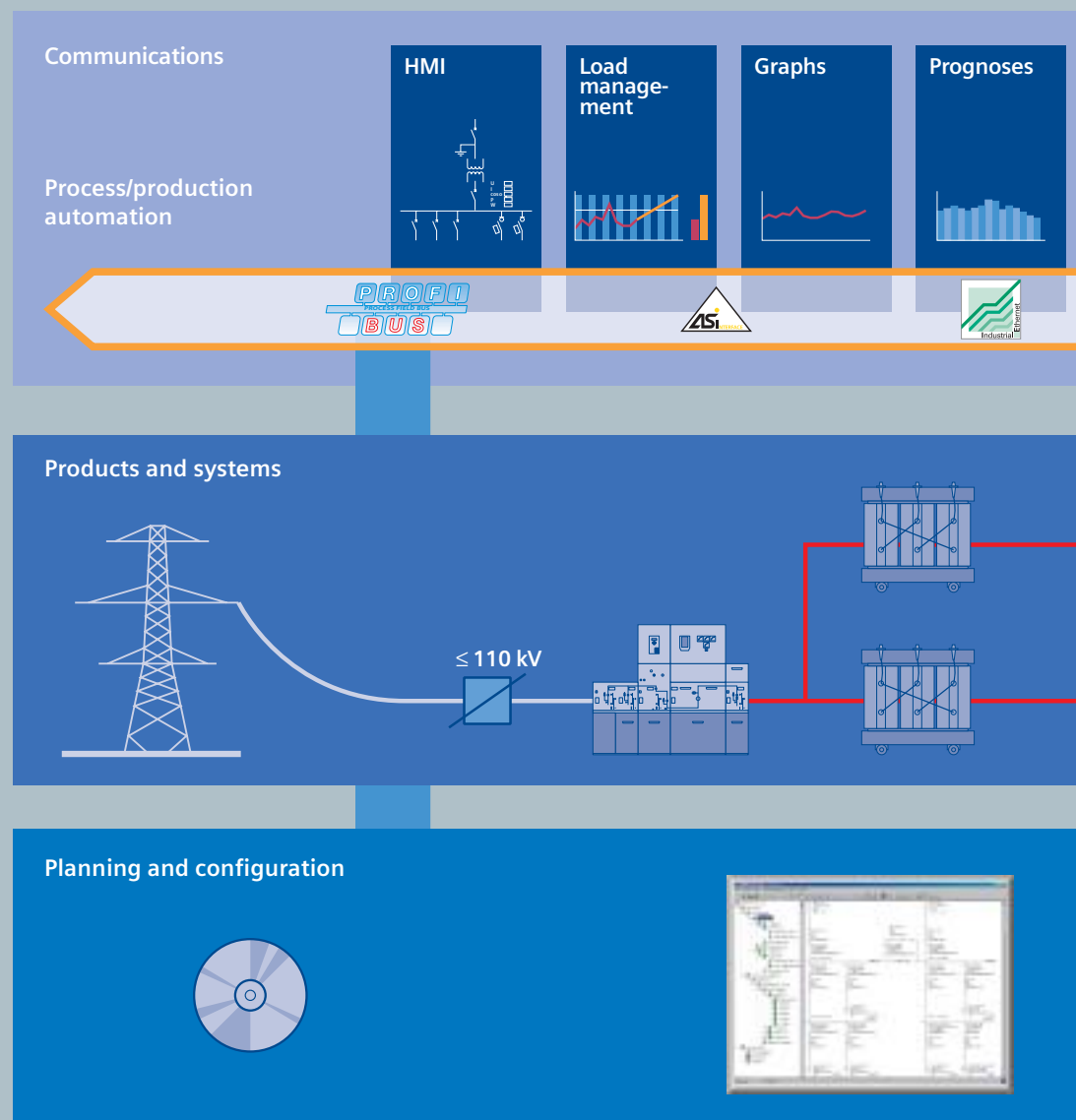
Main-tenance

- Substation
  - Distribution
    - Maintenance task

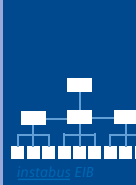|	
Hall 1	Air conditioning system checkup
Distribution 3	Replacing circuit breaker contacts
Infeed II	Replacing meters

Message/ error manage-ment

Selective protection

Protocols

Power quality

Cost center

Instabus EIB
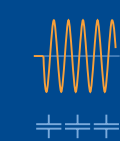
Building automation
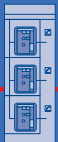
Introduction
SIMATIC Control Systems

Increased productivity in the global competitive arena is exceptionally important.

It is no longer possible to secure cost-effective operations without a high degree of automation.

To achieve that all important competitive lead, high performance and reliable automation systems must be used.

SIMATIC control systems can be used for the widest range of applications and industry sectors. This is due to the free configurability, the extensive function block library and the wide range of modules.

SIMATIC control systems are used, if

- conventional controllers have reached their performance limits,
- extremely fast response times, arithmetic operations and/or
- closed-loop control with the highest precision are required (sampling time from 100 µs).

For these and comparable applications, SIMATIC control systems have graduated performance levels to permit scalable solutions. All of the solutions are based on the same technological kernel, but differ when it comes to the packaging technology used:

- **Rack Based**
  SIMATIC TDC/SIMADYN D control system
- **Controller Based**
  SIMATIC FM 458-1 DP
- **Drive Based**
  T400 technological module

Rack Based

SIMATIC TDC and SIMADYN D control system

The SIMATIC TDC and SIMADYN D (Rack Based) subrack systems, have been especially designed for complex closed-loop control and arithmetic operations.

- The multi-processor SIMATIC TDC automation system offers an almost unlimited computational performance. Up to twenty 64-bit RISC CPU modules can be operated in synchronism in a single subrack.
- The SIMADYN D control system, using 32-bit technology, can accommodate up to eight CPU modules.
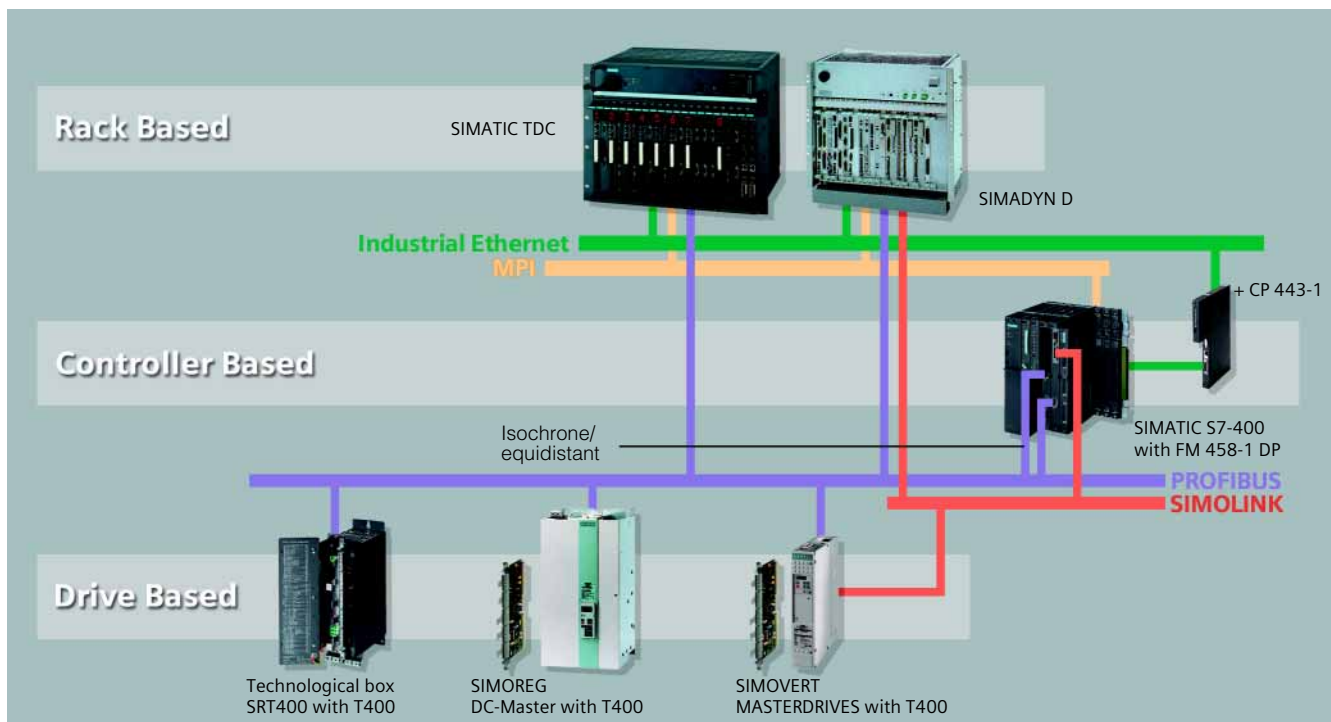
Controller Based

SIMATIC FM 458-1 DP

A conventional SIMATIC S7-400 (Controller Based) is expanded using the high-performance application module FM 458-1 DP. This allows it to master average up to sophisticated tasks, especially for machinery and plant construction.

Using this combination, all PLC, technological and Motion Control tasks can be universally implemented - which makes it unique in the SIMATIC system.

Expansion modules for communications and I/O peripherals, aligned and harmonized to the FM 458-1 DP, let you create solutions which are precisely matched to a machine or a plant.

Rack Based — SIMATIC TDC, SIMADYN D
Industrial Ethernet — MPI — + CP 443-1
Controller Based — Isochrone/equidistant — SIMATIC S7-400 with FM 458-1 DP — PROFIBUS SIMOLINK
Drive Based — Technological box SRT400 with T400 — SIMOREG DC-Master with T400 — SIMOVERT MASTERDRIVES with T400

Drive Based

Technological module T400

The T400 technological module (Drive Based) handles technological tasks directly in the drive:

- The T400 technological module is inserted in the
  - SIMOVERT MASTERDRIVES AC drive inverters and converters or in the
  - SIMOREG DC-Master drive converters
- Using the SRT400 technological box, the T400 can also be used as standalone solution for other drives

Totally Integrated Automation

SIMATIC control systems are integrated in Totally Integrated Automation (TIA) – the Siemens concept for triple integration - engineering, data management and communications.

The system is engineered using the integrated, unified SIMATIC software STEP 7, CFC, and optionally SFC.

Over 300 function blocks are integrated in the D7-SYS library to tackle almost any application.

Highlights

- SIMATIC control systems process every closed-loop control, arithmetic, open-loop control and communication task involving continually changing data with the highest speed and precision
- SIMATIC control systems have an extensive functionality
- They are graphically freely configurable
- They offer the short sampling times from 100 µs
- They ensure reproducible process quantities (i.e. stability of the settings and optimization of the production speed with the best quality)

Typical application areas

- Synchronous, dancer or closed-loop tension control systems, winders, multi-motor drives, gearbox/motor test stands, complex setpoint algorithms and closed-loop control for cross-cutters, "break-proof" electronic shafts
- Mechatronic solutions with high cycle rates in the area of production, packaging and printing machines
- Closed-loop torque, speed and position control for converter-fed DC and three-phase drives
- High precision rolling mill drives
- Hydraulic drives with a high-dynamic performance
- Special applications with converters, e.g. for excitation current control, high voltage DC power transmission, static reactive power compensation systems

SIMATIC TDC

Extremely complex closed-loop control and extensive communication tasks can be implemented using the SIMATIC TDC (SIMATIC Technology and Drives Control) automation system. It is admirably suited for applications in plant construction, for example, in rolling mills or in the iron and steel industry.

SIMATIC TDC is a state-of-the-art subrack system (Rack Based) and can accommodate up to 21 modules. Individually configured for the particular application, the required computational performance, the digital, analog, incremental and absolute value encoder connections as well as the serial interfaces can be combined with one another.

Multi-processing

In order to achieve a really effective multi-processing system, which can be synchronized, all of the modules in the SIMATIC TDC subrack are connected with one another through a high-performance 64-bit backplane bus.

GlobalDataMemory

Data can be exchanged „across all networked subracks" between all of the CPU modules in the system through the GlobalDataMemory (GDM), the central memory.

Communications

Drive units and the distributed peripherals are coupled by PROFIBUS DP interfaces with master and/or slave function.

Using a TCP/IP interface for up to 100 Mbit/s, several SIMATIC stations and third-party systems and host computers can be networked together with an extremely high degree of performance.

The PC or the PG, which is used for engineering and commissioning, as well as all of the SIMATIC HMI visualization components (e.g. WinCC or operator devices OP/TD) are connected through MPI (Multi-Point-Interface).

Interface modules

As a result of the large number of signals, the plant and process signals, for example, analog, digital and incremental encoder signals, are not directly connected to the modules, but are connected via interface modules and plug-in terminals.

Engineering

Extensive plant and communication engineering/configuring work is quickly and cost-effectively carried-out using the CFC function blocks.

SIMATIC TDC with CPU551	
Processor	64-bit RISC with FPU
Program memory (PC card)	2, 4, 8 Mbyte flash
Main memory	32 Mbyte SDRAM
Cache	2 Mbyte program/data
Permanent change memory	8 Kbyte EEPROM 256 Kbyte SRAM, battery-backed
Sampling time, rigidly cyclic • Shortest • Typical	100 µs 0.3 ms
Typical computation times (REAL) • MUL, multiplier • PIC, PI controller • RGE, ramp generator	0.9 µs 2.4 µs 5.0 µs
Networking	PROFIBUS Industrial Ethernet

SIMADYN D

SIMADYN D is suitable for all applications which involve high control dynamic response and arithmetic accuracy.

SIMADYN D is a well-proven subrack-based system (Rack Based), with a modular hardware and software design. This means that it can be configured for any type of application.

The subracks with up to 24 slots have two high-performance 16-bit backplane buses for fast data transfer between the individual modules.

An extremely fast fiber-optic cable couples several subracks for extremely complex closed-loop control and arithmetic tasks.

Communications

Serial coupling to PROFIBUS DP, SIMOLINK or Industrial Ethernet is established with communication modules. Plug-in communication sub-modules are inserted on the main communication modules.

Interface modules

As a result of the high number of signals, the plant and process signals, for example analog, digital and incremental encoder signals are not directly connected to the modules but rather to interface modules and plug-in terminals.

Configuring

Control-related applications are quickly and simply created using CFC function blocks

SIMADYN D with CPU module	PM5	PM6
Processor	32-bit RISC with FPU	64-bit RISC with FPU
Program memory (PC card)	2, 4 Mbyte flash	2, 4, 8 Mbyte flash
Working memory	4 Mbyte DRAM	8 Mbyte SDRAM
Cache (program/data)	16/4 Kbyte	Each 16 Kbyte
Permanent change memory	8 Kbyte EEPROM 64 Kbyte SRAM, battery-backed	8 Kbyte EEPROM 256 Kbyte SRAM, battery-backed
Sampling time • Shortest • Typical	 100 µs 0.8 ms	 100 µs 0.5 ms
Typical computation times (REAL) • MUL, multiplier • PIC, PI controller • RGE, ramp generator	 5.5 µs 14.3 µs 29,5 µs	 1.8 µs 4.7 µs 9.9 µs
Networking	PROFIBUS Industrial Ethernet SIMOLINK	PROFIBUS Industrial Ethernet SIMOLINK

SIMATIC FM 458-1 DP

The SIMATIC FM 458-1 DP application module processes sophisticated PLC, Motion Control and technological tasks in conjunction with the SIMATIC S7-400 automation system (Controller Based).

Given the unlimited functionality, the FM 458-1 DP can be flexibly used for a wide range of applications.

In addition to Motion Control, technological functions are possible, for example, cross-cutter, winder and hydraulic controls.

Because of its high clock cycle rates, the FM 458-1 DP can also handle closed-loop position and synchronous controls for up to several hundred drives.

The integrated, clock-cycle synchronous and equidistance-capable PROFIBUS DP interface, is ideally suited for motion control applications.

Communications

Communications to partners external to the S7-400 is preferably done with the PROFIBUS DP interface provided on the FM 458-1 DP. This offers the following new features:

- **Equidistance**, which means that the PROFIBUS DP cycle always has the same precise duration.
- **Isochrone mode**, this means that the CPU/Input and Output/user program are always in synchronism with the PROFIBUS clock cycle.
- **Slave-to-slave communications**, this means that the configured slaves can „directly" exchange data with one another without any configuring in the FM 458-1 DP.
- **Routing-capable,** this means that all of the bus nodes are accessed through an interface, for example, MPI (Multi-Point-Interface) or PROFIBUS DP and optionally, also Industrial Ethernet (CP 443-1).

Further, the extremely fast fiber-optic cable ring SIMOLINK is used on the EXM 448-1 expansion module to couple many drives.

For fast peripheral connections, the EXM 438-1 expansion module is used.

Interface modules

As a result of the high number of signals, the plant and process signals, for example, analog, digital and incremental encoder signals are not connected directly to the modules, but rather to interface modules and plug-in terminals.

Configuring

Complex and high speed motion control systems are simply and reliably created using the appropriate CFC function blocks.

SIMATIC S7-400 with the application module FM 458-1 DP, with expansion modules EXM 448-1 and EXM 438-1

SIMATIC S7-400: Inserting the FM 458-1 DP

SIMATIC S7-400 with FM 458-1 DP	
Processor	64-bit RISC with FPU
Program memory (MMC)	2 or 4 Mbyte flash
Working memory	8 Mbyte SDRAM
Cache (program/data)	Each 16 Kbyte
Permanent change memory	8 Kbyte EEPROM 256 Kbyte SRAM, battery-backed
Sampling time, rigidly cyclic	
• Shorted	100 µs
• Typical	0.5 ms
Typical computation times (REAL)	
• MUL, multiplier	1.8 µs
• PIC, PI controller	4.7 µs
• RGE, ramp generator	9.9 µs
Networking	PROFIBUS SIMOLINK, optionally with EXM 448-1

T400 Technological Module

Using the T400 technological module, sophisticated technological tasks for SIMOVERT, MASTERDRIVES 6SE70 AC drive inverter/converters as well as for the SIMOREG 6RA70 DC Master can be directly implemented in the drive, and that simply and at a favorable price. This is our Drive Based solution.

In this case, the prerequisite is that the drive must have an electronics box. The compact SRT400 technological box, with space for up to two T400 modules has been especially designed for applications where the T400 technological module cannot be used in the drive.

The technology box is especially suitable for smaller, cost-sensitive stand-alone applications. The T400 module is based on the well-proven, powerful 32-bit technology. This permits cycle times for typical control loops, of between approx. 0.8 ms and 1.6 ms.

Beyond this, the T400 offers extensive onboard peripherals as basis for flexible machinery concepts.

Engineering

Dynamic technological applications are quickly generated using the appropriate CFC function blocks.

Standard software packages which can be simply parameterized for

- Angular synchronism,
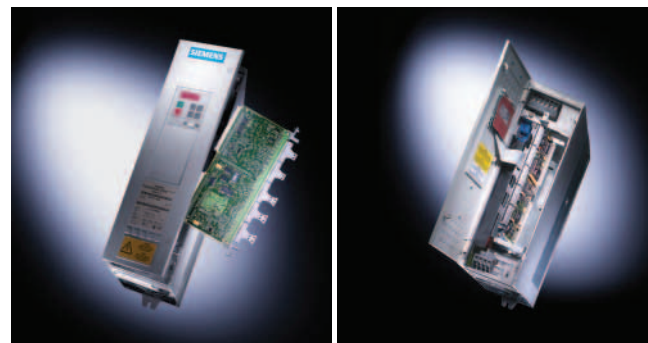- Axial winders,
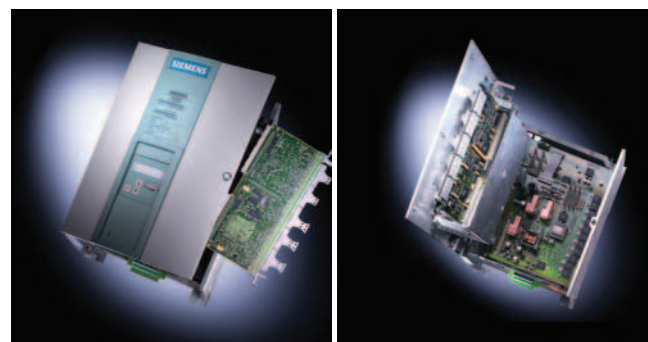- Flying shears/cross-cutters

offer a truly plug & play drive solution.
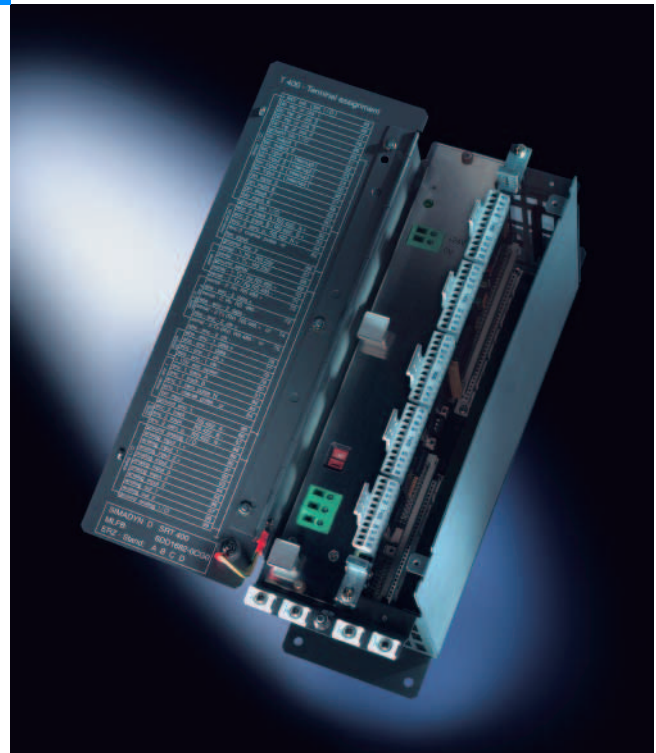
T400 technological module, inserted in the SRT400 technology box

T400 technological module, installed in SIMOVERT MASTERDRIVES

T400 technological module	
Processor	32-bit RISC with FPU
Program memory	2 Mbyte flash
Working memory	4 Mbyte DRAM
Cache (program/data)	4 Kbyte each
Permanent change memory	32 Kbyte NOVRAM
Sampling time, rigidly cyclic	
• Shortest	100 µs
• Typical	0.8 ms
Typical computation time (REAL)	
• MUL, multiplier	5.5 µs
• PIC, PI controller	14.3 µs
• RGE, ramp generator	29,5 µs
Networking	Point-to-point
	USS
	PROFIBUS slave, optionally with CBP2

T400 technological module, installed in SIMOREG DC Master

Software

For many years now, SIMATIC control systems have been used to develop and implement closed-loop control, technological and motion control concepts and their testing on the target system using graphic engineering tools directly on the screen.

Only well-proven and standard SIMATIC tools are used to engineer and configure the applications:

STEP 7 with SIMATIC Manager and HW-Config
For project management and to engineer the hardware

Continuous Function Chart CFC
The graphic function chart editor to implement technological functions

Sequential Function Chart SFC (optional)
To combine CFC programs using a user-friendly and transparent configurable sequence control

Import-Export-Assistant IEA (optional)
The Import-Export-Assistant is a tool developed especially when sections of a plant are repeated. It shortens engineering effort because existing parts of a plant can be imported into he engineering system, and can be re-used for similar parts of the plant.
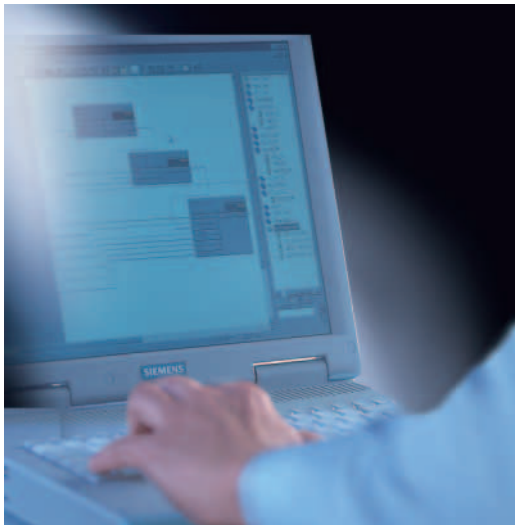
Function block library

The majority of specific functions for state-of-the-art machines are implemented with pre-configured CFC function blocks. These are included in the library of the supplementary D7-SYS package and are interconnected with one another in the CFC.

D7-SYS contains more than 300 function blocks which can be combined as required – from simple mathematical or logical operations up to complex functions to handle the complete Motion Control of axes.

A powerful code generator is also contained, which compiles the completed function charts into fast machine code.

These function blocks eliminate time-consuming programming work! The system is only configured.

Further, for special applications, dedicated function blocks can be programmed in C, and simply integrated into the application.

Motion Control Functions

Machines, especially in the production, packaging and printing areas require many drive-specific functions.
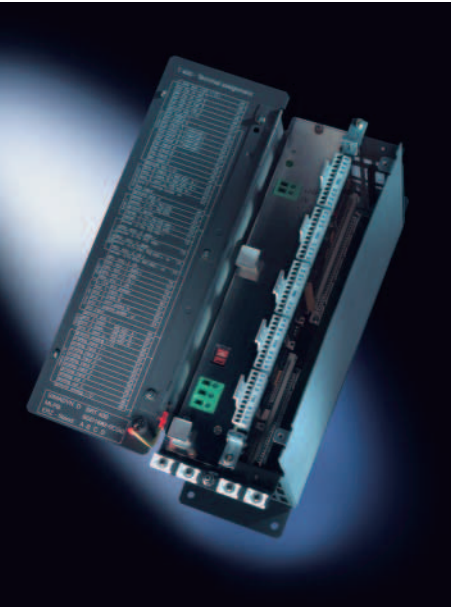
The D7-SYS library contains Motion Control blocks which have been especially designed for Motion Control tasks. These include, for example:

	Virtual master
	Catch-up/shutdown
	Gear synchronism
	Positioning
	Engaging/disengaging
	Cam control
	Traversing curves
	Cross-cutter/seamer
	Cam disks
	And many more

This means that even sophisticated Motion Control tasks can be implemented in a user-friendly fashion with SIMATIC without any programming work required.

An especially positive feature: An additional runtime license for each axis is not required.

T400
Technological Module

2

T400 Technological Module
Modules

2

Overview

The T400 technological module (Drive Based) handles technological tasks directly in the drive:

- The T400 technological module is inserted in the SIMOVERT MASTERDRIVES AC drive inverters and converters or in the SIMOREG DC-Master drive converters
- Using the SRT400 technological box, the T400 can also be used as standalone solution for other drives

Application

The T400 can be used in the electronics box when using the local bus adapter LBA:

- SIMOVERT MASTERDRIVES VC, MC Compact (not in the MC Compact PLUS!), and
- SIMOREG DC-Master 6RA70 or
- As standalone solution in the SRT400 technological box (an LBA is not required)

The T400 can also be used in the drive units and in the SRT400 together with the MASTERDRIVES communication modules. These include, for example, CBx as well as the ADB carrier module with the plug-in communication modules CBP2 (PROFIBUS DP), CBC (CAN), CBD (DeviceNet).

Design

Onboard I/O

- 2 analog outputs
- 5 analog inputs
- 2 digital outputs
- 8 digital inputs of which 4 digital inputs can be used to call interrupt tasks (50 µs response time)
- 4 bi-directional digital inputs or outputs
- 2 incremental encoder inputs with zero pulse
    - encoder 1 for HTL (15 V) encoder.
    - encoder 2 for HTL (15 V) or TTL/RS 422 encoder (5 V)
- 2 coarse pulse inputs can be used also as digital inputs
- Serial interface 1 with RS 232 and RS 485 data transfer format; selectable protocol:
    - service protocol for commissioning in the CFC test mode and program download
    - USS protocol, 2 wire, with selectable RS 232 or RS 485 data transfer format: Baud rates up to 38.4 kbit/s; can be configured as slave with parameters assigned by Drive Monitor
- Serial interface 2 with RS 485 data transfer format, selectable data transfer rates up to 38.4 kbit/s:
    - peer-to-peer, for fast process coupling (4 wire)
    - USS protocol, configurable as slave for parameterizing Drive Monitor (2 or 4 wire).
- 2 absolute value encoders with SSI or EnDat protocol (RS 485) for positioning applications

Note

- Serial interface 2 (peer, USS) or absolute value encoder 2 can be alternatively used.

Function

- Various ways of synchronizing to the sampling time permit short deadtimes:
    - Synchronizing the T400 to MASTERDRIVES (CUx, CBx) or a second T400
    - T400 generates synchronizing signals for MASTERDRIVES (CUx, CBx) or a second T400
- Only one serial interface can be operated with USS!

Information on the T400 with the ADB adapter board:

- It is not possible to use the SBx, SBRx encoder modules
- The EBx (terminal expansion) and SLB (SIMOLINK) modules are not supported

Engineering

Standard software packages which can be simply parameterized for

- Angular synchronism,
- Axial winders,
- Flying shears/cross-cutters

The following software tools are required to program the T400:

- If standard application software is already loaded: Assign parameters through Drive Monitor or PROFIBUS DP
- For free configuring or when using the source code of the standard application software: STEP 7, CFC, optionally SFC, D7-SYS

Benefits

The T400 is a technological module which can be graphically configured. This allows drives to be expanded by sophisticated open-loop and closed-loop control functions - and that at a reasonable cost.

As a result of the floating-point arithmetic, not only a high accuracy, but also simplified configuring as normalization and value range limits are eliminated.

Complex supplementary customer-specific functions can be very simply realized in the drives using the graphic STEP 7/CFC SIMATIC engineering tools.

Comparison of the T400 and the predecessor module T300	
T400	**T300**
Configured with STEP 7/CFC on a Windows PC (this is simple to learn; all help and documentation resources online)	Configured using STRUC G on a UNIX PC or STRUC L on a Windows PC
Typical sampling time 0.8 ms, optimally suitable for MASTERDRIVES MC	Typical sampling time, 4 ms
The program is downloaded over a serial link; the program memory cannot be removed!	Programmed via a SIMADYN D programming device; erased using a UV lamp; the program memory can be exchanged
All connections directly on the T400	Connections through a separate terminal module (SE58)
Can be used in the SRT400 technological box	-
USS slave to directly connect Drive Monitor (e.g. for use in the SRT400)	-
Two absolute value encoder connections for positioning applications	-
Upper and lower slot of the ADB carrier module can be used	Only the lower slot of the ADB carrier module can be used
High precision and simple configuring using floating-point numbers	Fixed-point numerical processing
Function blocks can be inserted online	–
Block groups can be switched-in and switched-out online	–

Technical specifications

T400 technological module

Processor	32 Bit RISC with FPU
Program memory (PC-Card)	2 Mbyte Flash
Program code loading	Through serial interface of PC (no plug-in memory module required)
Main memory (program/data)	4 Mbyte DRAM
Cache (Program/data)	4 Kbyte each
Permanent change memory	32 Kbyte NOVRAM
Memory retention at power failure	NOVRAM for approx. 30 configurable values (type real)
Sampling time, rigidly cyclic, for a closed control loop	
• Shortest	0.1 ms
• Typical	0.8 ms to 1.6 ms
Typical computation times (REAL)	
MUL, multiplier	5.5 µs
PIC, PI-controller	14.3 µs
RGE, ramp generator	29.5 µs
Networking	Point-to-point, USS, PROFIBUS slave, optionally with CBP2
Power supply/ typ. current consumption	+5 V ±5%: 1.1 A +15 V ±4%: 140 mA + max. 100 mA encoder current -15 V ±3%: 140 mA

Electrical isolation of the inputs/outputs	No
Space requirement	1 slot
Dimensions (W x H x D) in mm	14 x 267 x 140
Weight	0.3 kg
Analog outputs	
Number	2
Output range	±10 V
Short-circuit protection	Yes
Short-circuit current	±10 mA
Resolution	12 bit (4,88 mV)
Accuracy, absolute	± 3 bit
Linearity error	< 1 bit
Voltage rise time	4.2 V/µs
Delay time	3.5 µs
Analog inputs	
Number	2 differential inputs 3 unipolar inputs
Input range	±10 V
Measuring principle	Sampling
Conversion time	12 µs
Input resistance	20 kΩ
Input filter	3 dB transition frequency: 25 kHz

T400 Technological Module
Modules

2

Analog inputs (continued)	
Resolution	12 bit (4.88 mV)
Absolute accuracy	± 3 bit
Linearity error	< 1 bit
Digital outputs	
Number	2 + max. 4 (bi-directional)
External power supply voltage	
• Nominal value	24 V DC
• Permissible range	15 to 33 V DC
• Current drain	20 mA + output currents
Output voltage	
• For a 0 signal, max.	0.1 V
• For a 1 signal	Ext. power supply voltage – 0.3 V
Output current	Max. 50 mA/output
Overload protection	Yes (limited to 220 mA)
Switching frequency	
• Ohmic load	5 kHz
Max. switching delay (0 to 24 V)	70 µs
Digital inputs and coarse pulses:	
Quantity	8 + max. 4 (bidirectional) + max. 2 (coarse pulses)
Input voltage	
• Nominal voltage	24 V DC
• For a 0 signal	-1 to +6 V or open-circuit input
• For a 1 signal	+13 to +33 V
Input current	
• For a 0 signal	0 mA
• For a 1 signal	3 mA typ., 5 mA max.
Delay time	150 µs
Incremental encoder 1	
Encoder signal connection	Converter module (CUx) or T400/terminals 81-83
Signal voltage when connected to T400 (HTL, unipolar):	
• For a 0 signal	< 5 V
• For a 1 signal	> 8 V
Signal voltage when connected to a converter	As for the converter (see there); 5 V encoders are also possible
Input current, max.	8 mA
Max. pulse frequency	400 kHz (this depends on the cable length)
Input filter	This can be configured at the function block (NAV)

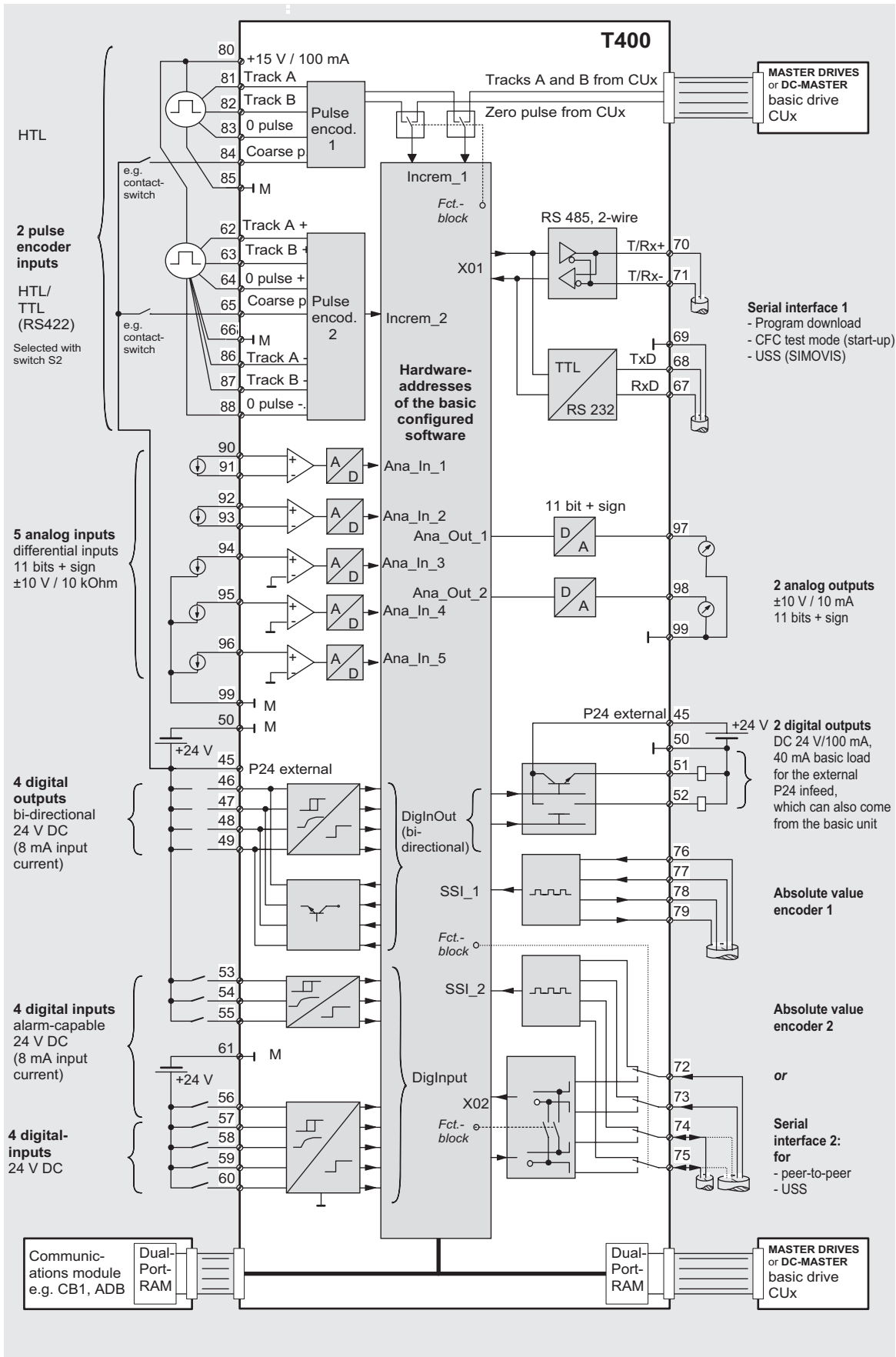| Incremental encoder 2	
Connecting the encoder signals	T400/terminals 62-64, 86-88
Signal voltages (nominal value)	5 V (TTL) or 15 V (HTL) unipolar or bipolar
Signal voltage for RS 422, bipolar:	
• For a 0 signal	< -0.2 V
• For a 1 signal	> 0.2 V
Signal voltage for TTL, unipolar (not typ.):	
• For a 0 signal	< 0.8 V
• For a 1 signal	> 2.3 V
Signal voltage at 15 V (HTL, bipolar):	
• For a 0 signal	- 30 V to 4 V
• For a 1 signal	8 to 30 V
Signal voltage at 15 V (HTL, unipolar):	
• For a 0 signal	< 4 V
• For a 1 signal	> 8 V
Input current, max.	2 mA
Max. pulse frequency	1.5 MHz (this depends on the cable length)
Input filter	This can be configured at the function block (NAV)
Absolute value encoder	
Quantity	Max. 2
Encoders which can be connected	Single- or multi-turn encoders with SSI (synchronous-serial) or with EnDat interface
Signal voltage	5 V according to RS 422
Data transfer rate	100 kHz up to 2 MHz
Data representation	Dual-, Gray-, Gray-Excess code

■ Connection diagram

T400

+15 V / 100 mA — 80
Track A — 81
Track B — 82
0 pulse — 83
Coarse p — 84
M — 85

HTL

Pulse encod. 1

Tracks A and B from CUx
Zero pulse from CUx

MASTER DRIVES or **DC-MASTER** basic drive CUx

e.g. contact-switch

2 pulse encoder inputs

HTL/ TTL (RS422)

Selected with switch S2

Track A + — 62
Track B + — 63
0 pulse + — 64
Coarse p — 65
M — 66
Track A - — 86
Track B - — 87
0 pulse -. — 88

Pulse encod. 2

e.g. contact-switch

Increm_1

Fct.-block

Increm_2

Hardware-addresses of the basic configured software

RS 485, 2-wire

X01

T/Rx+ — 70
T/Rx- — 71

Serial interface 1
- Program download
- CFC test mode (start-up)
- USS (SIMOVIS)

TTL
RS 232

TxD — 68
RxD — 67

69

5 analog inputs differential inputs 11 bits + sign ±10 V / 10 kOhm

90
91
A/D — Ana_In_1

92
93
A/D — Ana_In_2

94
A/D — Ana_In_3

95
A/D — Ana_In_4

96
A/D — Ana_In_5

11 bit + sign

Ana_Out_1
D/A — 97

Ana_Out_2
D/A — 98
99

2 analog outputs ±10 V / 10 mA 11 bits + sign

M — 99
M — 50

+24 V
45 — P24 external

4 digital outputs bi-directional 24 V DC (8 mA input current)

46
47
48
49

DigInOut (bi-directional)

P24 external — 45
50
51
52

+24 V

2 digital outputs DC 24 V/100 mA, 40 mA basic load for the external P24 infeed, which can also come from the basic unit

SSI_1

76
77
78
79

Absolute value encoder 1

Fct.-block

SSI_2

4 digital inputs alarm-capable 24 V DC (8 mA input current)

53
54
55

M — 61
+24 V

Absolute value encoder 2

or

DigInput

X02

Fct.-block

72
73
74
75

Serial interface 2: for
- peer-to-peer
- USS

4 digital-inputs 24 V DC

56
57
58
59
60

Communic-ations module e.g. CB1, ADB

Dual-Port-RAM

Dual-Port-RAM

MASTER DRIVES or **DC-MASTER** basic drive CUx

T400 Technological Module
Modules

2

■ **Selection and ordering data**

	Order No.
T400 technological module (incl. T400 brief description)	**6DD1 606-0AD0**
SC400 commissioning cable to connect a PC to the T400	**6DD1 684-0GF0**
LBA local bus adapter for MASTERDRIVES and SIMOREG DC-Master	**6SE7 090-0XX84-4HA0**
ADB adapter module	**6SE7 090-0XX84-0KA0**
CBP2 communications module for PROFIBUS DP and USS	**6SE7 090-0XX84-6FF5**
CBC communications module for CAN	**6SE7 090-0XX84-0FG0**

■ **Layout**
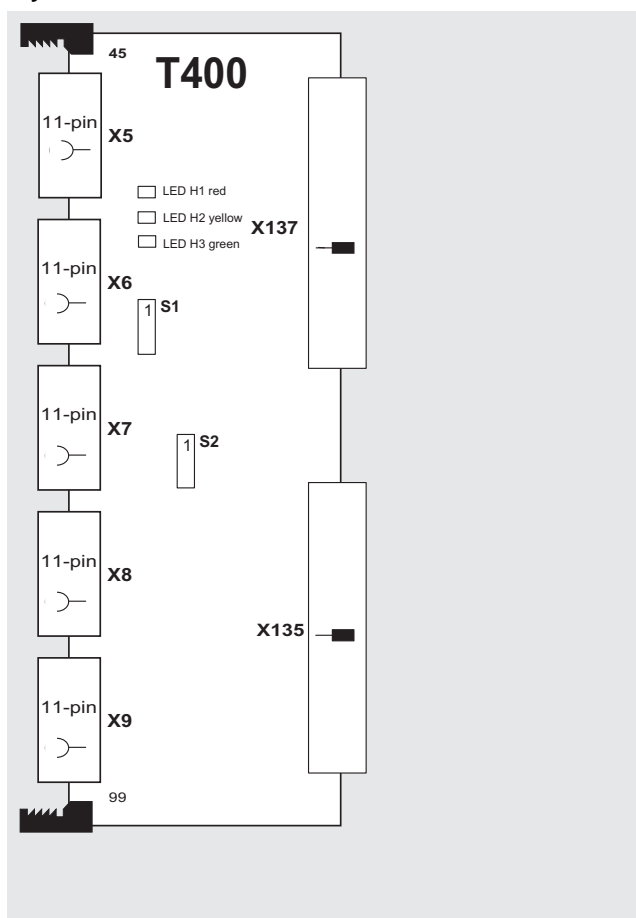
SRT400 Technological Box

Overview

Compact subrack for technologically orientated open-loop and closed-loop control tasks, e.g. for closed-loop controls for two up to four drives with a high dynamic response.

The SRT400 is comparable with the electronics box of SIMOVERT MASTERDRIVES.

The following can be inserted into the SRT400:

• Up to two T400 technological modules, or
• One T400 and one MASTERDRIVES communications module (e.g. CBx, ADB carrier module for CBP2 submodules (PROFIBUS DP), and CBC).

Benefits

It is possible to expand functions and modernize existing plants economically with the SRT400 technology box.

Application

The compact SRT400 Technology box with space for up to two T400 modules is especially suited for applications in which the T400 Technological module cannot be used for drives. The SRT400 Technology box is especially designed for small, cost sensitive stand-alone applications.

Design

• An enclosure which is closed and shielded on all sides
• A hinged front panel which can be swung to the left
• T400 terminal assignment is printed on the inside of the front door
• Strain relief for connecting cables

Function

• The drives can be controlled using analog or serial interfaces such as PROFIBUS DP, USS or peer-to-peer
• All of the synchronizing possibilities of the T400 can be used
• Integrated power supply for 115/230 V, 50/60 Hz with monitoring functions for the input and output voltages and 24 V DC output, for example for digital inputs/outputs
• Air self-cooling (no fan required)
• Monitoring LED for the power supply

Technical specifications

SRT400 technological box for T400	
Power drain for two T400 and max. 24V load	43 W at 115 V 54 W at 230 V
Power loss, typical (without modules)	7 W at 115 V 16 W at 230 V
Dimensions (W x H x D) in mm	90 x 291 x 175
Weight	2 kg
Input	
Input voltage	
• Nominal value	115 V/230 V AC
• Permissible range	± 15 %
Line supply frequency	
• Nominal value	50/60 Hz
• Permissible range	± 2.5 Hz
Line supply failure buffering	10 ms
Input current (nominal value)	
At 120 V AC	190 mA
At 230 V AC	140 mA to 320 mA (when the 24 V DC output is loaded)

Output	
Output voltages	
• +5 V	5.05 to 5.15 V
• +15 V	14.25 to 15.75 V
• -15 V	-14.25 to -15.75 V
• +24 V	20 to 30 V
Output currents	
• +5 V	3.0 A
• +15 V	0.5 A
• -15 V	0.5 A
• +24 V	0.6 A
Short-circuit protection	Yes
Electrical isolation	Yes

Selection and ordering data

	Order No.
SRT400 technological box	**6DD1 682-0CG0**
Compact subrack with power supply 115 V/230 V AC, 2 vacant slots	

T400 Technological Module
SRT400 Technological Box

SRT400 Technological Box

Dimension drawing
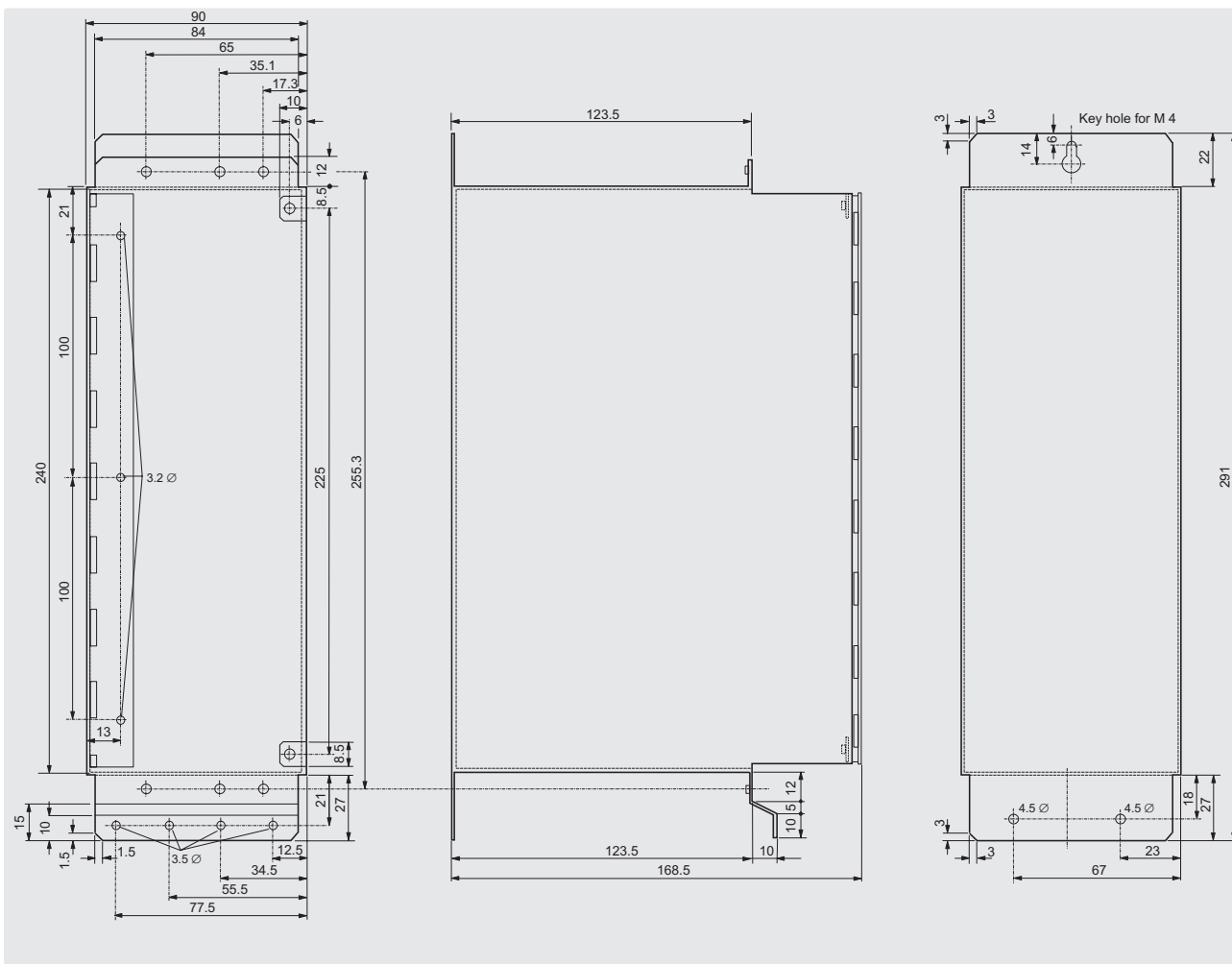
T400 Technological Module
Standard Software Packages

2

Overview

Standard software packages are available for the following applications:

- Axial winder
- Angular synchronism
- Cross-cutter/shears control

These standard software packages are configured using STEP 7/CFC. They have been especially conceived for distributed applications with the T400 technological module.

Benefits

The standard software package is loaded as an executable code on the T400 which contains the following advantages:

- Can be used immediately
- When commissioning, only a few parameters must be set depending on the specific application
- STEP 7/CFC is not required.

Applications

We recommend standard application software as CFC source code on CD-ROM, if:

- Application-specific changes have to be made, which are no longer possible using the integrated parameters
- A standard application software is frequently used.

Function

Using the source code, the functions of a T400 standard software package can also be ported to other processor modules. In this case, it is especially the closed-loop control-related core which can be used. Only the function blocks for the input, output and communication interfaces have to adapted.

SPW420 Axial Winder with T400

Overview

This standard software package is suitable for use in the following drive units:

- MASTERDRIVES VC/MC
- SIMOREG DC-Master

Application

- Foil manufacturing and finishing systems
- Paper machines
- Paper finishing machines
- Coating machines
- Textile machines
- All types of printing machines (foil, paper)
- Wire-drawing machines
- Coilers in metal processing (e.g. aligning machines, strip handling systems, etc.)
- The software package is suitable for winders and unwinders with and without flying roll change

Function

- Several closed-loop tension control methods, e.g. direct, indirect tension control, v = constant control
- A dancer roll or tension measuring transducer can be connected
- There are several techniques to calculate the diameter with "Set diameter" and "Hold", e.g. with/without incremental encoder or web tachometer
- The diameter value is saved when the power fails
- Tension and speed controllers are adapted depending on the diameter
- Friction equalization using a polygon characteristic, depending on the speed
- Inertia compensation depending on the diameter, material width and gearbox stage
- Ramp-function generator to ramp-up for a flying roll change followed by shutdown
- Pulse encoder can be connected for web velocity measurement

- The tension controller can either act on the speed controller or directly on the torque control
- Winding hardness control and characteristic
- Winder-related control (open-loop) with alarm and fault evaluation
- Jog, positioning and crawl
- Two motor potentiometers which can be freely used
- The drive can be shutdown softly without any overshoot using a braking characteristic
- Web break detection with automatic response
- Standstill detection
- Web length calculation
- Automatic measures against web sag

The documentation for these standard software packages can be downloaded from the Internet.

Selection and ordering data

	Order No.
Axial winder with T400 - SPW420 Standard software package, with documentation in German and English	**6DD1 842-0AA0**
Axial winder software on a CD, in German and English, runs under Win 95/98/ME, NT, 2000, in conjunction with STEP 7	**6DD1 843-0AA0**

T400 Technological Module
Standard Software Packages

Angular synchronous control with T400 - SPA440

2

Overview

The standard software package is suitable for use in the following drive units:
- MASTERDRIVES MC/SC/VC
- SIMOREG DC-Master

Application

- Replacing mechanical shafts, e.g. on gantry traversing units, loading and unloading machines for furnaces/ovens or weaving machines
- Replacing gearboxes with fixed or variable ratios, e.g. changeover gearboxes used at transfer locations on conveyor belts or at the transition from one machine section to the other as is used for packaging machines, book binding machines
- Angular synchronism, also when two machine parts intermesh with one another, e.g. when finishing (clothing) materials. It can also be used for printing or folding paper bags, round material etc.

Function

- Angular synchronism with a ratio which can be set within wide limits
- The offset angle between the drives can be set depending on coarse and fine pulse marks for angular detection (synchronizing)
- Synchronizing signals can be obtained from proximity switches (e.g. BEROs) or from pulse encoders (zero pulse)
- Angular reference point can be changed via a setpoint
- Reverse motion inhibit
- Overspeed and locked rotor protection
- Jogging
- Different offset angles can be entered for both directions of rotation (automatic changeover when the direction of rotation changes). This is required when synchronizing if the switching position of the fine pulse marks for clockwise and counter-clockwise rotation of the drive (or the machine part to which the drive is to be synchronized) are different and must be compensated. An additional example is a crane track where the fine pulse marks are on the flat surface.
- The angular controller is adapted corresponding to the ratio
- A setpoint can also be entered (speed setpoint) from a pulse encoder, for example, if there is no speed setpoint available via terminal or interface

The documentation for these standard software packages can be downloaded from the Internet.

Selection and ordering data

	Order No.
Synchronous angular control with T400 - SPA440 Standard software package, with documentation in German and English	**6DD1 842-0AB0**
Synchronous angular control software on a CD, in German and English, runs under Win 95/98/ME, NT, 2000, in conjunction with STEP 7	**6DD1 843-0AB0**

SPS450 Cross-cutters with T400

Overview

The SPS450 standard software package is suitable for use in the following drive units:

- MASTERDRIVES MC/SC/VC
- SIMOREG DC-Master

Application

- Flying saw/knife
- Rotational cross-cutter (drum-type shears)

Function

- Local operating modes:
  - Jogging 1/2
  - Calibrating
  - Approaching the start position
- Parameterizable angular ranges for synchronous operation
- Cutting mode types:
  - Single material cut
  - Cut to cut-off a defined length at the start of the material web
  - End cut to cut-off a defined length at the end of the material web
  - Continuous longitudinal cuts to chop or produce sheets
  - Test cut to cut a sheet
  - Cutting program where the number of cuts and cut length can be entered
- Referencing
- Fault monitoring
- Overspeed to adjust the lead
- Format change from cut to cut
- Soft traversing characteristics (sin/cos) to increase the cut accuracy and reduce the stressing on the mechanical system
- Format controller to optimize the cut accuracy
- Cutting characteristic to optimize the cutting velocity
- KP adaptation of the speed control to increase the cutting accuracy
- A variable moment of inertia can be compensated (oscillating torque), e.g. for oscillating shears
- Friction compensation
- Torque pre-control for acceleration
- Cutting torque input

The documentation for these standard software packages can be downloaded from the Internet.

Selection and ordering data

	Order No.
Cross-cutters with T400 - SPS450	**6DD1 842-0AD0**
Standard software package, with brief description and a documentation CD	

T400 Technological Module
Standard Software Packages

3

SIMATIC FM 458-1 DP

SIMATIC FM 458-1 DP
Basic Module

■ Overview

- Basic module for handling computing, open-loop control and closed-loop control tasks
- PROFIBUS DP interface for linking of distributed I/O and drive engineering
- Modular configuration with expansion modules for I/O and communication
- Max. ambient temperature 40 °C

■ Application

The FM 458-1 DP basic module handles complete closed-loop control and computing tasks. Very short sampling times down to 100 μs even enable the handling of dynamic control tasks.

- Normalization not required
- Practically unlimited value range
- Very high resolution

The shortest sampling times from 100 μs also allow dynamic closed-loop control tasks to be mastered. These include, for example, cross-cutter applications, hydraulic press control systems.

■ Design

- 64-bit RISC processor for the highest computational performance
- 8 fast digital inputs for signal level or edge-controlled call of up to 8 interrupt tasks (interrupts)
- PROFIBUS DP interface to couple distributed I/O (peripherals) and drive technology
- Battery-buffered SRAM with 256 Kbytes to save up to 1000 process quantities or recorded trace data in a non-volatile fashion

- A fan is required at ambient temperatures above 40 °C.

Expansion modules

Expansion modules are available for the FM 458-1 DP basic module for fast signal transmission.

EXM 438-1: I/O expansion

- Analog and digital inputs/outputs
- Incremental and absolute encoder connections

EXM 448: communication expansion

- PROFIBUS DP (master or slave), not equidistant or capable of internode communication; must be configured using COM PROFIBUS
- One slot for MASTERDRIVES option modules, e.g., for the
  - SIMOLINK module SLB (this is already integrated for the EXM 448-1)
  - high-resolution multi-turn encoder module SBM2
  - PROFIBUS DP slave module CBP2

The EXM 448 communication expansion is available unchanged for compatibility reasons and is configured using COM PROFIBUS.

EXM 448-2: communication expansion

- Communication through up to 2 SIMOLINK interfaces
- Scan-time synchronous coupling of several FM 458-1 DP

The expansion modules can only be used with the FM 458-1 DP, where max. two of these expansion modules can be combined.

Any number of these "FM 458-1 DP combinations" can be used in a SIMATIC S7-400 station taking into consideration the power consumptions.

Basic module FM 458-1 DP with expansion modules EXM 438-1 and EXM 448 (from the left)

■ Function

Communication

Data exchange with the assigned SIMATIC CPU (according to configuration in HW Config) is implemented via the backplane bus which has been designed for fast data exchange.

Startup and servicing using the online functions of STEP 7/CFC is carried out via the so-called C-bus on the S7-400 station.

It is then possible to start and diagnose the FM 458-1 DP e.g., via the central MPI connection of the SIMATIC CPU.

Communication with partners outside the S7-400 is preferably via the PROFIBUS DP interface present on the FM 458-1 DP basic module. This PROFIBUS DP interface offers the following properties:

FM 458-1 DP Basic Module

- Equidistance:
  The PROFIBUS DP cycle is always the same length. This PROFIBUS DP cycle can be used as the start event for one of the eight interrupts. This permits synchronization of the user program with the PROFIBUS DP cycle.
- Internode communication:
  The configured slaves can exchange data "directly" with one another without configuration in the FM 458-1 DP.
- Routing capability:
  The slaves connected to this PROFIBUS DP interface can be parameterized and diagnosed by means of the integrated C-bus function via any other interfaces on the S7-400 system (e.g., the MPI interface integrated on the SIMATIC CPU) providing this is supported by the slaves, e.g., with MASTER-DRIVES or DC-MASTER.
- Configuration using HW Config:
  The configuration software is already integrated in STEP 7 (not an additional tool).
- Isochrone mode
  The CPU, IO equipment and the user program run synchronously on the PROFIBUS cycle.

Accessories

- SB10, SB61, SU12 interface modules with SC64 cable (for digital inputs)
- Micro memory Cards (Program memory modules, required for operation)

■ Configuring

Configuring with CFC instead of programming

Configuring of the FM 458-1 DP is carried out using the well-known STEP 7 and CFC (Continuous Function Chart), optionally with SFC:

- The CFC test mode permits fast and graphically-supported startup and signal tracing during operation by means of:
  - Viewing and modification of values
  - Creation, modification and deletion of links between function blocks
  - Insertion or deletion of function blocks
- The application block generator D7-FB-Gen lets you create individual function blocks. These can also integrated into the CFC.

■ Technical specifications

FM 458-1 DP basic module	
Voltage/current supply (rated values)	+5 V: 2.3 A
Backup battery (of SIMATIC power supply)	3.4 V: 10 µA
PROFIBUS DP interface (connector X3)	Equidistant with linking to alarm tasks
	Internode communication capability
	Configuration with HW Config
Digital inputs (connector X2)	
Quantity	8 inputs, with interrupt capability
Galvanic isolation	No, only through optional interface module
Input voltage	
Rated value	24 V DC
• For "0" signal	-1 to +6 V or open-circuited input
• For "1" signal	+13 to +33 V
Input current	
• for "0" signal	0 mA
• For "1" signal, typ.	3 mA at 24 V
Delay time	20 µs
Real-time clock, resolution	0.1 ms
Space requirements/width	1 SIMATIC slot
Weight, approx.	0.8 kg

3

SIMATIC FM 458-1 DP
Basic Module

FM 458-1 DP Basic Module

▪ Selection and ordering data

	Order No.
FM 458-1 DP application module	**6DD1 607-0AA1**
Basic module for handling computing, open-loop control and closed-loop control tasks with PROFIBUS DP interface	
Micro memory card	
for FM 458-1 DP basic module	
• 2 MB	**6ES7 953-8LL11-0AA0**
• 4 MB	**6ES7 953-8LM11-0AA0**
FM 458-1 DP user guide	**6DD1 904-0AE1**
German/English	
SB10 interface module	**6DD1 681-0AE2**
to connect 8 digital inputs/outputs, 24 V DC, to FM 458-1 DP	
SB61 interface module	**6DD1 681-0EB3**
to connect 8 digital inputs/outputs, 24/48 V DC, to FM 458-1 DP	
SU12 interface module	**6DD1 681-0AJ1**
to connect 10 signals to an FM 458-1 DP	
SC64 interface cable	**6DD1 684-0GE0**
to connect an FM 458-1 to the serial interface of a PG/PC	
RS 485 bus connector with 90° outgoing feeder cable	
Max. transmission rate 12 Mbit/s	
• Without PG interface	**6ES7 972-0BA12-0XA0**
• With PG interface	**6ES7 972-0BB12-0XA0**
RS 485 bus connector with slanting outgoing feeder cable	
Max. transmission rate 12 Mbit/s	
• Without PG interface	**6ES7 972-0BA41-0XA0**
• With PG interface	**6ES7 972-0BB41-0XA0**
RS 485 bus connector with 90° outgoing feeder cable for Fast-Connect system	
Max. transmission rate 12 Mbit/s	
• Without PG interface	**6ES7 972-0BA50-0XA0**
• With PG interface	**6ES7 972-0BB50-0XA0**
PROFIBUS FastConnect bus cable	
Standard type with special design for quick assembly, 2-core, shielded, meter goods; max. consignment 1000 m, minimum order 20 m	**6XV1 830-0EH10**
Preferred lengths:	
• 20 m	**6XV1 830-0EN20**
• 50 m	**6XV1 830-0EN50**
• 100 m	**6XV1 830-0ET10**

▪ Connection diagram
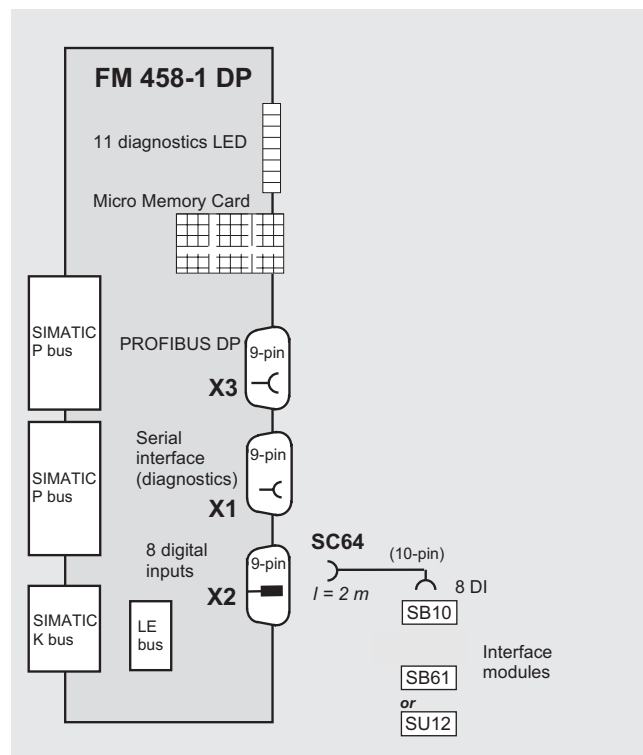
Overview

- Optional plug-in expansion module for the FM 458-1 DP basic module
- For input and output of time-critical signals
- With digital and analog inputs/outputs
- Incremental and absolute value encoders can be connected
- 4 high-resolution analog outputs
- Max. ambient temperature 40 °C

Benefits

The optional EXM 438-1 input/output expansion module permits direct exchange of signals between the FM 458-1 DP basic module and the installation.

The EXM 438-1 is able to record and convert the signals so rapidly that an up-to-date value is available for the FM 458-1 DP in every cycle (from 100 μs).

Design

- 5 analog inputs
- 4 analog outputs 12 bit
- 4 analog outputs 16 bit
- 16 digital inputs
- 8 digital outputs
- 8 incremental encoders, with synchronization capability
- 4 absolute encoders

A fan is required at ambient temperatures above 40 °C.

Accessories

- SU13 interface module with SC63 cable for all signals without signal conversion
- SB10, SB71, SU12 interface modules with SC62 cable for digital outputs
- SB61, SU12 interface modules with SC62 cable for digital inputs

Function

The EXM 438-1 is directly connected to the FM 458-1 DP basic module via the internal bus. This permits the FM 458-1 DP to access the I/O extremely rapidly. Only the power supply, but not the data transfer, is obtained from the backplane bus.

Access to the I/O of the EXM 438-1 is accomplished with configured function blocks.

Technical specifications

EXM 438-1	
Supply voltage	
Rated value	
• DC 5 V	Yes
• DC 24 V	Yes; must be externally connected
Current drain	
• Current drain, typ.	1.5 A
Digital inputs	
• Quantity	16
Input voltage	
• Rated voltage, DC	24 V
• For a 0 signal	-1 to +6 V or open-circuit input
• For a 1 signal	+13 to +33 V
Input current	
• For a 0 signal, max. (permissible idle current)	0 mA
• For a 1 signal, typ.	3 mA
Input delay (for rated input voltage)	
• for standard inputs	
- from 0 to 1, max.	200 μs
Digital outputs	
• Quantity	8
• Short-circuit protection	Yes; electronic/thermal
• Short-circuit protection, response threshold, typ.	250 mA
• Limiting of inductive switch-off voltages	Supply voltage + 1 V
Output voltage	
• Rated voltage (DC)	24 V; permissible range (including ripple): +20 to +30 V; briefly +35 V, max. 0.5 s
• for a 0 signal (DC), max.	3 V
• for a 1 signal (DC), max.	Supply voltage- 2.5 V
Output current	
• for a 0 signal, residual current, max.	20 μA
• for a 1 signal, rated value	50 mA
• for a 1 signal, permissible range for 0 up to 40 °C, min.	100 mA
• Total load	80 % at 50 °C all outputs 50 mA
Output delay time for an ohmic load	
• "0" up to "1", max.	15 μs

3

SIMATIC FM 458-1 DP
Expansion Modules

EXM 438-1 Input/Output Expansion

Analog inputs	
• Quantity	5; differential inputs
Input voltage range	
• -10 V to +10 V	Yes; -10 V ± 4 LSB to +10 V ± 4 LSB (1 LSB = 4.88 mV)
• Input resistance (-10 V to +10 V)	470 kΩ
Analog outputs	
• Quantity	8; 4 outputs 16 bit, 4 outputs 12 bit
• Voltage output, Short-circuit protection	Yes; with respect to ground
• Current output, Short-circuit protection, max	27 mA; 16 bit: 27 mA; 12 bit: 100 mA
Output voltage range	
• -10 to +10 V	Yes
Analog output values	
Integration and conversion time, resolution per channel	
• with boost range (bit , incl. sign), max.	16 bit; 4 AO: 16 bit, 4 AO: 12 bit, 5 AE: 12 bit
• Conversion time (per channel)	2 µs; 4 AO (16 bit): 2 µs; 4 AO (12 bit): 4 µs; 5 AE: 45 µs
Encoders	
• Number of encoders, max.	12; 8 incremental encoders (can be synchronized), 4 absolute value encoders
Connectable encoders	
• incremental encoder (symmetric)	Yes
• incremental encoder (asymmetric)	Yes
• Absolute value encoder (SSI)	Yes; Single- or multiturn encoder with SSI (synchronous serial) or EnDat interface
Absolute value encoder (SSI)	
• Signal voltage	5 V according to RS 422
• Data formats	Dual-, gray-, gray-excess code
• Data transfer rate, max.	2 MHz; 100 kHz to 2 MHz (this is dependent on the cable length)
Errors, accuracies	
• Linearity error (with respect to output range)	(± 1 LSB)
Isolation	
Analog outputs	
• Isolation analog outputs	No
Analog inputs	
• Isolation analog inputs	No
Digital outputs	
• Isolation digital outputs	No
Digital inputs	
• Isolation digital inputs	No
Dimensions and Weight	
Weight, approx.	1 kg
Space requirement	1 slot

Selection and ordering data

	Order No.
EXM 438-1 input/output expansion	**6DD1 607-0CA1**
for direct exchange of digital and analog signals between FM 458-1 DP and the plant	
FM 458-1 DP user guide	**6DD1 904-0AE1**
German/English	
SB10 interface module	**6DD1 681-0AE2**
to connect 8 digital inputs/outputs, 24 V DC, to FM 458-1 DP	
SB61 interface module	**6DD1 681-0EB3**
to connect 8 digital inputs/outputs, 24/48 V DC, to FM 458-1 DP	
SB71 interface module	**6DD1 681-0DH1**
to connect 8 digital outputs with transistors, 24/48 V DC	
SU12 interface module	**6DD1 681-0AJ1**
to connect 10 signals to an FM 458-1 DP	
SU13 interface module	**6DD1 681-0GK0**
to connect 50 signals to an FM 458-1 DP	
SC62 interface cable	**6DD1 684-0GC0**
to connect up to 5 interface modules SBxx and/or SU12, 2 m long	
SC63 interface cable	**6DD1 684-0GD0**
to connect an SU13 interface module, 2 m long	

Connection diagram

Overview

- Optional plug-in expansion module for the FM 458-1 DP basic module
- For fast communication via PROFIBUS DP or SIMOLINK
- EXM 448: with vacant slot for a MASTERDRIVES option module
- EXM 448-1: with installed MASTERDRIVES option module SLB for configuration of a SIMOLINK fiber-optic connection
- Max. ambient temperature 40 °C

Application

The optional EXM 448/EXM 448-1 communication expansion permits fast communication between the FM 458-1 DP basic module and drives, ET 200 stations or other components.

Design

EXM 448

- PROFIBUS DP interface (master or/and slave), not equidistant and not slave-to-slave communications-capable, to be configured with COM PROFIBUS
- Vacant slot for a MASTERDRIVES option module, e.g., for:
  - SLB for configuration of a SIMOLINK fiber-optic connection for very fast, synchronized connection of drives (MASTERDRIVES); operation as SIMOLINK master, dispatcher or slave (transceiver).
  - SBM2 for connection of a high-resolution multiturn encoder (sin/cos encoder)
  - CBP2 for PROFIBUS DP slave or USS
- A fan is required at ambient temperatures above 40 °C.

EXM 448-1:

- PROFIBUS DP interface (master or/and slave), not equidistant and not slave-to-slave communications-capable, to be configured with COM PROFIBUS
- Fitted MASTERDRIVES option module SLB in order to set up a SIMOLINK fiber-optic connection for very fast, synchronized connection of drives (MASTERDRIVES); operation as SIMOLINK master, dispatcher or slave (transceiver). See System and Communication Manual, Chapter 17, SIMOLINK Drive Interfacing.
- A fan is required at ambient temperatures above 40 °C.

Function

Mode of operation

The EXM 448/EXM 448-1 is directly connected to the FM 458-1 DP basic module via the internal bus. Only the power supply, but not the data transfer, is obtained from the backplane bus. Access to the EXM 448/EXM 448-1 is accomplished with configured function blocks.

Configuration

DP master programming with COM PROFIBUS

If an EXM 448 or an EXM 448-1 is to be used as a PROFIBUS DP master, the associated bus parameters must be calculated using the COM PROFIBUS PC program and transferred to the EXM 448/EXM 448-1.

When used as a DP slave, no parameterization is required with COM PROFIBUS.

The bus parameters can be transferred to the EXM 448/EXM 448-1 expansion module via the following interfaces:

- Directly with a PROFIBUS cable for a PROFIBUS DP connection, e.g., using the CP 5511 (PCMCIA).
- Using the "SS52load" program via the RS 232 interface of the EXM 448/EXM 448-1; "SS52load" is included in COM PROFIBUS V3.1 or later.

Technical specifications

EXM 448, EXM 448-1 communications expansion module	6DD1 607-0EA0	6DD1 607-0EA1
Power supply voltage		
Rated voltage	DC 5 V	DC 5 V
Current drain, typ.	0.6 A	0.8 A
Dimensions and Weight		
Weight, approx.	0.8 kg	0.9 kg
Space requirement	1 slot	1 slot

SIMATIC FM 458-1 DP
Expansion Modules

EXM 448, EXM 448-1 Universal Communication Expansion

■ **Selection and ordering data**

	Order No.
EXM 448 universal communications expansion module for fast communication, e.g. with drives; with vacant slot for MASTERDRIVES option module	**6DD1 607-0EA0**
EXM 448-1 universal communications expansion module for fast communication, e.g. with drives; with MASTERDRIVES option module SLB for designing a SIMOLINK fiber-optic connection	**6DD1 607-0EA1**
COM PROFIBUS V5.1 parameter assignment software for parameterization of PROFIBUS networks for Windows 95/98/NT/2000/Me on CD-ROM, in 5 languages, incl. documentation	**6ES5 895-6SE03**
FM 458-1 DP user guide German/English	**6DD1 904-0AE1**

■ **Connection diagram**
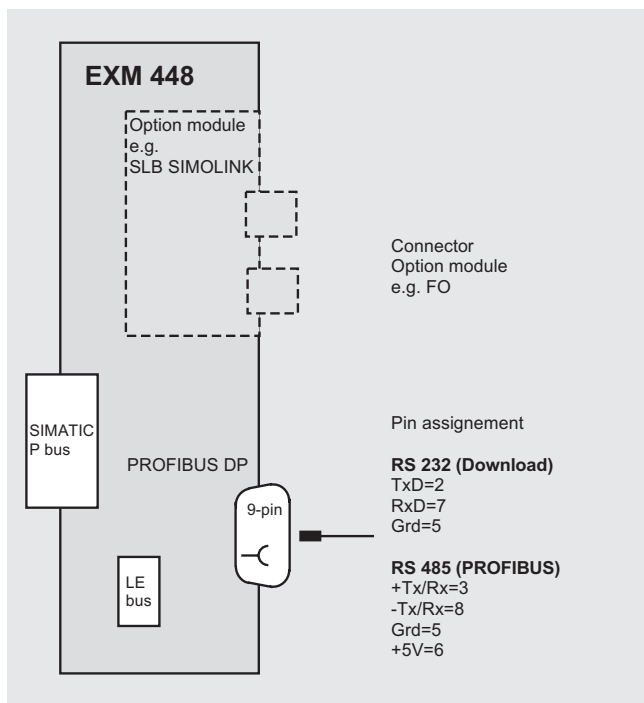
Overview

- Optional plug-in expansion module for the FM 458-1 DP basic module
- For fast communication over up to 2 SIMOLINK interfaces
- For coupling several FM 458-1 DP application modules in synchronism with the sampling time

Application

The optional communications expansion EXM 448-2 supports high-speed communication of the FM 458-1 DP-basic module with drives on the basis of the SIMOLINK protocol.

Design

- 2 SIMOLINK interfaces (master and/or slave) for connecting drive units (MASTERDRIVES) quickly and synchronized; operation as SIMOLINK master, dispatcher or slave (transceiver).
- ·Vacant slot for a MASTERDRIVES option module, e.g., for:
  - SBM2 for connection of a high-resolution multiturn encoder (sin/cos encoder)
  - CBP2 for PROFIBUS DP slave

Function

Mode of operation

Coupling to FM 458-1 DP

The EXM 448-2 is directly connected to the FM 458-1 DP basic module via the internal bus. Only the power supply, but not the data transfer, is obtained from the backplane bus. Access to the I/O is by means of configured function blocks..

Configuration

Configuring with CFC instead of programming

Configuring of the FM 458-1 DP is carried out using the well-known STEP 7 and CFC (Continuous Function Chart) software tools which are also used for programming the SIMATIC S7-400.

CFC is an object-oriented and intuitively applied Windows program which is simple to learn. The D7-SYS add-on software package expands the CFC by the function blocks and the optimized operating system. Data is exchanged with the connected drives using the SIMOLINK function blocks contained in D7-SYS.

For further details about D7-SYS, see page 7/4.

Technical specifications

EXM 448-2 universal communications expansion module	6DD1 607-0EA2
Power supply voltage	
• Rated voltage	DC 5 V
• Current, typ.	0.6 A
Weight, approx.	0.9 kg
Space requirement	1 slot

Selection and ordering data

	Order No.
EXM 448-2 universal communications expansion module	6DD1 607-0EA2
For fast communication with drives; for constructing two SIMOLINK fiber-optic connections	
Can be delivered as of November 2004	
FM 458-1 DP User guide	6DD1 904-0AE1
German/English	

Connection diagram
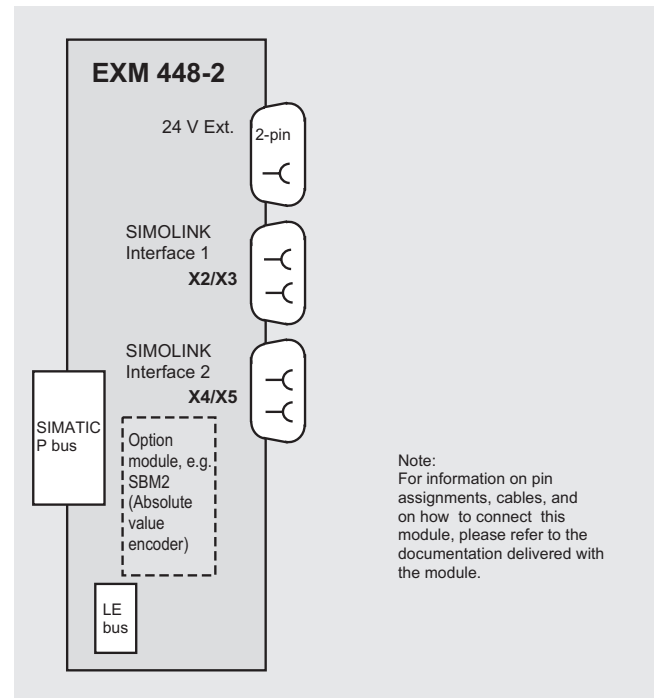
SIMATIC FM 458-1 DP
Expansion Modules

3

SIMATIC TDC

4

SIMATIC TDC
Introduction

■ Overview

SIMATIC TDC (Technology and Drives Control) is a digital control system which distinguishes itself by its high computational/arithmetic performance and the fact that it can process extensive, complex programs.

An extensive library with about 300 pre-configured function blocks is available for fast engineering.

■ Benefits

- SIMATIC TDC provides the highest degree of competence when it comes to motion control and closed-loop control technology.
- SIMATIC TDC especially distinguishes itself as an effective, synchronizable multi-processing system.

■ Application

SIMATIC TDC is used in plant construction, rolling mills and iron plants, as well as in energy distribution facilities.

■ Design

The system is of a modular design and can, depending on the particular application, be equipped with the necessary computational/arithmetic performance as well as digital, analog, incremental and absolute value encoder connections or communication interfaces.

All of the modules in the SIMATIC TDC subracks are connected through a high-performance 64-bit backplane bus. This allows data to be exchanged between all of the modules, almost in the processor clock cycle.

■ Function

Can be freely graphically configured

SIMATIC TDC is configured/ engineered using the windows-based STEP 7 and CFC graphic SIMATIC engineering tools. The D7-SYS software package supplements the CFC engineering tool by the function blocks for SIMATIC TDC as well as the high-performance operating system.

GlobalDataMemory

For complex automation tasks, it may be necessary to exchange data between CPUs accommodated in several subracks. For this reason, a GlobalDataMemory (GDM) can be used as central memory for a coupling involving a maximum of 44 subracks.

Data can be exchanged between all of the CPU modules in the system, across all of the networked subracks, through this memory. This means that over 800 CPU modules can be used in one system.

GDM comprises a subrack in which only GDM modules are inserted. This means that the subrack can be operated in a special fast mode.

Service and commissioning

The system is serviced and commissioned directly from the graphic engineering/configuring interface of STEP 7 and CFC. In this case, an MPI connection is used, to access all of the CPU modules in the subrack.

Alternatively, a CPU module can be addressed through a serial link (RS 232). In this case, access is restricted to the CPU module whose service interface is presently being used.

Programs from other processor modules

CFC charts for the CPU modules PM5, PM6, for the FM 458-1 DP application module or for the T400 technological module can be extremely simply transferred to the CPU modules of the SIMATIC TDC automation system.

■ Integration

Drives and distributed peripherals (e.g. I/O) are connected to SIMATIC TDC using PROFIBUS DP interfaces with master and/or slave function.

Several SIMATIC stations as well as third-party systems and host computers can be connected using a TCP/IP interface for up to 100 Mbit/s. This interface can also be used to connect visualization components, e.g. WinCC.

All of the visualization components of SIMATIC HMI, for example, WinCC or operator devices OP/TD are connected through MPI (Multi-Point Interface).

4

UR5213 Subrack

Overview

The UR5213 subrack, as basis for SIMATIC TDC, has an integrated system power supply and system fan. Fast data exchange is possible using a high-performance 64-bit backplane bus.

Design

- Enclosed enclosure which is EMC shielded
- 21 slots
- Battery compartment for back-up batteries (2 x 1.5 V Mignon, AA)
- Fan with fan monitoring
- Power supply with 3x fan and line switch which can be plugged-in and removed from the front
- 3 status LEDs
- 3 floating fault signaling relays
- High-performance 64-bit backplane bus for fast data exchange between the various modules
- Handles are available so that the module can be easily inserted and removed

Technical specifications

Input voltage range	95 – 255 V ~, 47 – 63 Hz
Power failure buffering	Min. 15 ms
Dimensions (W x H x D) in mm	482.6 x 354.9 x 342
Weight, approx.	20 kg
Degree of protection	IP20
Rated input current	Typ. < 10 A
Inrush current max.	16 A
Recommended fuse/protection	• Miniature circuit-breaker: 16 A (type B) • Fuse: Slow-acting 16 A
Max. switching voltage of the fault signaling relay	230 V AC
Output voltages	+ 3.3 V 60 A + 5 V 30 A + 12 V 8 A – 12 V 8 A
Operating temperature range	0 °C to + 55 °C
Storage temperature range	-40 °C to + 70 °C

Selection and ordering data

	Order No.
UR5213 subrack	**6DD1 682-0CH0**
UR5213 subrack spare-part compatible successor to 6DD1 682-0CH0, can be delivered as of 04/2005	**6DD1 682-0CH2**
Spare part: **PS5213 power supply** for 6DD1 682-0CH0, with system fan	**6DD1 683-0CH0**

4

SR51 Slot Cover

Overview
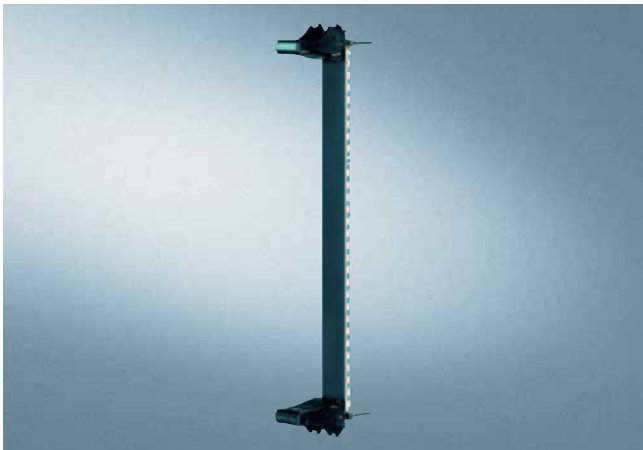
The SR51 slot cover is used to cover subrack slots which are not used.

This is required in order to ensure the correct cooling and EMC properties of the system.

Selection and ordering data

	Order No.
SR51 slot cover covers vacant slots in the subrack	**6DD1 682-0DA1**

SIMATIC TDC
Modules

CPU551 Processor Module

■ Overview
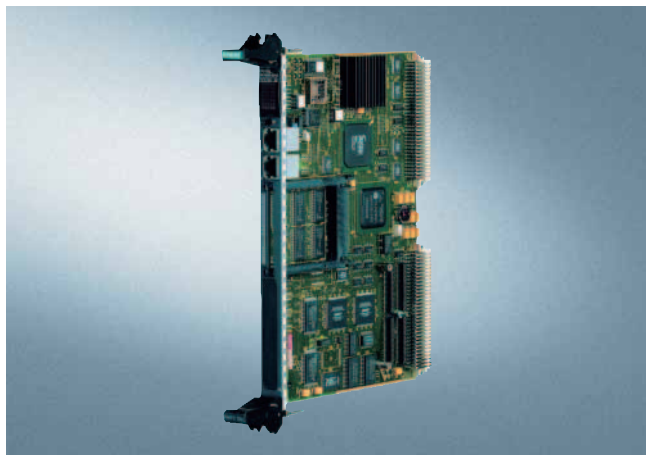
High-performance CPU module for open and closed-loop control and arithmetic tasks.

■ Benefits

The CPU551 module attains approximately 3 times the arithmetic performance of the PM6 module

■ Design

The CPU551 features a slot for the MC5xx program memory module:

- Program memory module MC500 (4 Mbyte) with 8 Kbyte memory (EEPROM)
- Program memory module MC510 (8 Mbyte) with 8 Kbyte memory (EEPROM)
- Program memory module MC521 (2 Mbyte) with 8 Kbyte memory (EEPROM)

■ Technical specifications

Space requirement/width	1 slot
Weight	0.6 kg
Display	5 x 7 LEDs
Interface for local service	Serial RS 232
Sampling times	from 100 µs
SDRAM	32 Mbyte
Synchronous cache	2 Mbyte
Clock cycle	266 MHz
CPU	64 bit RISC CPU with Floating Point Unit
SRAM	256 Kbyte battery-buffered
Power supply	
Voltage/current supply (at 25°C)	+ 3.3 V typ. 2.0 A + 5 V typ. 1.5 A + 12 V typ. 0.04 A − 12 V typ. 0.04 A
Back-up battery	3.0 V typ. 2.2 µA
Power loss, typ.	15 W
Space requirement/width	1 slot
Weight	0.6 kg

Digital inputs

Quantity	8 inputs of which 4 are interrupt-capable
Electrical isolation	Only by optional interface modules
Input voltage	
• Rated voltage	24 V
• For a 0 signal	-1 V to +6 V
• For a 1 signal	+13.5 V to +33 V
Input current	
• For a 0 signal	0 mA
• For a 1 signal	3 mA
Delay time	0.1 ms
Real time clock, resolution	0.1 ms

■ Selection and ordering data

	Order No.
CPU551 processor module	**6DD1 600-0BA1**
MC500 memory module 4 Mbyte	**6DD1 610-0AH4**
MC510 memory module 8 Mbyte	**6DD1 610-0AH6**
MC521 memory module 2 Mbyte	**6DD1 610-0AH3**
SB10 interface module to connect 8 digital inputs/outputs, 24 V DC, to FM 458-1 DP	**6DD1 681-0AE2**
SB60 interface module to connect 8 digital inputs, 115/230 V AC/DC, to FM 458-1 DP	**6DD1 681-0AF4**
SB61 interface module to connect 8 digital inputs/outputs, 24/48 V DC, to FM 458-1 DP	**6DD1 681-0EB3**
SU12 interface module to connect 10 signals to an FM 458-1 DP	**6DD1 681-0AJ1**
SC66 interface cable between the CPU551 and the SB10, SB60, SB61 or SU12 interface module, 2 m long	**6DD1 684-0GG0**
SC67 service cable between CPU551 and PG/PC, 7 m long	**6DD1 684-0GH0**

4

■ Connection diagram
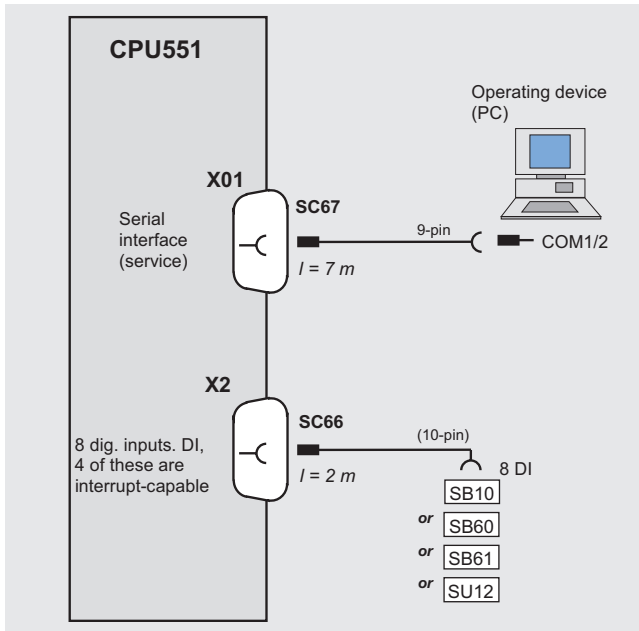
SIMATIC TDC
Modules

SM500 I/O Module

■ **Overview**
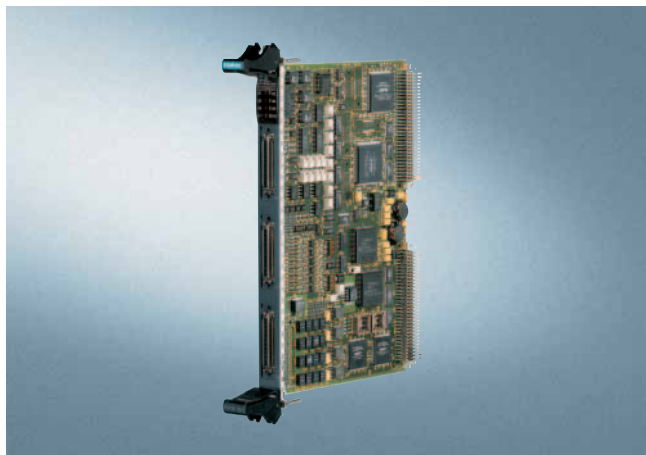
The SM500 I/O module provides analog and digital inputs/outputs as well as incremental and absolute value encoder connections.

■ **Function**

- 8 analog outputs
- 8 analog inputs
- 4 integrating analog inputs
- 16 digital outputs
- 16 digital inputs
- 6 LED for status displays
- 4 incremental encoder inputs
- 4 absolute value encoder inputs

The signals are not connected to the I/O modules directly. The following interface modules, which are available as accessories, are used for transmitting the signals:

- SU13 interface module with SC63 for all signals (without signal conversion, no electrical isolation)
- SB10, SB70, SB71, SU12 interface modules with SC62 cable for digital outputs (with electrical isolation)
- SB10, SB60, SB61, SU12 interface modules with SC62 cable for digital inputs (with electrical isolation)

■ **Technical specifications**

Power Supply	
Voltage/current supply (at 25 °C)	+ 5 V typ. 1.0 A + 3.3 V typ. 0.05 A + 12 V typ. 0.3 A – 12 V typ. 0.3 A
Power loss, typical	12.5 W
Space requirement/width	1 slot
Weight	0.7 kg
Digital outputs	
Quantity	8
Version	Outputs with associated ground
Electrical isolation	No
Output voltage range	–10 V to +10 V
Output current	± 10 mA
Resolution	12 bit
Typical conversion time per channel	4 µs
Accuracy	
• Max. differential linearity error	± 1 LSB (monotony guaranteed)
• Max. gain error	± 0.3 %
• Max. offset error	± 24 LSB
Slew rate	Approx. 3.5 V/µs
Voltage output	
• Short-circuit protection to ground	Yes
• Short-circuit current	Approx. 100 mA
Analog inputs	
Quantity	8
Version	Differential inputs
Electrical isolation	No
Input voltage range	–10 V to +10 V
Resolution	12 bit
Max. conversion time per channel	Approx. 20 µs
Accuracy	
• Max. differential linearity error	± 1 LSB (no missing code)
• Max. gain error	± 0.3 %
• Max. offset error	± 5 LSB

Input resistance	20 kΩ
Input filter	34 kHz
Incorrect polarity protection	Yes, as differential inputs are used
Integrating analog inputs (V/Hz)	
Quantity	4
Version	Differential inputs
Electrical isolation	No
Input voltage range	–10 V to +10 V
Resolution	Dependent on the integration time, e.g. 15 bits for a 4 ms integration time
Max. integration time per channel	Can be configured
Accuracy	
• Max. differential linearity error	0.05 %
• Max. gain error	1 %
• Max. offset error	± 2 LSB (software calibration)
Input resistance	470 kΩ
Input filter	2 kHz
Incorrect polarity protection	Yes, as differential inputs are used
Digital outputs	
Quantity	16
Electrical isolation	Only by using the optional interface modules
External power supply	
• Rated voltage	24 V
• Permissible range	20 to 30
• Briefly	35 V, for max. 0.5 s
• Max. current drain without load	40 mA
Output voltage range	
• For a 0 signal, max.	3 V
• For a 1 signal, min.	Ext. power supply voltage, –2.5 V
Output current	
• For a 0 signal, min.	- 20 µA
• For a 1 signal	
- rated value	50 mA
- permissible range, max.	100 mA

4

■ Technical specifications (continued)

Delay time	100 µs
Max. switching frequency of the outputs for an ohmic load	6 kHz
Short-circuit protection to	
• Ground	Yes
• Ext. power supply	No
Max. short-circuit current	250 mA
Summed current of the outputs (to 60 °C)	16 x 50 mA
Limiting of inductive switch-off voltages	External power supply voltage +1 V
Digital inputs	
Quantity	16
Electrical isolation	Only by using the optional interface modules
Input voltage	
• Rated voltage	24 V
• For a 0 signal	-1 V to +6 V
• For a 1 signal	+13.5 V to +33 V
Input current	
• For a 0 signal	0 mA
• For a 1 signal	3 mA
Delay time	100 µs

Incremental encoders		
Quantity	4	
Types which can be connected	Incremental encoder with tracks offset through 90° degrees	Incremental encoder with forward and reverse tracks
Version	Differential inputs, can be changed-over between 15 V (HTL) and 5 V (TTL) encoder signals	
Track signals	Track A, B with or without zero pulse	Forward or reverse track
Min. phase difference of the track signals	200 ns	
Max. pulse frequency (track frequency)	1 MHz	2.5 MHz
Input voltage		
• 15 V encoders		
- permissible range	- 30 V to + 30 V	
- for a 0 signal	- 30 V to + 4 V	
- for a 1 signal	+ 8 V to + 30 V	
• 5 V encoders		
- permissible range	- 7 V to + 7 V	
- for a 0 signal	- 7 V to - 0,7 V	
- for a 1 signal	+1.5 V to + 7 V	
Input current		
• For 15 V encoders (typ., absolute)	5.0 mA	
• For 5 V encoders (typ., absolute)	1.5 mA	
Monitoring output	Not available	
Monitoring input	Specifications the same as for the digital input	

Interrupt reset output	
• Short-circuit protection to ground	Yes
- ext. power supply	No
- max. short-circuit current	20 mA
Interrupt input	
• Input voltage (permissible range)	0 V to 5 V
- 0 signal, max.	< 0.5 V
- 1 signal, min.	> 2.0 V
• Input current	
- 0 signal	- 2.8 mA
- 1 signal	1.6 mA
Power supply voltage for encoders	
Quantity	1
Electrical isolation	No
Typical output voltage	13.5 V
Max. output current	150 mA, short-circuit proof to ground, short-circuit current, approx. 250 mA
Absolute value encoder inputs	
Quantity	4
Version	Differential inputs, RS 485 signal level
Types which can be connected	Single or multi-turn encoders
Protocols	SSI, EnDat
Data formats	Gray, binary
Data direction	
• Uni-directional	SSI
• Bi-directional	EnDat
Data bits	SSI: 13+parity, 25+parity EnDat: variable
Max. pulse frequency	2 MHz, dependant on the cable length
Input voltage	
• Permissible range	RS 485 signal level

4

SIMATIC TDC
Modules

SM500 I/O Module

■ Selection and ordering data

	Order No.
SM500 I/O module	**6DD1 661-0AE1**
SB10 interface module	**6DD1 681-0AE2**
to connect 8 digital inputs/out-puts, 24 V DC, to FM 458-1 DP	
SB60 interface module	**6DD1 681-0AF4**
to connect 8 digital inputs, 115/230 V AC/DC, to FM 458-1 DP	
SB61 interface module	**6DD1 681-0EB3**
to connect 8 digital inputs/out-puts, 24/48 V DC, to FM 458-1 DP	
SB70 interface module	**6DD1 681-0AG2**
8 digital outputs with relay	
SB71 interface module	**6DD1 681-0DH1**
8 digital outputs with transistors, 24/48 V DC	
SU12 interface module	**6DD1 681-0AJ1**
to connect 10 signals to an FM 458-1 DP	
SU13 interface module	**6DD1 681-0GK0**
to connect 50 signals to an FM 458-1 DP	
SC62 interface cable	**6DD1 684-0GC0**
to connect up to 5 interface mod-ules SBxx and/or SU12, 2 m long	
SC63 interface cable	**6DD1 684-0GD0**
to connect an SU13 interface module, 2 m long	

■ Connection diagram

CP50M0 Communication Module

Overview

The CP50M0 communication module provides two PROFIBUS DP/MPI interfaces and a buffer memory for communications between the CPUs. The interfaces can be used as PROFIBUS DP master, slave, as master and slave simultaneously or as MPI node.

Function

Functions of MPI interfaces

- Up to 2 MPI interfaces:
  - PG/OP utilities can be used
  - status display by LEDs

The visualization components of SIMATIC HMI, for example, WinCC or other HMI devices can be connected through MPI. The configuring workstation with CFC in the test mode can be coupled through this MPI interface.

For MPI, the PG and OP utilities, i.e. service, commissioning and visualization are supported. However, general process data transfer is not supported.

Functions of PROFIBUS DP interfaces

- Up to 2 PROFIBUS DP interfaces:
  - maximum data transfer rate, 12 Mbit/s
  - multi-master capable
  - up to 244 bytes of net data per node (station)
  - SYNC and FREEZE
  - shared input (reading)
  - can also be used as slave
  - database is generated using COM PROFIBUS
  - the database is downloaded through PROFIBUS cable or serial interface
  - status display using LEDs

For PROFIBUS DP, in addition, the functions SYNC and FREEZE as well as shared input (being able to read data from/to another master) are supported.

DP master programming using COM PROFIBUS

If the CP50M0 is to act as PROFIBUS DP master, then the associated bus parameters must be computed using the COM PROFIBUS PC program and then download into the CP50M0.

When used as DP slave, it is not required to parameterize the module using COM PROFIBUS.

The bus parameters can be downloaded into the CP50M0 through the following interfaces:

- For a PROFIBUS DP connection in the PC, directly through the PROFIBUS connector and cable; e.g. with CP5511 (PCMCIA).
- Using the program "SS52load" through the RS 232 interface of the CP50M0 communications module; SS52load is included in COM PROFIBUS from V3.1 onwards.

Technical specifications

Connector assignment of the PC − CP50M0 cable

CP50M0 (RS 232 interface)	PC 9-pin connector	PC 25-pin connector
2 (TxD)	2 (RxD)	3 (RxD)
7 (RxD)	3 (TxD)	2 (TxD)
1 (ground)	5 (ground)	7 (ground)

Power supply

Voltage/current supply	+ 5 V typical 1.0 A + 12 V typical 20 mA − 12 V typical 10 mA
Power loss, typical	5.5 W
Space requirement/width	1 slot
Weight	0.6 kg

Selection and ordering data

	Order No.
CP50M0 communication module with 8 MByte buffer memory, provides up to 2 MPI interfaces and up to 2 PROFIBUS DP interfaces	**6DD1 661-0AD0**

Connection diagram

CP50M0

X1

PROFIBUS DP

X2

PROFIBUS DP

Pin assignment

RS 232 (download)
TxD = 2
RxD = 7
Ground = 1

RS 485 (PROFIBUS)
+Tx/Rx-Sig. = 3
-Tx/Rx-Sig. = 8
Ground = 5

4
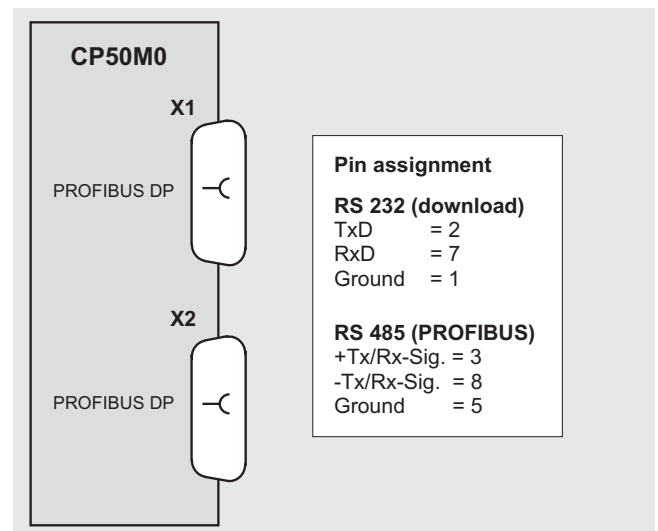
SIMATIC TDC
Modules

CP5100 Communication Module

■ **Overview**
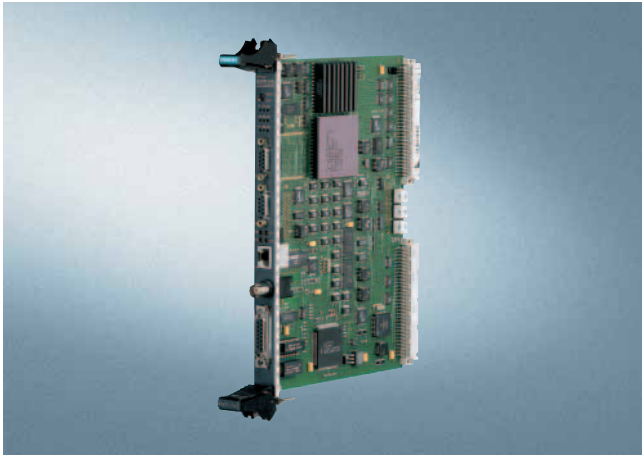
The CP5100 communications module provides an Industrial Ethernet interface.
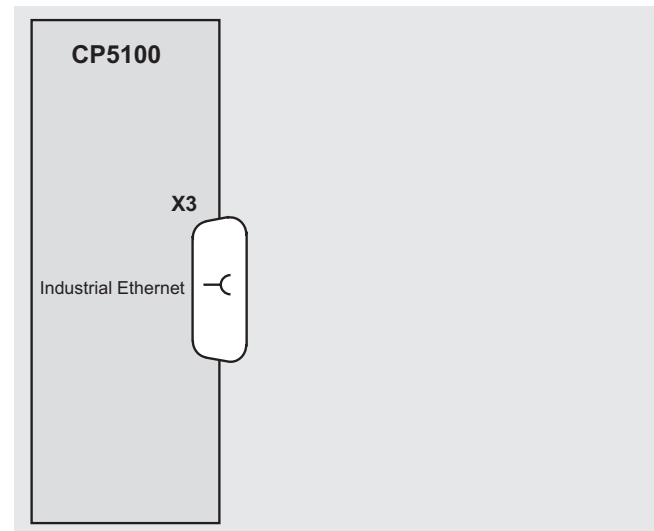
■ **Function**

The following tasks can be implemented through the CP5100:
- Process data can be exchanged with other CP5100 and Industrial Ethernet modules
- Process data and messages can be visualized with WinCC

■ **Technical specifications**

Space requirement/width	1 slot
Weight	0.6 kg
Industrial Ethernet connection	RJ45
Protocols	TCP/IP and/or UDP
Telegram lengths	also exceeding 2 Kbyte
Transmission modes	Refresh, handshake, multiple and select
Auto-sensing	for 10 Mbit or 100 Mbit networks
Default Router	can be set
Power supply	
Voltage/current supply (max. values)	+ 5 V 2.5 A + 12 V 100 mA − 12 V 100 mA
Power, loss, typ.	15 W

■ **Connection diagram**

■ **Selection and ordering data**

	Order No.
CP5100 communications module for Industrial Ethernet with TCP/IP and/or UDP	**6DD1 661-0AE0**

CP51M1 Communication Module

Overview
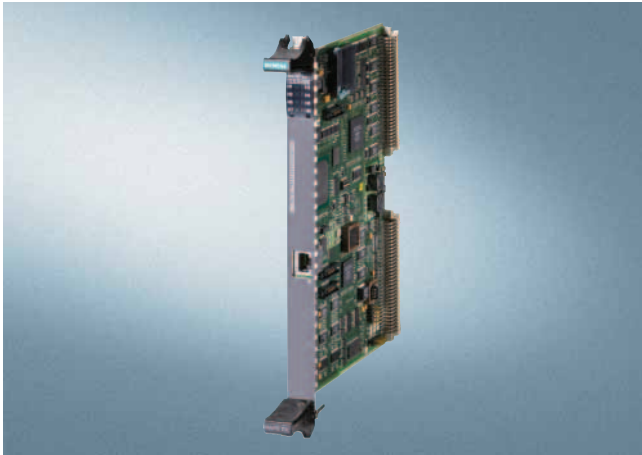
The CP51M1 communications module is an Industrial Ethernet interface for the SIMATIC TDC automation system.

Application

The CP51M1 communications module possesses the following areas of application:

- High-performance connection to other automation systems (e.g. SIMATIC S7) , especially when data quantities are high
- Transferring process variables, and messages for visualization purposes to SIMATIC HMI Systems, e.g. WinCC
- Plant-wide clock synchronization
- Configuring, commissioning and diagnostics with the SIMATIC engineering system

Design

The interface of this module is based on Industrial Ethernet TCP/IP and UDP.

The following application protocols are supported:

- PG-/OP communication for programming, commissioning and diagnostics through STEP 7/CFC/SFC
- PG-/OP communication for HMI interfacing
- Communication with other systems through TCP/IP or UDP

Function

The communication module CP51M1 is capable of performing the following functions:

- Exchange of process data with
  - other CP51M1
  - other SIMATIC Industrial Ethernet modules
  - PC-based host computers
- Configuring, commissioning and diagnostics of SIMATIC TDC with the SIMATIC engineering system
- Visualization of process data with WinCC (no additional software required on WinCC)
- Visualization of messages with WinCC (additional software required on WinCC)
- Clock synchronization with the standardized NTP protocol

Technical specifications

Space requirement/width	1 slot
Weight, approx.	
Connection for for Industrial Ethernet	RJ45
Protocols	TCP/IP and/or UDP
Telegram length	More than 2 KByte
Transmission modes	Refresh, handshake, multiple and select
Autosensing	For 10 MBit and 100 MBit networks
Default Router	adjustable
Power supply	[1]
• Voltage/current	[1]
• Power loss, typ.	[1]

1) Please look up the current technical data from the user documentation, which will be available when the module is deliverable.

Selection and ordering data

	Order No.
CP51M1 communication module	**6DD1 661-0AE1**
Can be delivered as of April 2005	

Connection diagram
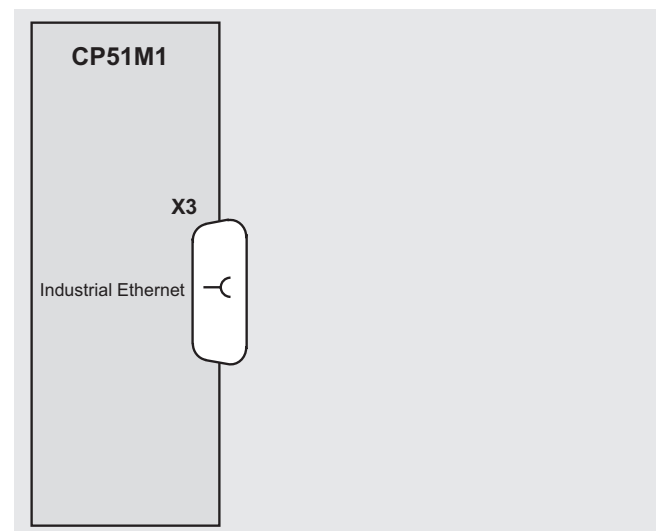
SIMATIC TDC
GlobalDataMemory

<div style="display:flex">
<div>

■ Overview
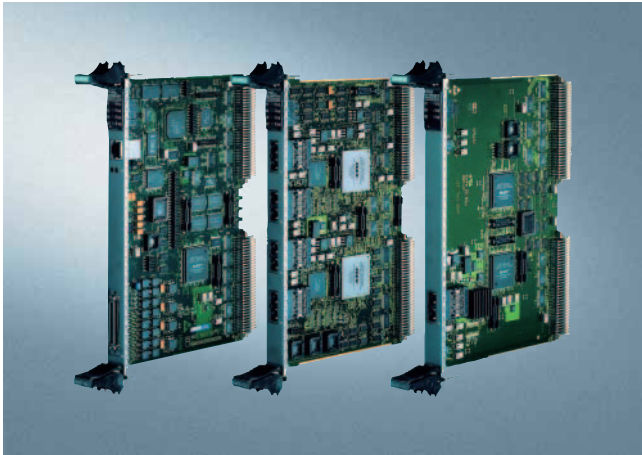
Data can be exchanged between all of the CPU modules in the system, over all of the networked subracks, using the memory in the GlobalDataMemory (GDM).

Up to 44 subracks can be coupled in synchronism through the central memory. This means that a maximum of 836 CPU modules can be used.

■ Design

A dedicated UR5213 (21 slots) is used for the GDM. The CP52M0 memory module (slot 1) and an appropriate number of CP52IO interface modules (slots 2 to 12) are specified for this.

An CP52A0 access module is required in every subrack which is coupled to the GDM.

The subracks are connected in a star topology to the GDM with glass fiber-optic cables.

■ Function

CP52M0 memory module

The 2 Mbyte central memory of the GDM system is located on the CP52M0 memory module. The complete data transfer and exchange between the processors in the coupled subracks is handled by this 2 Mbyte memory.

Data is exchanged between the CP52IO interface modules and the memory module along the backplane bus.

The CP52M0 reads-out from the fault and diagnostic registers of the CP52IO inserted in the GDM subrack at all of the fiber-optic cable interfaces. It centrally detects the operating status of all of the fiber-optic cable interfaces. The result is output at the digital outputs of the CP52M0 where the data can be further evaluated.

CP52IO interface module

The GDM access modules CP52A0 in the coupled subracks are connected to the GlobalDataMemory interface module CP52IO through fiber-optic cables. Up to 4 subracks can be connected to each CP52IO.

CP52A0 access module

The CP52A0 access module is configured in every subrack which is connected to the GDM.

Mixed operation

The CP52M0 and CP52IO GDM modules are operated in a special mode which is especially fast. It is not possible to use the GDM modules together with other SIMATIC TDC modules.

</div>
<div>

Fiber-optic cable

A duplex glass fiber-optic cable (62.5/125 µm core diameter) is used to establish the connection between the CP52IO interface modules and the CP52A0 access module. The maximum cable length is 200 m. A duplex SC connector is used to make the connection.
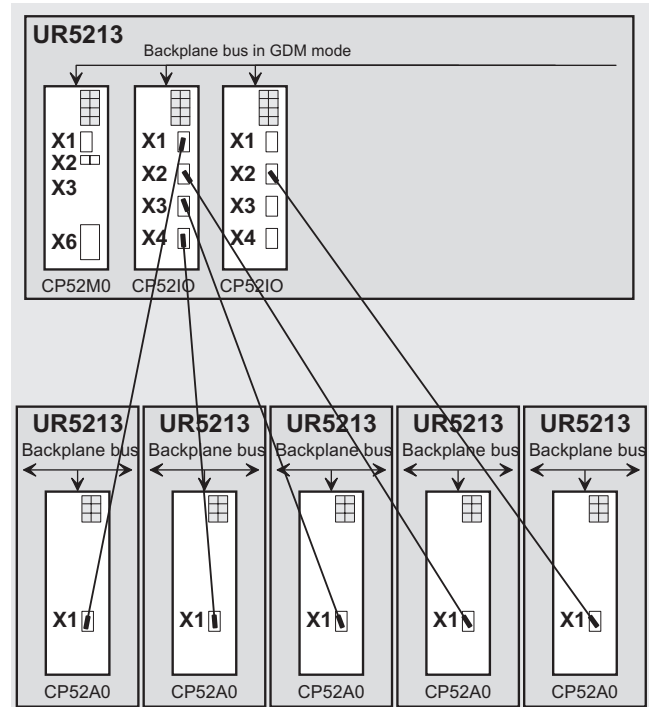
Example of GDM system with 5 subracks coupled by fiber-optic cables

</div>
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■ Technical specifications

CP52M0	
Power supply	
• Voltage/current supply (at 25 °C)	+ 5 V typ. 0.4 A + 3.3 V typ. 0.7 A + 12 V typ. 0.01 A – 12 V typ. 0.01 A
• Power loss, typical	4 5 W
Space requirement / width	1 slot
Weight	0.6 kg

Digital outputs	
Quantity	16
Electrical isolation	No
External power supply voltage	
• Rated value	24 V
• Permissible range	20 to 30
• Briefly	35 V, for max. 0.5 s
• Max. current drain (without load)	40 mA
Output voltage range	
• For a 0 signal, max.	3 V
• For a 1 signal min	External power supply -2.5 V
• Output current	
• For a 0 signal, min.	-20 µA
• For a 1 signal	
- Nominal value	50 mA
- Permissible range, max.	100 mA
Delay time	100 µs
Max. switching frequency of the outputs for an ohmic load	6 kHz
Short-circuit protection with respect to	
• Ground	Yes
• Ext. power supply	No
Max. short-circuit current	250 mA
Summed current of the outputs (up to 60 °C)	16 x 50 mA
Limiting, of inductive switch-off voltages	External power supply voltage + 1 V

CP52IO	
Power supply	
• Voltage/current supply (at 25 °C)	+ 5 V typ. 3 A + 3.3 V typ. 0.8 A
• Power loss, typical	18 W
Space requirement / width	1 slot
Weight	0.6 kg

CP52A0	
Power supply	
Voltage/current supply (at 25 °C)	+ 5 V typ. 1.5 A + 3.3 V typ. 0.4 A
Power loss, typical	9 W
Space requirement / width	1 slot
Weight	0.6 kg

■ Selection and ordering data

	Order No.
CP52M0 memory module with 2 Mbyte SRAM store	**6DD1 660-0BF4**
CP52IO interface module with 4 Interfaces	**6DD1 660-0BG0**
CP52A0 access module for GlobalDataMemory	**6DD1 660-0BH0**

4

SIMATIC TDC
GlobalDataMemory

4

SIMADYN D Control System

5

SIMADYN D Control System
Introduction

■ Overview

SIMADYN D is a well-proven subrack-based system (Rack Based), with a modular hardware and software design. This means that it can be configured for any type of application.

SIMADYN D distinguishes itself due to the various packaging types with subracks which are suitable for small extending up to high requirements. Not only this, but also the matching modules for closed-loop control, input/output and communications.

The subracks with up to 24 slots have two high-performance 16-bit backplane buses for fast data transfer between the individual modules.

■ Benefits

In addition to user-friendly engineering using graphic program techniques, users have all of the advantages of a system which has proven itself admirably in the widest range of applications, and that for over a decade now

Graphic engineering

For many years now, using SIMADYN D, control concepts have been developed, implemented and tested on the target system with the graphic STEP 7, and CFC engineering tools and, as an option, SFC - and that directly on the screen. These advantages have a positive impact in all of the phases of a project:

- Standard tools for engineering/configuring, testing, commissioning, service and maintenance as well as when making changes and expanding the functionality
- Configuring instead of programming: Suitable function blocks, e.g. for closed-loop control, arithmetic operations, input/output, communication or diagnostic tasks, are selected from a library and are located as graphic symbol directly on the "worksheet" on the screen. These function blocks are then interconnected using the mouse or are parameterized. A high-performance auto router immediately visualizes the signal flow which has been entered

- Complex tasks can be broken-down into transparent sub-tasks. This supports structured work and makes it easier to understand and even allows older concepts to be comprehended.
- An authentic print-out can be created from the configured hardware and software at the "press of a button".

The fact that automation tasks can be solved in a standard integrated fashion is reflected in the fact that the operator control and visualization systems of the SIMATIC HMI family, such as Operator Panels (OP/TD) and process visualization systems, based on WinCC, can be connected.

Advantages at a glance

- Using SIMADYN D, every automation task can be simply tackled thanks to the free graphic configuring/engineering using the SIMATIC S7 software tools. This significantly reduces the total costs when generating automation and drive solutions. A technology diagram can be printed-out for documentation purposes.
- Using state-of-the-art CPU modules, extremely high-performance system buses for effective multi-processing and with a fast operating system, which is tailored for complex control systems, SIMADYN D masters tasks requiring the highest dynamic response and complexity.
- SIMADYN D can be optimally adapted to any application as a result of the modular hardware and software structure - from small applications up to large plants. There are no restrictions due to the defined functions of a standard controller. SIMADYN D can also be subsequently expanded at any time for plant expansions and retrofits.
- SIMADYN D can be connected to higher-level automation systems and subordinate drive systems using standardized bus systems.

■ Application

Because of its excellent performance, SIMADYN D is especially suitable for all applications where a high control dynamic response and arithmetic accuracy are required or where a high level of functionality is required.

SIMADYN D can be used for the widest range of applications and industry sectors as it can be freely configured and because of its extensive range of modules:

- Closed-loop torque, speed and position control for converter-fed DC and three-phase drives. For example, for synchronous operation, dancer or tension controls, winders, multi-motor drives, gearbox/motor test stands, complex setpoint calculations and closed-loop control for cross-cutters, "break-proof" electronic shafts
- High precision rolling mill drives
- Hydraulic drives with a high dynamic response
- Special applications using converters, e.g. for closed-loop excitation current control, high voltage DC power transmission, static reactive power compensation equipment

5

■ **Design**

The SIMADYN D control system is of a modular design comprising hardware and software components, which are combined for a specific application.

Subracks

The selected modules are operated in a SIMADYN D subrack (SR..). Depending on the number of subracks required, there are versions available with between 6, 12 and 24 slots. Two high-performance backplane buses guarantee extremely fast data exchange between the various modules.

For extremely complex tasks, several subracks are connected together through an extremely fast fiber-optic cable coupling.

CPU modules

A SIMADYN D system always contains one or several CPU modules. The configured user program (e.g. user software) run on these CPU modules. For extremely complex, sophisticated tasks, or if many functions have to be processed in extremely short cycle times, then several CPU modules are used. There are various types of CPU modules with the following features:

- State-of-the art, high-performance 32-bit technology (PM5, PM6) permits cycle times for typical control loops of approximately 0.5 ms.
- PM5 for standard applications and PM6 for applications requiring a high performance

Up to 8 CPU modules can be operated in a subrack.

Program memory modules

A program, generated on a PC, is downloaded into a program memory module (MS..). This memory module is then inserted in the CPU module. The memory modules also have a non-volatile memory for permanently saving online changes.

Buffer memory

If more than one CPU module is operated in a subrack, a buffer memory module MM.. must be inserted between the CPUs to implement data exchange.

Input/output modules

Analog, digital and incremental encoder signals are connected to input/output expansion modules IT41/IT42 as well as via the SITOR converter module ITDC.

Every CPU module can be expanded by a max. of 2 IT.. modules.

The EA12 and EB11 input/output modules also provide additional connections for analog, digital and incremental encoder signals.

Communication modules

High-performance serial couplings are implemented (PROFIBUS DP, Industrial Ethernet, fiber-optic cable subrack coupling) using the communication modules (CS..) and the communication sub-modules which can be inserted on them.

It is important to especially mention the CS7 carrier module. Up to three communication modules, type SS4 (for DUST/USS protocols) or SS52 (for PROFIBUS DP) can be plugged-onto the CS7.

A SIMOLINK master interface ITSL is directly plugged onto one of the CPU modules.

Interface modules

As a result of the high quantity of signals, the plant and process signals, for example, analog, digital and incremental encoder signals, are acquired through interface modules.

The interface modules (SA.., SE.., SU..) are snapped onto mounting rails in the cabinet and are connected to the modules through pre-assembled, plug-in cables (SC..).

Using these interface modules, analog signals can be electrically isolated and adapted.

Digital signals are displayed on LEDs and can be electrically isolated.

Operator panels

SIMATIC operator panels are connected to MPI through the CS7 communication module and the SS52 communication module. Several operator panels can be operated on the MPI bus.

The user programs the function and display of the operator panels using the ProTool/ Lite SIMATIC tool. This means, for example, that several process quantities can be monitored and changed.

Commands can be entered, the SIMADYN D clock time can be set and displayed using function keys.

Operating and fault messages can be defined in the OP using the user data areas.

■ **Integration**

Serial coupling to PROFIBUS DP, SIMOLINK or Industrial Ethernet is established with communication modules. Plug-in communication submodules are inserted on the main communication modules.

As a result of the high number of signals, the plant and process signals, for example analog, digital and incremental encoder signals are not directly connected to the modules but rather to interface modules and plug-in terminals.

■ **Configuration**

Control-related applications are quickly and simply created using CFC function blocks.

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SIMADYN D Control System
Subracks

■ **Overview**

- For a module format ES 902C (233.4 x 220 mm)
- A housing enclosed and shielded on all sides with SR8x slot covers.
- A battery can be installed or connected to save data when the power is disconnected or during power failures: 3.4 V/5 Ah Lithium battery; size C (baby cell)
- Backplane buses with integrated bus terminating circuit
- Degree of protection IP00
- Can be supplied with or without fan; fan operating time, 40,000 h; the fan can be retrofitted or removed

Features of the integrated power supplies

- Permissible voltage ranges:
  - for 115/230 V AC: - 15 %, + 10 %
  - for 24 V DC: + 20 to + 30 V
- Input and output voltages are monitored; switch-off routines initiated to maintain data and reset outputs
- LED operating status display
- Automatic restart after power supply dips or failure

Subrack types

- SR6: 6 slots for 230 V AC power supply voltage
- SR12: 12 slots for 24 V DC or 115 – 230 V AC supply voltages
- SR24: 24 slots for 24 V DC or 115 – 230 V AC power supply voltages

■ **Application**

The SRxx subracks represent the mechanical rack system for the SIMADYN D control system.

■ **Function**

These subracks have the following tasks:

- They mechanically accommodate the modules
- They supply the modules with the operating voltages
- Fast data transfer between the individual modules through the L and C backplane buses
- CPU, buffer memory, input/ output, expansion and communication modules can be inserted

The output power of the integrated power supply is limited. For this reason it is important to observe the power requirement of the modules used (especially the current consumption at 5 V).

If the power supply output available with an SR6 or SR12 is not sufficient, then the next larger subrack should be used (SR12 or SR24).

5

SIMADYN D Control System
Subracks

Overview

- Subracks with 6 slots and power supply (as plug-in module)
- 230 V AC power supply voltage
- An external battery can be connected to save the data when the power supply is disconnected
- Cooling:
  - SR6 subracks: Without fan
  - SR6V subracks: With fan ("ventilated"); mounted on the top assembly; no fan monitoring; forced ventilation is required for the PM6 CPU modules

Application

- For SIMADYN D racks (cannot be used for CSH11, CS12 to CS22)
- For small and average sized applications

Function

L bus (local bus) with bus termination

Technical specifications

Rated input voltage	1 AC 50/60 Hz 230 V
Dimensions W x H x D in mm	
• SR6	228 x 320 x 280
• SR6V (fan)	228 x 335 x 280
Weight	4 kg
Nominal input current	AC 0.6 A
I²t value	0.5 A²s
Maximum value	25 A
Output voltages	+ 5 V/7 A +15 V/0.7 A - 15 V/0.6 A

Selection and ordering data

	Order No.
SR& subrack	**6DD1 682-0BB0**
without fan, 6 slots, 230 V AC input voltage	
SR6V subrack	**6DD1 682-0BB1**
with fan, 6 slots, 230 V AC input voltage	

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Dimension drawing
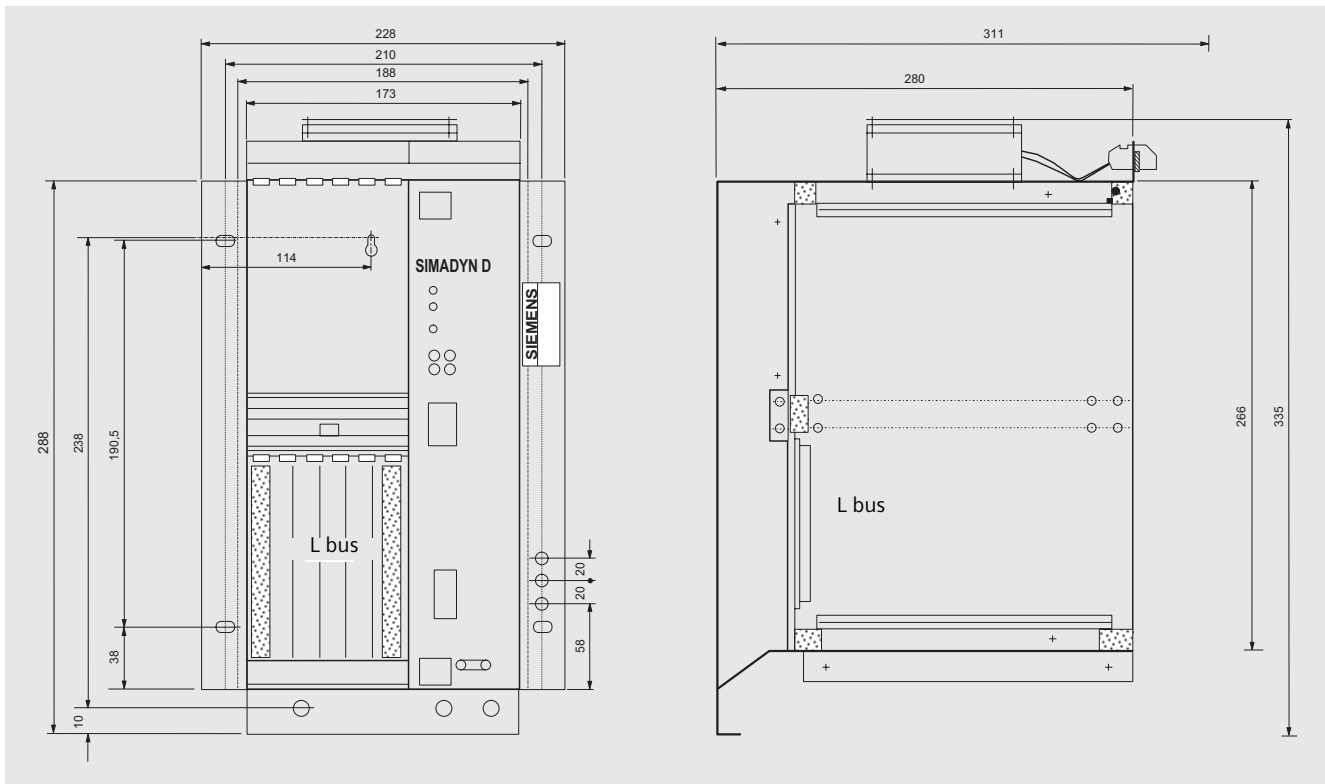
SIMADYN D Control System
Subracks

■ Overview

- Rack with 12 slots and power supply
- Slot for a buffer battery for saving data when the power is disconnected; this back-up battery must be ordered separately
- For versions with fan: The fan is integrated in the power supply, fan monitoring; forced cooling is required for the PM6 CPU module as well as CS12 to CS22
- Subrack with 12 slots and power supply. There are four supply voltage versions (supply voltage) and cooling versions:
  - SR12.1 with fan, 24 V DC input voltage
  - SR12.2 without fan, 24 V DC input voltage
  - SR12.3 with fan, 115/230 V AC input voltage
  - SR12.4 without fan, 115/230 V AC input voltage

■ Application

- For SIMADYN D modules
- For small, mid-range and large scale applications

■ Technical specifications

SR12.1 subrack with fan	
Rated input voltage	DC 24 V
Dimensions W x H x D in mm	298.5 x 508.5 x 320
Weight	11 kg
Rated input current	16 A
Inrush current, max.	32 A
I²t value	10 A²s
Output voltages	+ 5 V/26 A +15 V/3.3 A - 15 V/3 A

SR12.2 subrack without fan	
Rated input voltage	DC 24 V
Dimensions W x H x D in mm	298.5 x 508.5 x 320
Weight	10.5 kg
Rated input current	16 A
Inrush current, max.	32 A
I²t value	10 A²s
Output voltages	+ 5 V/26 A +15 V/3.3 A - 15 V/3 A

SR12.3 subrack with fan	
Rated input voltage	1 AC 50/60 Hz 115/230 V
Dimensions W x H x D in mm	298.5 x 508.5 x 320
Weight	11 kg
Rated input current	2.4 A, 115 V 1.2 A, 230 V
Inrush current, max.	3 A, 115 V 6 A, 230 V
I²t value	0.15 A²s, 115 V 0.6 A²s, 230 V
Output voltages	+ 5 V/26 A +15 V/3.3 A - 15 V/3 A

SR12.4 subrack without fan	
Rated input voltage	1 AC 50/60 Hz 115/230 V
Dimensions W x H x D in mm	298.5 x 508.5 x 320
Weight	10.5 kg
Rated input current	2.4 A, 115 V 1.2 A, 230 V
Inrush current, max.	3 A, 115 V 6 A, 230 V
I²t value	0.15 A²s, 115 V 0.6 A²s, 230 V
Output voltages	+ 5 V/26 A +15 V/3.3 A - 15 V/3 A

■ Selection and ordering data

	Order No.
SR12.1 subrack with fan, 12 slots, 24 V DC input voltage	**6DD1 682-0CC0**
SR12.2 subrack without fan, 12 slots, 24 V DC input voltage	**6DD1 682-0CD0**
SR12.3 subrack with fan, 12 slots, 115/230 V AC input voltage	**6DD1 682-0BC3**
SR12.4 subrack without fan, 12 slots, 115/230 V AC input voltage	**6DD1 682-0BC4**

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■ **Dimension drawing**
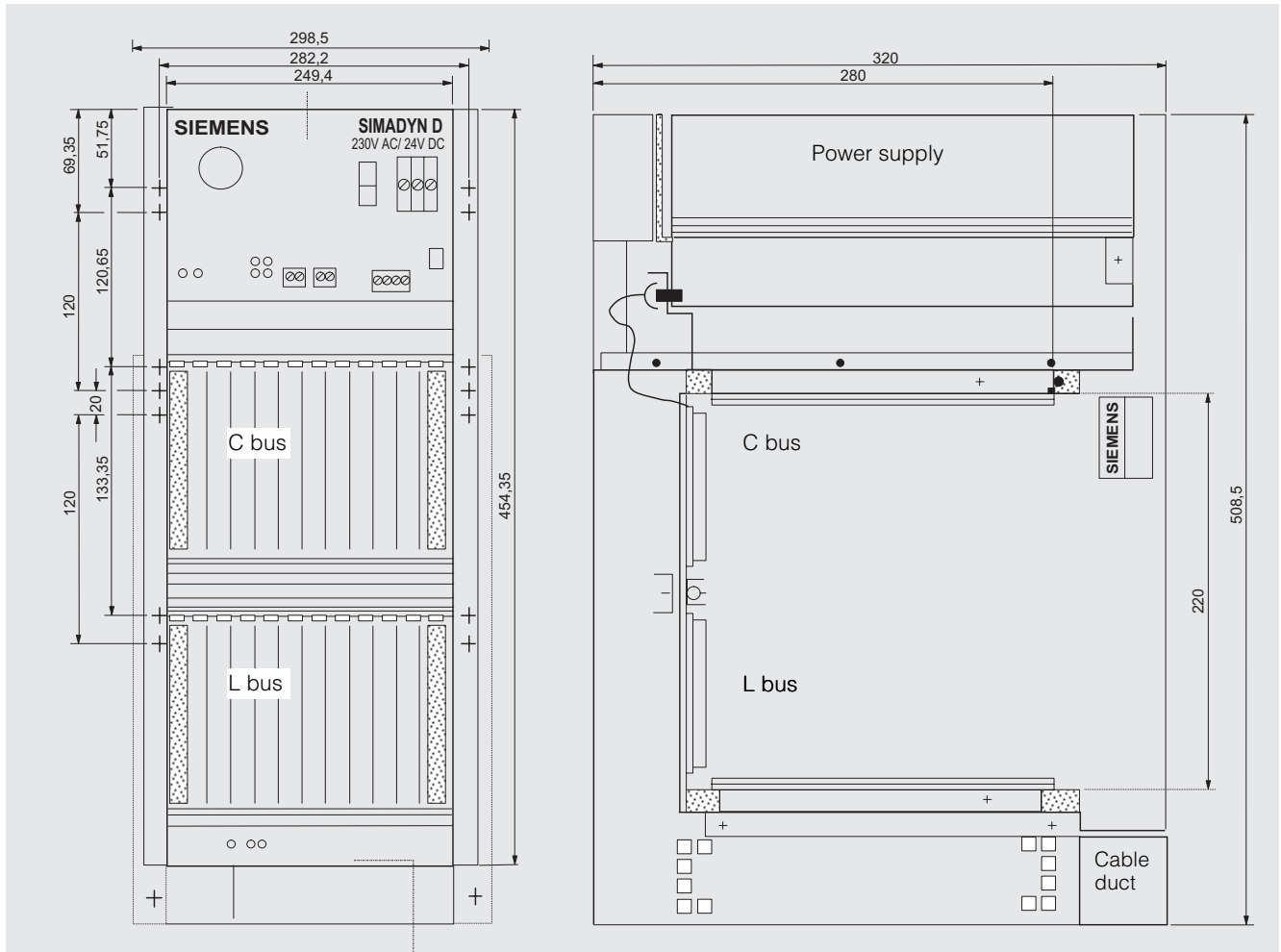
SIMADYN D Control System
Subracks

■ Overview

- Rack with 24 slots and power supply
- Slot for a buffer battery for saving data when the power is disconnected; this back-up battery must be separately ordered
- For versions with fan: The fan is integrated in the power supply, fan monitoring; forced cooling is required for the PM6 CPU module as well as CS12 to CS22
- There are 3 input voltage and cooling versions:
  - SR24.1 with fan, 24 V DC input voltage
  - SR24.2 without fan, 24 V DC input voltage
  - SR24.3 with fan, 115/230 V AC input voltage

■ Application

- For SIMADYN D modules
- For demanding applications

■ Function

- Continuous Local Bus (L bus) and Communication Bus (C bus) with the relevant bus termination
- The operating status (ready/fault) from the power supply, and if relevant, a fan, is signaled using a separate fan

■ Technical specifications

SR24.1 subrack with fan	
Rated input voltage	DC 24 V
Dimensions W x H x D in mm	542 x 508.5 x 320
Weight	17.3 kg
Rated input current	32 A
Inrush current, max.	64 A
I²t value	10 A²s
Output voltages	+ 5 V/52 A +15 V/6.5 A - 15 V/6 A

SR24.2 subrack without fan	
Rated input voltage	DC 24 V
Dimensions W x H x D in mm	542 x 508.5 x 320
Weight	16.2 kg
Rated input current	32 A
Inrush current, max.	64 A
I²t value	10 A²s
Output voltages	+ 5 V/52 A +15 V/6.5 A - 15 V/6 A

SR24.3 subrack with fan	
Rated input voltage	1 AC 50/60 Hz, 115/230 V
Dimensions W x H x D in mm	542 x 508.5 x 320
Weight	17.3 kg
Rated input current	5.4 A, 115 V 2.7 A, 230 V
Inrush current, max.	4.5 A, 115 V 9 A, 230 V
I²t value	0.25 A²s, 115 V 1 A²s, 230 V
Output voltages	+ 5 V/52 A +15 V/6.5 A - 15 V/6 A

■ Selection and ordering data

	Order No.
SR24.1 subrack with fan, 24 slots, 24 V DC input voltage	**6DD1 682-0BC0**
SR24.2 subrack without fan, 24 slots, 24 V DC input voltage	**6DD1 682-0BE0**
SR24.3 subrack with fan, 24 slots, 115/230 V AC input voltage	**6DD1 682-0CE3**

5

■ Dimension drawing

5

SIMADYN D Control System
Subracks

SR8x Slot Covers

■ Overview

Slot covers for unused slots in an SR6, SR12 or SR24 subrack.
- SR81: Cover for one slot, 20.32 mm wide
- SR82: Cover for two slots, 40.64 mm wide
- SR83: Cover for three slots, 60.96 mm wide

■ Application

Used in an SR6, SR12 or SR24 subrack.

■ Function

This is required to maintain the electromagnetic compatibility (EMC).

■ Selection and ordering data

	Order No.
SR81 slot cover	**6DD1 682-0AJ1**
for 20.32 mm wide slots	
SR82 slot cover	**6DD1 682-0AJ2**
for 40.64 mm wide slots	
SR83 slot cover	**6DD1 682-0AJ3**
for 60.96 mm wide slots	

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Overview
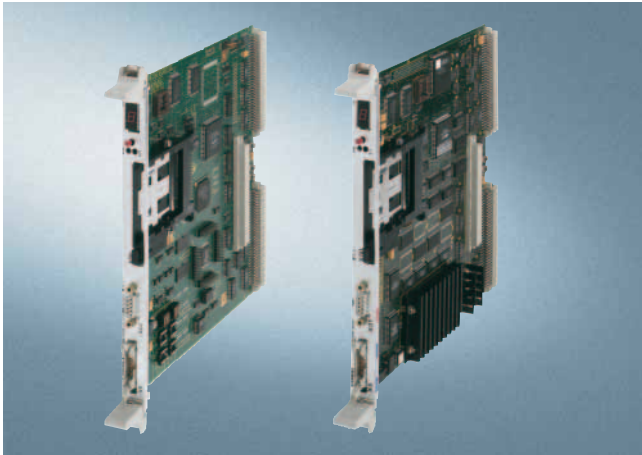
CPU modules

For SIMADYN D, general open-loop and closed-loop control tasks are executed on high-performance 32 and 64-bit CPU modules with RISC processors.

Both CPU modules offer a slot for Flash program memory modules MS5, MS51, MS52 (supplementary components)

Buffer memory modules

- The buffer memory modules provide a memory via which several CPU modules can exchange data with one another.

Benefits

- By utilizing floating-point arithmetic CPU modules achieve high arithmetic accuracy.
- Configuring is simplified because normalization is not required. SIMADYN D application software programs can be very simply ported to other SIMATIC modules.

Application

PM5 CPU module for standard applications, PM6 for high-performance applications.

Function

- Floating-point arithmetic
- Up to four digital inputs can be used to call interrupt tasks; with selectable signal level or edge evaluation
- Interface modules to use digital inputs: SB10, SB60, SB61, SU12. The 10-pin SC7 flat cable is required to connect the interface modules. Isolation with SB60, SB61 interface modules is possible
- Programming and operating:
Round cable with 9-pin sub-D connectors to connect a PC as programming and operator device to the serial interface of the CPU module
- Saving data
One buffered SRAM (using a battery in the subrack) permits up to 1000 configured processor quantities, messages and trace data to be saved in a non-volatile fashion (through power failures)
- Real-time clock to stamp messages of a configured message system and diagnostic messages of the operating system; Note: When the power fails, the time is not buffered! If buffering is required, then the MM3 buffer memory module must be used with integrated real-time clock

- Supplementary functions
Up to two "expansion modules" can be mounted on the CPU modules. They provide the following supplementary functions for this CPU module:
  - IT41: Analog and digital inputs/outputs, incremental encoder connections
  - IT42: Analog and digital inputs/outputs, integrating analog inputs
  - ITDC: To control line-commutated converters with a SITOR interface
  - ITSL: SIMOLINK connection with master function
- Commissioning and troubleshooting
9-pin sub-D socket (X01) on the front panel for the serial RS 232 interface for
  - commissioning and troubleshooting the processor program (using "Service-IBS" or the CFC test mode)
  - downloading the processor program with the 9-pin sub-D socket (X01)

Technical specifications

SIMADYN CPU module	PM5, PM6
Smallest sampling time	0.5 ms
Typical sampling time, approx.	0.5 ms
Display of state of operation	7-segment display
Bus connections	C bus, L bus
Width	1 slot

5

SIMADYN D Control System
CPU Modules

PM5 CPU Module (Standard CPU)

■ Overview
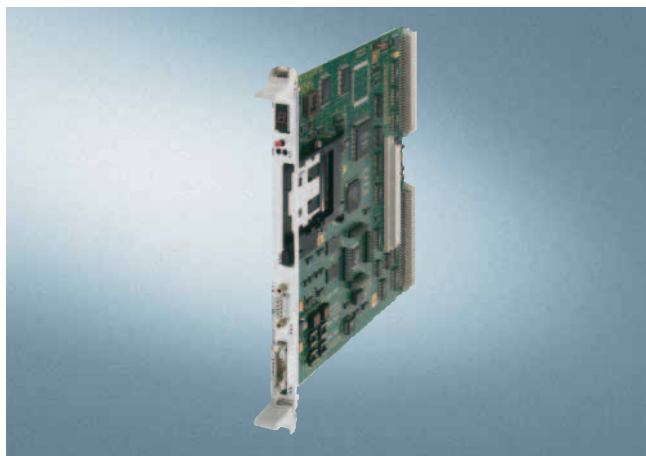
32-bit CPU module for SIMADYN D. The module can be operated in a non-ventilated rack

■ Technical specifications

Voltage/current supply (rated values)	+ 5 V/1.2 A +15 V/25 mA - 15 V/25 mA
Back-up battery (can be connected-up through the subrack)	3.4 V/10 µA
I/O (technical specifications of the inputs: similar to T400, see page 2/4)	• 4 interrupt-capable digital inputs, or • 2 absolute value encoder inputs, or • 2 incremental encoder inputs
Real-time clock, resolution	0.1 ms
Clock-rate (external/internal)	32/32 MHz
Cache	16 KB program, 4 KB data
Memory area which can be buffered using the subrack battery; to save configured data in a non-volatile fashion	64 KB SRAM
Program and data memory	4 MB SRAM
Inputs/outputs	10-pin front panel connector X5: The function of the signals fed through the connector, are set using coding connectors on the module. One of the following combinations can be selected • 8 digital inputs; 4 of which are interrupt-capable • 4 digital inputs (interrupt-capable) and 1 absolute value encoder • 4 digital inputs (interrupt-capable) and 1 incremental encoder • 1 absolute value encoder and 1 incremental encoder for extremely fast position calculations • 2 absolute value encoders • 2 incremental encoders
Space requirement/width	1 slot (20.32 mm)
Weight	0.6 kg

■ Selection and ordering data

	Order No.
PM5 CPU module Discontinued since 10/2003	**6DD1 600-0AJ0**

■ Connection diagram
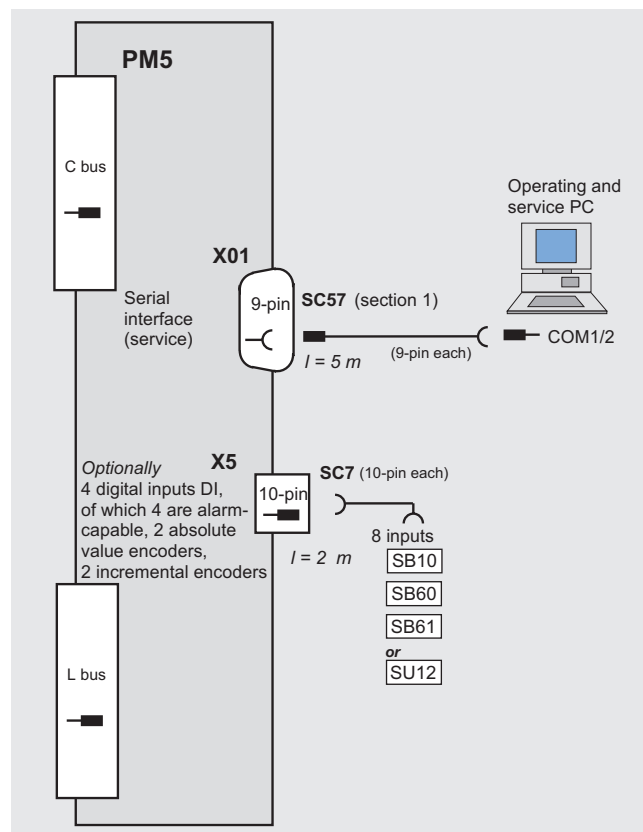
PM6 CPU Module (High Performance CPU)

Overview
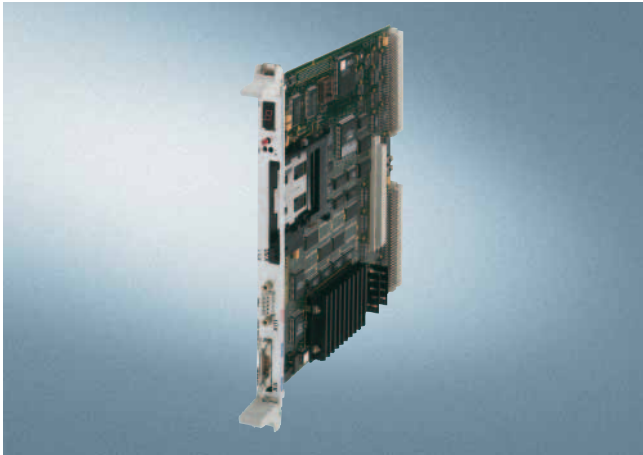
64 bit-CPU module for SIMADYN D. The module can only be operated in a forced-ventilation subrack.

Technical specifications

Voltage/power supply (rated values)	+ 5 V/1.7 A +15 V/50 mA - 15 V/30 mA
Back-up battery (must be connected-up through the subrack)	3.4 V/10 µA
Digital inputs: Connector X5	
Number of inputs	8 max. 4 interrupt-capable
Electrical isolation	No; only using optional interface modules
Electrical isolation	
• Rated value	DC 24 V
• For "O" signal	-1 to +6 or open-circuit input
• For "1" signal	+13 to +33 V
Input current	
• For "O" signal	–
• For "1" signal	5 mA
Delay time	0.05 ms
Real time clock, resolution	0.1 ms
Clock-pulse (external/internal)	32 MHz for local I/O or 64 MHz for DRAM access/128 MHz internal
Cache	16 Kbyte program, 16 Kbyte data
Memory area, which can be buffered using the subrack battery; to save configured data in a non-volatile fashion	256 Kbyte SRAM
Program and data memory	8 Mbyte DRAM
Space requirement / width	1 slot (20.32 mm)
Weight	0.6 kg

Selection and ordering data

	Order No.
PM6 CPU module	**6DD1 600-0AK0**
Fast 64 bit CPU module with digital inputs, L bus and C bus	

Connection diagram
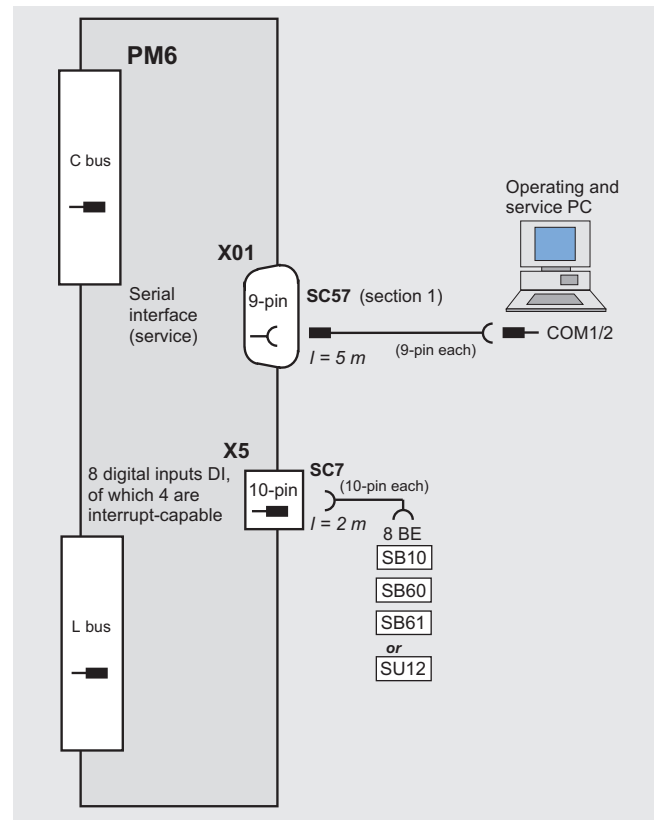
SIMADYN D Control System
CPU Modules

■ **Overview**

MS5x program memory modules contain the program to be processed by the CPU modules (PM5, PM6) as well as a memory for operating parameters which can be modified.

■ **Application**

The program memory modules are suitable for the CPU modules (PM5, PM6).

- MS5: 2 Mbyte flash for universal use
- MS51: 4 Mbyte flash for large programs
- MS52: 8 Mbyte flash for extremely large programs, preferably for PM6

■ **Function**

Configuring and downloading

The program is generated on a PC (configured) using STEP7/CFC and then downloaded into the program memory module. Downloading can be carried out with a PC Card Slot (PCMCIA) integrated into the PC. Typical flash programming time for a medium-sized program is approx. 0.5 min.

This memory module is then inserted in the slot provided on the CPU module.

Erasing

Can be electrically erased (flash technology).

Restriction of write operations

The EEPROM (8 Kbyte) allows a maximum of 100,000 write operations. This restriction must be carefully observed if write access operations are frequently made, e.g. from an automation system through PROFIBUS or USS (e.g. in the form of a "permanent change task"). Continuous changes should be made as simple change task (in the RAM).

■ **Technical Specifications**

Current consumption at + 5 V	
• MS5	150 mA
• MS51	150 mA
• MS52	180 mA
Program memory	
• MS5	2 Mbyte Flash
• MS51	4 Mbyte Flash
• MS52	8 Mbyte Flash
Dimensions (in mm)	3.3 x 54 x 8.6
Weight	0.03 kg

■ **Selection and ordering data**

	Order No.
MS5 flash memory	**6DD1 610-0AH0**
2 Mbyte	
MS51 flash memory	**6DD1 610-0AK0**
4 Mbyte	
MS52 flash memory	**6DD1 610-0AH2**
8 Mbyte	

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Overview

The MM3 module makes 2 x 64 Kbyte buffer memories available to exchange data between CPU modules

The module contains a clock unit which can be optionally synchronized by keys and by receiving the DCF77 time signal (radio-based clock)

This clock can be used as source for all clock function blocks of the CPU modules in the subrack ("system time", max. jitter between the individual modules: 3 ms).

The time and the date are used to stamp messages of a configured message system and for diagnostic messages of the operating system.

Application

Applications can be found in:
- SIMADYN systems with more that one CPU
- SIMADYN systems which require clock time

Function

- With radio-based clock
- L and C bus connection
- 64 Kbyte RAM for L and C bus respectively
- Real-time clock; the time is buffered using the battery in the subrack
  - the time can be set via keys
  - the time can be received (DCF77)
- 10 digit, 7-segment display to display the time: Month, day, hour, minute, seconds (years can be alternatively displayed as a 4-digit number)
- 4 LEDs to display the status of the time receiver
- Digital output (relay) to output a system error (program interrupted/stop status of a CPU module)

Technical specifications

Current consumption	+ 5 V/600 mA + 15 V/50 mA +3.4 V/0.02 mA
Space requirement	1 slot (20.32 mm)
Weight	0.5 kg

Selection and ordering data

	Order No.
MM3 buffer memory module 2 x 64 Kbytes for the L and C buses	**6DD1 611-0AF0**

SIMADYN D Control System
Buffer Memory Modules

MM4 Buffer Memory

Overview
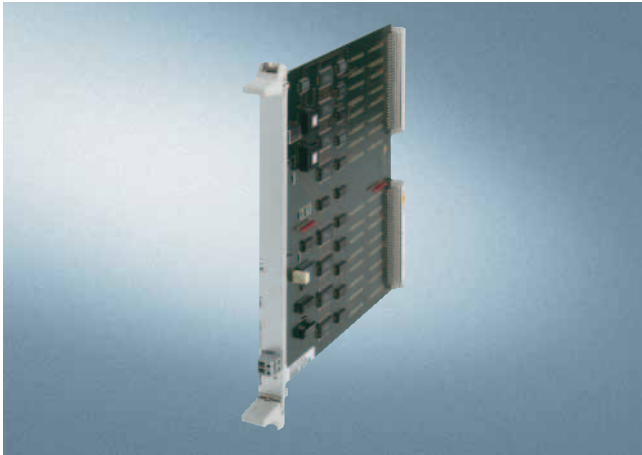
The MM4 module makes 2 x 2 Mbyte buffer memories available to exchange data between CPU modules.

Application

The MM4 should be used if there is a high memory requirement, e.g. due to a large number of connections between the various CPU modules ($ signals) as well as extensive communications.

Function

- L and C bus connection
- 2 Mbyte RAM for L and C bus respectively
- Digital output (relay) to output a system error (program interrupted/stop status of a CPU module)

Technical specifications

Current consumption	+ 5 V/600 mA + 15 V/50 mA +3.4 V/0.02 mA
Space requirement	1 slot (20.32 mm)
Weight	0.5 kg

Selection and ordering data

	Order No.
MM4 buffer memory module 2 x 2 MB for the L and C buses	**6DD1 611-0AG0**

Overview

Input and output modules provide additional analog and digital inputs/outputs as well as incremental encoder connections.

Design

- Type Exxx input/output modules can be inserted at any slot in the subrack
- Type ITxx expansion modules are directly mounted on the CPU modules (PM5, PM6) (max. two modules)
- Interface modules, which can be mounted on rails, provide the associated screw-plug-in terminals to connect the signal lines. The interface modules are connected to the input/output modules by using appropriate pre-assembled cables

Function

- The input/output channels of different CPU modules can be used with Exxx type input/output modules by means of the L/C bus.
- ITxx expansion modules supplement the CPU modules by input/output functions. Data is not exchanged through the L/C bus, but through a direct connection to the CPU module (LE bus). This means that it is especially fast (instantaneous) and does not influence data transfer with other modules through the L/C bus. However, only this CPU module can directly use the inputs/outputs of the IT modules.

EA12 Analog Output Module

Overview
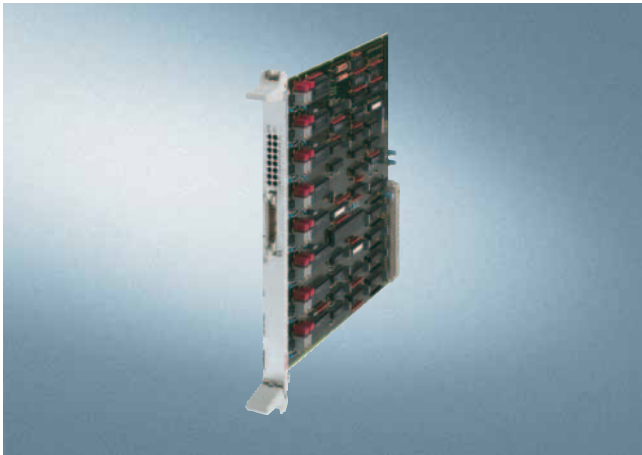
The EA12 module outputs analog signals

Function

- 8 analog outputs, ±10 V, with the associated test sockets
- There is no electrical isolation; optional via interface modules
- L-bus connection

Selection and ordering data

	Order No.
EA12 analog output module	**6DD1 642-0BC0**
8 AO, ± 10 V	

Connection diagram

Technical specifications

Current consumption	+ 5 V/600 mA + 15 V/200 mA - 15 V/200 mA
Space requirement	1 slot (20.32 mm)
Weight	0.5 kg
Analog outputs	X5A to X5H
Output voltage	-10 to +10 V
Output current	≤10 mA
Resolution	16 bit
Monotony	14 bit over the complete temperature range
Absolute accuracy	Typical 13 bit over the complete temperature range
Short-circuit protection to ground	R = 56 Ohm
Short-circuit duration	≤120 s

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SIMADYN D Control System
Input/Output Modules

EB11 Digital Input and Output Module

Overview
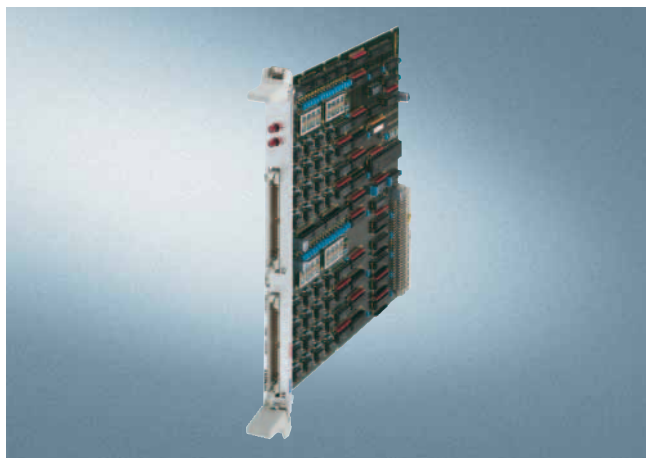
The EB11 digital input and output module reads-in 16 digital signals and outputs 16 digital signals.

Design

- 16 digital inputs and 16 digital outputs are combined in a connector; these 16 inputs/outputs are combined, on the software side to form two groups of 8 (function blocks)

Function

- 2 x 16 digital inputs and 2 x 16 digital outputs
- Electrical isolation is optionally possible through interface modules
- Electronic/thermal overload protection of the digital outputs with display
- Overload display (LED) of the digital outputs for each connector
- L-bus connection

Technical specifications

Current consumption	+ 5 V/400 mA + 15 V/0 mA - 15 V/20 mA + 24 V/200 mA (without X5/X6)
Space requirement	1 slot (20.32 mm)
Weight	0.6 kg
Digital outputs	X5A/X5B (2 x 8 outputs) X6A/X6B (2 x 8 outputs)
Electrical isolation	No
External P24 power supply	
• Rated value	+24 V
• Ripple	3.6 V
• Permissible range (including ripple)	+20 to +30 V
• Briefly for t $\leq$ 0.5 s	+35 V
Output current for a 1 signal	
• Rated value	50 mA
• Permissible range	0.2 to 100 mA
Short-circuit protection	Electronic, at approx. 250 mA
Residual current for a 0 signal	0.02 mA
Signal level of the outputs	
• For a 0 signal	< +3V
• For a 1 signal	> P24 -2.5 V
Switching delay	0.015 ms

Digital inputs

Digital inputs	X5C/X5D (2 x 8 inputs) X6C/X6D (2 x 8 inputs)
Electrical isolation	No
Input voltage	
• Rated value	+24 V
• For a 0 signal	-1 to +6 V or open-circuit input
• For a 1 signal	+13 to +33 V
Input current for a 1 signal (typical)	5 mA
Delay time	0.2 ms

Selection and ordering data

	Order No.
EB11 digital input and output module 2 x 16 DI, 2 x 16 DO	**6DD1 641-0AC0**
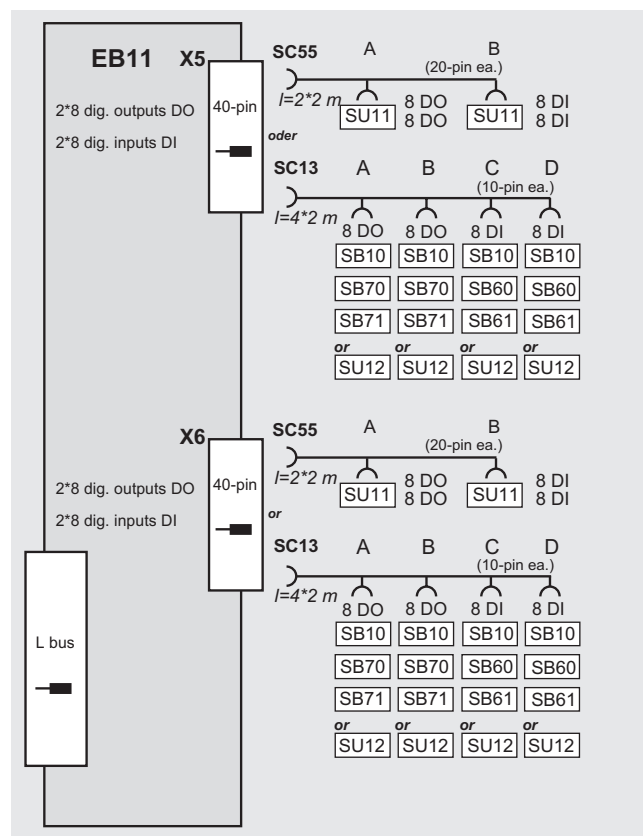
Connection diagram

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IT41 Digital/Analog Input and Output Module

Overview
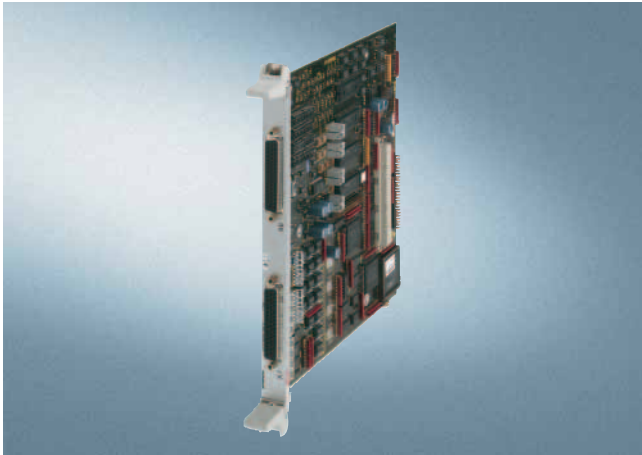
Expansion module for CPU modules (PM5, PM6) for additional analog and digital I/Os as well as incremental encoders

Function

- 4 analog outputs, ±10 V, 16-bit resolution, 14-bit accuracy, short-circuit proof to ground
- 4 analog inputs, ±10 V differential signal, 12-bit resolution
- 16 digital outputs, 24 V
- 16 digital inputs, 24 V
- The inputs/outputs are not electrically isolated
- 4 incremental encoder inputs with zero pulse, suitable for differential signals, floating:
  - for tracks (A, B), offset through 90° or separate forwards and reverse tracks
  - for 15 V (HTL) or 5 V encoders
  - With interrupt inputs and outputs and monitoring tracks for the appropriate encoders (Sony encoder)
  - Max. 1 MHz (15 V) or 2.5 MHz (5 V) pulse frequency (dependant on the cable length)

Technical specifications

Power supply	
Rated voltage	+ 5 V/400 mA + 15 V/0 mA - 15 V/20 mA + 24 V/200 mA (must be externally connected)
Typical current consumption	
• at +5 V	420 mA
• at +15 V	450 mA + encoder currents
• at -15 V	175 mA
• at +24 V	100 mA + digital output current
Space requirement	1 slot (20.32 mm)
Weight	600 g
Analog outputs	
Number of outputs	4
Version	Output with associated ground, non-floating
Output voltage range	-10 V to +10 V
Output current	± 10 mA
Resolution	16 bit
Monotony	14 bit over the complete temperature range
Absolute accuracy	Typical 13 bit over the complete temperature range

Short-circuit protection to ground	Yes
Analog inputs	
Number of inputs	4
Version	Differential inputs, non-floating
Input voltage range	- 10 V ± 4 LSB to + 10 V ± 4 LSB (1 LSB = 4.88 mV)
Input resistance	470 kΩ
Input filter	3 dB transition frequency:1.5 kHz
Resolution	12 bit
Absolute accuracy, typ.	11 bit over the complete temperature range
Max. conversion time	45 µs
Digital outputs	
Number of digital outputs	16, non-floating
Power supply voltage	Must be externally connected
• Rated value	24 V
• Permissible range (including ripple)	+20 to +30 V
• Briefly	+35 V, max. 0.5 s
Output current for a 1 signal	
• Rated current	50 mA
• Permissible range	to 100 mA
Short-circuit protection	Electronic/thermal at approx. 250 mA
Limiting inductive switch-off voltages	Power supply voltage + 1 V
Total load	80% at 50°C, all outputs 50 mA
Residual current for a 0 signal	20 µA
Signal level of the output	
• For a 0 signal, max.	3 V
• For a 1 signal	Power supply voltage - 2,5 V
Switching delay, max.	15 µs
Digital inputs	
Number of digital inputs	16, non-floating
Input voltage	
• Rated voltage	+24 V
• For a 0 signal	-1 to +6 V or open-circuit input
• For a 1 signal	+13 to +33 V
Input current	
• For a 0 signal	0 mA
• For a 1 signal, typ.	3 mA
Delay time, max.	200 µs
15 V incremental encoder	
Number of encoders, max.	4 (including 5 V encoder)
Version	Differential inputs, with electrical isolation
Internal current limiting, approx.	15 mA (electronic)
Track signals	Tracks A and B (phase-shifted through 90 degrees), if required with zero pulse N
Monitoring track	One monitoring track per encoder; specification as for the digital inputs
Pulse frequency, max.	1 MHz, dependent on the cable length (track frequency)
Phase difference of the track signals	Independent of the pulse frequency, min. 200 ns

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SIMADYN D Control System
Input/Output Modules

IT41 Digital/Analog Input and Output Module

Input voltage	
• For a 0 signal	-30 V to +4 V (for 15 mA load)
• For a 1 signal	+8 V to + 30 V (for 15 mA load)
Permissible input voltage range	Differential voltage -30 V to +30 V
Noise pulse suppression	Can be configured at the speed actual value function block: 0 – 16 μs (62.5 kHz)
5 V Incremental encoder	
Number of encoders, max.	4 (including 15 V encoder)
Version	Differential inputs, with electrical isolation
Track signals	1.) For tracks A and B (phase-shifted through 90°), if required with zero pulse N 2.) For separate forward and reverse track
Pulse frequency, max.	2.5 MHz (this depends on the cable length)
Permissible input voltage range	Differential voltage -5 V to +5 V
Max. input current	15 mA (Caution: This is not limited by the module!)
Input voltage	
• For a 0 signal	-5 V to 0 V
• For a 1 signal	+3 V to +5 V
Input resistance	
• Steady-state	180 Ohm
• Dynamic	100 Ohm (corresponding to the characteristic resistance of a twisted pair cable
Noise pulse suppression	This can be configured at the speed actual value function block: 0 or 125 ns
Interrupt inputs (e.g. for Sony encoders)	
Number of interrupt inputs	4
Version	Non-floating
Permissible input voltage range	0 V to +5 V
Input voltage	
• For a 0 signal	< 1.4 V
• For a 1 signal	> 2.0 V
Input current	
• For a 0 signal	Min. -5 mA, max. -3.6 mA
• For a 1 signal	Min. -3 mA, max. 0 mA
Interrupt reset outputs (e.g. for Sony encoders)	
Number of interrupt outputs	4
Version	Non-floating
Output voltage	15 V via 1 kΩ output resistor
Output voltage for 10 mA load	5 V
Power supply connection for pulse encoder	
Version	Non-floating, electronic short-circuit and overload protection
Output voltage, approx.	14 V
Max. output current	100 mA

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■ Selection and ordering data

	Order No.
IT41 digital/analog input and output module	**6DD1 606-3AC0**
with 4 incremental encoder inputs	
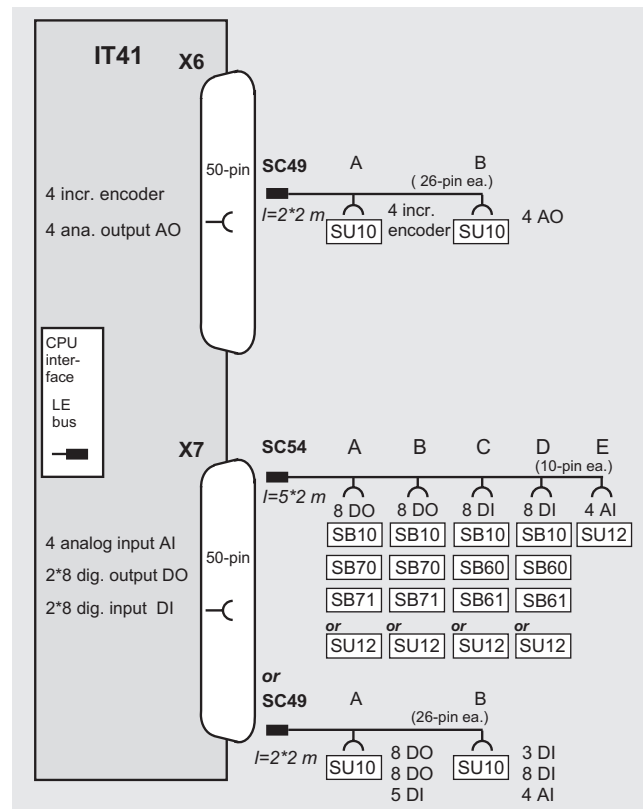
■ Connection diagram

Overview
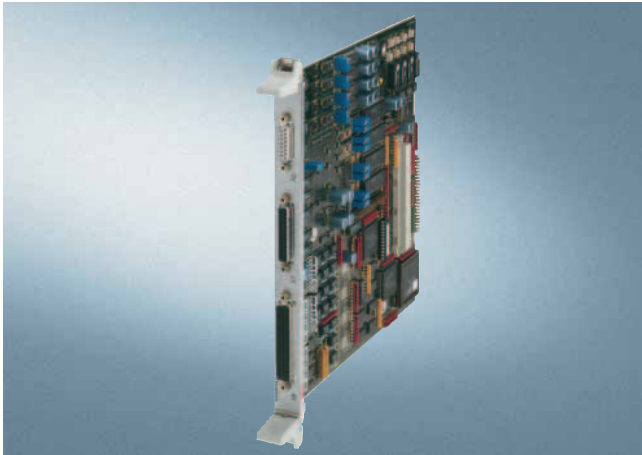
Expansion module for CPU modules (PM5, PM6) for additional digital inputs/outputs and high-resolution, integrating analog inputs.

Function

- With high-resolution analog outputs
- 16 digital outputs, 24 V
- 16 digital inputs, 24 V
- 4 analog outputs, ±10 V, 16-bit resolution, 14-bit accuracy, short-circuit proof to ground
- 4 analog inputs, ±10 V differential signal, 12-bit resolution
- 4 integrating analog inputs (V/Hz conversion), ±10 V differential signal, floating, up to 17-bit resolution depending on the integrating time, the integrating time can be externally triggered
- All of the other I/Os are non-floating; electrical isolation is optionally possible when using interface modules

Technical specifications

Power supply	
Nominal voltage	+ 5 V/400 mA + 15 V/0 mA - 15 V/20 mA + 24 V/200 mA (without X5/X6)
Typical current consumption	
• at +5 V	420 mA
• at +15 V	450 mA
• at -15 V	140 mA
• at +24 V	100 mA +digital output currents
Space requirement	1 slot (20.32 mm)
Weight, approx.	500 g

Analog outputs	
Number of analog outputs	4
Version	Output with associated ground, non-floating
Output voltage range	-10 V to +10 V
Output current	±10 mA
Resolution	16 bit
Monotony	14 bit over the complete temperature range
Absolute accuracy, typ.	13 bit over the complete temperature range
Short-circuit protection to ground	Yes

Integrating analog inputs (V/Hz)	
Number of integrating inputs	4
Version	Differential inputs, floating, integrating, V/Hz conversion; integrating time can also be externally triggered
Input voltage range	-10 V to +10 V
Input resistance	470 kΩ
Input filter	3 dB transition frequency : 2 kHz
Resolution	Up to 17 bit (depending on the integration time): •13 bit for 1 ms integration time •15 bit for 4 ms integration time •17 bit for 20 ms integration time
Relative accuracy, typ.	14 bit over the complete temperature range

Analog inputs	
Number of analog inputs	4
Version	Differential inputs, non-floating
Input voltage range	- 10 V ± 4 LSB to + 10 V ± 4 LSB (1 LSB = 4.88 mV)
Input resistance	470 kΩ
Input filter	3 dB transition frequency: 1.5 kHz
Resolution	12 bit
Absolute accuracy	Typical 10 bits over the complete temperature range
Max. conversion time	45 µs

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SIMADYN D Control System
Input/Output Modules

IT42 Digital/Analog Input and Output Module

Digital outputs

Number of digital outputs	16, non-floating
Supply voltage	
• Rated value (including ripple)	24 V
• Permissible range (including ripple)	+20 to +30 V
• Briefly	+35 V, max. 0.5 s
Output current for a 1 signal	
• Rated current	50 mA
• Permissible range	< 100 mA
Short-circuit protection	Electric/thermal at approx. 250 mA
Limiting of inductive switch-off voltages	V_{cc} + 1 V
Total load	80 % at 50 degrees C, all outputs 50 mA
Residual current for a 0 signal	20 µA
Signal level of the outputs	
• For a 0 signal, max.	3 V
• For a 1 signal	Power supply voltage - 2,5 V
Switching delay, max.	15 µs
Digital inputs	
Number of inputs	16, non-floating
Trigger inputs for integrating A/D converter	4, non-floating
Input voltage	
• Rated voltage	+24 V
• For a 0 signal	-1 to +6 V or open-circuit input
• For a 1 signal	+13 to +33 V
Input current	
• For a 0 signal	0 mA
• For a 1 signal	3 mA typ.
Delay time, max.	200 µs

Connection diagram
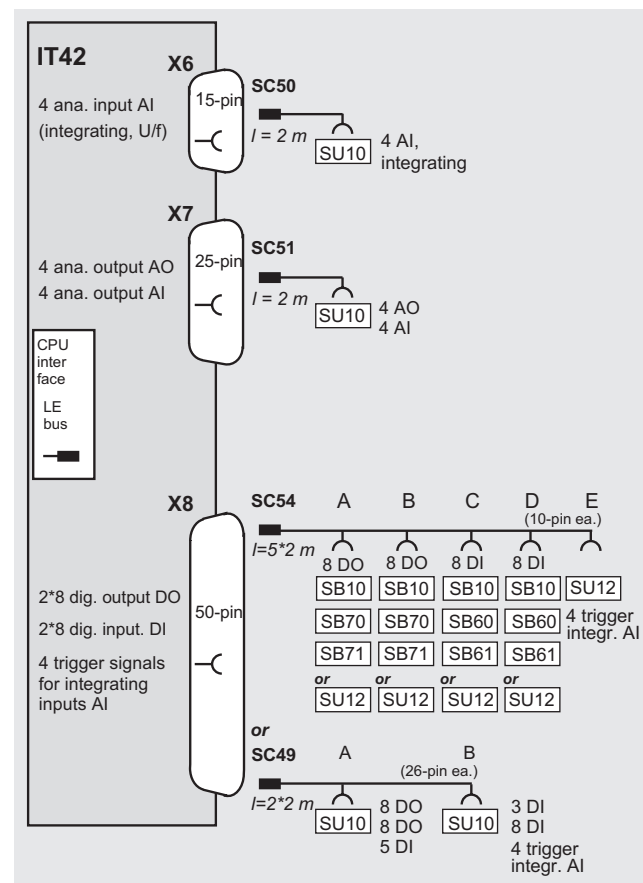
Selection and ordering data

	Order No.
IT42 digital/analog input and output module	**6DD1 606-4AB0**
with high-resolution analog outputs	

ITDC SITOR Converter Gating Module

Overview
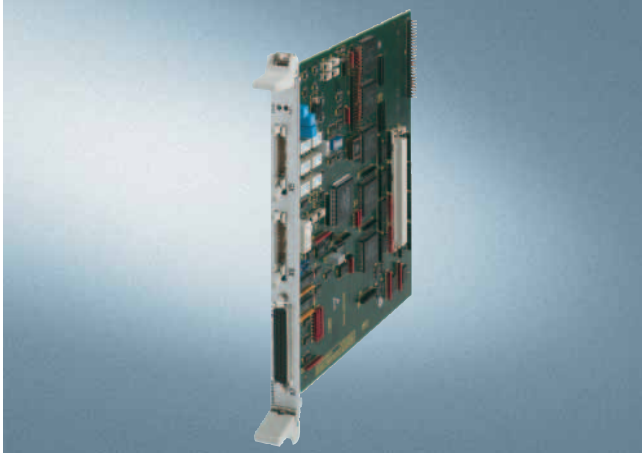
Expansion module for CPU modules (PM5, PM6) to gate line-commutated converters via a SITOR interface ("torque shell" for DC drives).

Design

- It is not possible to operate two ITDC modules on a single CPU module.

Function

- 2 analog outputs, of which 1 output optionally for an excitation current setpoint for an external closed-loop excitation current control
- 4 digital outputs, 24 V
- 4 digital inputs, 24 V
- No electrical isolation of the inputs/outputs
- 1 incremental encoder input
- Various SITOR setpoint/actual value as well as service/ diagnostics signals

Features of the converter gating

- Auto-reversing stage
- Current controller
- Gating unit (for 8 - 400 Hz line frequency)
- For 6-pulse converters

Technical specifications

Power supply	
Rated voltage	+ 5 V/400 mA + 15 V/0 mA - 15 V/20 mA + 24 V/200 mA (without X5/X6)
Typical current consumption	
• at +5 V	100 mA
• at +15 V	490 mA + encoder currents
• at -15 V	75mA
• at +24 V	40 mA + digital output currents
Analog outputs	
Number of analog outputs	2
Version	Output with associated ground, non-floating
Output voltage range	-10 V to +10 V
Output current	± 10 mA
Resolution	12 bit

Monotony	10 bit over the complete temperature range
Absolute accuracy	Typical 9 bit over the complete temperature range
Short-circuit protection to ground	Yes
Digital outputs	
Number of digital outputs	4, non-floating
Power supply voltage	
• Rated value	24 V DC
• Permissible range	+20 to +30 V including ripple
• Briefly	+35 V, max. 0.5 s
Output current for a 1 signal	
• Rated current	50 mA
• Permissible range	Up to 100 mA
Short-circuit protection	Electronic/thermal at approx. 250 mA
Limiting of inductive switch-off voltages	Power supply voltage + 1 V
Total load	80 % at 50 degrees C, all outputs 50 mA
Residual current	20 µA for a 0 signal
Signal level	
• For a 0 signal, max.	3 V
• For a 1 signal	Power supply voltage - 2,5 V
Switching delay	1 -> 0: max. 10 µs 0 -> 1: max. 100 µs
Digital inputs	
Number of digital inputs	4, non-floating
Input voltage	+24 V rated voltage
• For a 0 signal	-1 to +6 V or open-circuit digital inputs
• For a 1 signal	+13 to +33 V
Input current	
• For a 0 signal	0 mA
• For a 1 signal	3 mA typ.
Delay time	50 µs

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SIMADYN D Control System
Input/Output Modules

ITDC SITOR Converter Gating Module

15 V Incremental encoder	
Number of encoders	1, non-floating
Version	Differential inputs, without electrical isolation, can be changed over 5 V/15 V (HTL)
Track signals	Track A and B (shifted through 90 degrees), if required with zero pulse N
Pulse frequency, max.	1 MHz, dependent on the cable length (track frequency)
Phase difference of the track signals	Independent of the pulse frequency, minimum 200 ns
Input voltage at 15 V (HTL)	
• For a 0 signal	-30 V to +5 V
• For a 1 signal	+8 V to +30 V
Input voltage for 5 V	
• For a 0 signal	-7 V to -1,5 V
• For a 1 signal	+1,5 V to +7 V
Permissible input voltage range	Differential voltage -30 V to +30 V
Input resistance, approx.	40 kΩ
Noise pulse suppression	This can be configured at the speed actual value function block: 0 – 16 μs (62.5 kHz)
Power supply voltage for the pulse encoder	
Output voltage, approx.	14 V
Max. output current	100 mA
Version	Non-floating, electronic short-circuit- and overload protection
General information	
Space requirement	1 slot (20.32 mm)
Weight	600 g
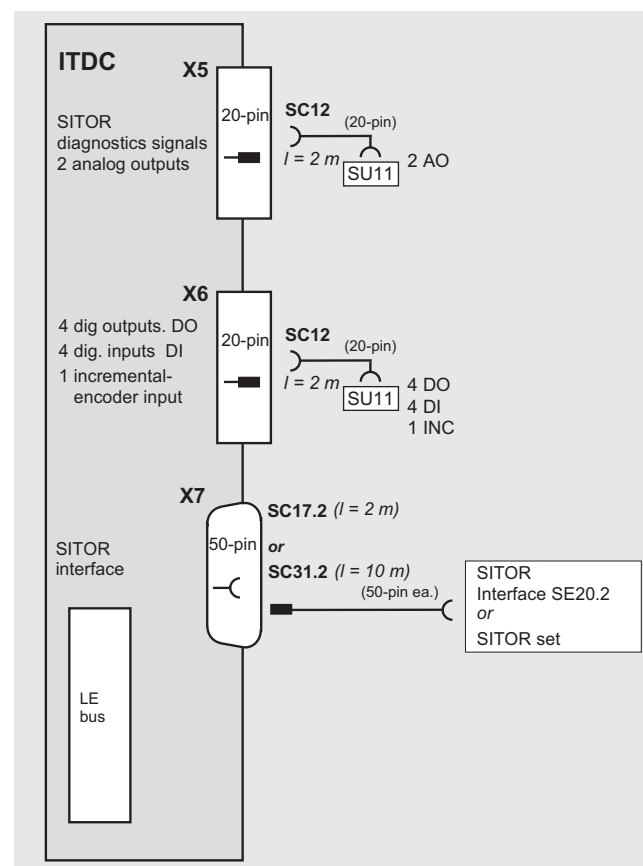
■ Selection and ordering data

	Order No.
ITDC SITOR converter gating module	**6DD1 601-0AH0**
SITOR SA60.1 synchronization module	**6DD2 920-0AR5**

■ Connection diagram

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■ Overview

Coupling to SIMOREG, SIMOVERT converter units

Protocol	Hardware (module, sub-module)	Application, comment
PROFIBUS DP	CS7 with SS52	• CS7/SS52 has a master function • User data is adapted to the device parameterization (PPO types) • For process data and parameters

Coupling to automation devices

Protocol	Hardware (module, sub-module)	Application, comment
Industrial Ethernet (SINEC H1)	CSH11	• Fast, serial bus, preferably for the master control level
PROFIBUS DP	CS7 with SS52	• As slave or master
DUST3	CS7 with SS4	• Protocol 3964(R) with RK512

Coupling to additional SIMADYN D subracks

Protocol	Hardware (module, sub-module)	Application, comment
Fiber-optic cable subrack coupling	CS12/13/14 (Master) and CS22 (Slave)	• Extremely fast • Star topology • Up to 9 subracks and more can be coupled
Industrial Ethernet (SINEC H1)	CSH11	• Serial bus, preferably for the supervisory level • Recommended if there are additional SINEC H1 bus nodes in the overall system
PROFIBUS DP	CS7 with SS52	• Master or slave interface • Recommended if there are additional DP nodes

PC couplings for service and download

Protocol	Hardware (module, sub-module)	Application, comment
Industrial Ethernet (SINEC H1)	CSH11	• Fast, high-performance coupling • Recommended if there are several H1 bus nodes (especially SIMADYN D racks) • Industrial Ethernet interface is required in the PC
DUST1	CS7 with SS4	• Low-cost point-to-point (no special PC hardware)

Coupling to the operator panels

Protocol	Hardware (module, sub-module)	Application, comment
MPI (Multi-Point-Interface)	CS7 with SS52	• SIMATIC OPs

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SIMADYN D Control System
Communication Modules

CS7 Carrier Module

■ Overview

The carrier module is prerequisite for the use of SS4, SS5x communication modules

■ Function

- Operation of up to three SS4 and SS52 communication modules
- L-bus connection
- 2 LEDs for each slot to indicate the operating status of the communication module and the interface and bus activity

■ Technical specifications

Current consumption	+5 V/400 mA
Space requirement	2 slots (40.64 mm)
Weight	0.5 kg

■ Selection and ordering data

	Order No.
CS7 carrier module	**6DD1 662-0AB0**
for SS4 and SS5x communication modules	

■ Connection diagram

CS7

Operator and service PC

SS4 DUST/USS — Sub-D high density — 26-pin

SC57 section 2 / section 1 — COM1/2

26-pin *l = 2 m* 9-pin — *l = 5 m* — 9-pin

or **SM8** Connector assembly

PIN assignment SS4	
RS 232	*RS 485 (USS bus)*
TxD = 4	+RS 485P = 5
RxD = 17	−RS 485N = 17
Grd = 9	Grd = 9

or

SS52 PROFIBUS DP, MPI — 9-pin **SM5** Connector assembly

PIN assignment SS52	
RS 232 (Monitor)	*RS 485 (PROFIBUS)*
TxD = 7	+Tx/Rx-Sig. = 3
RxD = 2	−Tx/Rx-Sig. = 8
Grd = 5	Grd = 5

or

SS52 PROFIBUS DP, MPI — 9-pin **SM5** Connector assembly

PIN assignement SS52	
RS 232 (Monitor)	*RS 485 (PROFIBUS)*
TxD = 7	+Tx/Rx-Sig. = 3
RxD = 2	−Tx/Rx-Sig. = 8
Grd = 5	Grd = 5

L bus

5

SIMADYN D Control System
Communication Modules

SS4 Communications Module

Overview
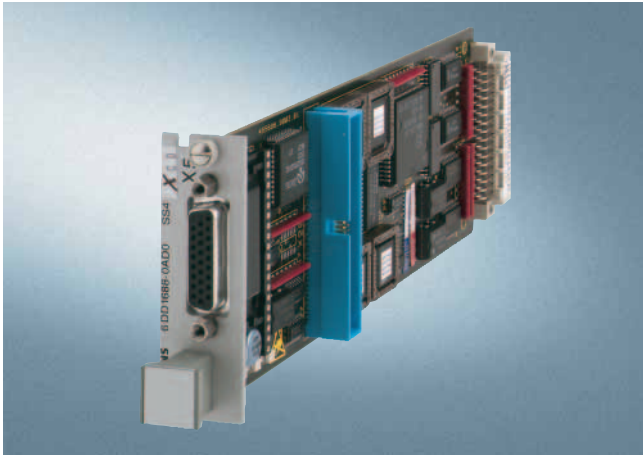
- Communication module which is inserted in the CS7 carrier module

Application

This is used for the most part as an interface to commission a multi-processor system. It is connected to a PC (operator/ programming device) for CFC/CFC test mode or service commissioning.

Design

- This module is inserted in one of the three slots of the CS7 carrier module

Function

- RS 232 interface for a configured USS or DUST protocol

Usable protocols:

- USS for SIMOREG and SIMOVERT drive converters
- DUST1 PC coupling for commissioning, TELEMASTER, program download and the CFC test mode
- DUST3 protocol 3964 of the SIMATIC S5
- The data transmission format can be appropriately modified by inserting an interface submodule (e.g. to adapt to the coupling partners, to increase the noise immunity or for longer cables):
  - interface submodule SS1 for a 20 mA line current

Technical specifications

Current consumption	+ 5 V/300 mA + 15 V/100 mA - 15 V/100 mA
Space requirement	1 slot on CS7
Weight	0.2 kg

Selection and ordering data

	Order No.
SS4 communication module for DUST/USS	**6DD1 688-0AD0**

SS1 20 mA-Interface Sub-Module for SS4

5

Overview

Serial interface with 20 mA for process coupling.

Design

- Interface submodule for inserting onto a SS4 communication module

Function

- 1 send and 1 receive circuit (full duplex) with the associated line current source can be connected
- The sender and receiver circuits can be electrically isolated with respect to the electronics of the carrier module through optocouplers

Technical specifications

Max. data transmission rate	19.2 kbit/s
Max. cable length	1000 m
Current consumption	+5 V/45 mA +15 V/40 mA
Weight	0.011 kg

Selection and ordering data

	Order No.
SS1 20 mA interface submodule for SS4 communication module	**6DD1 688-1AA0**

SIMADYN D Control System
Communication Modules

SS2 RS 232 Interface Sub-Module

Overview

Serial interface with an RS 232 signal level.

Application

SS2 should be used for the SS4 communication module instead of the simple and integrated RS 232 interface if the coupling partner requires V.24 (RS 232 C) control signals (CTS, RTS, etc.).

Design

- Interface submodule for inserting onto a SS4 communication module
- 1 send and 1 receive channel
- No electrical isolation
- Max. data transmission rate: 76.8 kbit/s
- Max. cable length: This is inversely proportional to the data transmission rate and depends on cable parameters, e.g. approx. 50 m at 19.2 kbit/s.

Technical specifications

Current consumption	+ 5 V/95 mA + 15 V/75 mA - 15 V/75 mA
Weight	0.011 kg

Selection and ordering data

	Order No.
SS2 RS 232 interface sub-Module for SS4 communication module	**6DD1 688-1AB0**

5

Overview
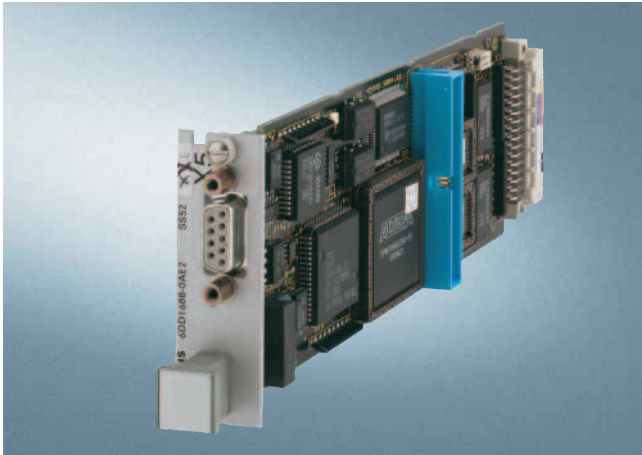
Communication module for PROFIBUS DP in master or slave function

Application

It is especially important to note that the SIMATIC distributed I/O can be connected to the SS52 - e.g.:

- ET 200B/C/L/U/IS and
- Conditionally ET 200M with signal modules, no signal pre-processing modules

If the SS52 is used as PROFIBUS DP master, the associated bus parameters must be calculated on the PC using the parameterizing software COM PROFIBUS and downloaded into the SS52.

Design

- Submodule which can be inserted in a CS7 slot

Function

- RS 485 interface for PROFIBUS DP, electrically isolated
- RS 232 interface to parameterize the bus node using COM PROFIBUS. The data set which is generated is downloaded into the SS52 via serial data transfer
- Connection to the bus cable via (also refer to Catalog IK PI):
  - PROFIBUS bus connector with integrated terminating resistors (up to 12 Mbit/s),
    e.g. 6ES7 972-0BB12-0XA0, 6ES7 972-0BB41-0XA0,
  - PROFIBUS bus terminal with integrated terminating resistors and plug-in cable to the SS52 (up to 1.5 Mbit/s),
    e.g. 6GK1 500-0AA10
- 1 diagnostics LED for the interface; located on the PC board
- The SS52 also has the additional functions - shared input, SYNC and FREEZE.
- Data transmission rate: 9.6 kbit/s up to 12 Mbit/s
- Max. 127 slaves can be connected
- Telegram length: max. 244 bytes per slave
- No parameters are required to be set in the DP slave or MPI function

Technical specifications

Current consumption	+ 5 V/300 mA + 15 V/50 mA - 15 V/50 mA
Space requirement	1 slot on the CS7 carrier module
Weight	0.2 kg
DP slaves used, e.g.	
SIMATIC S7	315-2DP, 413-2DP, 414-2DP, 416-2DP, CP 342-5, CP 443-5 Ext.
PC	CP 5511
Machine Tools	SINUMERIK 840D

Selection and ordering data

	Order No.
SS52 communication module for PROFIBUS DP/MPI	**6DD1 688-0AE2**
Parameter assignment software COM PROFIBUS V5.1	**6ES5 895-6SE03**

SIMADYN D Control System
Communication Modules

COM PROFIBUS Parameter Assignment Software

■ Overview

COM PROFIBUS is a parameter assignment software to set the SS52 communication module as PROFIBUS master.

COM PROFIBUS runs on Windows, including Win 2000.

■ Function

The data record to be generated with COM PROFIBUS should be downloaded onto the SS52.

It can be downloaded using:

- Bus cable with PROFIBUS DP interface in the PC, e.g. with CP 5511 (PCMCIA)
- The "SS52load" program via the serial PC interface on the RS 232 interface of the SS52. The "SS52load" download program is included in the COM PROFIBUS parameter assignment tool

■ Technical specifications

Connector assignment of the RS 232 connecting cable for "SS52load"

SS52	PC (9-pin interface)	PC (25-pin interface)
2	2	3
7	3	2
1	5	7

■ Selection and ordering data

	Order No.
COM PROFIBUS V5.1 parameter assignment software	**6ES5 895-6SE03**
Released for use with windows, including Win 2000	

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CS8 Carrier Module

Overview
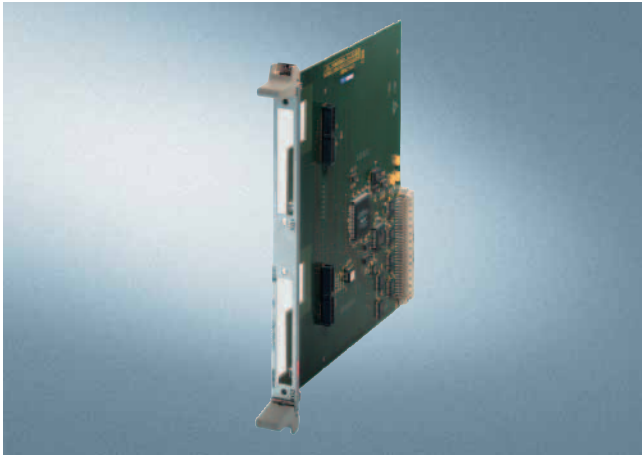
The CS8 module is a carrier module for the following MASTERDRIVE communication modules

- CBP2
- CBC, CBD, CBL

Design

- L bus connection
- 2 slots (X01, X02) for 2 communication modules (COMBOARDs, CBx)

Function

Serial data transmission protocols (CAN, DEVICE-NET Slave, PROFIBUS DP Slave) can be implemented using the CS8 and the communication modules

The properties and features of communication interfaces are defined by the MASTERDRIVES communication modules which are actually used.

Technical specifications

Power consumption	+5 V/400 mA
Space requirement	1 slot (20.32 mm)
Weight	0.3 kg

Selection and ordering data

	Order No.
CS8 carrier module	**6DD1 662-0AC0**
for MASTERDRIVES communication modules CBx	
CBP2 communication module	**6SE7 090-0XX84-0FF5**
for PROFIBUS DP/USS	
CBC communication module	**6SE7 090-0XX84-0FG0**
for CAN	

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SIMADYN D Control System
Communication Modules

CSH11 Communication Module

■ **Overview**
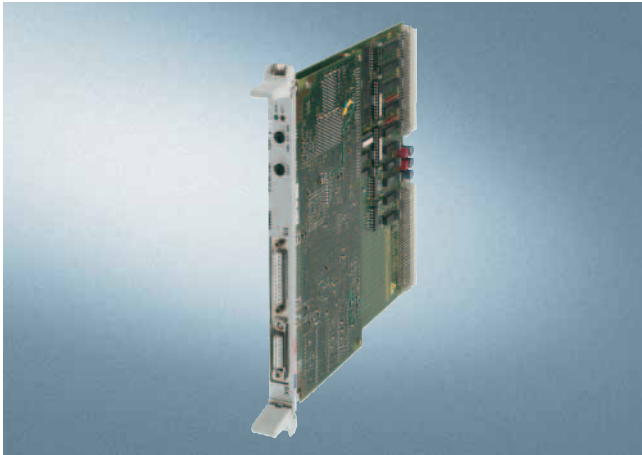
Communication connection for "Industrial Ethernet" - previously called SINEC H1.

■ **Application**

Using this interface, a process coupling can be established to higher-level automation systems.

The CSH11 can only be used in subracks with C bus (SR12, SR24) and can exchange data directly only over the C bus.

■ **Design**

- RS 485 interface for the bus
- RS 232 interface for parameterization
- Includes the CP 1470 SIMATIC communications processor
- L and C bus connection
- CSH11 modules require force-ventilated subracks - this means that they can be used in subracks SR12.1, SR12.3/SR24.1, SR24.3

■ **Function**

Setting parameters with SINEC NML

The PC software (for DOS) "SINEC NML" with the SIMADYN D-specific supplement is required to parameterize the module for the Industrial Ethernet bus.

The software, which can be downloaded at no charge from the Internet, contains a pre-configured database (e.g. for profiles and function distribution tables for layer 4 and 7 applications and application relationships).

The layer 7 functions of the CSH11 include the SINEC technological functions (STF) according to the "SINEC AP 1.0 specifications".

The data set, created using SINEC NML can be downloaded via the RS 232 interface of the CSH11.

Provided an Industrial Ethernet interface (e.g. CP 1512 (PCI) or CP 1613) is built into the PC, it is possible to load the data record through the bus.

■ **Technical specifications**

Current consumption	+ 5 V/2,5 A + 15 V/600 mA - 15 V/100 mA
Space requirement	1 slot (20.32 mm)
Weight	0.6 kg

■ **Selection and ordering data**

	Order No.
CSH11 communication module for Industrial Ethernet (SINEC H1), discontinued since 10/2003	**6DD1 661-0AB1**
SINEC NML German	**6GK1 740-0AB00-0BA0**
SINEC NML English	**6GK1 740-0AB01-0EA0**

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SIMADYN D Control System
Communication Modules

■ Overview

SIMADYN D subracks can be coupled with one another using an extremely fast fiber-optic cable coupling.

■ Application

For mastering complex open and closed-loop control and arithmetic tasks.

■ Design

Pre-assembled SIMATIC fiber-optic (glass) cables (refer to Catalog IK PI) are used to connect the modules, e.g. 6XV1820-5Bxxx.

- Connections for FOC with BF0C connectors (bayonet type); e.g. 6GK1901-0DA20-0AA0
- L and C bus connection (the modules cannot be used in subrack SR6!)
- Requires force-ventilated subracks, i.e. can be used in subracks SR12.1, .3 /SR24.1, .3.

Up to 8 slaves can be connected to a master. If additional subracks are connected to one another, several masters can also be inserted in a subrack. 8 slaves can then be connected (several master-slave arrangements) to each of these masters).

In addition, a master module can also be inserted in a slave subrack. This means that, for example, together with its associated slaves in additional subracks, a second master-slave arrangement can be established.

Any subracks can be connected with one another using this possibility of combining and cascading subracks.

■ Function

The fiber-optic cable coupling represents an approximately parallel "extension" of the L and C bus. The access to a connected subrack is realized within 5 to 8 µs per word.

All of the slaves are connected to the master module using full duplex point-to-point couplings (2 fiber-optic cables).

- Max. glass FO cable of a point-to-point coupling: 200 m (cable sold by the meter e.g. 6XV1820-5AH10 or 6XV1820-6AH10)
- A master module can, in addition to the configured process data, also transfer the following signals to the slave:
  - base sampling time (for synchronization)

CS12 Master Module

■ Overview
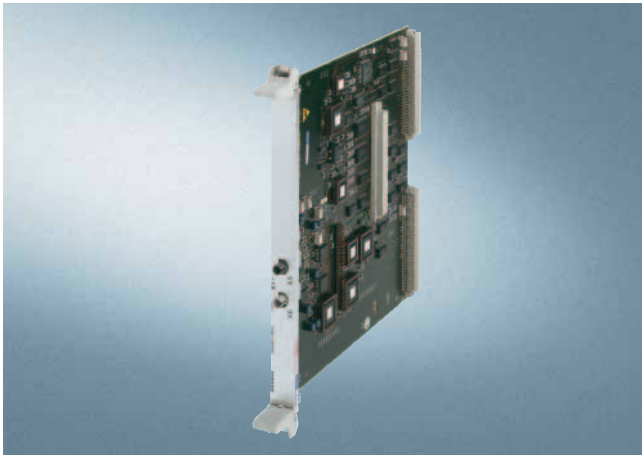
Master module of a fiber-optic cable connection to connect additional subracks through a CS22 slave module.

■ Technical specifications

Current consumption	+ 5 V/1,8 A
	+ 15 V/50 mA
Space requirement	1 slot (20.32 mm)
Weight	0.4 kg

■ Selection and ordering data

	Order No.
CS12 master module	**6DD1 660-0BA0**
for 1 slave	

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SIMADYN D Control System
Communication Modules

CS13 Master Module

■ Overview
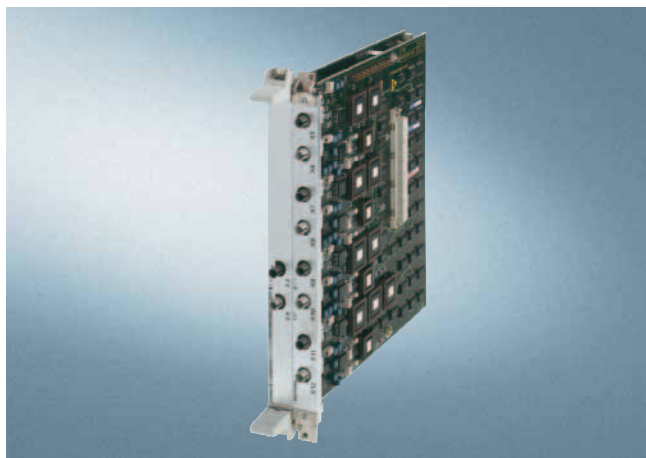
Master module of a fiber-optic cable coupling to connect up to 4 additional subracks through an appropriate number of CS22 slave modules.

■ Design

The CS13 comprises a CS12 master module on which a ICS1 module is mounted. This ICS1 module has the FO cable connections for the 4 slave modules.

The two FO cable connections of the basic CS12 module cannot be used in this configuration.

■ Technical specifications

Current consumption	+ 5 V/4 A + 15 V/100 mA
Space requirement	2 slots (40.64 mm)
Weight	0.8 kg

■ Selection and ordering data

	Order No.
CS13 master module for 4 slaves	**6DD1 660-0BB0**

CS14 Master Module

■ Overview
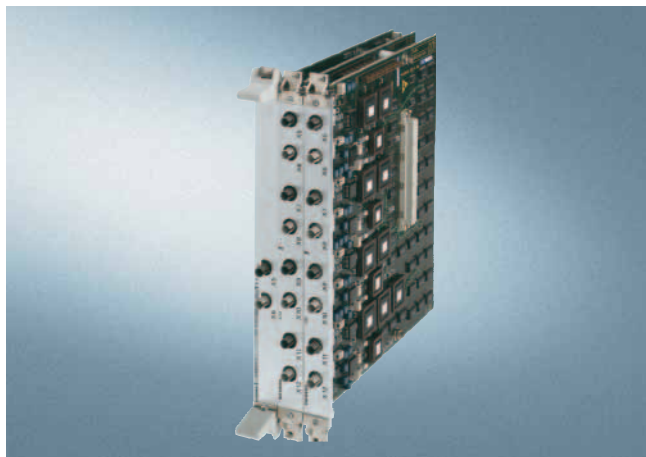
Master module of a fiber-optic cable connection to connect 8 additional subracks through an appropriate number of CS22 slave modules.

■ Design

The CS14 comprises a CS12 master module upon which two ICS1 modules are mounted. These ICS1 modules have FO cable connections for the 8 slave modules.

The two FO cable connections of the CS12 master module cannot be used in this configuration.

■ Technical specifications

Current consumption	+ 5 V/5,5 A + 15 V/150 mA
Space requirement	3 slots (60.96 mm)
Weight	1.1 kg

■ Selection and ordering data

	Order No.
CS14 master module for 8 slaves	**6DD1 660-0BC0**

5

Overview
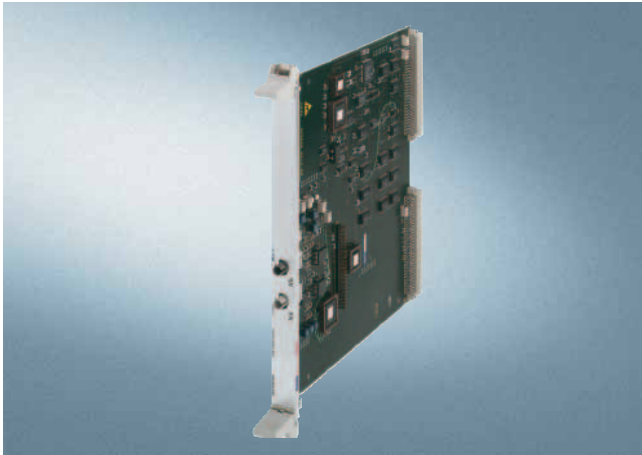
Slave module for a fiber-optic cable connection (a full duplex point-to-point coupling) to a master module CS12, CS13 or CS14.

Technical specifications

Length of glass FO cable, max.	200 m
Current consumption	+ 5 V/1,5 A + 15 V/50 mA
Space requirement	1 slot (20.32 mm)
Weight	0.4 kg

Selection and ordering data

	Order No.
CS22 slave module for a full duplex point-to-point coupling	**6DD1 660-0BD0**

Options

Standard SIMATIC components are used for the fiber-optic cable subrack coupling (refer to Catalog IK PI).

Presently, only glass-fiber-optic cables with a max. length of 200 m are released!

- Pre-assembled:
  - 6XV1 820-5B... or
  - 6XV1 820-6B... or
  - 6XV1 820-7B
- Fiber-optic cable sold by the meter, e.g.
  - 6XV1 820-5AH10 or
  - 6XV1 820-6AH10
- Connections for fiber-optic cables with BF0C plug connectors, e.g. 6GK1901-0DA20-0AA0

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SIMADYN D Control System
Communication Modules

ITSL SIMOLINK Module

Overview
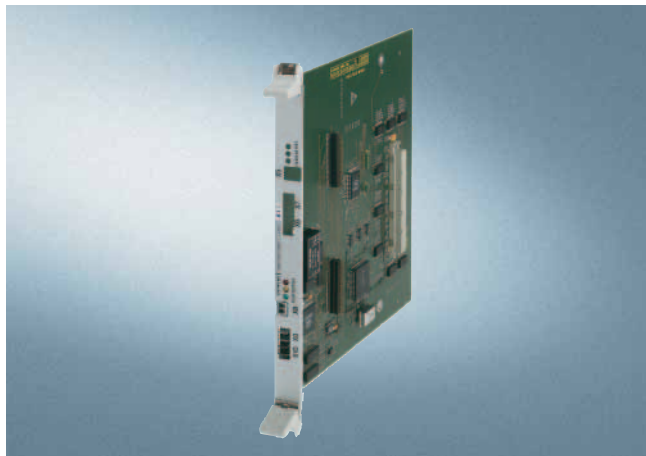
SIMOLINK interface for CPU modules (PM5, PM6) - can either be used as master or slave

Application

SIMOLINK is used above all in conjunction with the SIMOVERT MASTERDRIVES MC AC drive converters (as slaves).

Function

SIMOLINK is an extremely fast serial fiber-optic cable coupling which can also be synchronized (this is an important feature) in a ring-type topology for Siemens drive units.

Data is clocked, in the form of a large shift register, through the fiber-optic cables and the connected nodes (slaves).

Up to eight data words (each 32 bit) are assigned to each node in the shift register; when receiving, the node can read these data words and when sending, can write into them.

- For each node, up to eight 32-bit words can be sent and received
- Telegrams can be sent, synchronized to the base sampling time; beyond this, additional synchronizing types are possible
- 3 diagnostic LEDs
- Free slot for additional, optional MASTERDRIVES SIMOLINK module SLB
  (Order No.: 6SE7090-0xx84-0FJ0)

Technical specifications

Data transmission rate	11 Mbit/s
Data transmission time	6.36 µs/32-bit word
Number of bus nodes	200
Number of net data per telegram	max. 1000 32-bit words
Telegram cycle jitter	< 1 µs
Length of FO-cable, max.	40 m
Length of FO-cable (e.g. Siemens LY-1V015200/230, 10 A), max.	300 m
Current drain without SLB module	+ 5 V/0.5 A ± 15 V/6 mA
Current drain with SLB module	+ 5 V/0.7 A ± 15 V/22 mA
Space requirement	1 slot (20.32 mm)
Weight	0.3 kg

Selection and ordering data

	Order No.
ITSL SIMOLINK module	**6DD1 663-0AB0**

Options

Ordering information and instructions regarding fiber-optic cables: Refer to Catalog DA 65 (SIMOVERT MASTERDRIVES).

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Accessories

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Accessories
Interface Modules, Plug-in Cables

■ **Overview**

Interface modules represent the coupling element between the SIMATIC control system and the process. The signal cables of the process are connected at the screw/plug-in terminals of the modules.

The connection to the SIMATIC control system is established using pre-assembled plug-in cables.

An overview of which plug-in cable is used with which interface module is provided in the following table. This of course depends on the particular control system.

■ **Technical specifications**

Control system	Plug-in cable				Interface module
	Connector	Cable	Part connector	No. of pins	
T400					
T400	Terminals 67-69	SC400		3-pin to 9-pin	Engineering/service PC
SIMATIC S7-400					
FM 458-1 DP	X1	SC57		Only part 1: 9-pin to 9-pin	PC (only spline edit, service commissioning, symTrace)
	X2	SC64		9-pin to 10-pin	SU12, SB10, SB60, SB61
EXM 438-1	X1, X2	SC63		50-pin to 50-pin	SU13
	X3	SC63		50-pin to 50-pin	SU13
		SC62	A	40-pin to 5 x 10-pin	SU12, SB10, SB71
			B		SU12
			C		SU12, SB10, SB61
			D		SU12, SB10, SB61
			E		SU12
SIMATIC TDC					
CPU551	X01	SC67		8-pin to 9-pin	Configuring/service PC (local)
	X2	SC66		8-pin to 10-pin	SU12, SB10, SB60, SB61
SM500	X1, X2	SC63		50-pin to 50-pin	SU13
	X3	SC63		50-pin to 50-pin	SU13
		SC62	A	40-pin to 5 x 10-pin	SU12, SB10, SB70, SB71
			B		SU12, SB10, SB70, SB71
			C		SU12, SB10, SB60, SB61
			D		SU12, SB10, SB60, SB61
			E		SU12

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Control system	Plug-in cable				Interface module
	Connector	Cable	Part connector	No. of pins	
SIMADYN D					
PM5, PM6	X4	SC57		Only part1: 9-pin to 9-pin	Engineering/service PC
	X5	SC7		10-pin to 10-pin	SU12
CS7 with SS4	X5	SC57		Section 1: 9-pin to 9-pin / Tell 2: 26-pin to 9-pin	Engineering/service PC
EA12	X6	SC12		20-pin to 20-pin	SU11
EB11	X5	SC55	A	40-pin to 2 x 20-pin	SU11
			B		SU11
		SC13	A	40-pin to 4 x 10-pin	SU12, SB10, SB70, SB71
			B		SU12, SB10, SB70, SB71
			C		SU12, SB10, SB60, SB61
			D		SU12, SB10, SB60, SB61
	X6	SC55	A	40-ping to 2 x 20-pin	SU11
			B		SU11
		SC13	A	40-pin to 4 x 10-pin	SU12, SB10, SB70, SB71
			B		SU12, SB10, SB70, SB71
			C		SU12, SB10, SB60, SB61
			D		SU12, SB10, SB60, SB61
IT41	X6	SC49	A	50-pin to 2 x 26-pin	SU10
			B		SU10
		SC54	A	50-pin to 5 x 10-pin	SU12, SB10, SB70, SB71
			B		SU12, SB10, SB70, SB71
			C		SU12, SB10, SB60, SB61
			D		SU12, SB10, SB60, SB61
			E		SU12
	X7	SC49	A	50-pin to 2 x 26-pin	SU10
			B		SU10
		SC54	A	50-pin to 5 x 10-pin	SU12, SB10, SB70, SB71
			B		SU12, SB10, SB70, SB71
			C		SU12, SB10, SB60, SB61
			D		SU12, SB10, SB60, SB61
			E		SU12
IT42	X6	SC50		15-pin to 26-pin	SU10
	X7	SC51		25-pin to 26-pin	SU10
	X8	SC49	A	50-pin to 2 x 26-pin	SU10
			B		SU10
		SC54	A	50-pin to 5 x 10-pin	SU12, SB10, SB70, SB71
			B		SU12, SB10, SB70, SB71
			C		SU12, SB10, SB60, SB61
			D		SU12, SB10, SB60, SB61
			E		SU12
ITDC	X5, X6	SC12		20-pin to 20-pin	SU11
	X7	SC17.2		50-pin to 50-pin	SITOR interface (2 m)

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Accessories
Interface Modules, Plug-in Cables

SB10 Interface Module

Overview

The interface module is used to connect 8 digital inputs or outputs.

Application

The SB10 interface module is suitable for the SIMADYN D, SIMATIC TDC and SIMATIC S7-400 control systems.

Design

- 2 x 8 terminals to connect 8 signal cables
- Can be mounted onto standard mounting rails
- Requires an auxiliary voltage which must be externally connected (commercially available power supply units)

Function

- For digital I/Os
- Status display of the digital signals with one LED each
- Status display of the 24 V supply for the digital signals
- The signals are only transferred through; they are not electronically converted or processed

Technical specifications

Number of digital inputs or outputs	8
Electrical isolation	No
Max. cable cross-section	1.5 mm²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.3 kg

Selection and ordering data

	Order No.
SB10 interface module	**6DD1 681-0AE2**
8 digital inputs/outputs, 24 V DC	

Connection diagram
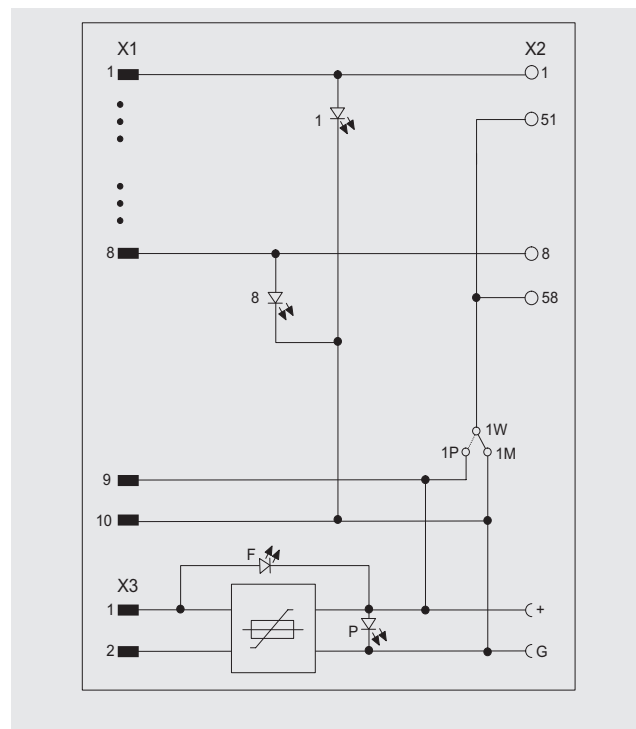
Overview

The interface module is used to connect 8 digital inputs with conversion from 120 V DC/AC to 24 V DC

Application

The SB60 interface module is suitable for the SIMADYN D and SIMATIC TDC control systems.

Design

- 3 x 8 terminals to connect 8 signal cables
- Can be mounted on DIN rails
- Requires an auxiliary voltage which must be externally connected (commercially available power supply units)

Function

- For 120 V AC digital inputs
- Voltage of the digital signal 120 V DC/AC
- Status display of the digital signals with one LED each

Technical specification

Number of digital inputs for	8
Input voltage	DC/AC 120 V
Insulation voltage	• Provides isolation between inputs and outputs
	• Provides isolation between input current circuits
	• 1125 V AC test voltage
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.31 kg

Selection and ordering data

	Order No.
SB60 interface module	**6DD1 681-0AF4**
8 digital inputs, 120 V AC	

Connection diagram

6
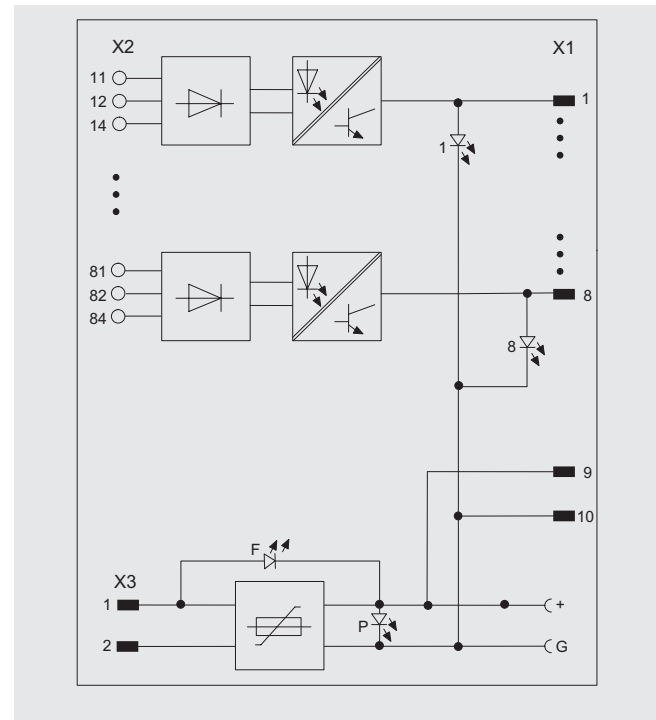
Accessories
Interface Modules, Plug-in Cables

SB61 Interface Module

■ Overview

It is used to connect 8 digital inputs with conversion from 24/48 V DC to 24 V DC.

■ Application

The SB61 interface module is suitable for the SIMADYN D, SIMATIC TDC and SIMATIC S7-400 control systems.

■ Design

- 3 x 8 terminals to connect 8 signal cables
- Can be mounted onto standard mounting rails
- Requires an auxiliary voltage which must be externally connected (commercially available power supply units)

■ Function

- For 24/48 V DC digital inputs
- Reference voltages can be separately set for the digital inputs
- Status display of the digital signals with one LED each

■ Technical specification

Number of digital inputs for	8
• Input voltage	DC 24/48 V
Electrical isolation	Yes, via optocouplers
Max. cable cross-section	1.5 mm²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.32 kg

■ Selection and ordering data

	Order No.
SB61 interface module	**6DD1 681-0EB3**
8 digital inputs, 24/48 V DC	

■ Connection diagram
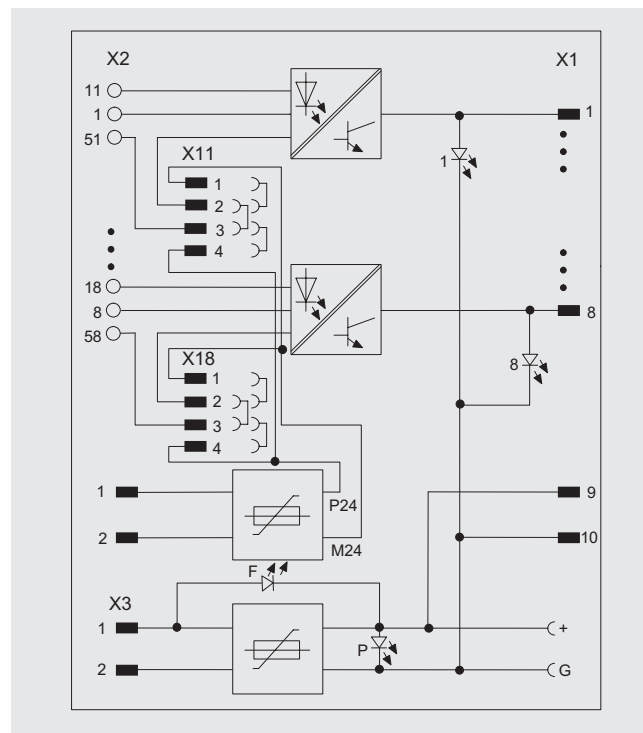
Overview

The interface module is used to connect 8 digital outputs with conversion of the 24 V DC voltage on the module side to a max. of 120 V DC/AC on the plant side using relays.

Application

The SB70 interface module is suitable for the SIMADYN D and SIMATIC TDC control systems.

Design

- 2 x 8 terminals to connect 8 signal cables; in the interface module, connected with the center, NC and NO contacts of changeover contacts (relays)
- Can be mounted on DIN rails
- Requires an auxiliary voltage which is externally connected (commercially available power supply units)

Function

- For digital outputs with relays
- The status of each digital signal is displayed using an LED

Technical specification

Number of digital outputs	8
• Output voltage, max	DC/AC 120 V
Relay switching current	
• For 120 V AC	2 A
• For 120 V DC	0.2 A
Isolation voltage	• Isolation between inputs and outputs assured
	• Provides isolation between input current circuits
	• 1125 V AC test voltage
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.32 kg

Selection and ordering data

	Order No.
SB70 interface module 8 digital outputs with relay	**6DD1 681-0AG2**

Connection diagram

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Accessories
Interface Modules, Plug-in Cables

SB71 Interface Module

Overview

The interface module is used to connect 8 digital outputs with conversion of the 24 V DC voltage on the module side to a max. of 24/48 V DC on the plant side using transistors.

Application

The SB71 interface module is suitable for the SIMADYN D, SIMATIC TDC and SIMATIC S7-400 control systems.

Design

- 2 x 8 terminals to connect 8 signal cables
- Can be mounted on DIN rails
- Requires an auxiliary voltage which is externally connected (commercially available power supply units)

Function

- For digital outputs with transistor
- Status display of the digital signals with one LED each

Technical specification

Number of digital outputs	8
Output voltage, max.	24/48 V DC
Output current, max.	40 mA, short-circuit proof
Electrical isolation	Yes, via optocoupler
Max. cable cross-section	1.5 mm²
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.32 kg

Selection and ordering data

	Order No.
SB71 interface module	**6DD1 681-0DH1**
8 digital outputs with transistors, 24/48 V DC	

Connection diagram
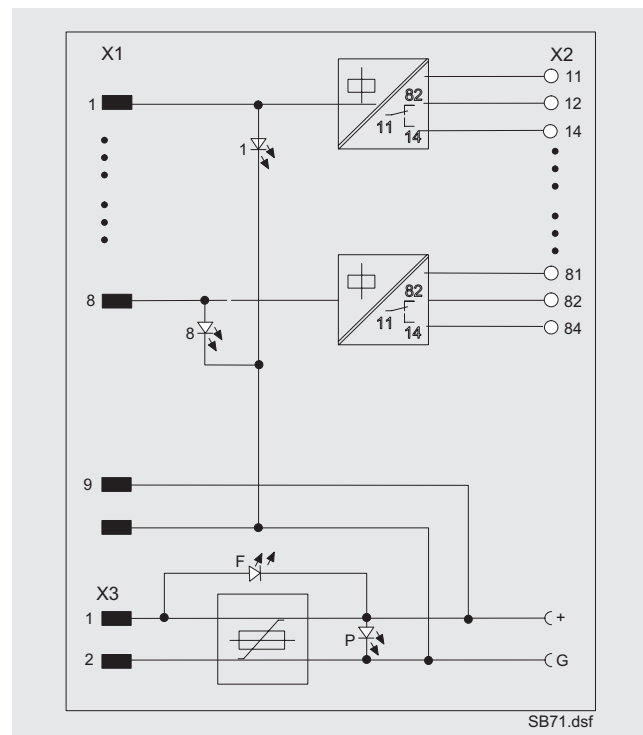
SB71.dsf

Overview

The interface module is used to connect 25 signals; there is no electronic conversion.

Application

The SU10 interface module is suitable for the SIMADYN D control system.

Design

- With 25-pin 1:1 connection
- With 26-pin plug-in terminal to connect 25 signal cables (terminal 26 is not assigned!)
- Can be mounted on DIN rails
- Requires an auxiliary voltage which is externally connected (commercially available power supply units)

Function

The following connecting cables can be used to connect to the modules:
- Cable SC49 to IT41, IT42
- Cable SC50 to IT42
- Cable SC51 to IT42

Technical specification

Number of signal cables which can be connected	25
Signal amplitude per signal, max.	60 V, 0.5 A
Electrical isolation	No
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.28 kg

Selection and ordering data

	Order No.
SU10 interface module	**6DD1 681-0FG0**
with plug-in terminal, 26-pin	

Connection diagram
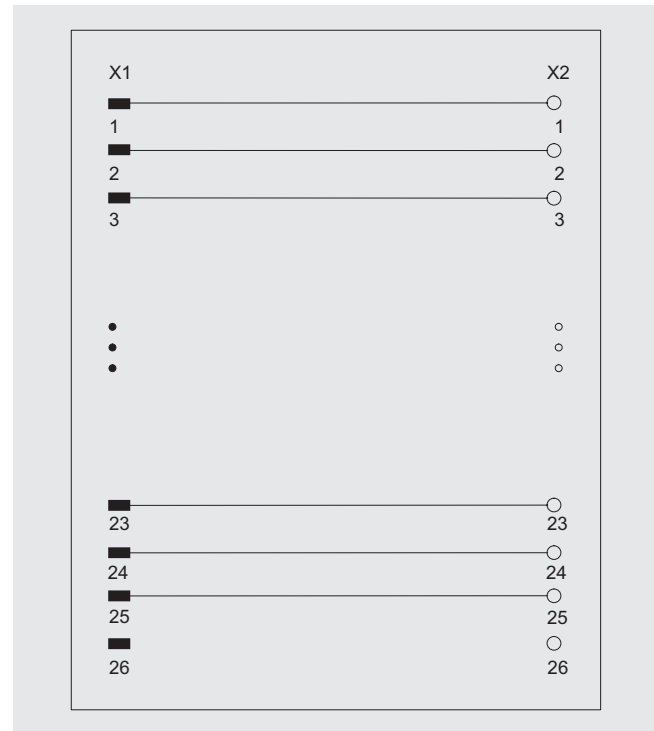
Accessories
Interface Modules, Plug-in Cables

SU11 Interface Module

■ Overview

The interface module is used to connect 20 signals; there is no electronic conversion.

■ Application

The SU11 interface module is suitable for the SIMADYN D control system.

■ Design

- With 20-pin 1:1 connection
- With 20-pin plug-in terminal to connect 20 signal cables
- Can be mounted onto standard mounting rails
- Requires an auxiliary voltage which is externally connected (commercially available power supply units)

■ Function

The following connection cables can be used to connect to the modules:
- Cable SC12 to EA12, ITDC
- Cable SC55 to EB11

■ Connection diagram

■ Technical specification

Number of signal cables which can be connected	20
Signal amplitude per signal, max.	60 V, 0.5 A
Electrical isolation	No
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.28 kg

■ Selection and ordering data

	Order No.
SU11 interface module	**6DD1 681-0EA1**
with plug-in terminal, 20-pin	
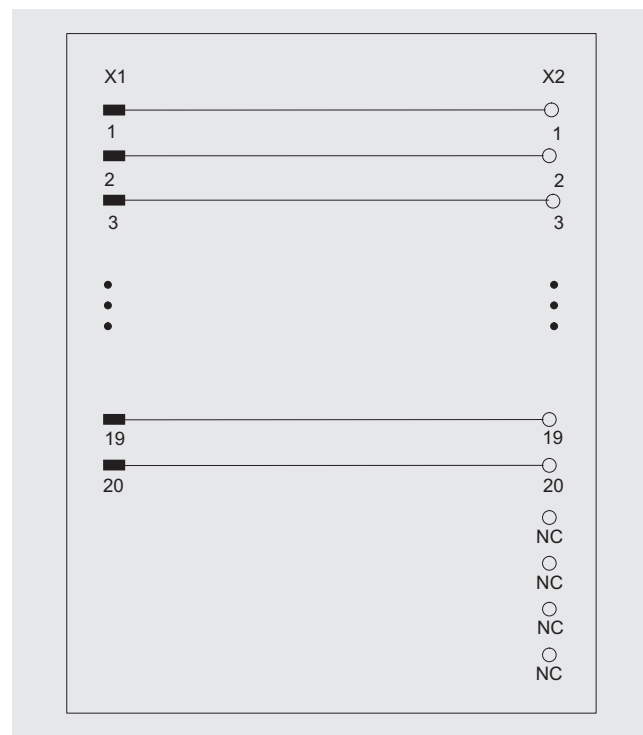
■ Overview

The interface module is used to connect 10 signals; there is no electronic conversion.

■ Application

The SU12 interface module is suitable for the SIMADYN D, SIMATIC TDC and SIMATIC S7-400 control systems.

■ Design

- With 10 pin 1:1 connection
- With 10 pin plug-in terminal to connect 10 signal cables
- Can be mounted on standard mounting rails
- Requires an auxiliary voltage which is externally connected (commercially available power supply units)

■ Function

Use the following cables to connect the SU12:
- Cable SC7 to PM5, PM6
- Cable SC13 to EB11
- Cable SC54 to IT41, IT42
- Cable SC62 to EXM 438-1, SM500
- Cable SC64 to FM 458-1 DP
- Cable SC66 to CPU551

■ Technical specification

Number of signal cables which can be connected	10
Signal amplitude per signal, max.	60 V, 0.5 A
Electrical isolation	No
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.28 kg

■ Selection and ordering data

	Order No.
SU12 interface module	**6DD1 681-0AJ1**
with plug-in terminal, 10-pin	

■ Connection diagram
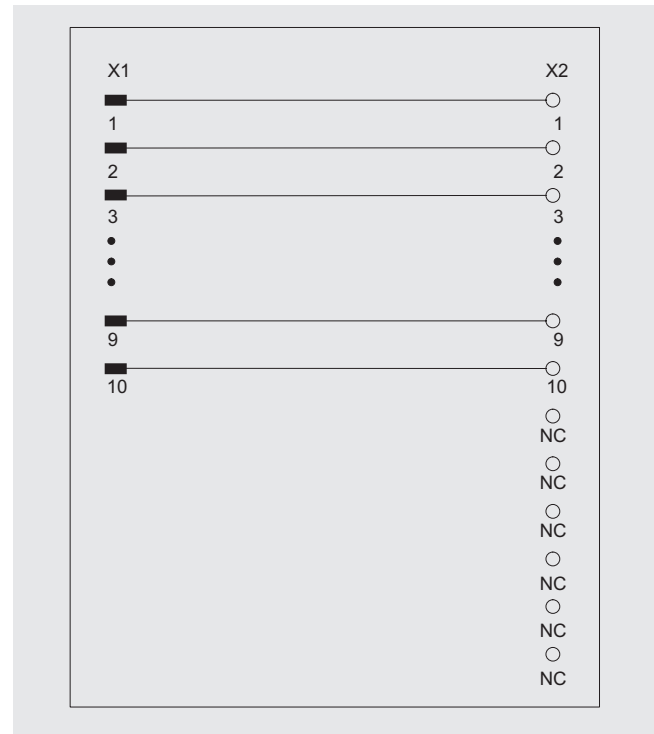
Accessories
Interface Modules, Plug-in Cables

SU13 Interface Module

■ Overview

This interface module can be used to connect 50 signals; there is no electronic conversion.

■ Application

The SU13 interface module is suitable for the control systems SIMATIC TDC and SIMATIC S7-400.

■ Design

- With 50-pin 1:1 connection
- With 50-pin plug-in terminal to connect 50 signal cables
- Can be mounted on DIN rails

■ Function

The following connecting cables can be used to connect to the modules:

- Cable SC63 to SM500
- Cable SC63 to EXM 438-1

Requires an auxiliary voltage which is externally connected (commercially available power supply units).

■ Technical specification

Number of signal cables which can be connected	50
Signal amplitude per signal, max.	60 V, 0.5 A
Electrical isolation	No
Max. cable cross-section	1.5 mm^2
Dimensions (W x H x D) in mm	45 x 130 x 156
Weight	0.3 kg

■ Selection and ordering data

	Order No.
SU13 interface module	**6DD1 681-0GK0**
with screw-plug-in terminal	

■ Connection diagram
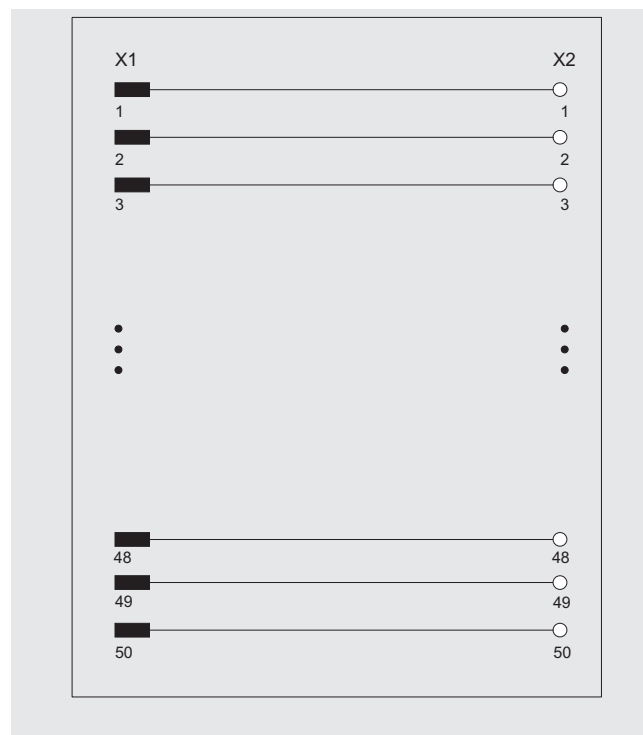
SC7 Ribbon Cable

■ Overview
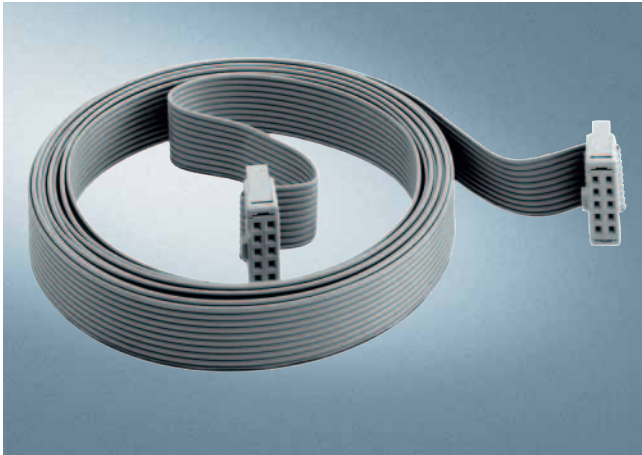
This cable is used to connect an SU12 interface module to the digital inputs of a PM5 or PM6 SIMADYN CPU.

■ Application

For the SIMADYN D CPU modules PM5, PM6 and the SU12 interface module

■ Design

• Non-shielded ribbon cable with any plug-in direction
• Length 2 m
• 10-pin socket connector to 10-pin socket connector
• 1:1 connection
• Plug connectors according to DIN 41651 with strain relief at both ends

■ Selection and ordering data

	Order No.
SC7 ribbon cable	**6DD1 684-0AH0**
between CPU PM5, PM6 and the SU12 interface module, 2 m long	

SC12 Ribbon Cable

■ Overview
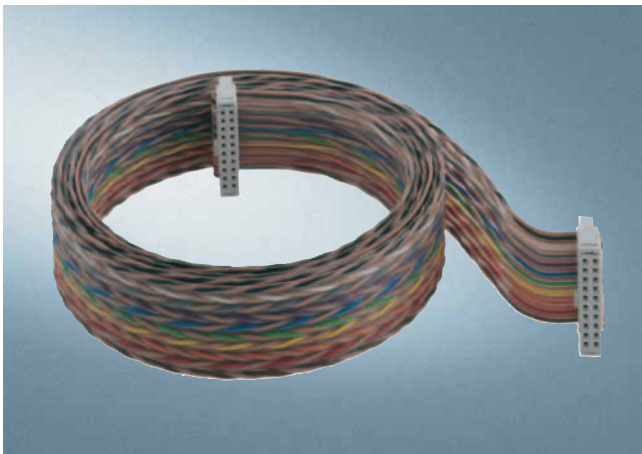
Connects the 20-pin plug connector of a SIMADYN EA12/ ITDC module with the 20-pin plug connector of an SU11 interface module.

■ Application

For the SIMADYN EA12 analog output module, the ITDC SITOR converter module and the SU11 interface module.

■ Design

• Non-shielded ribbon cable, twisted pairs, any plug-in direction
• Length 2 m
• 20-pin socket connector to 20-pin socket connector
• 1:1- connection
• Plug connectors according to DIN 41651 with strain relief at both ends

■ Selection and ordering data

	Order No.
SC12 ribbon cable	**6DD1 684-0BC0**
between the EA12/ITDC module and SU11 interface module, 2 m long	

SC17.2 Round Cable

■ Selection and ordering data

	Order No.
SC17.2 ribbon cable	**6DD1 684-0BH2**
between the ITDC modules and SITOR converter, 2 m long	

■ Overview

Round cable for connecting the SITOR interface of an ITDC SITOR module with the SITOR interface of a SITOR thyristor set or an interface module.

■ Design

• Shielded round cable
• Length 2 m
• 1:1 connection
• Sub-D plug connector (DIN 41652), 50-pin
• Sub-D socket connector, 50-pin
• Twisted pairs

6

Accessories
Interface Modules, Plug-in Cables

SC13 Ribbon Cable

Overview

Ribbon cable for connecting the 40-pin plug connector of an EB11 SIMADYN D module with the 10-pin plug connectors of 4 interface modules SU12, SB10, SB60, SB61, SB70, SB71.

Application

For the SIMADYN D EB11 digital input/output module and the SU12 and the SBxx interface modules.

Design

Non-shielded ribbon cable
- Length 2 m
- 40-pin socket connector to 4x10-pin socket connectors
- With printed partial connector designations A to D and the following assignment to the 40-pin plug connector:
  A: Pins 1 to 10
  B: Pins 11 to 20
  C: Pins 21 to 30
  D: Pins 31 to 40
- Plug connectors according to DIN 41651 with strain relief at both ends

Selection and ordering data

	Order No.
SC13 ribbon cable	**6DD1 684-0BD0**
between DI/DO EB11 module and 5 interface modules SU12, SB10, SB60, SB61, SB70 and SB71, 2 m long	

SC55 Ribbon Cable

Overview
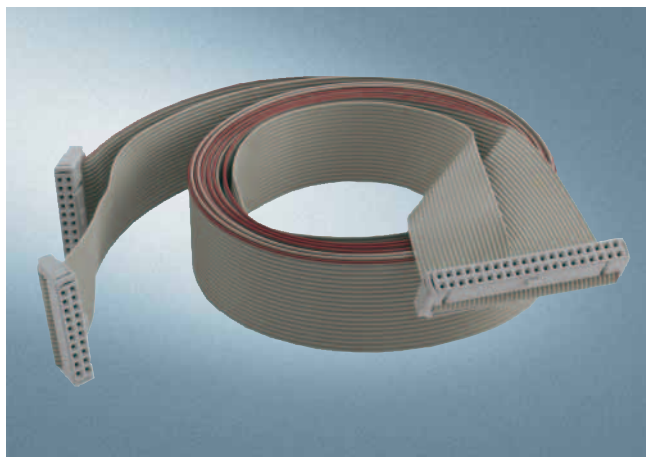
Ribbon cable for connecting the 40-pin plug connector of an EB11 SIMADYN D module with the 20-pin plug connectors of 2 SU11 interface modules.

Application

For connecting digital input/output EB11 SIMADYN D module with the SU11 interface module.

Design

- Non-shielded ribbon cable
- Length 2 m
- 40-pin socket connector to 2x20-pin socket connectors
- With printed part connector designations A to D and the following assignment to the 40-pin plug connector:
  A: Pins 1 to 20
  B: Pins 21 to 40
- Plug connectors according to DIN 41651 with strain relief at both ends

Selection and ordering data

	Order No.
SC55 ribbon cable	**6DD1 684-0FF0**
between DI/DO EB11 module and 2 SU11 interface modules, 2 m long	

6

SC49 Round Cable

■ **Overview**

Round cable for connecting the 50-pin socket connector of an IT41/IT42 module with the 26-pin plug connectors of 2 SU10 interface modules.

■ **Application**

For the IT41/IT42 SIMADYN D digital input/output modules and the SU10 interface module.

■ **Design**

• Shielded round cable
• Length 2 m
• 50-pin sub-D plug connector to 2x26-pin socket connectors
• With printed part connector designations A to B and the following assignment to the 50-pin Sub-D plug connector:
  A: Pins 1 to 25
  B: Pins 26 to 50
• Cable ends, with strain relief:
  - at the module: Sub-D plug connector acc.to DIN 41 652
  - at the interface module: Plug connector acc. to DIN 41 651

■ **Selection and ordering data**

	Order No.
SC49 round cable	**6DD1 684-0EK0**
between IT41/IT42 modules and 2 SU10 interface modules, 2 m long	

SC50 Round Cable

■ **Overview**

Round cable for connecting the 15-pin sub-D socket connector of an IT42 module with the 26-pin plug connector of an SU10 interface module.

■ **Application**

For the SIMADYN D IT42 digital/analog input/output modules and the SU10 interface module.

■ **Design**

• Shielded round cable
• Length 2 m
• 15-pin sub-D plug connector to 26-pin socket connector
• 1:1 connection
• Pins 16 to 26 of the socket connector are not assigned
• Cable ends, with strain relief:
  - at the module: Sub-D plug connector acc.to DIN 41652
  - at the interface module: Plug connector acc.to DIN 41651

■ **Selection and ordering data**

	Order No.
SC50 round cable	**6DD1 684-0FA0**
between the IT42 module and SU10 interface module, 2 m long	

6

Accessories
Interface Modules, Plug-in Cables

SC51 Round Cable

▪ Overview

Round cable for connecting the 25-pin sub-D socket connector of an IT42 module with the 26-pin plug connector of an SU10 interface module.

▪ Application

For the SIMADYN D IT42 digital/analog input/output modules and the SU10 interface module.

▪ Design

• Shielded round cable
• Length 2 m
• 25-pin sub-D plug connector to 26-pin socket connectors
• 1:1 connection
• Pin 26 of the socket connector is not assigned
• Cable ends, with strain relief:
  - at the module: Sub-D plug connector acc. to DIN 41652
  - at the interface module: Plug connector acc. to DIN 41651

▪ Selection and ordering data

	Order No.
SC51 round cable	**6DD1 684-0FB0**
between the IT42 module and SU10 interface module, 2 m long	

SC54 Round Cable

▪ Overview

Round cable for connecting the 50-pin sub-D socket connector to an IT41/ IT42 module with the 10-pin plug connectors of 5 interface modules SU12, SB10, SB60, SB61, SB70 and/or SB71.

▪ Application

For the IT41/IT42 digital/analog input/output modules and the SU12 and SBxx interface modules.

▪ Design

• Shielded round cable
• Length 2 m
• 50-pin sub-D plug connector to 5x10-pin socket connectors
• With printed part connector designations A to E and the following assignment to the 50-pin Sub-D plug connector:
  A: Pins 1 to 10
  B: Pins 11 to 20
  C: Pins 21 to 30
  D: Pins 31 to 40
  E: Pins 41 to 50
• Cable ends, with strain relief:
  - at the module: Sub-D plug connect. acc. to DIN 41 652
  - at the interface module: Plug connector acc. to DIN 41 651

▪ Selection and ordering data

	Order No.
SC54 Round cable	**6DD1 684-0FE0**
between the IT41/IT42 modules and interface modules SU12, SB10, SB60, SB61, SB70 and/or SB71, 2 m long	

■ Overview

The round cable set comprises 2 cables to connect an operator control or configuring PC to a SIMATIC control system. Service & commissioning and programs can be downloaded through this data transmission link.

■ Application

For PC to the PM5/PM6 SIMADYN D CPU modules, the FM 458-1 DP application module or the CS7 carrier module with the SS4 communication module.

■ Design

Part 1
• Shielded round cable, twisted pairs
• Length 10 m
• Sub-D socket connector, 9 pin (on the PC side)
• Sub-D socket connector, 9 pin, for the CPU module or Part 2

Part 2
• Shielded round cable, twisted pair
• Length 0.5 m
• Mini Sub-D socket connector, 26 pin (on the CS7/SS4 side)
• 9-pin Sub-D socket connector to connect at Part 1

■ Function

Part 1

9-pin/9-pin for PM5/6 ↔ PC

With Part 1, the serial RS 232 interface (V.24) of a PM5, PM6 CPU module or an FM 458-1 DP application module can be connected to the serial interface of a PC (COM1 or COM2).

Part 2

Adapter cable, 26-pin to 9-pin for CS7/SS4 ↔ Part 1

Part 2 is used as adapter in order to be able to connect a CS7 with SS4 to a PC through Part 1.

■ Selection and ordering data

	Order No.
SC57 round cable set between a PC and PM5/6, FM 458-1 DP or CS7 with SS4	**6DD1 684-0FH0**

Accessories
Interface Modules, Plug-in Cables

SC62 Interface Cable

Overview

This cable is used to connect the SIMATIC TDC SM500 peripheral module (I/O) or the SIMATIC S7-400 EXM 438-1 expansion module to up to 5 interface modules SB10, SB60, SB70, SB61 SB71 and/ or SU12.

Application

For the digital inputs/outputs of the SIMATIC TDC SM500 peripheral module (I/O), the SIMATIC S7-400 EXM 438-1 expansion module and for the SBxx and SU12 interface modules

Design

- Shielded round cable
- 5 x connector, 10 pin
- 50-pin connector (on the module side)
- Length 2 m

Selection and ordering data

	Order No.
SC62 interface cable	**6DD1 684-0GC0**
between the SM500 or EXM 438-1 module and a max. of 5 interface modules SB10, SB60, SB70, SB61 SB71 and/or SU12, 2 m long	

SC63 Interface Cable

Overview

This cable is used to connect the SIMATIC TDC SM500 peripheral (I/O) module or the SIMATIC S7-400 EXM 438-1 expansion module to a SU13 interface module.

Application

For the SIMATIC TDC SM500 peripheral (I/O) module, the SIMATIC S7-400 EXM 438-1 expansion module and the SU13 interface module.

Design

- Shielded round cable
- 2 x 50-pin connectors
- Length 2 m

Selection and ordering data

	Order No.
SC63 interface cable	**6DD1 684-0GD0**
between an SM500 or EXM 438-1 module and SU13 interface module, 2 m long	

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SC64 Interface Cable

◼ Overview

(Similar to cable shown)

Interface cable for the basic FM 458-1 DP module and the SB10, SB60, SB61 and SU12 interface modules.

◼ Design

• Round cable
• Length 2 m

◼ Function

The SC64 interface cable is used to connect terminal X2 of a SIMATIC FM 458-1 DP module to an SBxx or SU12 interface module in order to be able to use the interrupt-capable, digital inputs of the FM 458-1 DP.

◼ Selection and ordering data

	Order No.
SC64 interface cable	**6DD1 684-0GE0**
between the FM 458-1 DP (X2) module and an SBxx or SU12 interface module, 2 m long	

SC66 Interface Cable

◼ Overview

Interface cable for the SIMATIC TDC CPU551 processor module and the SB10, SB60, SB61 and SU12 interface modules

◼ Design

• Shielded round cable
• Coded RJ-45 connector, 10 pin
• Connector 10 pin
• Length 2 m

◼ Function

This interface cable is used to connect terminal X2 of a SIMATIC TDC CPU CPU551 module with an SB10, SB60, SB61 or SU12 interface module in order to be able to use the interrupt-capable, digital inputs of the CPU551.

◼ Selection and ordering data

	Order No.
SC66 interface cable	**6DD1 684-0GG0**
between the CPU551 and the SB10, SB60, SB61 or SU12 interface module, 2 m long	

6

Accessories
Interface Modules, Plug-in Cables

SC67 Service Cable

Overview

Service cable for the SIMATIC TDC CPU551 processor module and a local engineering/service PC.

Design

- Shielded round cable
- Coded RJ-45 connector, 10 pin (CPU side)
- Sub-D socket connector, 9 pin (on the PC/PG side)
- Length 7 m

Function

This service cable is used to connect the service interface X1 of a SIMATIC TDC CPU CPU551 module to the serial interface of a PC/PG.

Selection and ordering data

	Order No.
SC67 service cable	**6DD1 684-0GH0**
between CPU551 and PG/PC, 7 m long	

SM11 Power Supply Connector

Overview
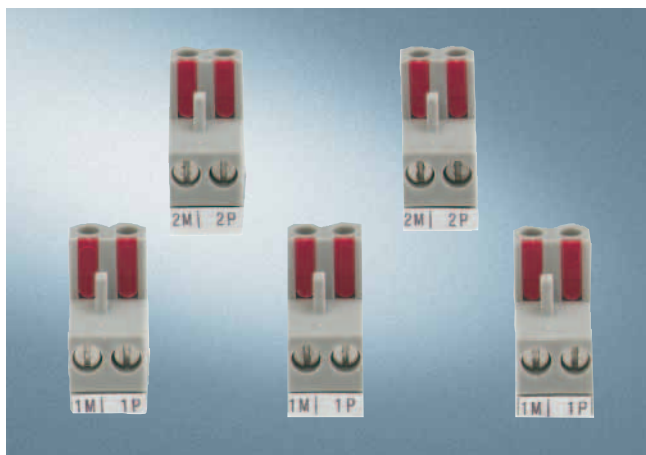
(Image is similar)

5 connectors with labeling (M/P) for connecting power supply for the SB10, SB60, SB70, SB61 and SB71 interface modules.

Selection and ordering data

	Order No.
SM11 power supply connector	**6DD1 680-0BB0**
for interface modules	

6

■ **Overview**

This battery is installed in the SR12 and SR24 SIMADYN D sub-racks.

■ **Design**

• Lithium battery 3.4 V, 5 Ah
• Size C (baby cell)

■ **Function**

The battery is used to save data when the line supply or power supply fails.

■ **Selection and ordering data**

	Order No.
Back-up battery	**6EW1 000-7AA**
for the SR12/SR24 subrack	

6

Accessories

Software

7

Software
Introduction

Configuring Software

■ Overview
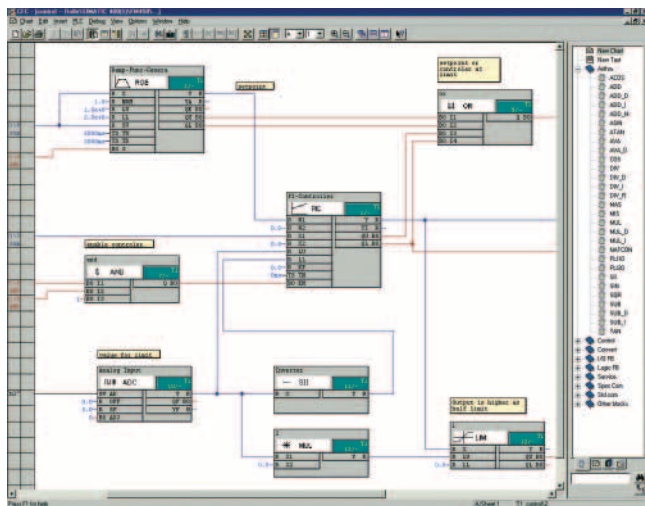
The required hardware and the programs running on the processor modules (T400 technological module, FM 458-1 DP application module, SIMATIC TDC CPU551 and SIMADYN D PM5 or PM6) are configured on a PC using graphic configuring and engineering tools. These engineering tools are in the form of function blocks which can be used to implement closed-loop control functions.

These tools are unified and integrated with the standard SIMATIC tools so that in addition to shared data management and communications, you also have the TIA Benefits - lower engineering costs when generating and servicing your automation solutions. This increases the productivity of machines and plants as well as the productivity of configuring engineers, programmers and operators.

The SIMATIC Manager, included in STEP 7, handles the program and project management. HW Config, included with SIMATIC Manager, is used to configure the hardware platform and parameterize its various properties.

The Engineering Editors CFC (SCL is not required) and optionally SFC are used to graphically program or configure the system in an object-oriented fashion.

- In the **Continuous Function Chart** (CFC), the function blocks are added and interconnected corresponding to the technological requirements. The appropriate blocks are dragged & dropped into the appropriate chart. The configuring engineer defines in which of the five possible cycle times (tasks) the function blocks should be located and also in which run sequence.

- The **Sequential Function Chart** (SFC) is used for program sections which run in sequence and which progress from one program step to the next program step dependant on conditions. The (technological) functions, generated with CFC, are controlled and selectively processed in the SFC.

Simple arithmetic, communications, logic, trigonometrical and closed-loop control blocks up to complex technological blocks for Motion Control (gears, positioning, cam disks, drum-type shears, and many more) are provided in the STEP 7/CFC/SFC library **D7-SYS**. These provide the optimum function blocks for every conceivable application.

The required program flow, which means processing tasks in cycles which are repeated, or after process synchronizing interrupts are received, is controlled by allocating run properties. This means that the sampling time and the processing sequence within a sampling time is defined for each individual block.

When configuring modules and function blocks, data which is entered is subject to a logical and syntax check. Incorrect entries are flagged using appropriate error messages.

Further, selection boxes make configuring easier. The objects used, e.g. symbolic addresses to access the peripherals (i.e. I/O) are offered contact-sensitive.

The graphic editors automatically generate entries in the margins with target and source information for signals which are used over several sheets. The function charts can be printed-out so they look exactly the same as they are when displayed on the screen. This provides powerful documentation.

The completed function charts are directly compiled into machine code, run-time optimized and then downloaded into the program memory of the processor module. The program can be downloaded using either integrated or external PC-card drives or alternatively online via a serial download link).

The CFC test mode provides an extremely user-friendly and transparent graphic tool to test function charts and to commission the automation system.

Windows are opened by clicking on the block inputs or outputs with the mouse. The actual values are displayed in these windows and values can be changed. Further, block connections can also be changed by clicking on them with the mouse and the function blocks can be deleted and inserted online. These changes are always made together with the CFC source code, provided on the PC, so that inconsistencies are avoided.

As a result of the standard configuring and engineering tool for all control systems, it is also very easy to port complete application software packages or just parts of them onto other types of processor or technological modules.

■ Application

Applications to be implemented using the SIMATIC control systems are configured using CFC function blocks. These function blocks are configured on a PG/PC.

The configuring software includes over 300 function blocks as well as the code to initialize the hardware and the real-time operating system which has been tailored for fast closed-loop controls and free configuring.

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■ **Configuration**

The SIMATIC Industrial Software provides various tools to solve drive and automation tasks using the SIMATIC and SIMATIC S7 control systems.

The SIMATIC Software Tools STEP 7 and CFC (optionally, SFC) are used for configuring. These are supplemented by the D7-SYS software package dedicated to control systems.

D7-SYS includes:

• Hardware and function block catalog

• Fast operating system

• Code generator to generate the machine code

• Driver software to connect to the control system

STEP 7, CFC and D7-SYS are also available as a favorably-priced complete package "D7-ES" (Engineering System).

The Engineering Tools can run on Windows PCs. They have an object-orientated Windows interface which allows the hardware and technological functions to be intuitively configured and engineered.

The complete documentation is also available online on the PC for the STEP 7/CFC configuring environment and with expanded functionality specific to D7-SYS. This documentation can then be called-up in a context sensitive fashion.

The STEP 7 basis software includes the software tools "SIMATIC Manager" and the "Hardware Configuration" (HW Config) which are used to configure the control system.

The SIMATIC Manager manages the data of all of the projects. This is done independently of the target system - i.e. absolutely identical for the SIMATIC S7 and SIMATIC control systems.

Refer to Catalog ST 70 for the ordering data of the SIMATIC Industrial Software STEP 7, CFC and SFC.

7

Software
Configuring with STEP 7/CFC

D7-SYS Function Block Library

■ Overview
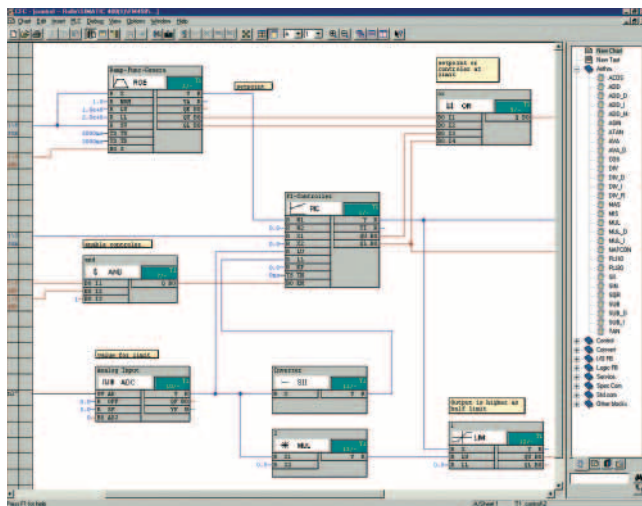
- Add-on for STEP 7/CFC/SFC for programming control and automation tasks with T400, FM 458, SIMADYN D or SIMATIC TDC
- Contains function blocks for every application
- For customers who do not own STEP 7 software:
  D7-ES, comprising D7-SYS, STEP 7, CFC and, as an option, SFC
- *D7-FB-Gen*, function block generator for generating own function blocks

■ Benefits

The uniformity provided by programming with the SIMATIC standard tools STEP 7, CFC and (option) SFC enables, in addition to common data saving and communication, use of the TIA advantages associated with reduced engineering requirements during the generation and maintenance of automation solutions. This means that increased productivity is achieved for machines and systems, as well as for the planning engineers, programmers, operators and servicing technicians.

■ Application

The D7-SYS engineering tool provides the optimum function blocks for every application. Simple:
- Arithmetic blocks
- Communication blocks
- Logic blocks
- Control loop blocks

are available, as well as technological blocks for motion control, e.g.:
- Gearbox
- Position controller
- Cam
- Shears
- etc.

The engineering tool is used as an add-on to STEP 7/CFC/SFC.

The user block generator can be applied if the standard blocks available are insufficient for special applications. User-specific function blocks can then be generated in C, and can be used in the CFC.

D7-ES complete packages

The D7-ES and D7-ES-SFC complete packages are recommended for customers not having any STEP 7 software. In addition to D7-SYS, these also contain STEP 7, CFC and SFC (only with D7-ES-SFC).

The complete software package thus provides all the required software required for configuring.

D7-FB-Gen block generator

The function-block generator enables advanced users to generate their own function blocks in addition to the existing D7-SYS library

■ Function

The object-oriented graphical programming or configuration is performed with the engineering editors CFC and SFC.

The function blocks are positioned and connected in the diagram with the help of the graphical editor continuous function chart (CFC) in accordance with the technological requirements.

SCL is not required for compilation and download.

The step sequence Editor SFC to combine CFC programs is optionally available. This provides a user-friendly transparent sequence control.

Sequential programs can be easily generated using SFC by controlling and selectively processing (technological) functions generated with CFC.

The SIMATIC Manager contained in STEP 7 manages the program and project administration. The required hardware is compiled and configured with the provided HW Config.

■ Selection and ordering data

	Order No.
SIMATIC D7-SYS	
Function block library for configuration of control and automation tasks on CD, German, English, with electronic documentation	
V6.1, Single license	**6DD1 801-5DA8**
V6.1, Upgrade V4.x or higher	**6DD1 807-5DA8**
V6.2, Floating license[1]	**6DD1 801-5DA9**
V6.2, license Disk, Floating license[1]	**6DD1 801-5AA9**
V6.2, Upgrade V4.x or higher[1]	**6DD1 807-5DA9**
SIMATIC D7-SYS-SFC	
Function block library for configuration of control and automation tasks; incl. sequence generator on CD, German, English, with electronic documentation	
V6.1, Single license	**6DD1 801-7DA8**
V6.2, Floating license[1]	**6DD1 801-7DA9**
V6.2, Upgrade license[1]	**6DD1 807-7DA9**

1) V6.2: can be delivered as of 03/2005

D7-ES Complete Package

Overview

Complete software packages to engineer and configure SIMATIC control system with STEP 7/CFC and, optionally, SFC.

Application

We recommend these complete packages for users who still do not have any STEP 7 software.

Design

- SIMATIC STEP 7 (includes SIMATIC Manager and HW Config)
- Engineering Tool CFC
- Engineering Tool SFC (optional)
- Library supplements D7-SYS (incl. documentation on CD-ROM in German and English)

Selection and ordering data

	Order No.
SIMATIC D7-ES	
comprising STEP 7, CFC and D7-SYS	
V6.1, Single license	**6DD1 801-4DA8**
V6.2, Floating license[1]	**6DD1 801-4DA9**
SIMATIC D7-ES-SFC	
comprising STEP 7, CFC, D7-SYS and SFC	
V6.1, Single license	**6DD1 801-6DA8**
V6.2, Floating license[1]	**6DD1 801-6DA9**

1) V6.2: can be delivered as of 03/2005

D7-FB-Gen Block Generator

Overview

The function block generator allows experienced users to generate their own function blocks to supplement the existing D7-SYS library.

Application

The function block generator to generate D7-SYS function blocks in the ANSI-C programming language is used, among other things if existing high-level programs are to be run and if specific technological know-how in the control system is to be protected.

Function

Block generation is supported by integrated example function blocks and a project-orientated generation with an integrated compiler.

Selection and ordering data

	Order No.
SIMATIC D7-FB-Gen V2.1, incl. SP2	**6DD1 805-5DA0**
generator to generate your own function blocks	

Channel-DLLs to Couple to WinCC

Overview

A channel DLL is required in order to connect SIMATIC TDC or SIMADYN D to WinCC.

Application

Using these channel DLLs, SIMATIC TDC or SIMADYN D stations with the S5-PMC protocol can be coupled to WinCC.

Selection and ordering data

	Order No.
Channel DLL for	
PMC Communications channel for SIMATIC TDC - TCP/IP	**2XV9450-1WC43-0KX0**
SIMADYN D - PMC Communications channel for Industrial Ethernet	**2XV9450-1WC43-0AX0**
SIMADYN D - PMC Communications channel for PROFIBUS	**2XV9450-1WC43-0BX0**

Further Information

under

Siemens AG
Industrial Solutions and Services IT Plant Solutions
I&S IT PS 21
Werner-von-Siemens-Str. 60
91052 Erlangen
Germany

http://www.siemens.de/it4industry

E-mail:
info@it4industry.de

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Software
Configuring with STEP 7/CFC

CFC Function Blocks (D7-SYS V6.1)

■ Overview

The function block files are sub-divided into a standard library, GMC library (Motion Control), technological library and various libraries which are dependant on the platform.

Control blocks

DEL	Dead line block
DEZ	Dead zone block
DIF	Differentiator block
DT1	Differentiator block with smoothing
FUZ	Fuzzy controller REAL
FUZ_I	Fuzzy controller INT
INT	Integrator
INT_M	Modulo integrator for integration w/ the correct axis cycle
LIM	Limiter
LIM_D	Limiter DINT
PC	P controller
PIC	PI controller
PT1	PT1 smoothing element
PWM	Pulse-width modulator
RGE	Ramp-function generator
RGJ	Ramp-function generator with jerk limiting

General Motion Control (GMC)

MDCMP	Compensation block with mode changeover
CAMSW	Cam block with 2 cams
CATCH	Catch-up/shutdown
EDC	Engager/disengager
NAVMC	Speed/position actual value sensing
POSREG	Read-out position register
PHSFT	Phase shifter
ADDAZ	Adder with axis cycle limiting
SPLINE	Spline with 32 points and gradient input (calculation)
CAMD	Cam disk
TABCAM	Cam disk in a tabular form
POSMC	Positioning block
OFSSAV	Offset calculation
OFSGEN	Offset input
GEAR	Gearbox block
INT_MR	Virtual master
WEBSFT	Measured value shift
OVFHSK	Overflow-handshake handling
TAB	Administering tabular values, REAL
TAB_D	Administering tabular values, DINT
DRVIF	Interface to the drive
MDCMP1	Basic and equalization functions for Motion Control
CLUTCH	Clutch-in/clutch-out (coupling)
SHEAR	Cross-cutter/transverse seamer
EDC1	Engager/disengager
MCSB	Generating motion sequences (basis block)
MCSS	Generating motion sequences (subsequent block)
CAMSW1	Cam controller for timed operations

Arithmetic blocks

ACOS	Arccosine function
ADD	Adder
ADD_I	Adder INT
ADD_D	Adder DINT
ADD_M	Modulo adder for adding with the correct axis cycle
ASIN	Arcsine function
ATAN	Arctangent function
AVA	Absolute value generator with sign evaluation
AVA_D	Absolute value generator DINT
COS	Cosine function
DIV	Divider
DIV_I	Divider INT
DIV_D	Divider DINT
DIV_R	Divider REAL
FRM	Formula block to compute complex formulas with up to 12 variables
MAS	Maximum evaluator
MIS	Minimum evaluator
MUL	Multiplier
MUL_I	Multiplier INT
MUL_D	Multiplier DINT
NATCON	Natural constant
PLI10	Polygon curve, 10 points
PLI20	Polygon curve, 20 points
SII	Inverter
SIN	Sine function
SQR	Square-root extractor
SUB	Subtractor
SUB_I	Subtractor INT
SUB_D	Subtractor DINT
TAN	Tangent function

Logic blocks

AND	AND block (BOOL)
AND12	AND block, status word (WORD)
AND_W	AND block (WORD)
NAND	NAND block (BOOL)
NOR	NOR block (BOOL)
NOT	Inverter (BOOL)
NOT_W	Inverter status word (WORD)
OR	OR block (BOOL)
OR_12	OR block, status word (WORD)
OR_W	OR block, status word (WORD)
XOR	Exclusive OR block (BOOL)
XOR_W	Exclusive OR block, status word (WORD)

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Timers

MFP	Pulse generator (BOOL)
PCL	Pulse contractor (BOOL)
PDE	Switch-on delay (BOOL)
PDF	Switch-off delay (BOOL)
PST	Pulse extender (BOOL)

Counters

CTR	Counter (BOOL)
UDI	Up-down pulse evaluator (BOOL)

Comparators

NCM	Numerical comparator (REAL)
NCM_I	Numerical comparator (INT)
NCM_D	Numerical comparator (DINT)

Switches

ANS	Automatic numerical changeover switch (REAL)
ANS_I	Automatic numerical changeover switch (INT)
BSW	Binary changeover switch (INT)
NSW	Numerical changeover switch (REAL)
NSW_D	Numerical changeover switch (DINT)
NSW_I	Numerical changeover switch (INT)

Multiplexers

DX8	Demultiplexer, 8 outputs, can be cascaded (REA)L
DX8_I	Demultiplexer, 8 outputs, can be cascaded (INT)
MUX8	Multiplexer, can be cascaded (REAL)
MUX8_I	Multiplexer, can be cascaded (INT)

Memories

CNM	Controllable numerical quantity (REAL)
CNM_D	Controllable numerical quantity (DINT)
CNM_I	Controllable numerical quantity (INT)
DFR	D flipflop, R-dominant (BOOL)
DFR_W	Reset-dominant D flipflop (WORD)
RSR	RS flipflop, R-dominant (BOOL)
RSS	RS flipflop, S-dominant (BOOL)

Data puffer

DAT	Data memory I/O of REAL values in/out of a data mem.
DLB	Delay block (REAL)
SAV	Value buffer (REAL)
SAV_B	Value buffer (BOOL)
SAV_D	Value buffer (DINT)
SAV_I	Value buffer (INT)
SAV_TR	Save FB for NOV_RAM

Input/output blocks

ADC	Analog input via A/D converter
AFC	Analog input via V/f/D converter
AENC	Absolute value encoder (SSI/EnDat)
BII8	Digital input
BIQ8	Digital output
BIQT	Digital input/output on T400

DAC	Analog output
NAV	Speed/position actual value sensing
NAVS	Speed/position/position difference sensing
SBI	Input, status byte
SBM	Speed encoder block
SBQ	Output, status byte

T400-specific couplings

@PEER	Peer-to-peer central block on T400
@USS_M	USS master central block on T400
@USS_S	USS slave central block on T400

FM 458-specific couplings

@CPD	P-bus coupling, central block
BRCV	Block-oriented data receipt through S7 connection
S7RD	Reading from the peripheral area of the S7-CPU (REAL)
S7RD_B	Reading from the peripheral area of the S7-CPU (BOOL)
S7RD_I	Reading from the peripheral area of the S7-CPU (INT)
S7RD_D	Reading from the peripheral area of the S7-CPU (DINT)
S7WR	Writing into the peripheral area of the S7-CPU REAL)
S7WR_B	Writing into the peripheral area of the S7-CPU (BOOL)
S7WR_I	Writing into the peripheral area of the S7-CPU (INT)
S7WR_D	Writing into the peripheral area of the S7-CPU (DINT)

SIMOLINK drive couplings

@SL	Central and initialization block
SLAV	Receive block, one for each actual value
SLAV_R	Receive block, one for each actual value (REAL)
SLD	Delta evaluation
SLDIS	Dispatcher
SLSV	Send block, one for each setpoint
SLSV_R	Send block, one for each setpoint (REAL)
SLSV2	Send block for 2 setpoints
SLSV2_R	Send blocks for 2 setpoints (REAL)

Parameter assignment

CBCONF	COMBOARD configuration
CBRFAW	Receives alarms from a COMBOARD
@CSPAR	Parameter processing on CPU modules
@FMPAR	Parameter processing on an FM 458-1 DP module
@DRIVE	Device coupling, parameter processing on T400
PLIM	Operator parameter limit (REAL)
PLIM_B	Operator parameter limit (BOOL)
PLIM_I	Operator parameter limit (INT)
PLIM_D	Operator parameter limit (DINT)
PNAME	Parameter names
PSTAT	Release to change a parameter
PTRANS	Parameter transfer on T400
RFAW	Receives errors and alarms on a BASEBOARD-T400 from a TECH/COMBOARD
SYNCT4	Synchronization on T400
TFAW	Sends errors and alarms from a TECHBOARD T400 to a BASEBOARD

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Software
Configuring with STEP 7/CFC

CFC Function Blocks (D7-SYS V6.1)

Data type conversion blocks

B_W	Converter, 16 binary quantities in a status word
BNR	Binary thumbwheel switch input
B_DW	Converter, 32 binary quantities into a DWORD (32 bit)
BY_W	Status byte to status word converter
D_I	Double integer to integer converter
D_R	Double integer to real converter
DW_B	DWORD (32 bit) into 32 binary quantities
DW_W	DWORD (32 bit) into two WORDS (16 bit)
I_D	Integer to double integer converter
I_R	Integer to real converter
N2_R	16-bit fixed-point format (N2) to REAL
N4_R	32-bit fixed-point format (N4) to REAL
R_D	REAL to double integer converter (DINT)
R_I	REAL to integer converter (INT)
R_N2	REAL to 16-bit fixed-point format (N2) converter
R_N4	REAL to 32-bit fixed-point format (N4) converter
SWB_DW	Byte reverser for double word inputs (DWORD)
SWB_W	Byte reverser for word inputs (WORD)
SWBI	Byte reverser for real connections (input)
SWBO	Byte reverser for real connections (output)
W_B	Converter, status word into 16 binary quantities
W_BY	Status word to status byte converter
W_DW	Two WORDS (16 bit) into one DWORD (32 bit) converter

Signaling system

@MSC	Central and initialization block
MSI	Message output block
MSIPRI	Message output block (printer)
MER0	Message block for 16 activated messages
MER1	Message block for 1 activated messages with text
MER16	Message block for 16 activated messages with text
MER	Mess. block f.1 act. message w/ measured value (REAL)
MER_I	Mess. block f.1 act. message w/ measured value (INT)
MER_D	Mess. block f.1 act. message w/ measured value (DINT)
MERF0	Mess. block f. 16 act. and 16 de-activated messages
MERF1	Mess. block f.1 act. and 1 de-activated message w/ text
MERF16	Mess. block f. 16 act. and 16 de-act. messages w/ text
MERF	Message block for 1 activated and 1 de-activated message with measured value (REAL)
MERF_I	Message block for 1 activated and 1 de-activated message with measured value (INT)
MERF_D	Message block for 1 activated and 1 de-activated message with measured value (DINT)

Service/diagnostic blocks

ASI	Acknowledge signal (BOOL)
DLED	Control diagnostics LED
EPE	Erase change memory
FMLED	Control FM 458-1 DP diagnostics LED
PNO	CPU number (INT)
PSL	Processor utilization (REAL)
RFG	Ramp function (REAL)
SER	Service block
SQG	Square-wave generator (REAL)
SQGB	Clock generator for binary signals (BOOL)

SSD	Output on a 7-segment display (WORD)
STG	Step function (REAL)
SYF1	System error field (WORD), 1-word format
SYF4	System error field (WORD), 4-word format
USF	User flags (WORD)

Special functions

BF	Flash function for a binary quantity (BOOL)
BF_W	Flash function for a status word (WORD)
DTS	Synchronization delay time (BOOL)
ETE	Edge evaluator (BOOL)
FUI_W	First-up indicator (WORD)
LVM	Limit value monitor w/ hysteresis, two directions (BOOL)
NOP1	Dummy block (REAL)
NOP1_B	Dummy block (BOOL)
NOP1_D	Dummy block (DINT)
NOP1_I	Dummy block (INT)
NOP8	Dummy block (REAL)
NOP8_B	Dummy block, 8 binary quantities (BOOL)
NOP8_D	Dummy block 8, 4-byte quantities (DINT)
NOP8_I	Dummy block, 8 word quantities (INT)
PIN8	Priority evaluator
SH	Shift block (WORD)
PAC	Process interrupt, counter
PAI	Process interrupt, periphery input
PAS	Process interrupt, software
PAS7	Initiate process interrupt to S7-CPU

Trace

TRCC	Analog trace acquisition block (REAL)
TRCC_I	Analog trace acquisition block (INT)
TRCC_D	Analog trace acquisition block (DINT)
@TCP	Single trace, central block
TRHI	Single trace, header block
TRP	Single trace, acquisition block
TRP_B	Single trace, acquisition block (BOOL)
TRP_I	Single trace, acquisition block (INT)
TRP_D	Single trace, acquisition block (DINT)
@TCI	Central and initialization block, system trace
@TRI	Acquisition block, system trace

Clock synchronization

RTCABS	Date and time output
RTCM	System time distribution
RTCCPU	Set module clock
RTCREL	Relative time output

SIMATIC OP connection

S7OS	OP function block
S7IA	User data area, "Interface area"
S7EMA	User data area, "Operating messages"
S7AMA	User data area "Fault messages"
S7FKA	User data area "Function keyboard image"

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CFC Function Blocks (D7-SYS V6.1)

Communication

DIAPRO	Diagnostics DP (PROFIBUS DP coupling)
SYNPRO	SYNC/FREEZE DP (PROFIBUS DP coupling)
@CEP	EP coupling, central block
@CMM	Communications buffer-coupling central block
@CPN	Local coupling, central block
@CS1	Subrack coupling (master), central block
@CS2	Subrack coupling (slave), central block
@CSD01	DUST1 coupling, central block
@CSD02	DUST2 coupling, central block
@CSD03	DUST3 coupling, central block
@CSD07	DUST 7 coupling, central block
@CSH11	SINEC H1 coupling, central block
@CSL2F	PROFIBUS FMS coupling, central block
@CSL2L	PROFIBUS FDL, central block
@CSMPI	MPI coupling, central block
@CSPRO	PROFIBUS DP, central block
@CSU	USS master, central block
CCC4	Collect block, process data
CDC4	Distribution block, process data
CRV	Receive block, process data
CTV	Send block, process data

Pointer-oriented communication

CPY_P	Copy block for pointer-oriented processing
CRV_P	Telegram block receiver with pointer
CTV_P	Telegram block transmitter with pointer
DB_P	Data block for pointer-oriented processing
DRD_x	Read block for pointer-oriented communication (for all data types)
DRW_x	Write block for pointer-oriented communication (for all data types)

Network

@NMC	Network central block
NRI	Freely selectable network interface block
NSI	Network status interface block
NSL	Network status transfer block
NTC	Rigid network monitoring block
NTD	Rigid network copy block

Display control

@DIS	Central and initialization block
DISA	Display device, actual value output (REAL)
DISA_B	Display device, actual value output (BOOL)
DISA_I	Display device, actual value output (INT)
DISA_D	Display device, actual value output (DINT)
DISA_W	Display device, actual value output (WORD)
DISA_T	Display device, actual value output (TIME)
DISA1B	Display device, actual value output (BINARY)
DISS	Display device, actual value output (REAL)
DISS_B	Display device, setpoint input (BOOL)
DISS_I	Display device, setpoint input (INT)
DISS_D	Display device, setpoint input (DINT)
DISS_W	Display device, setpoint input (WORD)

DISS_T	Display device, setpoint input (TIME)
DISS1B	Display device, setpoint input (BINARY)

Parameter processing with CS 7

@DPH	Central and initialization block
DPI	Read/change parameters (PROFIBUS DP, USS)

Converter-specific blocks (ITDC)

CAV	Current actual value sensing
CPC	Current pre-control
CPI	Current controller
CSP	Current-setpoint calculation
EMF	Voltage actual value sensing
FCS	Field current setpoint output
PA6	Synchronization and firing angle actual value generation
PC6	Firing angle controller
SOL	Auto-reversing stage

SFC block

SFC	SFC monitoring block
SFCSI	SFC step info block
SFCTI	SFC transition info block

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Appendix

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Appendix

Training

Training is decisive for your success

SITRAIN® - the Siemens Training for Automation and Industrial Solutions - provides you with comprehensive support when solving your tasks.

Training by the market leader in automation, plant installation and support permits you to make your decisions with certainty and full command. Especially where the optimum and efficient use of products and plants are concerned. You can eliminate deficiencies in existing plants, and exclude expensive faulty planning right from the beginning.

All in all, this represent an enormous gain for your company: shortened startup times, optimized plant components, faster troubleshooting, reduced down times. In other words, increased profits and lower costs.

Top trainers

Our trainers know their topics in practice, and possess comprehensive didactic experience. Course developers have a direct wire to product development, and directly pass on their knowledge to the trainers.

Practical experience

The practical experience of our trainers makes it possible for them to pass on theoretical matter in a plausible manner. But since it is known that all theory is drab, we attach great importance to practical exercises which can comprise up to half of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. You feel absolutely certain when trained in this manner.

Wide variety

With a total of approx. 300 local attendance courses, we train the complete range of A&D products and a large portion of the system solutions from I&S. Telecourses, teach-yourself software and seminars presented on the Web supplement our classical range of courses.

Close to our customers

The distance is short. You can find us approx. 60 times in Germany, and worldwide in 62 countries. You wish to have individual training instead of one of our 300 courses? No problem: we will provide a program tailored exactly to your personal requirements. Training can be carried out in our Training Centers or at your company.

The right mixture: blended learning

Blended learning is understood to be the combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a teach-yourself program as preparation or follow-up. Furthermore, SITRAIN utilizes supported online training for live instruction on the Internet at agreed times.

The right mixture is the solution. Therefore blended learning can convey complex topics well, and train networked thinking. Additional effect: reduced travelling costs and periods of absence through training sequences independent of location and time.

The international training portal

www.siemens.com/sitrain

All training facilities at a glance: search in the worldwide range of courses at leisure, call up all course dates online, utilize the daily updated display of vacant course spaces - and register directly.

Customer comments on Sitrain

" ... the good course documents, competence and flexibility convinced me."
[Manfred Riek from Festo Systemtechnik, responsible for planning the basic and further training of project engineers]

" ... represents effective training, constructive dialogs, and solutions which provide great help."
[Günter Niedermaier, electrical design manager at AMT, Aalen]

Contact

Visit us in the Internet:

www.siemens.com/sitrain

or let us advise you personally. You can request our latest training catalog from:

Course office, Infoline Germany:
Tel.: 01805 / 23 56 11 (0.12 €/Min)
Fax: 01805 / 23 56 12

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CE marking

The electronic products described in this catalog comply with the requirements and protection objectives of the following EU guidelines and with the harmonized European standards (EN) which have been published for programmable controllers in the Official Journal of the European Union:

- 89/336/CEE "Electromagnetic Compatibility" (EMC guideline)
- 73/23/CEE "Electrical Equipment for Use Within Specific Voltage Limits" (low voltage guideline)
- Machinery Directive (ML 89/392/EWG)
- Explosion Protection Directive ATEX 94/9/EG

The EU conformity declaration is available for examination by the appropriate authorities at:

SIMATIC
Siemens AG
Bereich Automatisierungstechnik
Dept. A&D AS
Postfach 1963
D-92209 Amberg

The SIMATIC PC meets stringent requirements with regard to emitted interference and is therefore allowed to be used in the domestic environment:

Noise emissions:
EN 50 081-2: 1993
Noise immunity:
EN 50 082-2: 1995

The installation guidelines described in the manuals and the important notes concerning installation in cabinets and the use of shielded cables must be complied with when installing and operating the products described in this catalog.

Notes for machine manufacturers

SIMATIC control systems are not machines within the context of the EU machine guidelines. A conformity declaration with respect to the EU machine guideline 89/392/ EMC is not available for SIMATIC.

The EU guideline for machines 89/392/EMC specifies the requirements for a machine. For purposes of this guideline, a machine is understood to be a combination of interconnected parts or mechanisms (see also EN 292-1, Paragraph 3.1).

SIMATIC is part of the electrical equipment of a machine and must therefore be included in the conformity declaration procedure by the machine manufacturer.

The EN 60204-1 standard (safety of machines, general requirements for the electrical equipment of machines) is applicable to the electrical equipment of machines.

The following table should be of assistance with the conformity declaration and shows which criteria of EN 60 204-1 (as of June 1993) apply for SIMATIC.

EN 60204-1	Topic/criteria	Notes
Paragraph 4	General requirements	The requirements are met when the equipment is assembled/ installed in accordance with the installation guidelines. Please note the relevant information in the manuals
Paragraph 11.2	Digital input/output interfaces	The requirements are met
Paragraph 12.3	Programmable equipment	The requirements are met when the equipment is installed in lockable cabinets to protect against alteration of the memory contents by unauthorized persons.
Paragraph 20.4	Voltage tests	The requirements are met

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Appendix
Siemens Contacts Worldwide

At

www.siemens.com/automation/partner

you can find details of Siemens contact partners worldwide responsible for particular technologies.

You can obtain in most cases a contact partner for

- Technical Support,
- Spare parts/repairs,
- Service,
- Training,
- Sales or
- Consultation/engineering.

You start by selecting a

- Country,
- Product or
- Sector.

By further specifying the remaining criteria you will find exactly the right contact partner with his/her respective expertise.

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A&D in the WWW

A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

The Siemens Automation and Drives Group (A&D) has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

http://www.siemens.com/automation

you will find everything you need to know about products, systems and services.

Product Selection Using the Interactive Catalog
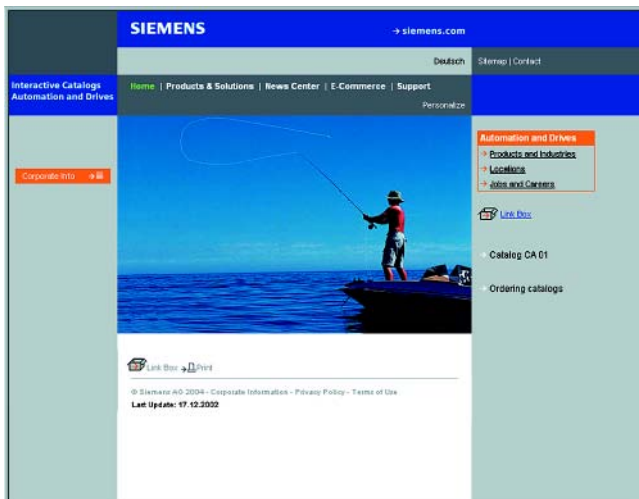
Detailed information together with convenient interactive functions:
The interactive catalog CA 01 covers more than 80,000 products and thus provides a full summary of the Siemens Automation and Drives product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives.
All information is linked into a user interface which is easy to work with and intuitive.

After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the interactive catalog CA 01can be found in the Internet under

http://www.siemens.com/automation/ca01

or on CD-ROM or DVD.

Easy Shopping with the A&D Mall
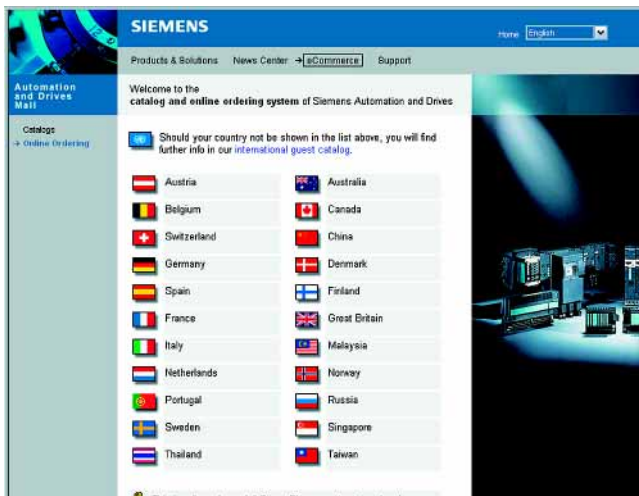
The A&D Mall is the virtual department store of Siemens AG in the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

Numerous functions are available to support you.

For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the A&D Mall on the Internet under:

http://www.siemens.com/automation/mall

Appendix
Customer Support

Our Services for Every Phase of Your Project

In the face of harsh competition you need optimum conditions to keep ahead all the time:

A strong starting position. A sophisticated strategy and team for the necessary support - in every phase.

Service & Support from Siemens provides this support with a complete range of different services for automation and drives.

In every phase: from planning and startup to maintenance and upgrading.

Our specialists know when and where to act to keep the productivity and cost-effectiveness of your system running in top form.

Online Support

The comprehensive information system available round the clock via Internet ranging from Product Support and Service & Support services to Support Tools in the Shop.

http://www.siemens.com/ automation/service&support

Technical Support

Competent consulting in technical questions covering a wide range of customer-oriented services for all our products and systems.

Tel.: +49 (0)180 50 50 222
Fax: +49 (0)180 50 50 223
E-Mail: adsupport@siemens.com

Technical Consulting

Support in the planning and designing of your project from detailed actual-state analysis, target definition and consulting on product and system questions right to the creation of the automation solution. [1]

Configuration and Software Engineering

Support in configuring and developing with customer-oriented services from actual configuration to implementation of the automation project. [1]

Service On Site

With Service On Site we offer services for startup and maintenance, essential for ensuring system availability.

In Germany
0180 50 50 444 [1]

Repairs and Spare Parts

In the operating phase of a machine or automation system we provide a comprehensive repair and spare parts service ensuring the highest degree of operating safety and reliability.

In Germany
0180 50 50 448 [1]

Optimization and Upgrading

To enhance productivity and save costs in your project we offer high-quality services in optimization and upgrading. [1]

[1] For country-specific telephone numbers go to our Internet site at:
http://www.siemens.com/automation/service&support

■ Knowledge Base on CD-ROM

For locations without online connections to the Internet there are excerpts of the free part of the information sources available on CD-ROM (Service & Support Knowledge Base). This CD-ROM contains all the latest product information at the time of production (FAQs, Downloads, Tips and Tricks, Updates) as well as general information on Service and Technical Support.

The CD-ROM also includes a full-text search and our Knowledge Manager for targeted searches for solutions. The CD-ROM will be updated every 4 months.

Just the same as our online offer in the Internet, the Service & Support Knowledge Base on CD comes complete in 5 languages (German, English, French, Italian, Spanish).

You can order the **Service & Support Knowledge Base** CD from your Siemens contact.

Order no. **6ZB5310-0EP30-0BA2**

Orders via the Internet
(with Automation Value Card or credit card) at:

http://www.siemens.com/automation/service&support

in the Shop domain.

■ Automation Value Card

By entering the card number and PIN you have full access to the Service & Support services being offered. The charge for the services procured is debited from the credits on your Automation Value Card.

All the services offered are marked in currency-neutral credits, so you can use the Automation Value Card worldwide.

Automation Value Card order numbers

Credits	Order no.
200	**6ES7 997-0BA00-0XA0**
500	**6ES7 997-0BB00-0XA0**
1000	**6ES7 997-0BC00-0XA0**
10000	**6ES7 997-0BG00-0XA0**

Detailed information on the services offered is available on our Internet site at:

http://www.siemens.com/automation/service&support

Service & Support à la Card: Examples

Technical Support

"Priority"	Priority processing for urgent cases
"24 h"	Availability round the clock
„Extended"	Technical consulting for complex questions

Support Tools in the Support Shop

"System Utilities"	Tools that can be used directly for configuration, analysis and testing
"Applications"	Complete topic solutions including ready-tested software
"Functions & Samples"	Adaptable blocks for accelerating your developments

Small card - great support

The Automation Value Card is an integral component of the comprehensive service concept with which Siemens Automation and Drives will accompany you in each phase of your automation project.

It doesn't matter whether you want just specific services from our Technical Support or want to purchase high-quality Support Tools in our Online Shop, you can always pay with your Automation Value Card. No invoicing, transparent and safe. With your personal card number and associated PIN you can view the state of your account and all transactions at any time.

Services on card. This is how it's done.

Card number and PIN are on the back of the Automation Value Card. When delivered, the PIN is covered by a scratch field, guaranteeing that the full credit is on the card.

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**Safety of Electronic Equipment
Quality Management**

Safety of electronic equipment

The information listed here is mainly of a fundamental nature and applies regardless of the type and vendor of the electronic control system.

Reliability

The reliability of devices and components is being driven as high as possible by employing extensive and cost-effective measures in development and production.

This includes

- Selection of high-quality components;
- Worst-case design calculation of all circuits;
- Systematic and computer-controlled testing of all subcontracted components;
- Burn-in of all large-scale integrated circuits (e.g. processors, memories etc.);
- Measures to prevent static charging when working at or with MOS circuits;
- Visual checks at various stages of production;
- In-circuit testing of all modules, i.e. computer-aided testing of all components and their interaction in the circuit;
- Hot endurance run at high ambient temperature over several days;
- Meticulous computer-controlled final testing;
- Statistical evaluation of all returns for immediate introduction of remedial actions.

These measures are regarded a basic measures in safety engineering. They prevent or keep control of the majority of potential faults.

Risks

Wherever faults are liable to cause injury to persons or damage to property it is necessary to introduce measures aimed in particular at the safety of the plant and, therefore, of the control system. Special, plan-specific directives exist for these applications and need to be taken into account when configuring the control system.

In the case of safety-relevant electronic control systems the measures needing to be taken to prevent or keep control of faults are aimed at the risk presented by the plant. In such a case the basic measures listed above are no longer sufficient above a certain level of hazard potential. Additional measures have to be implemented and certified (e.g. dual-channel arrangements, tests, checksums etc.) for the control system.

Division into a safe and a non-safe zone

In practically all machine installations there are parts which perform safety-related functions (e.g. emergency stop pushbuttons, mesh guards, two-hand controls). In order not to have to consider the complete control system in terms of safety engineering it is customary to divide the control system into a **safe** and a **non-safe zone**. No special requirements are imposed on the safety of the control system in the non-safe zone because there would be no impact on the safety of the plant if the electronics failed in this case. In the safe zone, on the other hand, you are only allowed to use control systems and/or circuits which satisfy the directives in question.

The following zonal divisions are customary in practice:
- Control systems with little safety engineering, e.g. machine control systems.
- Control systems with balanced zones, e.g. chemical plants, aerial ropeways.
- Control systems with mainly safety engineering, e.g. incineration plants.

Important

Even if a maximum of design-based safety is achieved in the configuration of an electronic control systems – e.g. through multi-edge configuration – it is still essential to closely follow the instructions in the operating manuals as otherwise wrong actions may suspend precautions for preventing potential faults or may create additional sources of danger.

Quality management

The quality management system of our A&D division complies with the international standard ISO 9001.

The products and systems described in this catalog are manufactured under application of a quality management system certified by DQS in accordance with DIN EN ISO 9001. The DQS certificate is recognized in all EQ Net countries.

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◼ Overview

Software types

Software requiring a license is categorized into types. The following software types have been defined:
- Engineering software
- Runtime software

Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing.

Data generated with engineering software and executable programs can be duplicated for your own use or for use by third-parties free-of-charge.

Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc.

The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge.

You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc.

Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

License types

Siemens Automation & Drives offers various types of software license:
- Floating license
- Single license
- Rental license
- Trial license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started.
A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software.

The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per device, per axis, per channel, etc.

One single license is required for each type of use defined.

Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific number of hours (the operating hours do not have to be consecutive).
One license is required for each installation of the software.

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes.
It can be transferred to another license.

Certificate of license

The Certificate of License (CoL) is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated.
The following delivery versions
- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.
A separate PowerPack must be purchased for each original license of the software to be replaced.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.
The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed.
A separate upgrade must be purchased for each original license of the software to be upgraded.

ServicePack

ServicePacks are used to debug existing products.
ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

License key

Siemens Automation & Drives supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

Detailed explanations concerning license conditions can be found in the "Terms and Conditions of Siemens AG" or under
http://www.siemens.com/automation/mall
(A&D Mall Online-Help System)

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Appendix

Fax Order Form

To:

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(Address see under *www.siemens.com/automation/partner*)

Fax-No.

Contact person

No.	Order No.	Description	Qty.	Unit price	Total price

Company address (company stamp):

Company number (if known)

Company/Dept.

Street, No.

Postal code/City

Contact partners

Tel. No./Fax

Customer Order No.: ....

Date

Delivery address (if different):

Company/Dept.

Street, No.

ZIP code/City

Comments

Desired delivery date: ....

Signature

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Siemens ST DA · 2005   **8/13**

Appendix

Conditions of Sale and Delivery

■ Terms and Conditions of Sale and Delivery

By using this catalog you can acquire hardware and software products described therein from the Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity.

for customers with a seat or registered office in the Federal Republic of Germany

The General Terms of Payment as well as the General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry shall apply.

For software products, the General License Conditions for Software Products for Automation and Drives for Customers with Seat or registered Office in Germany shall apply.

for customers with a seat or registered office outside of Germany

The General Terms of Payment as well as the General Conditions for Supplies of Siemens, Automation and Drives for Customers with a Seat or registered Office outside of Germany shall apply.

For software products, the General License Conditions for Software Products for Automation and Drives for Customers with Seat or registered Office outside of Germany shall apply.

General

The prices are in € (Euro) ex works, exclusive packaging.

The sales tax (value added tax) is not included in the prices. It shall be debited separately at the respective rate according to the applicable legal regulations.

In addition to the prices of products which include silver and/or copper, surcharges may be calculated if the respective limits of the notes are exceeded.

Prices are subject to change without prior notice. We will debit the prices valid at the time of delivery.

The dimensions are in mm. Illustrations are not binding.

Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

Comprehensive Terms and Conditions of Sale and Delivery are available free of charge from your local Siemens business office under the following Order Nos.:

• 6ZB5310-0KR30-0BA0
  (for customers based in the Federal Republic of Germany)
• 6ZB5310-0KS53-0BA0
  (for customers based outside of theFederal Republic of Germany)

or download them from the Internet:
www.siemens.com/automation/mall
(Germany: A&D Mall Online-Help System)

■ Export regulations

The products listed in this catalog / price list may be subject to European / German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog / price list:

AL	Number of the German Export List.
	Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to.
	Goods labeled with an "AL not equal to N" are subject to a European or German export authorization when being exported out of the EU.
ECCN	Export Control Classification Number.
	Products marked other than "N" are subject to a reexport license to specific countries.
	In the case of software products, the export designations of the relevant data medium must also be generally adhered to.
	Goods labeled with an "ECCN not equal to N" are subject to a US re-export authorization.

Even without a label or with an "AL: N" or "ECCN: N", authorization may be required due to the final destination and purpose for which the goods are to be used.

The deciding factors are the AL or ECCN export authorization indicated on order confirmations, delivery notes and invoices.

Errors excepted and subject to change without prior notice.

A&D/VuL/En 14.11.03

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