

**SIEMENS**

Equipment for Machine Tools  
SINUMERIK 805SM-P  
Software Version 3  
Interface Description  
Part 2: Connection Conditions

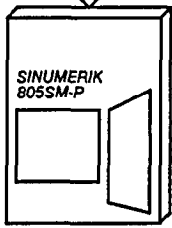
Planning Guide

Edition 05.94

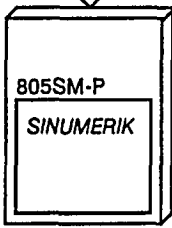
Manufacturer Documentation

# Overview of the SINUMERIK 805SM-P Documentation

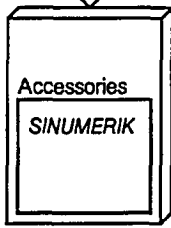
## General Documentation



Product Brief

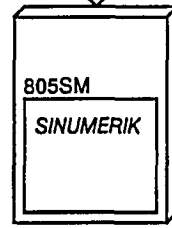


Catalog



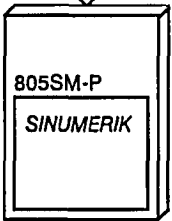
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## User, Manufacturer and Service Documentation



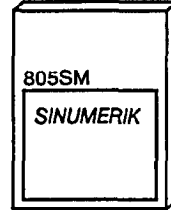
Communication (FH)

## User Documentation

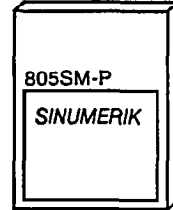


Operating Guide Technology (BA)

## Manufacturer Documentation

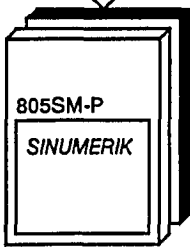


Instruction Manual (BE)



Operating Guide Standard (BA)

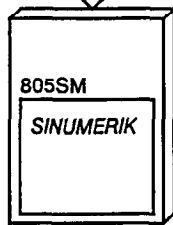
## Manufacturer Documentation



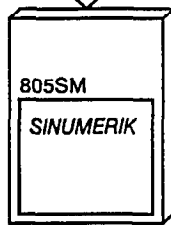
**Interface (PJ):**  
- Signals  
- Connection Conditions



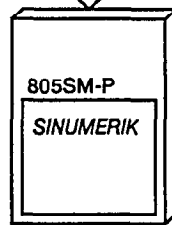
**Press Modules (PJ):**  
- Roll Feed Module  
- Pressure Module



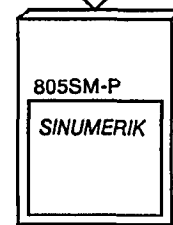
**PLC Programming (PJ)**



**NC Programming (PG)**

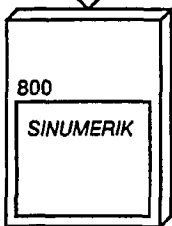


**Cycles (PJ)**

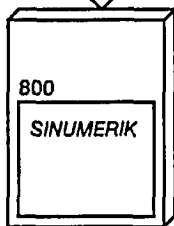


**Operating Environment (PJ)**

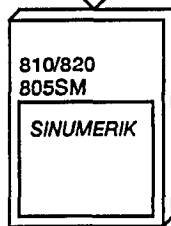
## Manufacturer Documentation



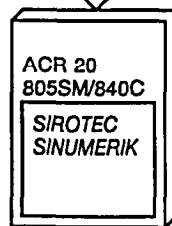
**Universal Interface (PJ)**



**SINUMERIK WS 800A, CL 800 Cycle Language (PJ)**

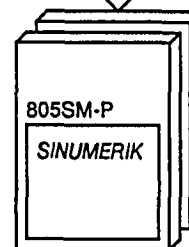


**Host PLC Link (BS) (in German)**



**Linking to SINEC L2-DP with IM 328-N Interface Module (BS) (in German)**

## Service-Documentation



**Installation Guide (IA):**  
- Instructions  
- Lists



# **SINUMERIK 805SM-P Software Version 3 Interface Description Part 2: Connection Conditions**

**Planning Guide**

**Manufacturer Documentation**

**Edition 05.94**

# SINUMERIK® Documentation

## Printing history

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

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

*Status code in "Remarks" column:*

**A** . . . New documentation

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

**C** . . . Revised edition with new status.

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

<b>Edition</b>	<b>Order No.</b>	<b>Remarks</b>
12.91	6ZB5 440-0MM02-0AA0	<b>A</b>
06.93	6ZB5 440-0MM02-0AA1	<b>C</b>
05.94	6ZB5 440-0MM02-0AN0	Supplement

Other functions not described in this documentation might be executable in the control. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

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# Preface

## Notes for the Reader

The documentation for the SINUMERIK 805SM control is subdivided into four levels:

- General Documentation
- User Documentation
- Manufacturer Documentation
- Service Documentation.

The **Manufacturer Documentation** consist of the following manuals:

- Instruction Manual
- Interface Description Part 1: Signals
- Interface Description Part 2: Connection Conditions
- PLC Programming Guide
- Standard Operating Guide
- Programming Guide
- Roll Feed, Planning Guide
- Pressure Control Module, Planning Guide
- Cycle, Planning Guide

This manual, the Interface Description Part 2: Connection Conditions, describes the electrical and mechanical connections of the hardware components (system configuration, rack assignments, jumper settings, cable diagrams, external devices).

This manual is written for technically qualified personnel especially those having knowledge of or being trained in automation and control technology.

The knowledge, understanding and correct observance of all the Safety Rules and Warnings are the necessary preconditions for the safe installation and commissioning as well as for the safe operation and maintenance of the product described in this manual. This manual describes the General Safety Rules and Warnings. Only the qualified personnel has the necessary technical knowledge to properly interpret and apply all the Safety Rules and Warnings in a particular case.

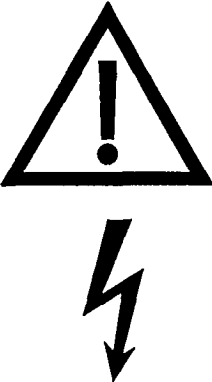
The contents of this instruction manual shall not become part or modify any prior or existing agreement, commitment or relationship. The Sales Contract contains the entire obligations of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

If you need further documentation for the SINUMERIK 805SM-P, please contact your local Siemens representative.

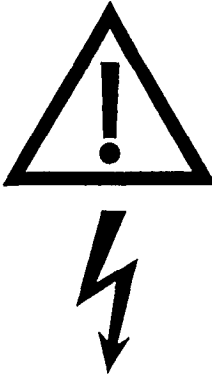
## Technical Notes

- **Description of Cables and Connectors:**  
The order numbers for the ready-made cables (cables with the attached connectors) have an empty square  to mark a space for the cable length code letter. If ordering a ready-made cable, the square has to be substituted by the code letter for the cable length desired. The section 2.1, "Accessories, Ordering Data", lists the available cable lengths.
- The standard strap connections indicated in these instructions do not always correspond to the status of the modules when delivered. Therefore, before commissioning, check the strap connections and adjust them accordingly.

## IMPORTANT SAFETY NOTES

	<b>WARNING</b>
	<p>Hazardous voltages are present in this electrical equipment during operation.</p> <p><b>Non-observance</b> of the safety instructions can result in severe personal injury or property damage.</p> <p>Only <b>qualified personnel</b> should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices, and maintenance procedures contained.</p>

### Qualified Person


	<b>WARNING</b>
	<p>For the purpose of this instruction manual and product labels, a "qualified person" is one who is familiar with the installation, construction and operation of the equipment and the hazards involved.</p> <p>In addition, he has the following qualifications:</p> <ol style="list-style-type: none"><li>1. Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.</li><li>2. Is trained in the proper care and use of protective equipment in accordance with established safety practices.</li><li>3. Is trained in rendering first aid.</li><li>4. Is trained in handling of electrostatically sensitive devices (ESD or EGB).</li><li>5. Is trained in the operation of automation equipment and familiar with the Programming and/or Operating Manual pertaining to the operating of the equipment.</li></ol>


*The personnel working on the engineering, assembly, commissioning or operating the control must be familiar with the respective manuals.*

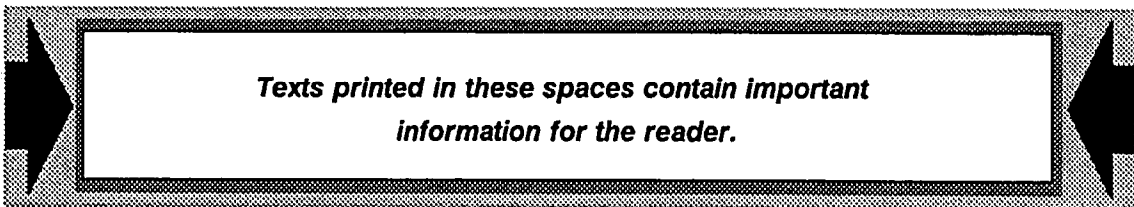
## Notes about the Hazards

The following notes serve your personal safety as well as the prevention of the damage to the product described and the to devices and machines connected to it.

The safety rules and warnings are highlighted below. You must familiarize yourself with these rules since there are hazards to your life or health if the rules are not observed. For the purpose of this manual and product labels the terms used below have the following meaning:

	<b>WARNING</b>
	<b>For the purpose of this manual and product labels, "Warning" indicates death, severe personal injury or substantial property damage can result if proper precautions are not taken.</b>

	<b>CAUTION</b>
	<b>For the purpose of this manual and product labels, "Caution" indicates personal injury or property damage can result if proper precautions are not taken.</b>



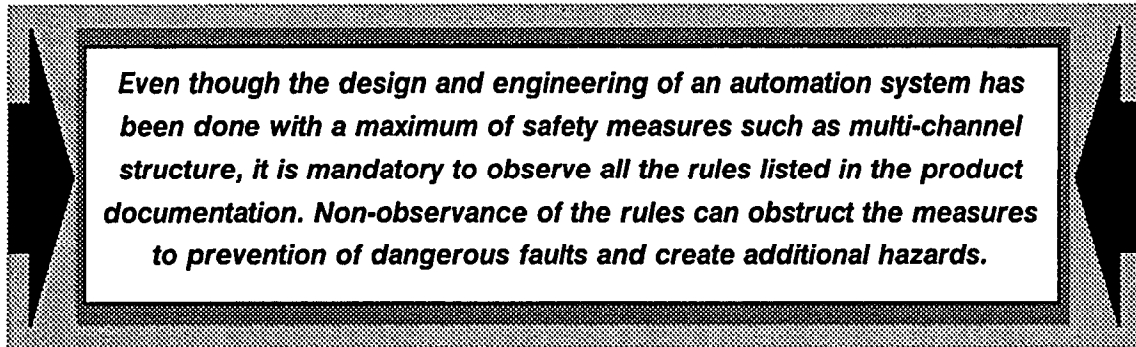
## Intended Purpose Usage of the Product

- This product, system, or component of the system may only be used for its intended purpose and only the way as described in the catalog and technical description and only with Siemens specified or recommended external devices or components.
- The product described in this manual was developed, produced, tested and documented in compliance with the respective Safety Standards. If all the Safety Rules pertaining to the engineering, assembly, operation, maintenance and handling are observed, and under the normal circumstances, the product does not represent any hazards to the person's health or property.

## Engineering Notes

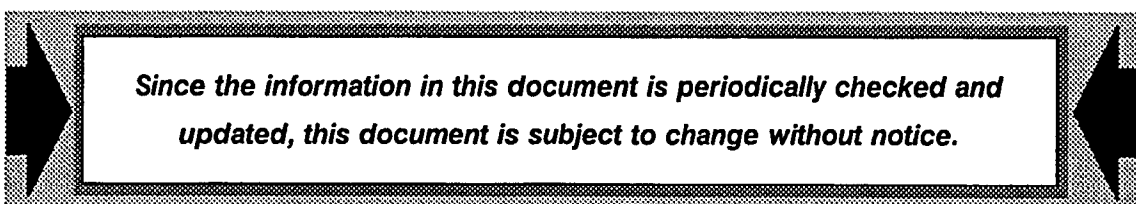
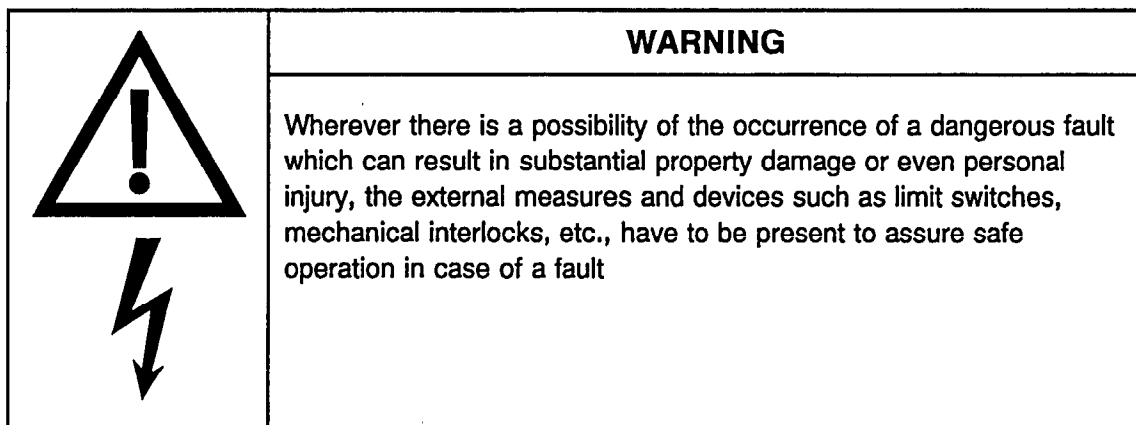
Since this product is usually applied as a part of a larger system or installation, these notes are written to serve as a guideline for the safe integration of the product in the system.

The following fact must be observed:



## Active and Passive Faults in Automation System

- Depending upon purpose of an automation system, the **active** as well as the **passive** faults can become the **dangerous** faults. For example, in a drive controller, the active fault becomes dangerous because it can cause an unintentional switch-on of a drive. In a monitoring controller, the passive fault can hinder an indicator of a dangerous condition.
- For the purpose of the product safety it is important to know the possible faults and to be able to distinct between the dangerous and common fault.





System Configuration and Rack Assignment

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Lists of Cables and Accessories

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2

Devices

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3

External Devices

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Cable Diagrams

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Terms and Abbreviations

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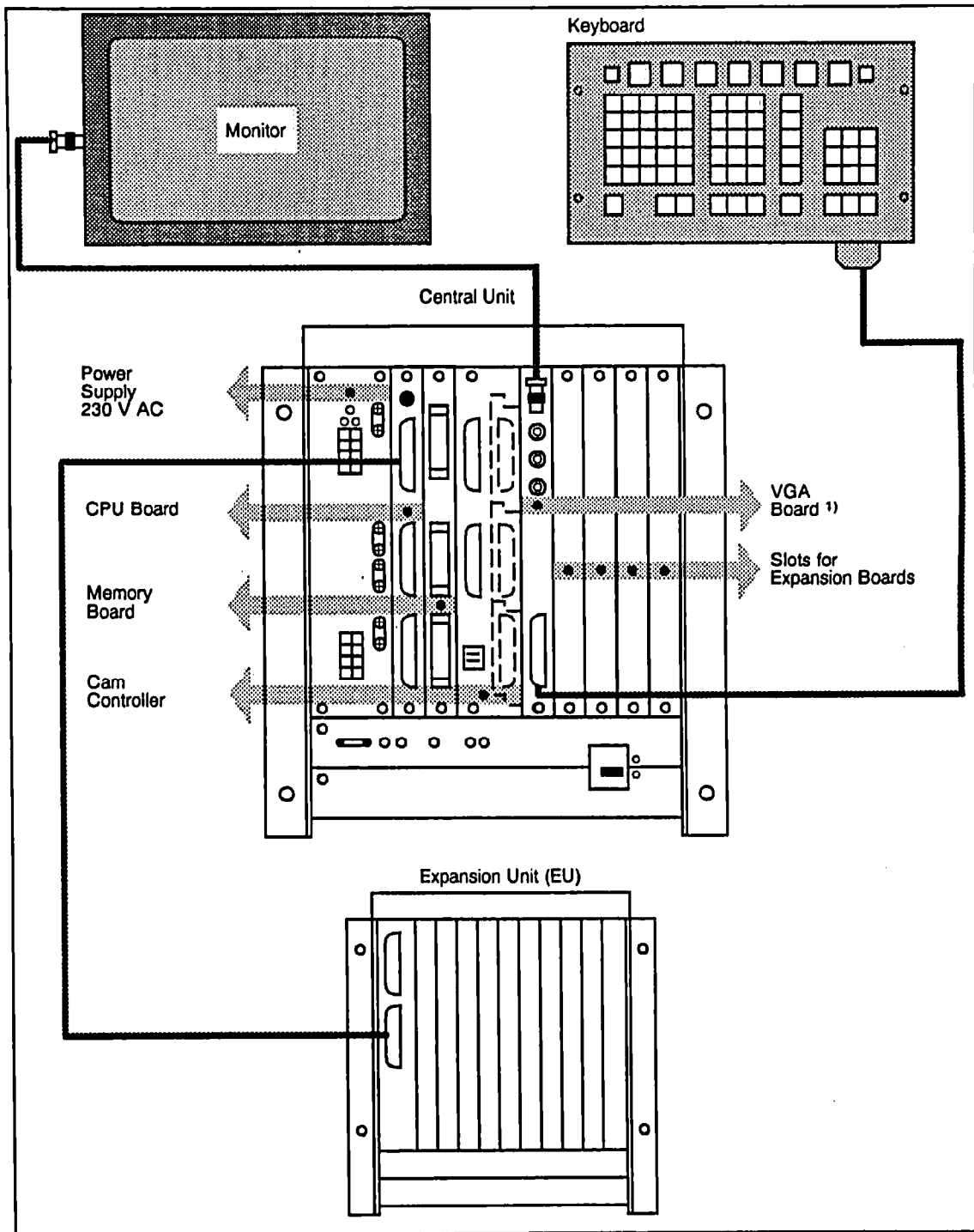
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# 1 System Configuration and Rack Assignment

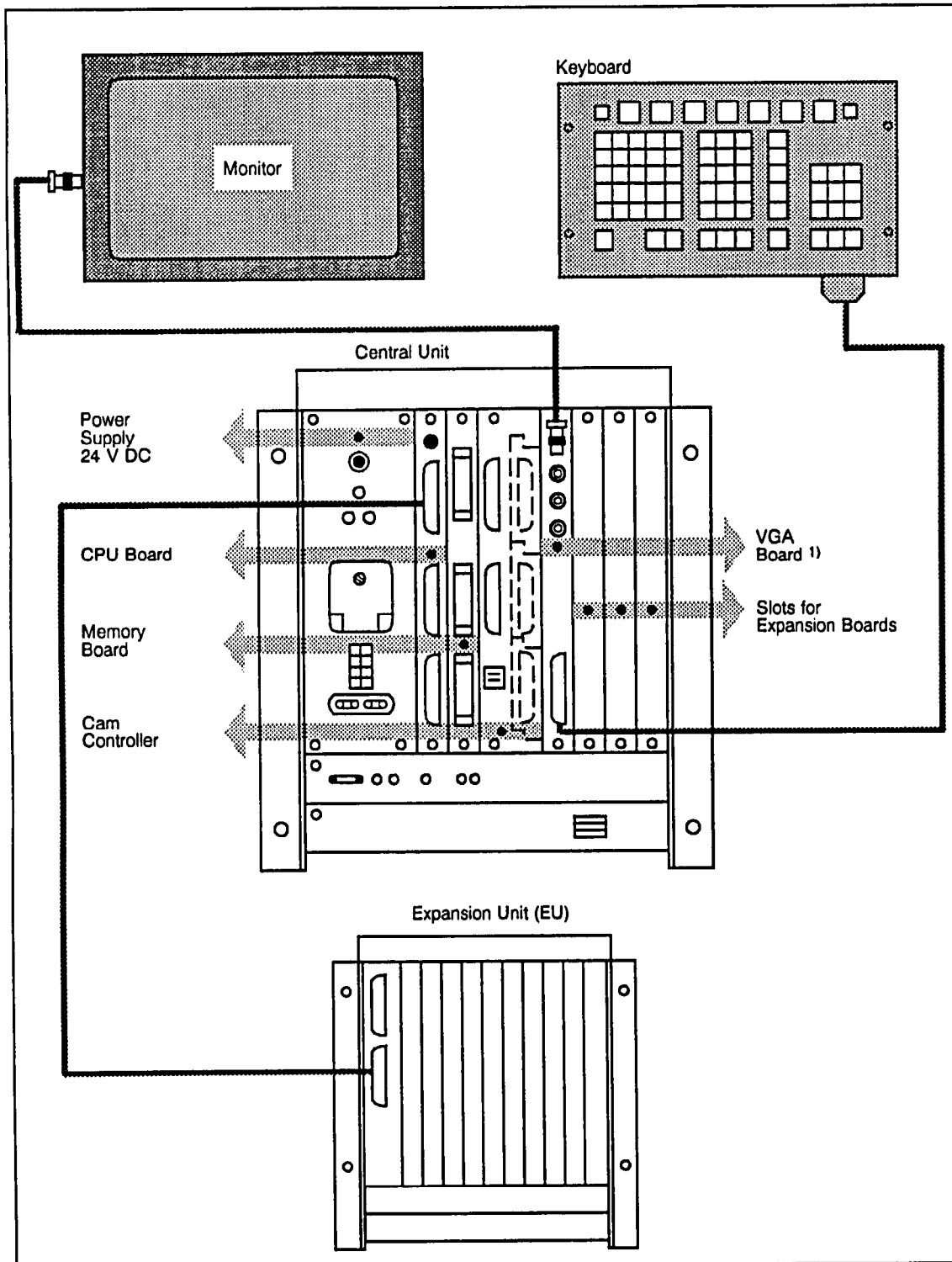
## 1.1 Overview SINUMERIK 805SM-P

### 1.1.1 Overview 230 V Version



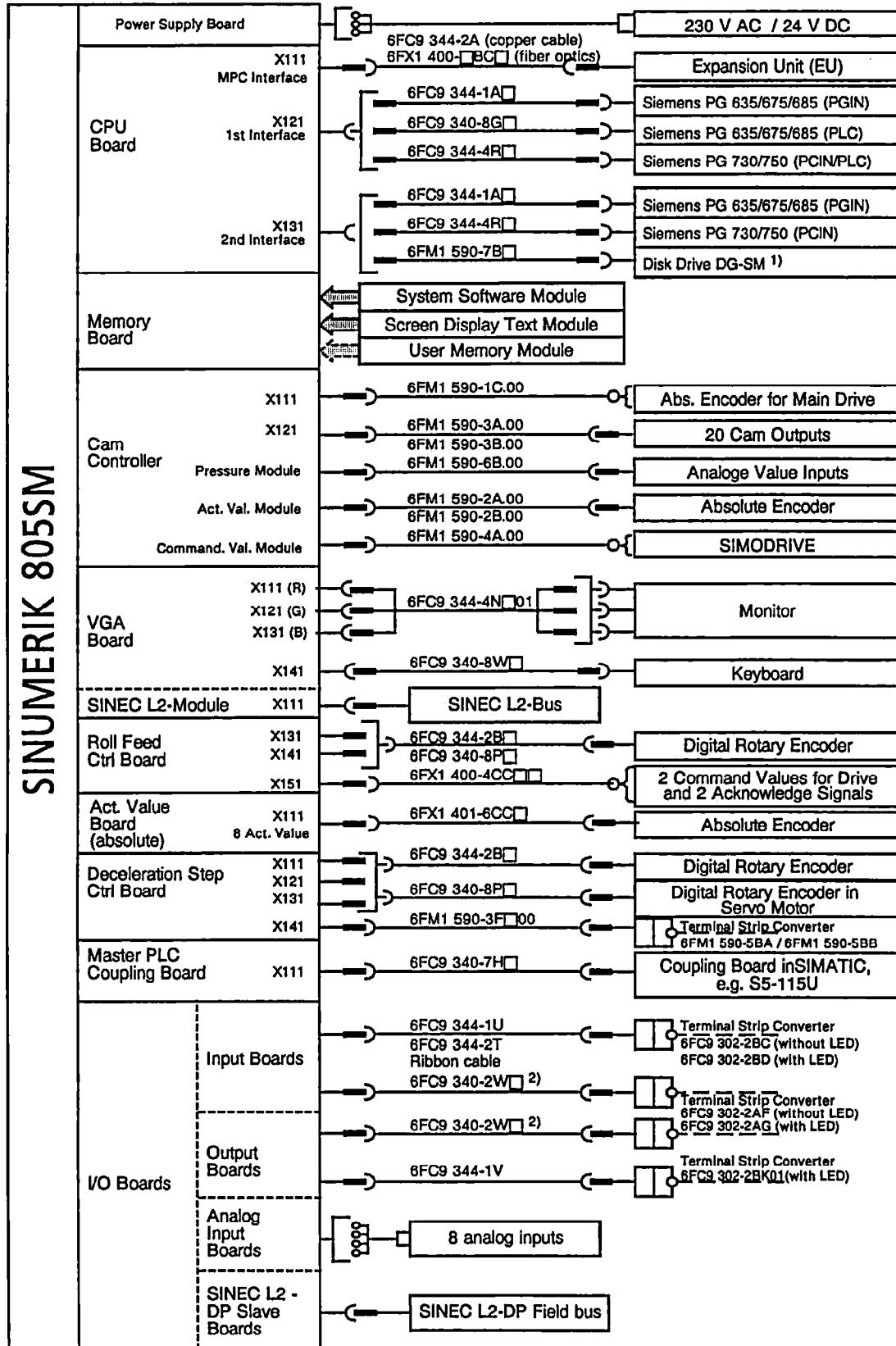
1) optional

### 1.1.2 Overview 24 V Version



1) optional

## 1.2 Connection Diagram SINUMERIK 805SM-P



1) May be connected to the 1st or 2nd interface  
 2) The cable 6FC9 340-5Q or 6FC9 340-5R may be used with the corresponding terminal strip converter (see 32 I/O in connection with I/O Board)







### 1.3.3 SINUMERIK 805SM-P with EU

There are 2 mechanically identical racks available. They offer additional space for digital Input/Output Boards.

- Rack 1 = SINUMERIK 805SM Rack equipped as for 230 V or 24 V Version
- Rack 2 = SINUMERIK EU Rack which can be equipped as shown below.

The EU is connected to the CPU Board in Rack 1 by a ready-made cable.

Since the SIMATIC I/O boards can be used in the EU, the user who uses both the SINUMERIK 805SM-P and SIMATIC PLC's has the advantage of using the same I/O Boards for both control types.

The EU is always supplied by 24 V DC. The main control rack can be supplied by 230 V AC or 24 V DC (see Sec. 1.3.1 and 1.3.2).

Description	Hardware No.	Order No.	Slot number													
			1	2	3	4	5	6	7	8	9	10	11	12		
EU Rack with Bus and CU-Coupling Board w. Power Supply	6FC3 984-4FG	6FC4 590-0AP06	□	■	■	■	■	■	■	■	■	■	■	■	■	■
EU Rack with Bus	570 031 9608.06	6FC3 984-4FG01														
CU-Coupling Board w. Power Supply	6FX1 132-1BA01	6FC3 984-4FG10	▲													
SIN. Boards	64 digit. Inp. isolated	6FX1 125-7BA01	6FC4 590-0AN71			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	32 digit. Outp. 0.5 A isolated	6FX1 122-8BC04	6FC4 590-0AN72			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	32 digit. Outp. 2.0 A isolated	6FX1 122-8BD04	6FC4 590-0AN73			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	32 digit. Inp. & 32 dig. Out. 0.1 A short-circuit-proof, isolated	6FX1 122-3CA01	6FC4 590-0AN50			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
SIMATIC Boards	32 digit. Inp. isolated		6ES5 432-4UA12			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	32 dig. Outp. 0.5 A, isolated		6ES5 451-4UA12			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	16 digit. Outp. 2.0 A isolated		6ES5 454-4UA12			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

Pack assignments of the Expansion Unit (EU)



Additionally, the following input and output boards (digital) of the U peripherals may be used:

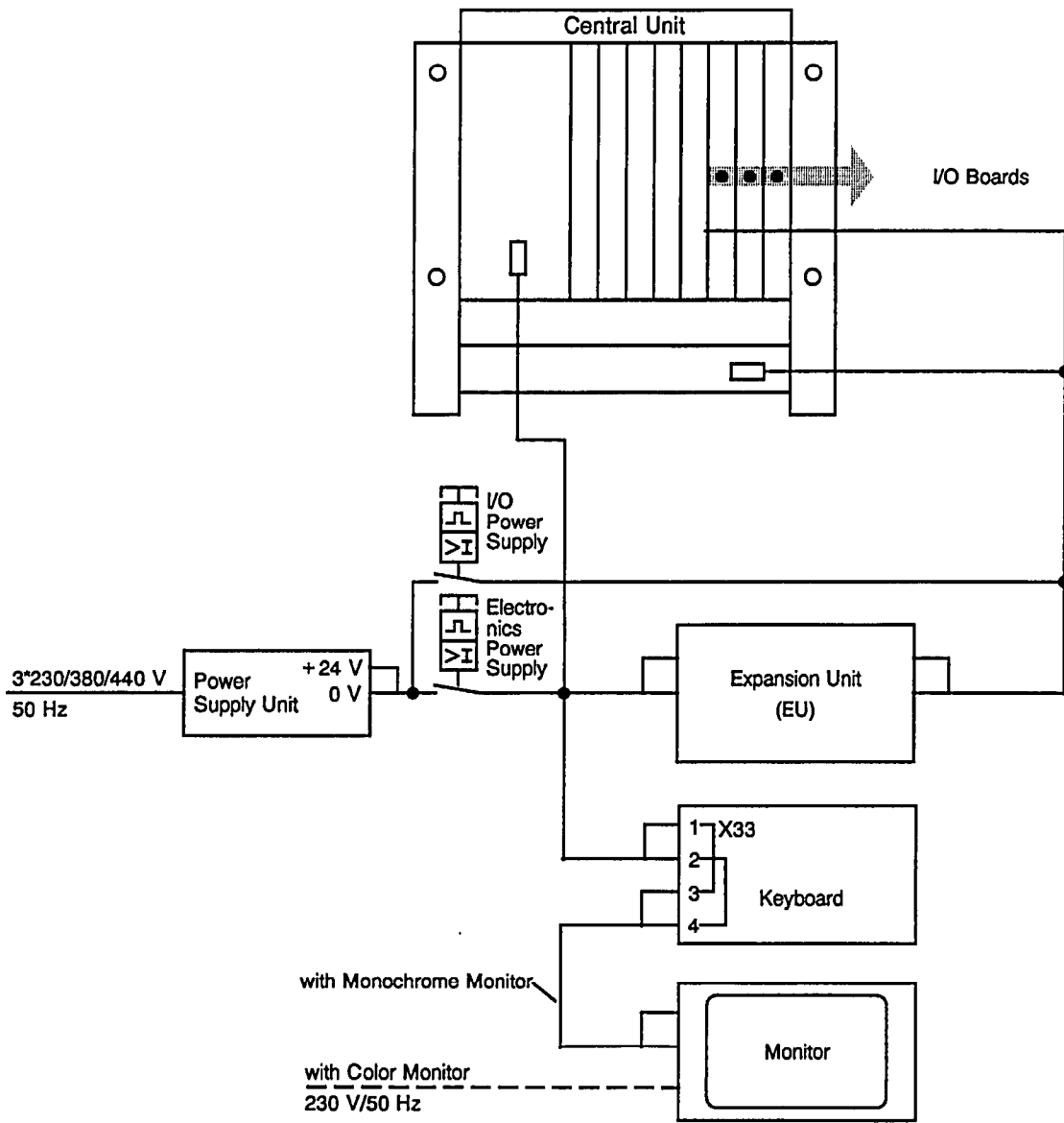
- Input boards:            6ES5 435-4UA12    6ES5 420-4UA12    6ES5 430-4UA12  
                               6ES5 436-4UA12    6ES5 436-4UB12    6ES5 434-4UA12
- Output boards:        6ES5 455-4UA12    6ES5 453-4UA12    6ES5 458-4UA12  
                               6ES5 456-4UA12    6ES5 457-4UA12    6ES5 431-4UA12  
                               6ES5 456-4UB12    6ES5 441-4UA12

**Note:**

For the description of the SIMATIC boards refer to the corresponding manuals.



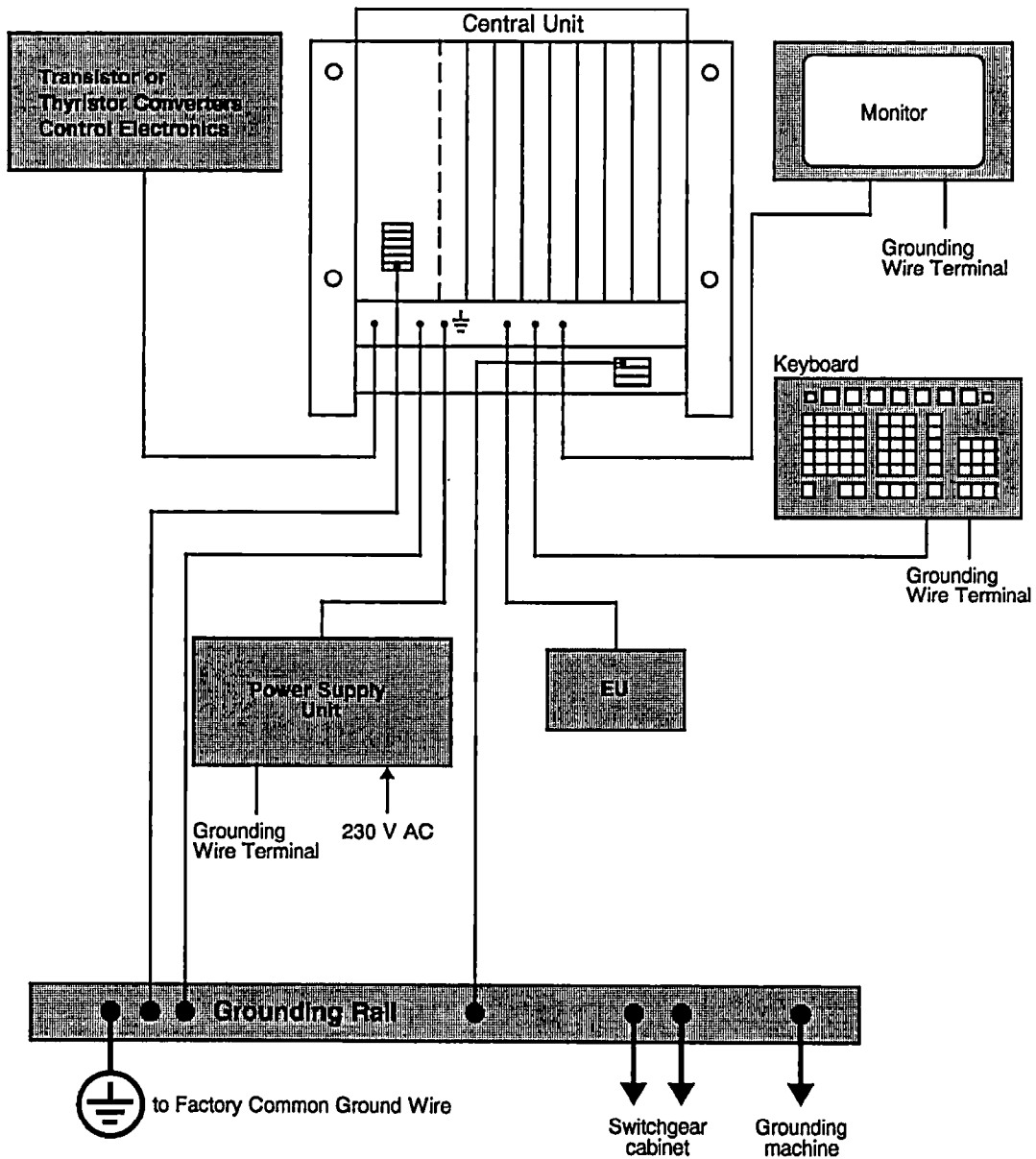
### 1.5.2 Connection Diagram 24 V Version



## 1.6 Grounding

All components which are interconnected by control cables have to be grounded (see Electro-magnetic Compatibility Guidelines, 6ZB5 410-0HX01-0AA0).

- The grounding wires of all components are daisy-chained to the one point on the central unit.
- The cross-section (wire size) of the grounding wire must be at least 10 mm<sup>2</sup>.



**For safety reasons the connection  
of all protective conductors is required.**

## 2 Lists of Cables and Accessories

### Note:

This Section does not list the components described in the Section RACK ASSIGNMENTS.

### 2.1 Accessories, Ordering Data

Device	Order No.
Monochrome CRT	6FM2 805-4AR04
Color CRT	6FM2 805-4AR50
Keyboard with Firmware	6FM2 805-4PS21
Incremental Rotary Encoder <sup>1)</sup> with Axial Cable Exit 1024 Pulse/Rev. 2000 Pulse/Rev. 2500 Pulse/Rev. 5000 Pulse/Rev.	6FC9 320-3KB00 6FC9 320-3KK00 6FC9 320-3KN00 6FC9 320-3KS00
Incremental Rotary Encoder <sup>1)</sup> with Radial Cable Exit 1024 Pulse/Rev. 2000 Pulse/Rev. 2500 Pulse/Rev. 5000 Pulse/Rev.	6FC9 320-3MB00 6FC9 320-3MK00 6FC9 320-3MN00 6FC9 320-3MS00
Clamp <sup>2)</sup> Spring Coupling	6FC9 320-4GA 6FC9 320-4GB
Actual Value Distributor for Connection for up to 3 Absolute Encoders	6FM1 590-5AA00
Distributor for Multi-Encoder Feedback	6FM1 590-5AB00
Power Supply Unit, Primary 3AC 380 V/Secondary DC 24 V 20 A Primary 3AC 380 V/Secondary DC 24 V 40 A	6FC9 304-0AC 6FC3 304-0AD
Terminal Strip Converter, 37 pin for I/O Boards (64 I, 16 I/O, 32 I/O) without LED's with LED's	6FC9 302-2BC01 6FC9 302-2BD01
Terminal Strip Converter, 37 pin for Output Boards (32 Out) with LED's	6FC9 302-2BK01
Terminal Strip Converter, 50 pin for I/O Boards (32 I/O) without LED's with LED's	6FC9 302-2AF 6FC9 302-2AG
Terminal Strip Converter, 37 pin Cam Signal Distributor/Digital Deceleration Step Output without LED's with LED's	6FM1 590-5BA 6FM1 590-5BB

1) Without spring coupling and clamps

2) There are 3 clamps for necessary for each encoder

Connector, complete	Order Number
<b>Round Connector, 12 Pin female (Siemens)</b> 10 mm Cable Ø 8 mm Cable Ø 6 mm Cable Ø	<b>6FC9 341-1FD</b> <b>6FC9 341-1FR</b> <b>6FC9 341-1FT</b>
<b>Round Socket Connector, 9 Pin female (Siemens)</b> 8 mm Cable Ø	<b>6FC9 341-1EW</b>
<b>Round Connector, 12 Pin male (Souriau)</b>	<b>6FC9 341-1AB</b>
<b>Round Connector, 17 Pin, female (Tuchel)</b>	<b>6FC9 341-1AC</b>
<b>D-Sub Connector, 15 Pin, female (Siemens)</b> with SINUMERIK Shell	<b>6FC9 341-1EC</b>
<b>D-Sub Connector, 25 Pin, female (Siemens)</b> with SINUMERIK Shell	<b>6FC9 341-1ED</b>
<b>D-Sub Connector, 37 Pin, female (Siemens)</b> with SINUMERIK Shell	<b>6FC9 341-1FH</b>
<b>D-Sub Connector, 37 Pin, female (Siemens)</b> with SINUMERIK Shell (Ribbon Cable)	<b>6FC9 341-1FX</b>
<b>D-Sub Connector, 25 Pin, male</b> Housing with Slide Latch	<b>6FC9 341-2AA</b>
<b>D-Sub Connector, 25 Pin, male (Siemens)</b> Post-housing	<b>6FC9 341-1ES</b>
<b>D-Sub Connector, 15 Pin, male (Siemens)</b> with SINUMERIK Shell	<b>6FC9 341-1EU</b>
<b>D-Sub Connector, 50 Pin, female (Siemens)</b>	<b>6FC9 341-1EE</b>
<b>D-Sub Connector, 50 Pin, male (Siemens)</b>	<b>6FC9 341-1EH</b>
<b>Connector Set for Cam Controller consisting of:</b> <b>Siemens D-Sub Connector, complete, female, Composite Shell,</b> <b>shielded, Crimp Contacts</b> 3 pcs. Connector 15 Pin 6 pcs. Connector 25 Pin 1 pcs. Connector 37 Pin	<b>6FM1 590-8AA00</b>





Ready-made <b>Cable</b>	Max. Length Permissible	Order No.
from Command Value Module to Drive Length 2 m Length 5 m Length 10 m Length 18 m Length 25 m Length 35 m Length 50 m	50 m	6FM1 590-4AA00 6FM1 590-4AB00 6FM1 590-4AC00 6FM1 590-4AD00 6FM1 590-4AE00 6FM1 590-4AF00 6FM1 590-4AG00
from Actual Value Module - to Actual Value Distributor Length 2 m Length 5 m Length 10 m Length 18 m Length 25 m Length 35 m Length 50 m - one cable end open Length 2 m Length 5 m Length 10 m Length 18 m Length 25 m Length 35 m Length 50 m	50 m         50 m	6FM1 590-2AA00 6FM1 590-2AB00 6FM1 590-2AC00 6FM1 590-2AD00 6FM1 590-2AE00 6FM1 590-2AF00 6FM1 590-2AG00  6FM1 590-2BA00 6FM1 590-2BB00 6FM1 590-2BC00 6FM1 590-2BD00 6FM1 590-2BE00 6FM1 590-2BF00 6FM1 590-2BG00
from Actual Value Distributor, one cable end open Length 2 m Length 5 m Length 10 m Length 18 m Length 25 m Length 35 m Length 50 m	50 m	6FM1 590-2EA00 6FM1 590-2EB00 6FM1 590-2EC00 6FM1 590-2ED00 6FM1 590-2EE00 6FM1 590-2EF00 6FM1 590-2EG00
for Digital Rotary Encoders, for Digital Linear Scales, and Main Motor Encoder (new Version) Length 5 m Length 10 m Length 18 m Length 25 m	35 m	6FC9 344-2BB 6FC9 344-2BC 6FC9 344-2BE 6FC9 344-2BF
for Digital Rotary Encoders Built-In in Servo Motors (ROD 320) Length 5 m Length 10 m Length 18 m Length 25 m	35 m	6FC9 340-8PB 6FC9 340-8PC 6FC9 340-8PE 6FC9 340-8PF

Ready-made <b>Cable</b>	Max. Length Permissible	Order No.
for Absolute Encoders Length 2 m Length 5 m Length 10 m Length 20 m Length 35 m	120 m	6FX1 401-6CC02 6FX1 401-6CC05 6FX1 401-6CC10 6FX1 401-6CC20 6FX1 401-6CC35
from CU to EU (MPC Interface) Copper Cable Length 2 m Length 5 m Length 10 m Length 18 m Length 25 m Length 50 m	50 m	6FC9 344-2AM 6FC9 344-2AB 6FC9 344-2AC 6FC9 344-2AE 6FC9 344-2AF 6FC9 344-2AG
from CU to EU (MPC Interface) Fiber Optics Cable Length 5 m (plastics) Length 10 m (plastics) Length 18 m (glass) Length 25 m (glass) Length 50 m (glass) Length 75 m (glass) Length 100 m (glass)	300 m	6FX1 400-2BC05 6FX1 400-2BC10 6FX1 400-1BC18 6FX1 400-1BC25 6FX1 400-1BC50 6FX1 400-1BC75 6FX1 400-1BC00
between Input Board (64 In) and Terminal (Strip Converter) Length 5 m Length 10 m Length 18 m Length 25 m	50 m	6FC9 344-1UB 6FC9 344-1UC 6FC9 344-1UE 6FC9 344-1UF
between Output Board (32 Out) and Terminal (Strip Converter) Length 5 m Length 10 m Length 18 m Length 25 m	50 m	6FC9 344-1VB 6FC9 344-1VC 6FC9 344-1VE 6FC9 344-1VF
between Mixed I/O Board (16 In/Out) and Terminal (Strip Converter) Length 5 m Length 10 m Length 18 m Length 25 m	50 m	6FC9 344-3XB 6FC9 344-3XC 6FC9 344-3XE 6FC9 344-3XF
between I/O Board (32 In/Out) and Terminal (Strip Converter) Length 5 m Length 10 m Length 18 m Length 25 m	50 m	6FC9 340-2WB 6FC9 340-2WC 6FC9 340-2WE 6FC9 340-2WF

Ready-made <b>Cable</b>	Max. Length Permissible	Order No.
between I/O Board (32 I/O, Outputs) and Machine control (Terminal Strip Converter) Length 2 m Length 3 m Length 5 m	50 m	6FC9 340-5RM 6FC9 340-5RN 6FC9 340-5RB
between I/O Board (32 I/O, Inputs) and Machine control (Terminal Strip Converter) Length 2 m Length 3 m Length 5 m	50 m	6FC9 340-5QM 6FC9 340-5QN 6FC9 340-5QB
from reducing-step module (X141) to terminal strip converter (nominal-value cable) Length 5 m Length 10 m Length 18 m Length 25 m Length 35 m Length 50 m	50 m	6FM1 590-3FB00 6FM1 590-3FC00 6FM1 590-3FD00 6FM1 590-3FE00 6FM1 590-3FF00 6FM1 590-3FG00
between Disk Drive DG-SM and Central Unit Length 2 m Length 5 m Length 10 m Length 18 m	30 m	6FM1 590-7BA00 6FM1 590-7BB00 6FM1 590-7BC00 6FM1 590-7BD00
between SIMATIC Programmer, PG 675/PG 685/PC 635 (Printer Interface, Trans PCIN), and Central Unit Length 5 m Length 10 m Length 18 m Length 25 m	30 m	6FC9 344-1AB 6FC9 344-1AC 6FC9 344-1AE 6FC9 344-1AF
between SIMATIC Programmer PG 730/750 (COM 1 Interface) and Central Unit (Trans PCIN and PLC Programming) Length 5 m Length 10 m Length 18 m	30 m	6FC9 344-4RB 6FC9 344-4RC 6FC9 344-4RE
between SIMATIC Programmer PG 670/675/685/635 (AG S5 Interface, PLC Programming) and Central Unit Length 5 m Length 10 m	30 m	6FC9 340-8GB 6FC9 340-8GC

**For more information about cables and connectors, see the  
"UNIVERSAL INTERFACE SYSTEM 800" manual.**

## 3 Devices

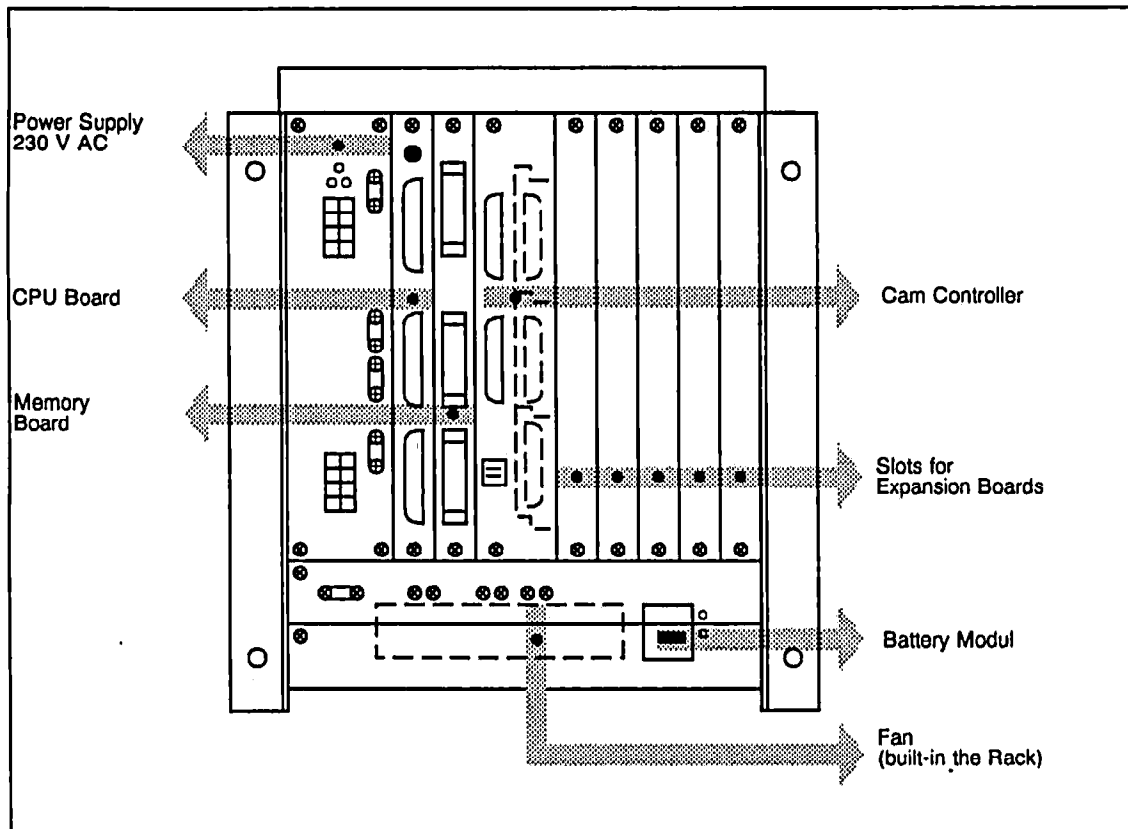
### 3.1 Central Unit

#### 3.1.1 Central Unit 230 V Version

The basic version of the central unit consist of the following components:

- SINUMERIK 805SM Rack with built-in fan (Hardw. No. 6FR2 907-0AA00)
- 230 V AC power supply component (Hardw. No. 6EW1 861-3..)
- CPU board (Hardw. No. 6FX1 138-5BB04)
- Memory board (Hardw. No. 6FX1 128-1BA00)
- Cam controller board (Hardw. No. 6FX1 132-4BA01)

The expansion boards (optional boards) are listed in section RACK ASSIGNMENT.



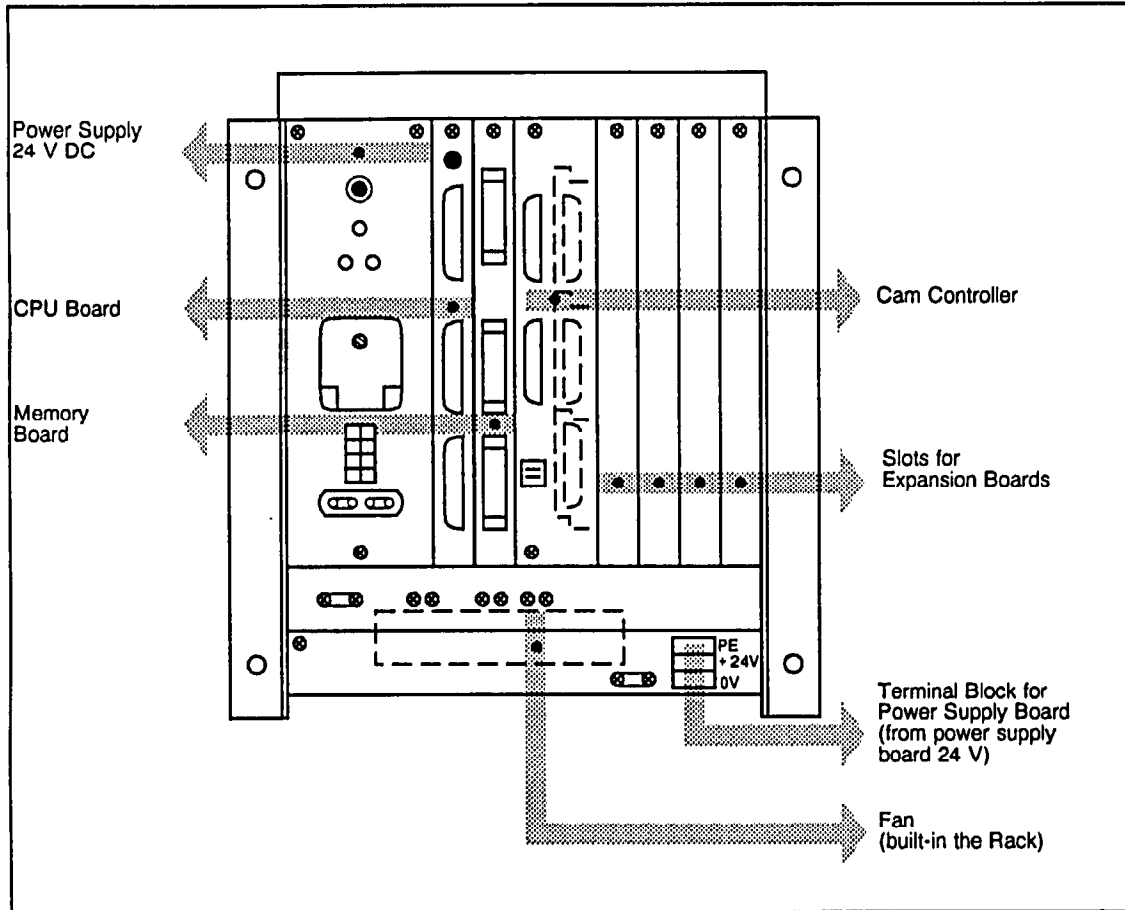
Central unit in 230 V Version

### 3.1.2 Central Unit 24 V Version

The basic version of the central unit consist of the following components:

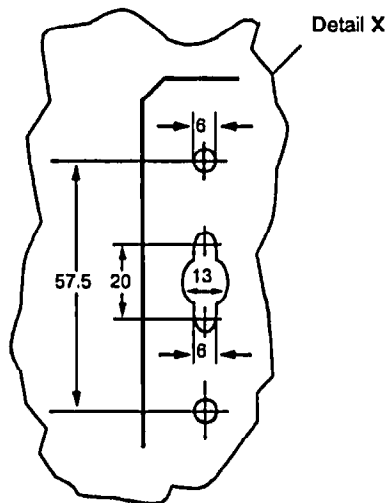
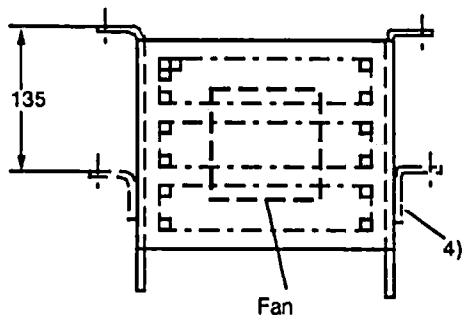
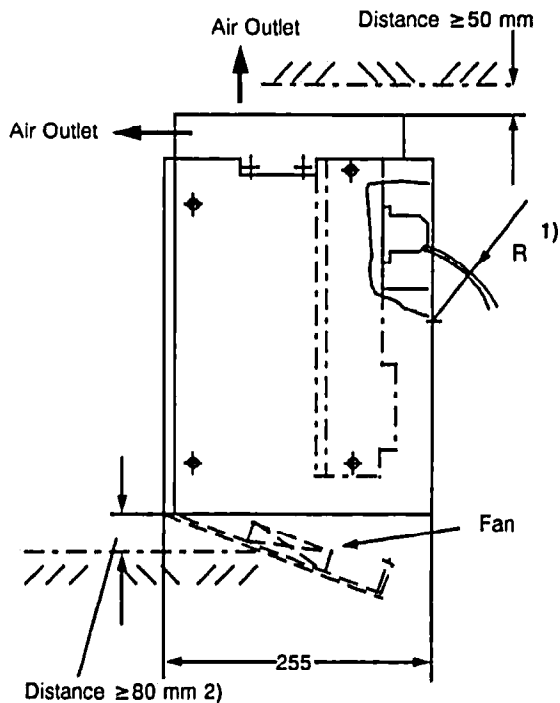
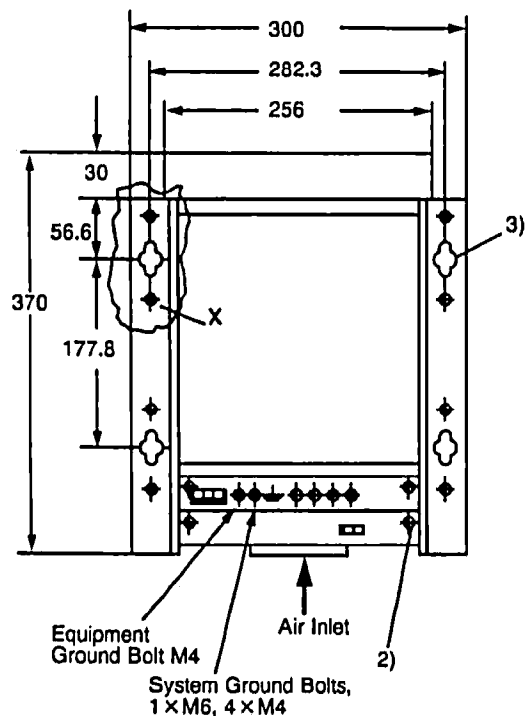
- SINUMERIK 805SM Rack with built-in fan (Hardw. No. 6FR2 907-0AA01)
- 24 V DC power supply component (Hardw. No. 6EV3 054-0GC)
- CPU board (Hardw. No. 6FX1 138-5BB04)
- Memory board (Hardw. No. 6FX1 128-1BA00)
- Cam controller board (Hardw. No. 6FX1 132-4BA01)

The expansion boards (optional boards) are listed in Section RACK ASSIGNMENTS.



Central unit in 24 V DC version

**3.1.3 Dimensions** (All dimensions in millimeters)



- 1) According to cable type.  
Siemens cable radius  $R \geq 100$
- 2) To open or remove the body panel  
loosen the fastening screws
- 3) Mounting screw M6
- 4) Mounting possibility for two  
additional brackets  
(Order No. 226 104. 0362.01)

**Note:**

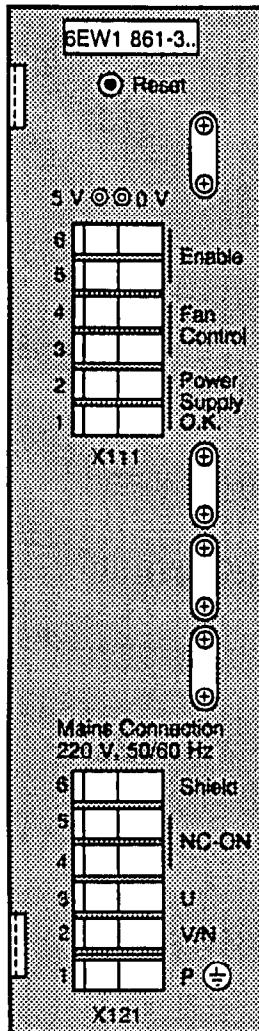
The dimensions for 230 V  
and 24 V version are the same.

### 3.1.4 Power Supply Boards

#### 3.1.4.1 Power Supply 230 V AC (Hardw. No. 6EW1 861-3..)

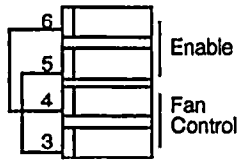
The board features:

- Hardware Reset push-button
- Measuring sockets for 0 V and +5 V (Power Supply Output Voltage)
- Terminals for Ready-to-Operate (Enable), Fan Signal (Fan Control), Power Supply signal (Power Supply O.K.)
- Terminals for NC-ON and 230 V supply



***The 230 V version has the factory-made connections to the battery module and fan via the back plane.  
(In case of the malfunction, check the connectors.)***

## Brief Description



- X111 Terminals 5 and 6, ENABLE:**  
 Enable signal, e.g. relay contact, has to be always available in order to switch on the power supply.  
 In the standard version, these terminals are connected to Fan Control, so that in case of fan failure the Ready message for the power supply disappears.
- X111 Terminals 3 and 4, FAN CONTROL:**  
 Fan output signal, relay contact, isolated, (100 V/250 mA, dielectric strength  $\leq 100$  V).  
 In case of permanent enable, jumper on ENABLE, the power supply must be switched off within one minute after the FAN CONTROL signal appears otherwise, the control may overheat.
- X111 Terminals 1 and 2, POWER SUPPLY O.K.:**  
 Ready signal from power supply, relays contact, isolated, (100 V/250 mA, dielectric strength  $\leq 100$  V).
- X121 Terminal 6, SHIELD:**  
 Shielding
- X121 Terminals 4 and 5, NC-ON:**  
 Connection for the NC-ON push-button. The cable for NC-ON must be shielded and the shield must be connected to terminal SHIELD. Terminals 4 and 5 can also permanently be jumpered.
- X121 Terminals 3, 2, 1, U V/N P:**  
 connecting of the supply voltage, U: 230 V, N: Equipment Ground, P: System Ground

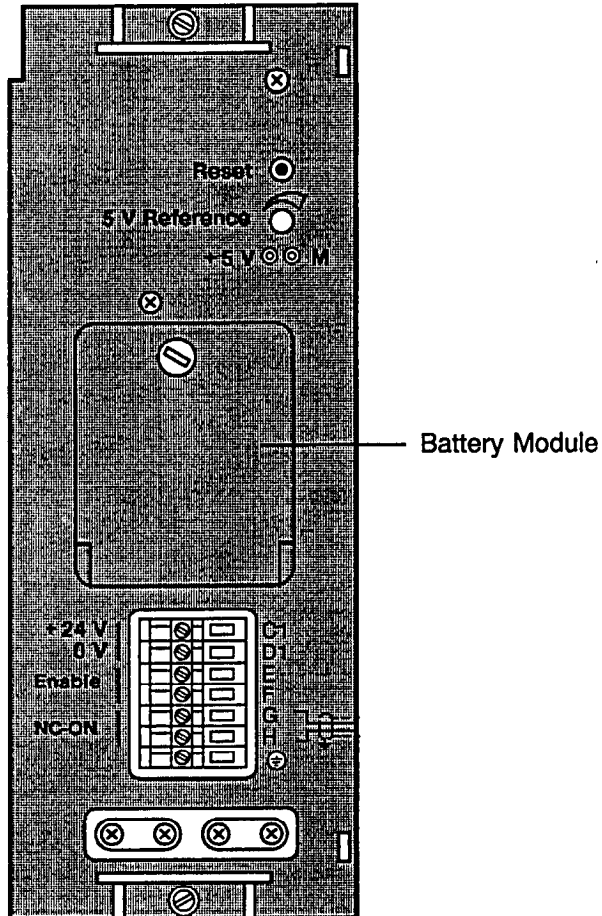
	<b>WARNING</b>
	<ul style="list-style-type: none"> <li>Exceeding the values for fluctuation or deviation of the supply voltage over the limits specified in the technical data can cause the product malfunction or become hazardous.</li> <li>It is necessary to provide for the proper program start after the power sag or power outage. The hazardous operation conditions may not be present even for the short time. If necessary, the EMERGENCY STOP signal has to be forced.</li> </ul>



### 3.1.4.2 Power Supply 24 V DC (Hardw. No. 6EV3 054-0GC)

The board features:

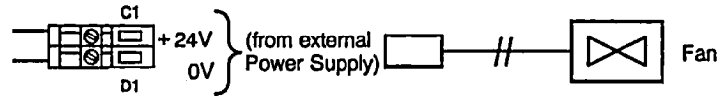
- Hardware Reset push-button
- Potentiometer for +5 V adjustment
- Measuring sockets for +5 V and 0 V (Power Supply Output Voltage)
- Terminals for NC-ON, Ready-to-Operate (Enable), and 24 V DC power supply
- Battery module consisting of 3 batteries 1.5 V Mignon (LR6 size, normal retail battery).



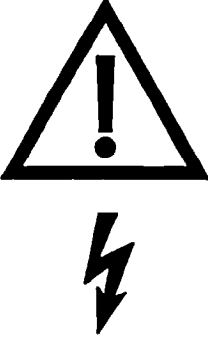
## Brief Description

- Terminals C1 and D1:

Terminals for connecting of 24 V DC to power supply and fan.



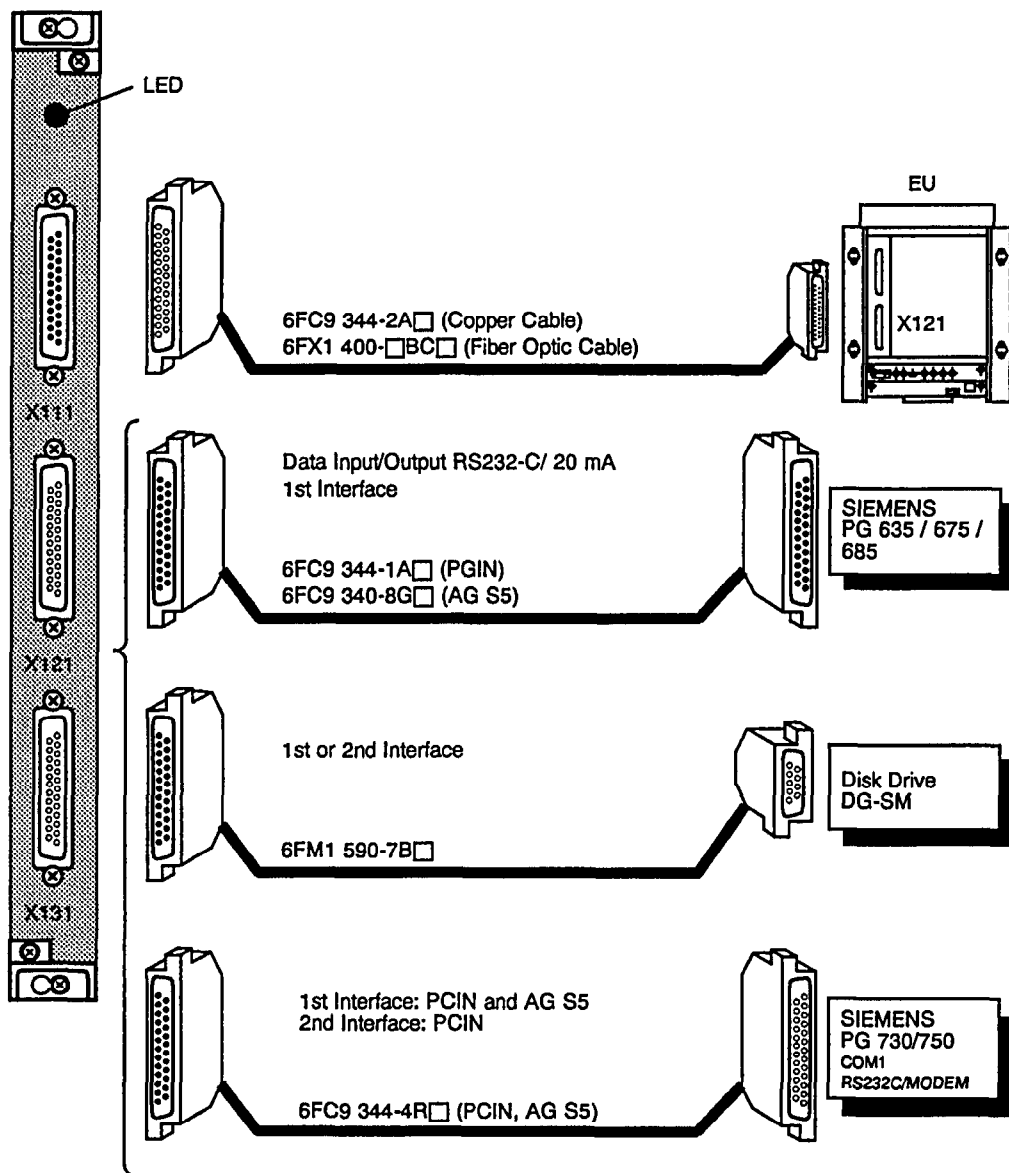
- Terminals E and F, ENABLE:  
Enable signal, e.g. relay contact, has always to be available in order to switch on the power supply.
- Terminals G and H:  
Connection for the NC-ON push-button. The cable for NC-ON must be shielded and the shield must be connected to terminal **GROUNDING TERMINAL**. Terminals G and H can also permanently be jumpered.
- Grounding terminal

<b>WARNING</b>	
	<p>If using the 24 V power supply, the low voltage must be separated properly. Only the external power supplies built in compliance with IEC 364-4-41 or HD 384.04.41 (VDE 0100 Part 410) may be used.</p>

### 3.1.5 CPU Board (Hardw. No.: 6FX1 138-5BB04)

The board features:

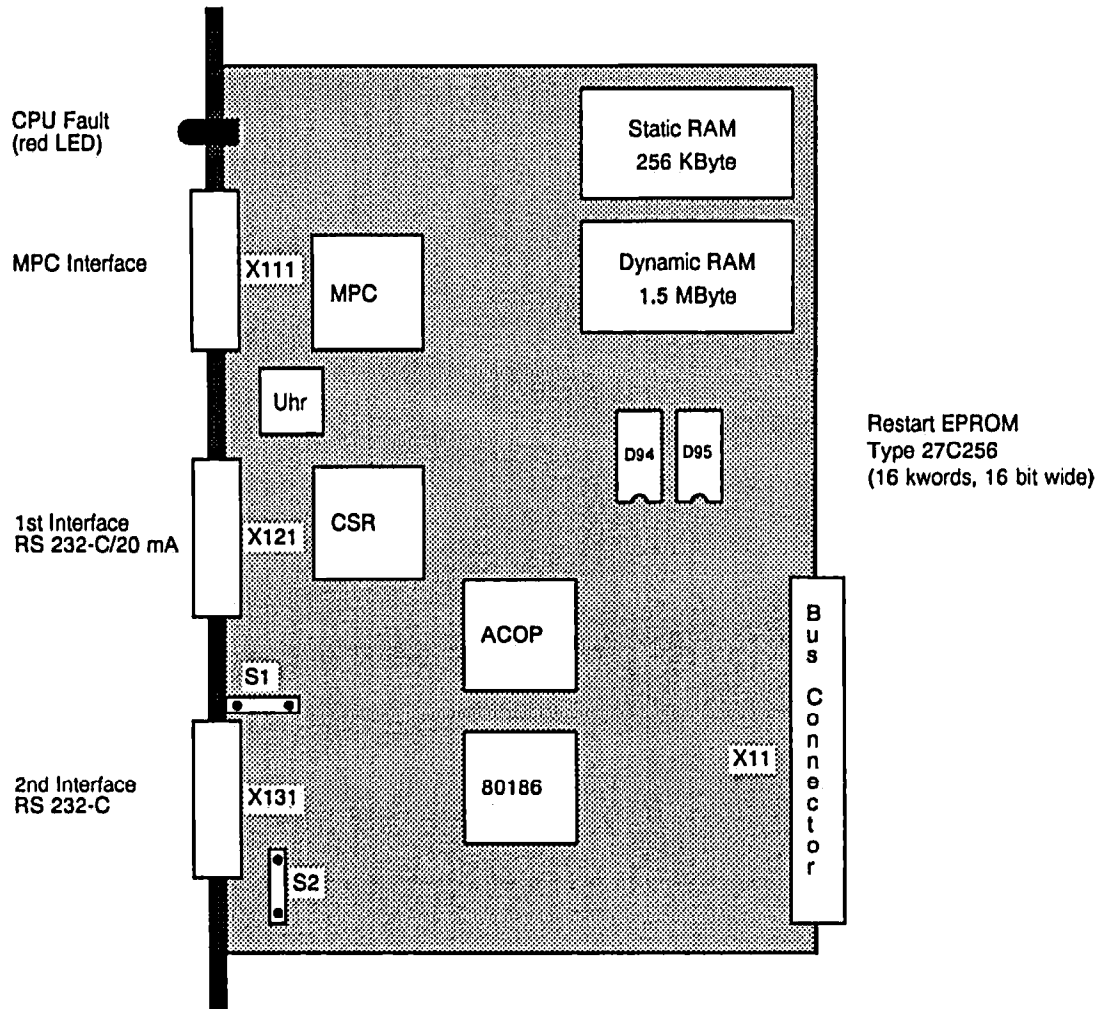
- 1 LED (red)
- 1 MPC Interface for connecting of the distributed peripherals
- 1 Serial Interface RS232-C/ 20 mA (TTY)
- 1 Serial Interface RS232-C only (Option)



**Note:**

For other devices, see the "Universal Interface System 800" manual.

### Location of the Sockets and Jumpers

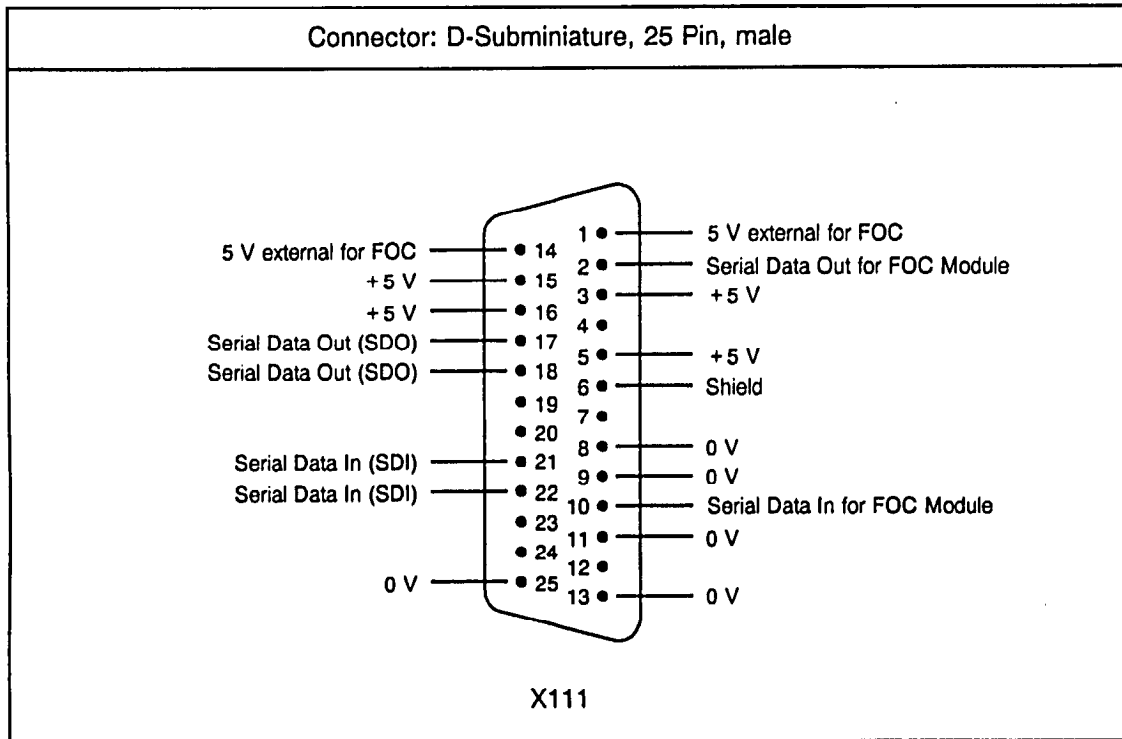


### Standard Jumper setting

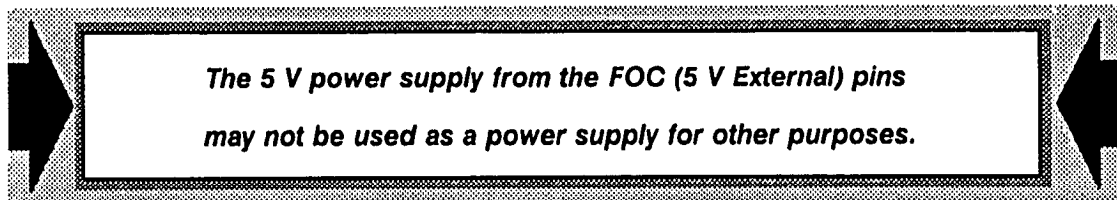
- Switch S1: open
- Switch S2: open

### 3.1.5.1 MPC-Interface

The MPC (Multi Port Controller) interface serves the data transfer between central controller (MPC Master) and distributed peripherals (MPC Slave).

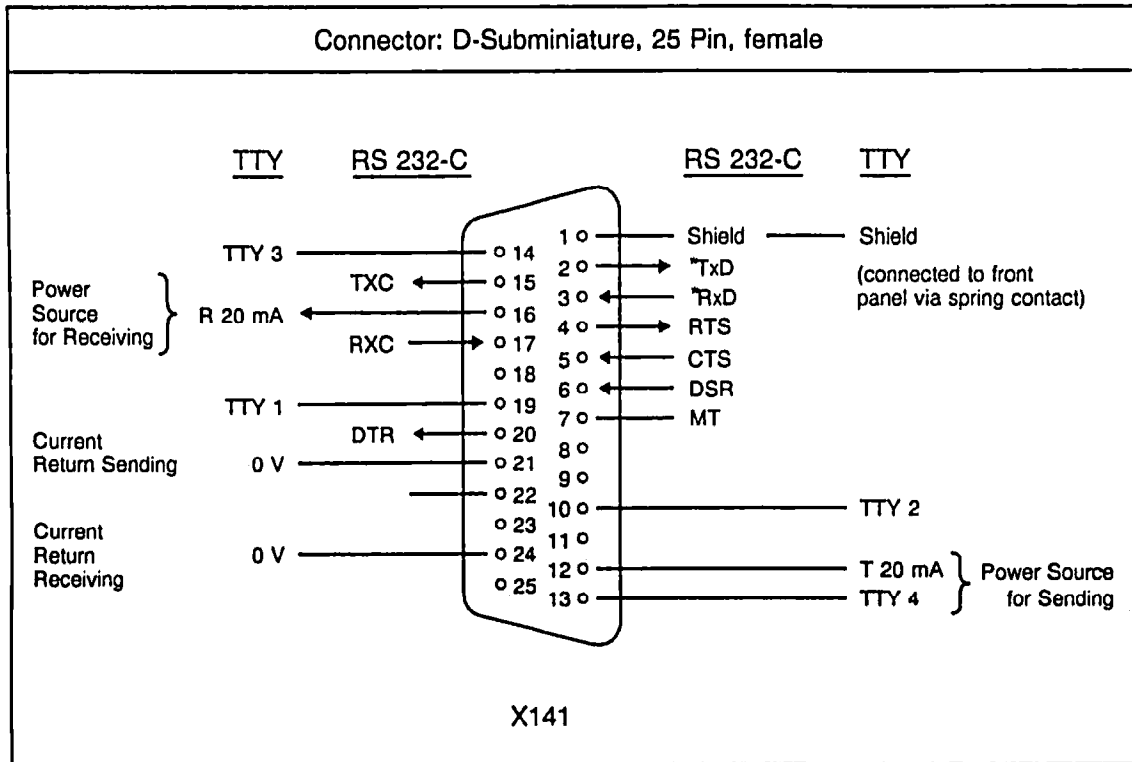


*Pin assignments for the MPC interface*



### 3.1.5.2 1st User Interface (RS 232-C/TTY)

Applicable for: RS 232-C (V.24)/TTY (20 mA)



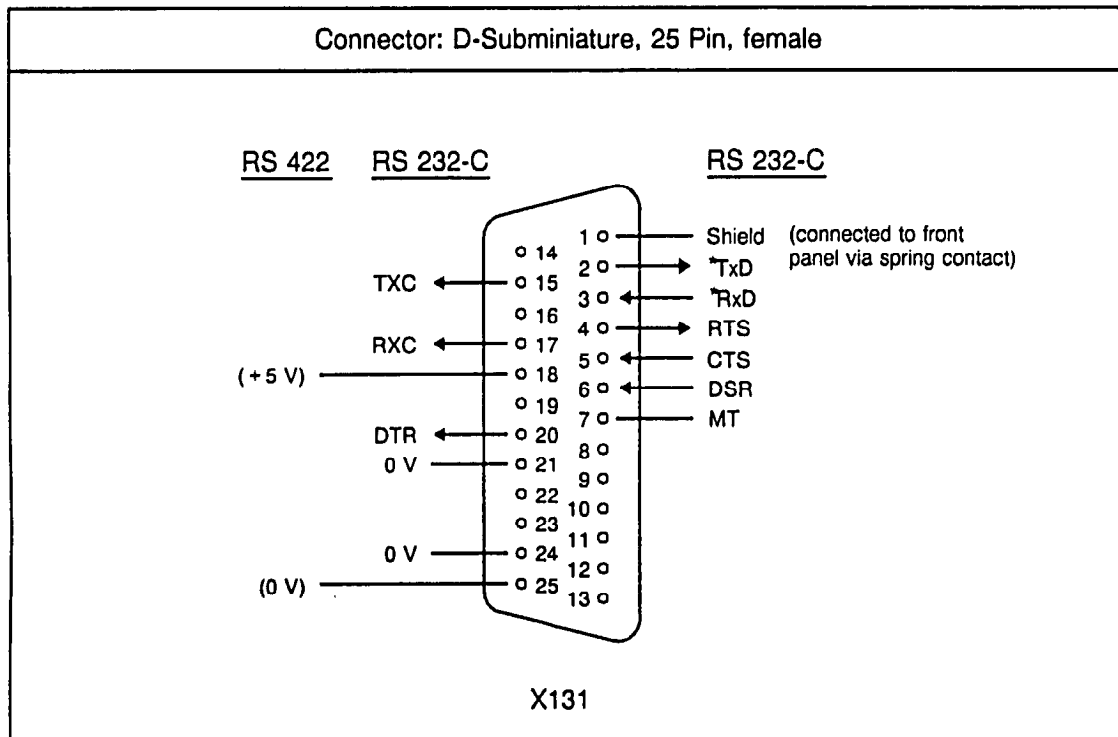
*Pin assignment to the first interface*

#### Interface Data:

- RS 232-C      Signal level  $\pm 12$  V  
                  Signals \*RxD and \*TxD are low-active
- 20 mA         Active or passive (via pin selection)  
                  Only Full-Duplex mode possible

### 3.1.5.3 2nd User Interface (RS 232-C)

Applicable for: RS 232/RS 422 (with RS 422 adapter)

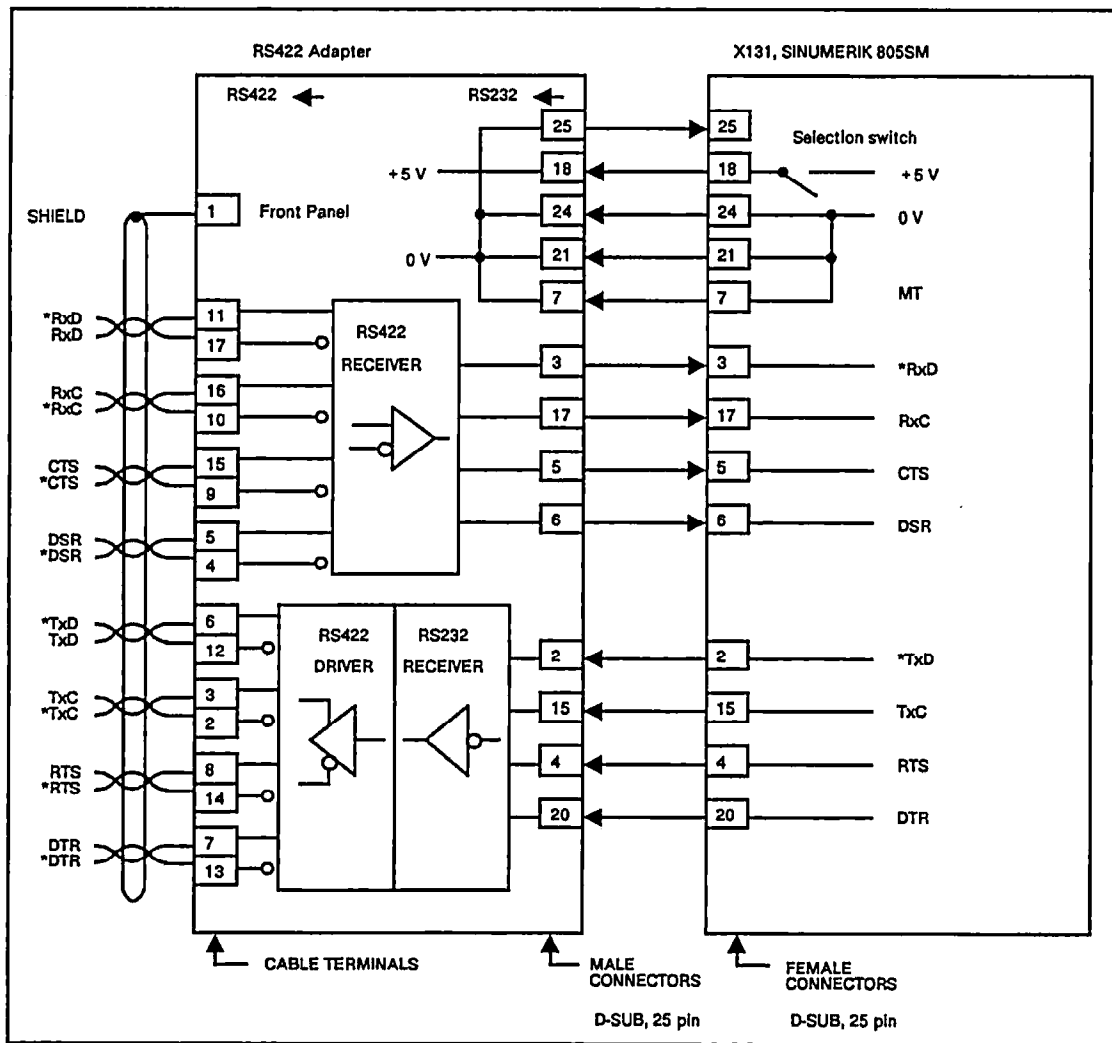


*Pin assignment for the second interface*

#### Note:

- The serial interfaces are described in more detail in the UNIVERSAL INTERFACE SYSTEM 800 manual.
- The second interface is only functional when the option SECOND INTERFACE is installed.
- If used as RS422 interface, the RS422 adapter (Order No. 6FX1137-2BA) is plugged directly into X131 receptacle (see RS 422 block diagram). RS 422 adapter increases distance for data transfer.

### 3.1.5.4 User Interface with RS 422 Adapter, Block Diagram



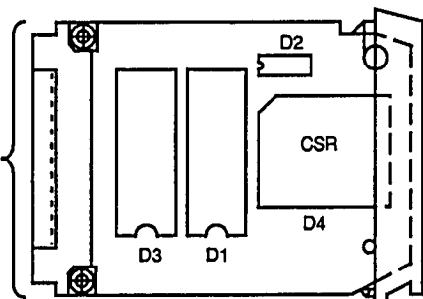
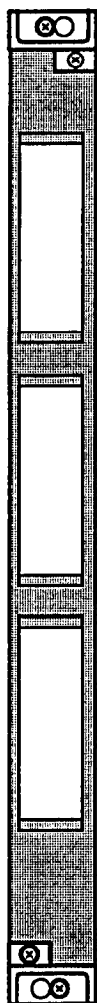
Block Diagram RS422



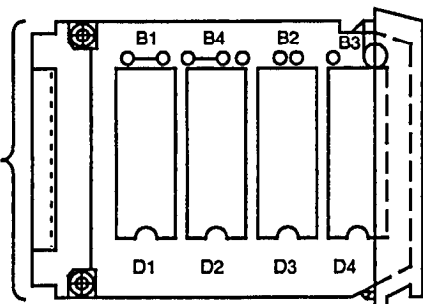
### 3.1.6 Memory Board (Hardw. No.: 6FX1 128-1BA00)

The board features:

- 3 locations for EPROM/RAM modules



Module for System software or  
for screen display texts  
1 MByte



User Memory Submodule (UMS)  
256 KByte  
Standard jumper setting:  
B1 closed  
B2 open  
B3 open  
B4 closed

**Note:**

In SW3, you can also use an UMS  
with 1 MByte memory capacity.

Description	Order No.	Module location		
		1	2	3
System software	6FX1 882-4BX01-XX	▲		
Screen display texts, English/German	6FX1 882-4BX12-XX		▲	
Screen display texts, French/German	6FX1 882-4BX32-XX		▲	
Screen display texts, Italien/German	6FX1 882-4BX42-XX		▲	
Screen display texts, Spanish/German	6FX1 882-4BX52-XX		▲	
UMS, EPROM, unprogrammed, 256 KByte	6FX1 128-4BC00			▲
UMS, RAM, unprogrammed, unbuffered, 256 KByte	6FX1 135-3BA00			▲
UMS, EPROM, unprogrammed, 1 MByte <sup>1)</sup>	6FX1 154-5BA00			▲
Cover rail	6FX1 410-0CX17			▲

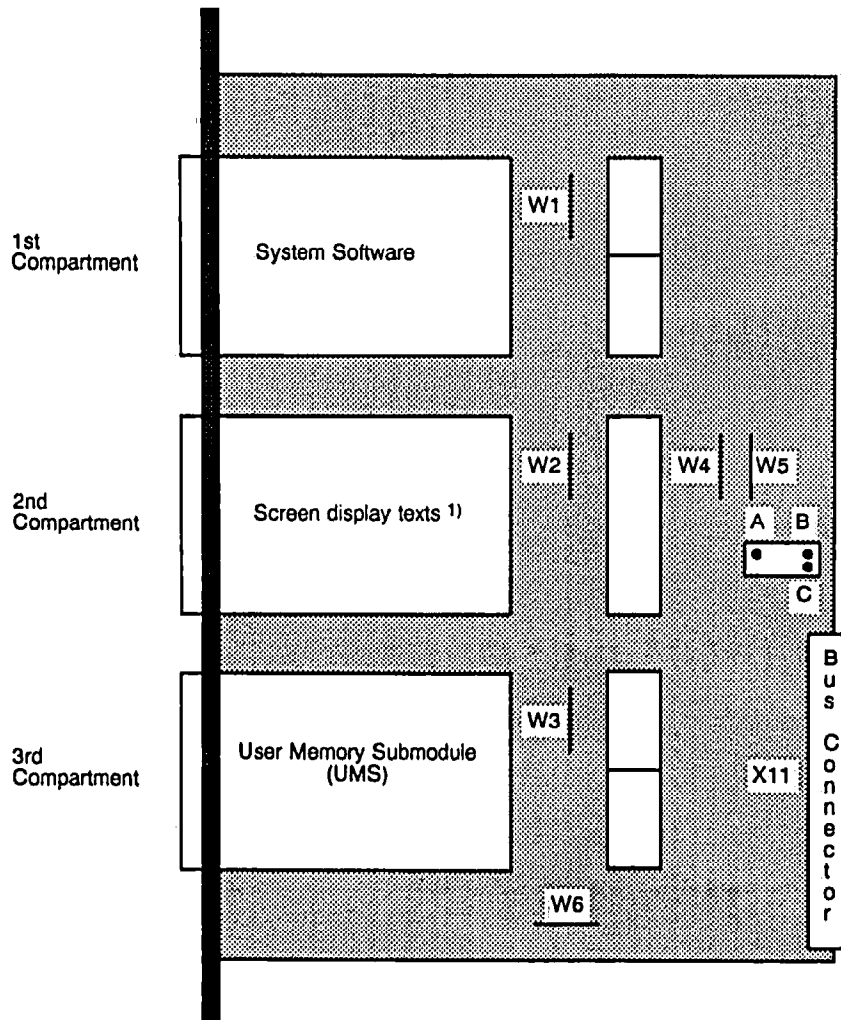
XX: represents the possible software version

▲ Basic version

▲ Option

1) can only be used from SW3 on

## Location of the Sockets and Jumpers



### Standard jumper setting:

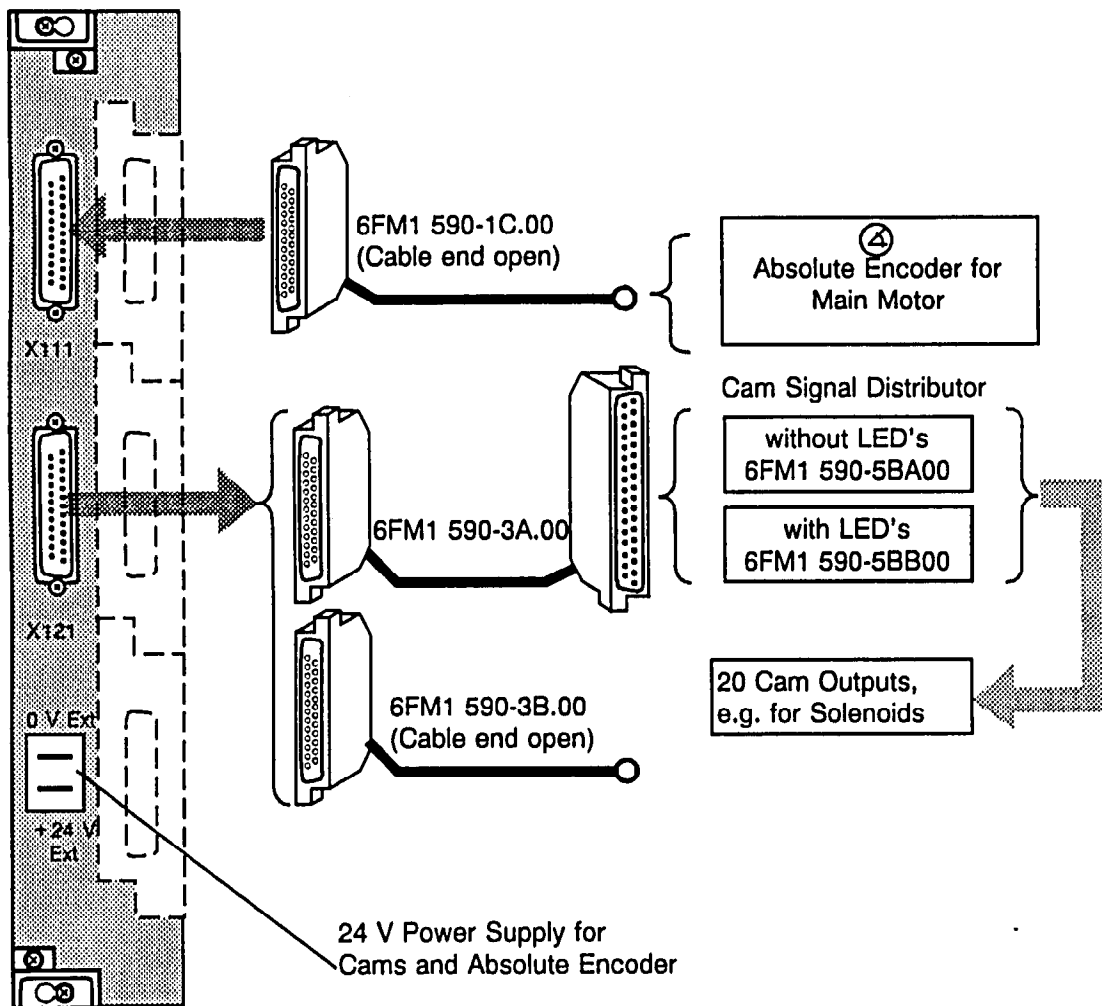
W1	open
W2	closed
W3	open
W4	closed
W5	open
W6	open
A-B	open
A-C	open

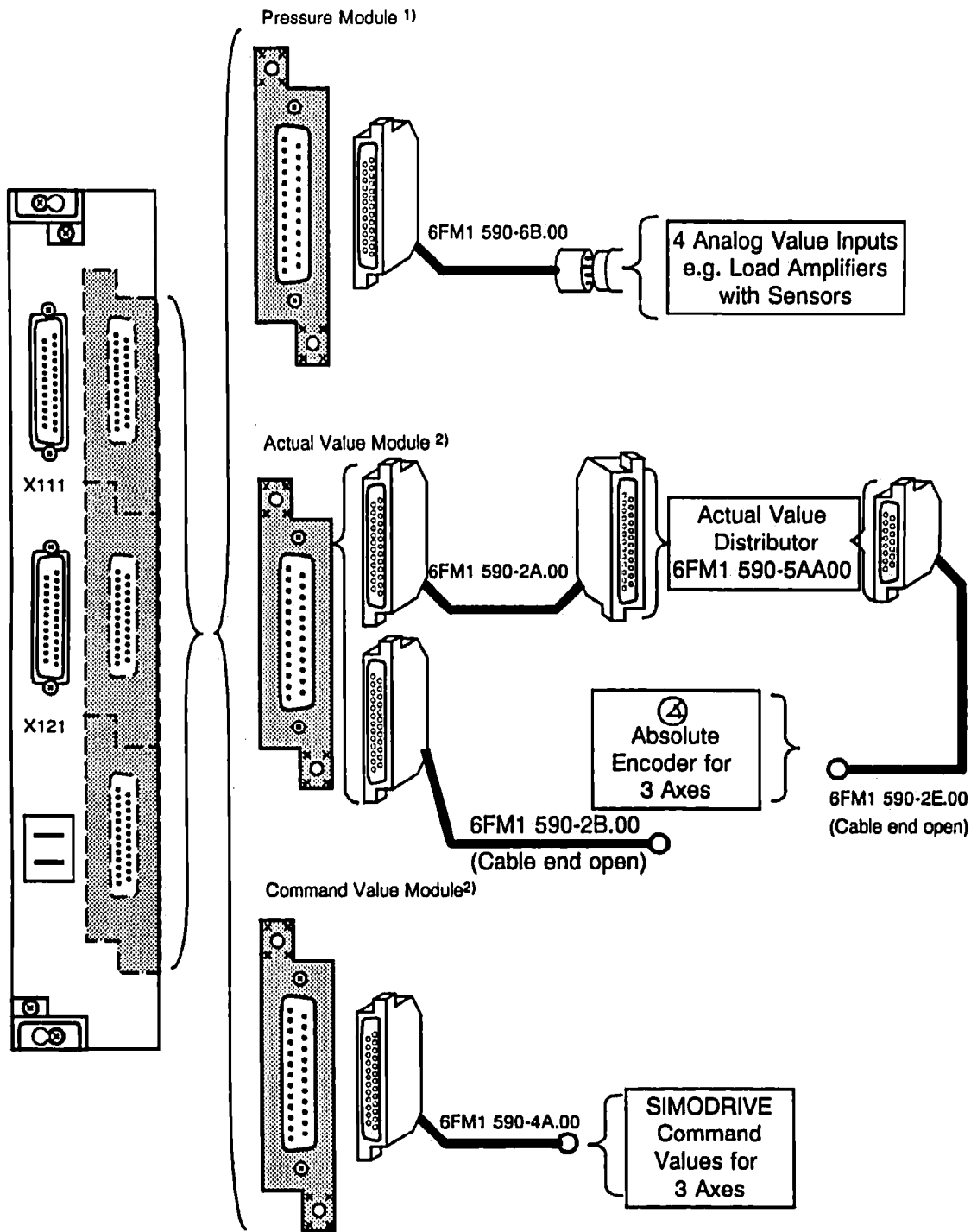
1) *Is an option, must nevertheless be used.*

### 3.1.7 Cam Controller (Hardw. No. 6FX1 132-4BA01)

**The board features:**

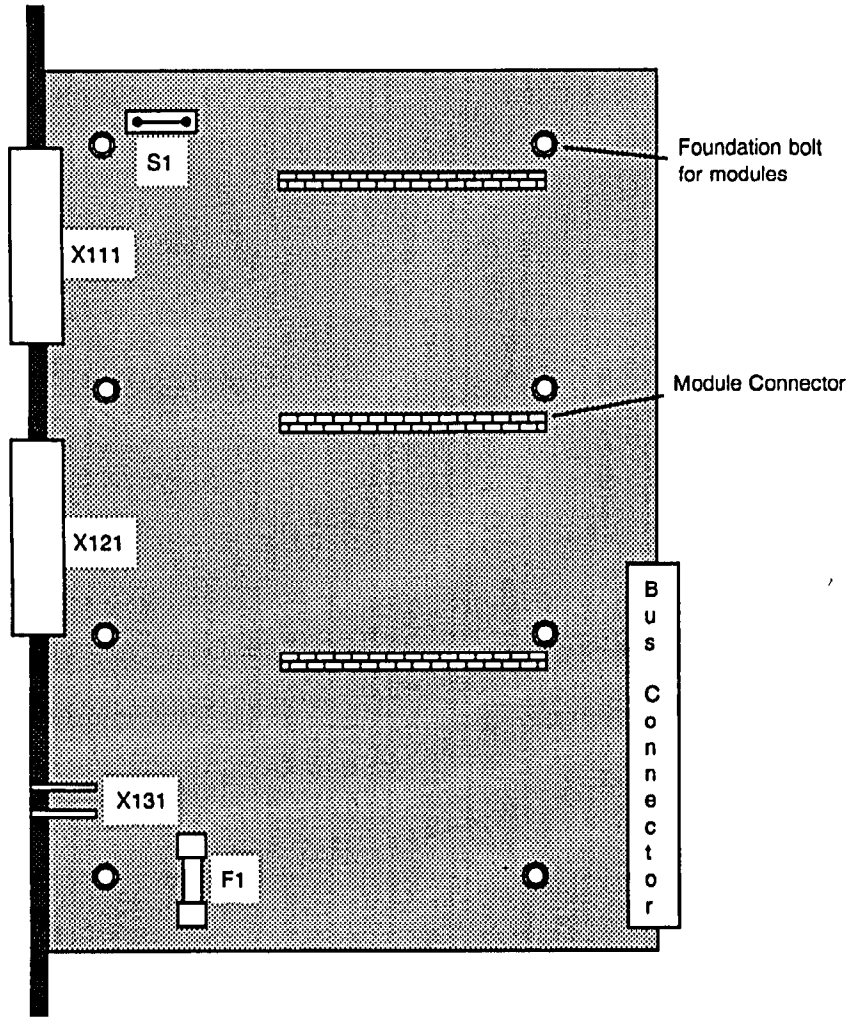
- Interface for connecting of the main motor
- Terminal block for connection of the cams and absolute encoders
- Module compartments for pressure module, actual value module, and command value module
  - pressure module interface for 4 analog inputs (inputs for pressure sensors 0 to 10 V or 0 to 20 mA)
  - actual value interface for feedback connection from 3 auxiliary axes
  - command value module with outputs for 3 axis drive amplifiers.





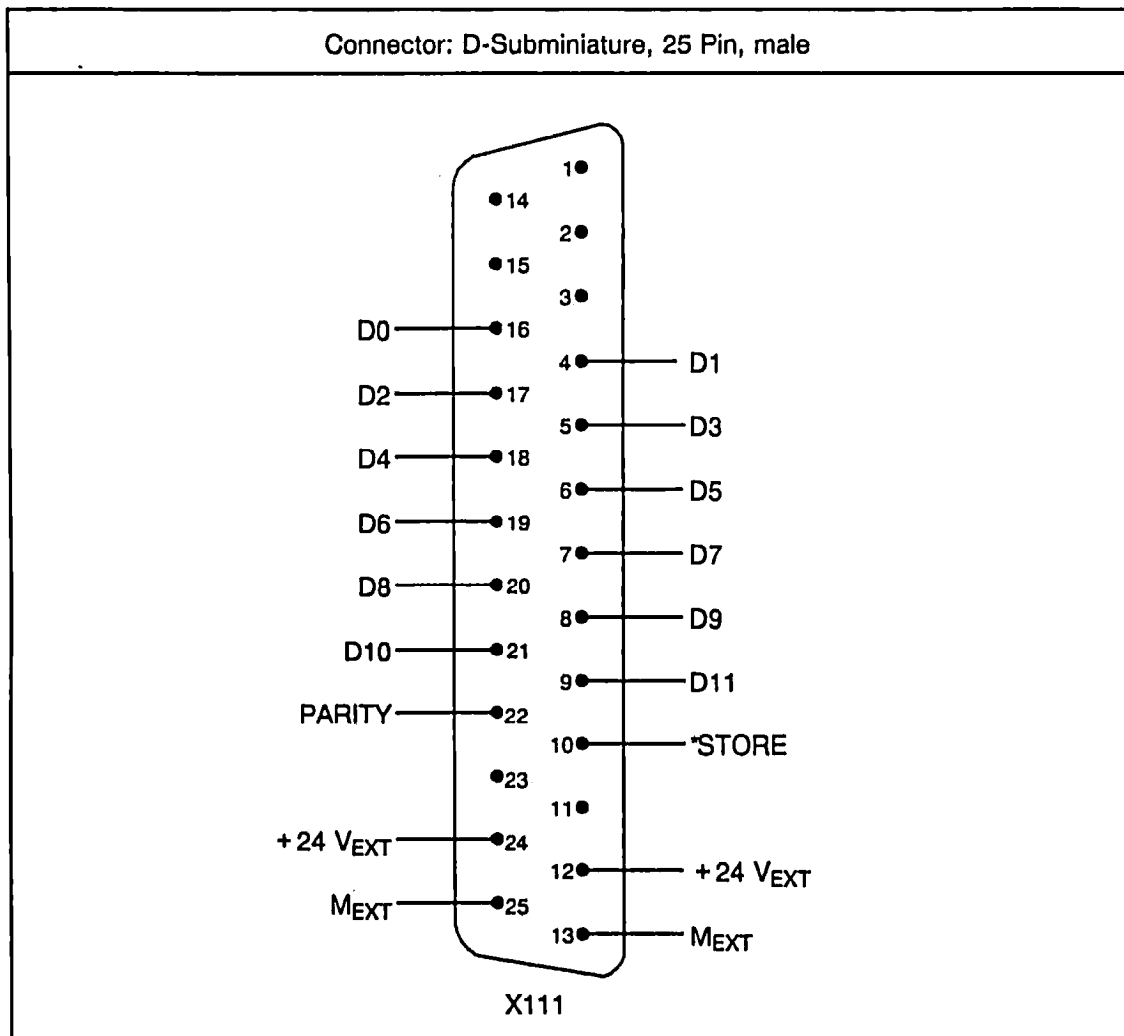
1) only in module compartment 1 and 2 possible  
2) possible in module compartments 1, 2, and 3

### Location of the Sockets and Jumpers



Switch S1: closed  
Fuse F1: FF4 (non-time delay, 4 A)

### 3.1.7.1 Main Drive Encoder, Connector Pin Assignment



*Pin assignments for the main motor encoder*

The main motor encoder has to have the following data:

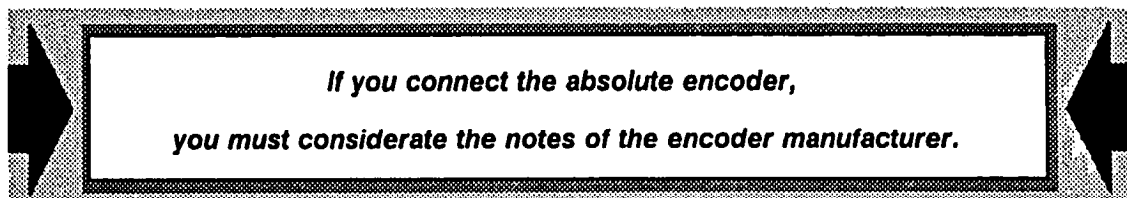
- Single Turn Absolute Encoder
- Gray Code, Data Transfer Parallel
- Signal Width 12 Bit
- Supply voltage 24 V
- Level voltage 24 V
- Open Collector
- V/R Input

**Note:**

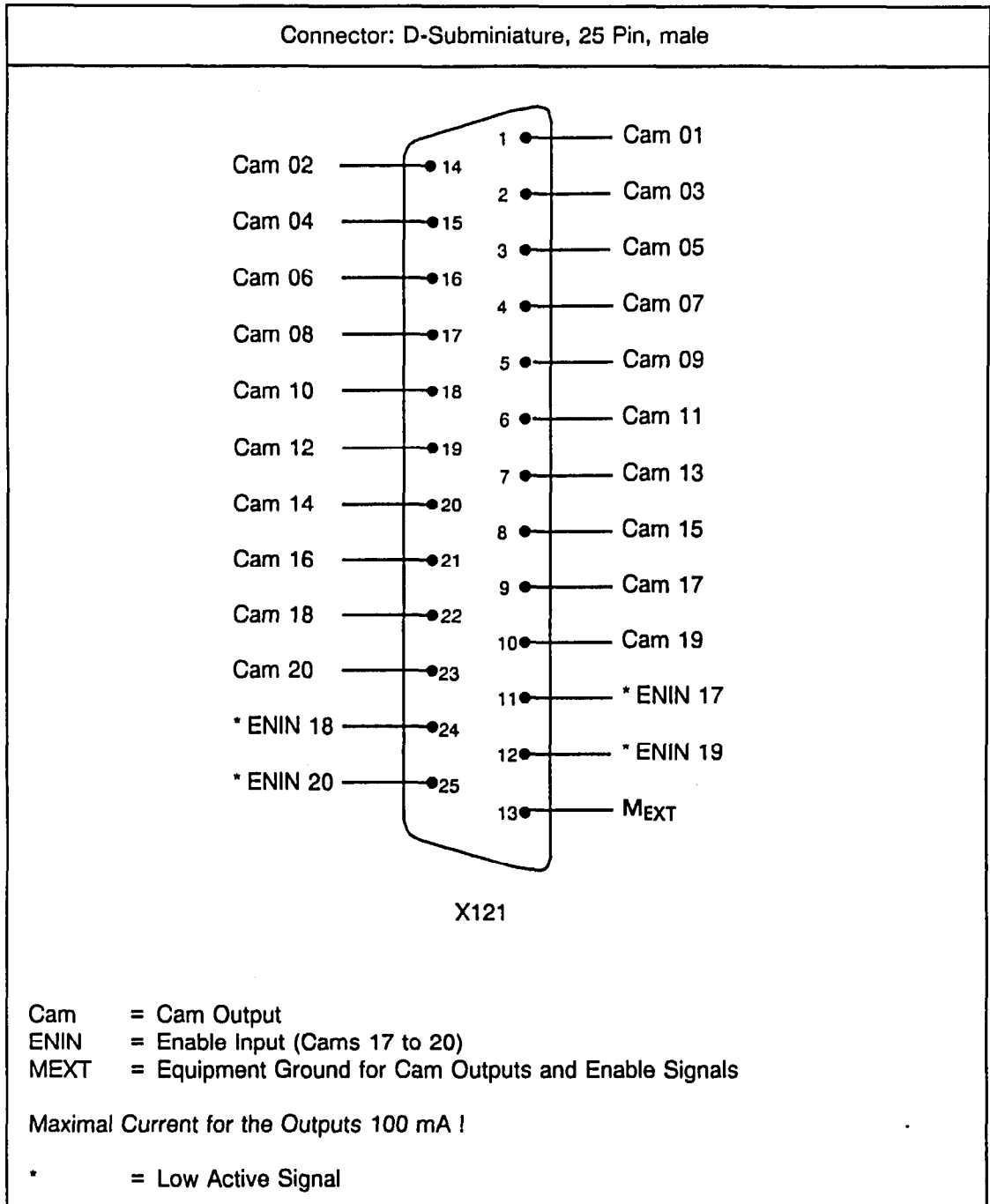
The following signals are additionally required for the parity evaluation:

- PARITY signal (even parity)
- STORE signal

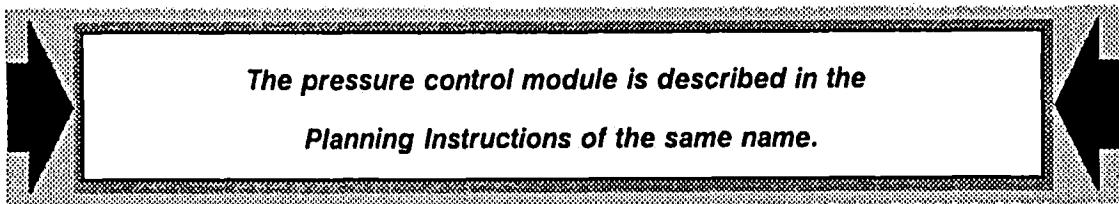
We recommend the encoder types CE65S or HE65S by T + R Electronic GmbH, Trossingen.



### 3.1.7.2 Cam Output and Cam Enables, Connector Pin Assignment



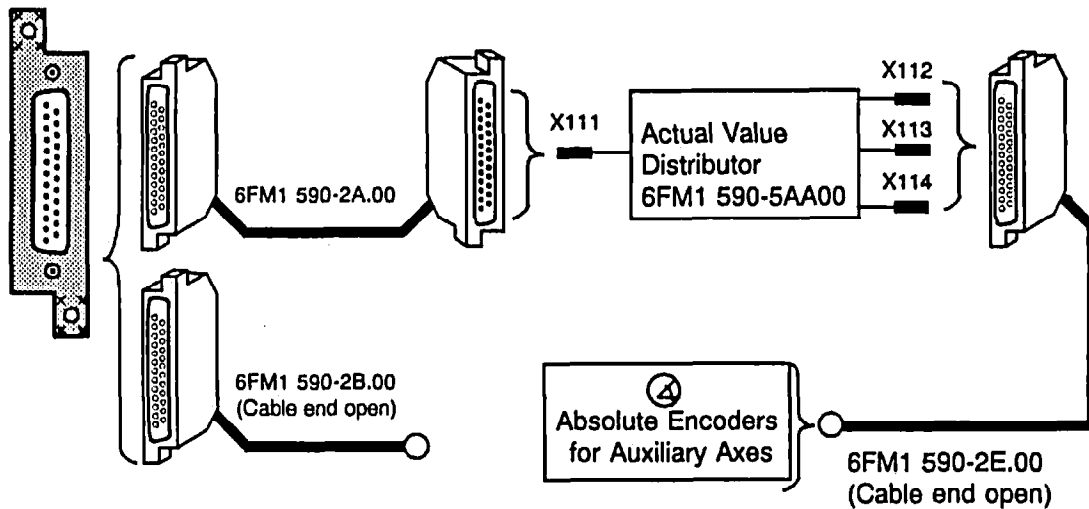
### 3.1.7.3 Pressure Control Module (Hardw. No. 6FX1 132-7BA01)



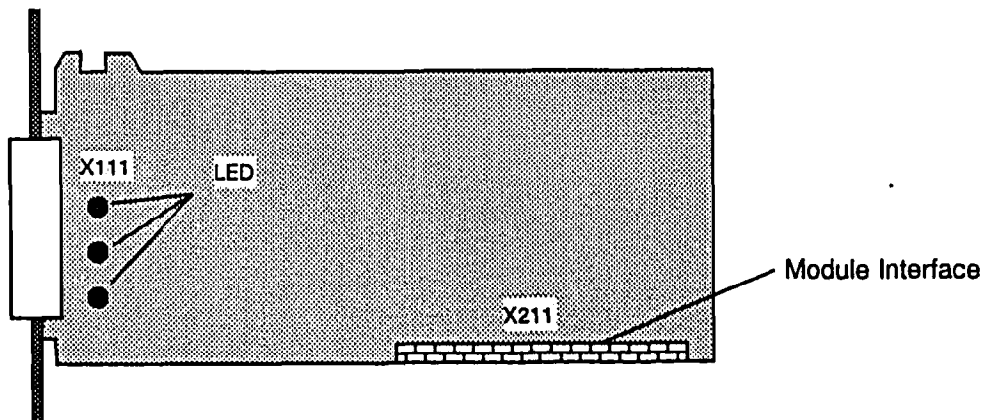
### 3.1.7.4 Actual Value Module (Hardw. No. 6FX1 132-6BA01)

The board features:

Actual value input for connecting of 3 auxiliary axes.



Module top view



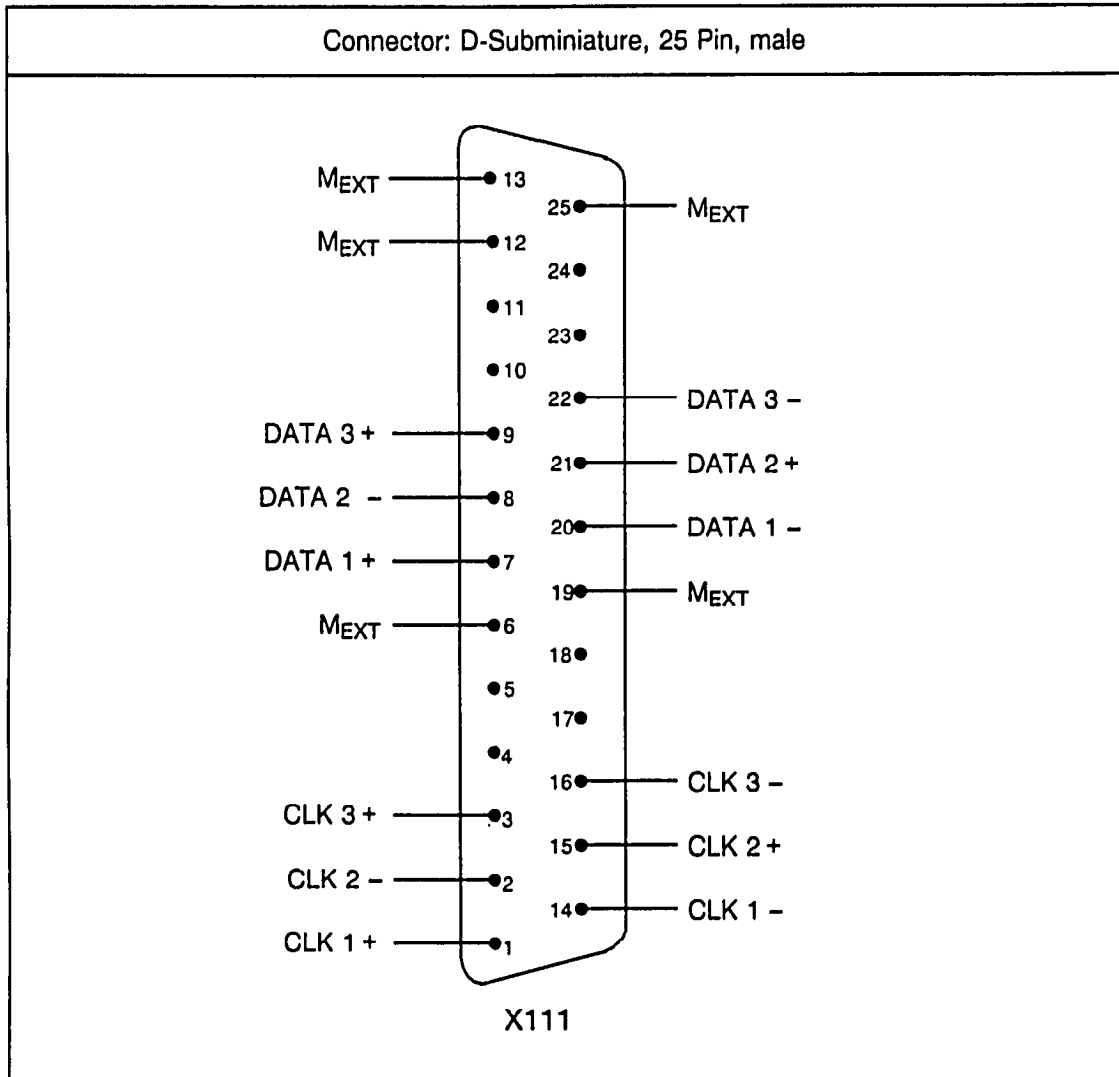
**Note:**

No jumper assignment is required for the actual value module.

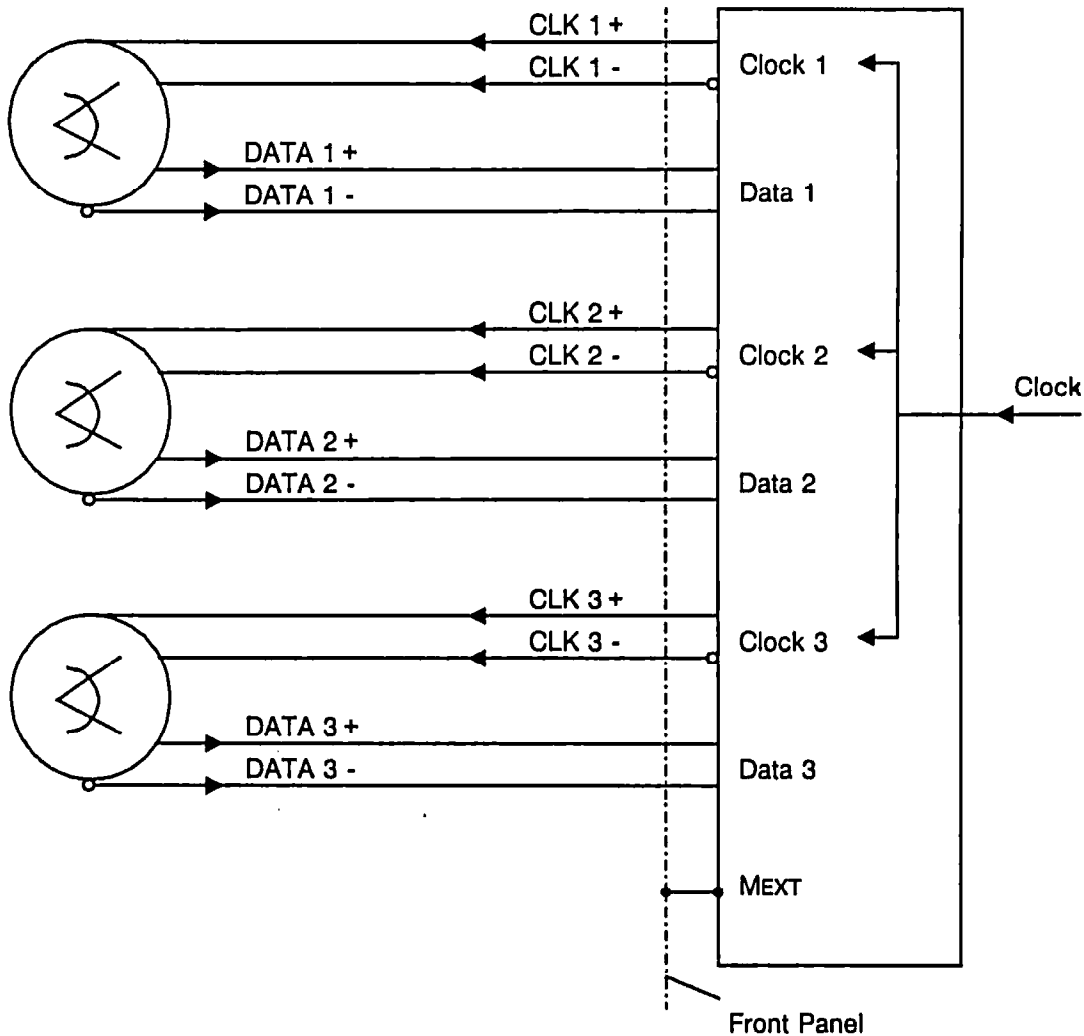


Connector pin assignment for the absolute actual values

The 3 absolute actual values are fed to the control via 25 pin connectors.



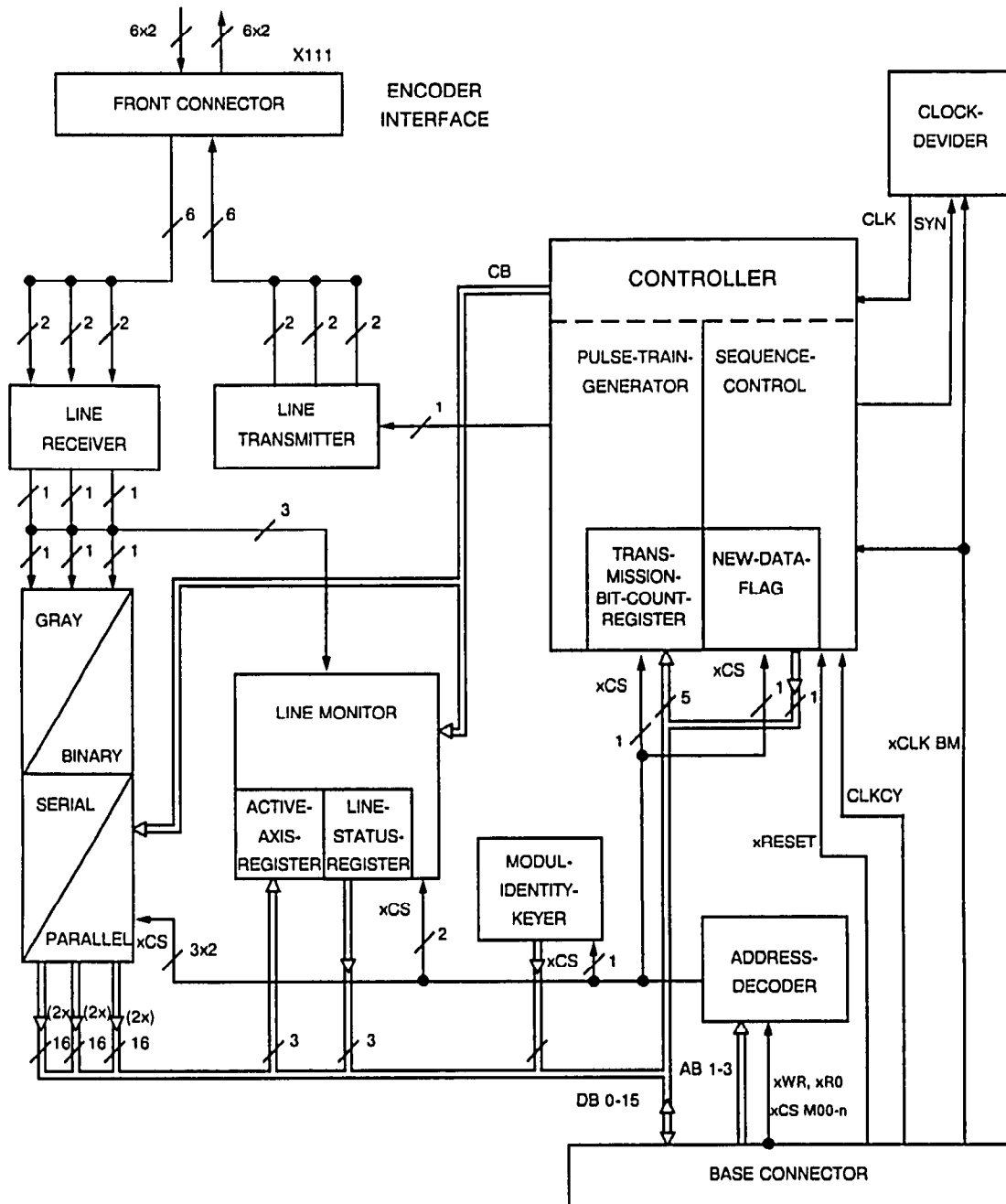
**Data Transfer from Encoder to the Board**



***The cable shield is connected only on the board, pin (M<sub>EXT</sub>). There is no connection of the shield on the encoder side.***

Signal level is 5 V  
Power Supply is 24 V.

Block Diagram of the Actual Value Module

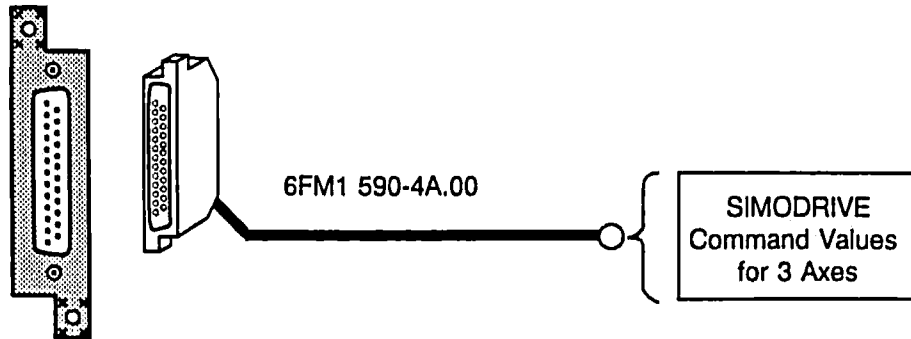


X211

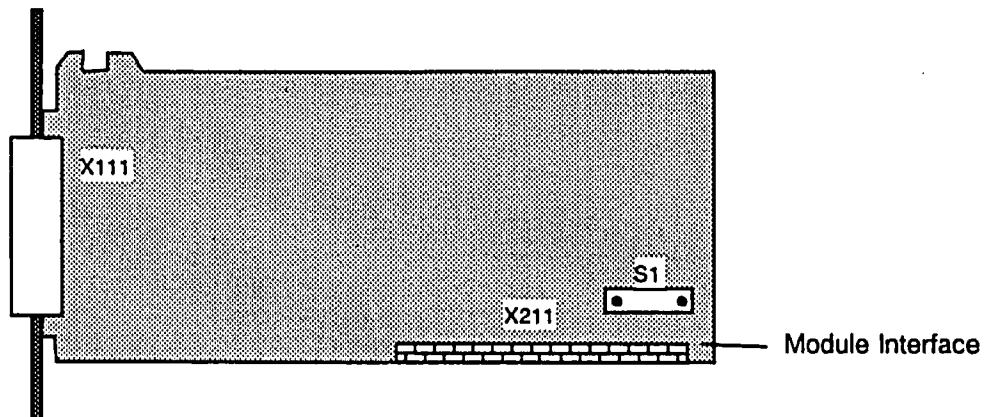
### 3.1.7.5 Command Value Module (Hardw. No. 6FX1 132-5BA02)

The board features:

- The command value output for 3 axis drive amplifier or for 2 axis drive and 1 main drive.



#### Location of the Sockets and Jumpers



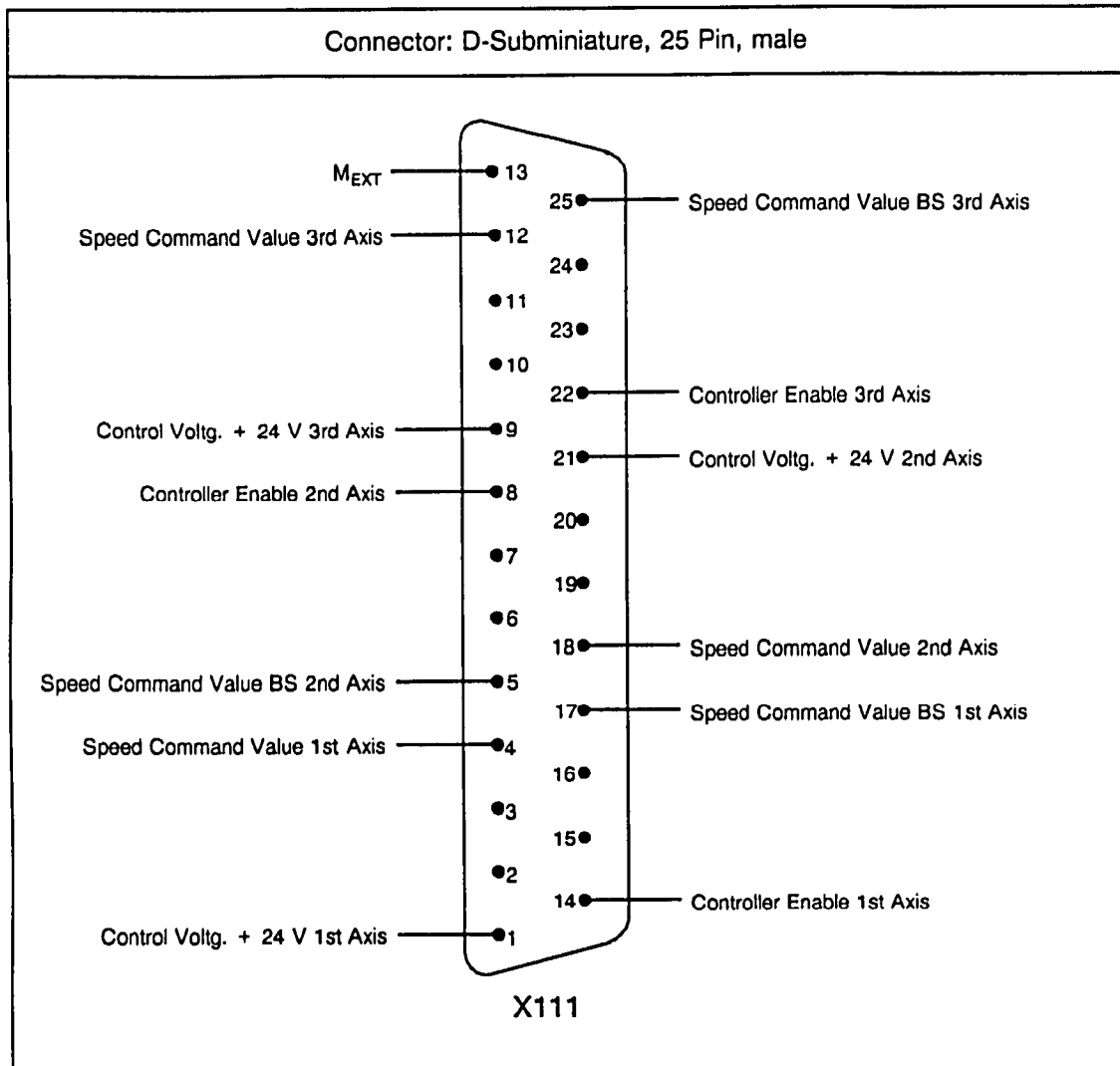
The signal MODULE CHIP SELECT may return as MODULE READY to the mother board via switch S1 (DIPFIX).

**Note:**

When using SINUMERIK 805SM-P the switch S1 must be open.

### Connector Pin Assignment for Speed Command Values and Controller Enables

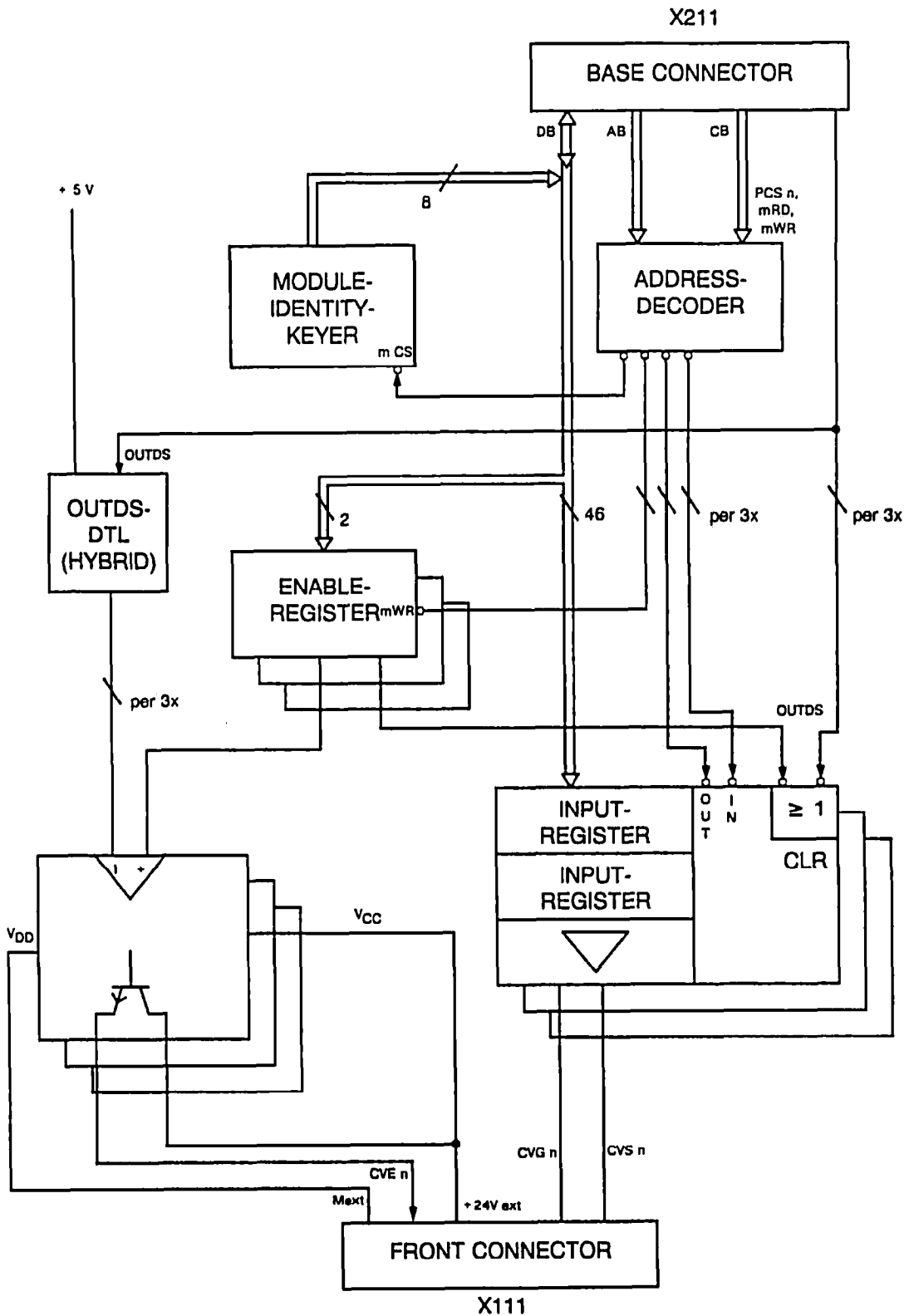
The speed command values and axis specific controller enables are output from the NC via 25 pin connector.



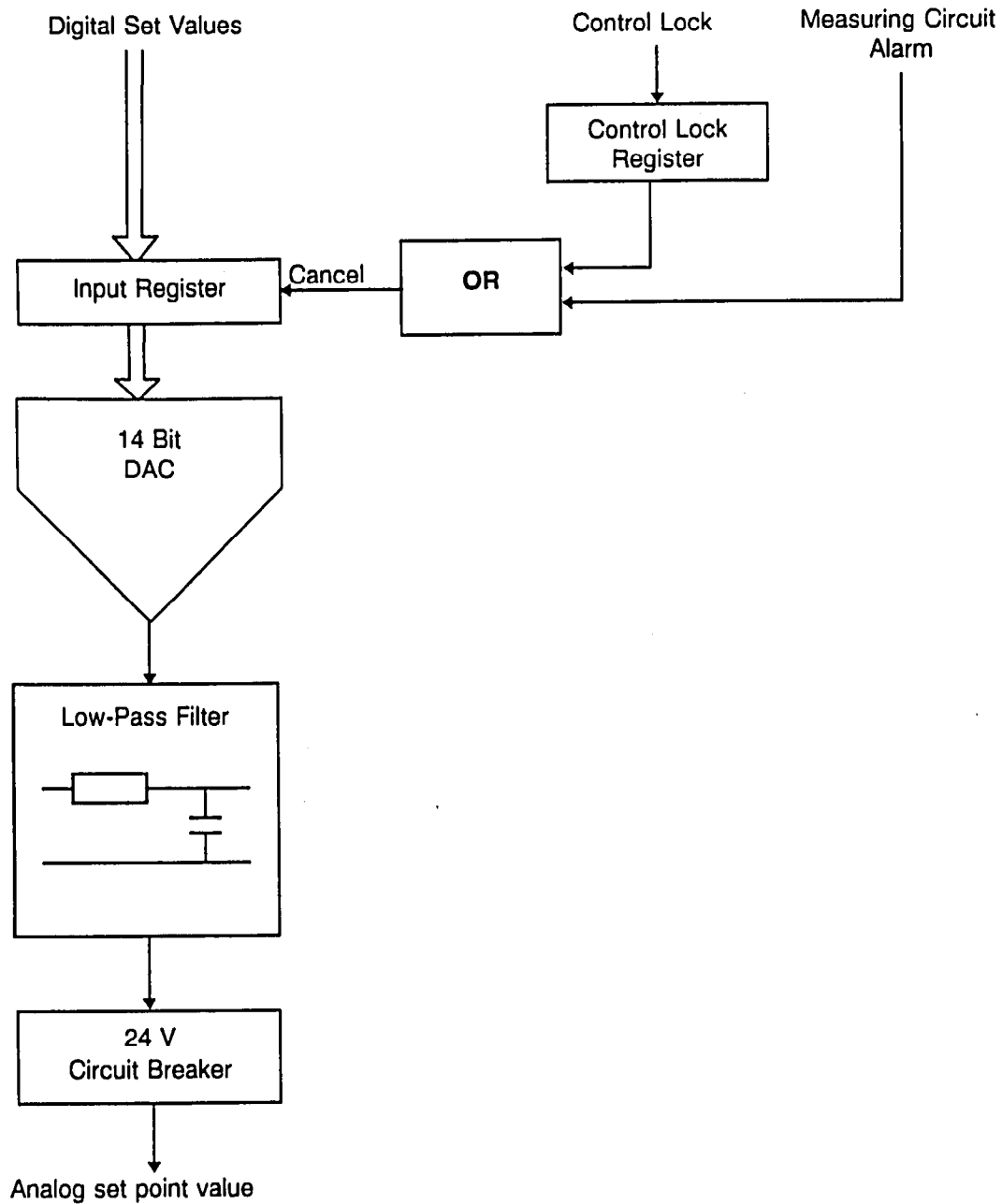
#### Technical Data:

Max. Analoge Command Value Voltage	$\pm 10\text{ V}$
Max. Current	2 mA
Max. Current for Ctrl Enablen	100 mA/short-circuit-proof

Block Diagram of the Command Value Module



**Simplified Diagram for Axis Control Loop**



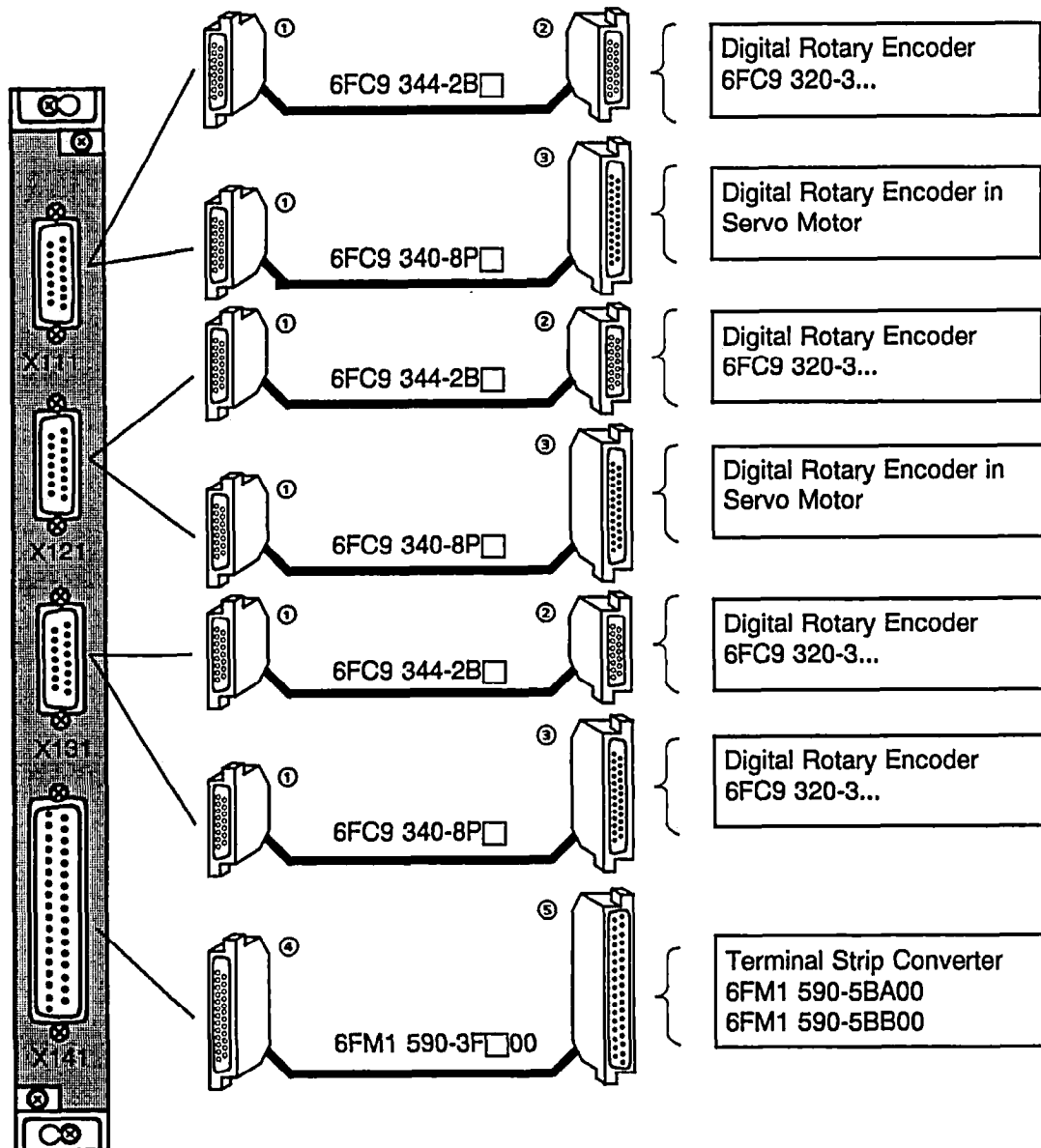
**3.1.8 Roll Feed Module (Hardw. No. 6FX1 127-4AC01)**

*The roll feed module is described in more detail in "Roll Feed Module, Planning Instruction" manual.*

### 3.1.9 Deceleration Step Control Module (Hardw. No. 6FX1 126-4BE00)

#### The board features:

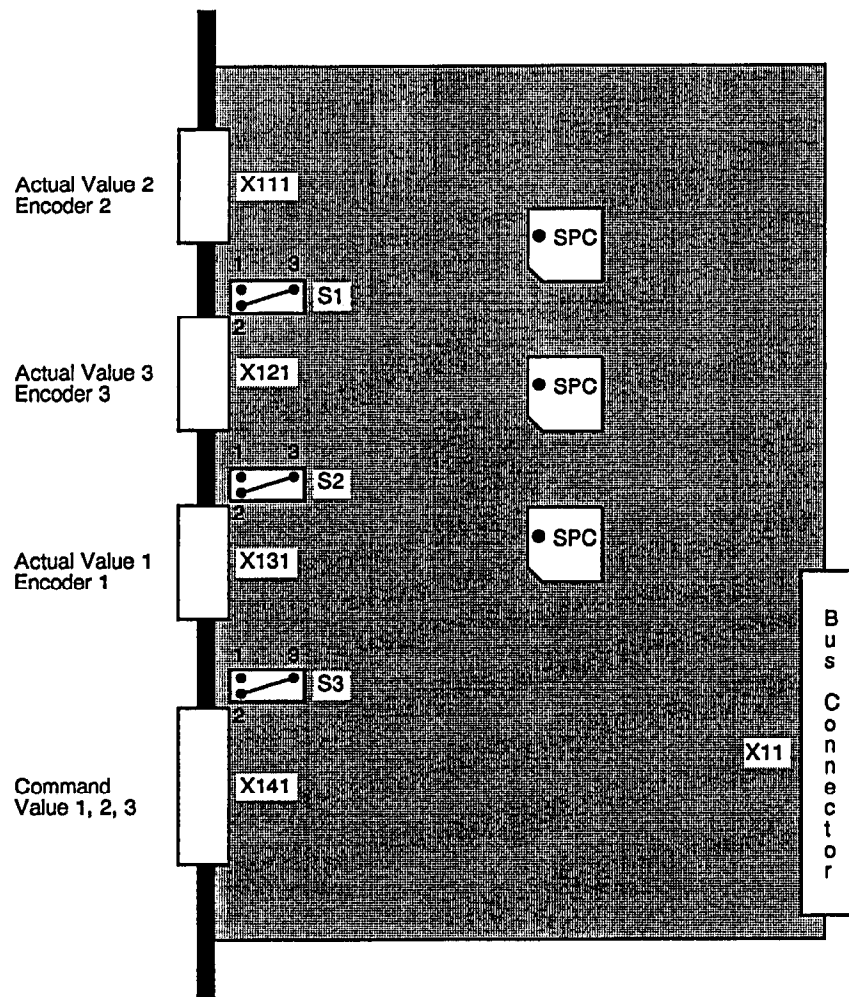
- Three actual value inputs for connecting of the 3 incremental feedbacks from the auxiliary axes, open/closed loop control.
- Three command value outputs for open loop auxiliary axes with 4 deceleration steps.



- ① 15 Pin, Female
- ② 12 Pin, Female
- ③ 17 Pin, Female
- ④ 25 Pin, Female
- ⑤ 37 Pin, Female



### Location of the Sockets and Jumpers



SPC (Speed Position Controller)

#### Standard jumper setting

- Switch S1: 2 - 3 closed
- Switch S2: 2 - 3 closed
- Switch S3: 2 - 3 closed

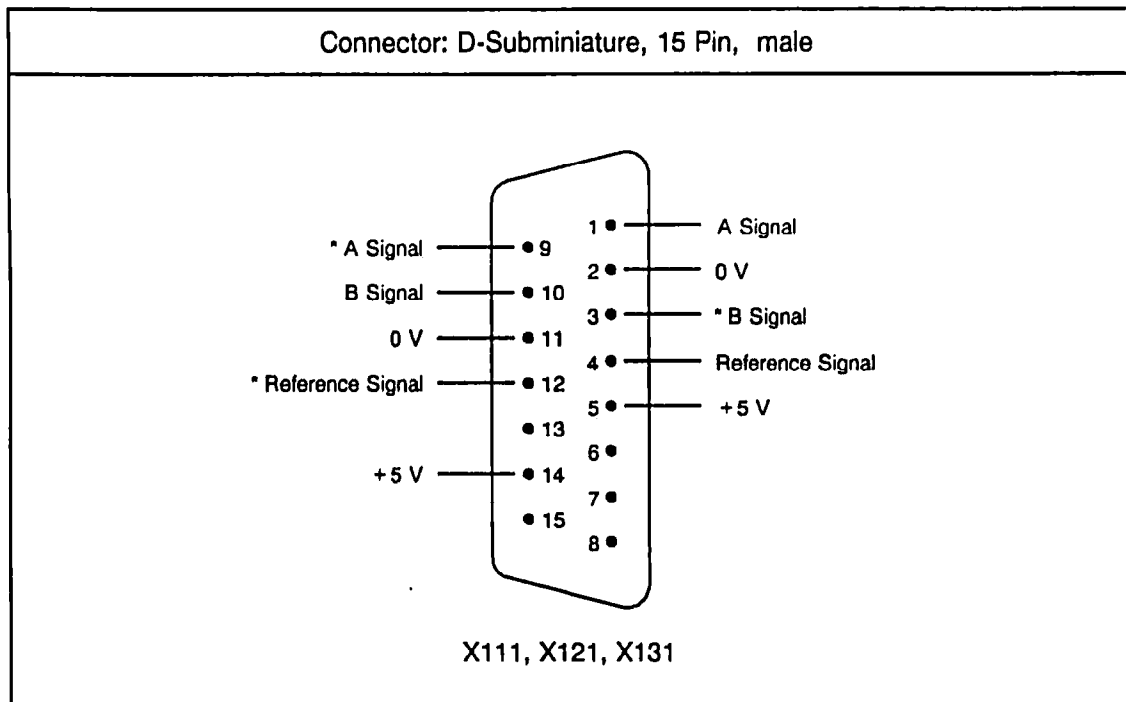
### Pin Assignments for Connectors X111, X121, and X131

The actual values are fed to the control via 15 pin connectors.

- X131 Actual Value Connector for Encoder 1
- X111 Actual Value Connector for Encoder 2
- X121 Actual Value Connector for Encoder 3

The incremental rotary encoders of the linear axes can be connected.

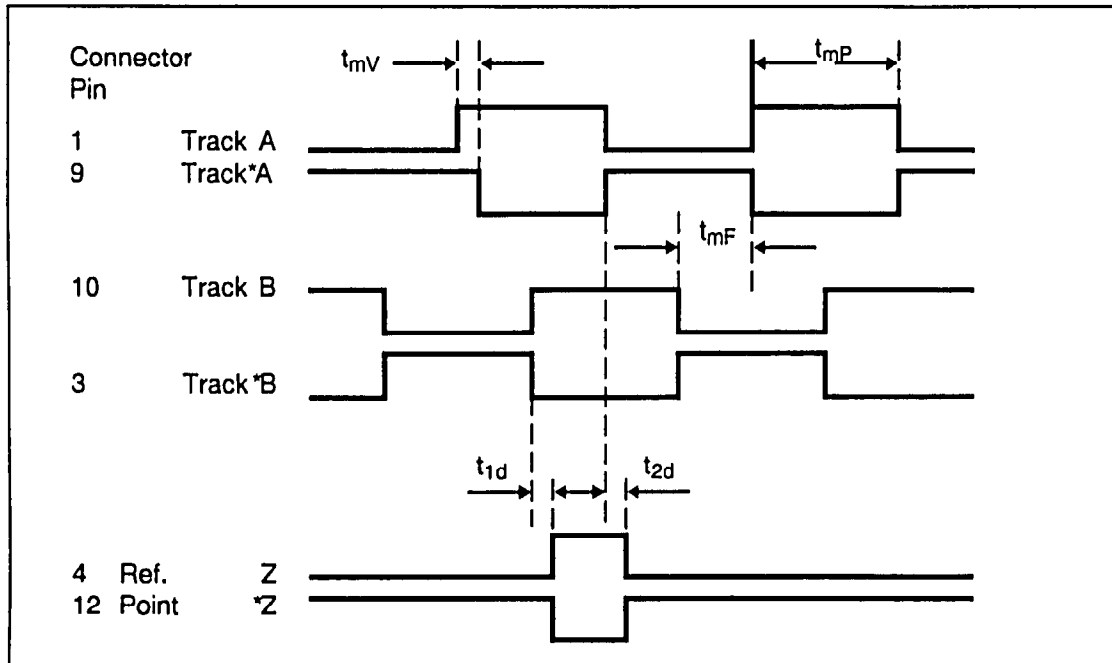
The input signals to the deceleration step controller are the same for both the encoder types.



*Pin assignments of the actual value connector.*

## Differential Input

Encoder signal data for the digital measuring systems with differential input.

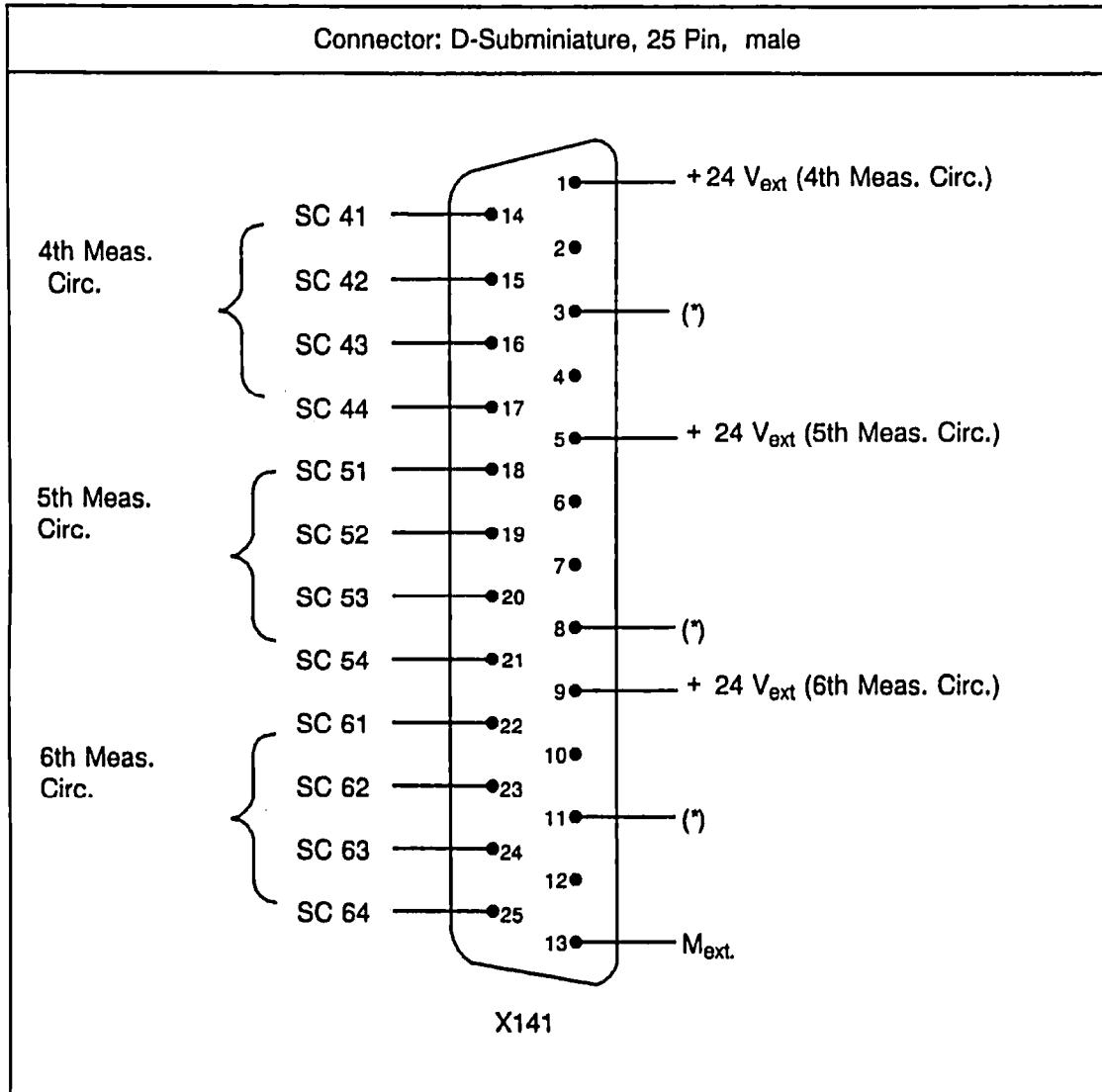


### Important Technical Data:

- Encoder Supply Voltage  $5\text{ V} + 5\%$
- Current per Encoder  $\leq 300\text{ mA}$
- Ohm Resistance  $470\ \Omega$
- Voltage Difference btw. A and \*A  $\geq 1\text{ V}$
- Maximum Voltage Difference  $10\text{ V}$
- Maximum Input Frequency at 90° Electrical Phase Shift between A and B Pulse Tracks  $1\text{ MHz (w/o EXE)}$
- Minimum Pulse Width  $t_{mP}$   $1\ \mu\text{sec.}$
- Minimum Distance between two Signal Edges following each other  $t_{mF}$   $500\text{ nsec.}$
- $t_{1d}$  and  $t_{2d}$   $\geq 200\text{ nsec.}$
- Maximum Time Delay between two Signal Edges of the One Track following each other  $t_{mV}$   $\leq 50\text{ nsec.}$

### Connector X141, Pin Assignment

The axis specific speed steps are output from the NC via 25 pin connector.



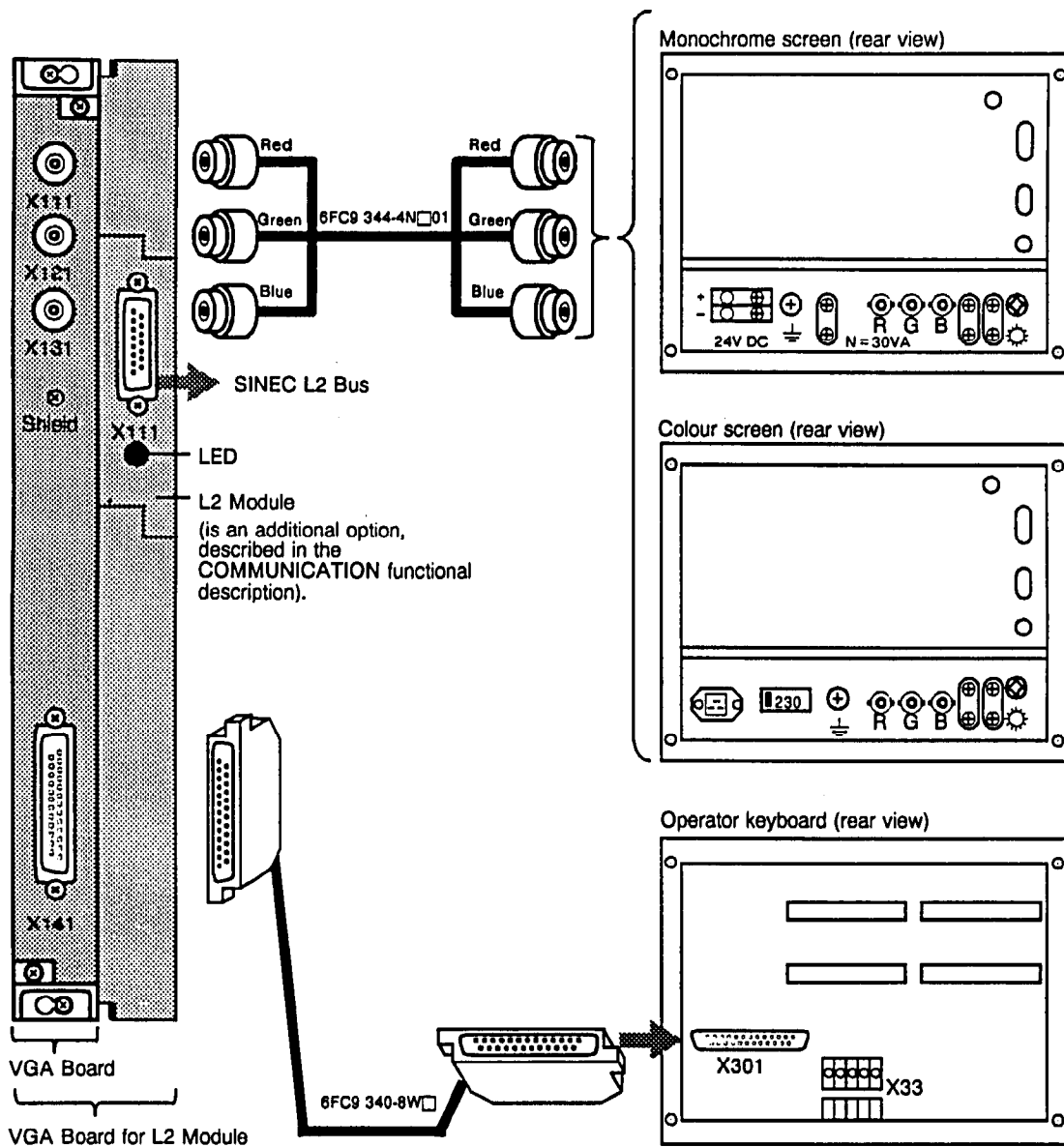
SC: Speed Control (Digital Output)  
 (\*): internally used  
 M<sub>ext</sub>: Equipment Ground for Digital Outputs and Control Voltages  
 + 24 V<sub>ext</sub>: Control voltage

### 3.1.10 VGA Board (Hardware MLFB: 6FX1 147-1BA01) VGA Board for L2 Module (Hardware MLFB: 6FX1 147-1BB01)

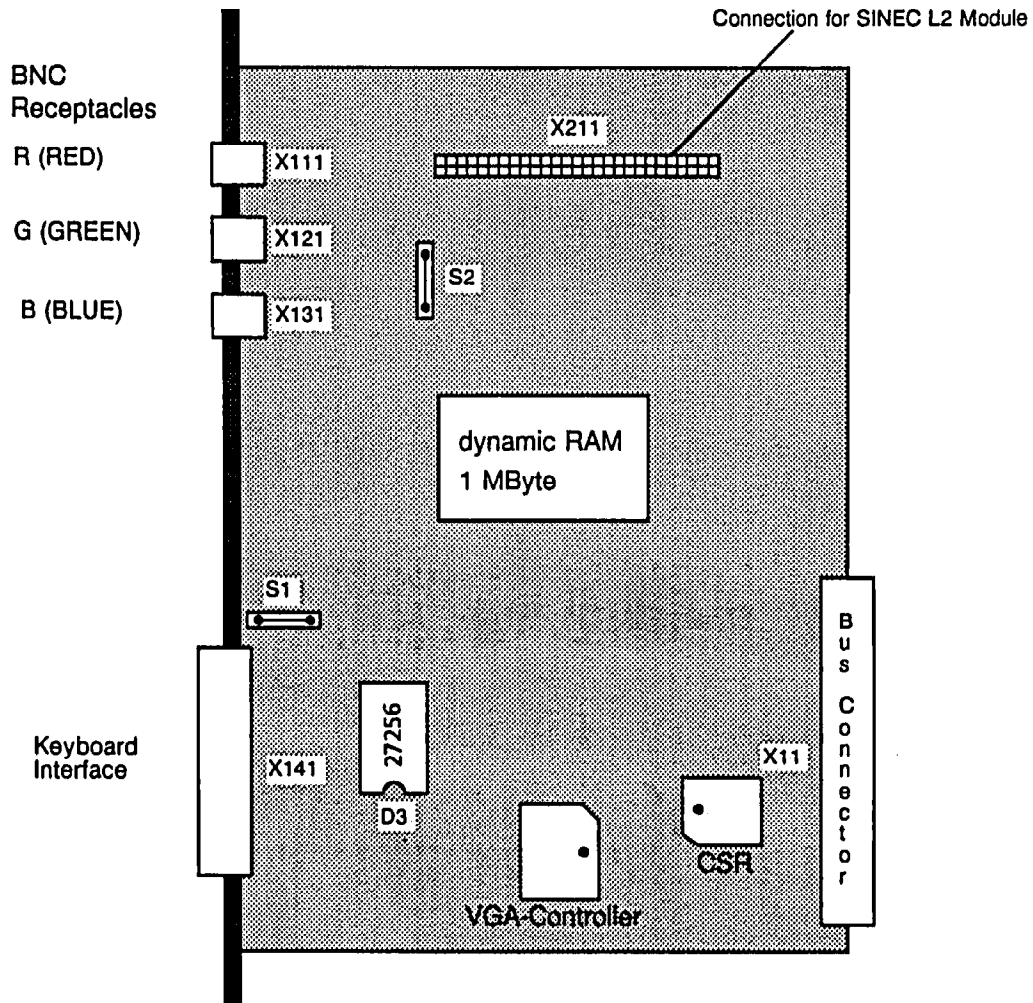
The VGA (Video Graphics Adapter) board represents the interface between central unit, monitor and operator keyboard. It enables a monitor resolution of 640x480 pixels with 16 shades of grey or 16 colours.

The board includes:

- 3 BNC sockets for screen connection, RGB analog according to RS 343
  - Socket G (green) to control the monochrome monitor
  - Socket R (red), G (green), B (blue) to control the colour monitor
- 1 serial keyboard interface, RS 232C, max. cable length 30 m (with RS 422: 1000m)
- 1 interface for the connection to the SINEC L2 Bus (on the L2 Module)
- 1 LED for operating status (on the L2 Module)



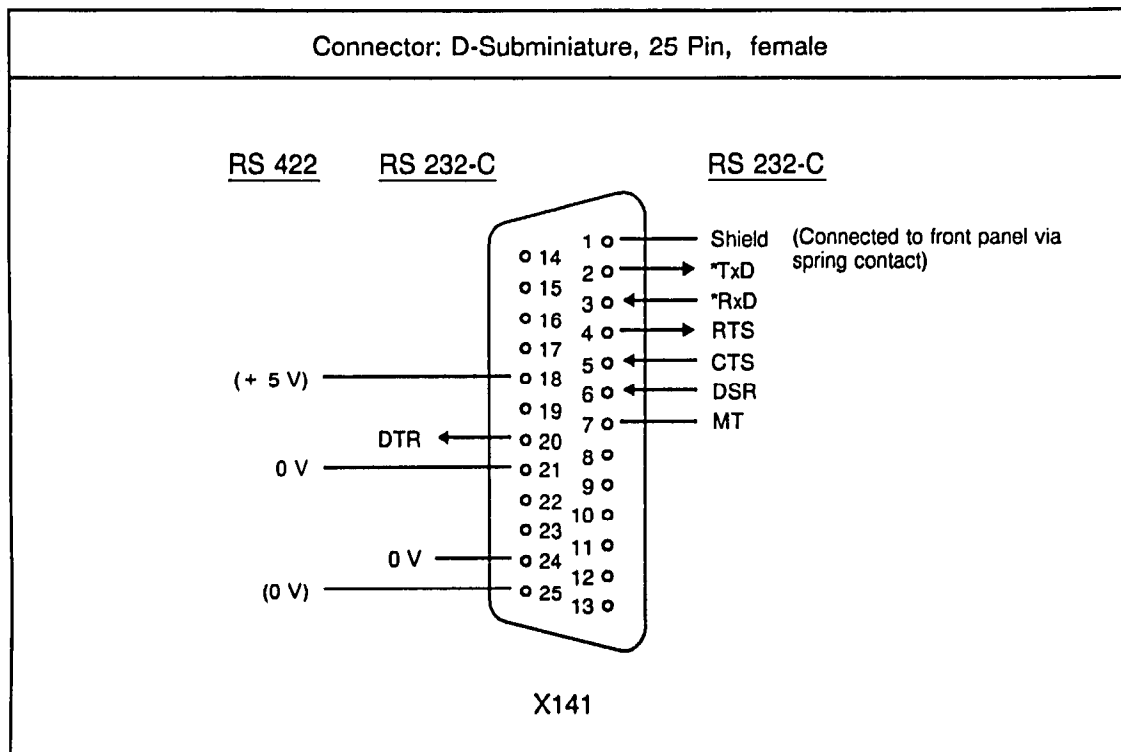
## Location of the Sockets and Jumpers



### Standard Jumper setting:

Switch S1: closed  
 Switch S2: closed

### Keyboard Interface



Pin assignment for the keyboard interface.

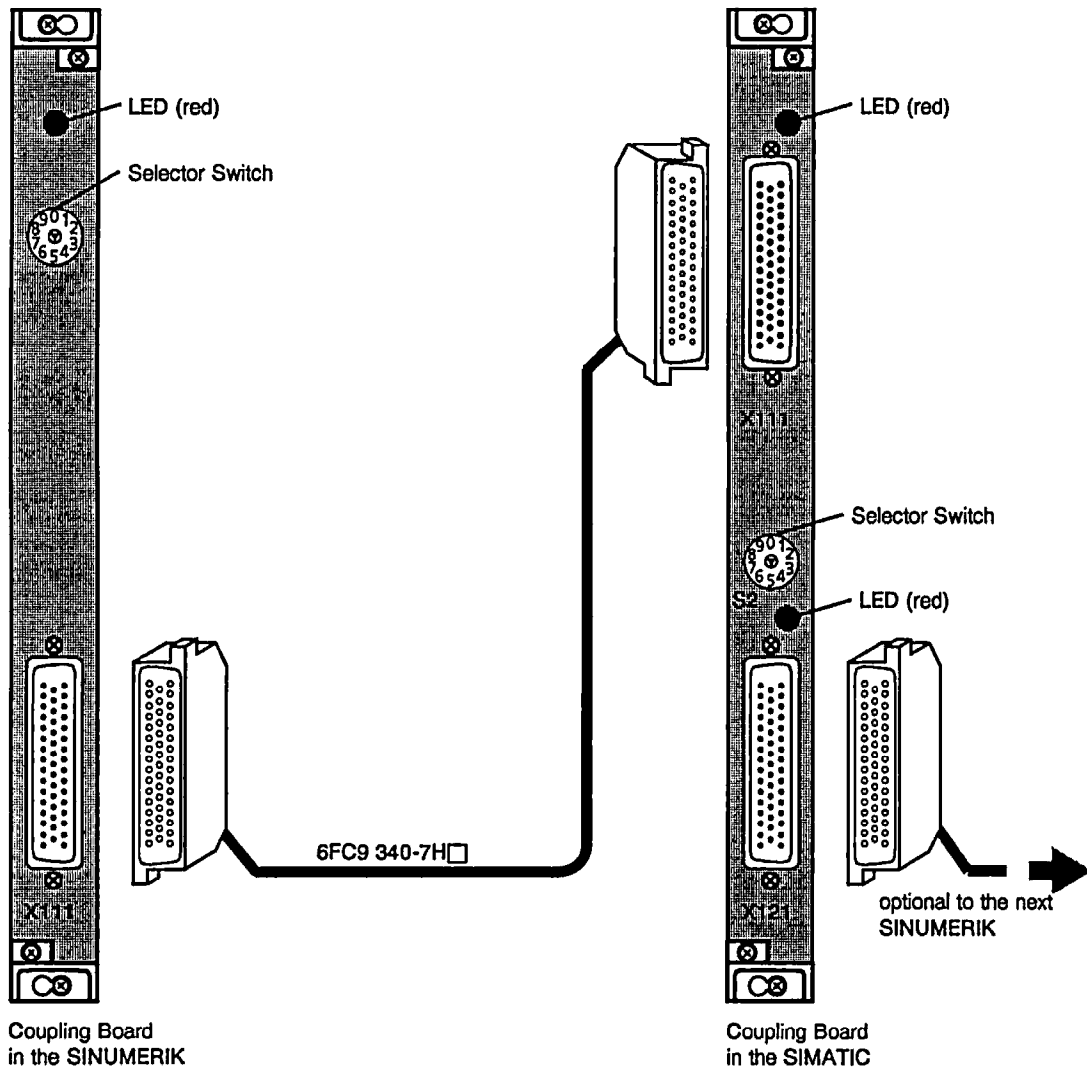
**Note:**

- The RS422 adapter can also be used with the keyboard interface (see Sec. 3.1.5.4).
- When using the RS422 Adapter the switch S1 on the VGA Board must be closed.

### 3.1.11 Master PLC Coupling Boards

When using the SINUMERIK 805SM-P up to 8 individual SINUMERIK controls may be connected to a coordinating control (e.g. SIMATIC S5-115U).

The coupling of 2 SINUMERIK controls requires one coupling board in the SINUMERIK and one coupling board (2 interfaces) in the SIMATIC of each.

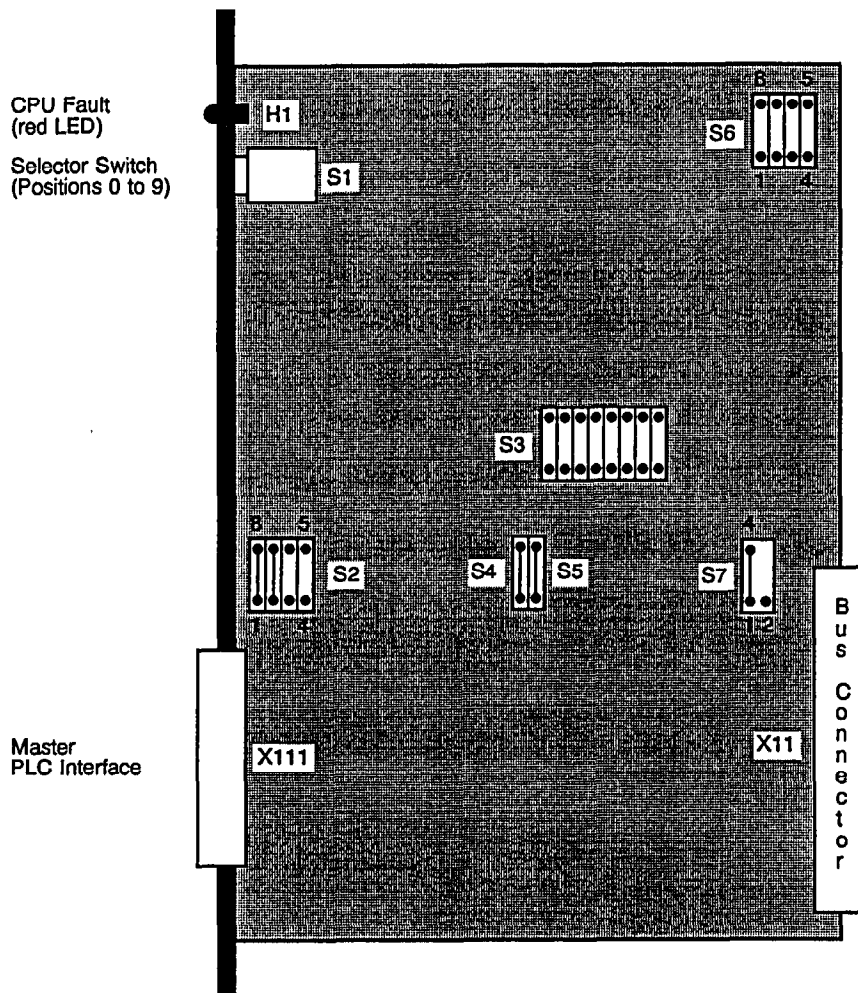




### 3.1.11.1 Master PLC Coupling Board in SINUMERIK (Hardw. No. 6FX1 135-6BA01)

The board features:

- 1 LED (red)
- 1 Selector switch for the size selection of the coupling area
- 1 One interface for Master PLC connection



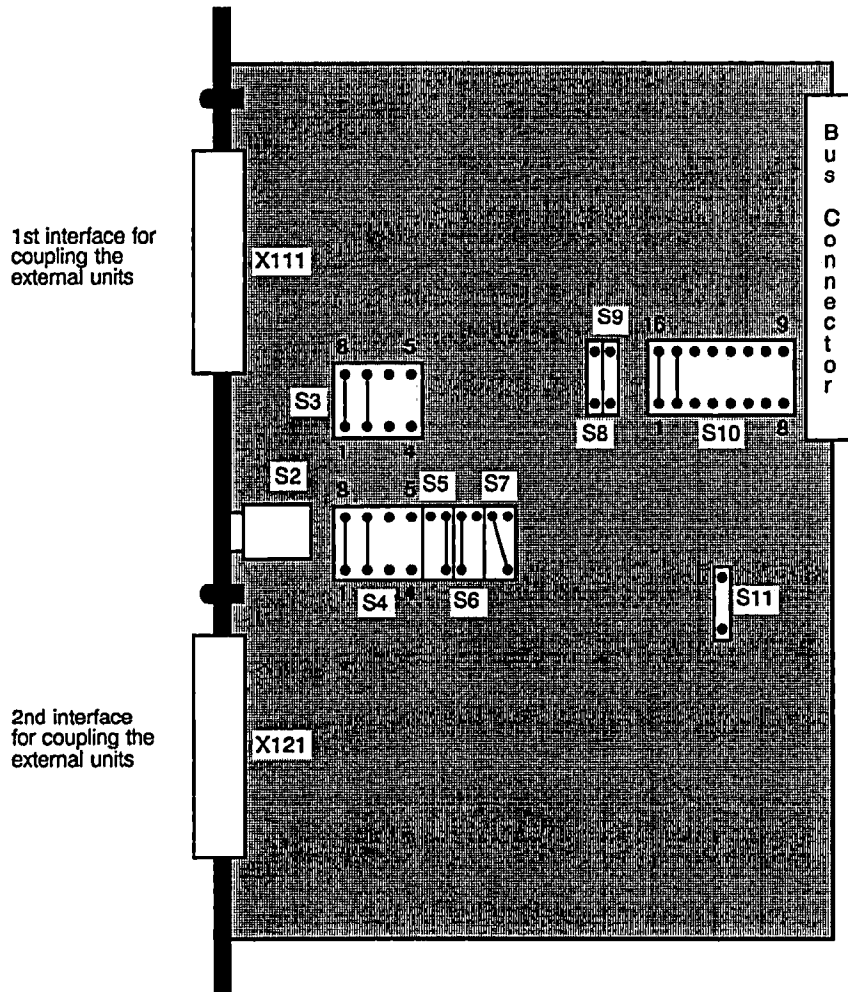
#### Standard settings

Selector Switch	S1:	Position 1
Switch	S2:	1 - 8 closed
		2 - 7 closed
		3 - 6 open
		4 - 5 open
Switch	S3:	all open
Switch	S4:	closed
Switch	S5:	closed
Switch	S6:	1 - 8 open
		2 - 7 open
		3 - 6 open
		4 - 5 open
Switch	S7:	4 - 1 closed

### 3.1.11.2 Master PLC Coupling Board in SIMATIC (Hardw. No. 6FX1 135-7BB)

The board features

- 2 monitoring LEDs
- 2 Interfaces for connecting of SINUMERIK controls
- 1 Selector switch for the assignment of the address area within the dual port RAM (DPR)



*For the jumper assignment refer to the Installation  
Instructions (chapter COUPLING WITH MASTER PLC).*

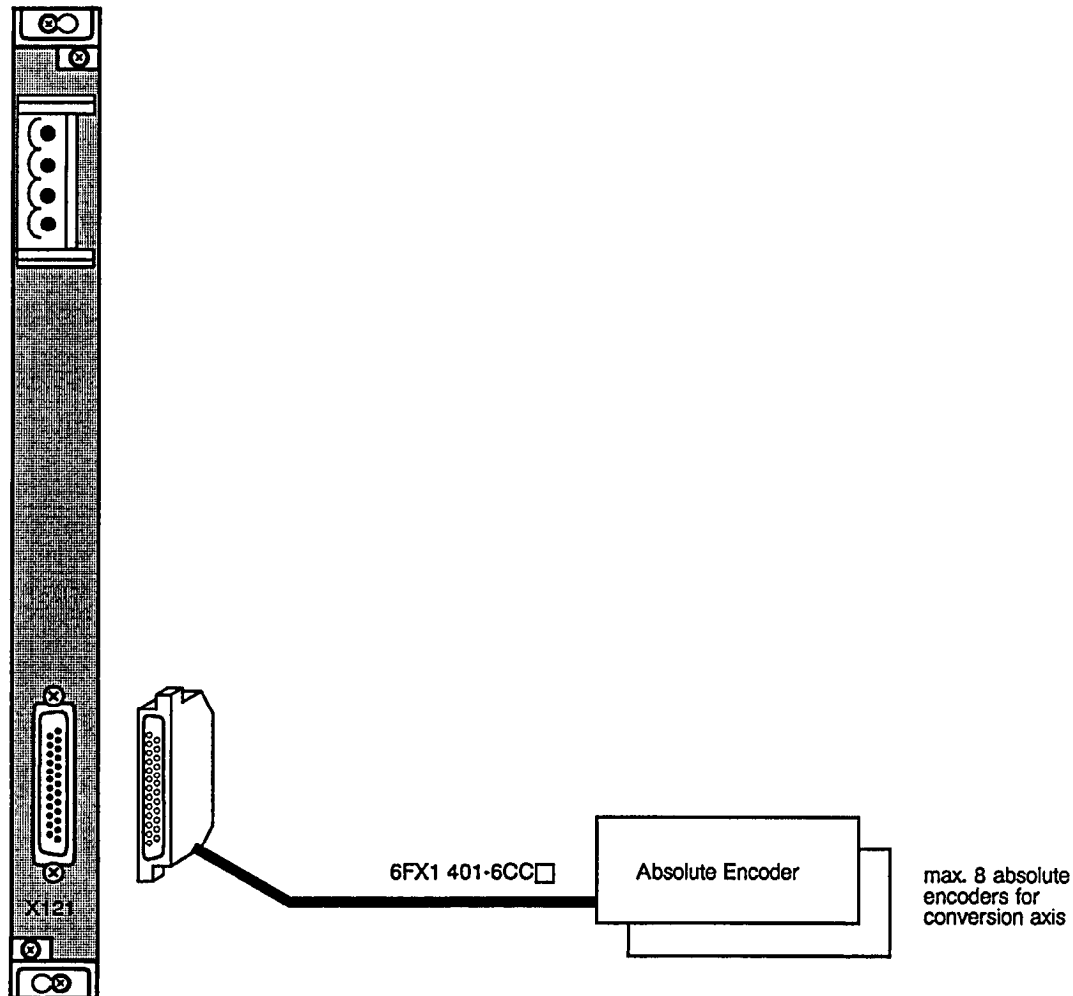
#### Note:

The monitoring LEDs for the interface X111 or X121 may be switched off by short-circuiting pin 16 and pin 17 of the corresponding interface (e.g. when the interface is not in use).

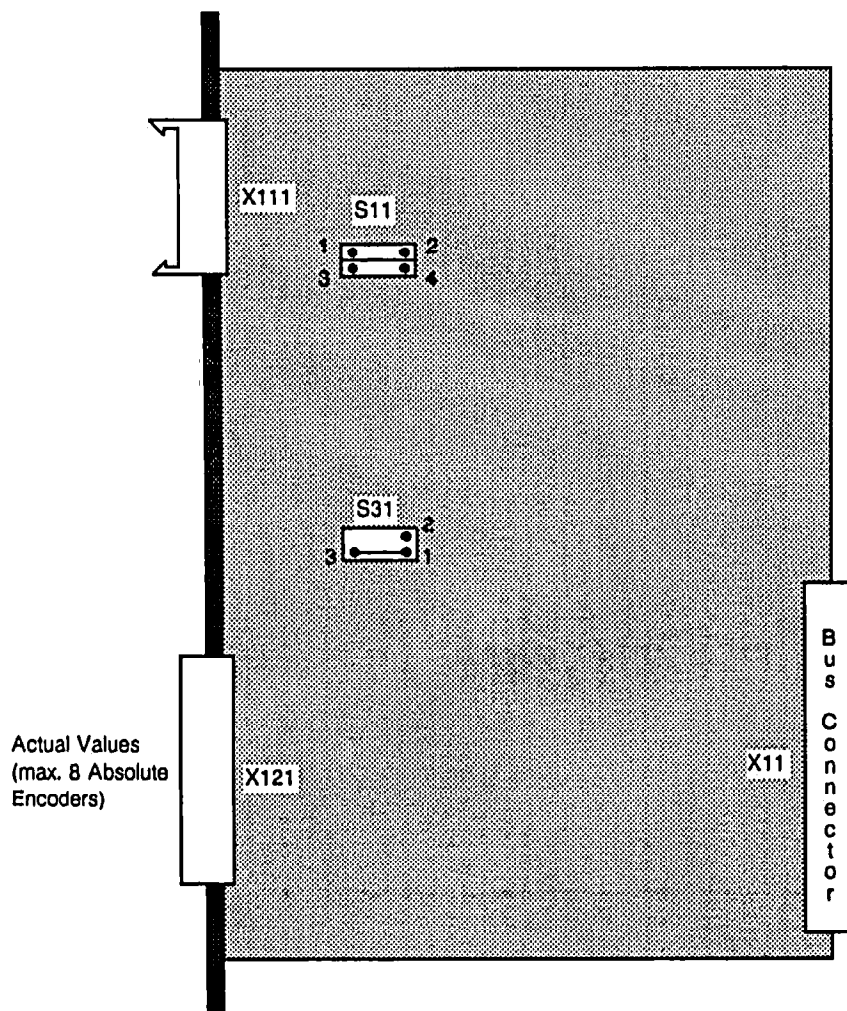
### 3.1.12 Actual Value Board for Absolute Encoder (Hardw. No. 6FX1 120-3CB02)

The board features:

- One 4 pin plug-in terminal block (no significance with 805SM-P)
- One measuring circuit input for connecting up to 8 actual value inputs from conversion axis.



## Location of the Sockets and Jumpers

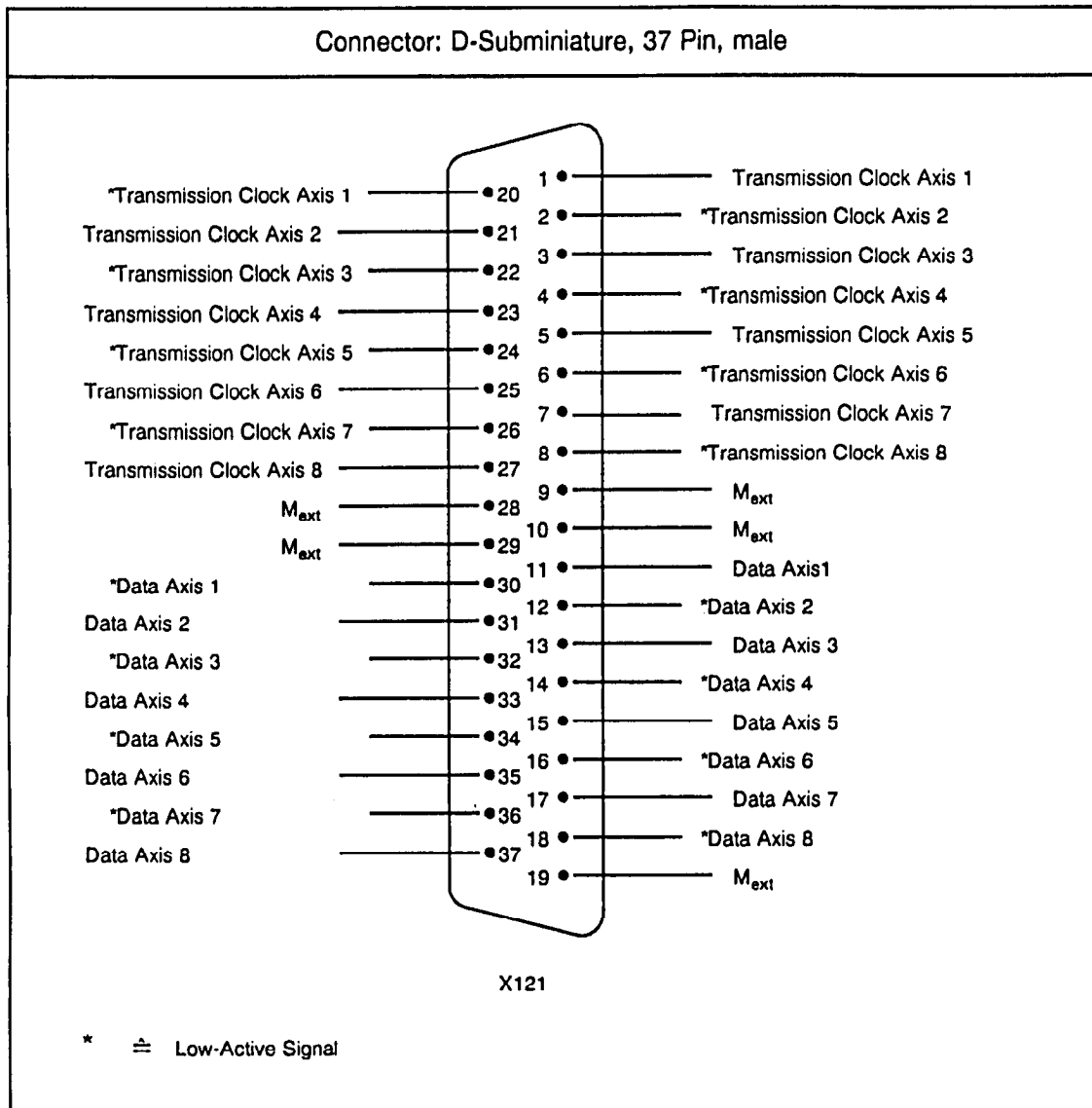


### Standard settings:

- Switch S11: 1 - 2 open  
 3 - 4 open  
 Switch S31: 1 - 3 closed

### Connector X121, Pin Assignments

8 measuring circuit actual value inputs to connect 8 absolute encoders for conversion axes



Pin assignments for encoder interface

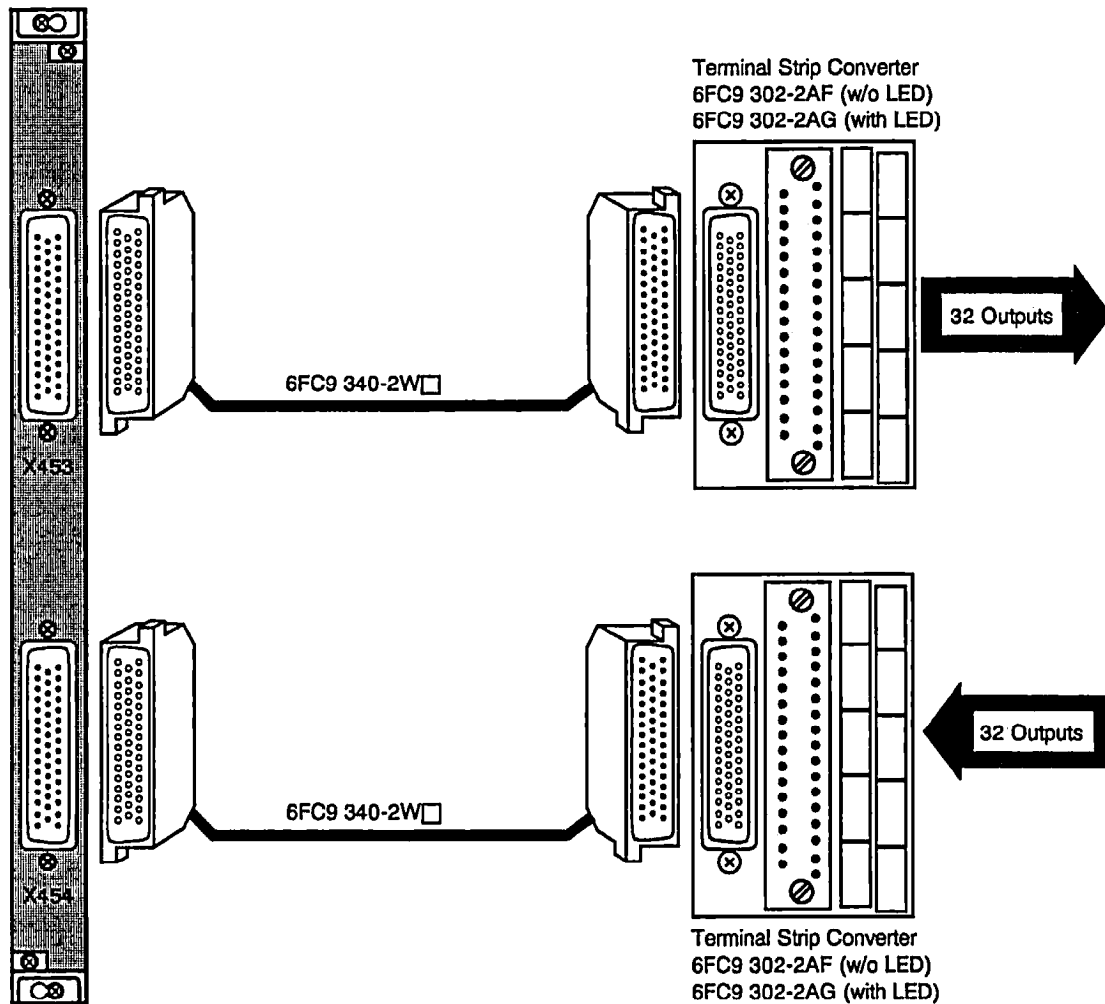
### 3.1.13 Central Peripherals (Input/Output Boards)

#### 3.1.13.1 Input/Output Board 32 In/Out (Hardw. No. 6FX1 122-3CA01)

The board features:

- 32 digital inputs, isolated, in groups of 8
- 32 digital outputs, isolated, 24 V/100 mA, short-circuit-proof.

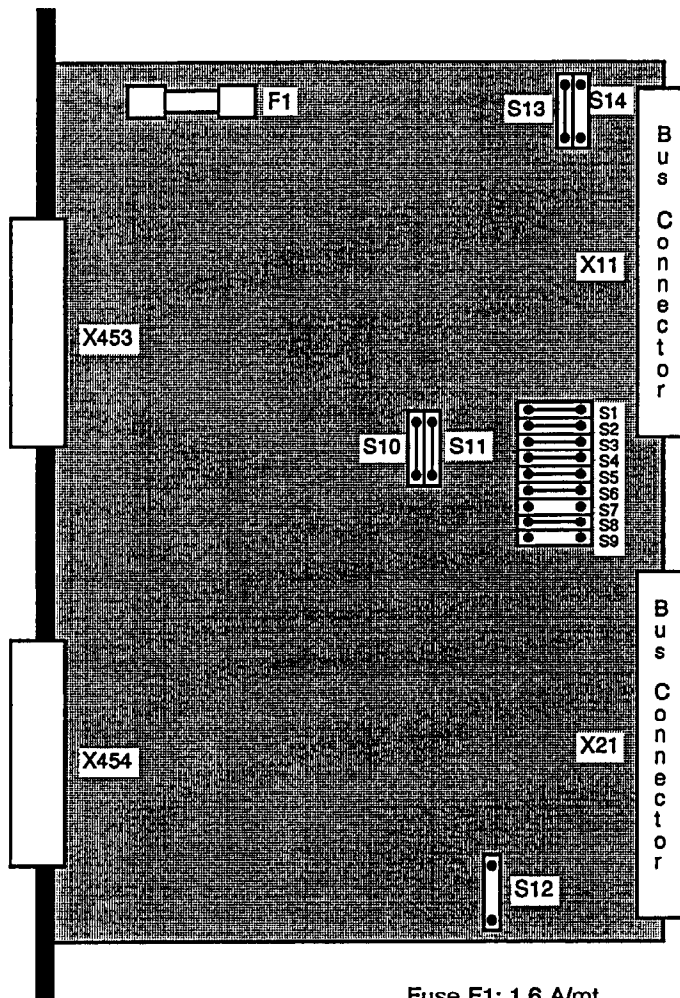
The interferences in the circuit common wires, caused by the circulating currents, are suppressed by optocouplers. In addition to this all input signals are filtered through RC filters. This eliminates the inductive and capacitive interference signals smaller than 2 ms.



#### Note:

- The cable 6FC9 340-5R may be used for the outputs (X453) with the terminal strip converter 6FC9 302-2AF (without LED) or 6FC9 302-2AG (with LED).
- The cable 6FC9 340-5Q may be used for the inputs (X454) with the terminal strip converter 6FC9 302-2BD (without LED) or 6FC9 302-2BC (with LED).

**Location of the Sockets and Jumpers**



Fuse F1: 1.6 A/mt

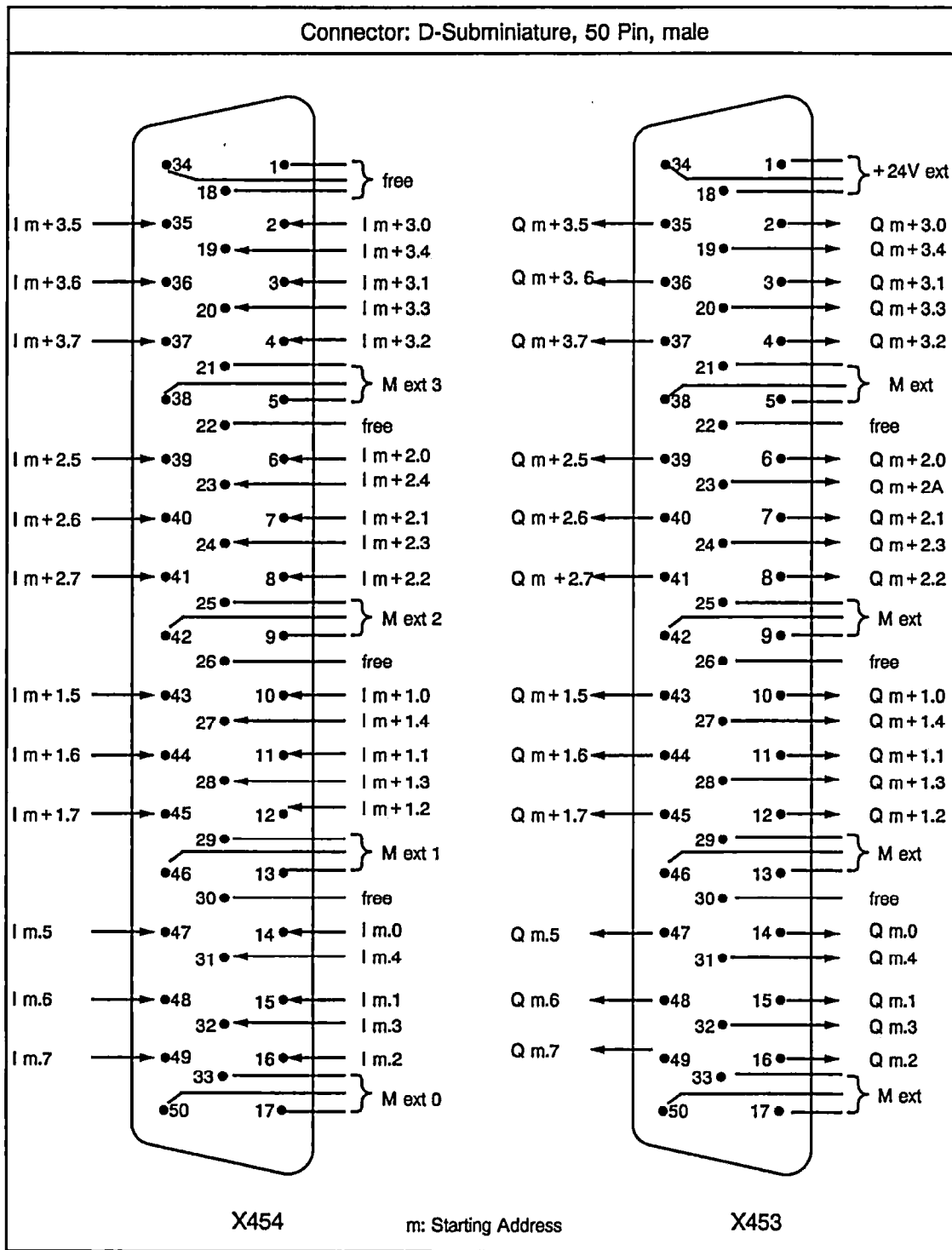
**Standard settings:**

Switch S1 – S6: Setting of the starting address m

Switch	Central Unit (CU)	Extension Unit (EU)
S7	open	closed
S8	closed	open
S9	open	open
S10	closed	open
S11	closed	open
S12	open	open
S13	closed	open
S14	open	closed

### Connection of Inputs and outputs

The 32 digital inputs are connected on connector X454, and the 32 digital outputs, on connector X453.



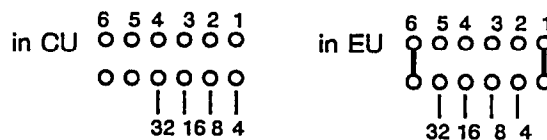


**Setting of the starting address m**

Starting Address (Hex.)	Input Byte Output Byte (Dec.)	in CU	in EU
		6 5 4 3 2 1 	6 5 4 3 2 1 
00	IB 0 to 3 QB 0 to 3		
08	IB 4 to 7 QB 4 to 7		
10	IB 8 to 11 QB 8 to 11		
18	IB 12 to 15 QB 12 to 15		
20	IB 16 to 19 QB 16 to 19		
28	IB 20 to 23 QB 20 to 23		
-----			
58	IB 44 to 47 QB 44 to 47		
60	IB 48 to 51 QB 48 to 51	from SW3 on	
68	IB 52 to 55 QB 52 to 55	from SW3 on	
70	IB 56 to 59 QB 56 to 59	from SW3 on	
78	IB 60 and 61 <sup>1)</sup> QB 60 to 63	from SW3 on	

**The address areas IB 0 to IB 47 (61, from SW3 on) or QB 0 to QB 47 (63, from SW3 on) may be used (see INTERFACE DESCRIPTION PART 1 - SIGNALS).**

Jumper significance:



open jumper means:

1) With this setting of the starting address m, IB 62 and IB 63 are not taken into account.

## Signal Assignment on the PLC Interface for Input and Output Signals

Digital Inputs								
Byte No.	Bit No.							
	7	6	5	4	3	2	1	0
IB m	49	48	47	31	32	16	15	14
IB m + 1	45	44	43	26	28	12	11	10
IB m + 2	41	40	39	23	24	8	7	6
IB m + 3	37	36	35	19	20	4	3	2

Digital Outputs								
Byte No.	Bit No.							
	7	6	5	4	3	2	1	0
QB m	49	48	47	31	32	16	15	14
QB m + 1	45	44	43	26	28	12	11	10
QB m + 2	41	40	39	23	24	8	7	6
QB m + 3	37	36	35	19	20	4	3	2

The address **m** is set through jumpers on the I/O board.

Diagram of the Digital Input Circuit

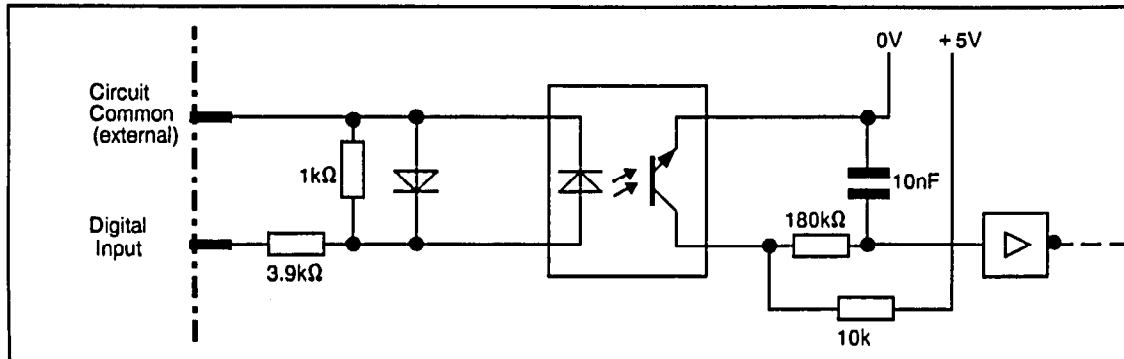
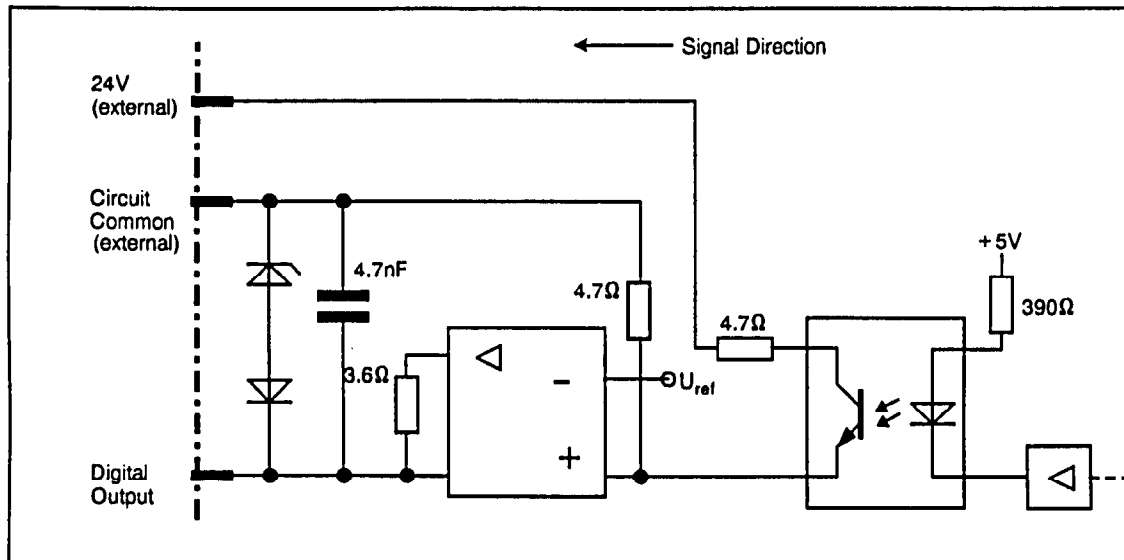



Diagram of the Digital Output Circuit



	<b>CAUTION</b>
	<p>The capacitor in the output circuitry compensates only for the cable inductivity. If contactors, relays, etc. are connected to the outputs, additional external devices for interference suppression such as RC components, suppression diodes, have to be used.</p>

### Technical Data

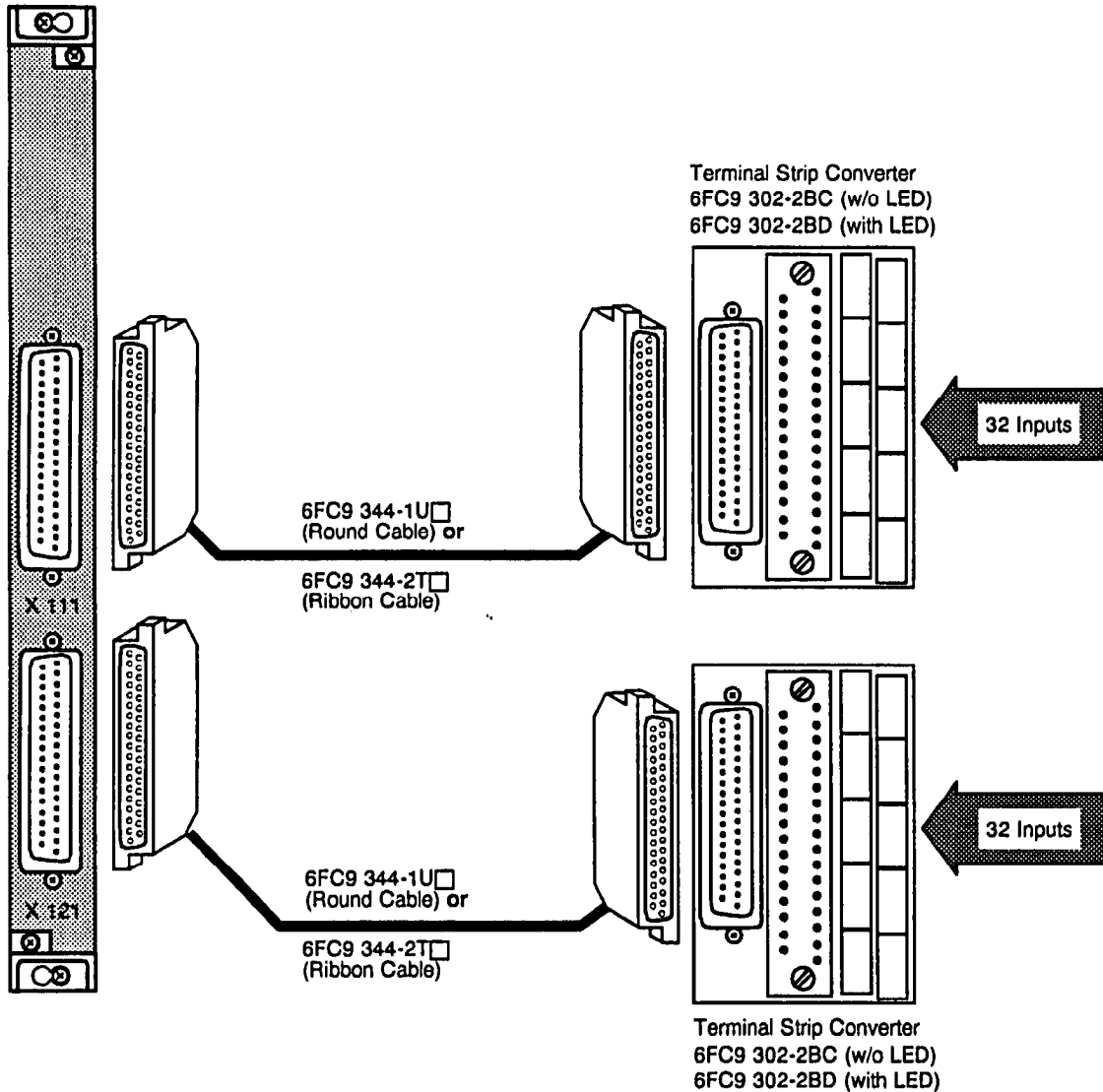
Number of Inputs Rooting of Inputs	32, Digital 4x8
Isolation Method	Optocoupler
Rated Input Voltage	24 V DC
Input Voltage	for "0" Signal for "1" Signal
	-2.1 V to +5 V +15 V to +33 V
Input Current	at "1" Signal
	5,6 mA to 8,8 mA
Delay Time	for tpLH
Delay Time	for tpHL
	0.55 ms to 4.05 ms 0.95 ms to 2.95 ms
Maximum Cable Length	50 meters
Number of Outputs Rooting of Outputs	32, Digital -
Isolation Method	Optocoupler
Supply Voltage U <sub>p</sub>	
- Rated Value	DC 24 V
- Ripple V <sub>pp</sub>	3.6 V <sub>pp</sub>
- Permissible Range (ripple included)	20 V to 33 V
Output Current	at "1" Signal (Rated Value)
	100 mA
Short circuit protection	Yes
Maximum Cable Length	50 meters
Internal Current Consumption	at 5 V typ. at 24 V typ.
	800 mA 100 mA
Size	Double-height Eurocard
Board Width	20 mm
Weight	approx.
	360 g
Degree of Protection DIN 40050	IP00
Humidity Class DIN 40040	F
Vibration/Shock SN 29010	Class 12

### 3.1.13.2 Input Board 64 Inputs (Hardw. No. 6FX1 125-7BA01)

The board features:

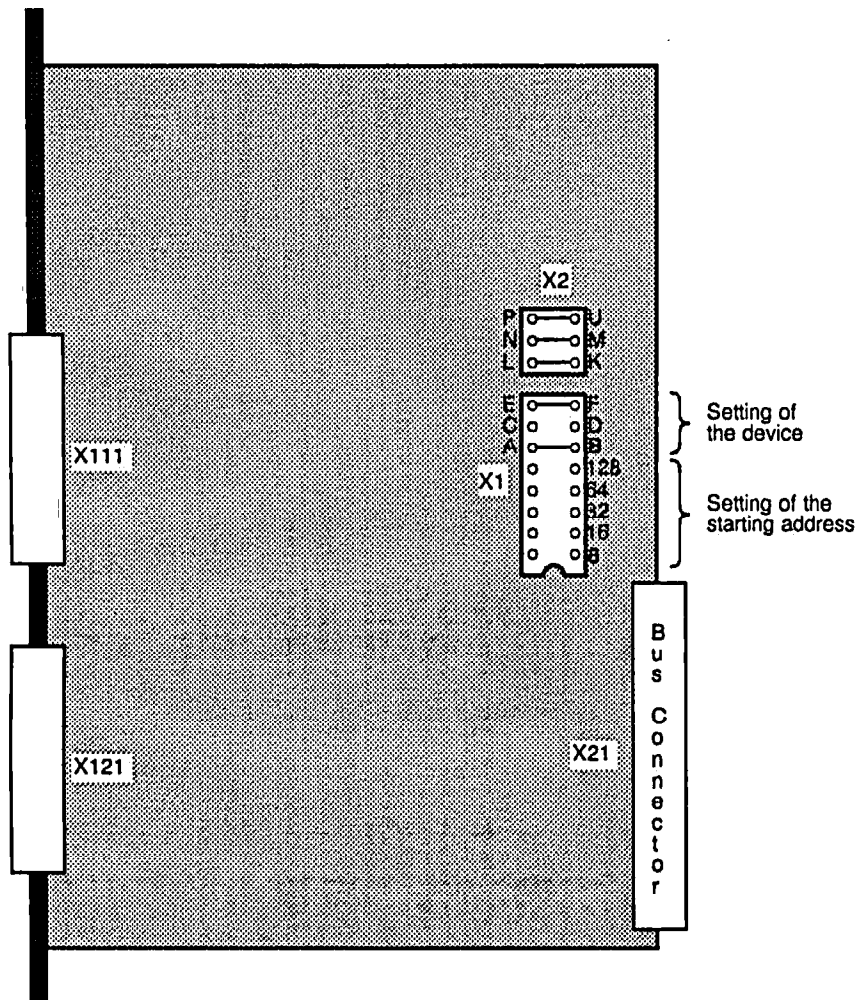
- 64 digital inputs, isolated, in groups of 8.

The interferences in the circuit common wires, caused by the circulating currents, are suppressed by opto-couplers. In addition to this all input signals are filtered through RC filters. This eliminates the inductive and capacitive interference signals smaller than 2 ms.



The board occupies 8 consecutive input bytes on the PLC interface.

## Location of the Sockets and Jumpers



### Standard settings:

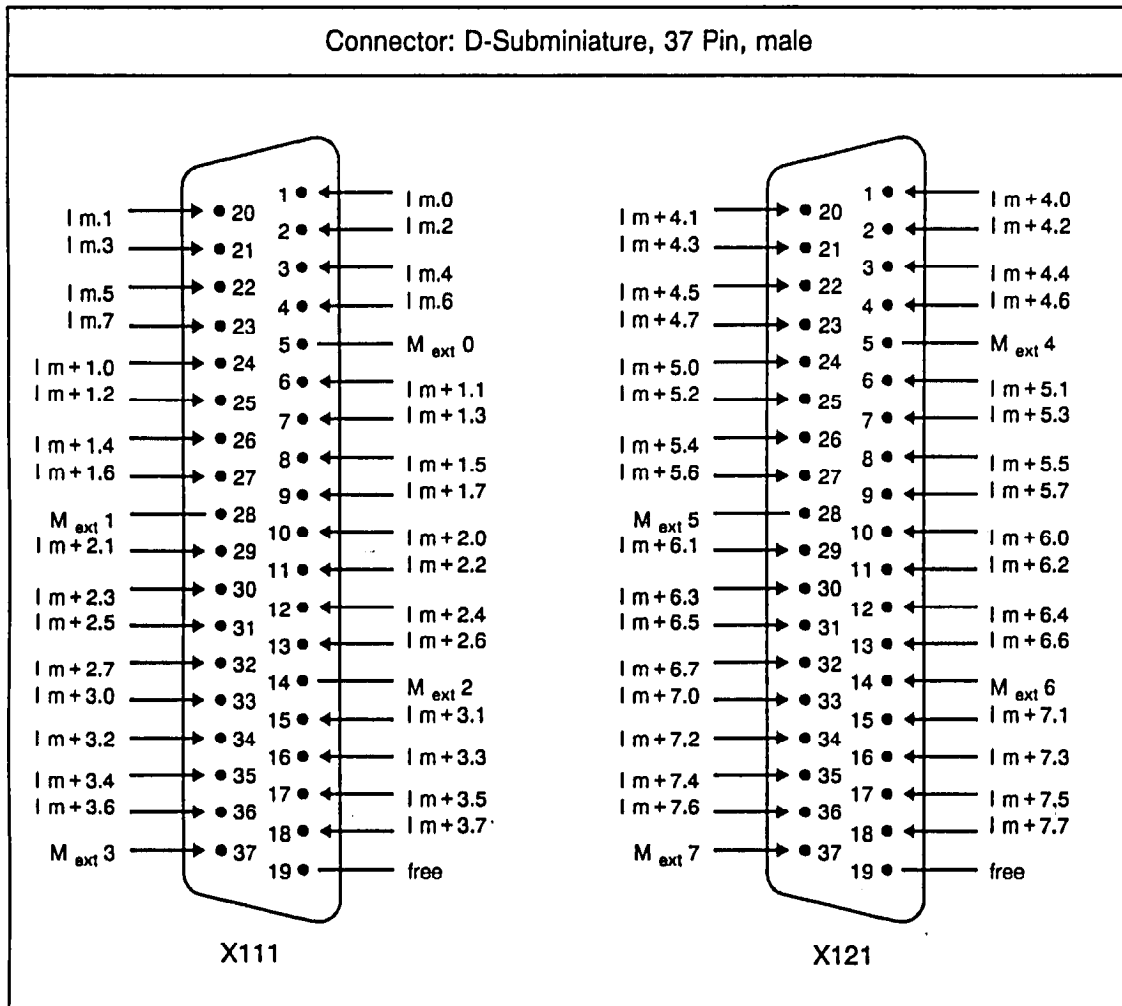
- Jumper X1:
- Setting of the Starting Address m
  - Setting of the Device

Jumper	Central Unit	EU
E - F	closed	open
C - D	open	open
A - B	closed	open

- Socket X2:
- |        |       |        |
|--------|-------|--------|
| Jumper | P - U | closed |
|        | N - M | closed |
|        | L - K | closed |

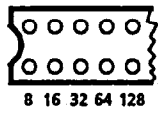
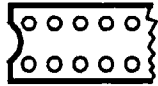
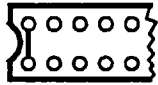
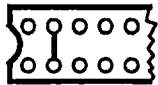
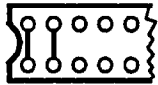
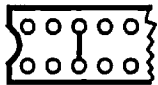
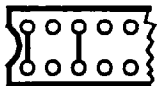
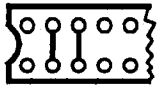
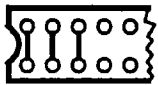
### Connecting of the Inputs

The 64 digital inputs are connected to connectors X111 and X121 (32 inputs each).



**Since the M0 to M9 (circuit common ground) are organized by bytes, each M pin has to be wired.**

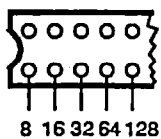
Setting of the Starting Address *m*

Starting Address (Hex.)	Input Byte (Dec.)	Socket X1 (DIP FIX)
		
00	0 - 7	
08	8 - 15	
10	16 - 23	
18	24 - 31	
20	32 - 39	
28	40 - 47	
30	48 - 55	 from SW3 on
38	56 - 63 <sup>1)</sup>	 from SW3 on

**The address area IB 0 to IB 47 (61, from SW3 on) may be used  
(see INTERFACE DESCRIPTION PART 1 - SIGNALS).**

Jumper significance:

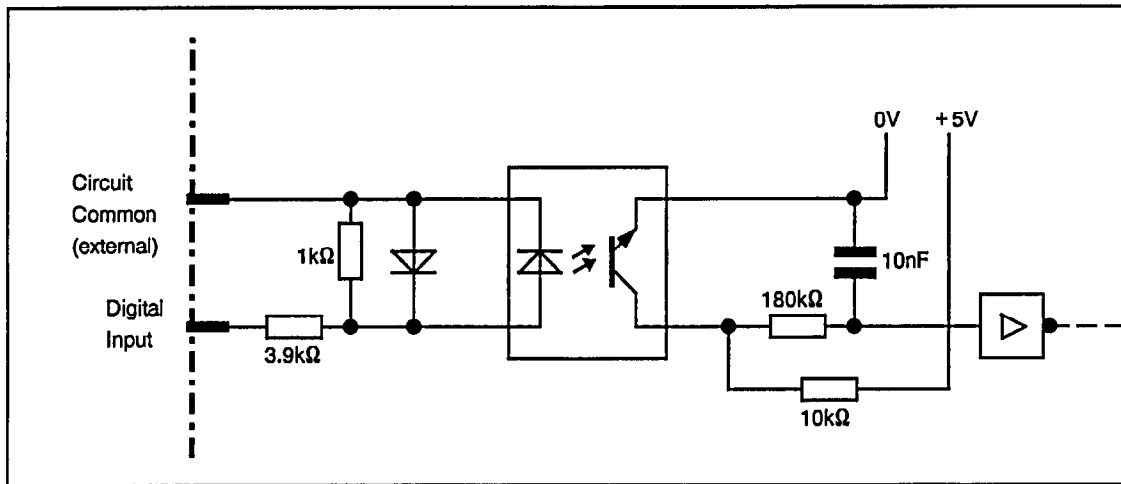
jumper closed  
means:



<sup>1)</sup> With this setting of the starting address *m*, IB 62 and IB 63 are not taken into account.



Diagram of the Digital Input Circuit



Signal Assignment on the PLC Interface for Input Signals

Input Board 6FX1 125-7BA								
Byte No.	Bit No.							
	7	6	5	4	3	2	1	0
IB m	23	4	22	3	21	2	20	1
IB m + 1	9	27	8	26	7	25	6	24
IB m + 2	32	13	31	12	30	11	29	10
IB m + 3	18	36	17	35	16	34	15	33
IB m + 4	23	4	22	3	21	2	20	1
IB m + 5	9	27	8	26	7	25	6	24
IB m + 6	32	13	31	12	30	11	29	10
IB m + 7	18	36	17	35	16	34	15	33

The address m is set through jumpers on the board.

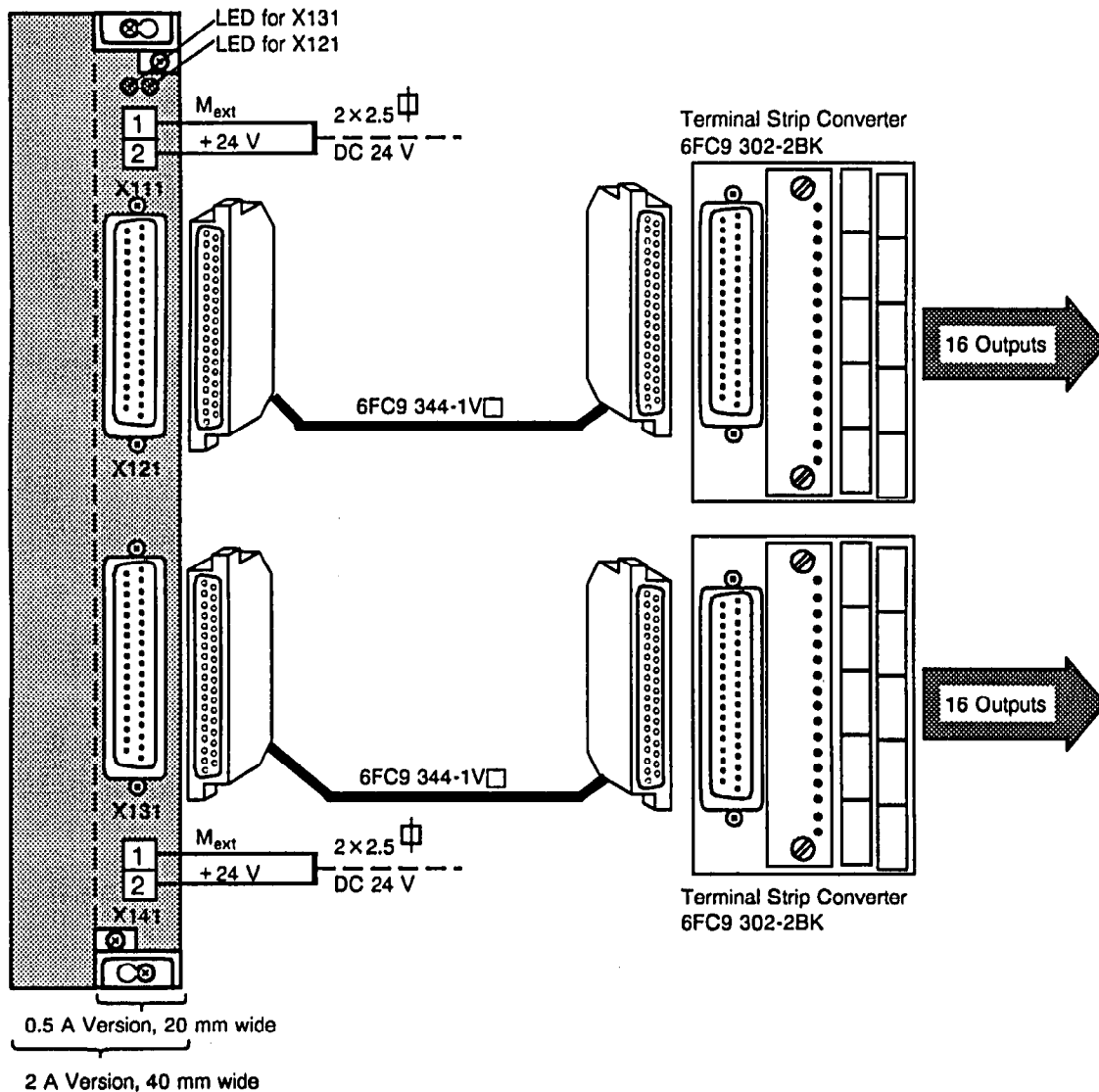
## Technical Data

Number of Inputs Galvanic Isolation	64, Digital Yes
Rated Input Voltage	DC 24 V
Input Voltage for "0" Signal for "1" Signal	-3 V to +5 V +14 V to +33 V
Input Current at "1" Signal	3.6 mA to 7.7 mA
Delay Time for tpLH Delay Time for tpHL	1.8 ms to 2.2 ms 1.8 ms to 2.2 ms
Maximum Cable Length	50 meters
Dielectric Strength - Accord. to VDE 0160 - Tested with	
Internal Current Consumption - at 5 V typically - at 24 V typically	120 mA
Size	Double-height Eurocard
Board Width	20 mm
Weight approx.	350 gram
Degree of Protection DIN 40050	IP00
Humidity Class DIN 40040	F

### 3.1.13.3 Output Board 32 Out. 0.5 Amp. (Hardw. No. 6FX1 122-8BC04) Output Board 32 Out. 2.0 Amp. (Hardw. No. 6FX1 122-8BD04)

The board features:

- 32 digital outputs, isolated, 24 V/0.5 A or 2 A, in groups of 16, short-circuit-proof. The outputs may be parally connected to increase the power.
- 2 terminal blocks for external power supply to the outputs.
- 2 red LED's as indicators of overcurrent or short circuit (1 LED for each block). The monitoring is word by word.

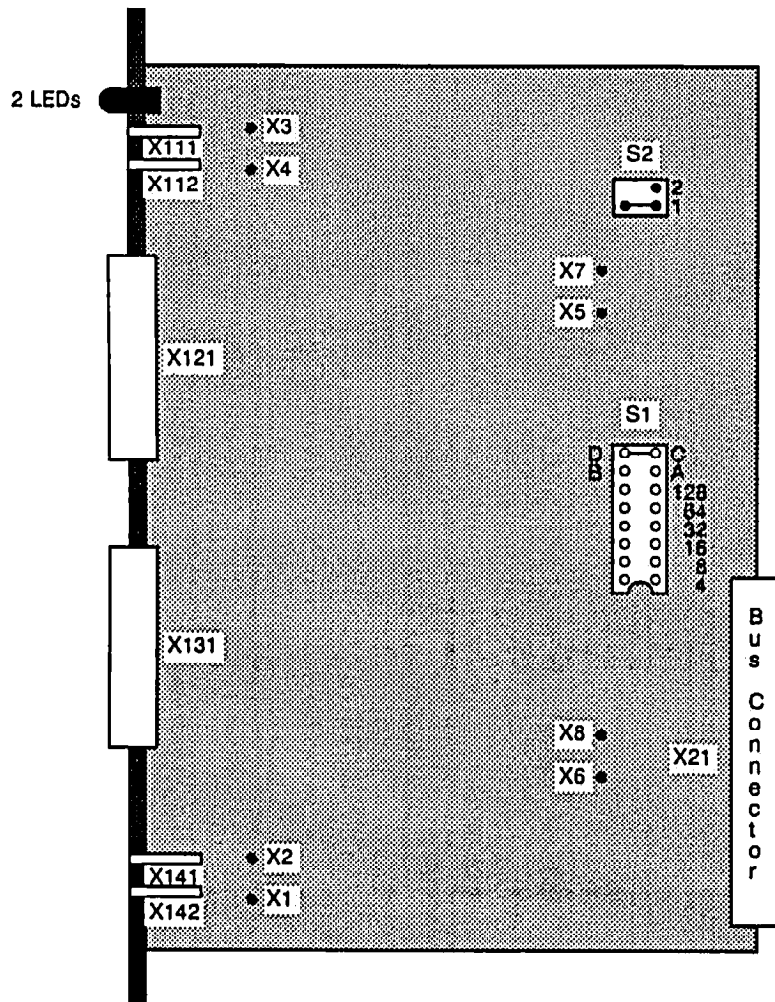


#### Board versions available:

- The 0.5 A version is 20 mm wide. It can operate with 50% simultaneous load factor when sufficient ventilation is guaranteed.
- The 2.0 A version is 40 mm wide. It can operate with 50% simultaneous load factor.

The board occupies 4 consecutive output bytes on the PLC interface.

## Location of the Sockets and Jumpers



### Standard Settings

Switch S1: Setting of starting address

Jumper	Central Unit	EU
C - D	closed	open

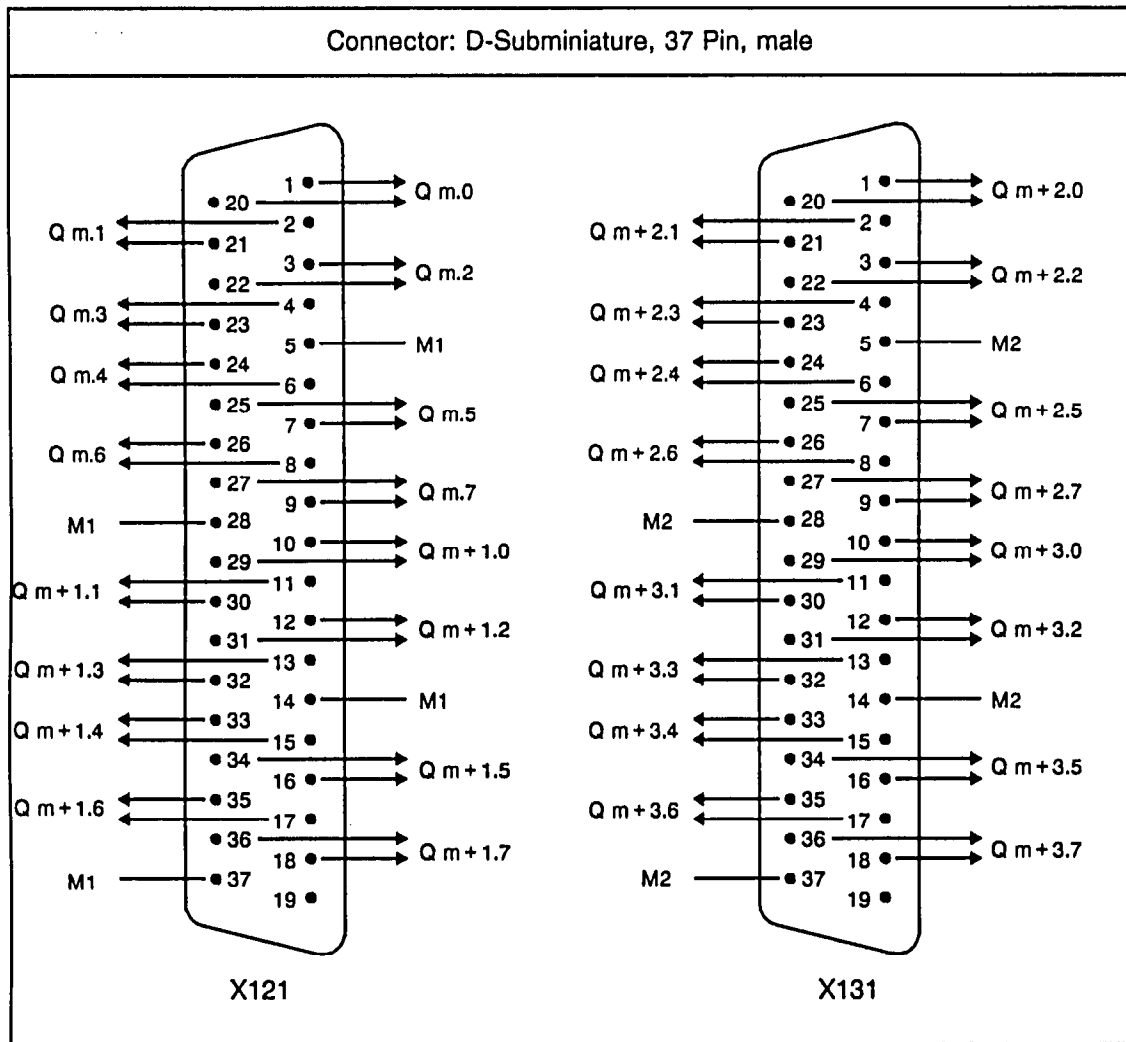
Jumpers:  
 X1 - X2 open  
 X3 - X4 open  
 X5 - X7 open  
 X6 - X8 open

Switch S2:

	Central Unit	EU
Jumper	1	2

### Connecting of the Outputs

The 32 digital outputs are connected to connectors X121 and X131 (16 outputs each).



***M1, M2 as well as all other pins without assignment  
may not be used. They are used for board test purposes.***

**Setting of the Starting Address m**

Starting Address (Hex.)	Output Byte (Dec.)	Switch S1(DIP FIX)
0	0 - 3	
4	4 - 7	
8	8 - 11	
C	12 - 15	
10	16 - 19	
14	20 - 23	
.....		
3C	44 - 47	
40	48 - 51	
44	52 - 55	
48	56 - 59	
4C	60 - 63	

**The address area QB 0 to QB 47 (63, from SW3 on) may be used  
(see INTERFACE DESCRIPTION PART 1 - SIGNALS).**

Jumper significance:

jumper closed  
means:

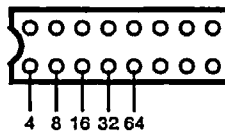
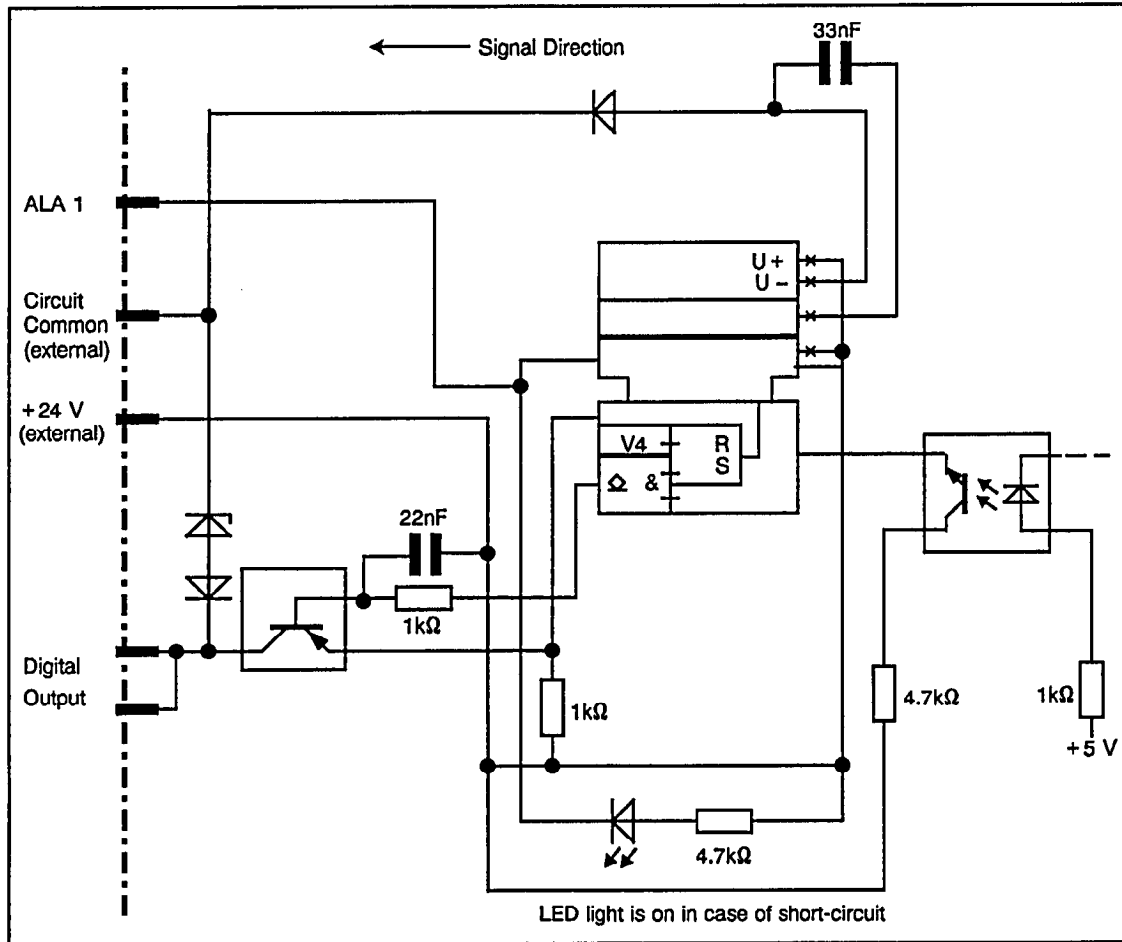



Diagram of the Digital Output Circuit



	<b>CAUTION</b>
	<p>The capacitor in the output circuitry compensates only for the cable inductivity.</p> <p>If contactors, relays, etc. are connected to the outputs, additional external devices for interference suppression such as RC components, suppression diodes, have to be used.</p> <p>When directly setting PTC thermistors (e.g. bulbs bigger than 1 W) the overload monitoring may respond and the output may be switched off for a short time because of the short-time high current when switching on.</p>

## Signal Assignment on the PLC Interface for the Output Signals

Output Board 6FX1 122-8B								
Byte No.	Bit No.							
	7	6	5	4	3	2	1	0
QB m	Connector X121 Pin No.							
	9/27	8/26	7/25	6/24	4/23	3/22	2/21	1/20
QB m+1	Connector X121 Pin No.							
	18/36	17/35	16/34	15/33	13/32	12/31	11/30	10/29
QB m+2	Connector X131 Pin No.							
	9/27	8/26	7/25	6/24	4/23	3/22	2/21	1/20
QB m+3	Connector X131 Pin No.							
	18/36	17/35	16/34	15/33	13/32	12/31	11/30	10/29

The address m is set through jumpers on the I/O board.



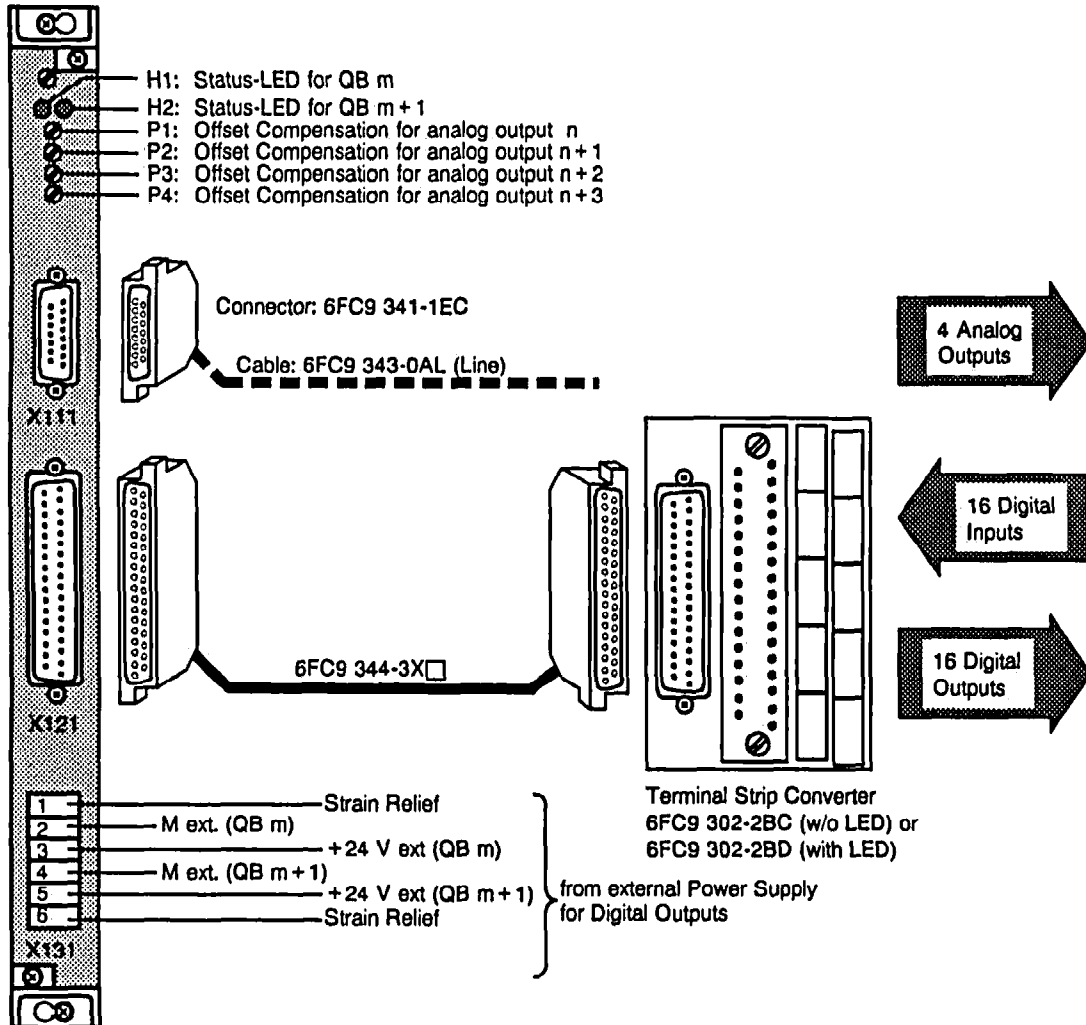
## Technical Data

	6FX1 122-8BC	6FX1 122-8BD
Number of Outputs Galvanic Isolation	32 digital Yes	32 digital Yes
Supply Voltage $U_P$ - Rated Value - Ripple $U_{PP}$ - Permissible Range (ripple included)	24 V DC 20 V to 33 V	24 V DC 20 V to 33 V
Output current at "1" signal (Rated Val.)	500 mA	2 A
Short-circuit protection	Electronic with LED indicator light	Electronic with LED indicator light
Inductive Voltage Switch-Off Limitation Load for Lamps		
Switch Frequency with - resistive load - Lamps - inductive load (W. rated current. Higher values with reduced current are permitted)	100 Hz 11 Hz 2 Hz	100 Hz 11 Hz 2 Hz
Load factor at 55°C (With reference to the sum of all rated output currents)	50 %	50 %
Signal Level of the Outputs - for "0" Signal - for "1" Signal	Output is open $U_P - 1 V$	Output is open $U_P - 1 V$
Maximum Cable Length	50 m	50 m
Insulation voltage of external connectors against enclosure - Accord. to VDE 0160 - Tested with		
Internal Current Consumption at 5 V typically at 24 V typically	320 mA 100 mA	320 mA 100 mA
Size	Double-height Eurocard	Double-height Eurocard
Board Width	20 mm	40 mm
Weight approx.	500 gram	1210 gram
Degree of Protection DIN 40050	IP00	IP00
Humidity Class DIN 40040	F	F

### 3.1.13.4 Mixed Input/Output Board 16 In/Out (dlg.), 4 analog (Hardw. No. 6FX1 138-4BA01)

The board features:

- 16 digital inputs, isolated, in groups of 8
- 16 digital outputs, isolated, 24 V/400 mA, in groups of 8, short-circuit-proof
- 4 analog outputs, non-isolated, ± 10 V/3 mA, 13 plus sign bit resolution, short-circuit-proof
- 2 LEDs for the display of error states of the digital outputs (one LED per output block),
- 4 potentiometer for offset adjustment of the analog outputs
- 1 terminal block for the connection of the external power supply for the digital outputs

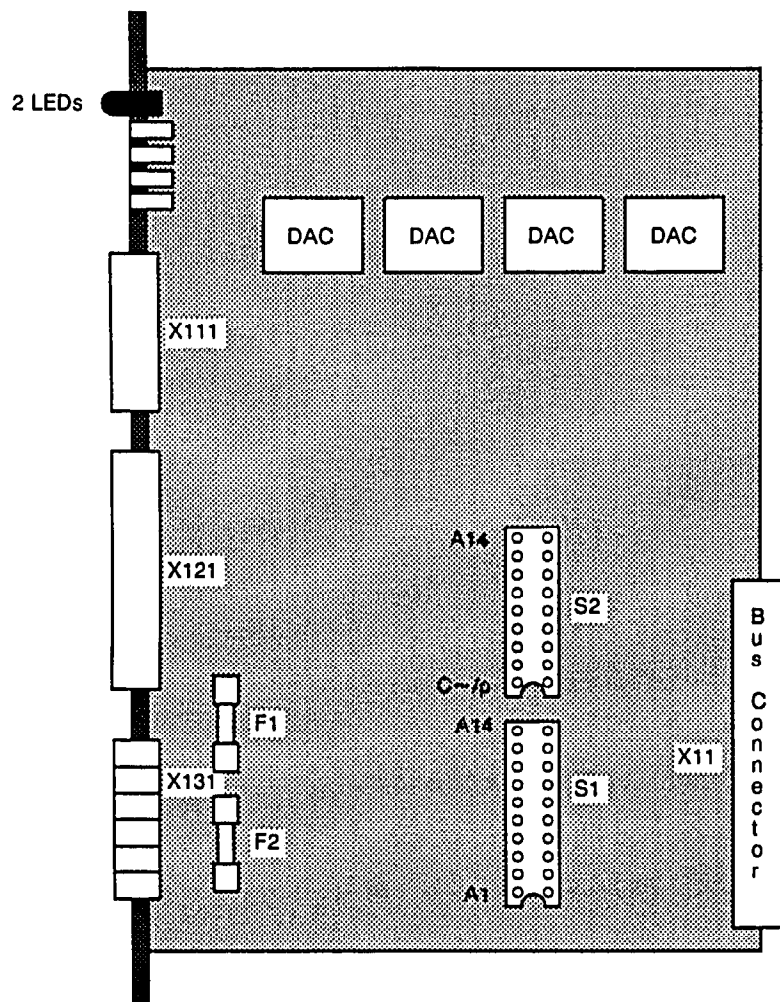


The PLC interface is occupied as follows. The 16 digital inputs and outputs occupy 2 inputs and 2 output bytes, and the 4 analog outputs occupy 8 output bytes.

**Note:**

- This board may not be used with the expansion unit (EU).
- Available from SW 2 on.
- Connecting the external frames is imperative.

## Location of the Sockets and Jumpers



F1, F2: Fuses 250 V, 4 A, quick

S1: Setting of starting address  $m$  for digital inputs and outputs

S2: Setting of starting address for analog outputs

Jumper C~/p open

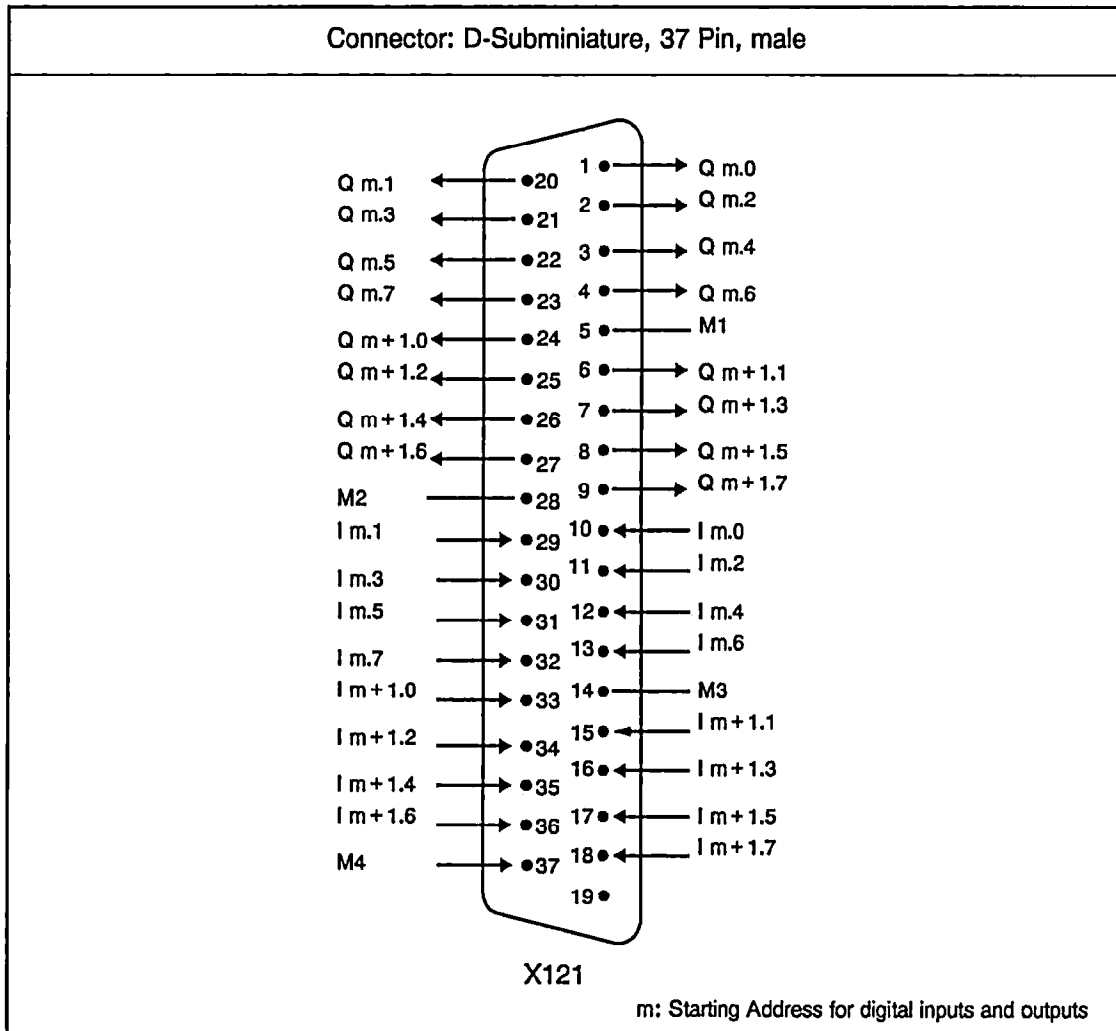
Jumper C~/p closed

= Hardware-dependent assignment  
 = Software-dependent assignment  
 (when initializing)

***The coding by the software by using  
 the jumper C~/p is not possible.***

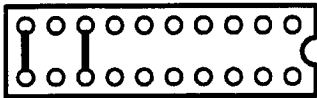
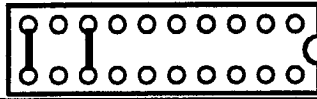
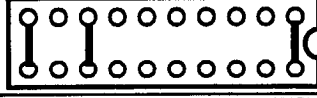

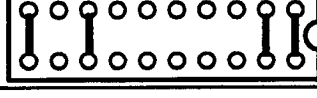
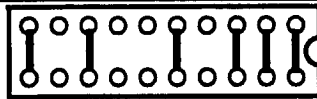
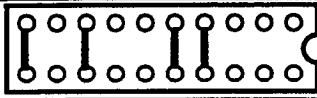
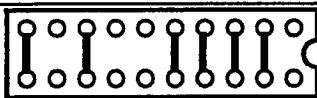
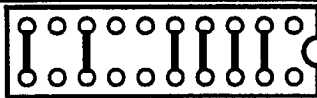
### Connecting of the Digital Inputs and Outputs

The 16 digital inputs and 16 digital outputs are connected to connector X121.



**Since M1 and M2 are used for test purposes, they may not be wired. The M3 and M4 however, have to be connected (equipment common ground).**

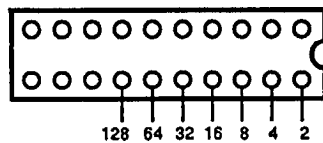
**Setting of the Starting Address m for the Digital Inputs and Outputs**

Starting Address (Hex.)	Input Byte Output Byte (Dec.)	S1	
			
0	IB0 and 1 QB 0 and 1		
2	IB 2 and 3 QB 2 and 3		
4	IB 4 and 5 QB 4 and 5		
6	IB 6 and 7 QB 6 and 7		
-----			
2E	IB 46 and 47 QB 46 and 47		
30	IB 48 and 49 QB 48 and 49		from SW3 on
-----			
3C	IB 60 and 61 QB 60 and 61		from SW3 on
3E	QB 62 and 63 1)		from SW3 on

**The address area IB 0/QB 0 to IB 47/QB 47  
(IB 61/QB63, from SW3 on) may be used  
(see INTERFACE DESCRIPTION PART 1 - SIGNALS).**

Jumper significance:

jumper closed means:



1) With this setting of the starting address m, only the output bytes are taken into account.

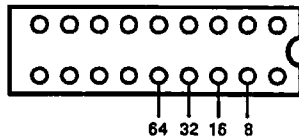
**Setting of the Starting Address m for the Analog Outputs**

Starting Address (Hex.)	Output Byte (Dec.)	S2	
00	0 - 7		
08	8 - 15		
10	16 - 23		
18	24 - 31		
20	32 - 39		
28	40 - 47		
38	56 - 63		from SW3 on

**The address area QB 0 to QB 47 (QB 63, from SW3 on) may be used  
(see INTERFACE DESCRIPTION PART 1 - SIGNALS).**

Jumper significance:

jumper  
closed means:

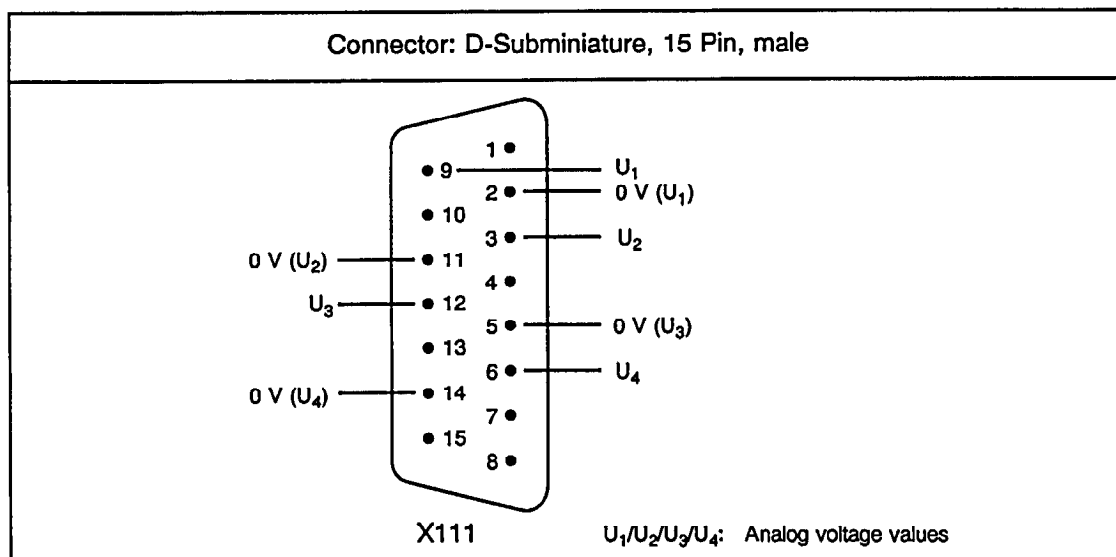


Digital Inputs								
Byte No.	Bit No.							
	7	6	5	4	3	2	1	0
IB m	32	13	31	12	30	11	29	10
IB m + 1	18	36	17	35	16	34	15	33

Digital Outputs								
Byte No.	Bit No.							
	7	6	5	4	3	2	1	0
QB m	23	4	22	3	21	2	20	1
QB m + 1	9	27	8	26	7	25	6	24

*The jumper assignment on the board sets address m and is the same for both the input and output area.*

**Connecting of the Analog Outputs**



Recommended cable: 12×2×0.14, shielded, twisted pairs Order No.: 6FC9 343-0AL

## Setting of analog outputs

The output word corresponding to the analog output must be described for the output of voltage values (hexadecimal number).

The jumper assignment on the board defines address n.

AW n	Hexadecimal number for analog output 1
AW n + 2	Hexadecimal number for analog output 2
AW n + 4	Hexadecimal number for analog output 3
AW n + 6	Hexadecimal number for analog output 4

A word consists of the following:

Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	VZ														al-ways 0	al-ways 0
	Amount															
Digital value	$2^{12}$	$2^{11}$	$2^{10}$	$2^9$	$2^8$	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$			

VZ: Sign bit  
(1 = negative, 0 = positive)

7 F F C	hex = +9.9988 V
:	
0 0 0 4	hex = +1.22 mV
0 0 0 0	hex = 0 V
F F F C	hex = -1.22 mV
:	
8 0 0 0	hex = -10.000 V

### Note:

- The amount (decimal number) =  $|U \text{ analog (V)}| : 10 \text{ V} \times 8192$
- Negative values are displayed in complements of 2.
- The high and low byte must be exchanged for the output of the hexadecimal number to the output word.

### Examples:

The following voltages are to be output to analog output 1 if the address n = 16 is set:

Example 1: 9.5 V

Amount (decimal no.): 7782  
 Amount (binary no.): 0111 1001 1001 10  
 Word (binary no.): 0111 1001 1001 1000  
 Word (hexadecimal no.): 7998

PLC program

```

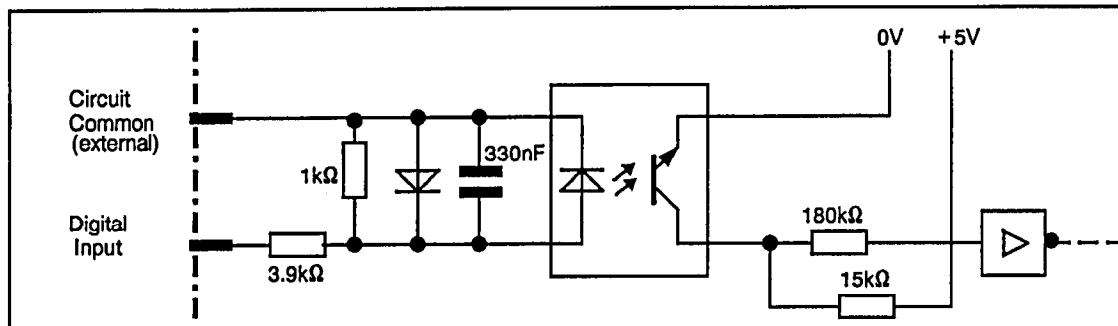
.
L KH 9879
T AW 16
.

```

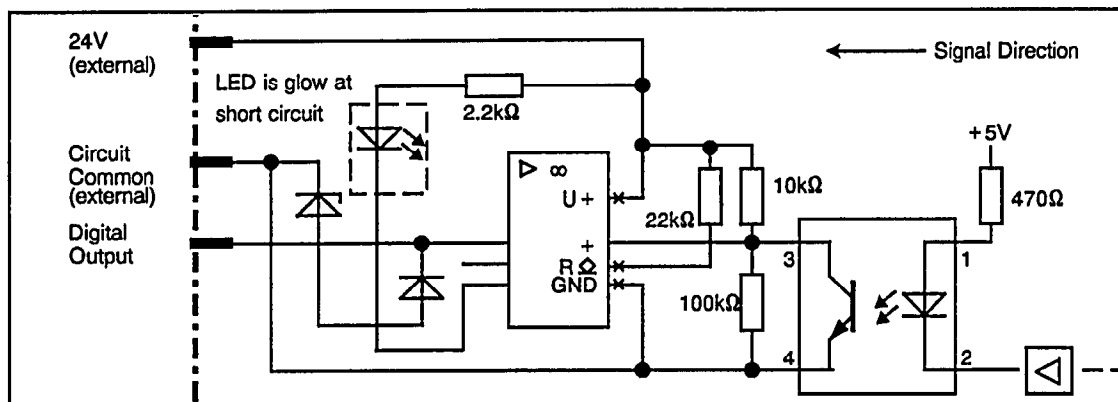


Example 2: -4.12 V	PLC program	.
Amount (decimal no.):	3375	.
Amount (binary no.):	0011 0100 1011 11	L KH 44CB
Complement of 2:	1100 1011 0100 01	T AW 16
Word (binary no.):	1100 1011 0100 0100	.
Word (hexadecimal no.):	CB44	.

**Diagram of the Digital Input Circuit**



**Diagram of the Digital Output Circuit**

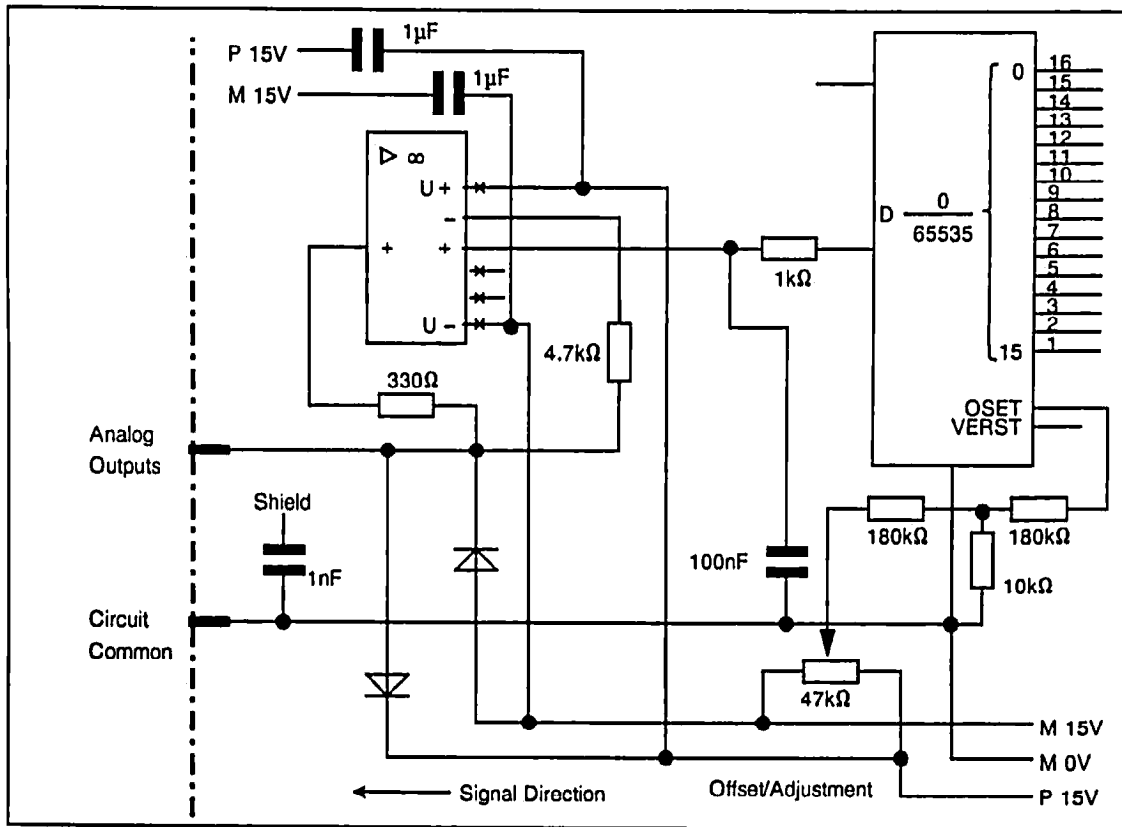


**CAUTION**

The capacitor in the output circuitry compensates only for the cable inductivity.

If contactors, relays, etc. are connected to the outputs, additional external devices for interference suppression such as RC components, suppression diodes, have to be used.

Diagram of the Analog Output Circuit



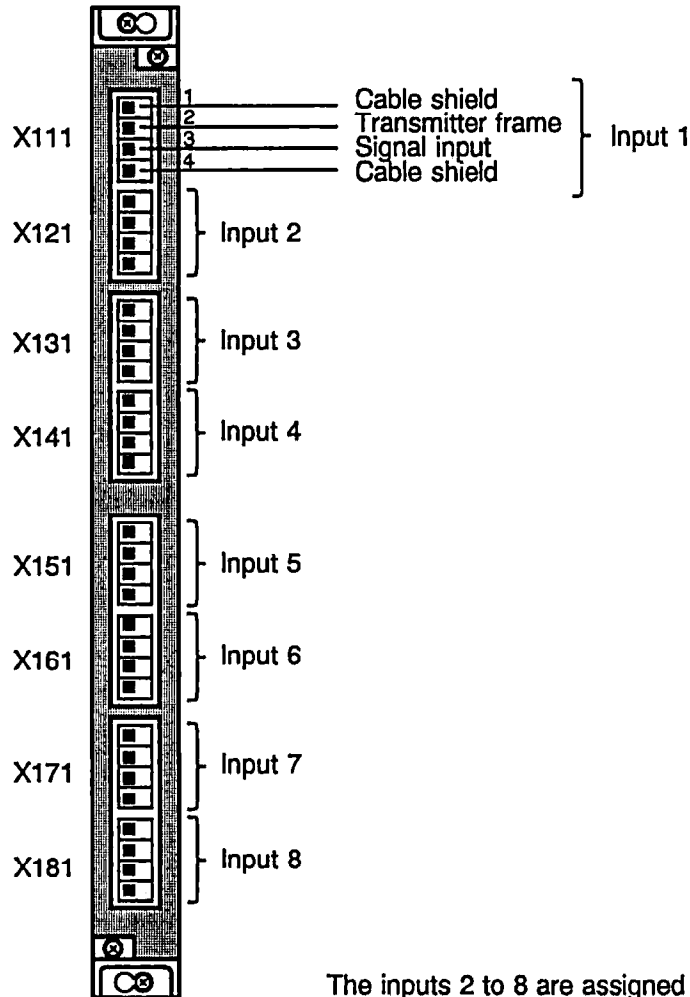
## Technical Data

Number of Inputs Galvanic Isolation	16 Digital Yes
Rated Input Voltage	24 V DC
Input Voltage for "0" Signal for "1" Signal	-3 V to +5 V +14 V to +33 V
Input Current at "1" Signal	
Delay Time for tpLH Delay Time for tpHL	
Maximum Cable Length	50 meters
Number of Outputs Galvanic Isolation	16 Digital Yes
Supply Voltage U <sub>p</sub> - Rated Value - Ripple U <sub>SS</sub> - Permissible Range (ripple included)	24 V DC 20 V to 33 V
Output Current at "1" Signal	400 mA
Short-Circuit Protection	Electronic with LED Indicator Light
Inductive Voltage Switch-Off Limitation Load for Lamps	
Switch Frequency with - resistive load - lamps - inductive load (W. rated current. Higher values with reduced current are permitted)	100 Hz 11 Hz 2 Hz
Load Factor at 55°C (With reference to the sum of all rated output currents)	50 %
Signal Level of the Outputs - for "0" Signal - for "1" Signal	Output is open U <sub>p</sub> -1 V
Maximum Cable Length	50 meters
Number of Outputs Galvanic Isolation	8 Voltage Outputs, Analog No
Rated Output Values	± 10 V
Load Resistance for Voltage Outputs, Minimum	3.3 Ω
Load Connection	Load to the 0 V terminal
Digital Representation of the Output Signal	16 bits with sign bit
Permissible Overload Capacity Approx.	
Short-circuit Protection	Yes
Short-circuit Current	
Voltage between the Reference Potential of the Load (0 V connection) and the Housing, maximum in the Rated Range	
Operational Limits (0 °C to 60 °C)	
Maximum Cable Length (shielded cable)	
Insulation Voltage Rating (external connections to housing) - according to VDE 0160 - tested with	
Current Consumption internal (at 5 V) internal (at 24 V) typ. typ.	
Board Format	Double-height Eurocard
Board Width	20 mm
Weight approx.	
Degree of Protection DIN 40050	IP00
Humidity Class DIN 40040	F

### 3.1.13.5 Analog Input board (Hardware MLFB: 6FX1 136-1BA01)

#### The board includes:

8 analog inputs, non-floating,  $\pm 10V$ , resolution = 4.88 mV, with programmable input filters.

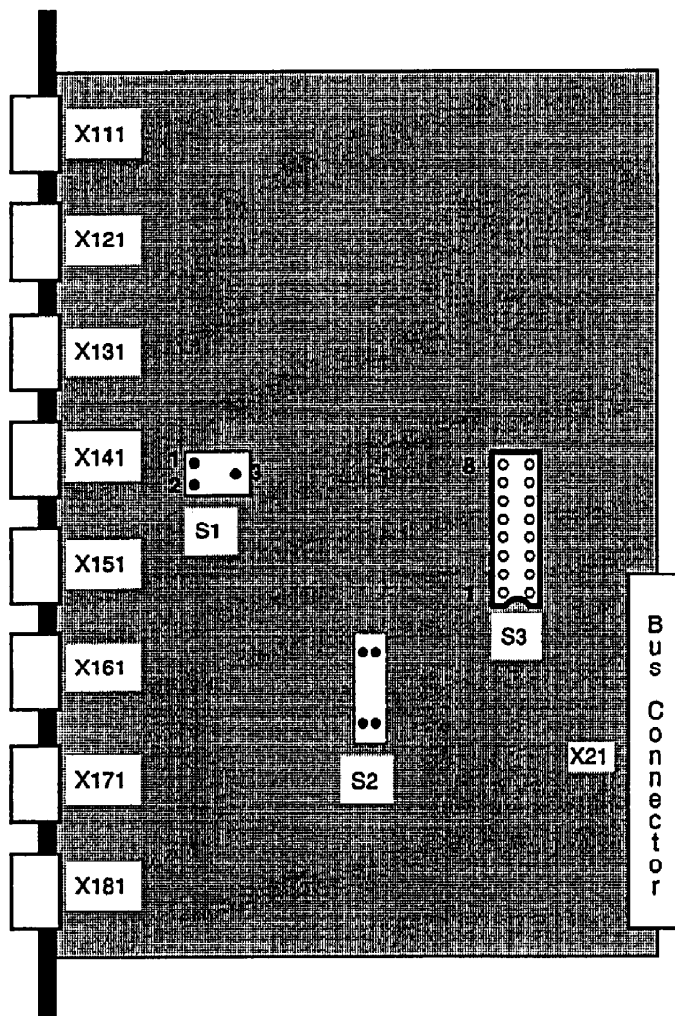


The inputs 2 to 8 are assigned like input 1.

**Inputs that are not in use are to be short-circuited (connect transmitter frame with signal input) or connected to shield (connect transmitter frame with cable shield and signal input with cable shield).**

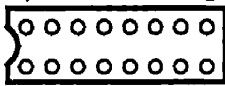
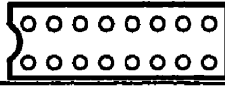

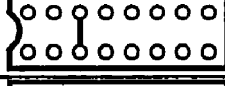
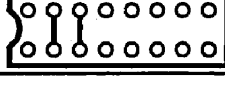
#### Notes:

- This board may not be used in the expansion unit (EU).
- The board is assigned to 16 consecutive input and output bytes on the PLC interface.

**Position of socket and switches:****Standard jumper assignment:**

- Switch S1: According to version, factory-adjusted, must not be modified!  
 Switch S2: According to version, factory-adjusted, must not be modified!  
 Switch S3: Setting of initial address

### Setting of Initial address m

Initial address (Hex.)	Input byte (Dec.)	Socket S3
		<div style="display: flex; justify-content: space-between; width: 100%;"> <span>1</span> <span>8</span> </div> 
0	0 - 15	
10	16 - 31	
20	32 - 47	
30	48 - 61 1) from SW3 on	

**The address area IB 0 to IB 47 (61, from SW3 on) may be used  
(see INTERFACE DESCRIPTION PART 1 - SIGNALS).**

### Digital analog value display

The voltage area of the 8 analog inputs amounts to  $\pm 10V$ . A resolution of 11 bits results in steps of 4.88 mV. The analog value is digitally displayed in complements of 2:

Analog voltage on input	Bit											
	211	210	29	28	27	26	25	24	23	22	21	20
9.99512 V	0	1	1	1	1	1	1	1	1	1	1	1
⋮							⋮					
4.88 mV	0	0	0	0	0	0	0	0	0	0	0	1
0 V	0	0	0	0	0	0	0	0	0	0	0	0
-4.88 mV	1	1	1	1	1	1	1	1	1	1	1	1
⋮							⋮					
-10 V	1	0	0	0	0	0	0	0	0	0	0	0

1) With this setting of the starting address m, IB 61 and IB 62 are not taken into account (corresponds to analog Input 8).

**Assignment of Inputs on the PLC Interface:**

The input word 0 displays how the digitalized analog value is stored.

Analog input board 6FX1 136-1BA01								
Byte No.	Bit No.							
	7	6	5	4	3	2	1	0
IB m	2 <sup>11</sup> Sign	2 <sup>10</sup>	2 <sup>9</sup>	2 <sup>8</sup>	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>
IB m + 1	Connector X111, Input 1							
	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>	1 <sup>*)</sup>	1 <sup>*)</sup>	1 <sup>*)</sup>	1 <sup>*)</sup>
IB m + 2	Connector X121, Input 2							
IB m + 3	Connector X131, Input 3							
IB m + 4	Connector X141, Input 4							
IB m + 5	Connector X151, Input 5							
IB m + 6	Connector X161, Input 6							
IB m + 7	Connector X171, Input 7							
IB m + 8	Connector X181, Input 8							
IB m + 9								
IB m + 10								
IB m + 11								
IB m + 12								
IB m + 13								
IB m + 14								
IB m + 15								

Address m is defined by the jumper assignment on the board.

<sup>\*)</sup> These bits are fixed assignments to the 1 signal. They must be masked out if necessary.

### Programmable Input filters

Filters may be used for the user program in connection with the individual analog inputs to suppress interferences. The filters are selected by describing the output word of the corresponding addressed input word. No other output board may be addressed to this output word.

Byte No.	Bit No.							
	7	6	5	4	3	2	1	0
QB m	Input 8 F1   F0		Input 7 F1   F0		Input 6 F1   F0		Input 5 F1   F0	
QB m + 1	Input 4 F1   F0		Input 3 F1   F0		Input 2 F1   F0		Input 1 F1   F0	

Address m corresponds to the initial address of the board (e.g. EW 16).

Because of the two bits for filter selection (F1, F0) there are the following input filters for each analog input:

Bit		Input filter
F1	F0	
0	0	Direct connection, standard after Reset (no filter)
0	1	Filter T1 = 0.01 ms
1	0	Filter T2 = 0.1 ms
1	1	Filter T3 = 1 ms

***The output bytes from QB m + 2 to QB m + 15 may not be used for other boards and/or functions.***

#### Example:

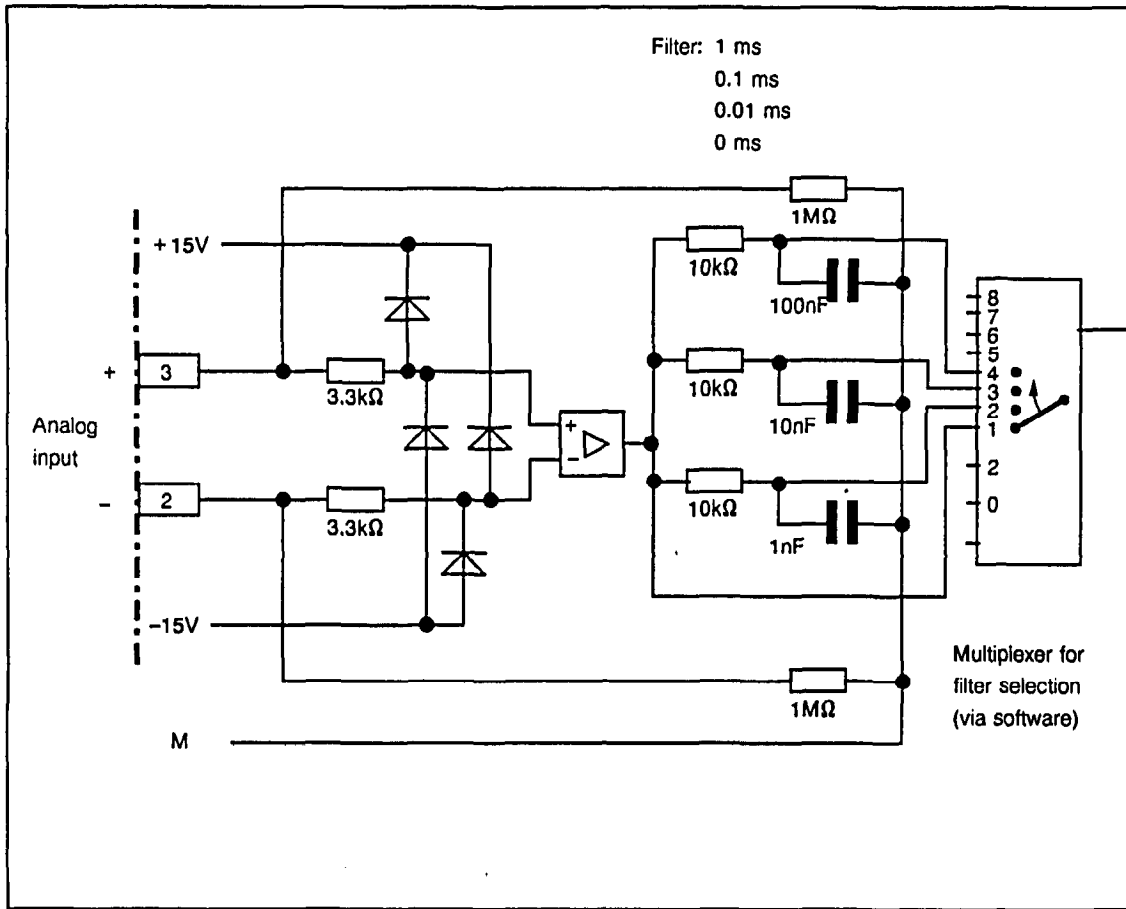
Filter T3 = 1ms is to be active for analog input 3. The initial address of the board is EW 16.

⋮  
L KH 0030  
T AW 16  
⋮

The commands must be cyclically executed.



Analog input circuit



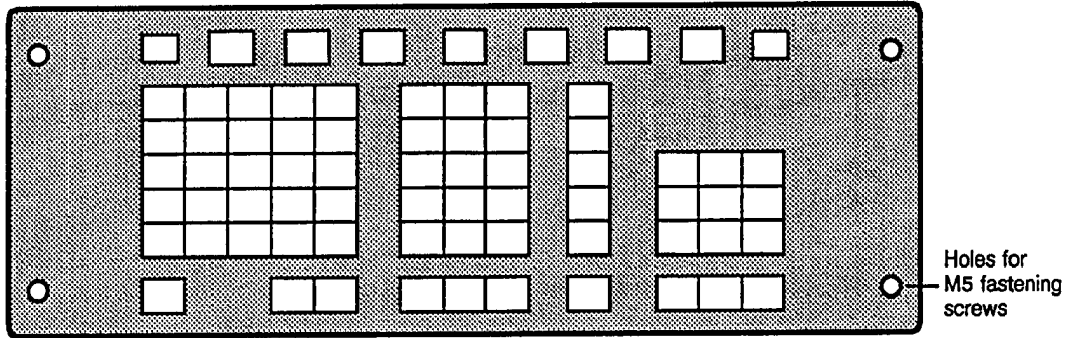
## Technical Data

Number of Inputs Galvanic Isolation	8 Voltage Inputs, Analog No	
Rated Input Voltage	±10 V	
Input Resistance in Individual Areas	≥	
Encoder Connection	Two-wire Connection	
Digital Representation of the Input Signal	12 bits, Complement of Two	
Measuring Principle	Successive Approximation	
Conversion Principle	Successive Approximation	
Averaging Time (Settable for Optimizing the Interference Voltage Suppression)		
Coding Time Individual Coding Possible	max.	396 μs for 8 Channels including 1 Compensation No
Cycle Time for 8 Inputs		
Admissible Voltage between Inputs or between Inputs and Central Earthing Point (Surge Limit)	DC ±35 V	
Admissible Voltage between Reference Potential of a Potential-Dependent Encoder and Central Earthing Point	±1 V	
Error Message if - Out of Range - Encoder Wire Broken	No No	
Interference Voltage Rejection for $f = n$ . (50/60Hz ± 1%) $n = 1, 2, \dots$ - Common-mode interference voltage ( $U_S < 1V$ ) min. - Normal-mode interference voltage (peak value of interference < rated value of area)	- -	
Intrinsic Error Limits	1 LSB	
Operating Error Limits (0°C to 60°C)	±10 V (0°C to 70°C: 7 LSB)	
Supply Voltage (as for Analog Outputs)	5 V, ±15 V	
Enable Input (as for Analog Outputs)		
Maximum Cable Length		
Insulation Voltage Rating (External Connections to Housing - According to VDE 0160 - Tested with		
Current Consumption	Internal (at 5V) Internal (at 24V)	typ. typ. 5 V: 0.55 A ±15 V: 0.1 A
Board Format	Double-height Eurocard	
Board Width	20 mm	
Weight	approx.	400 g
Degree of Protection DIN 40050	IP 00	
Humidity Class DIN 40040	F	

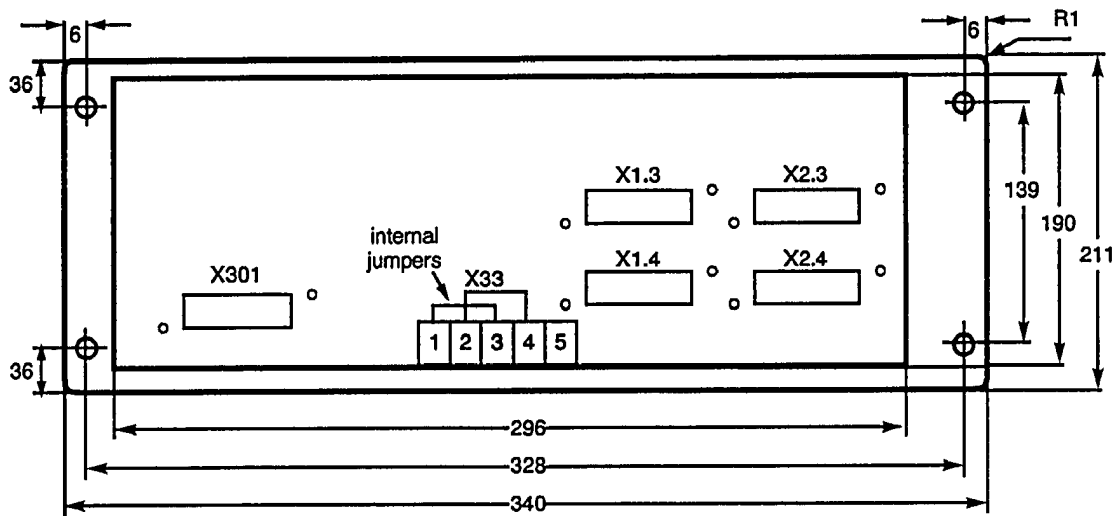
### 3.2 Keyboard

Order No. 6FM2 805-4PS21

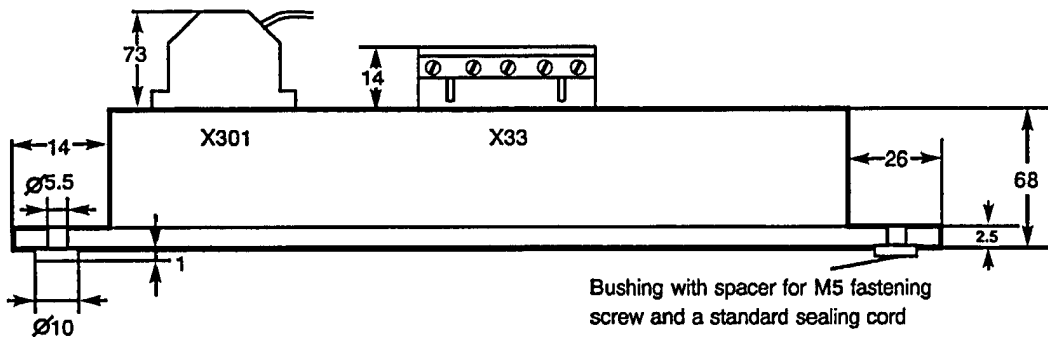
#### Front Panel



#### Back Plane



#### Underside



### 3.3 CRT Monitors

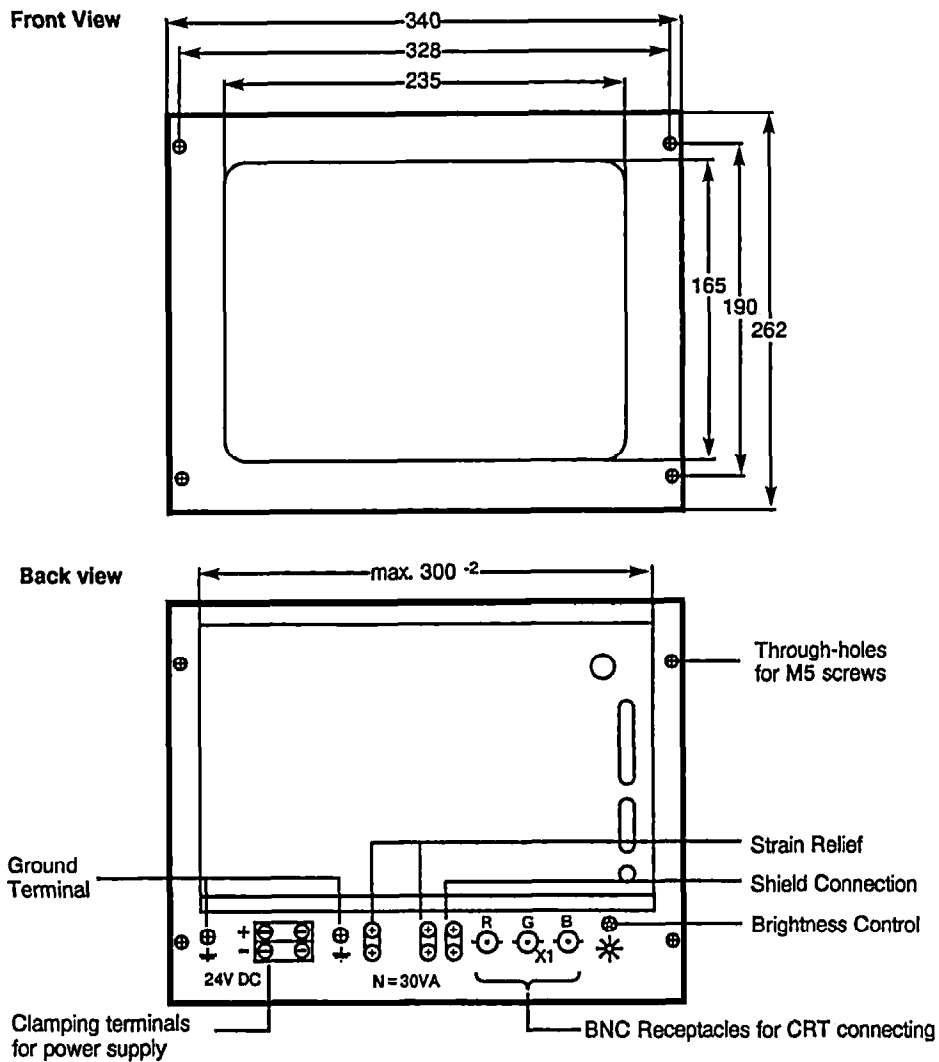
#### Adjusting the brightness:

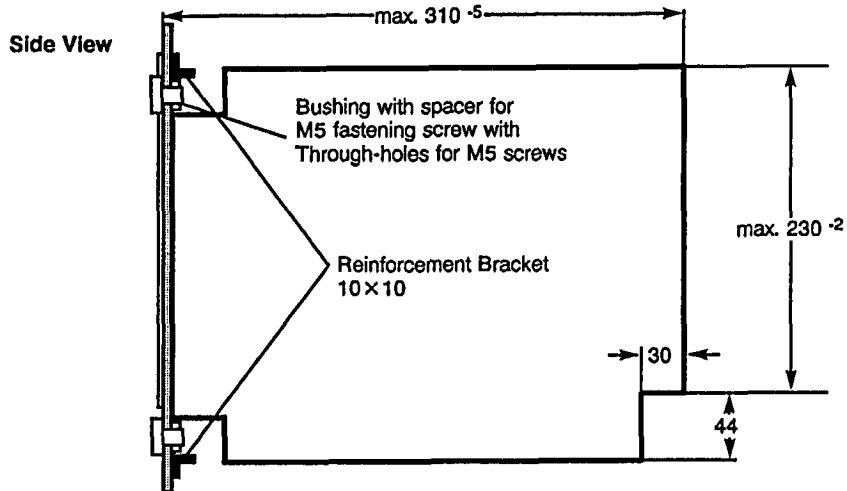
The brightness may be adjusted with a potentiometer according to the environmental light conditions of the control. The potentiometer is situated at the back of the monitor and may be approached from outside.

Image quality, picture height, contrast etc., are usually correctly factory-adjusted.

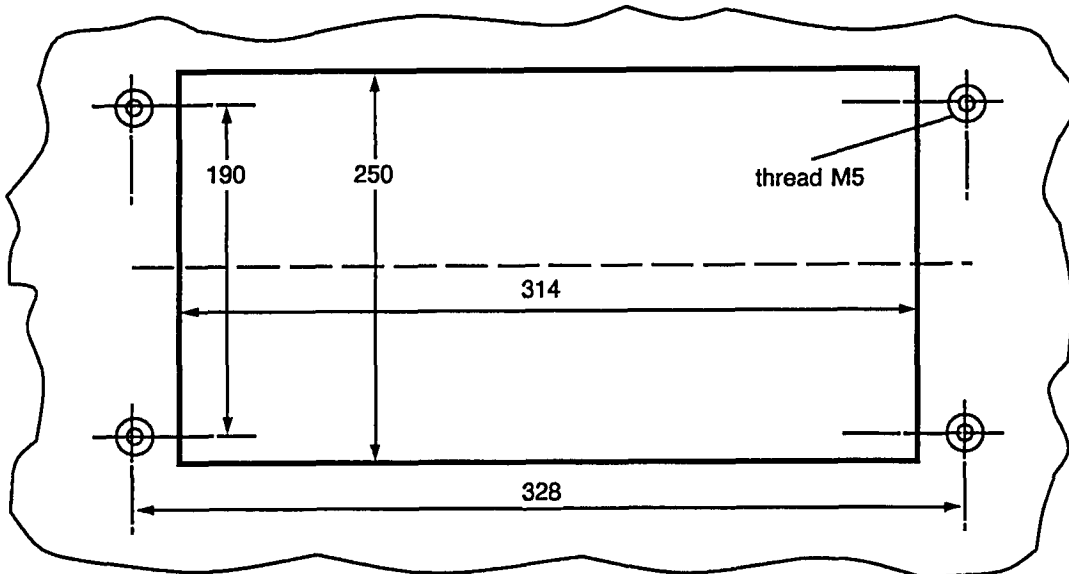
#### 3.3.1 Monochrome CRT Monitor

Order No. 6FM2 805-4AR04





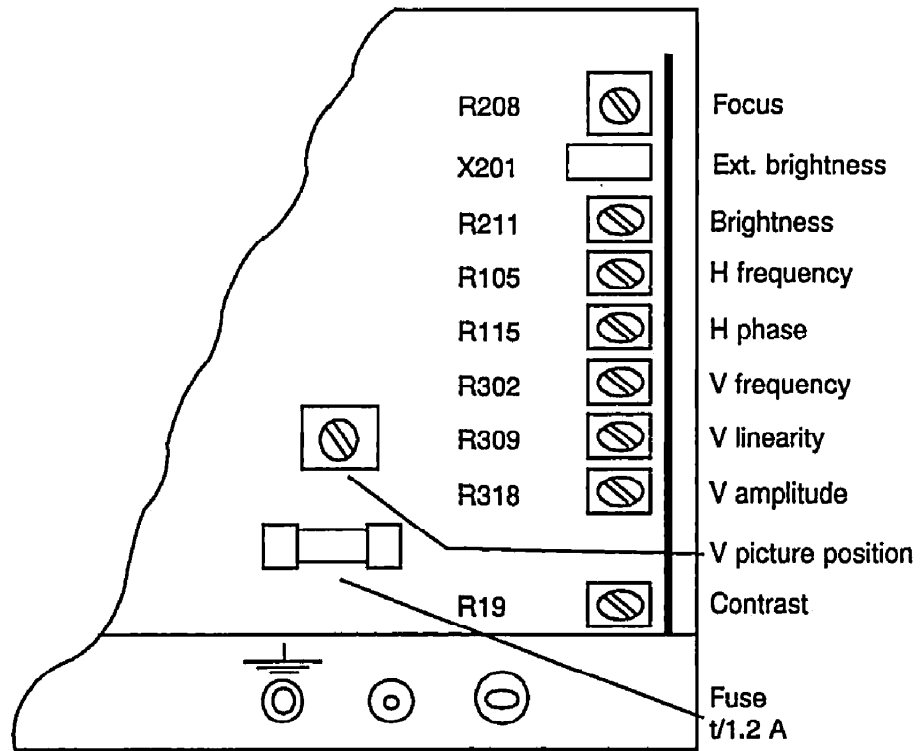
Mounting opening



Adjustment possibilities for monochrome monitor

	<b>DANGER</b>
	<p>High voltage approx. 16 kV in the display unit, h. v. transformer, anode line and anode terminal of the picture tube. Potentiometer settings on the monitor printed circuit board may be modified by qualified personnel only with the corresponding tools (screwdriver made of epoxy resin).</p> <p>Please adhere to the Guidelines of the Association of Precision and Electrical Engineering.</p>

**Back view without shield:**

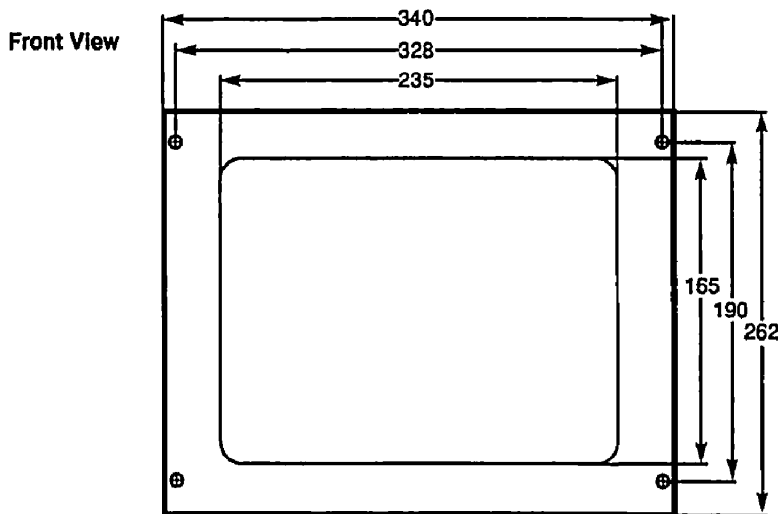


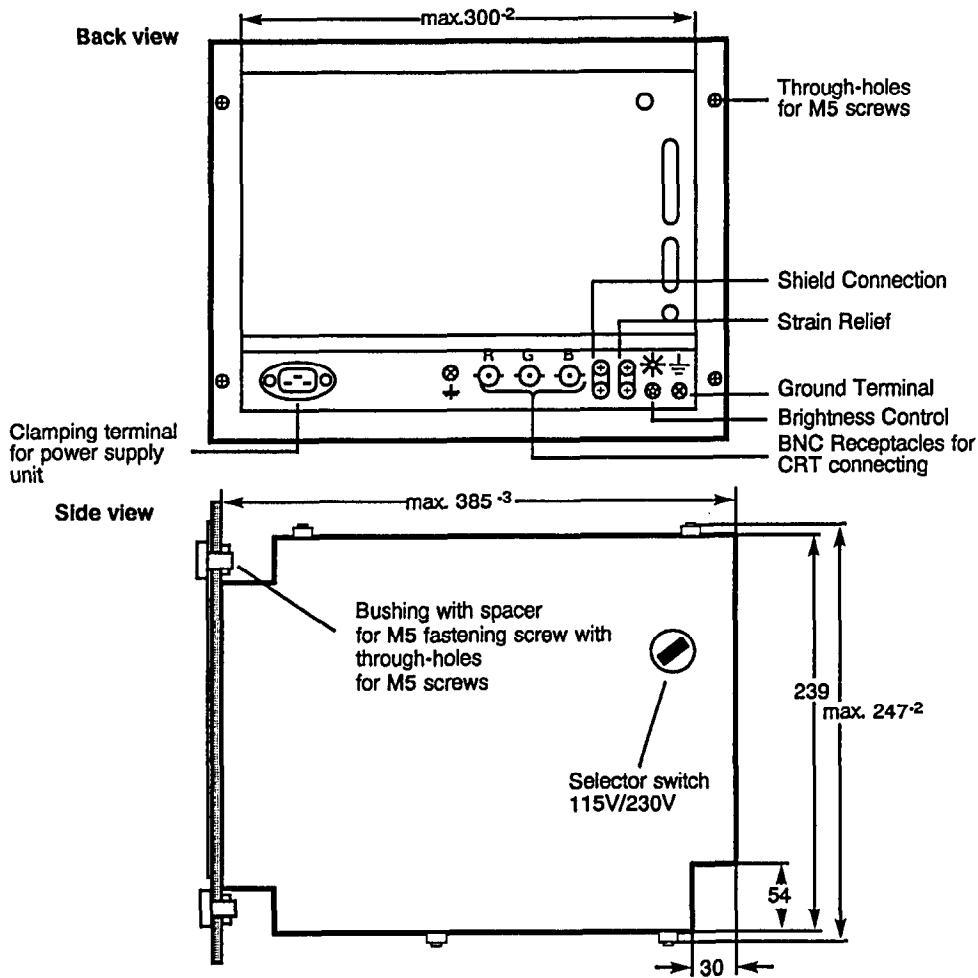
**Note:**

There is another fuse (2 A) in the internal monitor power supply unit.

**3.3.2 Colour CRT Monitor**

Order No. 6FM2 805-4AR50

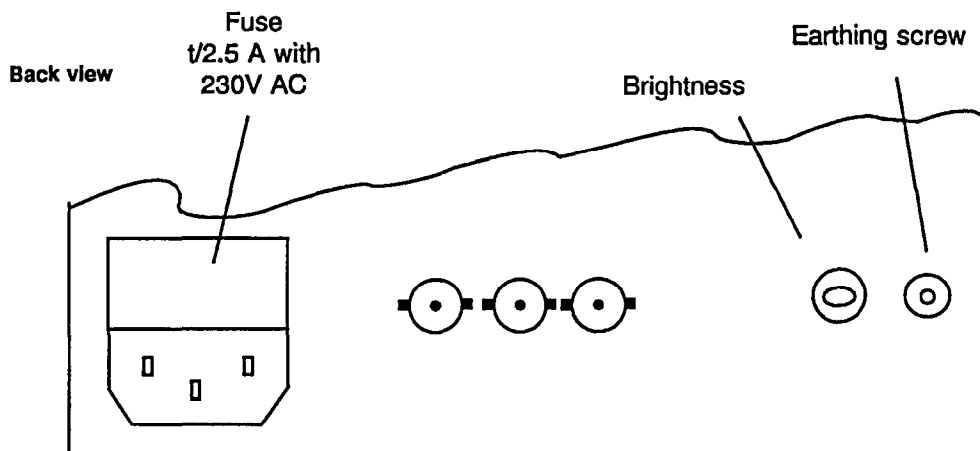




**Mounting opening:** see monochrome monitor

**Adjustment possibilities for colour monitor**

The potentiometer of a colour monitor may not be adjusted from outside (as with monochrome monitor). Only the brightness may be adjusted with the potentiometer on the lower right on the back.

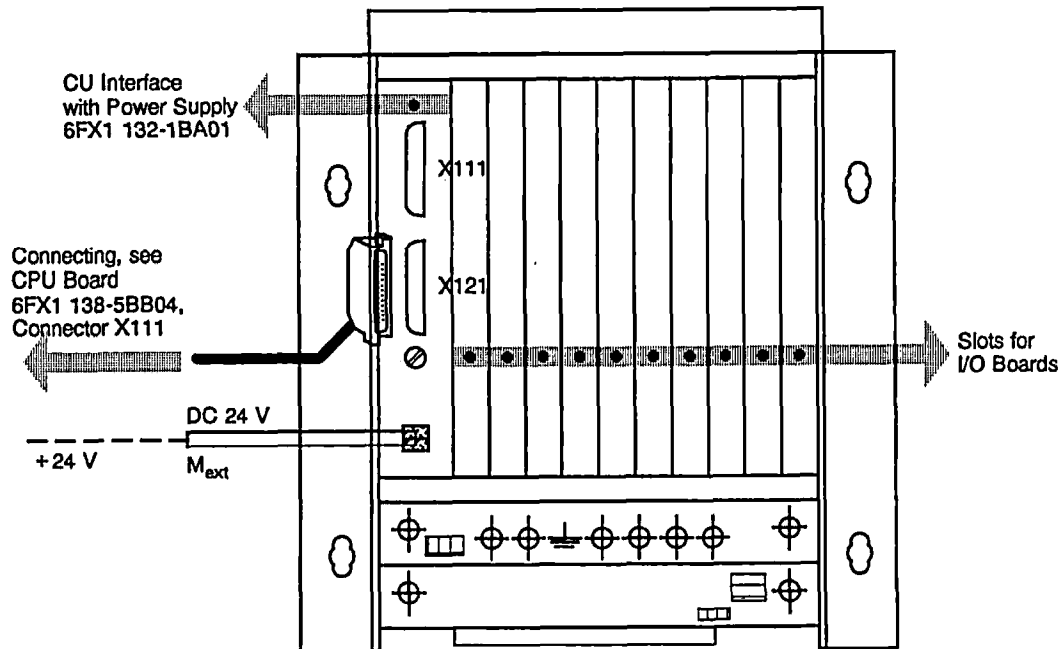


### 3.4 Distributed Peripherals (EU)

The Expansion Unit (EU) can accommodate the standard SINUMERIK I/O boards as well as the SIMATIC boards specified for use with SINUMERIK control.

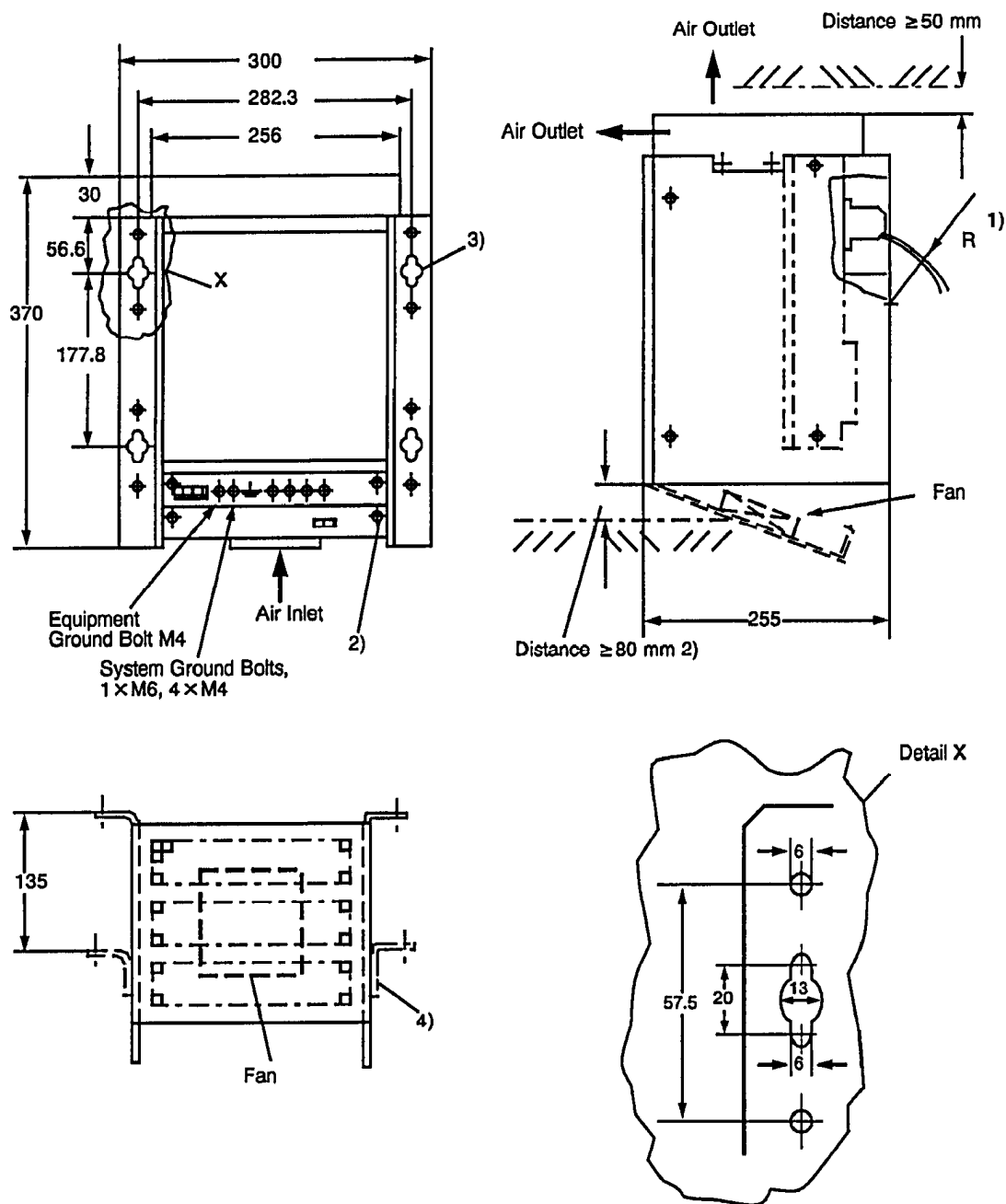
The EU rack assignment is shown in the section SINUMERIK 805SM-P with EU.

#### 3.4.1 Overview





**Dimensions (All dimensions in millimeters)**

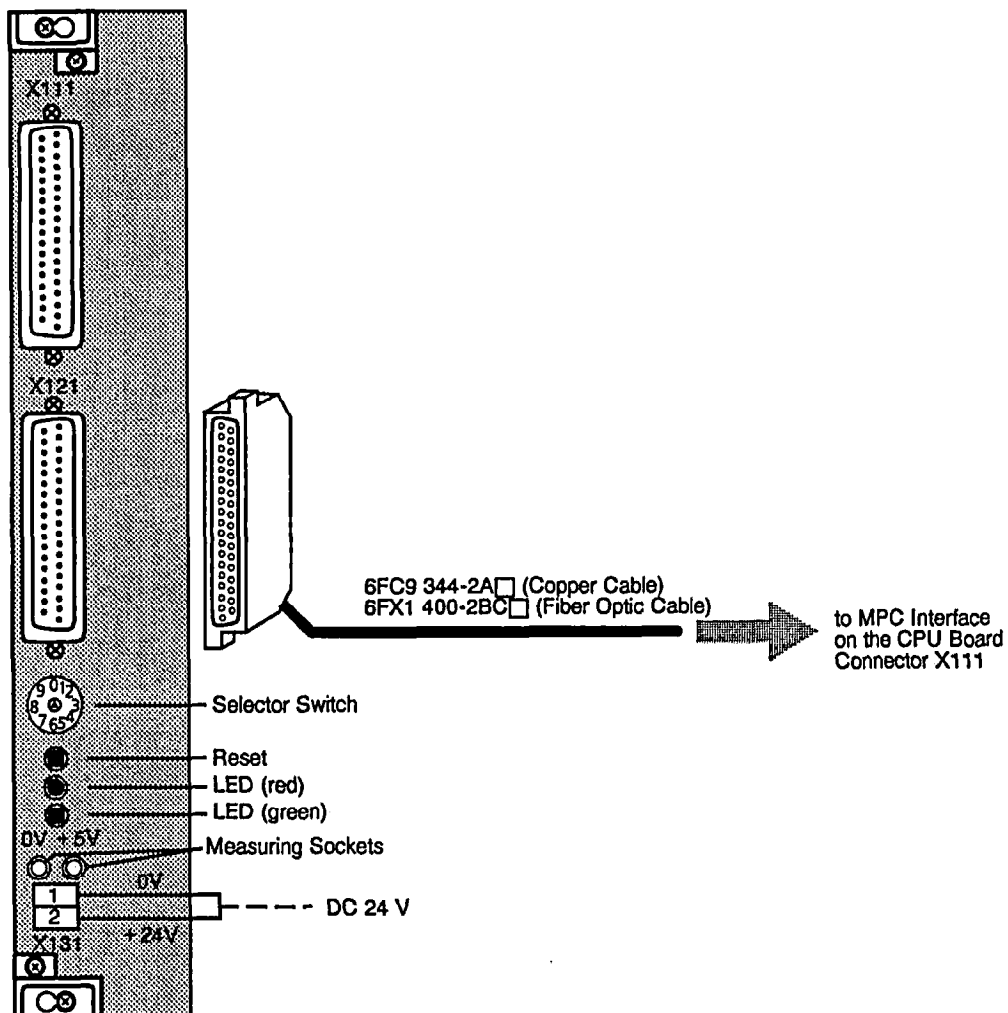


- 1) Appropriate cable type.  
Siemens cable radius  $R \geq 100$  mm
- 2) To open or remove the body panel loosen the fastening screws
- 3) Mounting screw M6
- 4) Mounting possibility for two additional brackets  
(Order No.: 226 104. 0362.01)

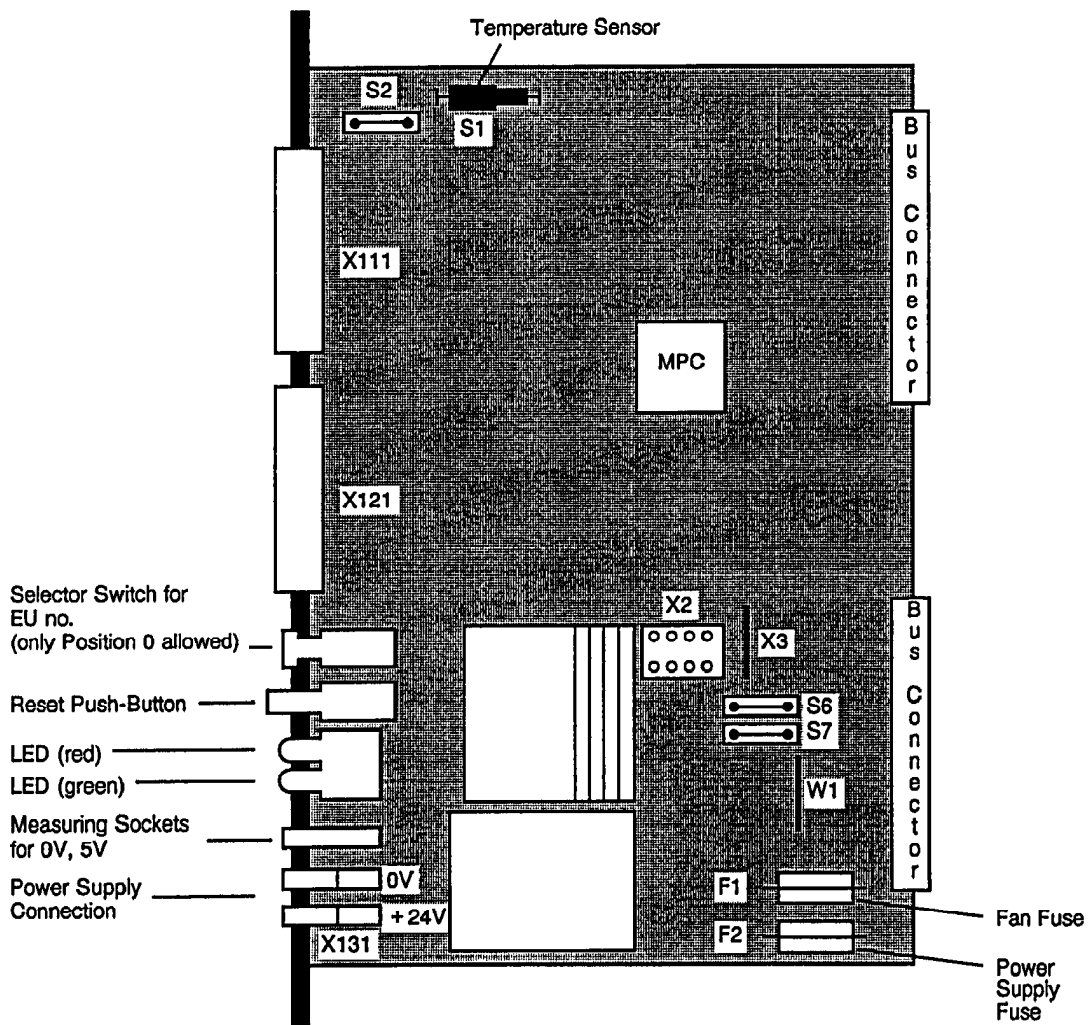
### 3.4.2 CU Coupling Board (Hardw. No. 6FX1 132-1BA01)

The board features:

- 1 interface for outputs X111, (reserved, not used with SINUMERIK 805SM-P)
- 1 interface for inputs X121 for connection to the central unit (MPC interface on the CPU board, X111)
- 1 selector switch for expansion unit number setting. Since the SINUMERIK 805SM-P can have only one EU, the switch must to be set to 0.
- 1 reset push-button
- 1 red LED indicating command output lock
- 1 green LED indicating power supply O.K.
- 2 measuring sockets for 0 V and +5 V
- 2 terminals for connecting (X131) of 0 V and +24 V from the power supply



**Location of the Sockets and Jumpers**



The CU Coupling Board must always be plugged into the first slot of the EU rack.

**Standard jumper setting:**

- W1 closed : (test field)
- X3 closed : command output lock
- S1 : temperature sensor
- S2 closed : switch-off after 20 ms if temperature exceeded
- S6 closed : (test field)
- S7 closed : (test field)

### 3.4.3 SINUMERIK I/O Boards

The boards which can be used with the SINUMERIK 805SM-P rack can also be used with the EU.

Input/Output Board	32 In/Out	(HW-MLFB: 6FX1 122-3CA01)
Input Board	64 In	(HW-MLFB: 6FX1 125-7BA01)
Output Board 0.5 A	32 Out	(HW-MLFB: 6FX1 122-8BC04)
Output Board 2 A	32 Out	(HW-MLFB: 6FX1 122-8BD04)

The I/O boards are described in Section CENTRAL PERIPHERALS.

### 3.4.4 SIMATIC I/O Boards

The following SIMATIC I/O boards can be used with the EU:

Input Board	32 In	(6ES5 432-4UA12)
Output Board 2 A	16 Out	(6ES5 454-4UA12)
Output Board 0.5 A	32 Out	(6ES5 451-4UA12)

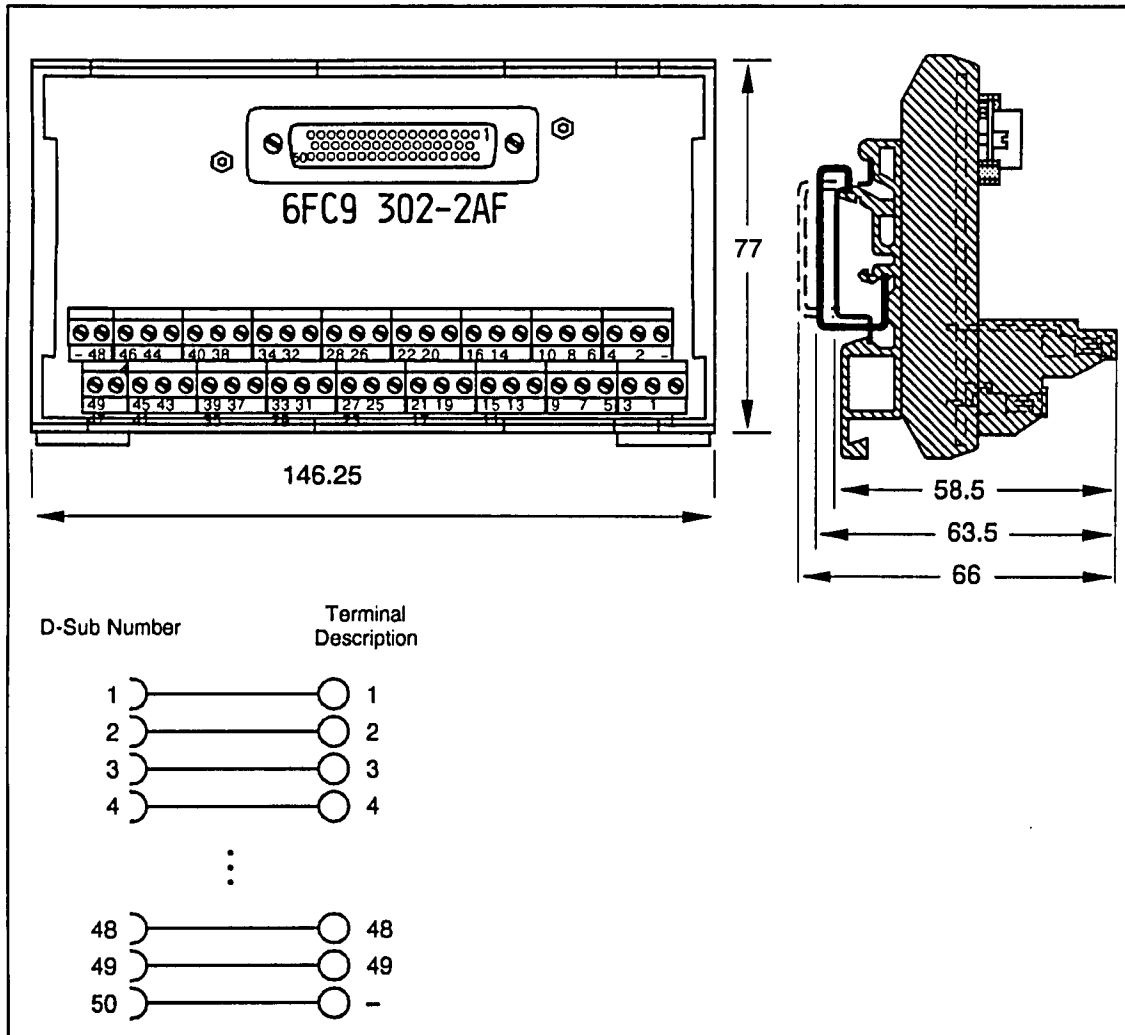
**Note:**

- Other SIMATIC boards of the U peripherals may be used (see chapter SINUMERIK 805 SM with EU).
- The SIMATIC I/O boards are also used in the PLC controls series AG 135U, AG 150U and AG 155U.
- For the description of the individual SIMATIC boards refer to the corresponding operating manual.

### 3.5 Terminal Strip Converter

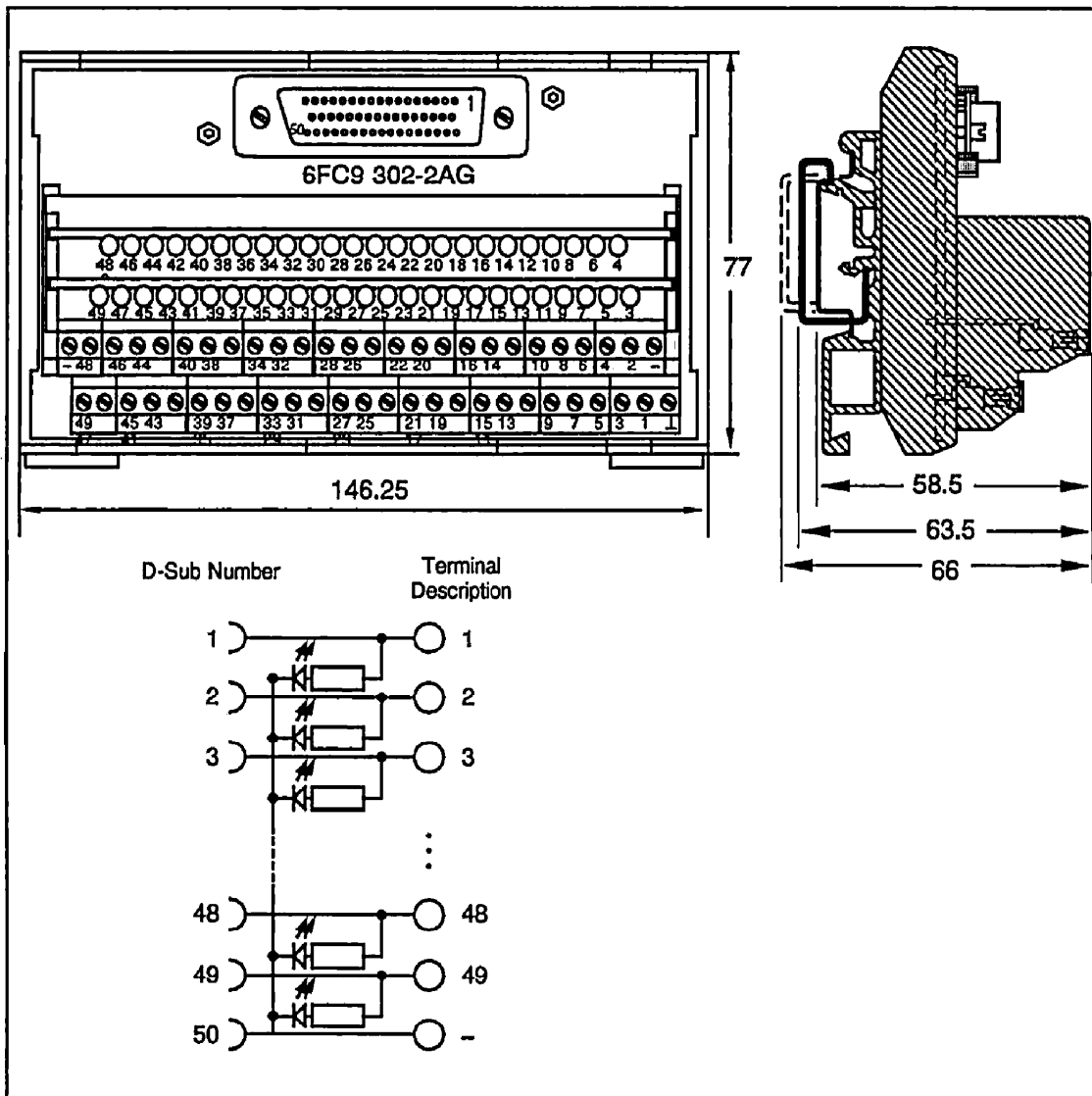
#### 3.5.1 Terminal Strip Converter w/o LED's for I/O Board with 32 Inputs/Outputs

Order Number: 6FC9 302-2AF  
 Rated Voltage/Rate Current: DC 24 V / 0.5 A  
 Number of Conductors: 49  
 Admissible Environmental Temperature: -20°C to +50°C  
 Connector Type: D-Sub, 50 Pin, Female / Screw Terminals  
 Wire Cross-Section: 1.5 mm<sup>2</sup> (at Screw Terminals)  
 Snap Socket: TS 32/TS 35  
 Color: RAL 7032



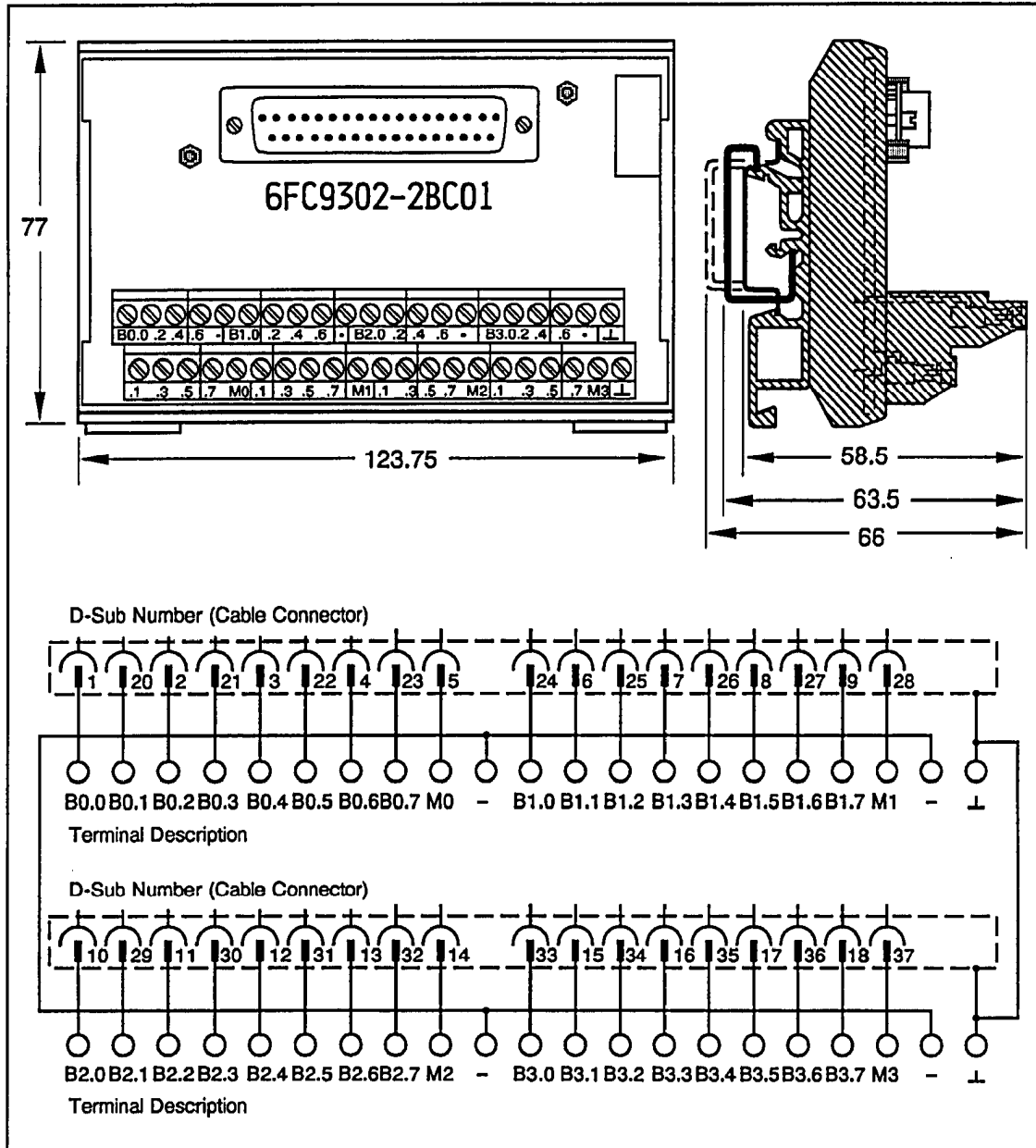
### 3.5.2 Terminal Strip Converter with LED's for I/O Board with 32 Inputs/Outputs

Order Number	6FC9 302-2AG
Rated Voltage/Rated Current:	DC 24 V / 0.5 A
Number of Conductors:	49
Admissible Environmental Temperature:	-20° to +50°C
Durrent Consumption LED:	approx. 2 mA
Connector Type:	D-Sub, 50 Pin, Female / Screw Terminals
Wire Cross-Section:	1.5 mm <sup>2</sup> (at Screw Terminals)
Snap Socket:	TS 32/TS 35
Color:	RAL 7032



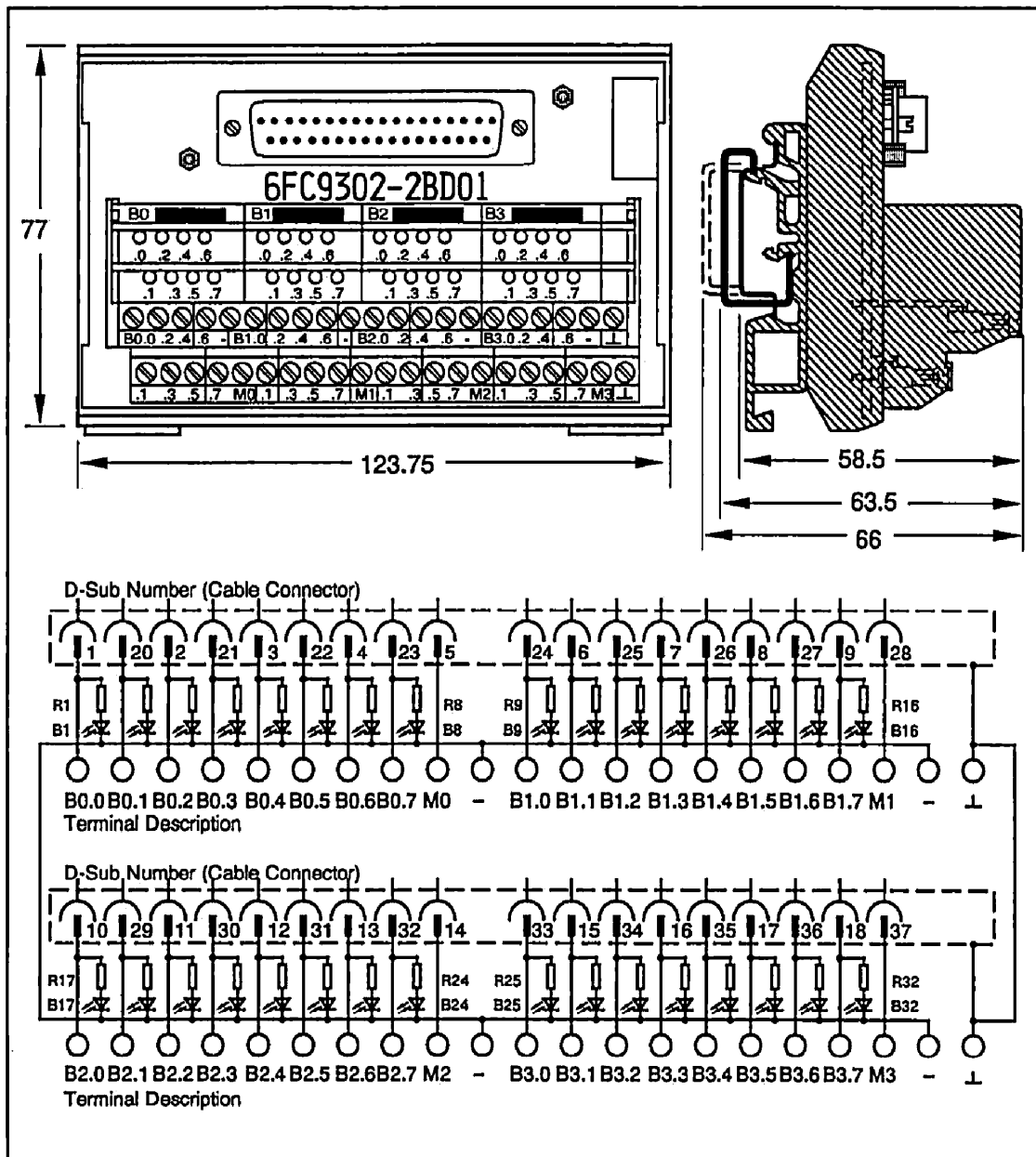
### 3.5.3 Terminal Strip Converter w/o LED's for Input Board (64 Inputs) and Mixed I/O Board (16 Inputs/Outputs, 4 A analogue)

Order Number:	6FC9 302-2BC01
Rated Voltage/Rated Current:	DC 24 V/0.5 A (x 37 Terminals)
Number of Conductors:	37
Connector Type:	D-Sub, 37 Pin, Male / Screw Terminals
Wire Cross-Section:	1.5 mm <sup>2</sup> (at Screw Terminals)
Snap Socket:	TS 32/TS 35
Color:	RAL 7032



### 3.5.4 Terminal Strip Converter with LED's for Input Board (64 Inputs) and Mixed I/O Board (16 Inputs/Outputs, 4 A analoge)

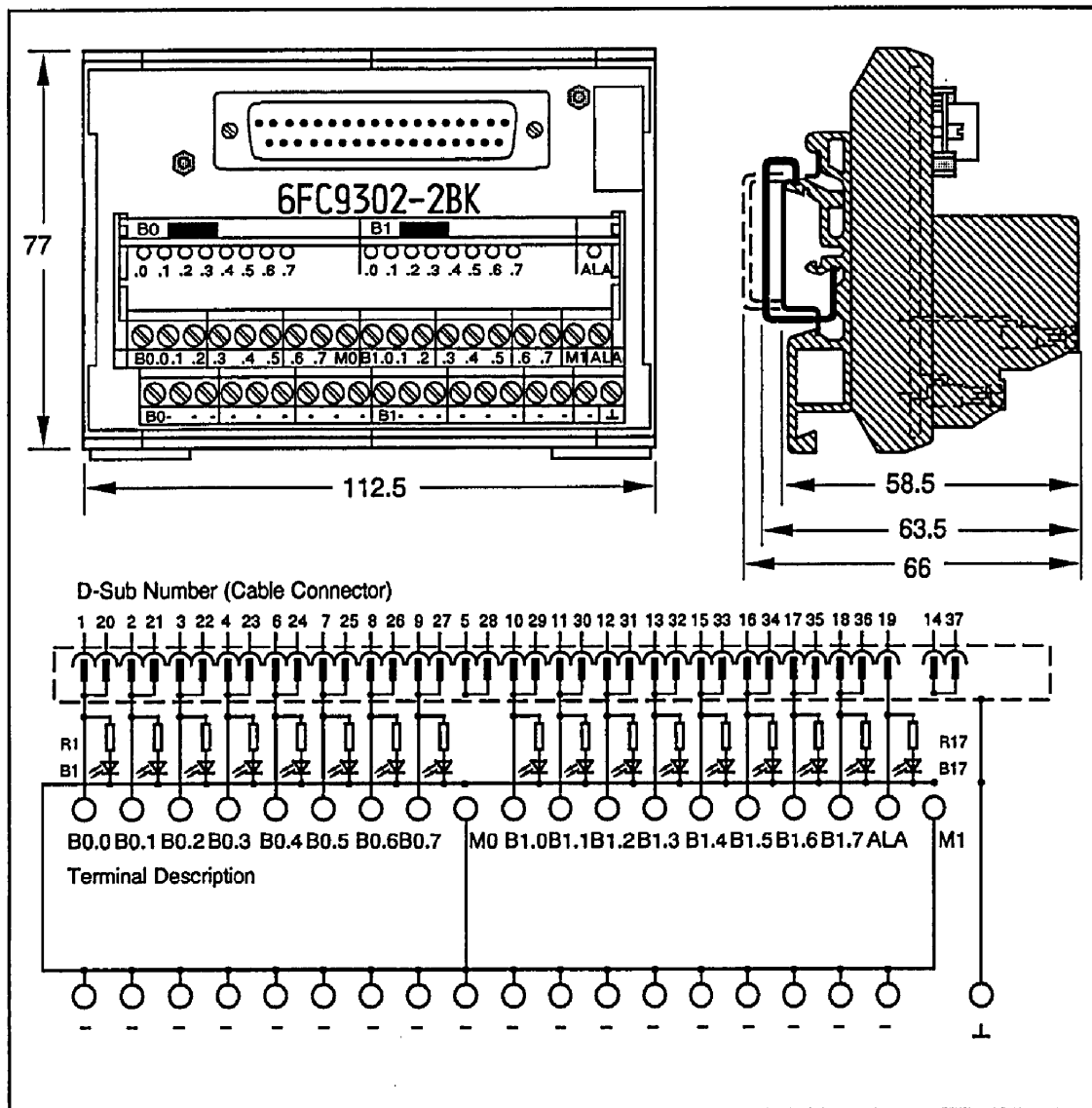
Order Number:	6FC9 302-2BD01
Rated Voltage/Rated Current:	DC 24 V/0.5 A (x 37 Terminals)
Number of Conductors:	37
LED Indicator, green:	37 pcs., (Plug-In Type, Service Friendly)
LED Current:	approx. 5 mA
Connector Type:	D-Sub, 37 Pin, Male / Screw Terminals
Wire Cross-Section:	1.5 mm <sup>2</sup> (at Screw Terminals)
Snap Socket:	TS 32/TS 35
Color:	RAL 7032





### 3.5.5 Terminal Strip Converter with LED's for Output Board (32 A)

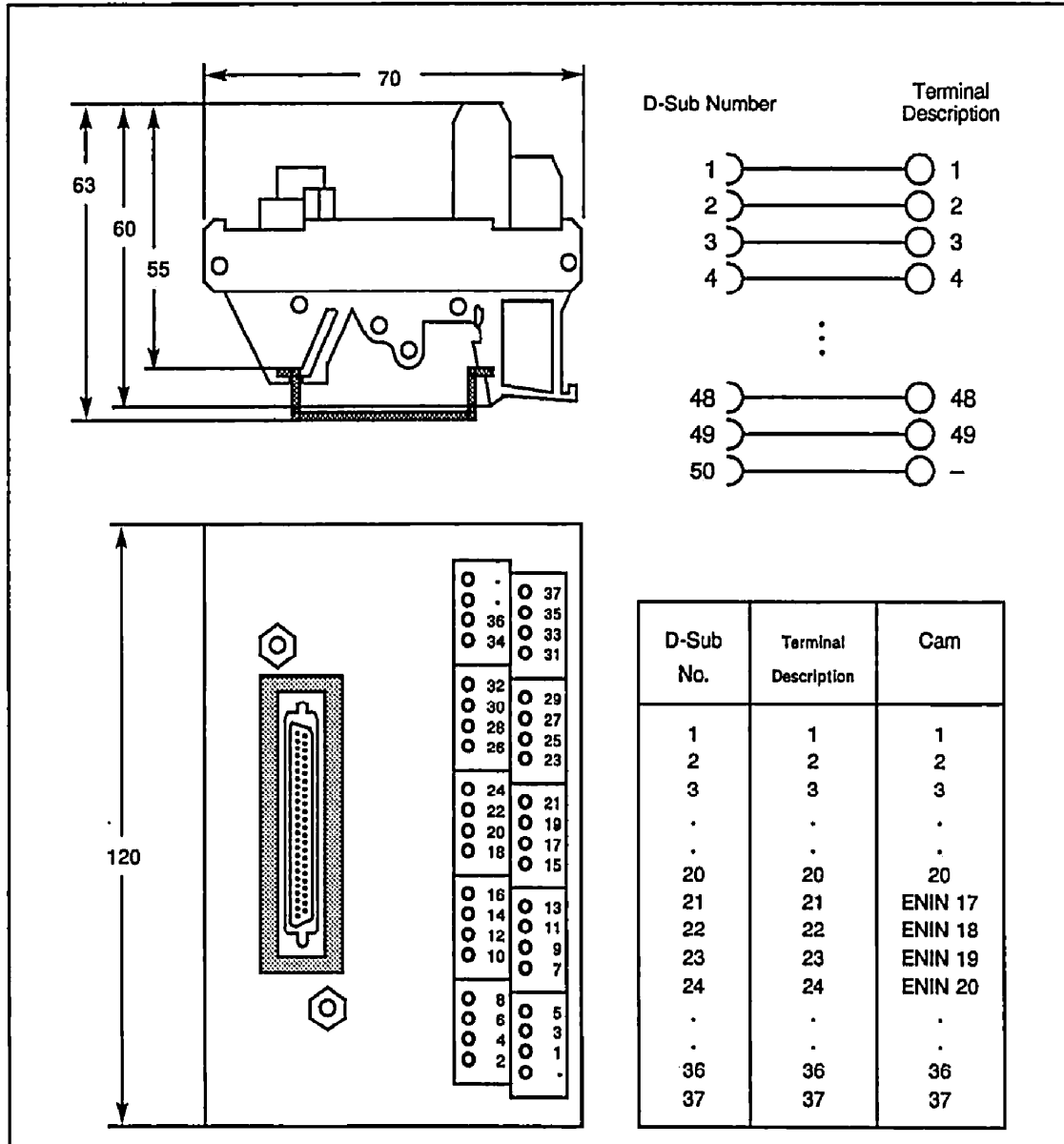
Order Number:	6FC9 302-2BK21
Rated Voltage/Rated Current:	DC 24 V/2 A (x 16 Terminals)
Number of Conductors:	16
LED Indicator, green:	16 pcs.
LED Current:	5 mA
Connector Type:	D-Sub, 37 Pin, Male / Screw Terminals
Wire Cross-Section:	1.5 mm <sup>2</sup> (at Screw Terminals)
Snap Socket:	TS 32/TS 35
Color:	RAL 7032



### 3.6 Distributors

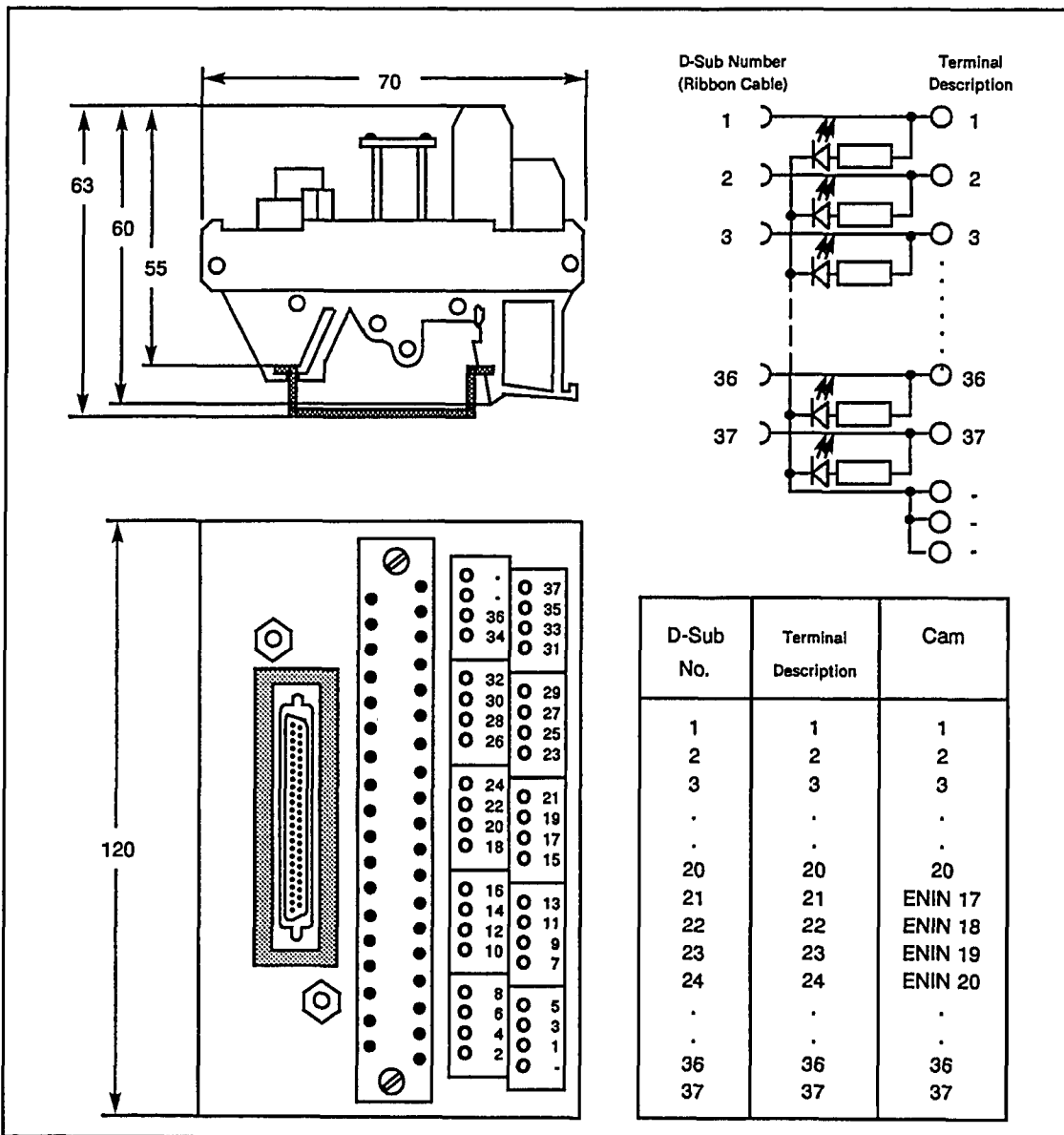
#### 3.6.1 Cam Distributor without LED's

Order Number	6FM1 590-5BA00
Rated Voltage/Rated Current:	DC 24 V/0.5 A (x 37 Terminals)
Number of Conductors:	37
Connector Type:	D-Sub, 37 Pin, Male
Wire Cross-Section:	1.5 mm <sup>2</sup> (Screw Terminals)
Snap Socket:	TS 32/TS 35
Colour of snap socket and terminals:	RAL 7032



### 3.6.2 Cam Distributor with LED's

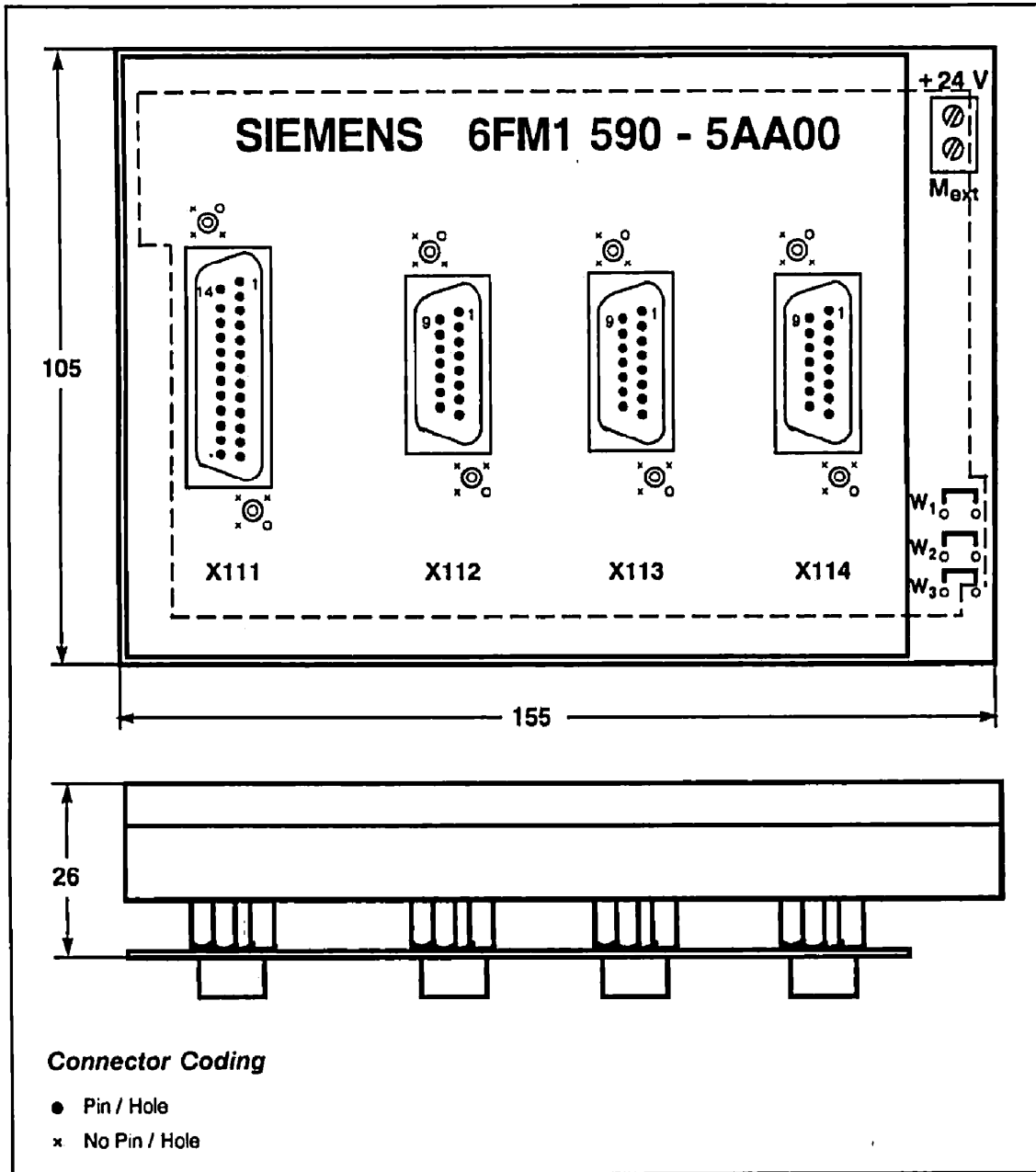
Order Number	6FM1 590-5BB00
Rated Voltage/Rated Current:	DC 24 V/0.5 A (x 37 Terminal)
Number of Conductors:	37
LED Indicator, green:	37pcs. (Plug-In Type, Service Friendly)
LED Current:	approx. 5 mA
Connector Type:	D-Sub, 37 Pin, Male / Screw Terminals
Wire Cross-Section:	1.5 mm <sup>2</sup> (at Screw Terminals)
Label:	SIEMENS 6FC9 302-AD
Snap Socket:	TS 32/TS 35



### 3.6.3 Actual Value Distributor

Order Number:  
 Rated Voltage:  
 Connector Type:  
 Label:  
 Snap Socket:

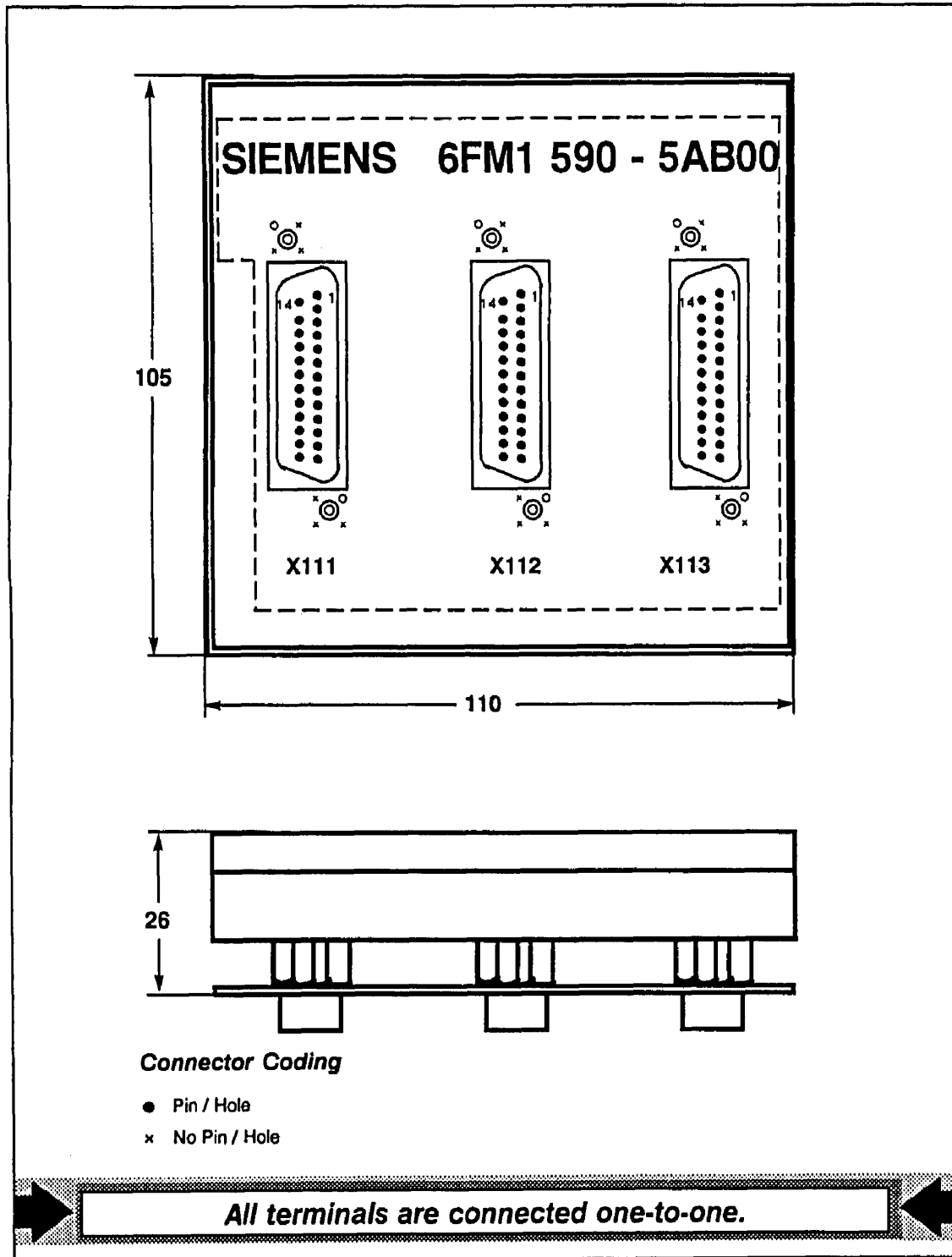
6FM1 590-5AA00  
 24 V-  
 D-Sub, Female / Screw Terminals  
 SIEMENS 6FM 1590-5AA00  
 TS 35



### 3.6.4 Distributor for Multi-Encoder Feedback

Order Number:  
 Connector Type:  
 Label:  
 Snap Socket:

6FM1 590-5AB00  
 D-Sub, Female  
 SIEMENS 6FM 1590-5AB00  
 TS 35

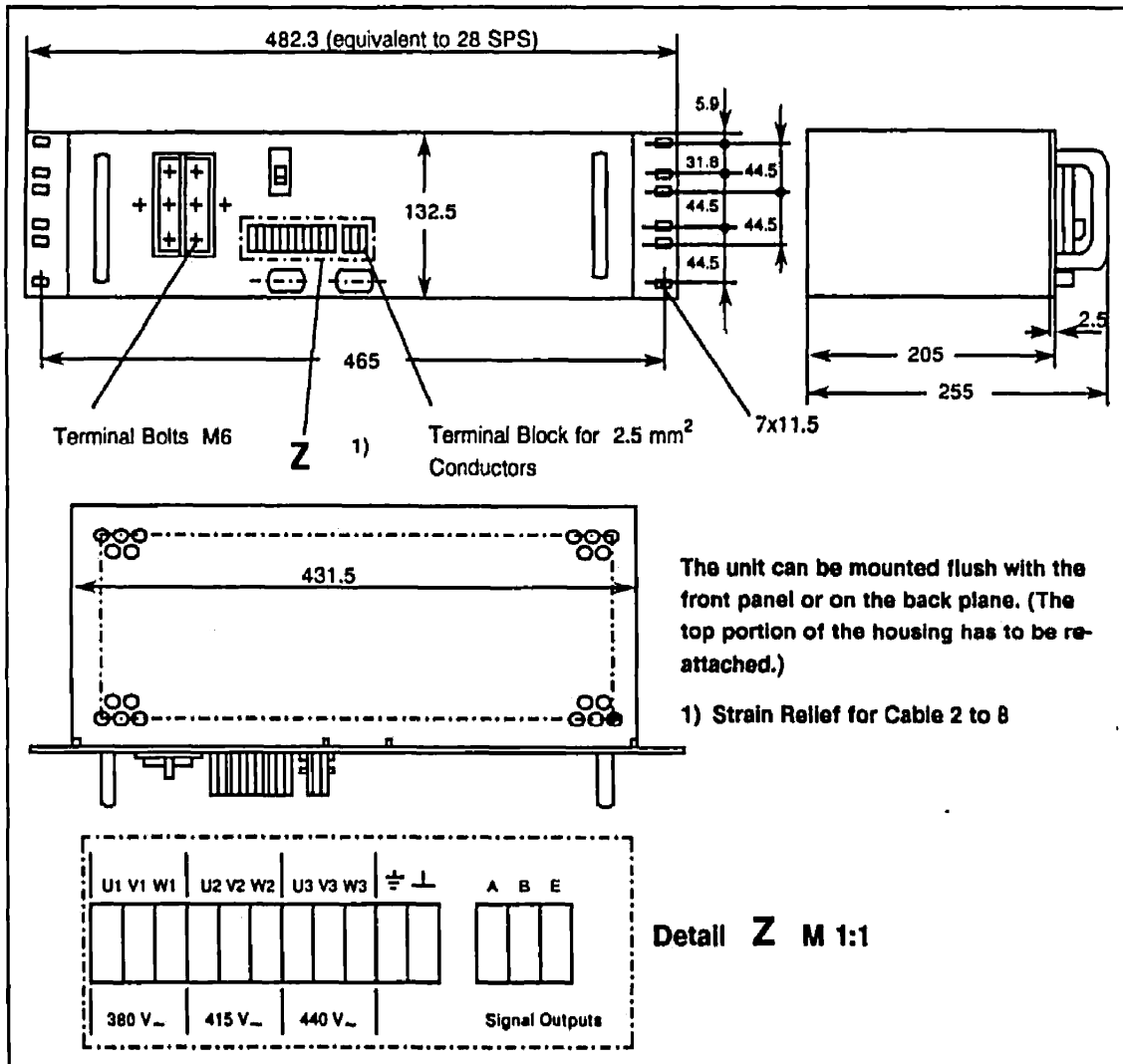


# 4 External Devices

## 4.1 Power Supply Unit

Order No.: 6FC9 304-0AC for 20 A  
 Type: 6EV1 352-5BK  
 Primary Voltage: 380 V / 415 V / 440 V AC, 3 Phase  
 Secondary Voltage: 24 V DC/20 A

Order No.: 6FC9 304-0AD for 40 A  
 Type: 6EV1 362-5BK  
 Primary Voltage: 380 V / 415 V / 440 V AC, 3 Phase  
 Secondary Voltage: 24 V DC / 40 A



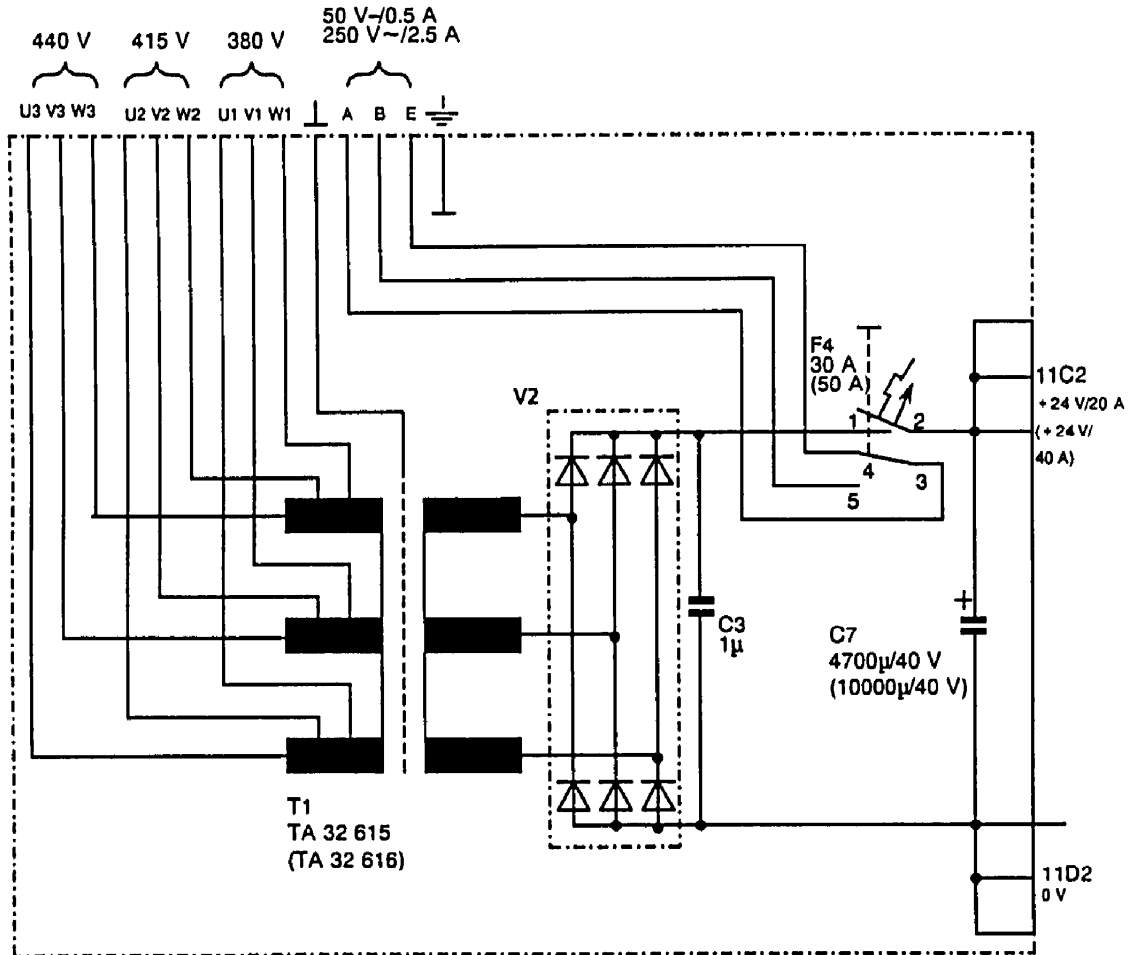
### Connecting of the Power Supply Units

380 V / 415 V / 440 V~ / 24 V-

Rated output currents 20 A and 40 A

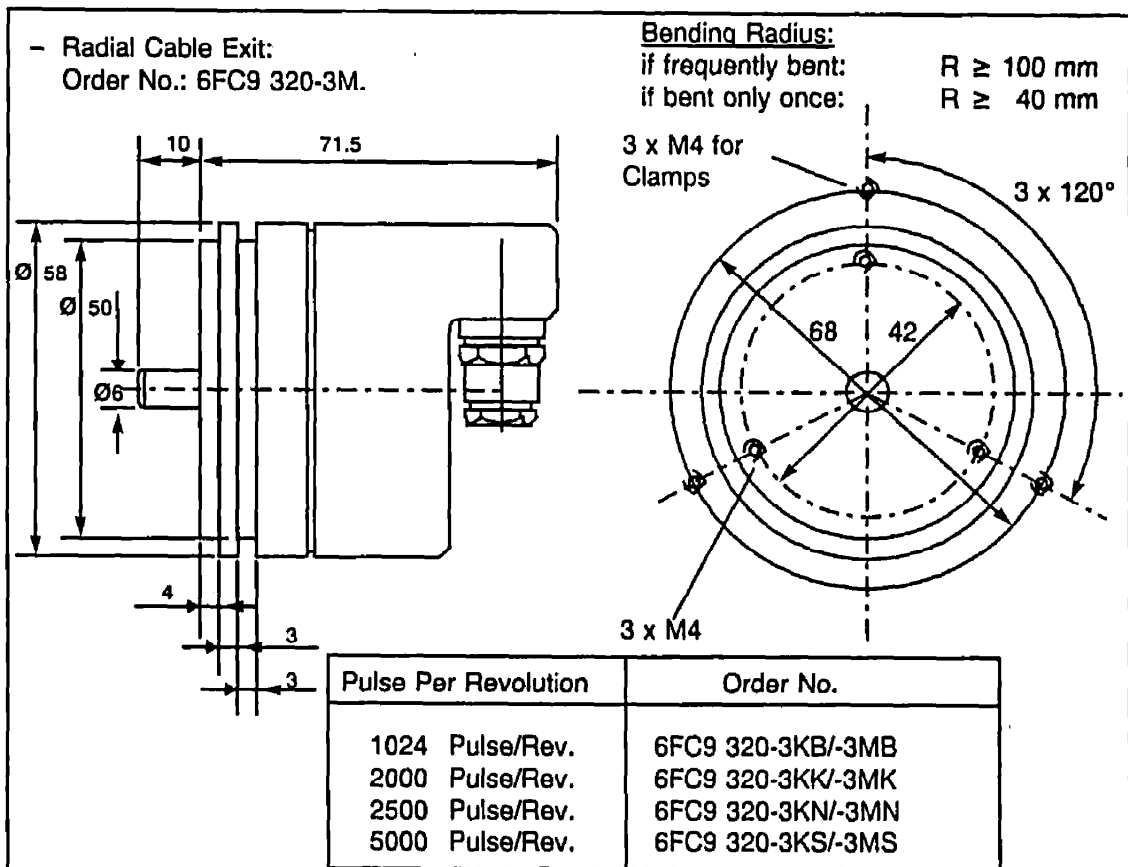
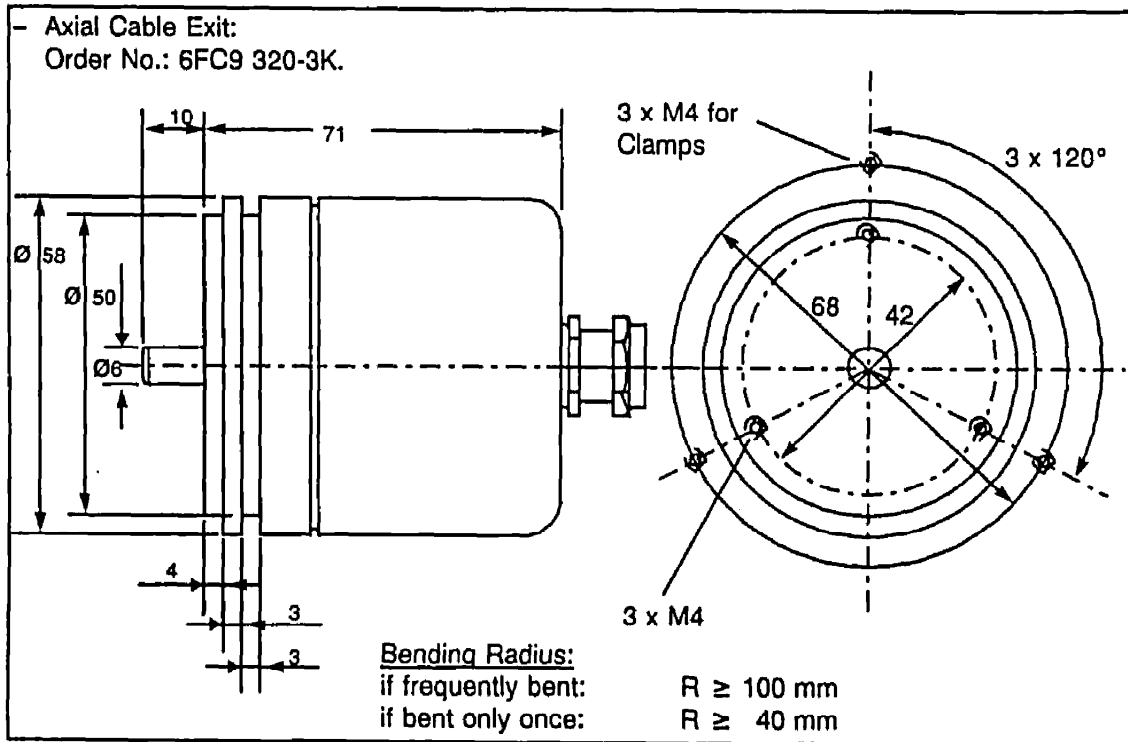
380 V / 415 V / 440 V AC, 3 Phase, Wye,  $\Delta$  3 ~ 50 Hz

Type: 20 A (40 A)



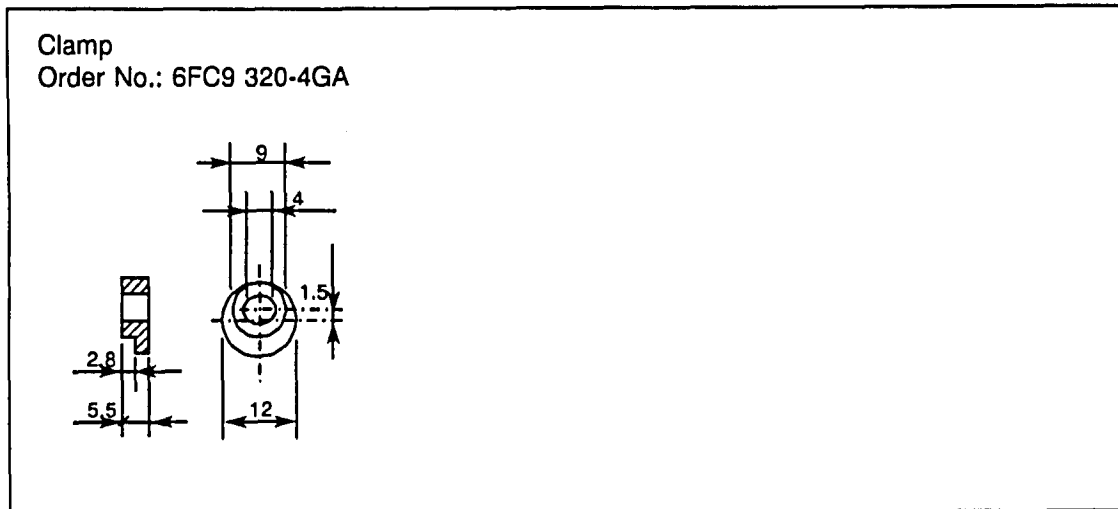
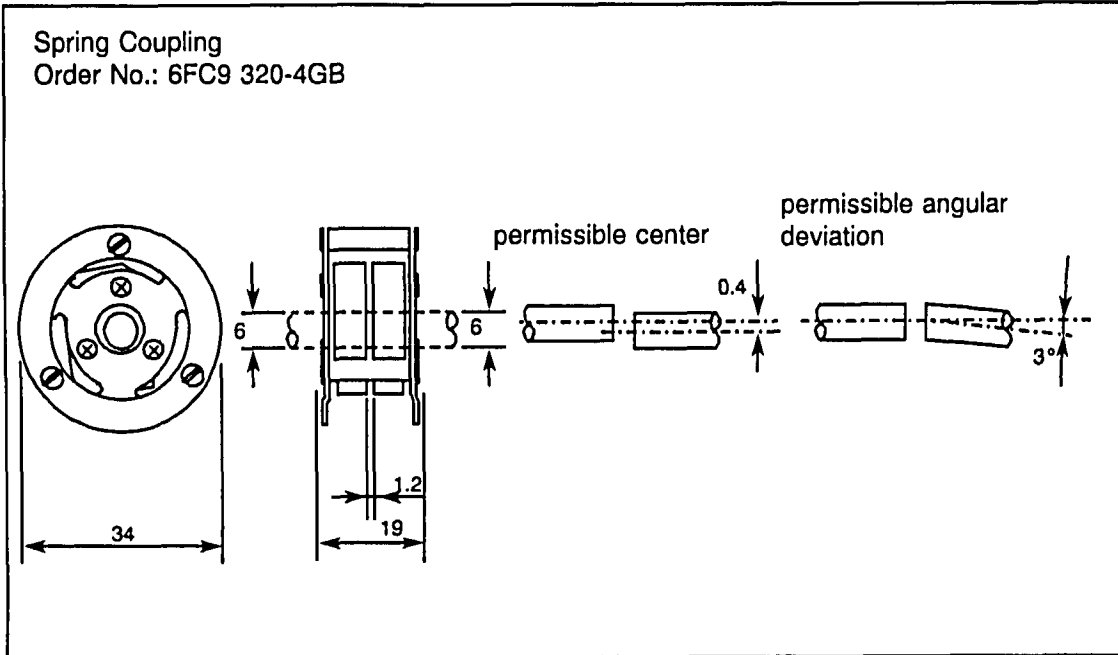
## 4.2 Incremental Encoders

### 4.2.1 Rotary Encoders

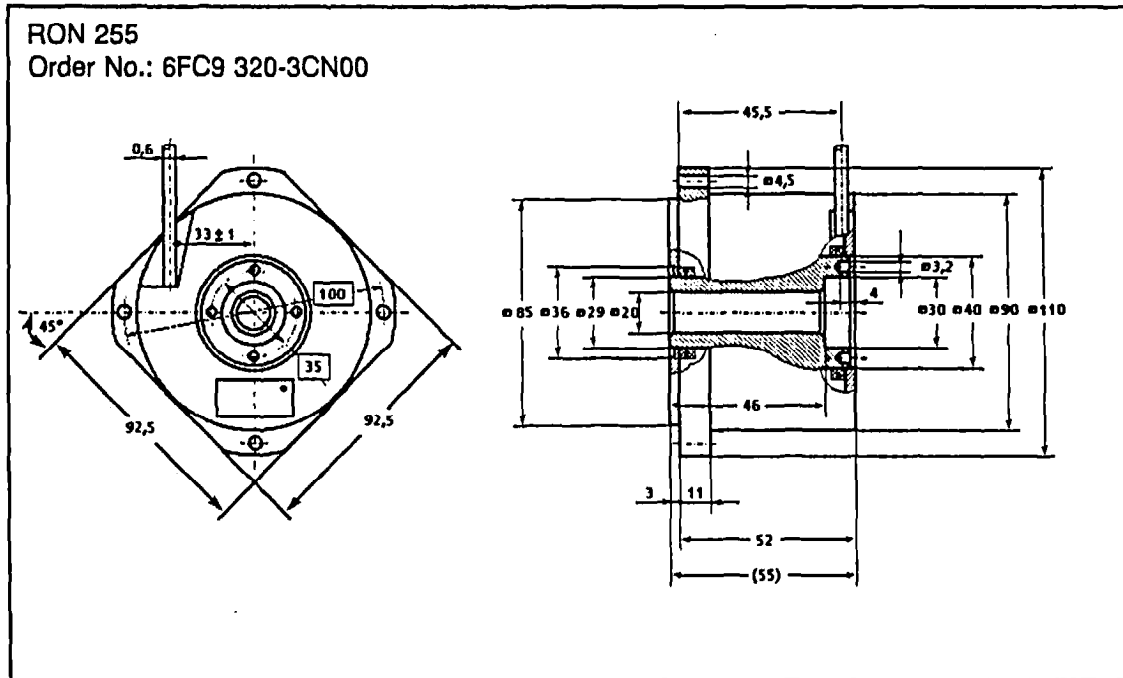
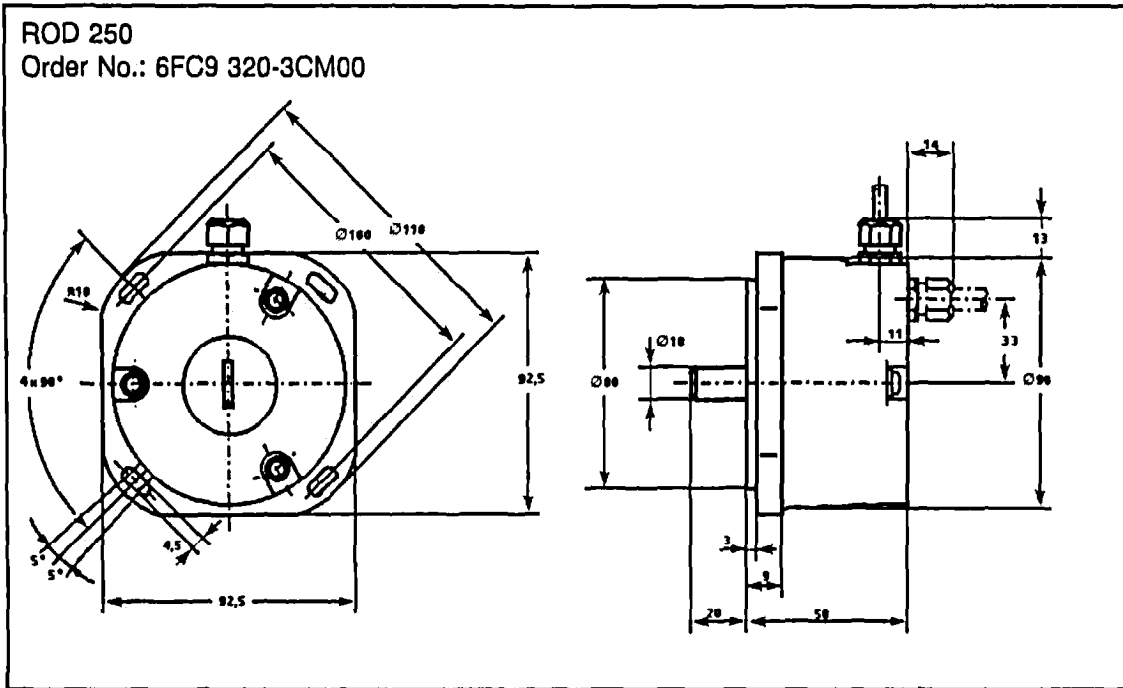




### 4.2.2 Spring Coupling and Clamp



### 4.2.3 High-Resolution Rotary Encoders for Rotary Axes



## 4.3 Data for the Peripheral Units

### 4.3.1 Interface Parameters for Peripheral Units

In order to transfer data to and from an external unit, the data interface of the SINUMERIK 805SM-P has to be programmed for the communication with the particular unit. The table below shows the interface parameters to be set for different peripheral units:

Peripheral Unit Parameter	Siemens Prog.Unit PG 750/685/675 20 mA S5 PLC Interface	Siemens Prog.Unit PG 750/685/675 V.24 Print Interface	Siemens Prog.Unit PG 615 U 20 mA	Siemens Printer PT 80 V.24/20 mA	Siemens Printer PT 88 V.24
UNIT TYPE	PLC-PROG	RTS-LINE	PLC-PROG.	RTS-LINE	RTS-LINE
BAUD RATE	9600	9600	9600	300	9600
DATA BITS	8	8	8	8	8
STOP BITS	2	2	2	2	2
PARITY	NONE	NONE	NONE	NONE	NONE
X <sub>ON</sub>					
X <sub>OFF</sub>					
EIA Code for @					
EIA Code for:					
EIA Code for =					
EIA Code for Transm. End		03		03	03
Start w. X <sub>ON</sub>					
Program Start w. LF					
Block End w. CRLF		X		X	X
Output in E/A Code					
Stop at Transmission End Character		X		X	X
DSR Signal Evaluation					
Leading/Trailing End		X		X	X
Program from System 3/8					
REORG via Interface		X		X	X
Time Monitoring		X		X	X

X = Parameter is active

Parameter \ Peripheral Unit	Siemens Workstation PD., PG V.24	SINUMERIK System 800 NC-NC Coupl. V.24	Teletype ASR 33 Full-Duplex	Sanyo-Cassette M2502V-ZE-601 V.24
UNIT TYPE	PD/PF	RTS-LINE	RTS-LINE	RTS-LINE
BAUD RATE	4800	9600	110	1200
DATA BITS	8	8	8	8
STOP BITS	2	2	2	1
PARITY	NONE	NONE	NONE	NONE
X <sub>ON</sub>	11			
X <sub>OFF</sub>	93			
EIA Code for @				
EIA Code for:				
EIA Code for =				
EIA Code for Transmission End Character				
Start w. X <sub>ON</sub>				
Program Start w. LF				
Block End w. CRLF		X		
Output in EIA Code				
Stop at Transmission End Character				
DSR Signal Evaluation				
Leading/Trailing End				
Programm von System 3/8				
REORG via Interface				
Time Monitoring				

Peripheral Unit Parameter	Facit 4040, 4042 Tape Reader/Puncher V.24	Facit 4030 Tape Reader V.24	Sommer-Terminal MDE-3 SNC Cassette Recorder V.24
UNIT TYPE	RTS-LINE	RTS-LINE	RTS-LINE
BAUD RATE	1200	1200	9600
DATA BITS	8	8	8
STOP BITS	2	2	2
PARITY	NONE	NONE	NONE
XON			
XOFF			
EIA Code for @			
EIA Code for:			
EIA Code for =			
EIA Code for Transm. End			
Start w. XON			
Program Start w. LF			
Block End w. CRLF			
Output in EIA Code			
Stop at Transmission End Character			
DSR Signal Evaluation			
Leading/Trailing End			
Program from System 3/8			
REORG via Interface			
Time Monitoring			

### 4.3.2 Technical Interfacing Data

#### Siemens Programmer PG 730/750/685/675

##### Interface AG S5

Cable Order No.: 6FC9340-8G

##### Technical data

Interface: current loop  
20 mA  
Transmission ratio: 9600 bauds  
Character format: 1 startbit,  
8 data  
1 parity bit (even  
parity),  
2 stop bits

#### Siemens Programmer PG 615 U with PG 615 Adaptor and power supply unit

##### Interface AG

Cable Order No.: 6FC9340-8H.

##### Technical data

Interface current loop 20 mA  
Transmission ratio 9600 bauds  
Character format 1 start bit  
8 data bit

#### Siemens Programmer PG 685/675

##### Interface Printer

Cable Order No.: 6FC9344-1A.

##### Technical data

Interface V.24  
Transmission ratio 1200 bauds  
Character format 1 start bit  
8 data bits  
2 stop bits

##### Operating conditions

For the PLC programming the programmer PG 730/750/685/675/670 is directly connected to interface 1 (20 mA current loop interface) of the SINUMERIK 805SM. For the filing of cycles and part programs on disk or transfer to and from the NC as well as the generation of programs the PG 685/675 is connected to a V.24 interface of the NC via the interface printer, the PG 730/750 is connected to a V.24 interface via the interface COM1 or COM2.

#### Siemens Programmer PG 730/750

##### Interface COM1

Cable Order No.: 6FC9 344-4R

or

##### Interface COM2

Cable Order No.: 6FC9 344-4H

##### Technical data

Interface V.24  
Transmission ratio 9600 bauds  
Character format 1 start bit  
8 data bits  
2 stop bits

**Siemens Page Printer PT80**

Cable Order No.: 6FC9340-8C.  
(V.24)  
6FC9340-8T.  
(20 mA)

**Technical data**

Transmission ratio 300 bauds  
Character format 1 start bit  
8 data bits  
2 stop bits

Order No. for PT80 according to  
SINUMERIK specification:

V.24 vers.: L22751-A80-D442  
(Interface STT104)

20 mA vers.: L22751-A80-D441  
(Interface  
STT104 + LAT101)

Additional cable for  
clamping terminal:  
6FC9340-4KA

With the 20 mA interface unit a NC-  
controlled reading operation is possible.

**Siemens Printer PT88**

Cable Order No.: 6FC9340-8D.

**Technical data**

Interface adaptation SAP-S1  
(V.24)

**Setting the mode switch****Switch S1**

1	2	3	4	5	6
ON	ON	ON	OFF	OFF	OFF

(with this setting the printer has a  
transmission ratio of 9600 bauds)

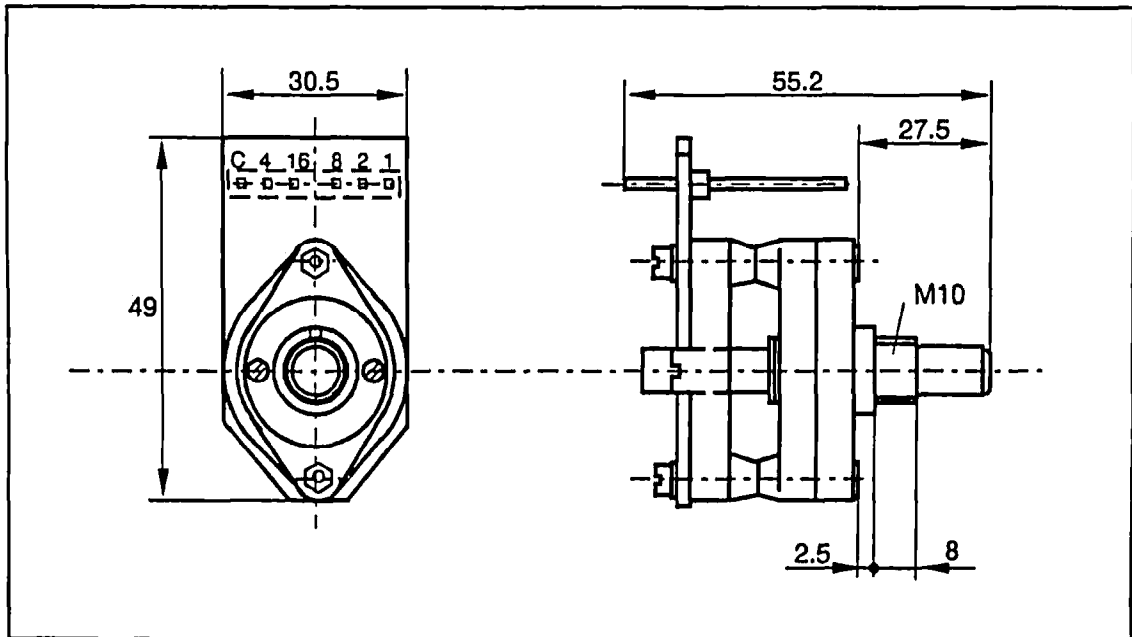
**Switch S2**

1	2	3	4	5	6
OFF	ON	OFF	ON	OFF	ON

(this setting means:  
Line BUSY (X2.10) connected to  
Line BUSY (X1.25)  
and negative potential)

## 4.4 Components for the Customer Control Panel

### 4.4.1 Coded Selector Switch



Applicable in the Customer Control Panel as ...	Positions		Switch Angle	Order Number
	available	used		
Mode Selector Switch	16	13	15°	6FC9 301-0AE
Axis Selector Switch	8	5	30°	6FC9 301-0DC

The OEM can use these switches for custom operator panels.

The engravings for the switches have to be made by the OEM.



#### 4.4.2 Mode Selector Switch Codes

Order Number: 6FC9 301-0AE

The mode selector switch on the custom operator panel provides the following codes (Gray Code) depending on the position of the switch:

Position	Code			
	8	4	2	1
1	0	0	0	1
2	0	0	1	1
3	0	0	1	0
4	0	1	1	0
5	0	1	1	1
6	0	1	0	1
7	0	1	0	0
8	1	1	0	0
9	1	1	0	1
10	1	1	1	1
11	1	1	1	0
12	1	0	1	0
13	1	0	1	1

#### 4.4.3 Axis Selector Switch Codes

Order Number: 6FC9 301-0DC

The axis selector switch provides the following codes (Gray Code) depending on the position of the switch:

Position	Code				
	E	D	C	B	A
1	0	0	0	1	1
(Z)	0	0	0	1	0
2	0	0	1	1	0
(Z)	0	0	1	1	1
3	0	0	1	0	1
(Z)	0	0	1	0	0
4	0	1	1	0	0
(Z)	0	1	1	0	1
5	0	1	1	1	1
(Z)	0	1	1	1	0
6	0	1	0	1	0
(Z)	0	1	0	1	1
7	0	1	0	0	1
(Z)	0	1	0	0	0

(Z): In-between position of the switch; however there is an electrical contact available, the switch will not snap-in there. These in-between codes are not evaluated.

## 4.5 Cables and Connectors

The connections between the components have to be done according to the connecting instructions and by using the specified cables only.

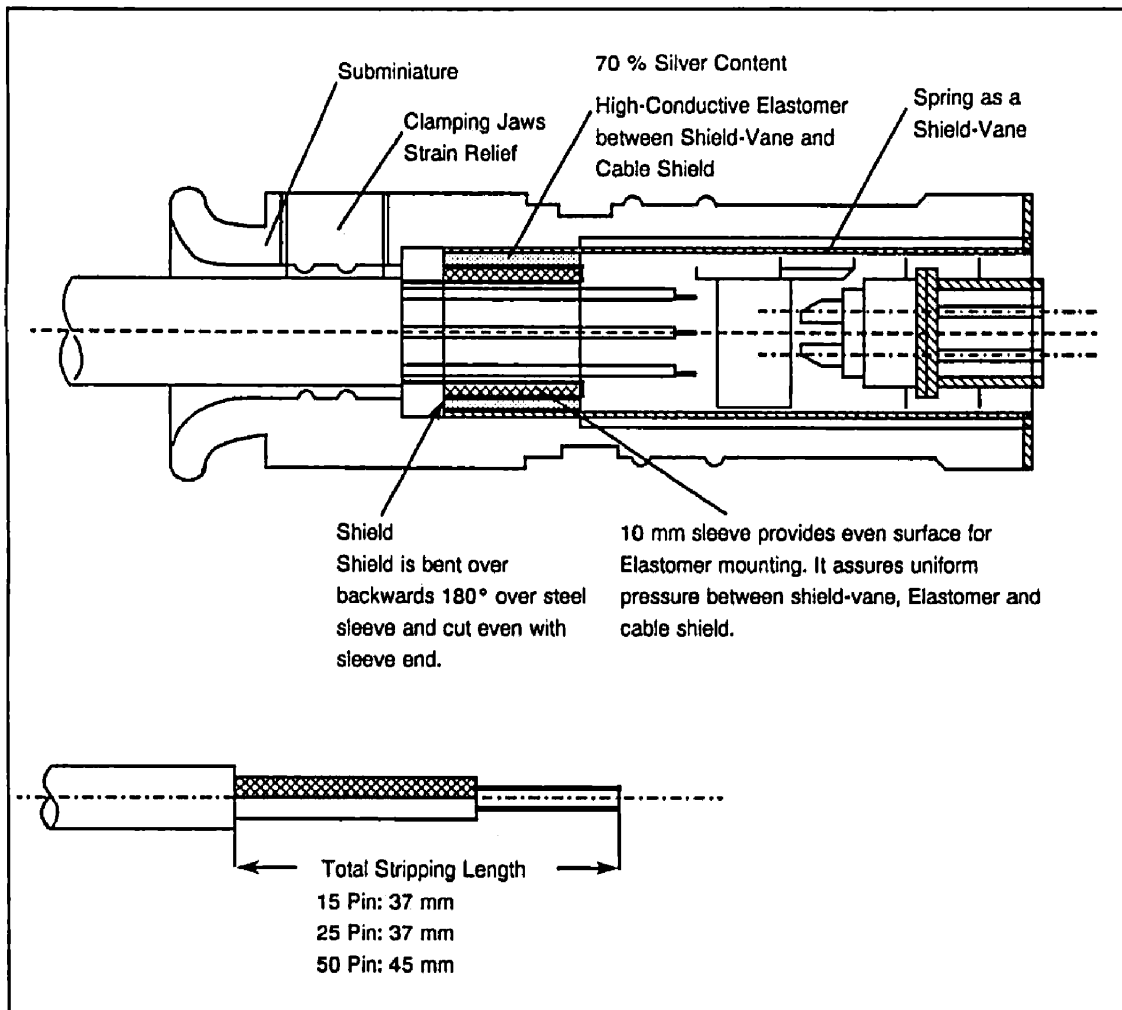
The maximal permissible cable lengths are listed in the cable overview. The cable shield is connected according to the connecting instructions for the subminiature connectors.

The cables have to be protected against mechanical damage, e.g. by using cable ducts or sheet-metal covers. The intrusion of oil, coolants, or chips have to be prevented. The power cables may not run parallel with the signal cables.

The cables not belonging to this system may not be routed through the unit.

The connectors have to be fastened to the front panels of the boards.

Connecting Instruction: Cable / Subminiature Connector , Dimensions



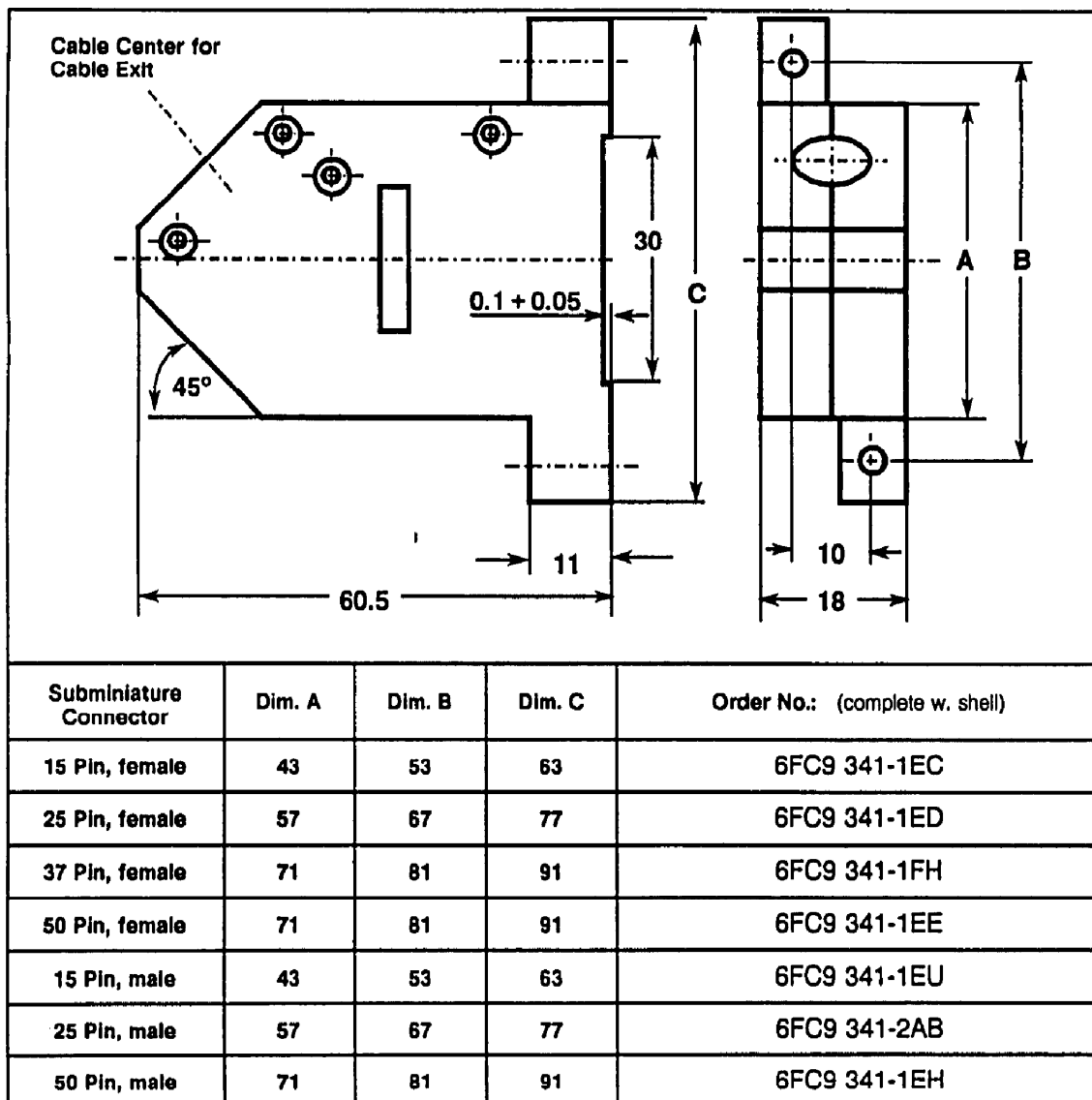
### Connector Features

1. Internationally standardized connector in 15, 25, 37 and 50 pin version with SINUMERIK specific shell.
2. Connector fastening to the front panel of the board by means of the fastening screws, secured in the shell.
3. Cable strain relief in the shell.
4. Shell coding for avoidance of plugging into wrong receptacle.
5. Perfect shield connection between cable shield and M terminals of the SINUMERIK through shield-vanes in the connector.

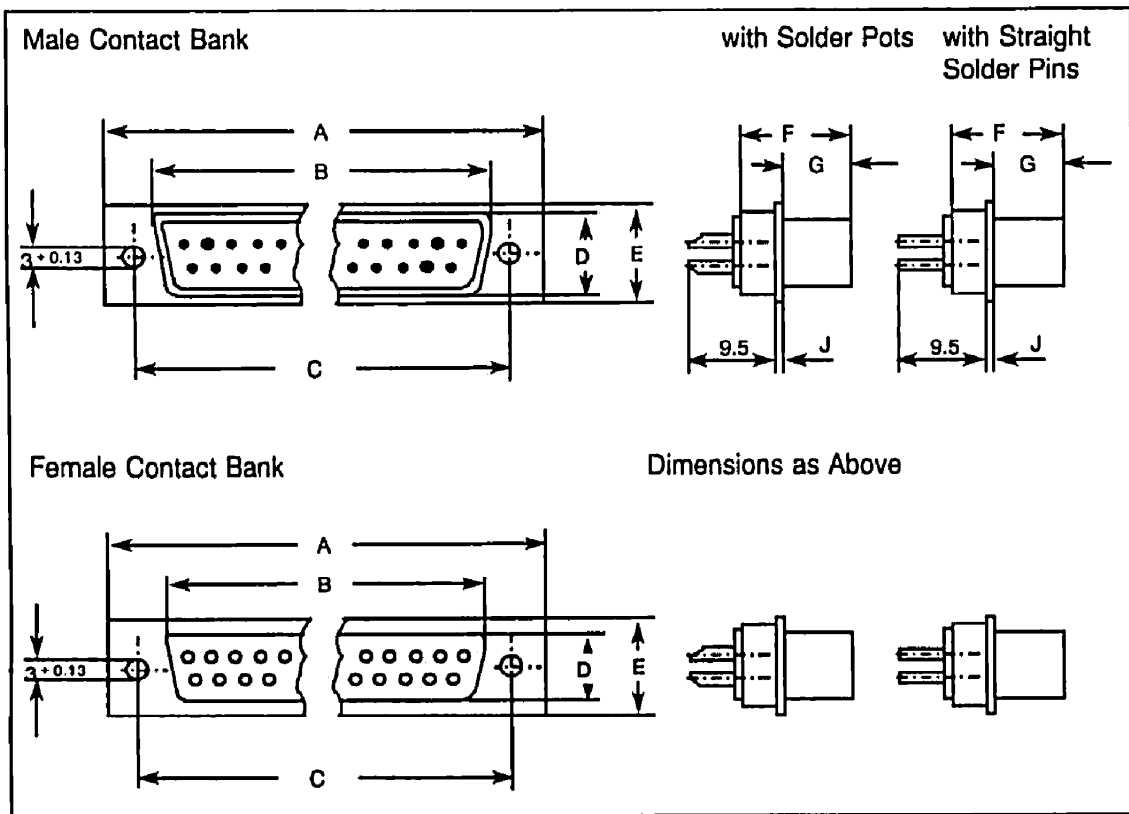
### Assembly Instructions

Since no other connector brand has all the features required, the use of the Siemens Subminiature Connector with the SINUMERIK control is necessary. If the connectors are used for manufacturing of the self-made cables, the connector assembly instructions have to be followed very thoroughly to assure the proper function.

### Subminiature Connectors with SINUMERIK Shell



**Assembly Notes**

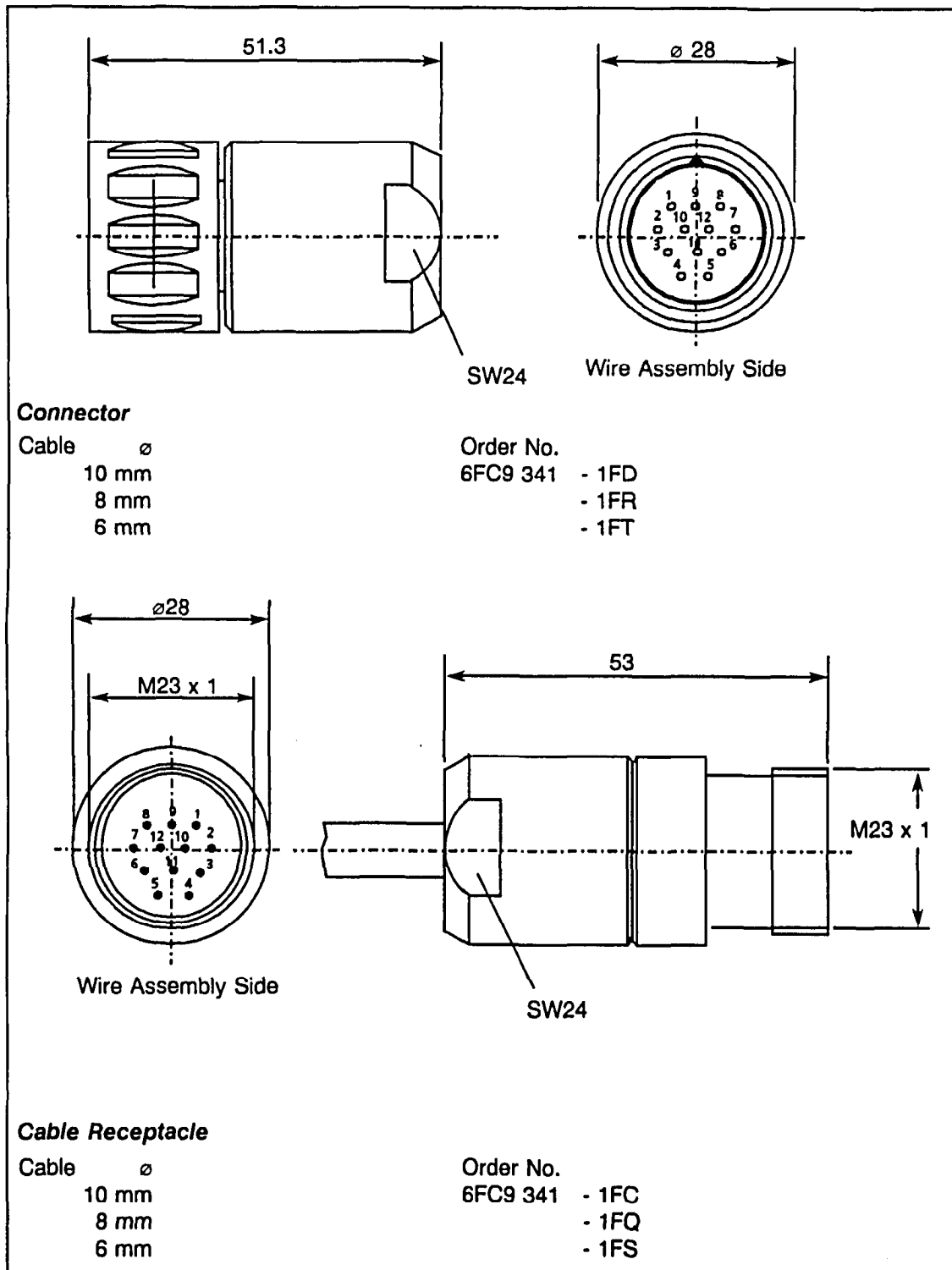


Pin No.	Contact	A in mm	B 1) in mm	C in mm	D 1) in mm	E in mm	F in mm	G in mm	J in mm
15	Male	39.1	25.2	33.3	8.4	12.5	10.8	5.9	1.0
15	Female	39.1	24.6	33.3	7.8	12.5	10.8	6.2	0.9
25	Male	53.0	38.9	47.0	8.4	12.5	10.8	5.9	1.0
25	Female	53.0	38.3	47.0	7.8	12.5	10.8	6.2	0.9
50 2)	Male	66.9	52.8	61.1	11.1	15.4	10.8	5.9	1.0
50 2)	Female	66.9	52.4	61.1	10.7	15.4	10.8	6.2	0.9

1) Dimensions are: inside at male contact bank and outside at female contact bank

2) 3 ter contact bank

**Siemens Connector for Rotary Encoders**

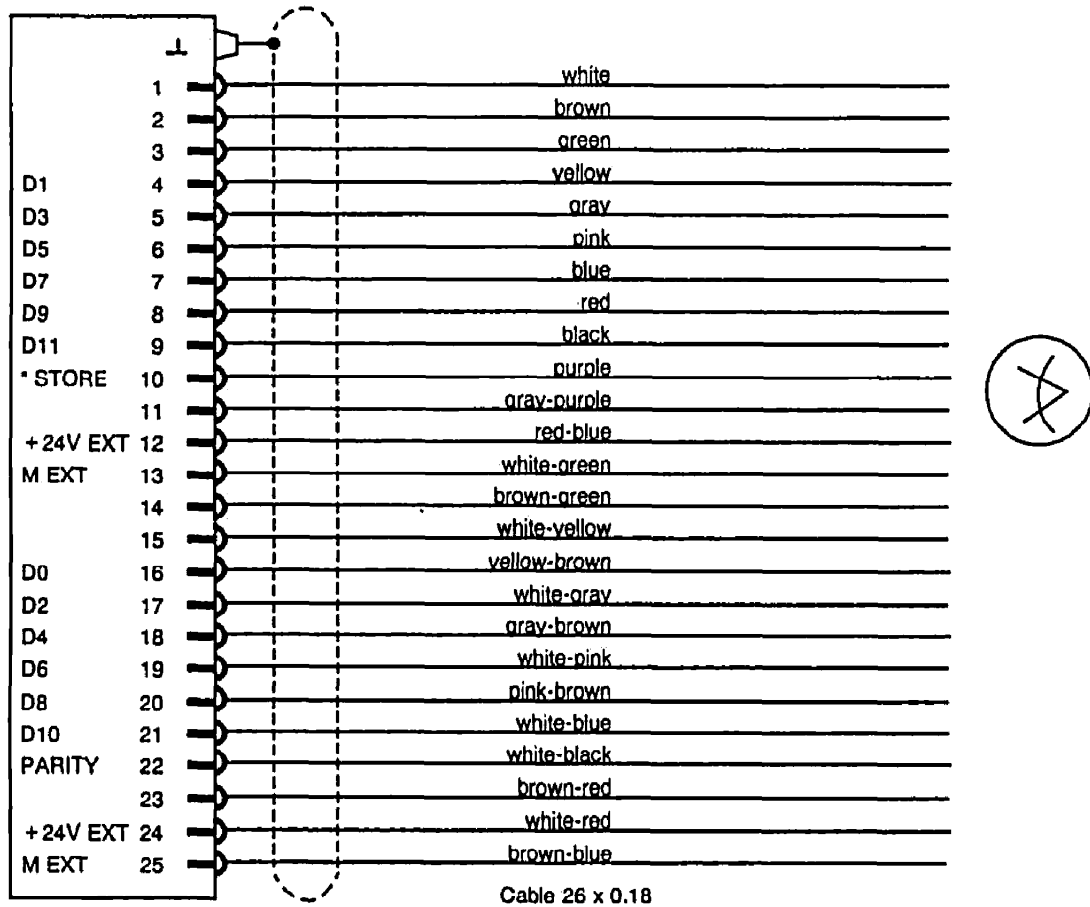


# 5 Cable Diagrams

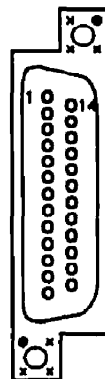
## 5.1 Cable Diagrams for Cam Controller

Cable Name: Cable from Cam Controller to Encoder, one cable end open  
 Order No.: 6FM1 590-1C□

**SINUMERIK 805SM-P** **Encoder side  
Cable end open**  
**Board** : Cam Controller  
**Connector** : X111



**Connector**  
 D-Sub  
 25 pin female  
 SINUMERIK shell  
 6FC9 341-1ED  
**Front view** →

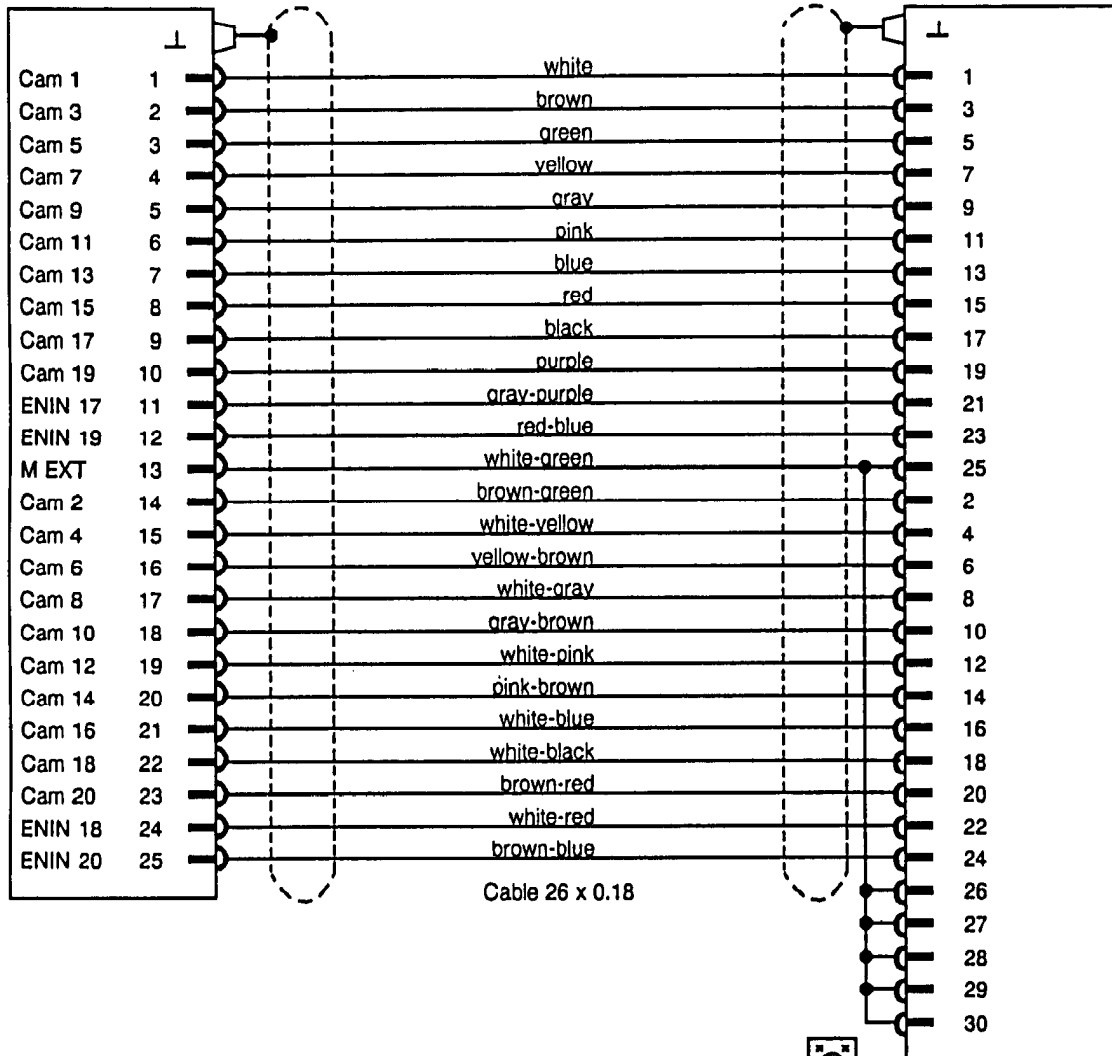


**Conn. coding**

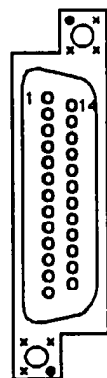
- pin / hole
- x no pin / hole

Cable Name: Cable from Cam Controller to Cam Outputs  
 Order No.: for cable to cam distributor: 6FM1 590-3A   
 for cable with one end open: 6FM1 590-3B

**SINUMERIK 805SM-P** **Cam Distributor**  
or cable end open  
**Board** : Cam Controller  
**Connector** : X121

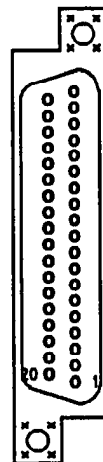


**Connector**  
 D-Sub  
 25 pin female  
 SINUMERIK shell  
 6FC9 341-1ED  
**Front view** →



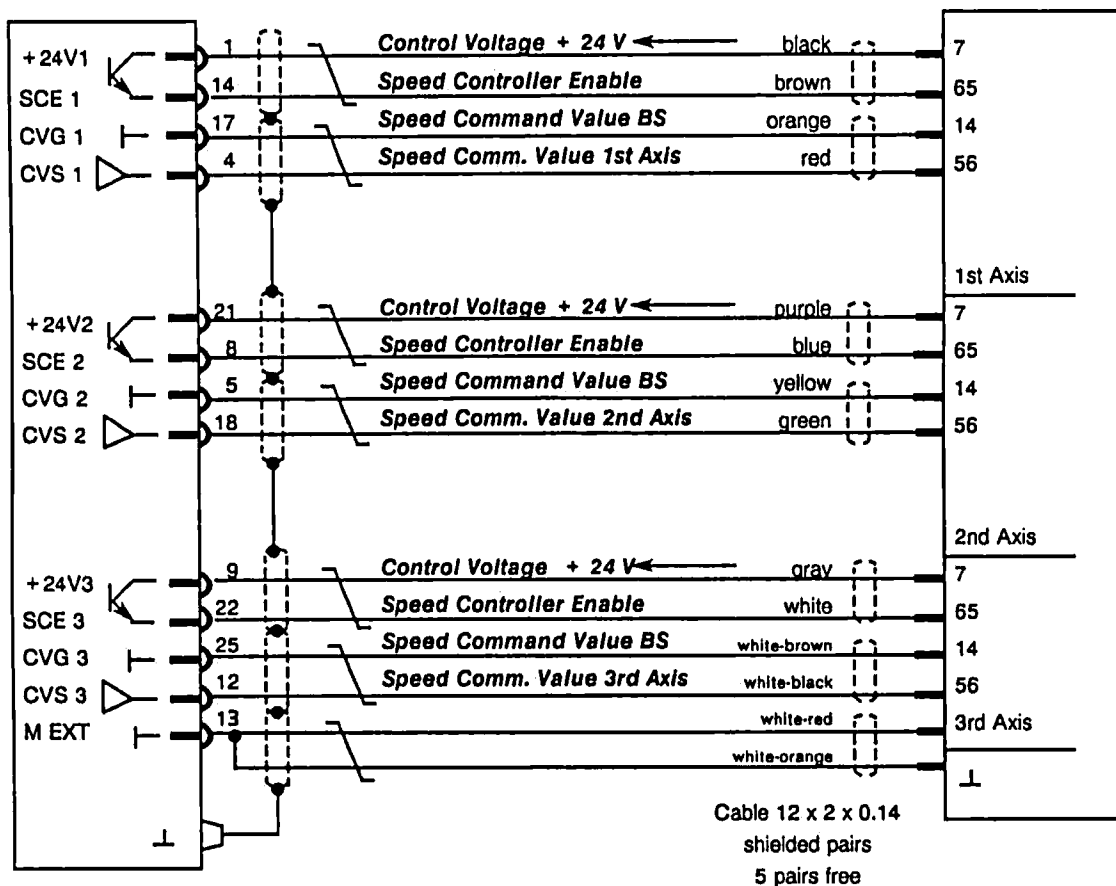
**Conn.coding**  
 ● pin / hole  
 x no pin / hole

**Connector**  
 D-Sub  
 37 pin female  
 SINUMERIK shell  
 6FC9 341-1FH  
 ← **Front view**

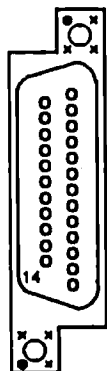


Cable Name: Cable from Command Value Module to Drive Amplifier  
 Order No.: 6FM1 590-4A□

<b>SINUMERIK 805SM-P</b>		<b>Drive Amplifier</b>
<b>Board</b>	: Comm. Val. Mod. 6FX1 132-5B	<b>SIMODRIVE</b>
<b>Connector</b>	: X111	<b>Terminals</b>



**Connector**  
 D-Sub  
 25 pin female  
 SINUMERIK shell  
 6FC9 341-1ED  
 Front view



**Conn.coding**

- pin / hole
- x no pin / hole

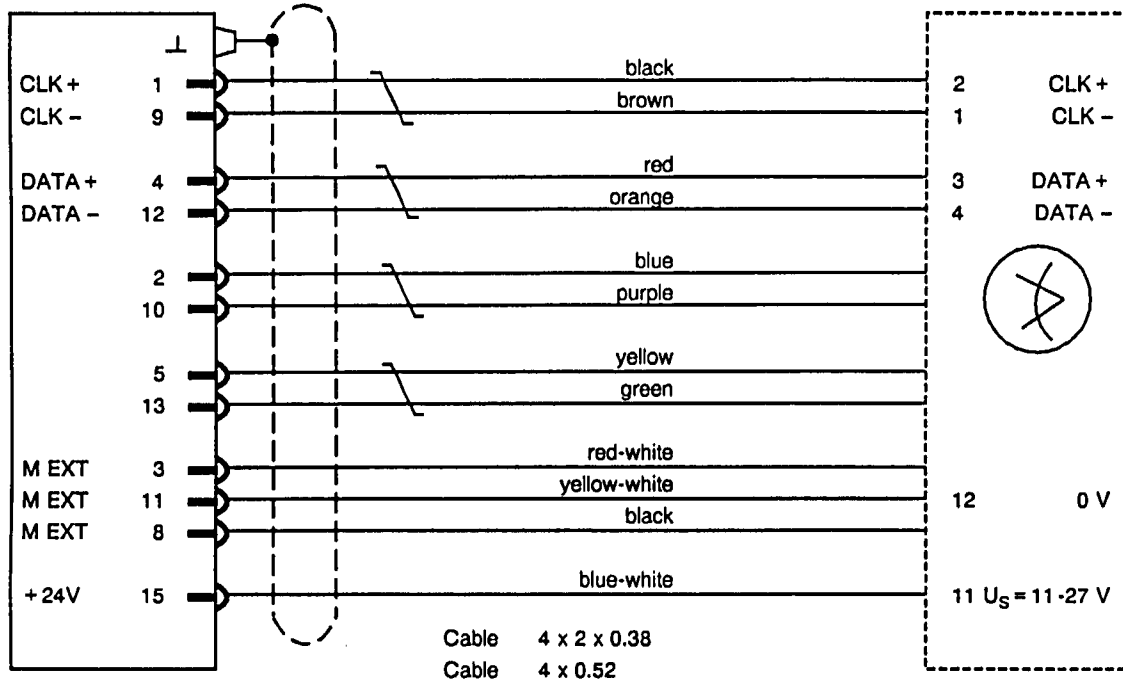
**Cable end**

400 mm outside insulator  
 stripped, 30 mm  
 conductors ends free, with  
 end terminals, wires tagged



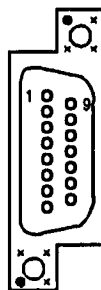
Cable Name: Cable from Actual Value Distributor to the Encoder, one cable end open  
 Order No.: 6FM1 590-2E□

**SINUMERIK 805SM-P**  
**Board : Actual Value Distributor**  
**Connector : X112/X113/X114**



**Connector**

D-Sub  
 15 pin female  
 SINUMERIK shell  
 6FC9 341-1EC  
 Front view →



**Conn. coding**

- pin / hole
- x no pin / hole

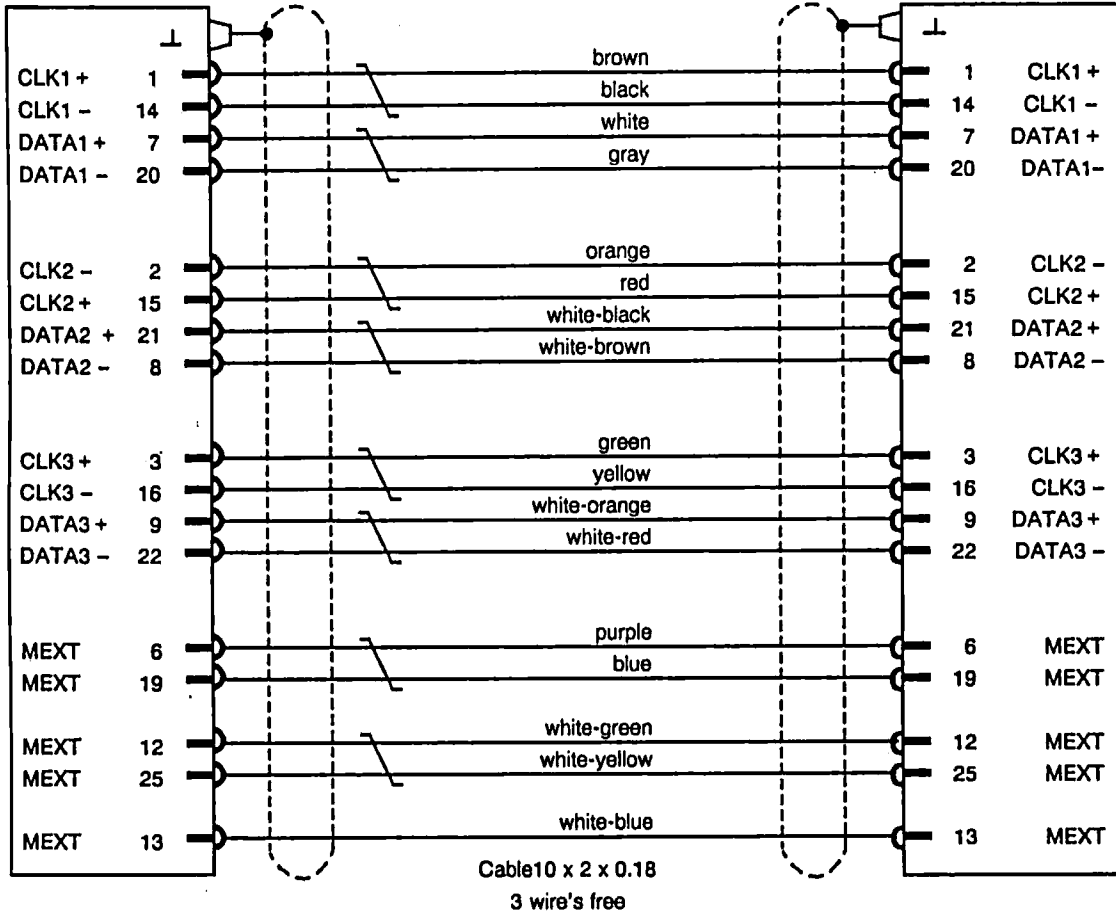
**Note:**

The following encoder type is recommended: HE65M \* 256/256, SSI by T + R Electronic GmbH, Trossingen. For the connection of this encoder type see the hatched field.

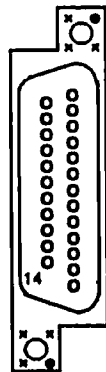
Cable Name: Cable from Actual Value Module  
 Order No.: to actual value distributor:  
 cable with one end open:

6FM1 590-2A   
 6FM1 590-2B

**SINUMERIK 805SM-P** **Actual Value Distributor**  
**Board** : Act. Value Module 6FX1 132-6BA **Connector X111**  
**Connector** : Front Connector X111 **or cable end open**



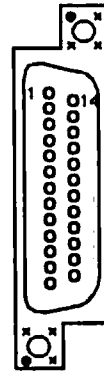
**Connector**  
 D-Sub  
 25 pin female  
 SINUMERIK shell  
 6FC9 341-1ED  
**Front view** →



**Conn. coding**

- pin / hole
- x no pin / hole

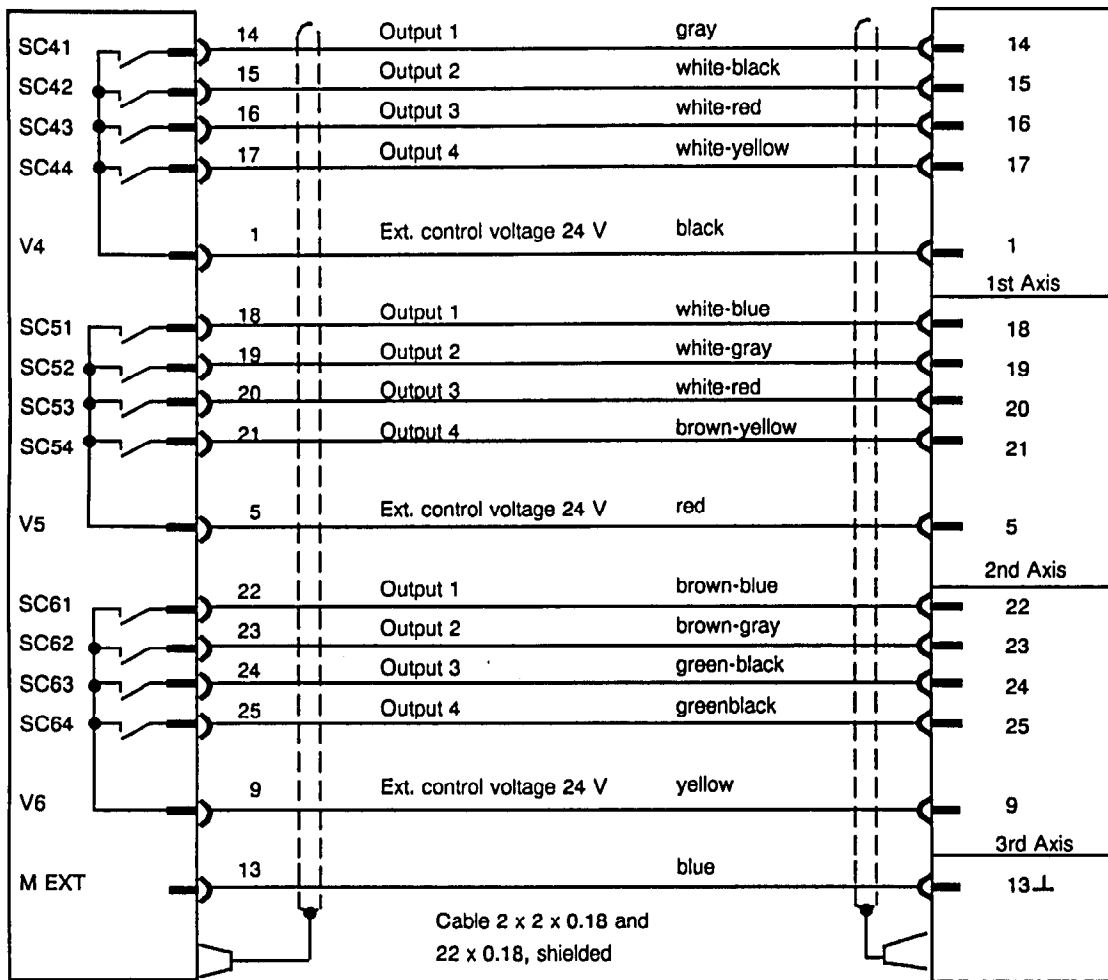
**Connector**  
 D-Sub  
 25 pin female  
 SINUMERIK shell  
 6FC9 341-1ED  
 ← **Front view**



## 5.2 Cable Diagrams for Deceleration Step Controller

Cable Name: Cable from Interface for break points  
(command value cable for Deceleration Step Controller)  
Order No.: 6FM1 590-3F□00

<b>SINUMERIK 805SM-P</b>		<b>Cam distributor</b>
<b>Board</b>	<b>Deceleration Step Controller</b>	<b>6FM1 590-5BA00</b>
<b>Connector</b>	<b>X141</b>	<b>6FM1 590-5BB00</b>

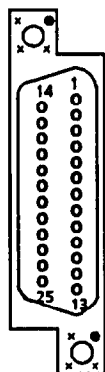


**Connector**

D-Sub  
25 pin female  
SINUMERIK shell  
6FC9 341-1ED  
Terminal end →

**Conn. coding**

- Coding pin
- x no coding pin



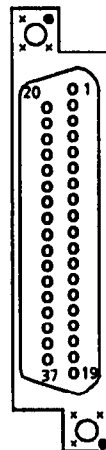
SC ● = Digital output  
Output (1-4)  
Meas. circuit (4, 5 or 6)

V ● = Ext. voltage 24V  
Meas. circuit (4, 5 or 6)

M<sub>ext</sub> ● = Reference point

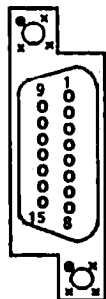
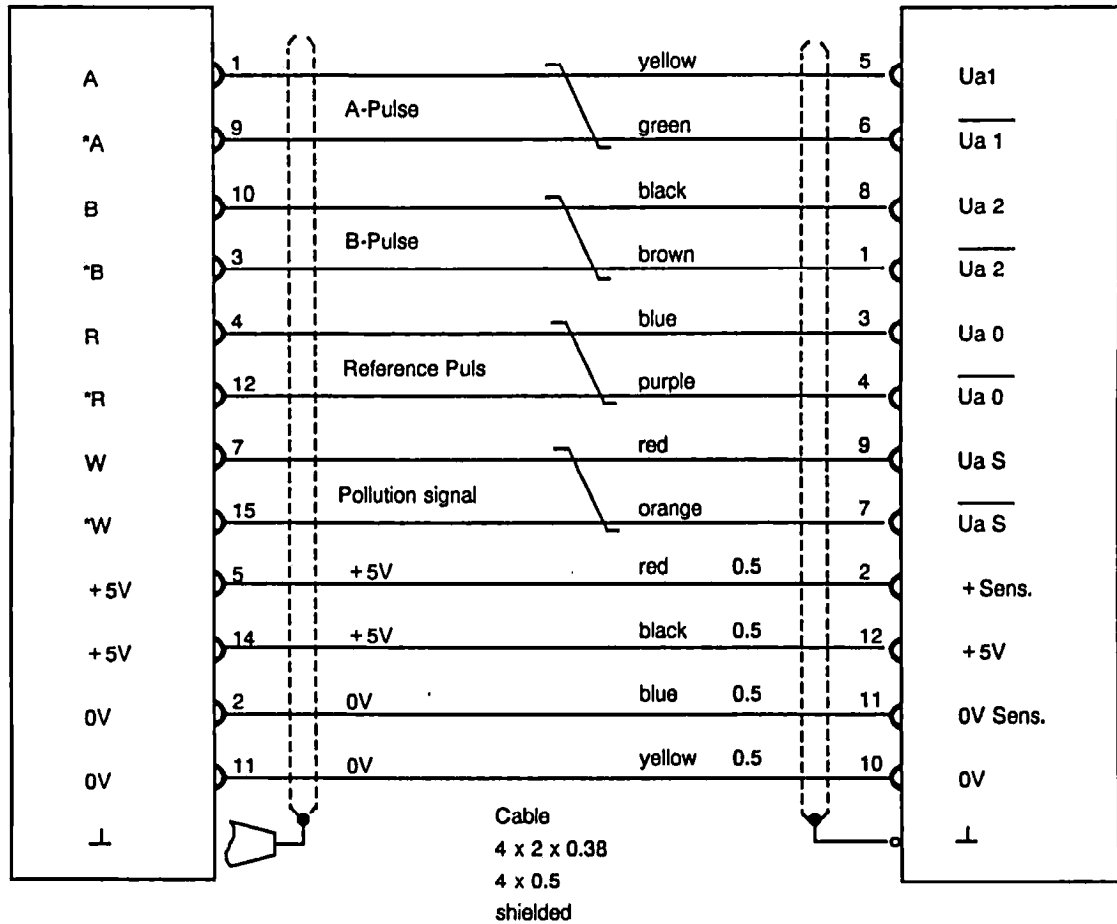
**Connector**

D-Sub  
37 pin female  
SINUMERIK shell  
← Terminal end  
6 FC9 341 - 1FH



Cable name: Digital Rotary Encoder (new version)  
 Linear scales with EXE 60. SI  
 Order No.: 6FC9 344-2B□

**SINUMERIK 805SM-P** **Encoder Connector**  
**Board** : Deceleration Step Controller  
**Connector** : Encoder 1 to 3 (X111, X121, X131)



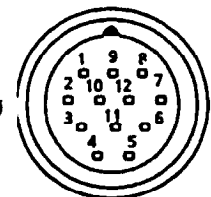
**Connector**  
 Position: 1 at the top  
 D-Sub  
 15 pin female  
 Wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1EC

**Connector coding**

- coding pin
- x no coding pin

**Connector**

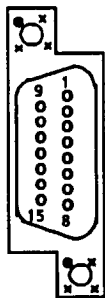
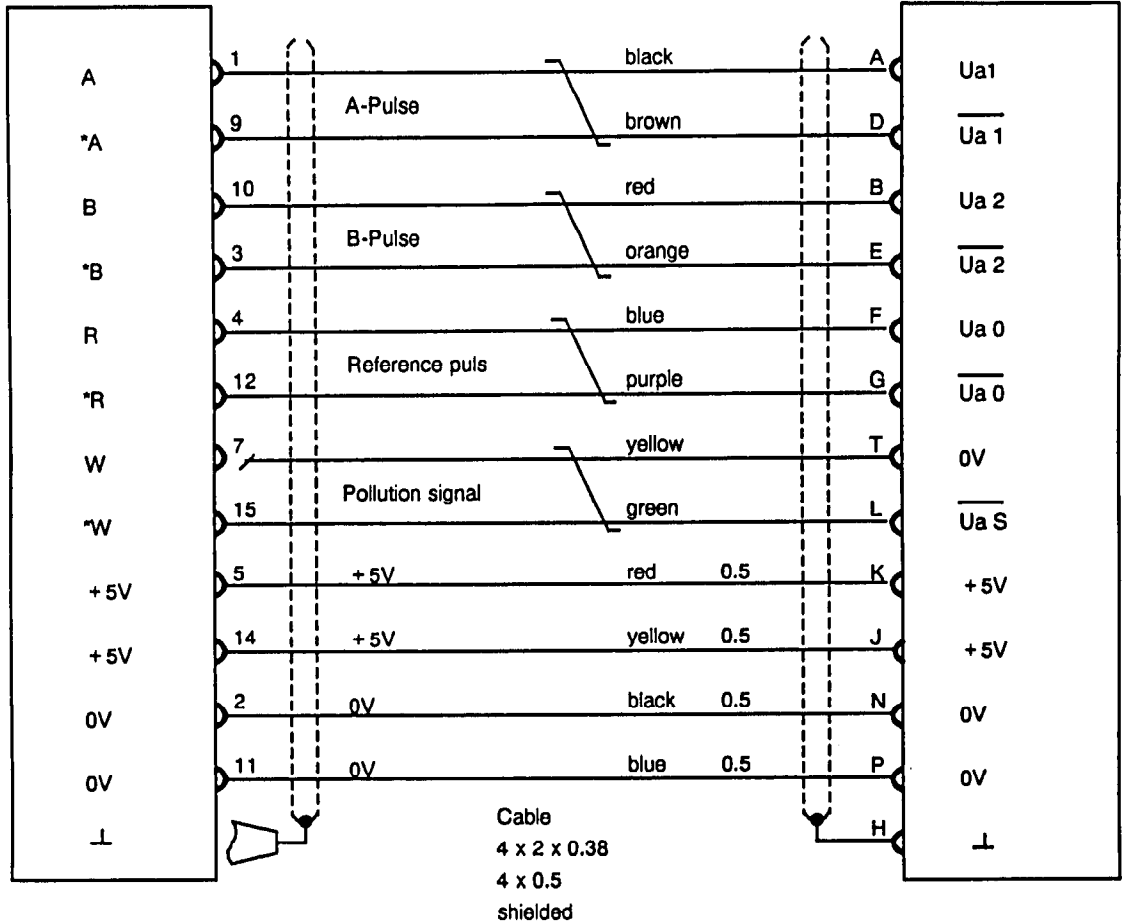
12 pin female  
 SIEMENS  
 Cable dia. 10 mm ∅  
 Wire assembly side view



6 FC9 341-1FD

Cable Name: Digital Rotary Encoder in Servo Motor  
 Order No.: 6FC9 340-8P□

**SINUMERIK 805SM-P**  
**Board : Deceleration Step Controller**  
**Connector : Encoder 1 to 3 (X111, X121, X131)** **Encoder Connector**



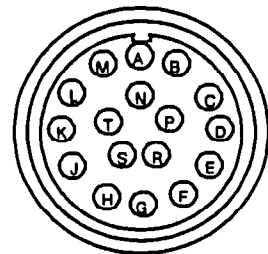
**Connector**  
 Position: 1 at the top  
 D-Sub  
 15 pin female  
 Wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1EC

**Connector coding**

- pin / hole
- x no pin / hole

**Connector**  
 17 pin female  
 Tuchel  
 CA 08-20-295  
 Wire assembly side view

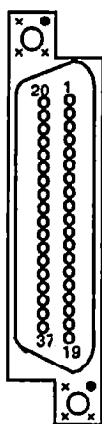
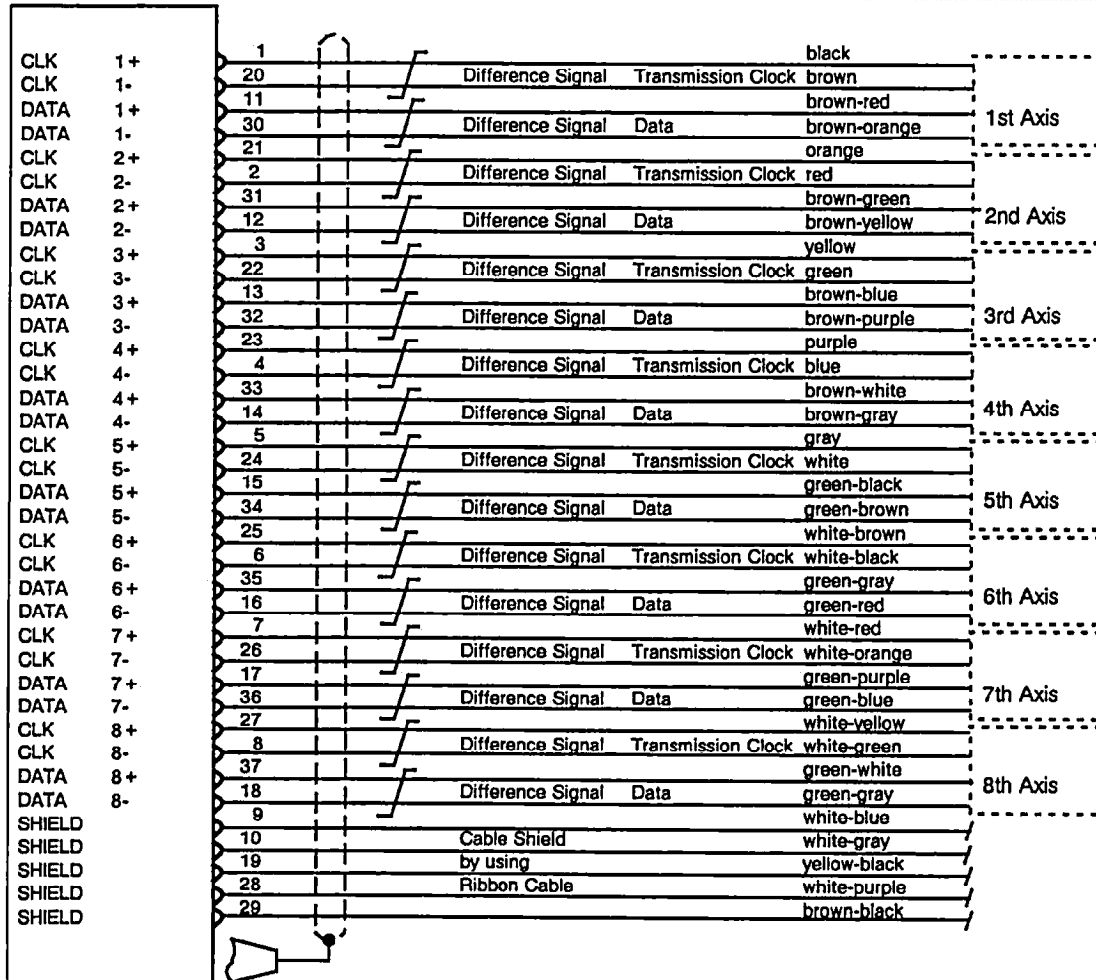
6 FC9 341-1AC



### 5.3 Measuring System Cables

Cable Name: Actual Value Interface Absolute Encoder  
 Order No.: 6FX1 401-6CC□

<b>SINUMERIK 805SM-P</b>		<b>Encoder</b>
Board	: Actual value board (absoluta)	
Connector	: X121	



#### Connector

Position: 1 at the top  
 D-Sub  
 37 pinfemale  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1FH

Description: NC

#### Connector coding

- pin / hole
- × no pin / hole

#### Cable end

400 mm outside insulator stripped,  
 30 mm conductors ends free,  
 with end terminals, wires tagged

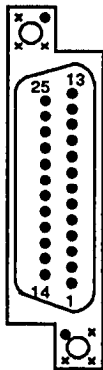
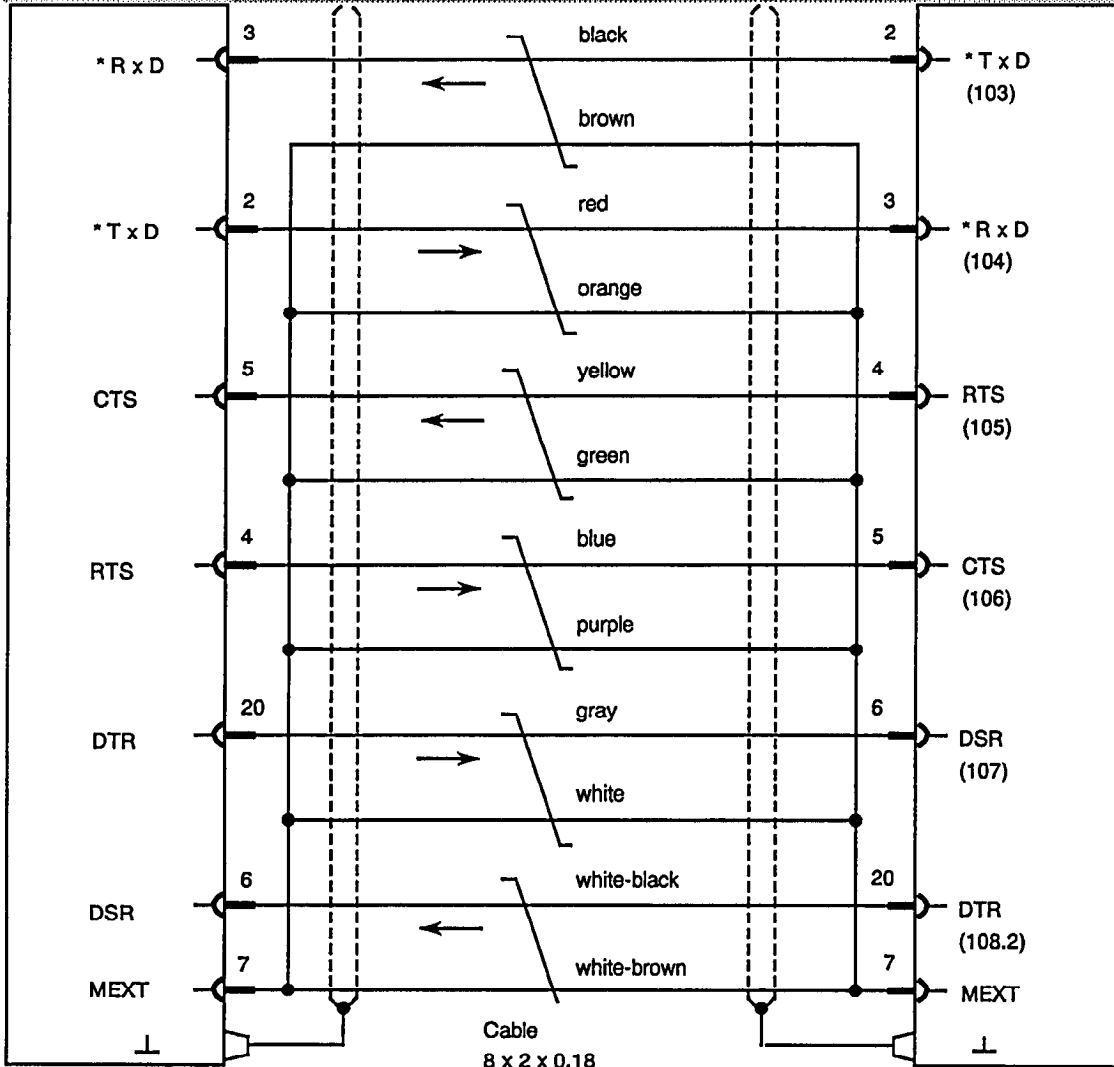
### 5.4 Keyboard Cable (Keyboard ↔ CU)

Cable Name: SINUMERIK System 800, RS 232C

Application: Keyboard connection

Order No: 6FC9 340-8W□

<b>SINUMERIK 805SM-P</b>	<b>Keyboard PCB</b>
Board : <b>VGA board</b>	Connector <b>X301</b>
Connector : <b>X141</b>	



**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-2AB  
 Description: NC 1

**Connector coding**

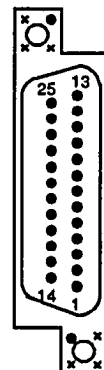
- coding pin
- x no coding pin

Cable  
 8 x 2 x 0.18  
 shielded  
 2 pairs free

**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 Keyboard shell  
 6FC9 341-2AB  
 Description: NC 2

**Connector coding**

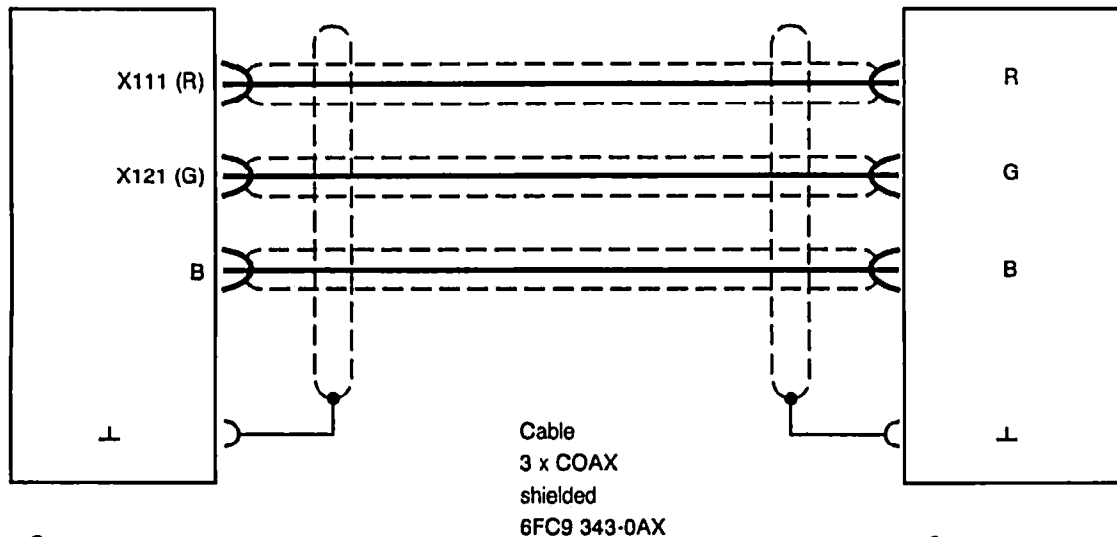
- coding pin
- x no coding pin



## 5.5 CRT Cable

Cable Name: Monitor RGB  
 Application: Connection between the color monitor and SINUMERIK 805SM  
 or btw. color monitor, RGB switch-over and SINUMERIK 805SM  
 Order No.: 6FC9 344-4N□

<b>SINUMERIK 805SM-P</b>		<b>Monitor</b>
<b>Board</b>	: VGA board	<b>R, G, B</b>
<b>Connector</b>	: X111 (R), X121 (G), X131 (B)	



### Connector

BNC, female

80 mm outermost  
insulation stripped

80 mm wire with  
M3 terminal for  
connecting  
the shield  
cable end marked  
with red, green, blue

### Connector

BNC, female

80 mm outermost  
insulation stripped

80 mm wire with  
M3 terminal for  
connecting  
the shield  
cable end marked  
with red, green, blue

### Cable Data:

3 single coaxial cables, PVC sheath, polyurethane sheath, additional total sheath

Connector:	BNC
Temperatur range:	- 40 °C to 90 °C
Resistant against:	oil, coolant acc. to VDE 472/804
Smallest bending radius:	150 mm



### 5.6 Terminal Strip Converter Cable

Cable Name: Machine Controller

Order No.: 6FC9 340-2W□

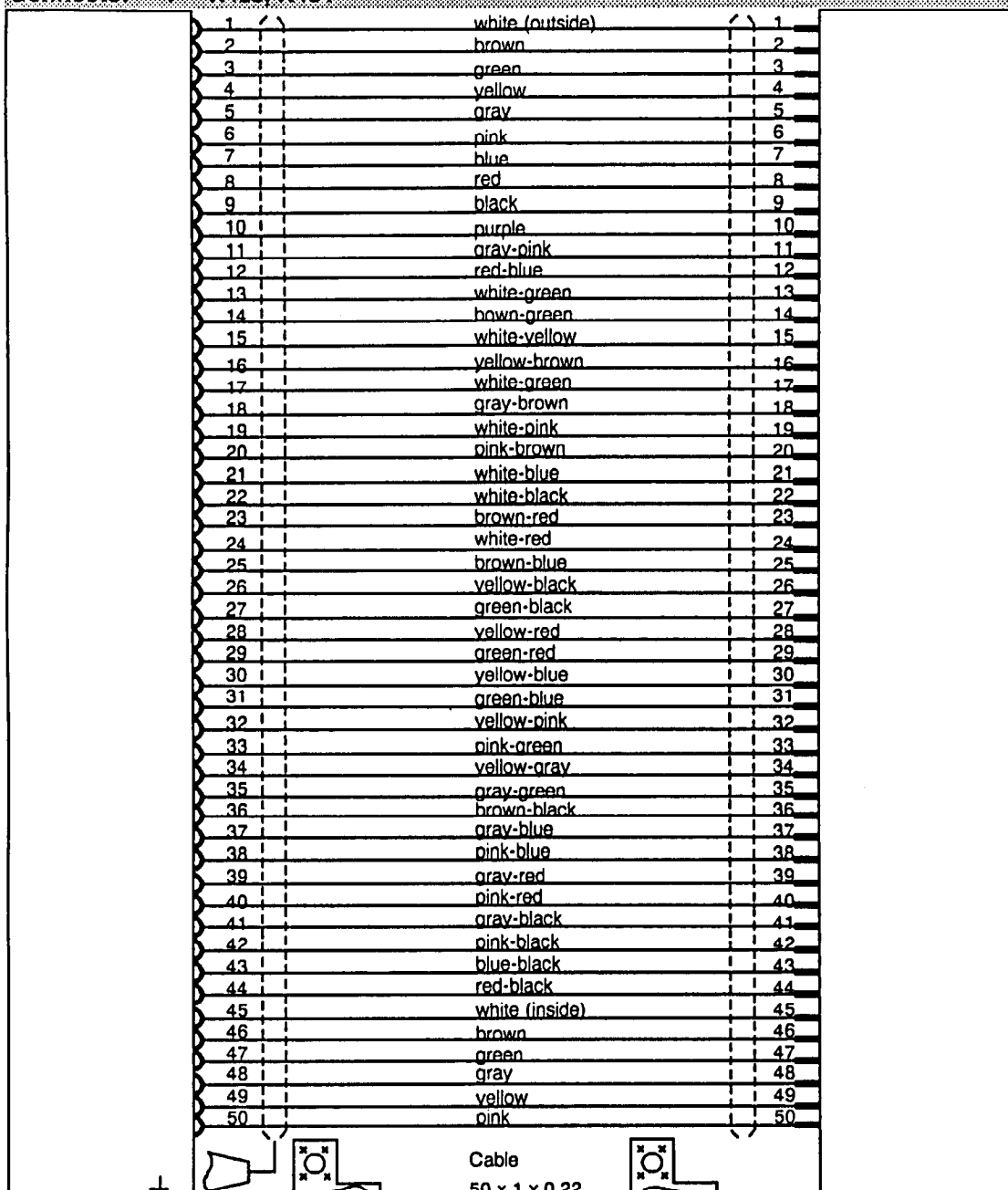
**SINUMERIK 805SM-P**

Machine Controller/

Board : I/O board (32 In/out)

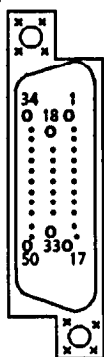
Terminal Strip Converter

Connector : X453, X454

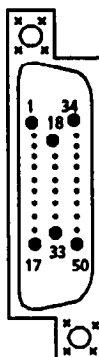


**Connector**

Position: 1 at the top  
 D - Sub  
 50 pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1EE



Cable  
 50 x 1 x 0.22  
 6FC9 343-0AE



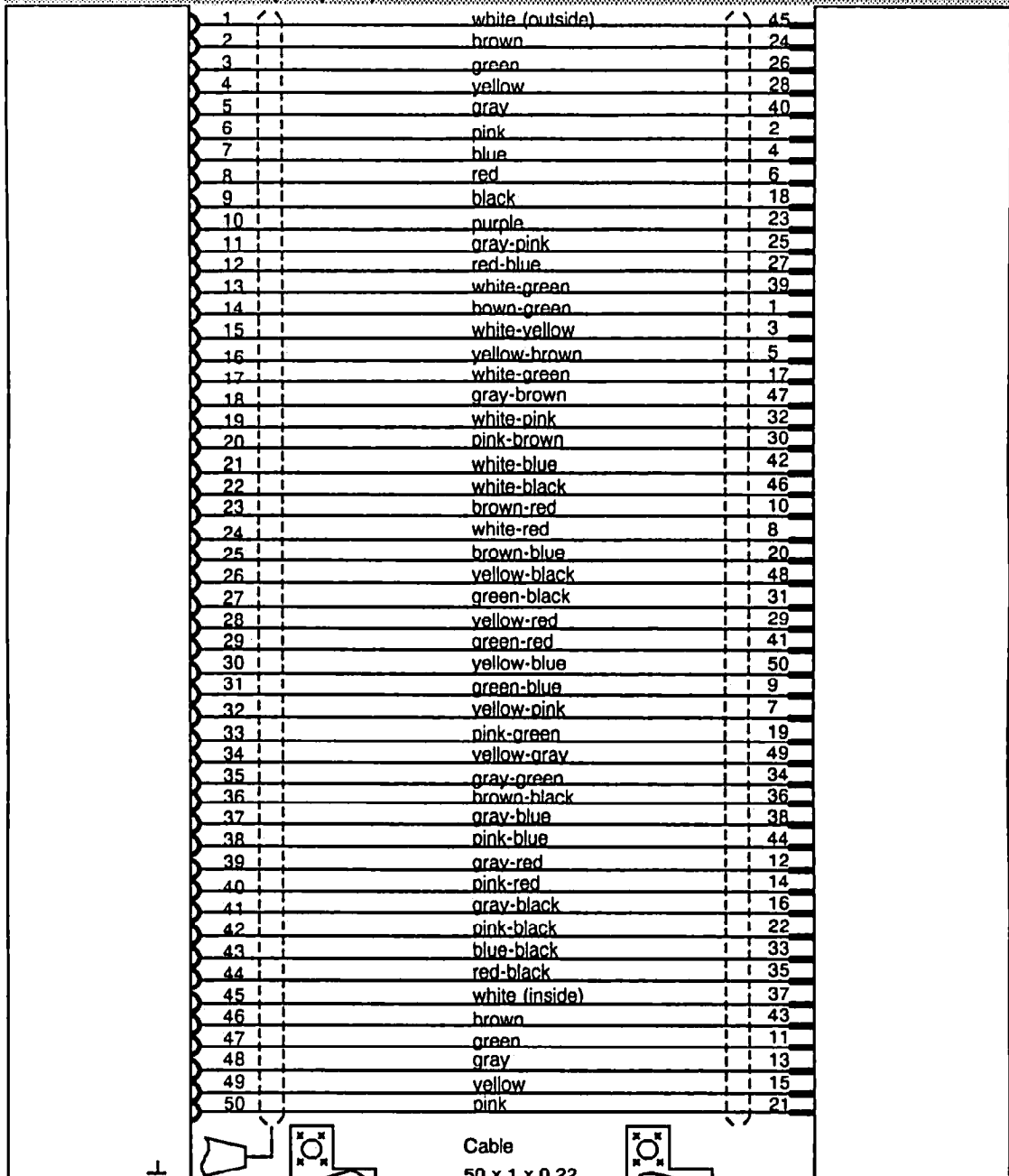
**Connector**

Position: 1 at the top  
 D - Sub  
 50 pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1EH

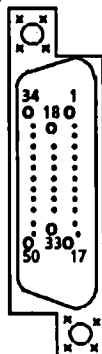
Cable Name: Machine Controller  
 Order No.: 6FC9 340-5R□

**SINUMERIK 805SM-P**  
 Board : I/O board (32 in/out)  
 Connector : X453 (Outputs)

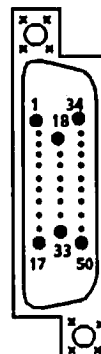
**Machine Controller/  
 Terminal Strip Converter**



**Connector**  
 Position: 1 at the top  
 D - Sub  
 50 pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1EE



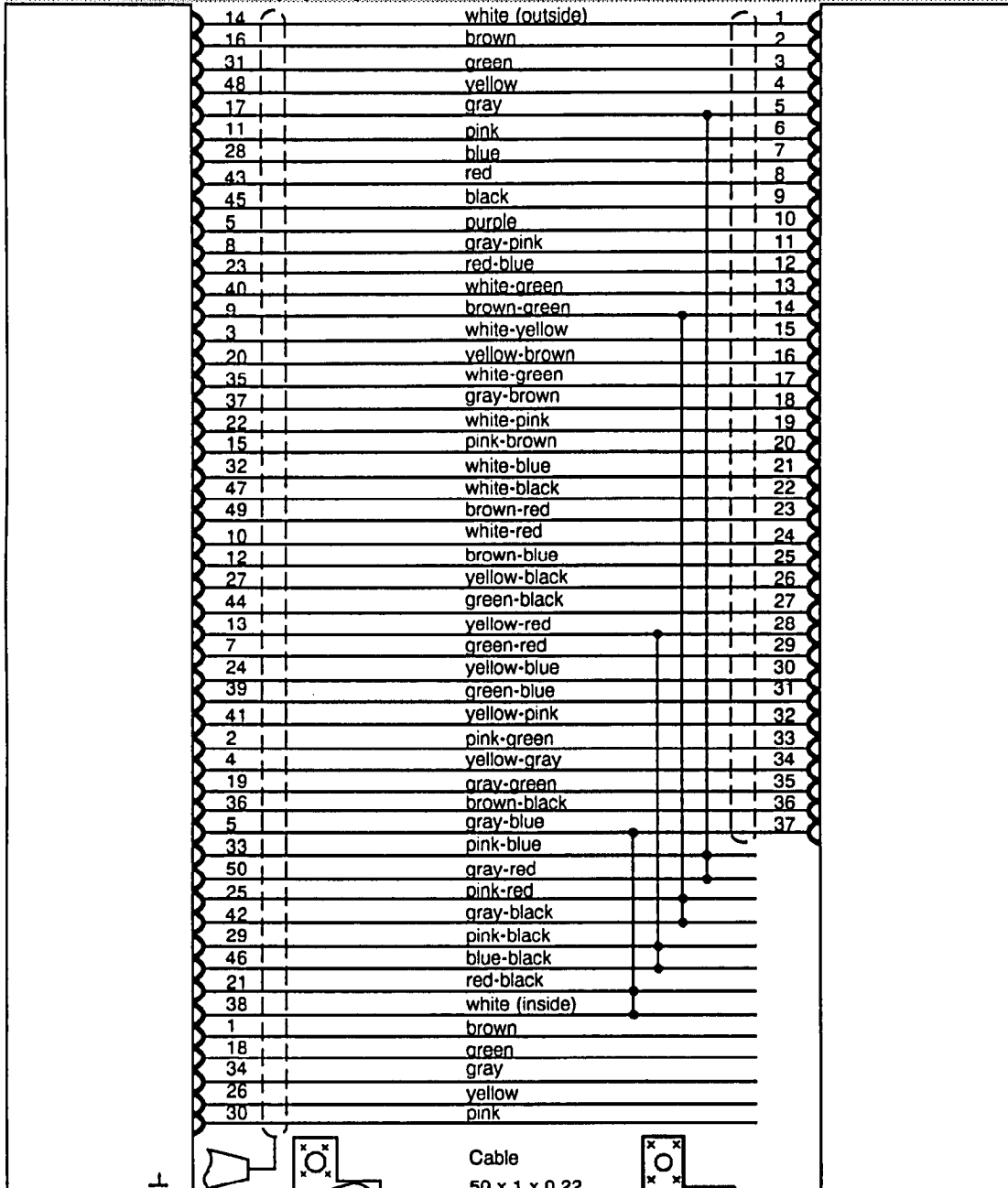
Cable  
 50 x 1 x 0.22  
 6FC9 343-0AE



**Connector**  
 Position: 1 at the top  
 D - Sub  
 50 pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1EH

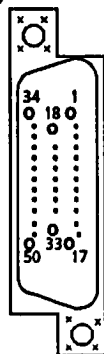
Cable Name: Machine Controller  
 Order No.: 6FC9 340-5Q □

**SINUMERIK 805SM** **Machine Controller/  
Terminal Strip Converter**  
 Board : I/O board (32 in/out)  
 Connector : X454 (Inputs)

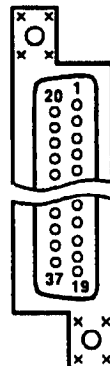


**Connector**

Position: 1 at the top  
 D - Sub  
 50 pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1EE



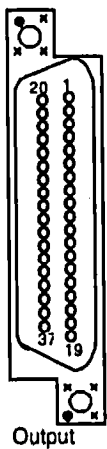
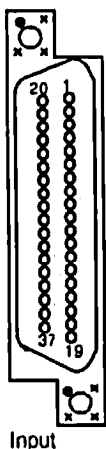
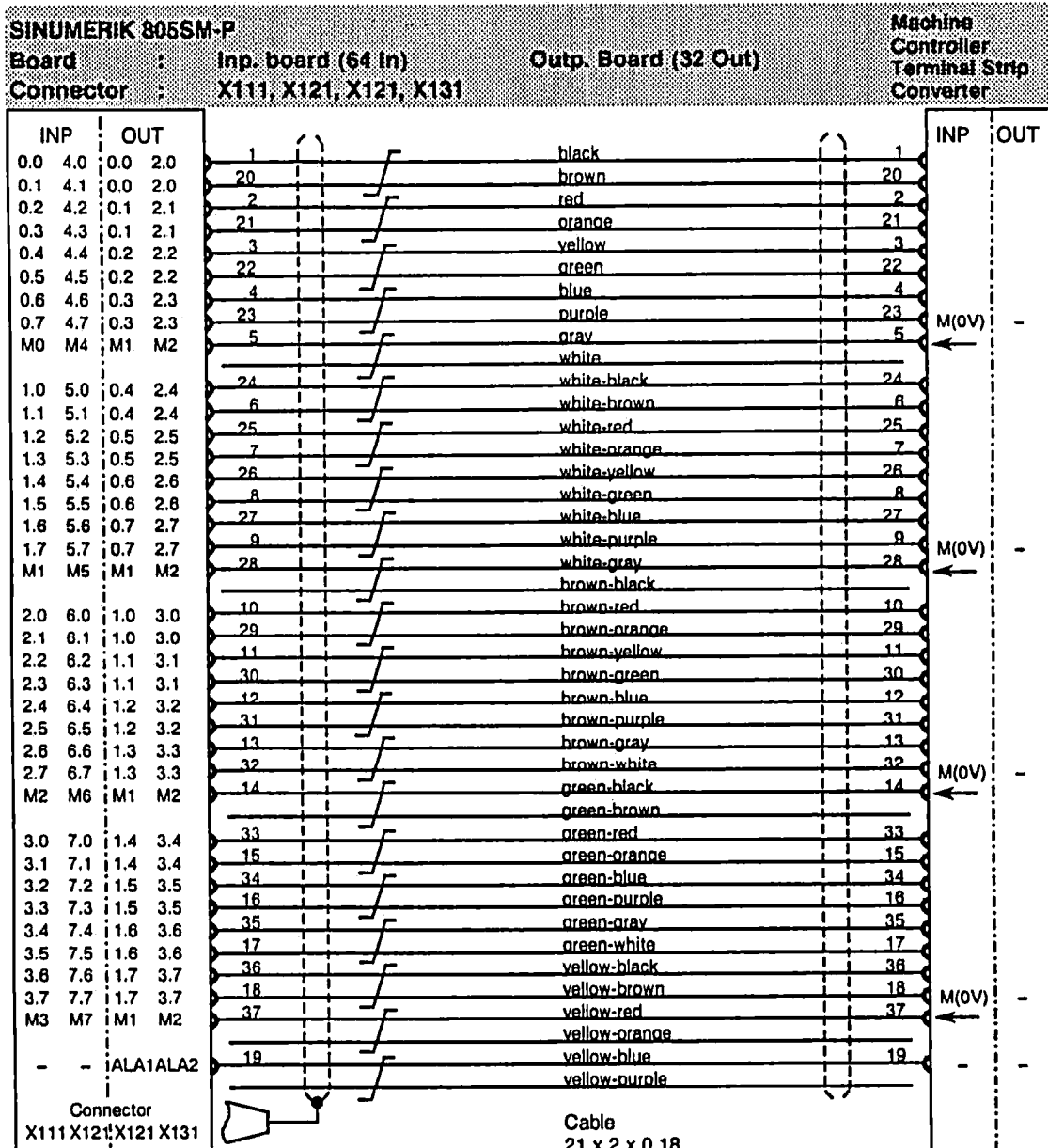
Cable  
 50 x 1 x 0.22  
 6FC9 343-0AE



**Connector**

Position: 1 at the top  
 D - Sub  
 37 pin female  
 wire assembly side  
 view  
 SINUMERIK shell  
 6FC9 341-1EH  
 Description KLU

Cable Name: Machine Controller Input/Output  
 Order No.: 6FC9 344-1U  Input  
 6FC9 344-1V  Output



**Connector**  
 Position: 1 at the top  
 D-Sub  
 37pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1FH

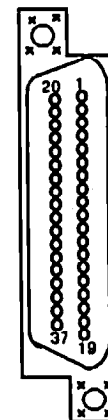
Description: NC

**Conn. coding**

- coding pin
- × no coding pin

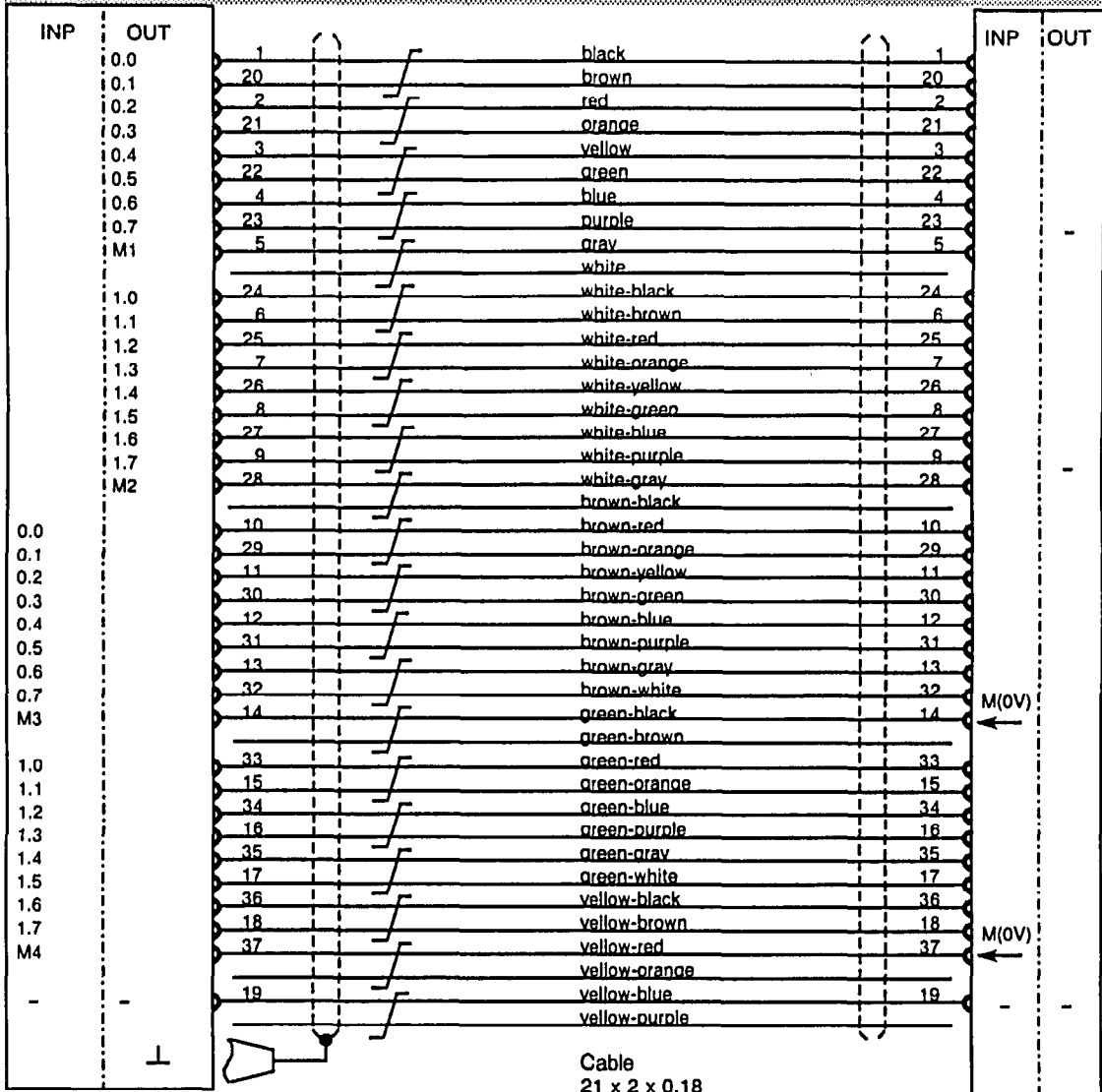
**Connector**  
 Position: 1 at the top  
 D-Sub  
 37pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1FH

Description: KLU

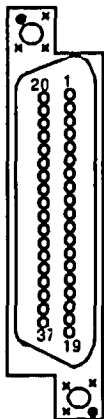


Cable Name: Machine Controller Mixed Input/Output  
 Order No.: 6FC9 344-3X□

**SINUMERIK 805SM-P**  
**Board** : Mixed Input/output board (16 In/out, 4 A analogue)  
**Connector** : X121 Machine Controller Terminal Strip Converter



Cable  
 21 x 2 x 0.18  
 shielded  
 6FC9 343-0AD



**Connector**

Position: 1 at the top  
 D-Sub  
 37pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1FH

Description: NC

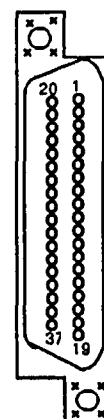
**Connector coding**

- coding pin
- x no coding pin

**Connector**

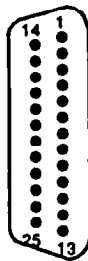
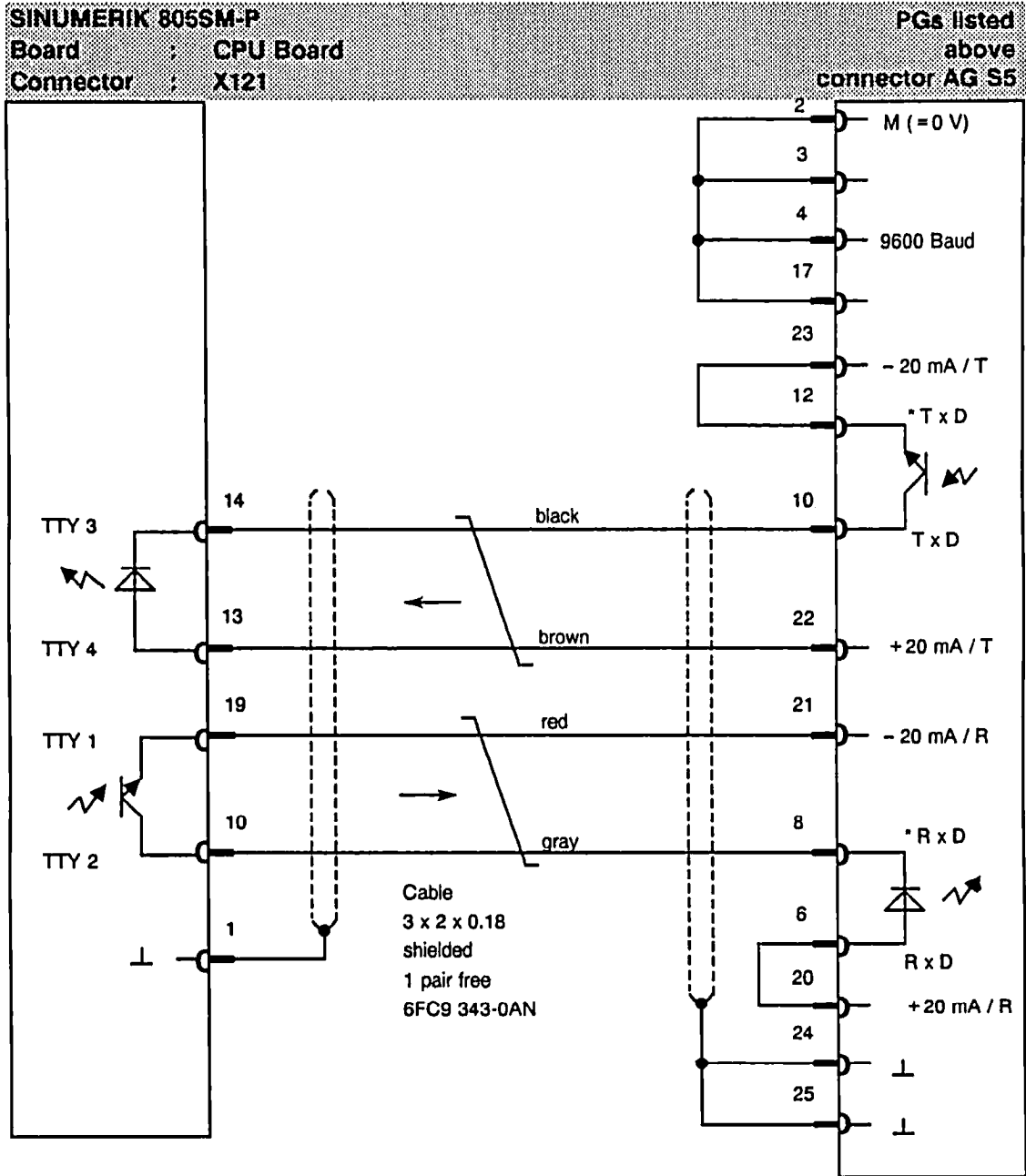
Position: 1 at the top  
 D-Sub  
 37pin female  
 wire assembly side view  
 SINUMERIK shell  
 6FC9 341-1FH

Description: KLU

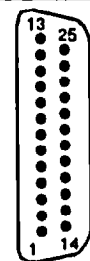


### 5.7 Other Cables

Cable Name: SIMATIC PG 670/675/685/635, AG S5 interface  
 Order No: 6FC9 340-8G□



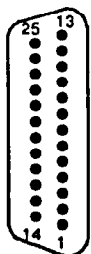
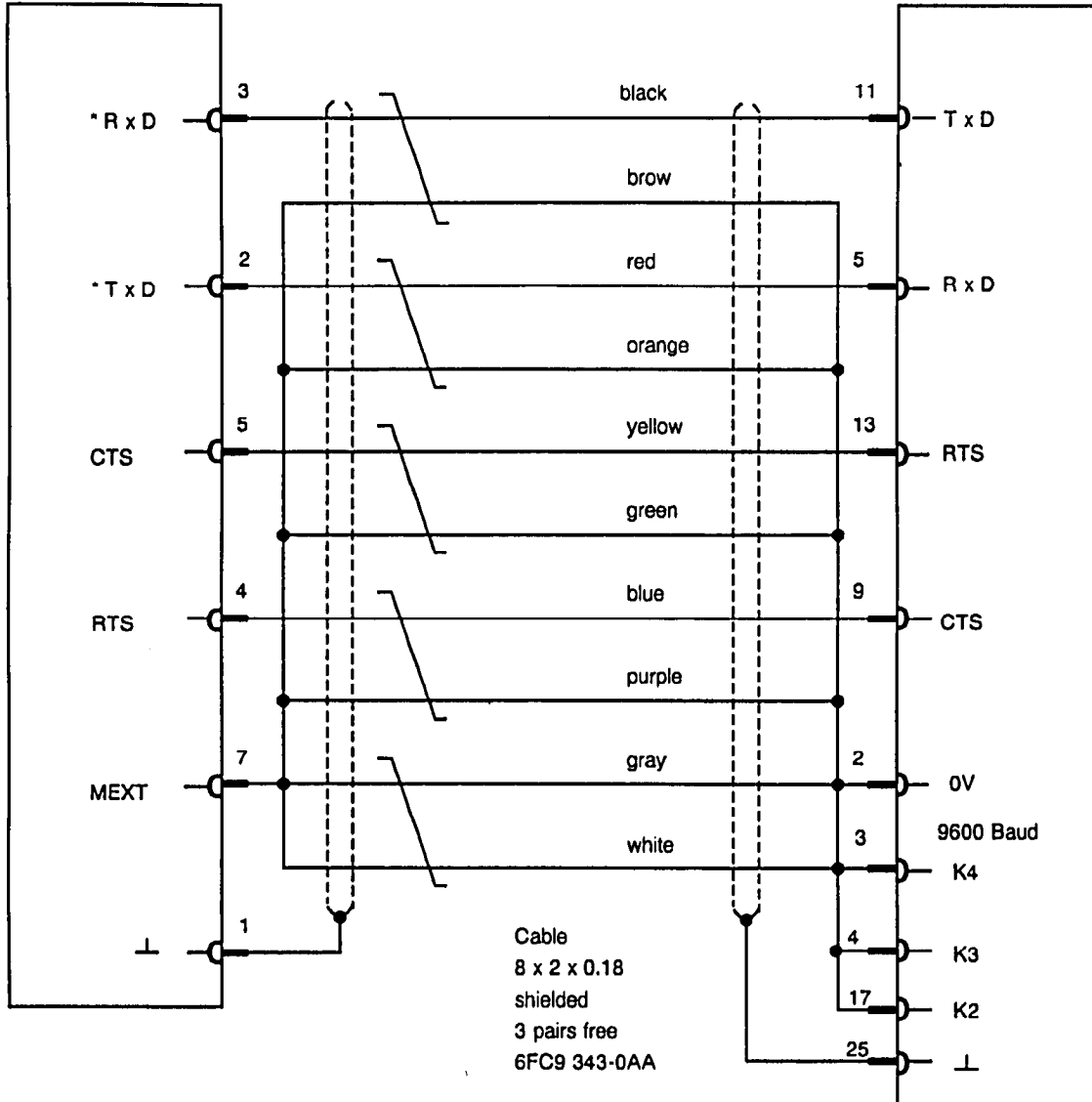
**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 housing with slide latch  
 6FC9 341-2AA  
 Description: NC



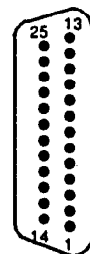
**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 housing with slide latch  
 6FC9 341-2AA  
 Description: PG AG

Cable Name: SIMATIC PG 675/685/635 (TRANS-PGIN)  
 Order No.: 6FC9 344-1A□

**SINUMERIK 805SM-P** PGs listed above  
**Board : CPU Board** Printer (V.24)  
**Connector : X121/X131**

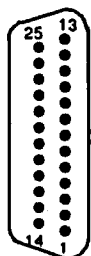
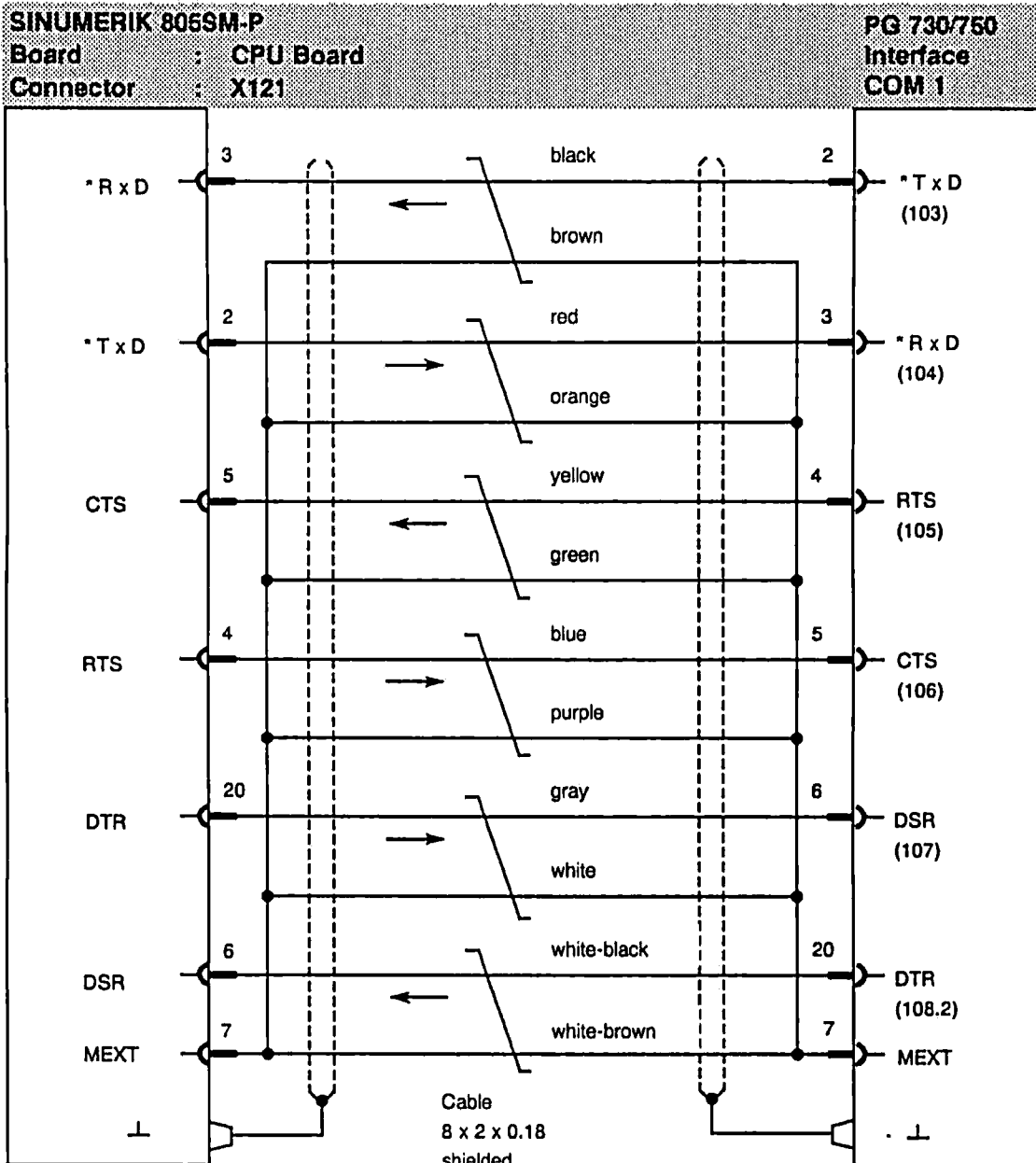


**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 housing with slide latch  
 6FC9 341-2AA  
 Description: NC

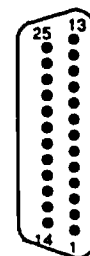


**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 Post-housing  
 6FC9 341-1ES  
 Description: PG D

Cable Name : SIMATIC PG 730/750 (TRANS PCIN and PLC-Programming)  
 PC (AT compatible)  
 Order No. : 6FC9 344-4R□



**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 housing with slide latch  
 6FC9 341-2AA  
 Description: NC



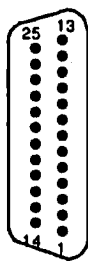
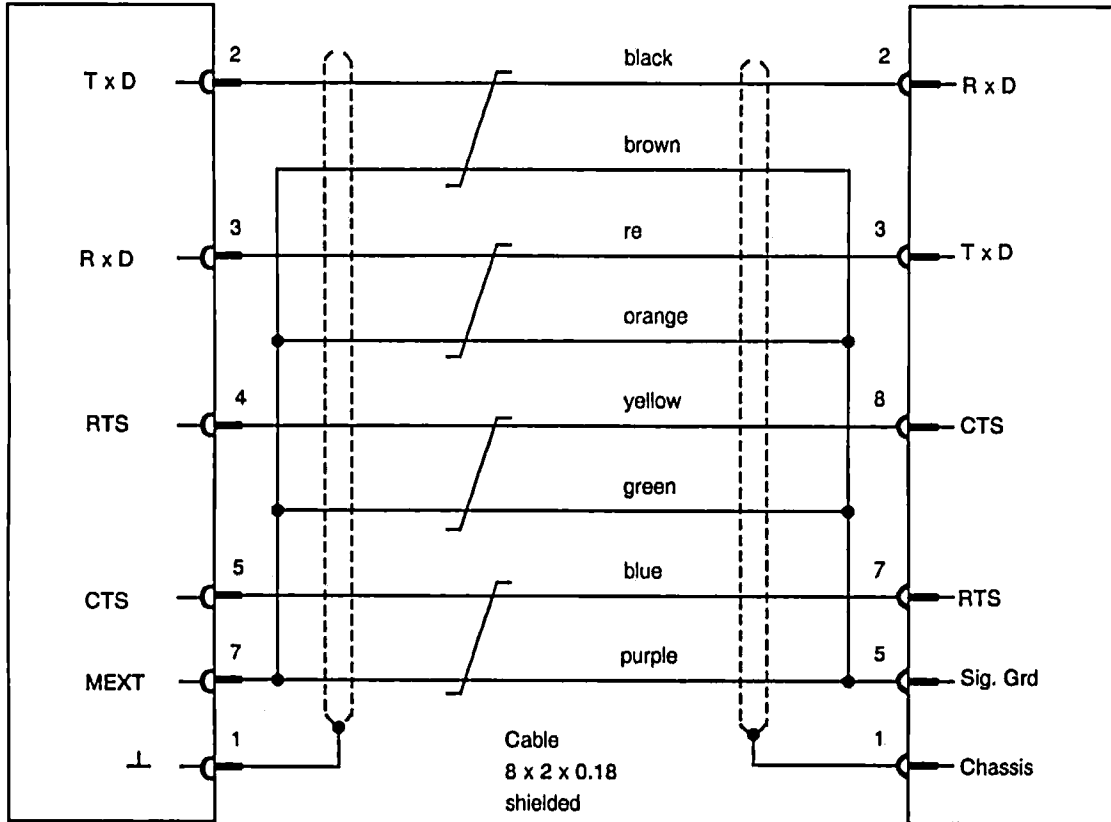
**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 Post-housing  
 6FC9 341-1ES  
 Description: PC



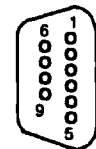


Cable Name: Disk drive DG-SM (RS 232C)  
 Order No.: 6FM1 590-7B□00

**SINUMERIK 805SM** **DG-SM**  
**Board : CPU Board** **X1**  
**Connector : X121/X131**



**Connector**  
 Position: 1 at the bottom  
 D - Sub  
 25 pin male  
 wire assembly side view  
 housing with slide latch  
 6FC9 341-2AA  
 Description: NC



**Connector**  
 Position: 1 at the top  
 D - Sub  
 9 pin male  
 wire assembly side view  
 SBM 383 shell  
 6FC9 341-2AE  
 Description: DSG-2S

The cable 6FM1 590-7B□00 serves to transfer data between the SINUMERIK 805SM and the disk drive DG-SM (by MCA).

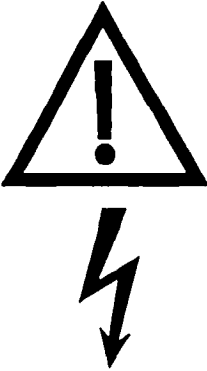
The 25-pin connector is to be plugged in female X121 on the CPU board (in the central unit) (or in female X131 if the second interface is in use). The 9-pin female is to be plugged on connector X1 of the disk drive.

For the length key of the cable see chapter LISTS OF CABLES AND ACCESSORIES.

## 6 Connection Conditions

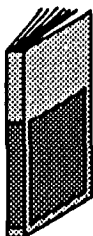
### 6.1 Safety Notes

In order to assure proper function of the control on the machine tool, it is necessary to read and follow the connecting instructions.

	<b>WARNING</b>
	<p>The connecting and commissioning of the product can only be done by qualified personnel under observance of all the warning notes written in this manual. This is the precondition for the safe operation of the product.</p> <p>Especially important are the general safety rules pertaining to work with the high-voltage/high-current electrical equipment (e.g. DIN VDE), the rules pertaining to use of material handling devices and tools, and the use of personal safety equipment (safety glasses, etc.).</p> <p>The failure to observe these safety rules can result in death, severe personal injury or substantial property damage.</p> <p>If a piece of equipment should be connected directly to the mains, before connecting it to the mains, make sure that the voltage set on the equipment corresponds with the mains voltage.</p>

***The equipment must be installed to conform  
all local and code rules and regulations.***

***Please read and observe the additional information  
included in the manuals listed below.***



**EMV Guidelines for SINUMERIK and SIROTEC Controls**

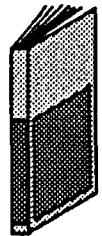
Order No.: 6ZB5410-0HX02-0AA0

and

**Instructions Manual SINUMERIK 805SM**

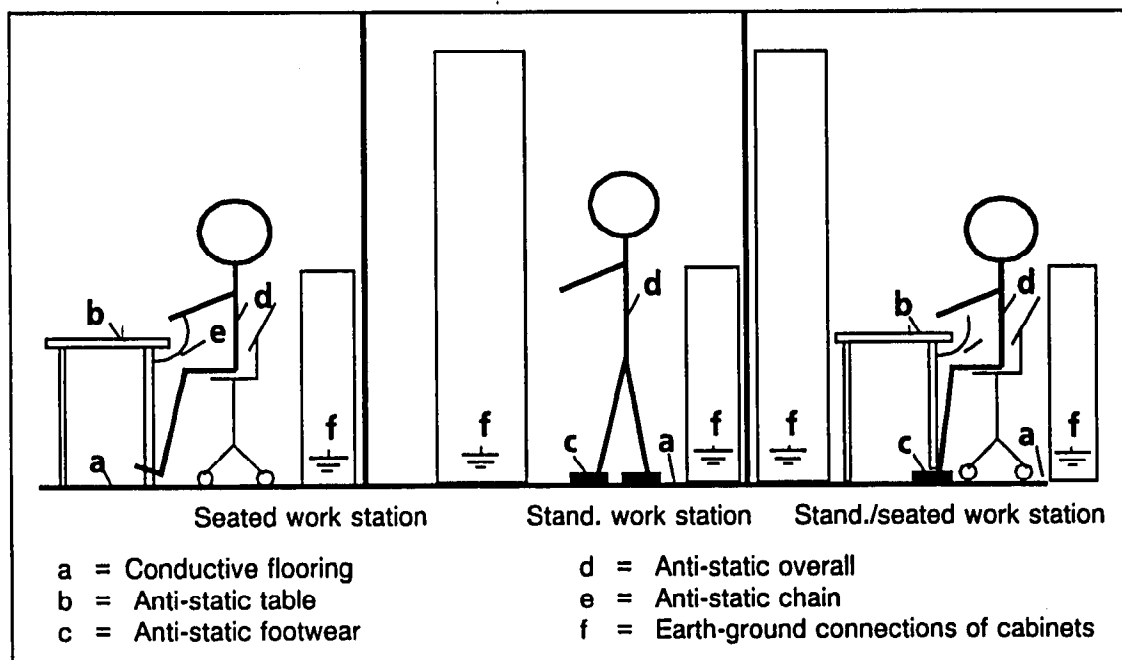
Order No.: 6FC 3987-7GC02

(to order from: Gerätewerk Erlangen)



### 6.1.1 Electrostatically Sensitive Devices (ESD)

- Generally, PCB's should not be touched unless work has to be carried out on them.
- Before touching a PCB, the person carrying out the work must himself be electrostatically discharged. The simplest way to doing this is to touch an electrically conducting earth-grounded object (e.g. a bare metal part of a switchboard or the protective earth contact of a socket outlet).
- PCB's must not be allowed to come in contact with electrically insulating materials such as plastic foil, insulating table tops or clothing made of synthetic fibers.
- PCB's may only be set down or stored on electrically conducting surfaces.
- PCB's may only be plugged in or pulled out the rack when the voltage (power supply) is disconnected.
- The signal voltages may be applied to the PCB only after it has been connected to the supply voltage.
- When carrying out soldering jobs on PCB's, make sure that the soldering tip has been earth-grounded.
- PCB's and electronic components should generally be packed in electrically conducting containers (such as metallized-plastic boxes or metal cans) before being stored or shipped.
- If the use of non-conducting packing containers cannot be avoided, PCB's must be wrapped in a conducting material before being put in them. Examples of such materials include electrically conducting foam rubber or household aluminum foil.
- For easy reference, the protective measures necessary when dealing with electrostatically sensitive devices (ESD) are illustrated in the sketches below.



## 6.2 Technical Data

The SINUMERIK 805SM-P control has been manufactured in compliance with the DIN VDE 0160 standard.

### 6.2.1 Electrical Data

#### 6.2.1.1 Overview

Unit \ Feature	Rated Voltage and Tolerance	Rated Frequency	Max. Apparent Power at Rated Voltage	Typ. Power Dissipation at Rated Voltage	Max. Inrush-Current
Central Unit	AC 230 V	50/60 Hz $\pm 5$ Hz	(see Table 4)	(see Table 5)	20 x I <sub>n</sub> for 10 ms
	DC 24 V 20-30 V 1)	max.ripple content 3,6V	(see Table 4)	(see Table 5)	20 x I <sub>n</sub> for 10 ms
Keyboard	DC 24 V	-	75 VA	5 W	20 x I <sub>n</sub> for 10 ms
Monochrome CRT	DC 24 V	-	70 VA	75 W	20 x I <sub>n</sub> for 10 ms
Color CRT	AC 230 V AC 110 V	50/60 Hz	90 VA	80 W	20 x I <sub>n</sub> for 10 ms
EU	DC 24 V	-			

Table 1: Electrical data, overview

#### 6.2.1.2 Requirements for AC Power Supply

- **Rated Voltage**
  - tolerance
  - frequency
  - power-on initialization time

230 V AC, single phase  
- 20%, + 10 % (184 V bis 253 V)  
50/60 Hz  $\pm 5$  Hz  
 $\leq 100$  ms
- **Harmonic Content**

according to IEC 550, Section 6.5 and  
DIN VDE 0160, Section 5.3.1.2

10%
- **Non-periodical voltages**

according DIN VDE 0160  
in preparation

1) inclusive ripple and tolerance

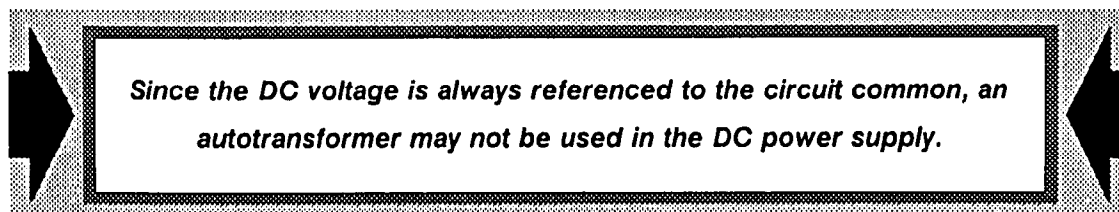
- **Short time power breakdowns**

according to IEC 550, Section 6.5 and  
DIN VDE 0160, Section 5.3.1.1

- power interruption at rated voltage and current  $\leq 10$  ms
- recovery time  $\leq 10$  s
- events per hour  $\leq 10$

A 50 percent power sag for a whole AC cycle (20 ms at 50 Hz), as per IEC 550, Section 6.5, is not possible.

### 6.2.1.3 Requirements for DC Power Supply



- **Rated voltage** 24 V DC
  - voltage range incl. ripple 20 V DC to 33 V DC
  - ripple at rated voltage and current, peak-to-peak 3.6 V
  - power-on initialization time  $\leq 100$  ms
- **Harmonic content according** to IEC 550, Section 6.5 and DIN VDE 0160, Section 5.3.1.2 10%
- **Non-periodical power surges**  $\leq 35$  V
  - duration of the surge  $\leq 500$  ms
  - recovery time  $\leq 50$  s
  - events per hour  $\leq 10$
- **Short time power sags referred** to rated voltage 24 V DC  $\leq 14.25$  V
  - duration of the sag  $\leq 5$  ms
  - recovery time  $\leq 10$  s
  - events per hour  $\leq 10$

### 6.2.1.4 Power Consumption and Power Dissipation Calculations

The maximum values for power consumption (compact unit or central unit) listed in table 1 are based on the power supply output value  $A = 100\%$ .

The maximum values for the power dissipation (central unit, keyboard) are based on:

- power supply output  $A = 100\%$
- no power output from power supply to external components (e.g. encoders)
- use of all output boards in compact or central unit, i.e. a maximum number of peripherals.

If according with the values from table 1 an oversized surface for heat exchange must be present, the values from the tables 3 to 5, can be used to determine the actual values for power consumption and dissipation based on the specific control configuration.

If the power supply and cooling is designed for the maximum values from table 1, these detailed calculations are not necessary.

However, in large installations were a lot of hardware options and external components are planned, these calculation have to be done to make sure that the power supply is not overloaded.

**Explanations to the calculation table:**

- **Power Supply Capacity Usage  $A_n$**

The table must list the current consumptions of all the expansion boards used and all external components.

The power supply capacity usage have to be checked for all output voltages.

- **Power Consumption of the Power Supply**

To determine the power consumption it is necessary to find the efficiency factor in the table below. It depends upon power supply capacity usage  $A$ :

$A$	230 V $\eta$	24 V $\eta$
$\leq 20 \%$	0.5	0.60
20 % bis 30 %	0.58	0.67
30 % bis 40 %	0.62	0.72
40 % bis 50 %	0.66	0.74
50 % bis 60 %	0.68	0.75
$\geq 60 \%$	0.69	0.73

Table 2: Efficiency factor

- **Power Dissipation  $P_v$**

If determining the power dissipation  $P_v$  the following has to be taken into account:

- the power dissipation of the external components  $P_{v\text{ext}}$  does not affect the power dissipation of the compact or central unit.
- the power dissipation of the output boards  $P_{vE/A}$  used in the compact or central unit however, do increase the total power dissipation value.

Power Supply Capacity Usage $A_n = I_{An} / I_{Amn} \times 100 \%$										
Boards (PCB's) MLFB (Order Number)	$U_{A1} = +5 \text{ V}$			$U_{A2} = +15 \text{ V}$			$U_{A3} = -15 \text{ V}$			Comments
	A	No. of PCB's	$\Sigma A$	A	No. of PCB's	$\Sigma A$	A	No. of PCB's	$\Sigma A$	
6FX1 147-1BA01	1.0	1		0.1	1		0.1	1		
6FX1 147-1BB01	1.0	1		0.1			0.1			
6FX1 147-0BA02	1.2	1		0			0			
6FX1 128-1BA00	0.24	1	0.24	0			0			
6FX1 120-3CB02	2.00			0			0			
6FX1 135-6BA01	1.18			0			0			
6FX1 138-5BB04	1.5			0.12			0.05			
6FX1 132-4BA01	2.3	1		1)			1)			
6FX1 132-7BA01	0.48			0.075			0.05			
6FX1 132-6BA01	0.8			0			0			
6FX1 132-5BA02	0.21			0.09			0.09			
6FX1 127-4AC01	2.5	1		0.04			0.06			
6FX1 126-4BE00	0.8	1		0			0			
6FX1 136-1BA01	0.55			0.09			0.1			
6FX1 138-4BA01	0.5			0.075			0.08			
6FX1 122-8BD04	0.32			0			0			
6FC5 012-0CA01-0AA0	0.28			0			0			
6FC4 590-0AN72	0.24			0			0			
6FC4 590-0AN71	0.14			0			0			
6FC4 590-0AN50	0.60			0			0			
$\Sigma$ PCB Currents	—	—		—	—		—	—		①
Encoder										
FOC Adapter	0.5									
RS 422 Adapter	1			0			0			
$\Sigma$ Currents (ext. Components)										② $I_{\text{extn}}$
$\Sigma$ Currents ① and ②										③ $I_{An}$
Max. Power Supply (PS) Output Current 230 V			$I_{Am1} = 15 \text{ A}$			$I_{Am2} = 0.5 \text{ A}$			$I_{Am3} = 0.5 \text{ A}$	$I_{Amn}$
Max. Power Supply (PS) Output Current 24 V			$I_{Am1} = 15 \text{ A}$			$I_{Am2} = 0.5 \text{ A}$			$I_{Am3} = 0.5 \text{ A}$	$I_{Amn}$
Power Supply Capacity Usages $A_n$										max.permitted : 100 %

Table 3: Table for calculation of the power supply capacity usage

1) Depending on the plugged-on boards



Power Consumption of the Power Supply $P_S = 1 / \eta \times P_A + P_L$				
Currents $I_{An}$				(carried over) from ②
Voltages $U_{An}$	+ 5 V	+ 15 V	- 15 V	
Outp.Power of the Power Supply (PS) $P_{An}$	VA	VA	VA	$P_{An} = I_{An} \times  U_{An} $
acct. Output Power of the PS max. $P_A$				$P_A = \sum P_{An}$
max. Output Power of the PS $P_{Am}$	230 V : 90 VA		24 V : 140VA	
Power Supply Capacity Usage $A$				$A = P_A / P_{Am}$
Power Factor $\lambda$	230 V : 0.55		24 V : 1.0	
Efficiency Factor $\eta$	230 V : see Table 2		24 V : 0.60	see Table 2
Fan Power Consumption $P_L$	30 VA			
Power Consumption of the PS $P_S$				

Table 4: Table for calculation of the power consumption

Power Dissipation Value $P_V = 1 / \eta \times P_A + P_L - P_{Vext} + P_{VE/A}$				
Current $I_{ext.}$ (ext. Components)				(carried over) from ②
Pwr Dissip. $P_{Vext.}$ (ext. Comp.)				$P_{Vext.} =  U_{An}  \times I_{ext.}$
Pwr Dissip. $P_{Vext}$ (ext. Comp.)				$P_{Vext} = \sum P_{Vextn}$
Pwr Dissip. $P_{VIO}$				
Total Power Dissipation Value $P_V$				

Table 5: Table for calculation of the power dissipation value

## 6.2.2 Mechanical Data

### 6.2.2.1 Overview

Unit \ Feature	Dimensions Width Height Depth	Weight	Degree of Protection acc. to DIN 40050	Against Electric Shock acc. to DIN VDE 0160
Central Unit	300 mm 370 mm 255 mm	13 kg	backplane IP 20 front cover IP 20	I
Keyboard	340 mm 211 mm 60 mm	2.4 kg	backplane IP 20 front cover IP 54	I
Monochrome CRT	340 mm 262 mm 310 mm	8.2 kg	backplane IP 20 front cover IP 54	I
Color CRT	340 mm 262 mm 382 mm	11.5 kg	backplane IP 20 front cover IP 54	I
EU	300 mm 370 mm 255 mm	13 kg	backplane IP 20 front cover IP 20	I

### 6.2.2.2 Vibration and Shock Resistance Data

- **Resistance against vibrations**

- for operation Degree of severity acc. to SN 1) 29010,  
Part 1 for all components
- for storage in original package Degree of severity acc. to SN 1) 29010,  
Part 2 for all components

- **Resistance against shock**

Testing group E, test according to DIN 40046, Part 7

- acceleration 15 g (1 g = 9.81 m/s<sup>2</sup>)
- duration of the rated shock 11 ms

1) SN = Siemens Standard (see Section 6.2.7)

## 6.2.3 Installation Conditions

### 6.2.3.1 Electrical and Mechanical Installation Conditions

Unit	Feature	Rated Voltage $U_N$	max. Power Dissipation $P_V$	Degree of Protection (to DIN 40050)	Dim. w h d	Weight
Power Supply Component  6FC9 304-0AC 6FC9 304-0AD		3 x 380 V ~ 415 V ~ 440 V ~ 24 V/20 A 24 V/40 A		IP 00	431.5 mm 132 mm 255 mm	
Incremental Encoder 6FC9 320-3..		internal Voltage 5V D.C.		IP 54	∅58 mm 83 mm	

### 6.2.3.2 Climatic Installation Conditions

Unit	Feature	Air Exchange	Air and Ambient Temperature	Maximum Temperature Change	Permissible Humidity (DIN 40040)
Power Supply Component  6FC9 304-0AC 6FC9 304-0AD  6FC9 304-0A					
Incremental Encoder 6FC9 320 - 3..					

## 6.2.4 Climatic Ambience Conditions

### General Requirements

- The components have to be packed according to climatic conditions during the transport and at the destination point.
  - List of the destination points according to SN 69154 1)
  - Map with the climate overview for see transport acc. to SN 29080 1)
  - Climatic conditions for commissioning acc. to SN 29081 1).
- If the maximum permissible values cannot be held the heat exchangers or air conditioners have to be used.

### 6.2.4.1 Installation and Operation

- **Temperature range**
  - lower temperature limit 0 °C
  - upper temperature limit + 45 °C / + 55 °C
- **Dew point temperature  $t_d$  and relative humidity U**
  - year average U = 75 %  
 $t_d$  = 17 °C
  - on 30 days (24 hours) per year U = 95 %  
 $t_d$  = 24 °C

These days should be spread naturally through the year.

  - on other days (< 24 hours) U = 85 %  
considering the year average  $t_d$  = 20 °C
- **Moisture condensation** not permitted
- **Temperature change**
  - within one hour  $\leq$  10 K
  - within three minutes  $\leq$  1 K
- **Barometric pressure** 860 mbar to 1080 mbar  
(86 kPa to 108 kPa)

The values above refer to installation locations up to 1500 m above the sea level. At locations above 1500 m above sea level, reduce the upper temperature limit 3.5° for every 500 m.

1) SN = Siemens Standard (see Section 6.2.7)


### 6.2.4.2 Transport and Storage

- **Temperature range**
  - lower temperature limit - 40 °C
  - upper temperature limit + 70 °C
  
- **Dew point temperature  $t_d$  and relative humidity U**
  - year average U = 75 %  
 $t_d$  = 17 °C
  - on 30 days (@ 24 hours) per year U = 95 %  
 $t_d$  = 24 °C

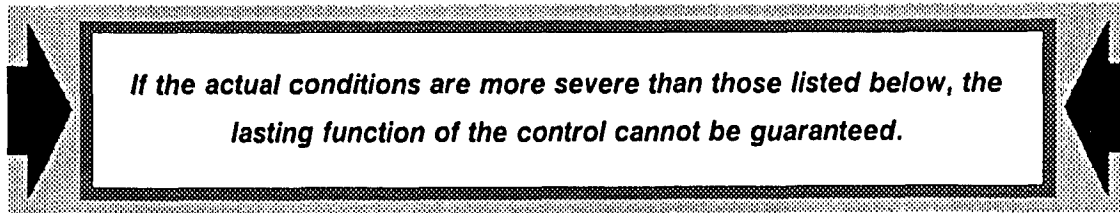
These days should be spread naturally thorough the year.

  - on other days (< 24 hours) U = 85 %  
considering the year average  $t_d$  = 20 °C
  
- **Moisture condensation** light, for short-time, seldom  
Rare, short-time, light moisture condensation applies to cases, for which at the same time the following conditions are valid:
  - max. duration of the condensation 3 hours
  - frequency of condensations: average 3 per year  
maximum 10
  - shortest sequence 1 day
  
- **Temperature change**
  - within one hour  $\leq$  10 K
  
- **Barometric pressure** 660 mbar to 1080 mbar  
(66 kPa to 108 kPa)

The values above refer to locations up to 3500 m above the sea level.

	<b>ATTENTION</b>
	The lithium batteries which are included with the control are considered dangerous freight according to the legal regulations at surface, air, and see transportation.

## 6.2.5 Influence of the Pullutants



Applicable standards

DIN 40046, Teil 36 and 37  
DIN 40050

### 6.2.5.1 Gases Harmful to the Control

- **Sulfur dioxide (SO<sub>2</sub>)**

Testing conditions:

concentration  
temperature  
relative humidity

1 cm<sup>3</sup>/m<sup>3</sup>, ± 0.3 cm<sup>3</sup>/m<sup>3</sup>  
25 °C, ± 2 °C  
75 %, ± 5 %

- **Hydrogen sulfide (H<sub>2</sub>S)**

Testing conditions:

concentration  
temperature  
relative humidity

1 cm<sup>3</sup>/m<sup>3</sup>, ± 0.3 cm<sup>3</sup>/m<sup>3</sup>  
25 °C, ± 2 °C  
75 %, ± 5 %

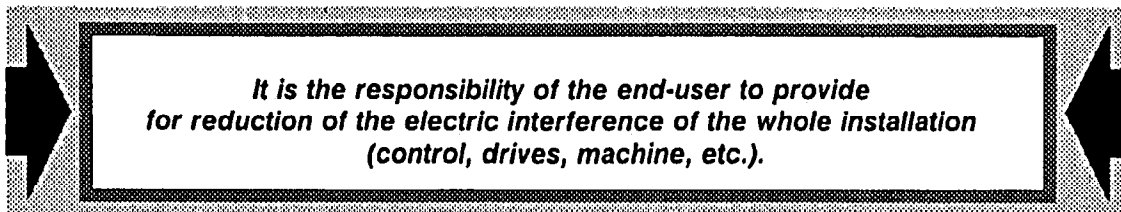
### 6.2.5.2 Dust Harmful to the Control

If the control is installed in the location where a dustharmful to the control is present, it has to be installed in an enclosure with heat exchanger or in a cabinet with respective treatment for the air used for ventilation.

In addition to this, if the service work whit cabinet doors open is conducted, the air filter has to be used.

## 6.2.6 Electromagnetic Compatibility (EMC)

### 6.2.6.1 Electric Interference Reduction



The SINUMERIK 805SM-P connected to 24 V DC meets the requirements of the Class A according to DIN VDE 0871, Parts 1 and 2.

### 6.2.6.2 Electric Interference Resistance

Applicable standards

IEC 801-2, 3 and 4

- **Resistance against interferences through the supply voltage**

Testing according with IEC 801-4

- Power supply lines:

testing voltage

≥ 3 kV

testing time

≥ 10 s

- Signal lines:

testing voltage

≥ 2.5 kV

testing time

≥ 10 s

- **Resistance against static discharge**

Testing according with IEC 801-2

testing voltage

≥ 12 kV

testing time

≥ 10 discharges  
at 1 discharge/s

- **Resistance against high frequency interferences**

Testing according with IEC 801-3

test field intensity

10 V/m

testing time

≥ 11 minutes/frequency  
decade

### 6.2.6.3 X-Ray Prevention

- Excerpt from RÖV Paragraph 5:

The operation of an x-ray unit requires permission.

- The sample testing of the SINUMERIK 805SM guarantees that the above mentioned regulations are met. There is enough shield available to sufficiently screen the x-rays occurring in the control.

Acceleration voltage (typically)

12.5 kV

Permit No. according to RÖV

not required

### 6.2.7 Standards

At the development of the SINUMERIK 805-SM control, the following Siemens Standards (SN) were observed in addition to the applicable national and international standards.

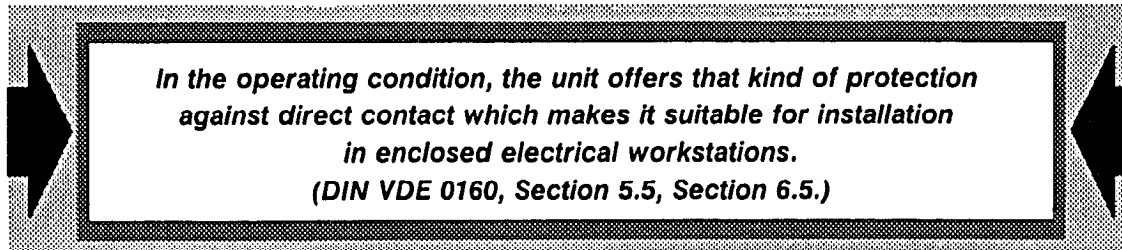
Siemens Standard	Content	Part																				
SN 26555	<p><b>Electrical Interfaces</b></p> <p>This standard specifies the conditions for DC voltage and DC current signal interfaces which should preferably be used in the process-close information processing, measuring, and control technology in the fields of energy, process engineering, drive technology as well as development and research. It intends to unify the function components in order to improve the compatibility and ability to work together.</p>	1, 2, 3																				
SN 26556	<p><b>Application Classes for Electronic Components</b></p> <p>Air temperature, barometric pressure, humidity.</p> <p>This norm specifies application classes for electronic components, e.g. those of measuring and control technology. It allows the selection of the proper components under the consideration of the expected conditions for application, transport and storage. An application class according to this standard is specified by the lower and upper temperature limits of a media surrounding the component as well as the barometric pressure and humidity existing in this area.</p>																					
SN 29010	<p><b>Mechanical Testing Conditions for the Electrical Equipment</b></p> <p>This norm specifies the testing condition severity degrees for the testing of the electrical installations, units and components. Using these degrees of severity it is possible to determine the resistance of the electrical installations, units and components against mechanical vibration and shocks.</p> <table border="1" data-bbox="355 1268 1230 1549"> <thead> <tr> <th rowspan="2">Severity Degree</th> <th rowspan="2">Frequency Range (Hz)</th> <th colspan="2">Constant Amplitude or</th> </tr> <tr> <th>Deviation (mm)</th> <th>Acceleration (m/s<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">12</td> <td>10 to 58</td> <td>0.075</td> <td>—</td> </tr> <tr> <td>58 to 500</td> <td>—</td> <td>9.8</td> </tr> <tr> <td rowspan="2">22</td> <td>5 to 8</td> <td>3.5</td> <td>—</td> </tr> <tr> <td>8 to 500</td> <td>—</td> <td>9.8</td> </tr> </tbody> </table>	Severity Degree	Frequency Range (Hz)	Constant Amplitude or		Deviation (mm)	Acceleration (m/s <sup>2</sup> )	12	10 to 58	0.075	—	58 to 500	—	9.8	22	5 to 8	3.5	—	8 to 500	—	9.8	1, 2
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22	5 to 8	3.5	—																			
	8 to 500	—	9.8																			
SN 29080	<p><b>Climatic Conditions for the Electrical Equipment</b></p> <p>This standard contains a map with the overview of the climate zones for the sea routes.</p>																					
SN 29081	<p><b>Guidelines for Packaging of the Electrical Equipment</b></p> <p>Permitted climatic conditions for the commissioning.</p> <p>This standard specifies the limits for the climatic conditions which are permitted for the electrical equipment for the transport, storage, and commissioning.</p>																					

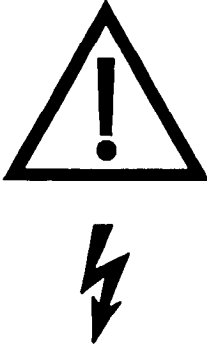


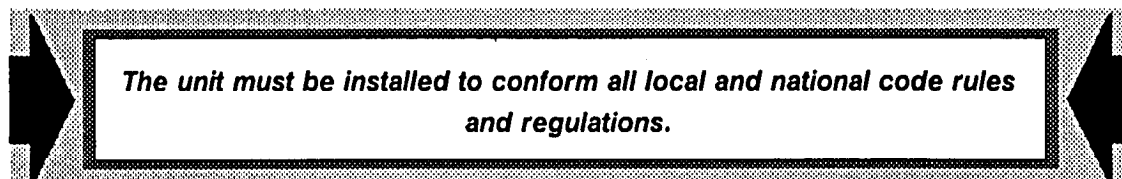
Siemens Standard	Content	Part
SN 29500	<p><b>The Failure Rates for Component</b></p> <p>Part1: General Information The failure rate is the most popular significant value used at the reliability calculation for the PCB's and units. The explanations contained in this standard are applicable with:</p> <p>Part 2: Empirical values for integrated circuits (IC). Part 3: Empirical values for discrete semiconductors (DH). Part 4: Empirical values for passive components (PB). Part 5: Empirical values for electrical connections. Part 6: Empirical values for plug-in connections for PCB. Part 7: Empirical values for relays. Part 8: Empirical values for IC sockets. Part 9: Empirical values for switches. Part 10: Empirical values for indicator lamps. Part 11: Empirical values for contactors.</p>	1 to 11
SN 30901	<p><b>Color Selection for Products.</b></p> <p>Siemens Colors and Surfaces. The subject of this standard is to provide a uniform color line for of the products of the Siemens AG and applies to outside surfaces which affect the appearance of the product. It applies to the synthetic materials, paints, and similar surface treatments.</p>	
SN 30920	<p><b>Outside Surface Finishes</b></p> <p>Paint Jobs and Similar Treatments. This standard specifies the uniform description of the paint jobs and similar surface treatments within Siemens AG. This standard makes it easy to electronically process the surface descriptions by using the Siemens part numbers.</p>	
SN 47030	<p><b>Composites, Thermoplastics</b></p> <p>Description in the Text, Material Selection This standard provides the data for the recording of the material data and material properties of the formed parts in the production record and notes for the material selection..</p>	1
SN 47030	<p><b>Composites, Thermoplastics</b></p> <p>Colors This standard contains the color data for the composites and thermoplastic materials specified in SN 47030, Part 1.</p>	2
SN 69154	<p><b>Guidelines for Packaging of the Electrical Equipment</b></p> <p>Register of the Destination Points This standard contains the information for the transport to the destination locations listed and information about the local conditions. It is intended to provide all the departments involved with the information about the kind of packaging required due to the particular conditions during the transport.</p>	

## 6.3 Installation

### 6.3.1 Installation Guidelines



<b>WARNING</b>	
	<p>The connecting and commissioning of the product can only be done by qualified personnel under observance of all the warning notes written in this manual. This is the precondition for the safe operation of the product.</p> <p>Especially important are the general safety rules pertaining to work with the high-voltage/high-current electrical equipment (e.g. DIN VDE), the rules pertaining to use of material handling devices and tools, and the use of personal safety equipment (safety glasses, etc.).</p> <p>The failure to observe these safety rules can result in death, severe personal injury or substantial property damage.</p>



### 6.3.2 Installation of Common Ground Wires

- **General Rule:**

In order to assure the interference free operation of the control, all control components (NC, PLC, EU, etc.) which are connected by means of signal cables have to be connected to the common ground wires.

- **Exception:**

The components connected by means of the fiber optics cables (FOC) do not require connection to the common ground.

At each configuration of the control, the installation of the common ground connections has to be done according to "EMC Guidelines for SINUMERIK and SIROTEC Controls" manual.

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The wires used for the ground connection have to have a cross-section of at least : 10 mm<sup>2</sup>. The connection with the earth-ground is done by means of grounding rail (see chapter EARTHING CONCEPT).

### 6.3.3 Installation of the Control and Power Cables

#### Definitions:

- **Signal Cables**, for example
  - command and actual value cables
  - data cables (RS232C, RS422, coupling cables, sensor cables, etc.)
  - all signal and control cables from/to NC power supply
  - binary input and output cables
  - EMERGENCY STOP cables
- **Power cables**, for example
  - low voltage power supply cables ( 24 V DC, etc.)
  - mains cables (110 V AC, 230 V AC, etc.) for power supply of NC, PLC, Extension Unit, Drive, etc.
  - contactor cables, both the primary and secondary circuits

In order to provide the best interference protection possible, the following EMC guidelines have to be followed:

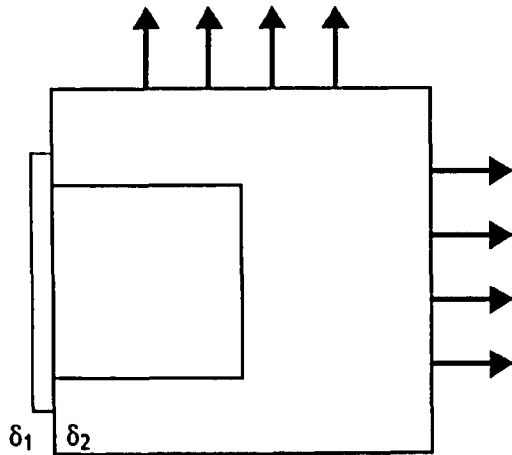
- Provide for the biggest possible space distance between the signal and power cables.
- If no other possibility exists, the power and signal cables may only cross each other but they may not run parallel close to each other.
- Only the for NC or PLC specified cables may be used for connections to and from NC or PLC.
- The signal cables may not be put in a close proximity to powerful magnetic fields generated by motors and transformers.
- Cables with oscillating or pulsating high frequency / voltage currents must always be run separately from all other cables.
- If it is not possible to provide for enough distance, the signal cables should be put in the shielded (metal) cable ducts.
- The distance (head-on interference surface) must be as small as possible between:
  - signal cable and signal cable
  - signal cable and associated common ground cable
  - common ground cable and equipment ground cable

For further information about the interference prevention measures and connecting of the shielded cables, please refer to "EMC Guidelines for SINUMERIK and SIROTEC Controls" manual.

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## 6.4 Heat Dissipation

### 6.4.1 Heat Dissipation (Keyboard, CRT)



#### 1) By Convection

The required surface of the enclosed space (steel or aluminum, 1.5 mm thick) is calculated using the following formula

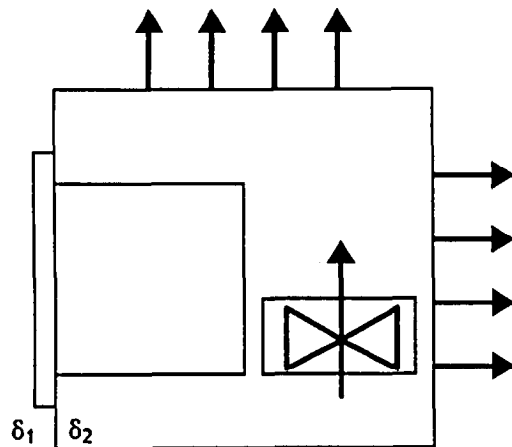
$$A[m^2] = \frac{P_V [W]}{5 \times (\delta_2 - \delta_1) [K]}$$

$P_V$  is the total of power dissipation for the unit installed in the enclosure (power dissipation  $\approx$  approx. rated power consumption)

$\delta_2$  is the temperature in the enclosure

$\delta_1$  is the ambience temperature

The formula above delivers approximate values when  $\delta_2 - \delta_1 \geq 10$  K. The formula does not consider the front panel and bottom surface of the enclosure.



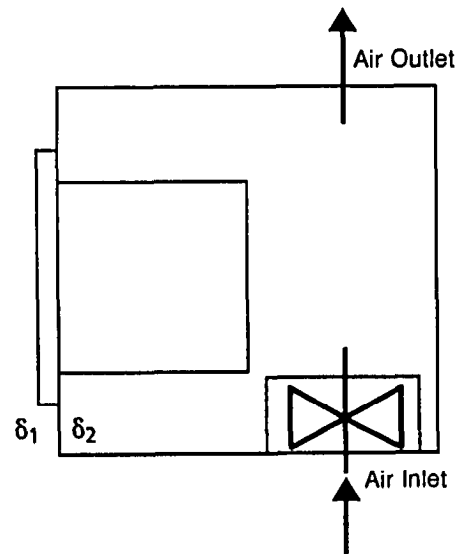
#### 2) By Air Circulation in Enclosure and Convection

The following formula applies:

$$A[m^2] = \frac{P_V [W]}{10 \times (\delta_2 - \delta_1) [K]}$$

For parameters, see 1)

Air volume of the fan  
100 to 165 m<sup>3</sup> / h



#### 3) By Passing the Air Through

The air volume necessary to transport the dissipated heat away is calculated by using the following formula:

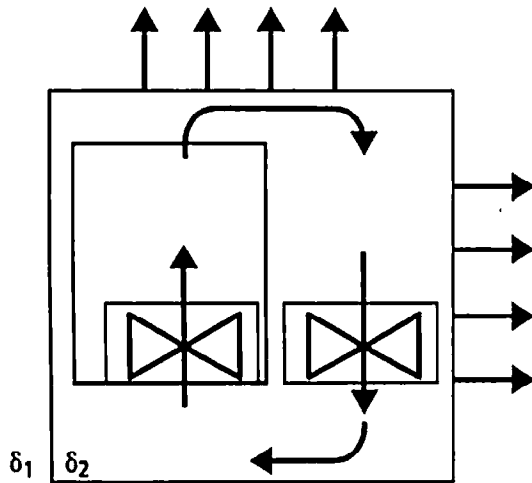
$$V[m^3 / h] = \frac{3.5 \times P_V [W]}{(\delta_2 - \delta_1) [K]}$$

For parameters, see 1)

Incoming air temperature  $\leq 55$  °C

(For calculation of the power dissipation  $P_V$ , see Section 6.2)

## 6.4.2 Heat Dissipation (Central Unit)



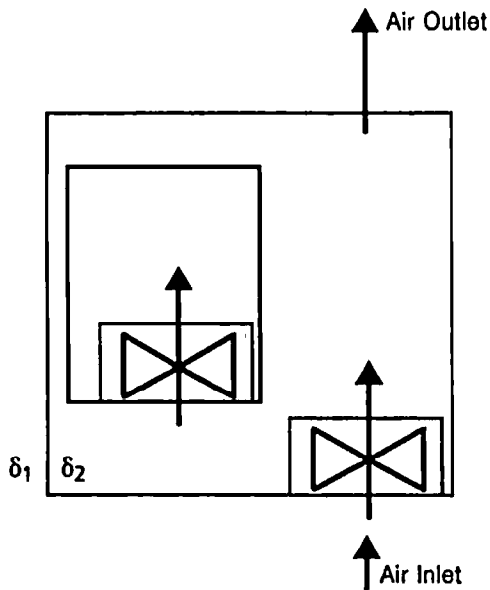
### 1) Heat Dissipation by Means of Convection and Internal Air Circulation

The approximate calculation for the free surface of the enclosed space (steel or aluminum 1.5 mm thick) assuming a temperature difference of

$\delta_2 - \delta_1 \geq 10\text{K}$  is done using the formula below:

$$A[\text{m}^2] = \frac{P_V [\text{W}]}{10 \times (\delta_2 - \delta_1) [\text{K}]}$$

The formula does not consider the front panel and bottom surface of the enclosure.



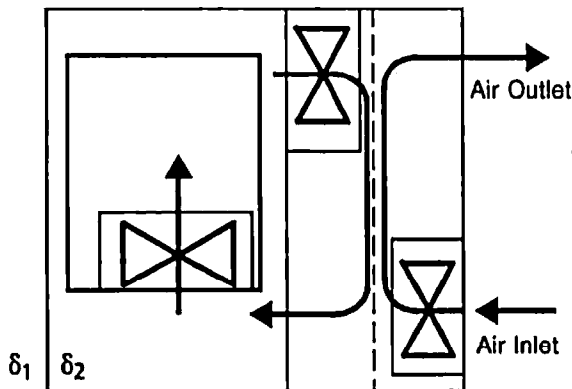
### 2) Heat Dissipation by Means of Passing the Air Through

Air temperature at the air intake:

$$\leq 55 \text{ }^\circ\text{C}$$

The air volume necessary to transport the dissipated heat away is calculated by using the following formula:

$$V[\text{m}^3/\text{h}] = \frac{3.5 P_V [\text{W}]}{(\delta_2 - \delta_1) [\text{K}]}$$



### 3) Heat Dissipation by Means of Heat Exchanger

The size of the heat exchanger is determined by the total amount of power dissipated within the enclosure.

Maximum temperature in the enclosure:  $+55 \text{ }^\circ\text{C}$

(For calculation of the power dissipation  $P_V$ , see Section 6.2)

## 7 Terms and Abbreviations

<b>AC</b>	Alternating current
<b>ASCII</b>	American Standard Code for Information Interchange
<b>Baud</b>	Unit of data transfer speed, 1 Baud = 1 bit per sec.
<b>Bit</b>	Binary digit; a binary information unit; a yes or no signal; unit for the amount of digital information; the smallest piece of information which can be addressed
<b>Bus</b>	Connecting cable, collective cable or bar for transmitting of signals, providing supply voltages, or for ground connection
<b>Byte</b>	Memory unit with mostly 8 bits, can interpret two decimal numbers or one alpha-numeric character; unit of the memory capacity
<b>CC</b>	Cam Controller
<b>CNC</b>	Computerized Numerical Control; microcomputer based numerical control with one or more microprocessors and respective system software capable of performing some or all NC functions.
<b>CPC</b>	Copper Cable
<b>CPU</b>	Central Processing Unit; central unit of a controller, calculation and control portion of a computer
<b>CU</b>	Central Unit
<b>DAC</b>	Digital Analog Converter
<b>DC</b>	Direct Current
<b>DL</b>	Datenbyte links
<b>DR</b>	Datenbyte rechts
<b>DW</b>	Data word
<b>EIA</b>	Electronic Industry Association
<b>Enable</b>	Enable signal of enable input
<b>Encoder</b>	Encoder outputs digital signals when its shaft rotates. The signals are then processed in the measuring circuits to determine the amount of travel which is an analog value.
<b>EPROM</b>	Erasable Programmable Read Only Memory
<b>ESD</b>	Electrostatically Sensitive Device
<b>EU</b>	Expansion Unit

<b>Fault</b>	An error, malfunction, fault signal
<b>FOC</b>	Fiber Optics Cable
<b>HMS</b>	High Resolution Measuring System
<b>HW</b>	Hardware
<b>IB</b>	Input Byte
<b>Increment</b>	a) the smallest unit of a numerical representation b) positioning step, if positioning in fix predetermined steps
<b>Incremental</b>	The measurements or distance related to the point reached immediately before as opposite to the relation to permanently fixed point
<b>INF</b>	Interface
<b>ISO</b>	International Organization for Standardization
<b>IW</b>	Input Word
<b>KBD</b>	Keyboard
<b>KSTT</b>	Customer Control Panel (CCP)
<b>LED</b>	Light Emitting Diode
<b>MCP</b>	Machine Control Panel
<b>MLFB</b>	Order Number
<b>MOD</b>	Mode of Operation, e.g. Automatic
<b>Module</b>	A self-contained assembly of electronic components and circuitry, board, PCB, or piece of software
<b>MPC</b>	Multi Port Controller
<b>NC</b>	Numerical Control
<b>OPST</b>	Operating Structure
<b>OPSY</b>	Operating System, system software
<b>PCB</b>	Printed Circuit Board
<b>PLC</b>	Programmable Logic Controller
<b>PS</b>	Power Supply
<b>QB</b>	Output Byte
<b>QW</b>	Output Word

<b>RAM</b>	Random Access Memory, a read-write memory
<b>Resolver</b>	A device which outputs an analog signal when its shaft rotates, used for indirect distance measurement
<b>RGB</b>	Red Green Blue, three signals which control the color CRT
<b>ROM</b>	Read Only Memory
<b>SPC</b>	Speed Position Controller
<b>SW</b>	Software
<b>TSC</b>	Terminal Strip Director



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**Suggestions**

**Corrections**

For Publication/Manual:

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Interface Description  
Part 2: Connection Conditions  
Planning Guide

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