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SYSTEM

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System

ECOFAST

Manual

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Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety as well as to avoid property damage. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage are not designated by a safety alert symbol. Depending on the danger level, the warnings will be displayed in descending sequence as follows.



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Warning

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Caution

used without safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

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indicates a potential situation which, if not avoided, may result in an undesirable result or state.

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Qualified Personnel

The device/system may only be set up and operated in conjunction with this documentation. Only **qualified personnel** should be allowed to install and work on the equipment. Qualified persons are defined as persons who are authorized to commission, ground and tag circuits, equipment and systems in accordance with established safety practices and standards.

Intended Use

Please note the following:



Warning

This device and its components may only be used for the applications described in the catalog or technical description, and only in connection with devices or components from other manufacturers approved or recommended by Siemens.

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We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Introduction and Notes on Using the Manual

Purpose of the manual

This manual is intended to serve as a reference document. The information it contains will help you operate the ECOFAST system with the PROFIBUS-DP and AS-Interface field buses.

Topics

This manual consists of instruction chapters and reference chapters. It covers the following topics, among others:

- System Description
- Product Family
- Installation Guidelines
- Installation
- Connections
- Commissioning
- Technical Data
- Dimension Drawings
- Order Numbers
- Questions and Answers
- ECOFAST Pilot Projects
- Glossary

Note

Notice

Important information requiring particular attention is enclosed between two horizontal lines.

Specifications

This manual only describes shared components of the ECOFAST system.

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Correction sheet

A correction sheet is attached at the end of this manual. Please enter any suggestions for improvements, additions or corrections there and return the sheet to us. In doing so, you can help us improve the next edition.

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ECOFAST System Description

1.1 Philosophy of the ECOFAST System

ECOFAST - An integrated connection system for data and power on the field level

The ECOFAST system (Energy and Communication Field Installation System) sets new standards whenever machines and plants need to be equipped with automation, control & distribution and drive technology. The central elements of the ECOFAST philosophy are extensive decentralization and modularization of the installation system and comprehensive diagnostics on the component level.

ECOFAST links all components of an automation system together using an integrated connection technique for data and power that complies with the high IP65 degree of protection. ECOFAST is thus an integral part of "Totally Integrated Automation" and open from the point of view of both manufacturers and users.

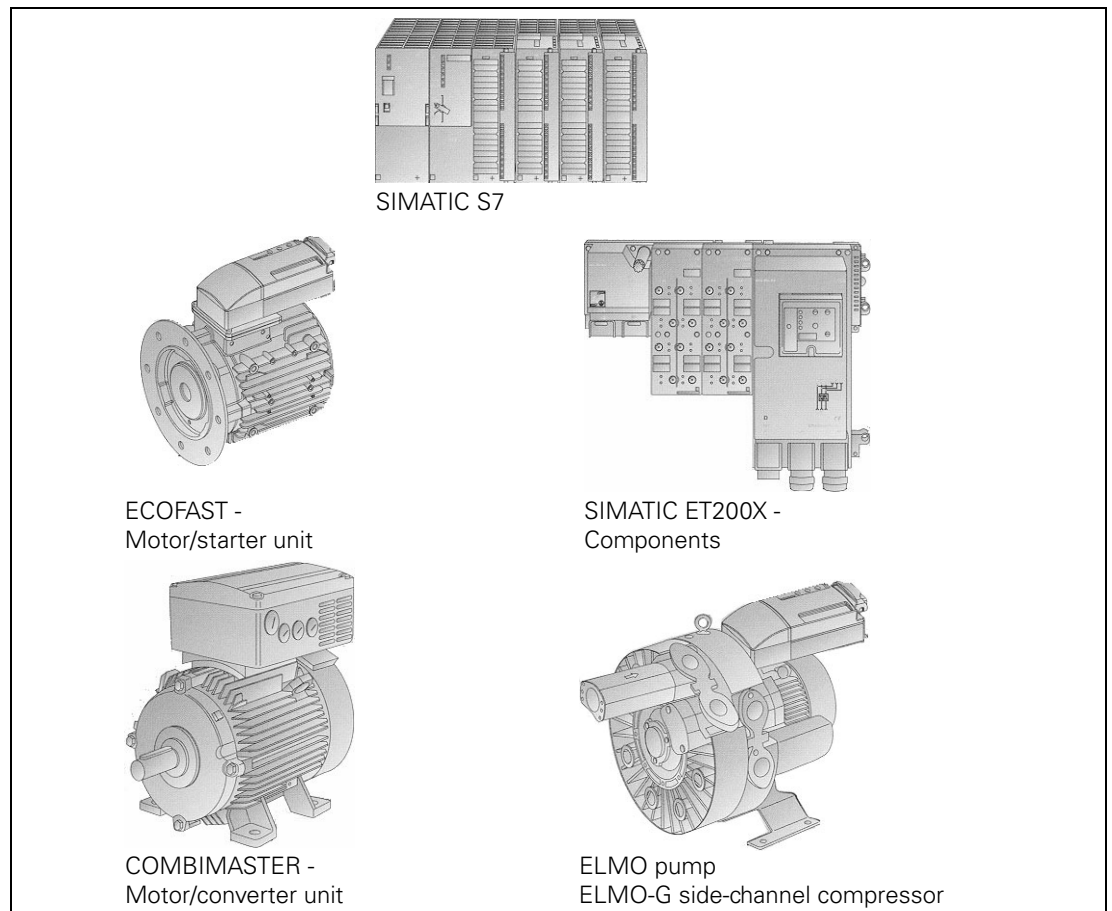


Fig. 1-1: Typical components of an automation system

1.1.1 Requirements Specified for Innovative Automation and Drive Systems

- Short phases for offering, planning and configuring machines and plants
- Rapid installation and assembly
- Quick and easy commissioning
- High system availability

Short phases for offering, planning and configuring machines and plants

- Modular planning process for machines and plants
- Offers prepared by combining prefabricated modules
- Use of CAD/CAE macros
- Use of standardized bus systems such as PROFIBUS-DP and AS-Interface
- Rapid installation and assembly
- Cabinetless installation systems with a high degree of protection
- Use of prefabricated and tested functional units
- Smaller system footprint
- Rapid installation on site
- Standardized connection method for power and data lines

Quick and easy commissioning

- Potential fault sources reduced to a minimum thanks to standardized connectors
- Comprehensive diagnostics on the device and over the bus
- Improved EMC because the contact unit and the drive are linked together directly

High system availability

- Shorter downtimes because devices can be replaced quickly and easily
- No need to interrupt the power and field buses in order to replace a device
- Automatic parameterization if a device is replaced
- Comprehensive status and diagnostic information
- Transfer of operating parameters, such as current values or status signals

1.1.2 Desina and Field Bus Certificates

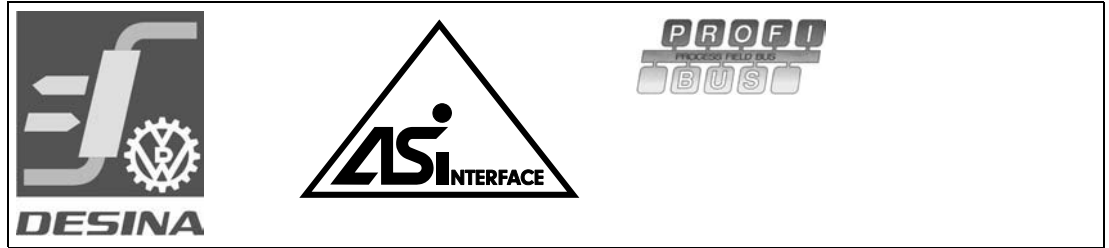


Fig. 1-2: Desina and Field Bus Certificates

Advantages

- Common connection method for all modules
- PROFIBUS-DP connected using Han Brid connectors
- AS-Interface connected using the insulation displacement method
- Power connected with HAN Q4/2 connectors
- Recommended by Profibus International (PNO) and
- Verein Deutscher Werkzeugfabriken VDW (DESINA)

1.1.3 ECOFAST certified and ECOFAST integrated



Fig. 1-3: ECOFAST certified and ECOFAST integrated certificates

ECOFAST certified

The new “ECOFAST certified” certificate, which is assigned by an accredited test laboratory, guarantees reliable planning. It confirms that devices from different manufacturers are compatible with ECOFAST specifications.

ECOFAST integrated

Another user-friendly and time-saving feature. Plans and quantity/parts lists are created along with the entire system documentation for ECOFAST ES.

Using an export function, they can then be easily integrated for further CAD processing. In addition to Siemens components, devices from other manufacturers can also be integrated in this configuration tool. Their integration and conformity is confirmed by the “ECOFAST integrated” certificate.

1.2 ECOFAST ES Software

The ECOFAST ES configuration tool supports power-engineering system design with the following range of functions:

- Graphical configuration of the consumers, cables, and switching/protection functions
- Power bus dimensioning by automatically determining cable cross-sections and automatic dimensioning of the switching/protection elements
- Power-engineering design and testing according to the relevant standards and today's generally accepted practices
- Creation of documentation: circuit diagram of the power bus, quantity/parts lists

1.3 The ECOFAST Basic System

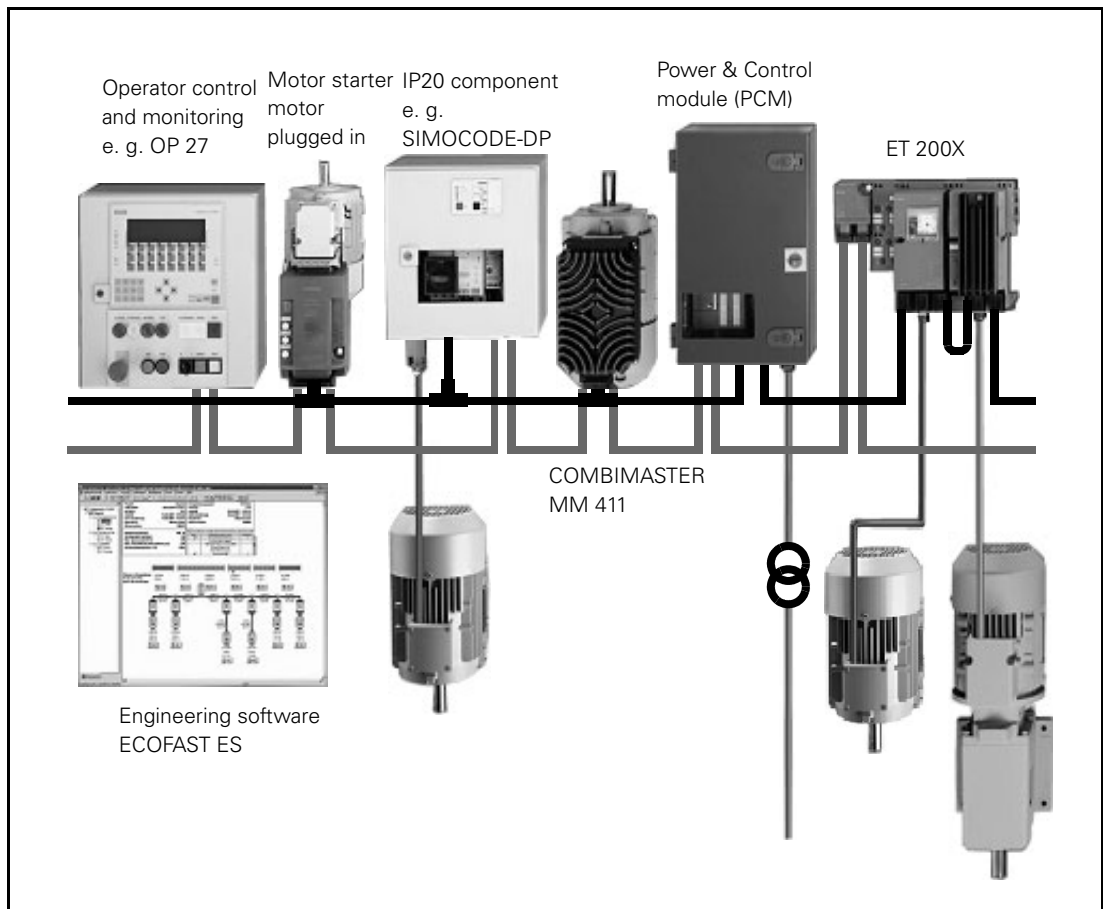


Fig. 1-4: The ECOFAST basic system

1.3.1 Topology of the Network

Block diagram

The block diagram below shows a possible topology of the ECOFAST network:

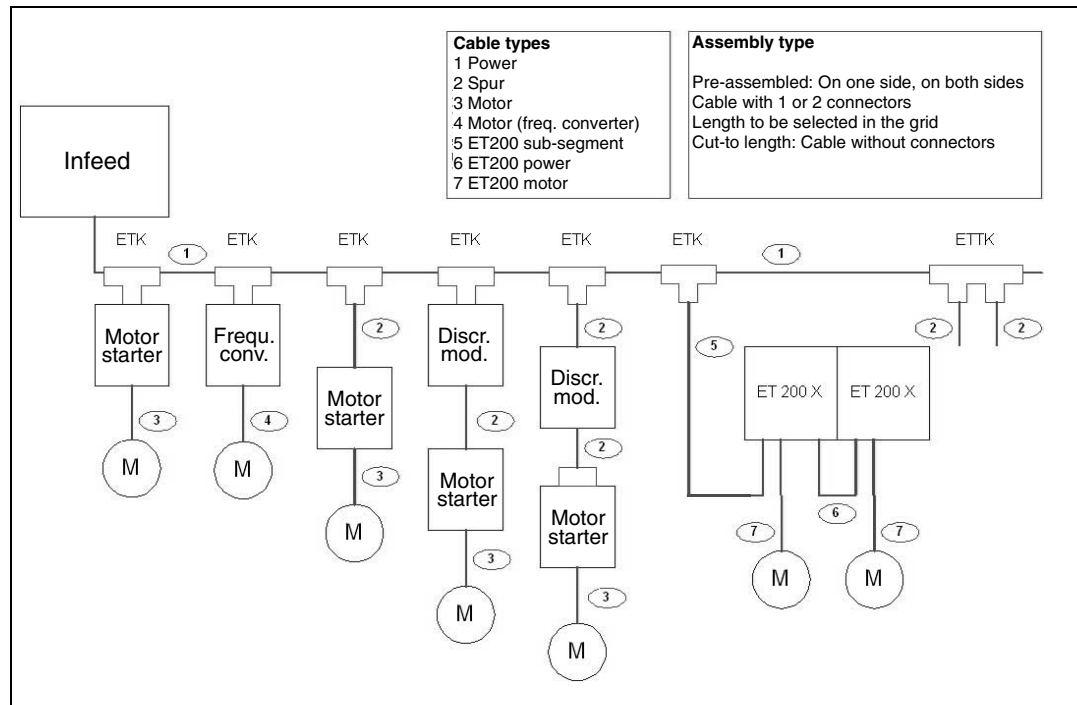


Fig. 1-5: Block diagram of the network topology

Power & control module (PCM)

- Supplies power up to 690 V
- Generates 24 V for interfaces to the field bus and the sensors
- Generates 24 V for actuators
(can be switched by EMERGENCY STOP modules in the power & control module)
- Integrates EMERGENCY STOP functionality

Power bus

The consumers are supplied by the power bus via power tee connectors.

Field bus



The DP master supplies the DP protocol to the hybrid line (fiber-optic or Cu). ECOFAST motor starters allow the stations on the PROFIBUS-DP to be connected without interruption to the data tee connector.



The AS-i master supplies the AS-i protocol to the AS-i line. The stations on the AS-Interface are connected using the insulation displacement method.

1.3.2 Overview of Interfaces

Diagram

The diagram below shows an overview of the system interfaces using the example of a motor starter:

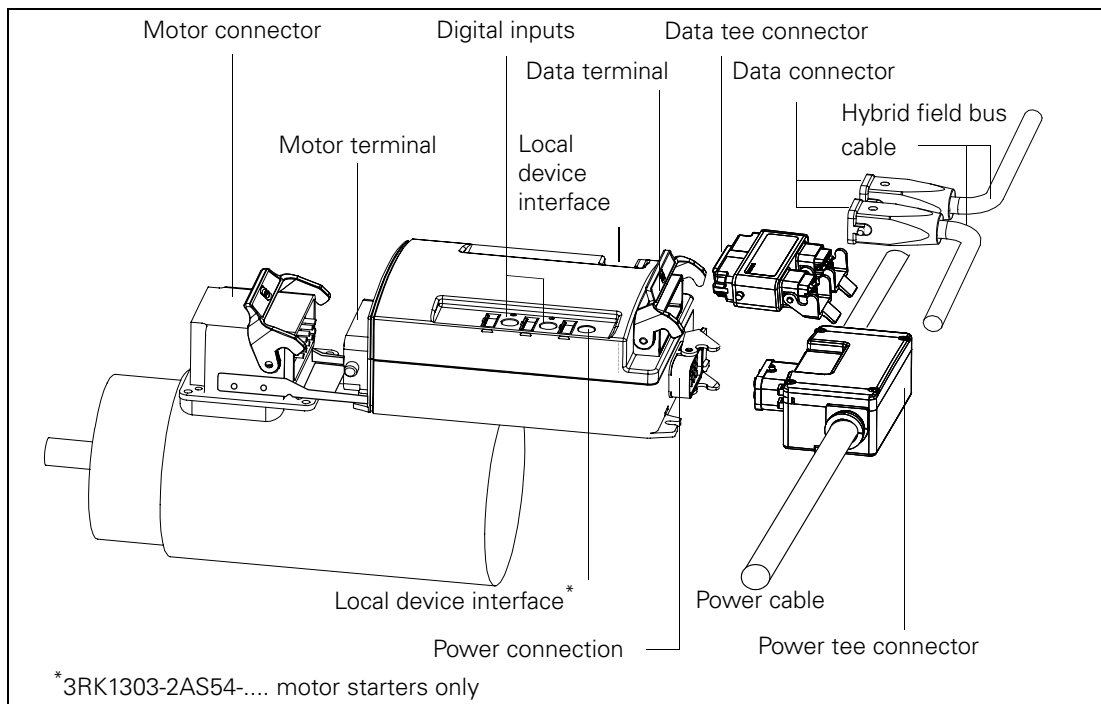


Fig. 1-6: Overview of Interfaces

Field Bus Interfaces

ECOFAST components feature the following field bus interfaces, depending on the device version:

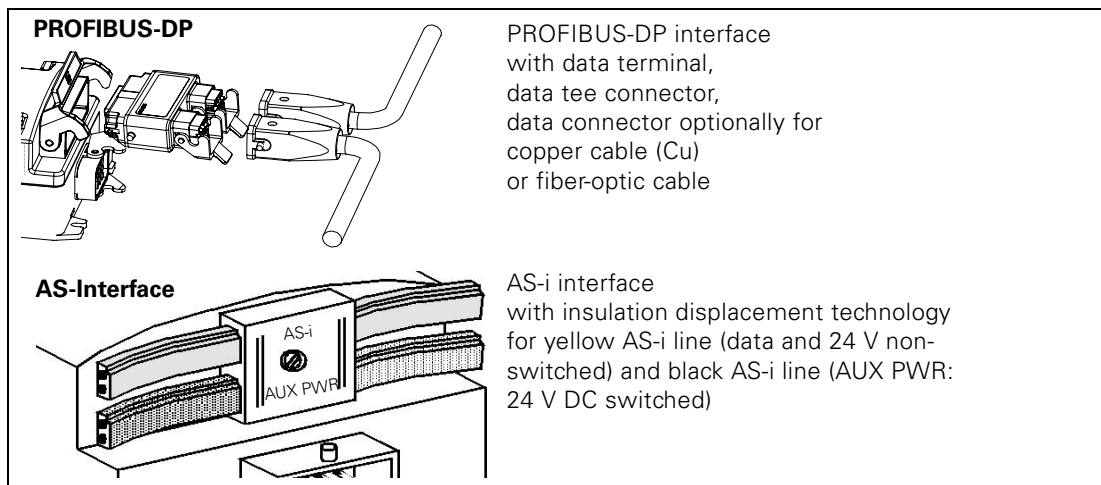


Fig. 1-7: Field bus interfaces

Product Family

2.1 Power & Control Module (PCM)

2.1.1 Tasks of the Power & Control Module (PCM)

The PCM performs the following tasks in the ECOFAST system:

- Supplying the connected ECOFAST components via two Han Q4/2 sockets with 400 V AC power
- Short-circuit protection with the S2 circuit-breaker
- Supplying the connected ECOFAST components via two Han Brid sockets with
 - 24 V DC switched (DC24V-S): This voltage is not always present. It is used to control the switching elements (e.g. contactor).
 - 24 V DC non-switched (DC24V-NS): This voltage is always present. It is used to supply power to the electronic ECOFAST components and sensors and interrogate auxiliary contacts.
 - PROFIBUS-DP
- Supplying the AS-Interface profile lines with 24 V DC (switched) (black, AUX PWR) and 24 V DC (non-switched) (yellow, AS-i) via AS-Interface.
- Protection and monitoring
- PLC function
 - Central SIMATIC S7 module: CPU 313-2 DP, 16 DI + 16 DO x 24 V DC with 64K memory card or
 - SIMATIC S7 slave module: ET 200M with digital input output module: SM 323 16 DI + 16 DO x 24 V DCA program for controlling the PCM is installed in the CPU at the factory. You can also store the user program for controlling your system here.
For more information, refer to
"System Software for S7 300/400, System and Standard Functions Reference Manual".
- EMERGENCY STOP function with contactor safety combination
 - Main switch function, rotary actuator
 - SIGUARD safety combination 3TK2 8... or
 - Safety at work 3RK1 1...
 - Stop category: 0 to EN 60204-1
(uncontrolled shutdown by means of immediate switch-off of power to the machine actuator components)
 - Category: 4 according to EN 954-1

2.1.2 Device Versions

The PCM is available in a housing version with degree of protection IP65 and for control cabinet mounting with degree of protection IP00.

Set-up

Depending on the device version, the PCM comprises the following components:

- PLC (DP master, DP slave, AS-i master)
- 3TK28 (SIGUARD) safety combination or AS-i monitor
- 24 V DC (switched (DC24V-S)) and 24 V DC (non-switched (DC24V-NS))
- 24 V DC (switched (AUX PWR)) and 30 V DC (non-switched (AS-i)) for AS-Interface

24 V DC power supplies

Safe separate supply according to PELV.

The 24 V DC power supplies (switched (DC24V-S) and non-switched (DC24V-NS)) are available in two different versions. Features to take into consideration during configuration:

- **Version 1:** SIDAC power supply
 - Equipped with a safety isolating transformer
 - Very high EMC resistance
 - Very robust
- **Version 2:** SITOP power supply
 - Very high control accuracy for output voltage
 - Settable voltage level
 - Lightweight

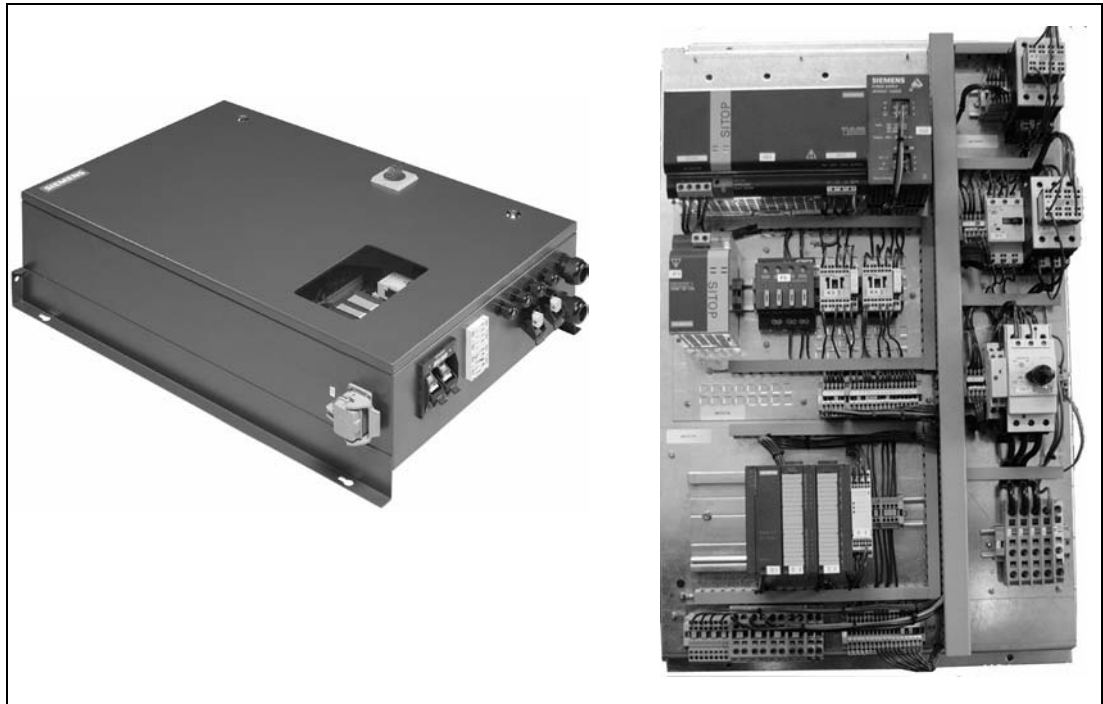


Fig. 2-1: Power & Control Modules (PCM) IP65 and IP00

2.1.3 PCM Order Numbers

Power and Control Module (PCM), version IP65			Order no.
Housing dimensions (W x H x D):		550 x 850 x 255 mm	
Overall dimensions w/o external connector (W x H x D):		600 x 920 x 310 mm	
Bus connection	Safety system	Generation of aux. voltage	
PROFIBUS master with S7-300 CPU 313C-2 DP	SIGUARD safety contactor combination	SIDAC DC 24 V, 10 A (NS), 10 A (S)	4FB2 111-2A . . . 1-0AA0
PROFIBUS master with S7-300 CPU 313C-2 DP + AS-i master with AS-i power supply 2.4 A			4FB2 121-2A . . . 1-0AA0
	AS-Interface Safety at Work	SITOP DC 24 V, 10 A (NS), 10 A (S)	4FB2 112-2A . . . 1-0AA0
			4FB2 112-2A . . . 2-0AA0
PROFIBUS slave with ET 200M	SIGUARD safety contactor combination	SIDAC DC 24 V, 10 A (NS), 10 A (S)	4FB2 111-2A . . . 1-0AA1
		SITOP DC 24 V, 10 A (NS), 10 A (S)	4FB2 111-2A . . . 2-0AA1
Power and Control Module (PCM), control cabinet mounting			
Housing dimensions (W x H x D):		550 x 850 x 255 mm	
Overall dimensions w/o external connector (W x H x D):		600 x 920 x 310 mm	
Bus connection	Safety system	Generation of aux. voltage	
PROFIBUS master with S7-300 CPU 313C-2 DP	SIGUARD safety contactor combination	SIDAC DC 24 V, 10 A (NS), 10 A (S)	4FB2 111-2A . . . 1-0AA2
PROFIBUS master with S7-300 CPU 313C-2 DP + AS-i master with AS-i power supply 2.4 A			4FB2 121-2A . . . 1-0AA1
	AS-Interface Safety at Work	SITOP DC 24 V, 10 A (NS), 10 A (S)	4FB2 112-2A . . . 1-0AA1
			4FB2 112-2A . . . 2-0AA1
PROFIBUS slave mit ET 200M	SIGUARD safety contactor combination	SIDAC DC 24 V, 10 A (NS), 10 A (S)	4FB2 111-2A . . . 1-0AA3
		SITOP DC 24 V, 10 A (NS), 10 A (S)	4FB2 111-2A . . . 2-0AA3
Main power supply	Breaking capacity	External back-up fuse ^{*)}	
16 A	50 kA	100 A	A0
20 A	50 kA	125 A	B0
25 A	50 kA	125 A	C0
32 A	50 kA	125 A	D0
40 A	50 kA	160 A	E0
			Unregulated 1
			Regulated 2

Table 2-1: PCM device versions

*) External back-up fuse

If the short-circuit current at the installation location exceeds $I_{cu} = 100$ kA, a back-up fuse (gL/gG) with the maximum value specified in the table is required.

Max. input voltage: 415 V AC.

2.2 Alternative Power Supply

2.2.1 Simple Energy Unit (SEU)

For applications with an external 24 V auxiliary power supply or which require a different automation structure, it is not necessary to use a complete PCM module with incoming supply, auxiliary power supply generation and automation component.

In these cases we recommend using a circuit-breaker, two contactors and two cable through-feeds as a "Simple Energy Unit" (SEU) which can be mounted in existing control cabinets.

The SEU is used in a IP65 housing. The 24 V auxiliary power and the wiring including the EMERGENCY STOP must be provided by the plant.

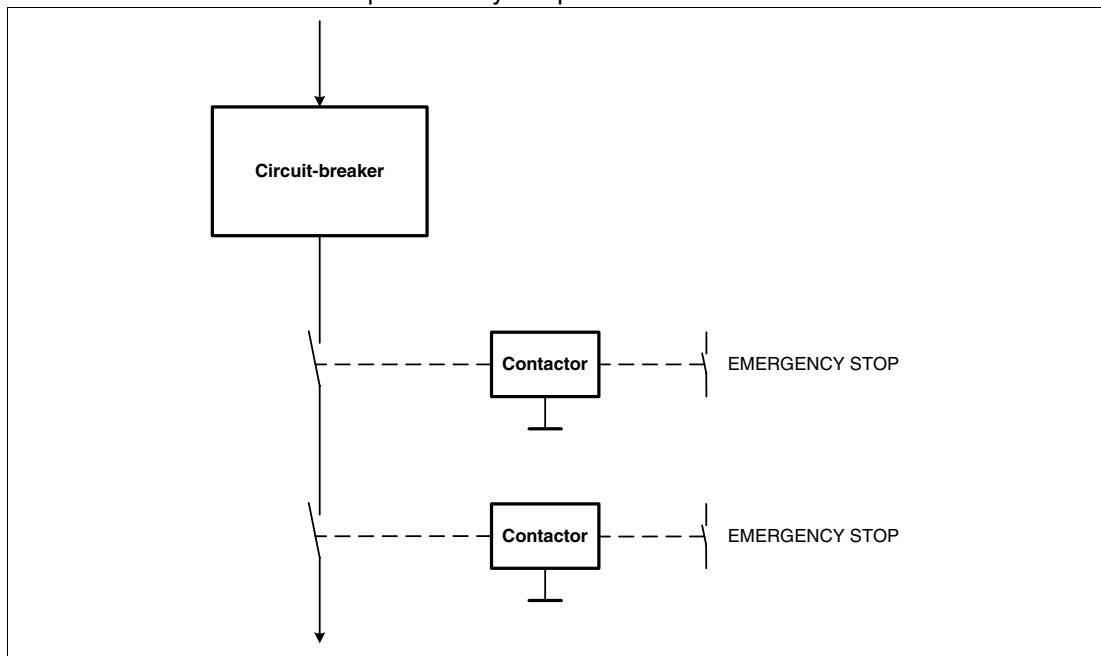


Fig. 2-2: Simple Energy Unit (SEU)

Device versions

The SEU is available for the following supply voltages: 8 A, 16 A, 20 A, 25 A, 32 A, 40 A, 50 A. The frame sizes S00 and S0 are provided for 8 A.

With the exception of the version 8 A with frame size S00, the SEUs correspond to type of coordination 2, i.e. in case of a short circuit, the contactor and the overload relay must not endanger either personnel or the plant and must be suitable for further use.

SEU Type	Circuit-breaker		Contactor with Auxiliary Switch	Type of coordination/Short-Circuit Breaking Capacity
	Order No.	I_N [A]		
S00	3RV1011-1HA10	8.00	3RT1015-1BB44-3MA	Type of coordination 1/ $I_q=50$ kA
S0	3RV1021-1HA10	8.00	3RT1024-1BB44-3MA	Type of coordination 2/ $I_q=130$ kA
S2	3RV1031-4AA10	16.00	3RT1026-1BB44-3MA0	Type of coordination 2/ $I_q=130$ kA
S2	3RV1031-4BA10	20.00	3RT1026-1BB44-3MA0	Type of coordination 2/ $I_q=130$ kA
S2	3RV1031-4DA10	25.00	3RT1034-1BB44	Type of coordination 2/ $I_q=100$ kA
S2	3RV1031-4EA10	32.00	3RT1034-1BB44	Type of coordination 2/ $I_q=100$ kA
S2	3RV1031-4FA10	40.00	3RT1035-1BB44	Type of coordination 2/ $I_q=100$ kA
S2	3RV1031-4HA10	50.00	3RT1036-1BB44	Type of coordination 2/ $I_q=100$ kA

Table 2-2: Device versions: Simple Energy Unit

2.2.2 ET 200S Motor Starter

For applications with an external 24 V auxiliary power supply or which require a different automation structure, it is not always necessary to use a complete PCM module with incoming supply, auxiliary power supply generation and automation component.

In these cases, an ET 200S motor starter can be used as an alternative to the SEU, which can protect and switch a complete chain. In combination with the terminal and the power module, they form a completely wired unit. Up to 5 expansions (16 A each) can be achieved by linking terminal blocks.

All parameterizations, messages and switching commands possible in ET 200S can be transmitted via profi bus for automation.

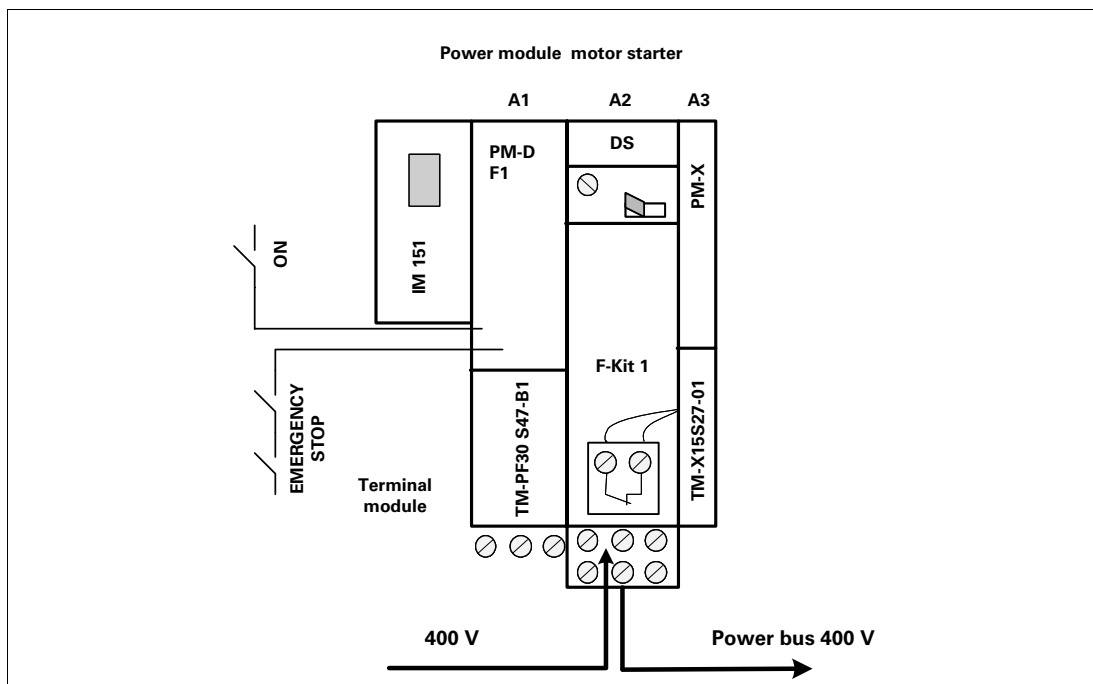


Fig. 2-3: Overview: ET 200S as incoming supply

2.3 Power Tee Clamp Connector

Tasks

Power tee clamp connectors connect ECOFAST components with the power bus. The power bus is not interrupted when the ECOFAST components are unplugged.

Two different versions are available:

- Power tee clamp connector with Han Q4/2 socket. This version connects the power bus with the load.
- Power tee-tee clamp connector with Han Q4/2 socket. This version connects the power bus with two loads. As an alternative, a further power bus segment can be fed via the second Han Q4/2 socket.

The clamp connectors may be inserted anywhere within the wiring chain. The round cable is contacted via insulation displacement or screw-type terminals without interrupting the wires. Cables with individual wires according to DIN VDE 0281/0295 with conductor cross sections ranging from 2.5 to 6 mm² are suitable for use.

Versions

The following versions are currently available:

Order no.	Version
3RK1911-2BF01	Power tee clamp connector Han Q4/2, cable cross section 2.5 – 4 mm ²
3RK1911-2BF02	Power tee clamp connector Han Q4/2, cable cross section 4 – 6 mm ²
3RK1911-2BG02	Power tee-tee clamp connector Han Q4/2, cable cross section 4 – 6 mm ²

Table 2-3: Versions of power tee clamp connectors

Seals for Power Tee Clamp Connectors

Suitable seal sets are required for the power tee clamping connectors to attain degree of protection IP65/67. A seal set contains two seals, which are available with different internal diameters depending on the external diameter of the round cable used.

ECOFAST power cables with 7 x 2.5 mm² and 5 x 4 mm² have an external diameter of approx. 15 mm. If a power tee clamp connector is the last connector on the power bus, i.e. if the power cable is not continued, the cable throughfeed has to be sealed with a filler plug.

Sealing sets are not supplied with the power tee clamp connector. They must be ordered separately.

The following sealing sets are currently available:

Order No.	Round cable/mm Ø
3RK1911-5BA00	10 to 13
3RK1911-5BA10	13 to 16
3RK1911-5BA20	16 to 19
3RK1911-5BA30	19 to 22
3RK1911-5BA50	Filler plug

Table 2-4: Sealing sets for power tee clamp connectors

Design

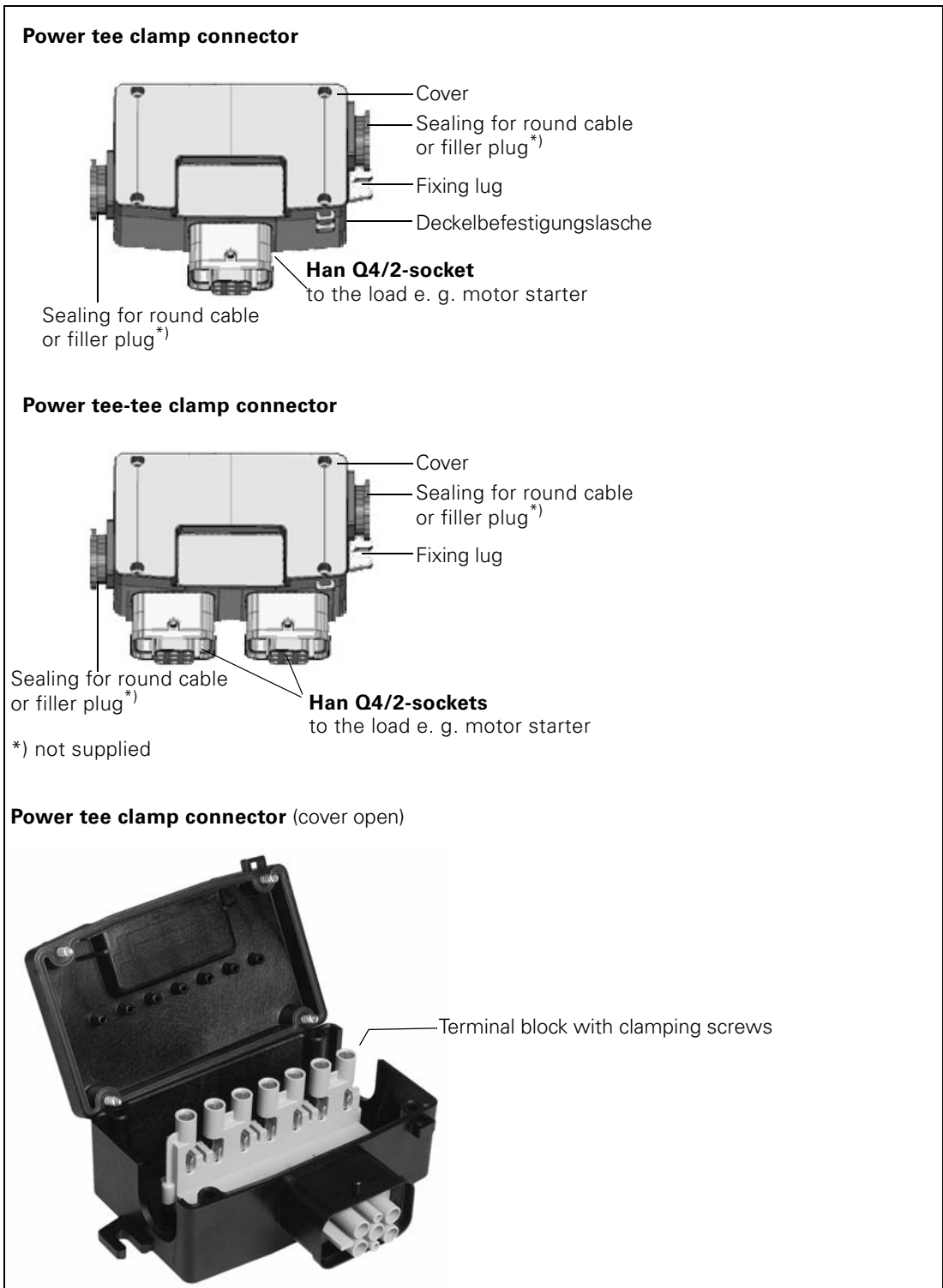


Fig. 2-4: Power tee/tee-tee clamp connector

2.4 Hybrid Field Bus Connections

Tasks

In the ECOFAST system, hybrid field bus connections act as an interface between the control cabinet/terminal box (IP20) and the field bus level (IP65/67).

In the ECOFAST system, hybrid field bus connections perform the following functions:

- Supply:
 - data via RS 485, shielded copper cable (Cu) or fiber-optic cable.
 - 2 x 24 V DC, switched (S) and non-switched (NS).
- Conducting:
 - data via RS 485, shielded copper cable (Cu) or fiber-optic cable.
 - 2 x 24 V DC, switched (S) and non-switched (NS).
- Repeater function
- Media converter

Installation

Hybrid field bus connections always have 2 channels (2 Han-Brid on the IP65 side).

Depending on the device version, the hybrid field bus connection comprises the following components:

- IP65 side (field bus level)
 - Han-Brid pin/socket for conducting
 - Han-Brid socket/socket for supplying IP20 to IP65
- IP20 side (in control cabinet)
 - Terminal block for 2 x 24 V DC (switched and non-switched)
 - PROFIBUS-DP: Shielding terminals and A/B terminals or SUB-D socket (9-pin) or Fast-Connect.



Fig. 2-5: Hybrid field bus connections

Notice

Please observe the set-up recommendations for PROFIBUS-DP (see chapter 3.2).

Versions

The following versions are currently available:

Order No.	Function	Segment 1/2 – Medium	PROFIBUS-DP – IP20
3RK1911-1AA22	Supply (passive)	Socket/socket (copper)	A/B terminals
3RK1911-1AA32	Conducting (passive)	Pin/socket (copper)	A/B terminals
3RK1911-1AB22	Supply (active)	Socket/socket (fiber-optic cable)	SUB-D socket
3RK1911-1AB32	Conducting (active)	Pin/socket (fiber-optic cable)	SUB-D socket
3RK1911-1AE22	Supply (active)	Socket/socket (copper)	SUB-D socket
3RK1911-1AE32	Conducting (active)	Pin/socket (copper)	SUB-D socket
3RK1911-1AF22	Supply (passive)	Socket/socket (copper)	Fast-Connect
3RK1911-1AF32	Conducting (passive)	Pin/socket (copper)	Fast-Connect

Table 2-5: Hybrid field bus connection versions

Passive and active

- Passive means that the signals are not regenerated. The IP20 and IP65 sides are electrically connected.
- Active means that the signals are regenerated (repeater function). The IP20 and IP65 sides are electrically isolated for versions with a fiber-optic cable.

24 V DC non-switched supply voltage (NS)

This voltage is required for:

- supplying the electronics (in the case of the active versions)
- transfer connection

24 V DC switched supply voltage (S)

This voltage is required for:

- transfer connection

2.5 Data Tee Plug Connector

Definition

Data tee plug connectors connect the components of an automation system with

- PROFIBUS DP
 - Data tee plug connector with copper cable (PROFIBUS-DP Cu)
 - Data tee plug connector with fiber-optic cable (PROFIBUS-DP LWL)
- Non-switched supply voltage 24 V DC (DC24V-NS)
- Switched supply voltage 24 V DC (DC24V-S)

Non-switched supply voltage 24 V DC

This voltage is required for

- supplying the electronics in the motor starter
- interrogating the auxiliary contacts

Switched supply voltage 24 V DC

This voltage is required for

- controlling the switching elements (e.g. contactor)

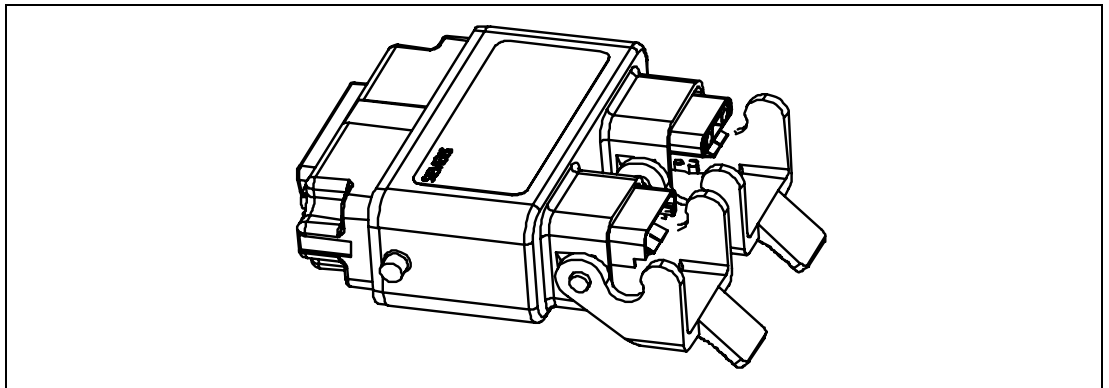


Fig. 2-6: Data tee plug connector

2.6 Discriminating Module and Maintenance Switch

2.6.1 Discriminating Module

The discriminating module performs the following tasks in the ECOFAST system:

- Protecting the line when the cross-section is reduced
- Expanding the system with the same or a smaller line cross-section
- Switching off part of the system selectively in the event of an overload or short circuit
- Disconnecting part of the system and securing this operating status with padlocks

Set-up

The discriminating module comprises a circuit-breaker, mains switch and alarm switch.

The discriminating module has the following connections:

- Han Q4/2 pin for supplying the power
- Han Q4/2 socket for conducting the power
- M12 connector for check-back contact

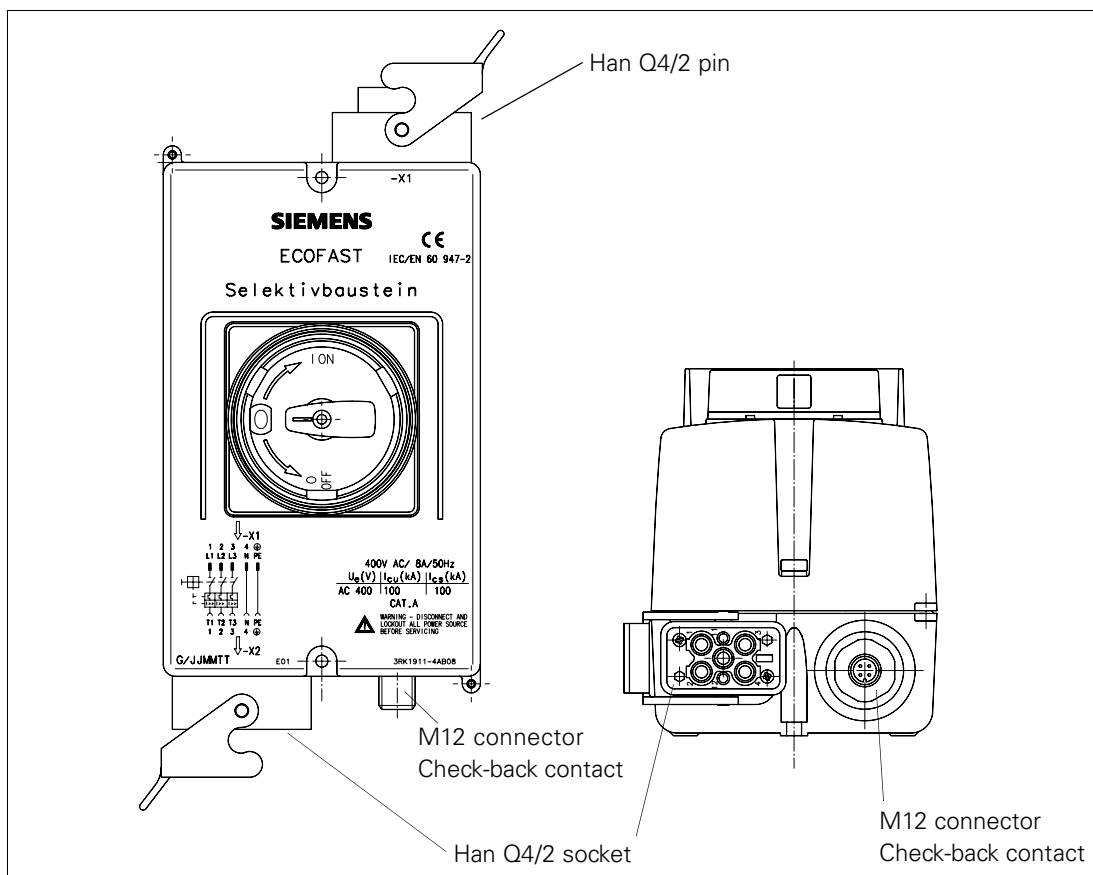


Fig. 2-7: Set-up of the discriminating module

Device versions

Discriminating modules are available in three different device versions:

Device version	Current	Order No.
1	25 A	3RK1911-4AB25
2	16 A	3RK1911-4AB16
3	8 A	3RK1911-4AB08

Table 2-6: Discriminating module versions

2.6.2 Maintenance Switch with M12 Connector

The maintenance switch in the ECOFAST system is based on the 3LD2164-1GP51 standard main switch (type: black/gray).

The rated current is 25 A. The maintenance switch is equipped with an HAN Q4/2 connecting unit (pin insert) for the power supply infeed. The power is transferred via a 0.5 m Ölflex 110H cable and an HAN Q4/2 socket. The switching status can be checked via the built-in M12 connector (pin) (DESINA Spec_11).

Maintenance switch with M12 connector, rated current 25 A:

6AG1264-1GP51-6AA0

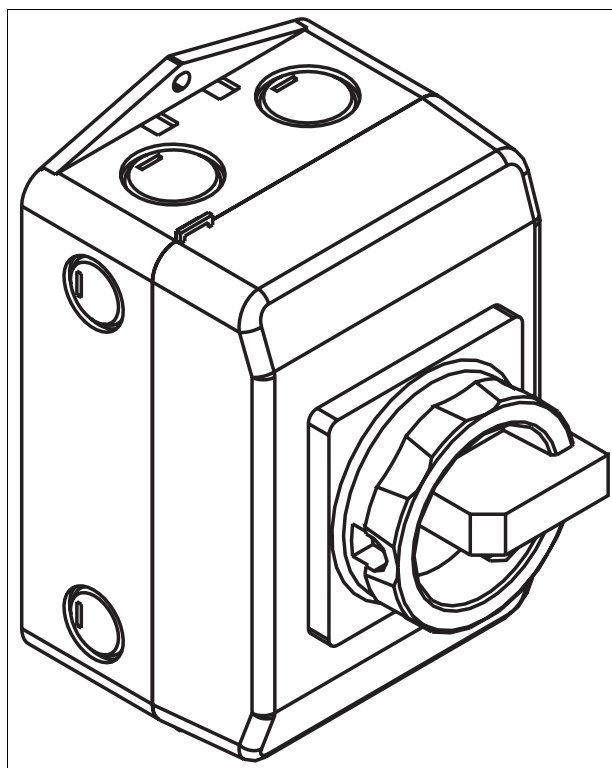


Fig. 2-8: Maintenance switch with M 12 connector (pin) for check-back

Installation Guidelines

3.1 Installation Guidelines for PROFIBUS-DP with ECOFAST Hybrid Field Bus Cable

ECOFAST hybrid field bus cable

ECOFAST hybrid field bus cables are suitable for trailing. They are shielded with two copper cores for PROFIBUS-DP and four 1.5 mm² copper cores for 24 V DC switched (DC24V-S) and 24 V DC non-switched (DC24V-NS).

What is a bus segment?

The PROFIBUS-DP consists of at least one bus segment. Each bus segment has at least two stations, of which at least one is a DP master.

Maximum configuration of a bus segment

A bus can consist of up to 32 stations, all physically connected by means of an ECOFAST hybrid field bus cable.

You must connect the bus terminating connector at the beginning and end of the bus.

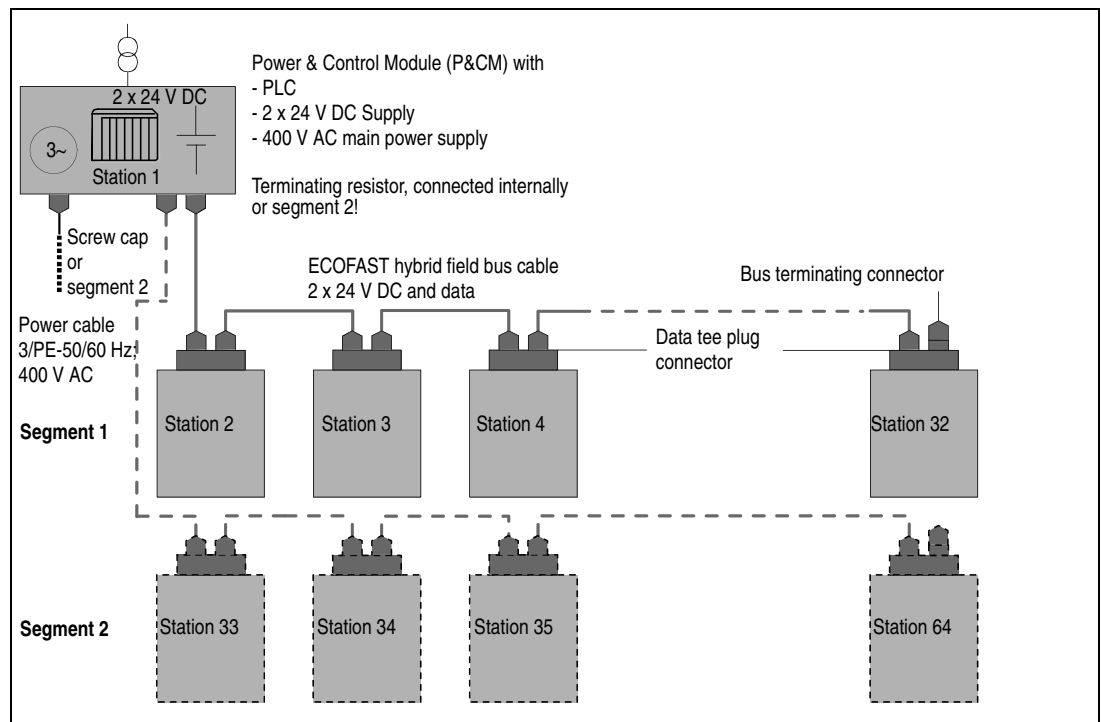


Fig. 3-1: Set-up of a bus segments with RS 485

Key data of a bus segment

The maximum line length of a bus segment depends on the baud rate that is used:

Baud rate	Max. line length of a segment [m]
9.6 to 187.5 kBaud	1000
500 kBaud	400
1.5 MBaud	200
3 to 12 MBaud	100

Table 3-1: Permissible line length of a bus segment based on the baud rate

3.2 Installation Guidelines for PROFIBUS-DP with ECOFAST Hybrid Field Bus Cable (Fiber-optic Conductors)

ECOFAST hybrid field bus cable

ECOFAST hybrid field bus cables are suitable for trailing. They have two plastic fiber-optic conductors for PROFIBUS-DP and four 1.5 mm² copper cores for 24 V DC switched (DC24V-S) and 24 V DC non-switched (DC24V-NS).

Connection to PROFIBUS-DP

If you want to bridge long distances with the field bus regardless of the baud rate, or if disturbance fields must not be allowed to interfere with data traffic on the bus, you should use fiber-optic cables instead of copper cables.

The PROFIBUS-DP stations are connected to the PROFIBUS-DP by means of

- Separate data tee plug connectors with fiber-optic cables (PROFIBUS-DP LWL)
- Integrated plug connectors, e.g. ET 200X base module BM143

Advantages and applications

Fiber-optic cables have the following advantages compared to electrical conductors:

- Electrical isolation of the PROFIBUS-DP components
- Insensitivity to electromagnetic interference (EMC)
- No electromagnetic radiation into the environment
- Additional grounding and shielding measures can consequently be dispensed with
- No need to comply with minimum distances from other lines on account of EMC
- No need for equipotential bonding jumpers
- No need for lightning protection elements
- Maximum permissible line lengths are no longer dependent on the baud rate

Optical PROFIBUS-DP network with line topology

The optical PROFIBUS-DP network is designed with a line topology. The PROFIBUS-DP stations are connected together in pairs by means of DESINA hybrid field bus cables. If one PROFIBUS-DP station fails, the line topology means that all downstream DP slaves are no longer accessible to the DP master. Faults can thus be easily localized.

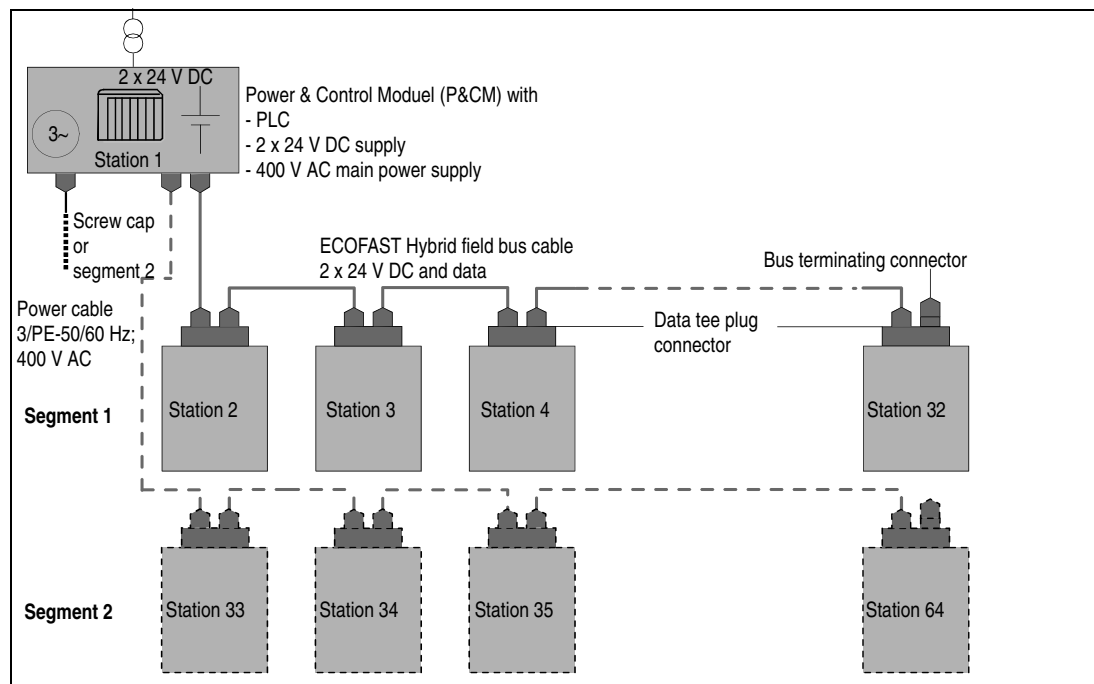


Fig. 3-2: Optical PROFIBUS-DP network with line topology

Baud rate

The optical PROFIBUS-DP network with a line topology can be operated with the following baud rates:

9.6, 19.2, 45.45, 93.75, 187.5, 500 kbaud, 1.5 and 12 Mbaud.

Line lengths

If fiber-optic cables are used, the length of the transmission link is independent of the baud rate.

Every PROFIBUS-DP station connected to the optical PROFIBUS-DP network has a repeater functionality. The distances specified below therefore refer to the distance between two neighboring PROFIBUS-DP stations in the line topology.

The maximum line length between two PROFIBUS-DP stations is dependent on the type of fiber-optic cable that is used.

Fiber-optic cable	Max. line length between 2 stations [m]	Projection to 1 network (= 32 stations) [m]
ECOFAST hybrid field bus cable	50	1550

Table 3-2: Permissible line lengths in the optical PROFIBUS-DP network

3.3 Guidelines for PROFIBUS-DP Standard Cables

3.3.1 Potential Equalization

When do differences in potential occur?

Differences in potential can occur, for example, when different mains supplies are used. Damage may be caused to the system as a result of potential differences between various system parts if:

- programmable controllers and inputs/outputs are connected by potentialbonded couplings, or
- cable shields are connected at both ends and grounded to different parts of a system.

Avoiding potential differences

It is important to install potential equalization lines in order to minimize potential differences and ensure the functionality of the electronic components.

When and why do you need potential equalization?

Potential equalization has the following advantages:

- Devices with a grounded interface may be destroyed as a result of potential differences.
- The shielding of the PROFIBUS cable must not be used for potential equalization. This is the case, however, with any parts of the system that are linked together via the cable shield, but are connected to different grounding points.
- Potential equalization is a precondition of lightning protection.

Rules for potential equalization

Note the following points:

- The smaller the impedance of the potential equalization line, the higher the efficiency of potential equalization.
- If shielded signal cables are installed between certain parts of the system and are connected at both ends to ground/protective conductors, it is important to ensure that the impedance of the additional potential equalization line is not in excess of 10% of the shield impedance.
- Use connectors with large contact areas to connect the potential equalization conductors to the ground/protective conductor.
- Protect the potential equalization conductors against corrosion.
- Use potential equalization conductors made of copper or galvanized steel.
- Route the potential equalization conductors in such a way that the areas bounded by the potential conductor and the signal lines are as small as possible.
- Use equipotential bonding conductors made of copper or galvanized steel.

Notice

Equipotential bonding conductors are not necessary if the parts of the system are connected to each other exclusively by means of fiber-optic cables.

3.3.2 Cable Shielding

Definition

Shielding is a means of weakening (attenuating) magnetic, electric and electromagnetic interference fields.

Interference currents on cable shields are diverted to ground via the shield busbar, which forms a conductive connection with the housing. It is particularly important to ensure a low-ohmic connection to the protective conductor, as otherwise the interference currents themselves may become a source of interference.

Measures for cable shielding

Note the following points:

- If possible, use only cables with braided shields. The shield density should be more than 80%. Avoid using cables with foil shielding, because tensile and compressive loads at the attachments can easily damage the foil. The result is a reduction in shield efficiency.
- Always connect the cable shields at both ends. It is only when the shielding is connected at both ends that interference suppression is effective at the high end of the frequency range.

Exceptions: It may be better to connect the shield at one end only, if

- for some reason it is not possible to install potential equalization lines,
- analog signals (in the low mV or A range) are transmitted, or
- foil shielding (static shields) is used.

Note, however, that if the shield is connected at one end only it can suppress only low-frequency interference.

- Connect the shield of the data line to the plug body.
- If the system is installed for stationary operation, it is advisable to remove the insulation from the shielded cable without interruption and connect the cable to the shielding/protective conductor busbar.

Notice

If a potential difference occurs between the grounding points, an equalization current can flow through a shield connected at both ends.

In this case, install an additional potential equalization line.

Correct Shield Installation

Observe the following points:

- Use cable clamps made of metal to secure the braided shield.
- The enclosing clamps must hold a large part of the shield and make good contact (see Figure).
- Connect the shield to a shield busbar immediately adjacent to the point where the cable enters the cabinet.

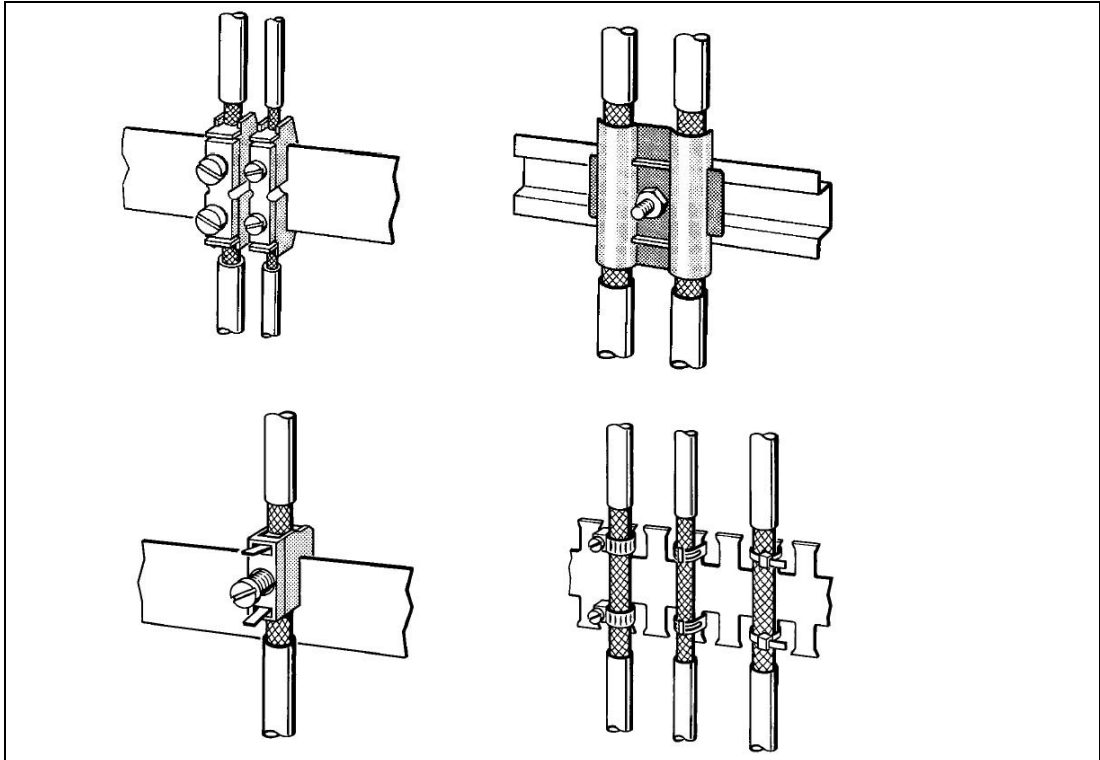


Fig. 3-3: Securing shielded cables with cable clamps and cable ties (schematic diagram)

3.4 PNO Installation Guidelines

PNO installation guidelines

Please comply with the PROFIBUS-DP/FMS Installation Guidelines of the PROFIBUS-Nutzerorganisation (user organization) when using electrical networks. They describe important measures to be taken as regards the wiring, cabling and commissioning of PROFIBUS networks.

Publisher

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Haid-und-Neu-Straße 7
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Internet: <http://www.profibus.com>

Guideline order number: 2.111

3.5 Power Bus Installation Versions

3.5.1 Unassembled set-up with power tee clamp connector and power cable

Installation

The consumers are connected to the power bus via the power tee clamp connector. The power cable is installed in one piece in the plant. In the set-up shown in the figure below, only one HAN Q4/2 connector set has to be assembled at the beginning and at the end of the power cable.

Benefits

- In principle, any cable with a diameter between 10 mm and 22 mm can be used in accordance with requirements.
- The power tee clamp connector can be connected at any point.

Diagram

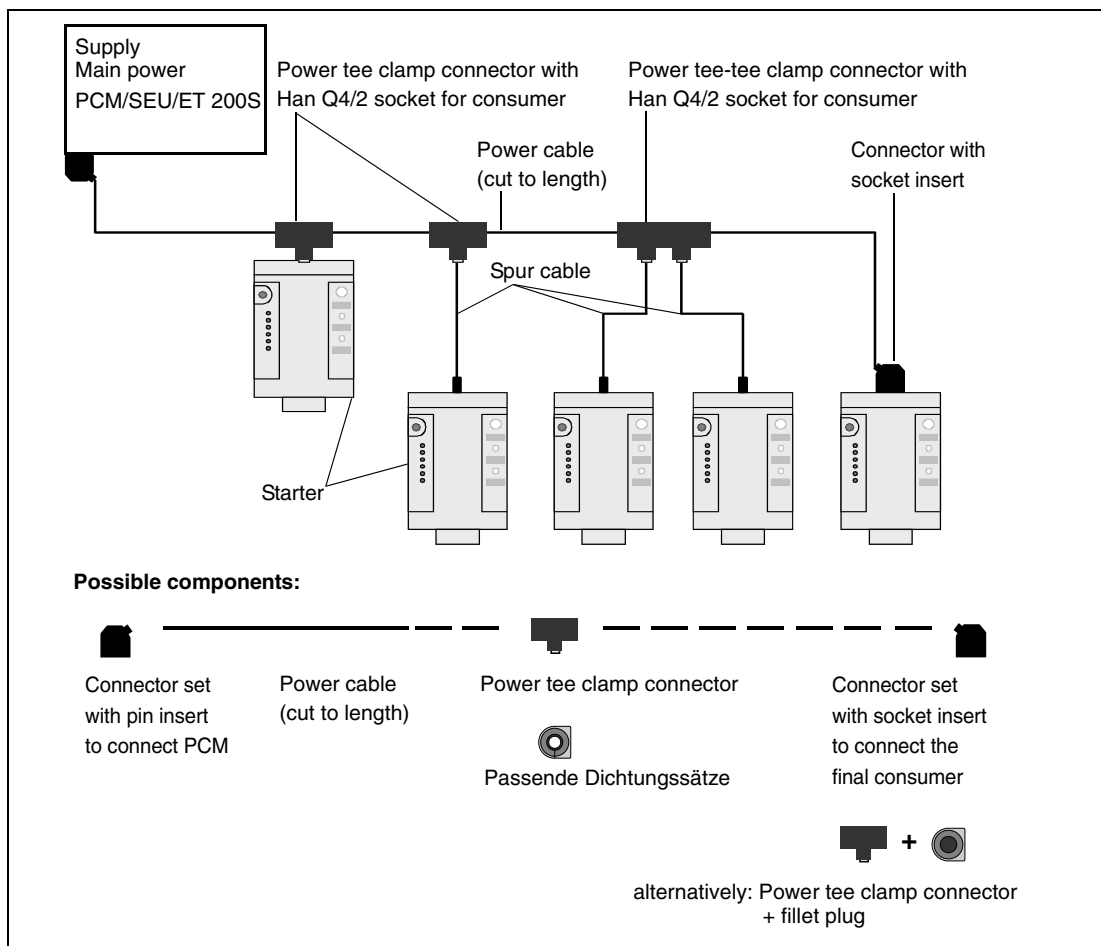


Fig. 3-4: Set-up with power tee clamp connector

3.5.2 Connecting Consumers with a Spur Cable

Set-up

The consumers are connected to the power bus via a spur cable and a power tee clamp connector.

The spur cable can be ordered preassembled.

Diagram

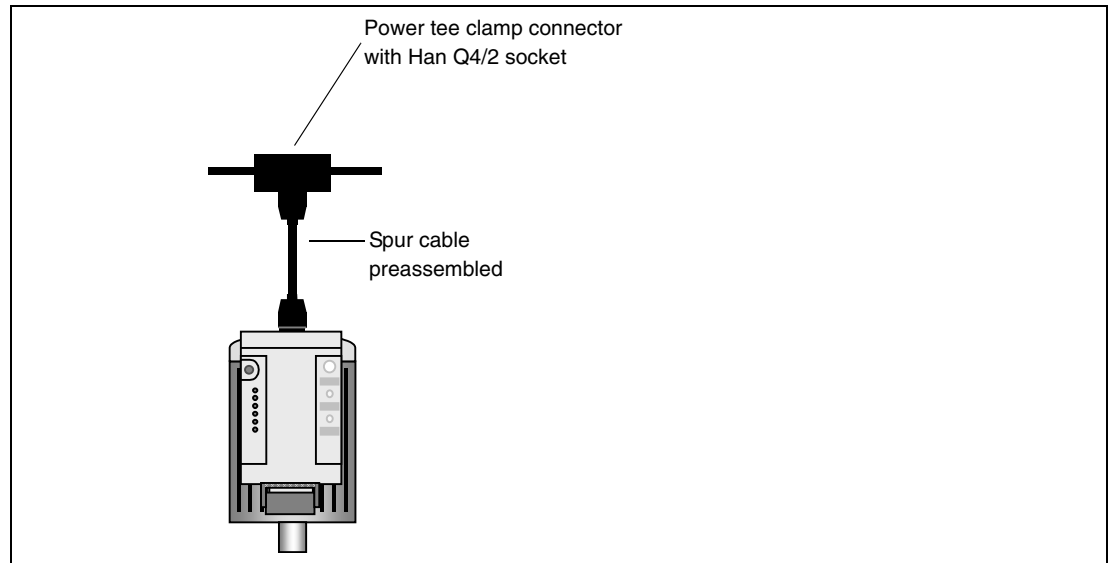


Fig. 3-5: Set-up of sub-segment

3.5.3 ET 200X Sub-Segmente with EM 300 Motor Starter

Installation

When using 200X sub-segments with an EM300 motor starter, an ET 200X is connected to the power bus using an ET 200X sub-segment cable and a power tee clamp connector.

The sub-segment cable can be ordered preassembled.

Diagram

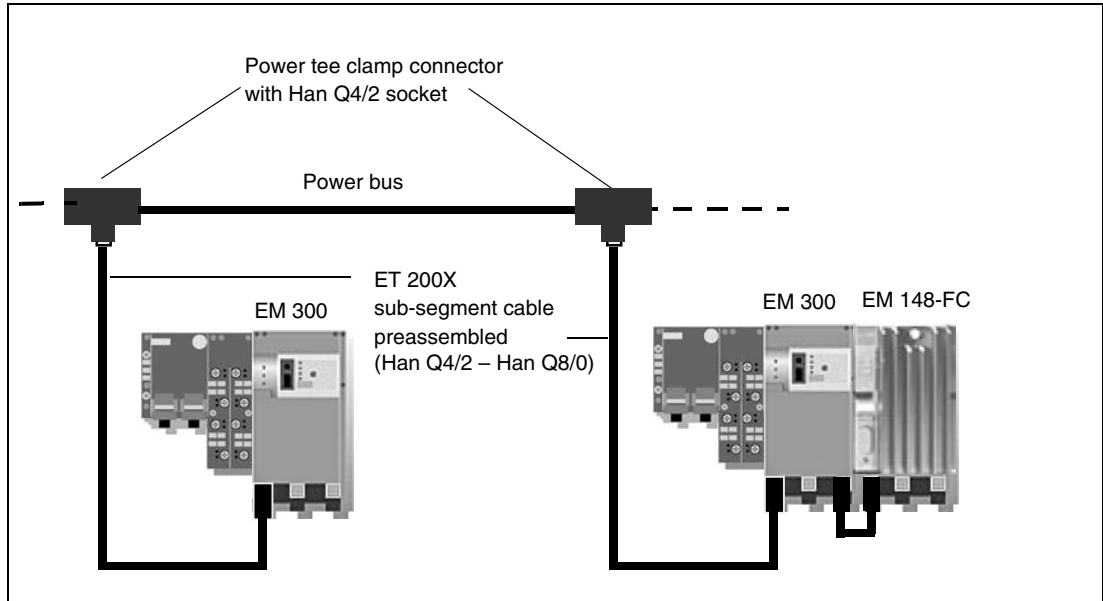


Fig. 3-6: Set-up of sub-segment

Notice

The ET 200X sub-segment cable can only be used for ET 200X sub-segments that are equipped with at least one EM300 motor starter. The ET 200X sub-segment cable features a phase displacement for connecting the EM300 motor starters to the power bus. The motor starters are always connected to the power bus.

Guidelines for the ET 200X Sub-Segment

Distributed ET 200X peripheral devices can be integrated in the ECOFAST system. The following rules, however, must be followed:

- An ET 200X sub-segment comprises the ET 200X sub-segment cable and a distributed ET 200X peripheral device with at least one feeder.
- A maximum of 6 motor starters or frequency converters can be used in one ET 200X sub-segment.
- Motor starters must be installed on the base module upstream of frequency converters (see diagram).
- The EM300 motor starters are connected to the motor with a preassembled line (line type: ET 200X motor).
- The EM148-FC frequency converters are connected to the motor with a preassembled line (line type: ET 200X FU motor).
- The preassembled ET 200X power cables must be used for connecting the ET 200X sub-segment to the power bus and for transferring the power.

Notice

The ET 200X sub-segment cable and the power cable for transferring the power are two separate cables. They can only be used for their intended purpose.

3.5.4 Possible Power Distribution with Discriminating Modules

Diagram

The diagram below shows the possible power distribution arrangements with discriminating modules:

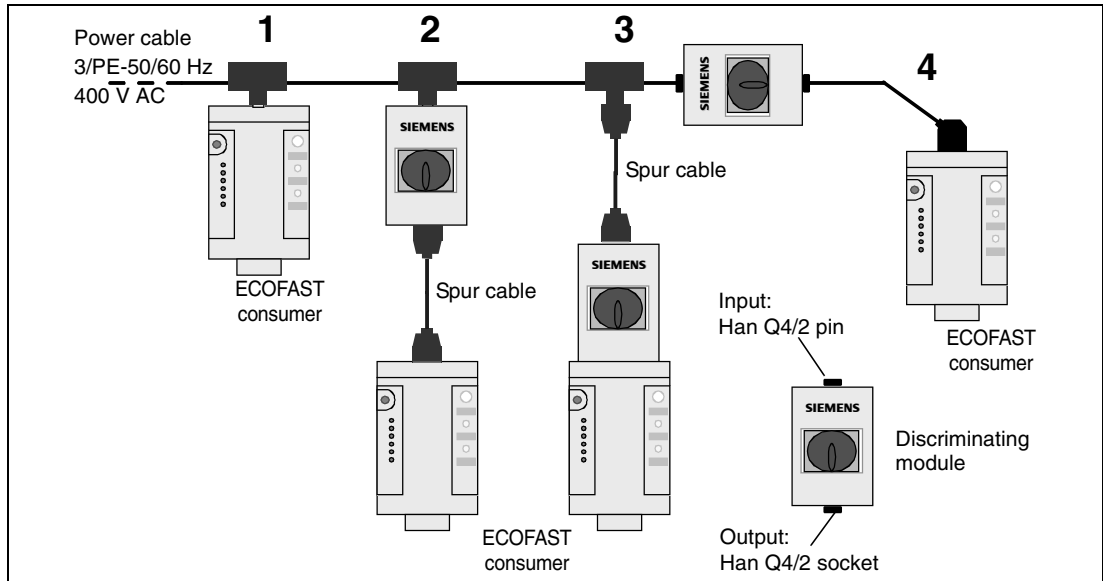


Fig. 3-7: Possible power distribution with discriminating modules

1. ECOFAST consumer without a discriminating module directly in the power bus segment backbone.
2. Discriminating module directly in the power bus segment backbone. Connection to ECOFAST consumer via spur cable with Han Q4/2 pin/socket.
3. The ECOFAST consumer and the discriminating module form a power bus sub-segment. They are connected directly to each other without a cable. Connection to the power bus segment backbone via spur cable with Han Q4/2 pin/socket.

Notice

The discriminating module cannot be connected without a cable if ECOFAST motor starters are operated with the PROFIBUS-DP field bus.

4. ECOFAST consumer decoupled via discriminating module in the power bus segment backbone.

3.5.5 Line Protection in Power Bus Segment for Motor Starters Without Thermal Motor Model (Installation in the Vicinity of the Motor)

Diagram

The power bus segment to be protected contains motor feeders with:

- Motor starters that only have motor protection with a temperature sensor, and
- Motors with motor supply leads (installation in the vicinity of the motor). The motor supply lead is not protected by the motor starter.

In this case, the maximum permissible current-carrying capacity of the motor supply lead must be set on the next upstream protection module:

- Variant A: discriminating module, circuit-breaker
- Variant B: PCM, circuit-breaker F1.

The following diagram shows the set-up:

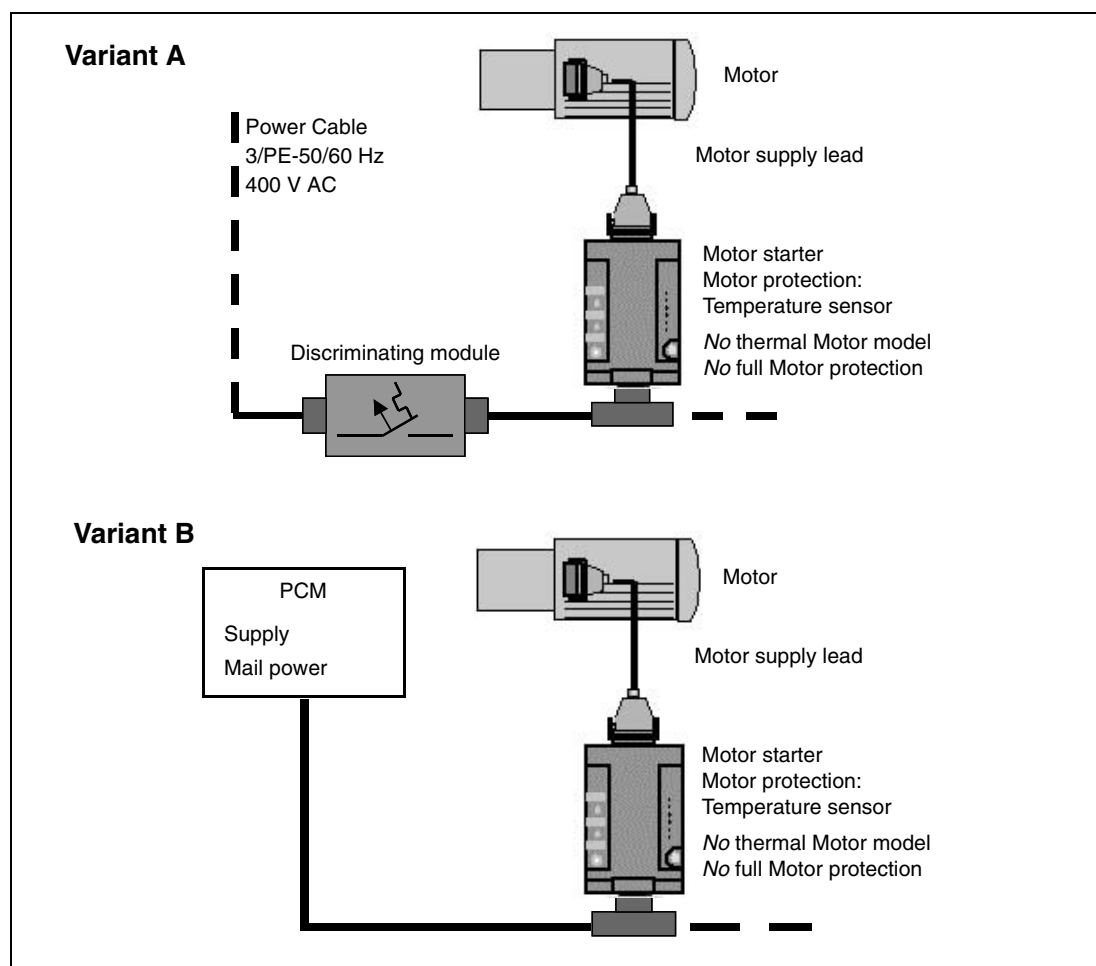


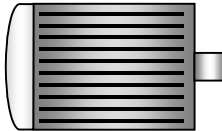

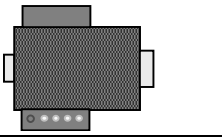




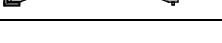


Fig. 3-8: Line protection for motor starters without thermal motor model

Example

Motor starter used:	ECOFAST motor starter Order No.: 3RK1323-2AS51-1AA3
Motor supply lead:	1.5 mm ² (max. current-carrying capacity: 18.5 A)
Installation type:	E (reduction factor: 0.650 at 30 °C)
Setting value:	12 A
Variant A:	16 A and 25 A discriminating modules must be opened so that they can be set. The 8 A discriminating module limits the current to 8 A (nothing is set).
Variant B:	The PCM must be opened so that it can be set.

3.6 Installation Versions for Switching Devices and Control Circuit Devices

Legend for switching devices and control circuit devices

	Motor
	Switching device
	Frequency converter, R2SS load regulator
	Power tee clamp connector
	HanDrive
	Spur cable (Han Q4/2 pin – socket)
	Sub-segment line (Han Q4/2 pin – Han Q8/0 socket)
	Motor line, both ends Han 10E, unshielded
	Motor line, both ends Han 10E, shielded
	Motor line Han Q8/2 pin – Han 10E socket unshielded/shielded, assembled by user. As an alternative instead of Han 10E socket, open cable end in motor terminal box with M-screw fitting.

Switching device, plugged in (only motor starters, soft starters)

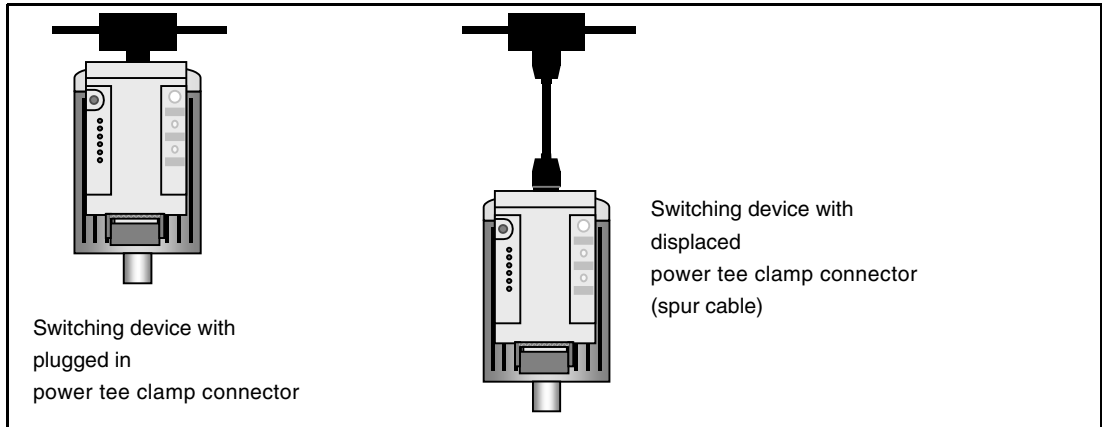


Fig. 3-9: Plugged in switching device (only motor starters, soft starters)

Switching device in the vicinity of the motor (only motor starters, soft starters)

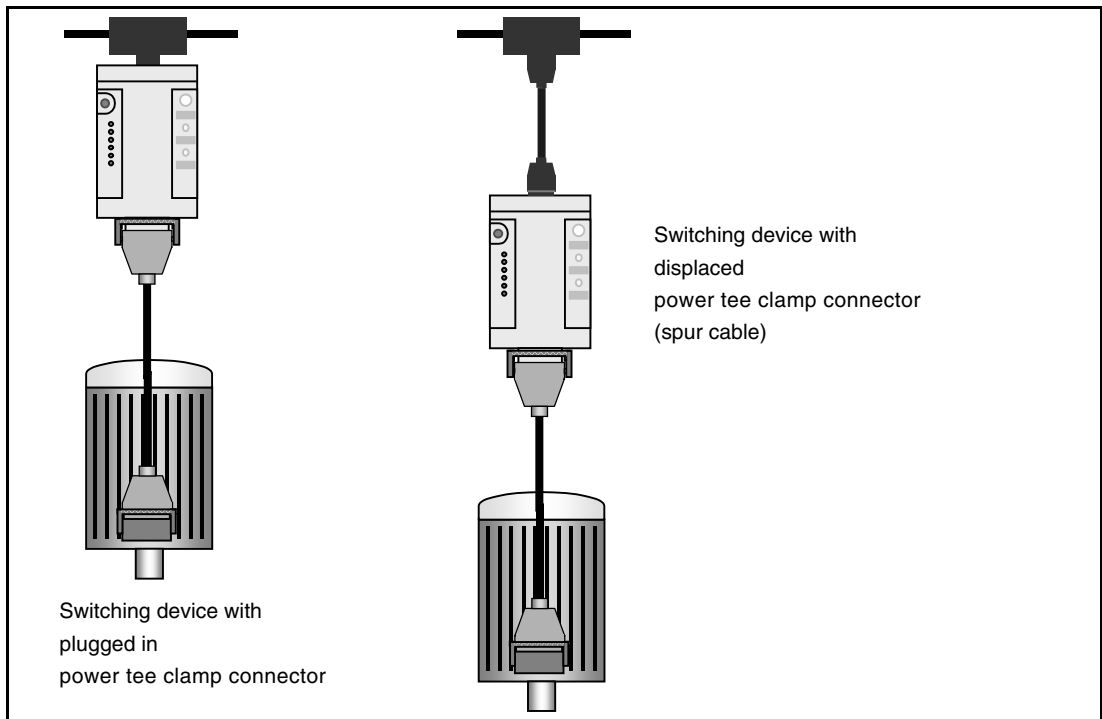


Fig. 3-10: Switching device in the vicinity of the motor (only motor starters, soft starters)

Control circuit device, plugged in (R2SS load regulator, MMI 411 frequency converter)

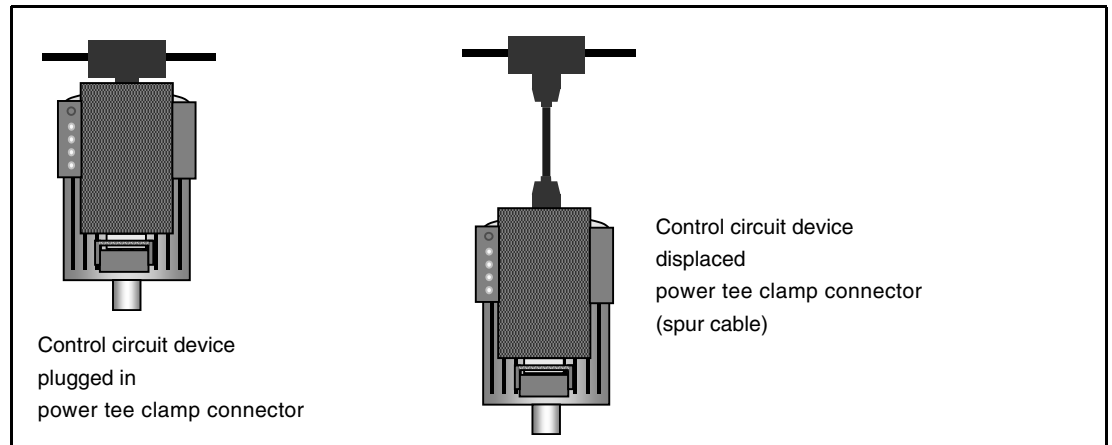


Fig. 3-11: Control circuit device, plugged in (R2SS load regulator, MMI 411 frequency converter)

Control circuit device in the vicinity of the motor (R2SS load regulator, MMI 411 frequency converter)

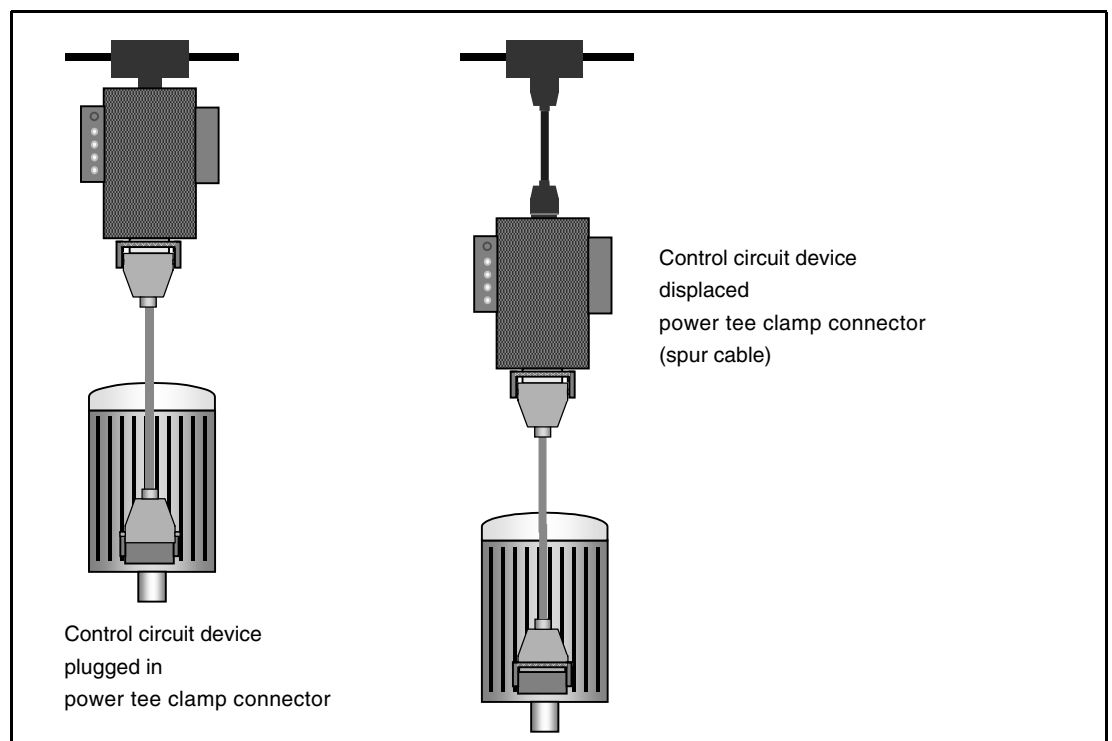


Fig. 3-12: Control circuit device in the vicinity of the motor (R2SS load regulator, MMI 411 frequency converter)

ET 200X Sub-segment (with EM 300 motor starter and EM148C frequency converter)

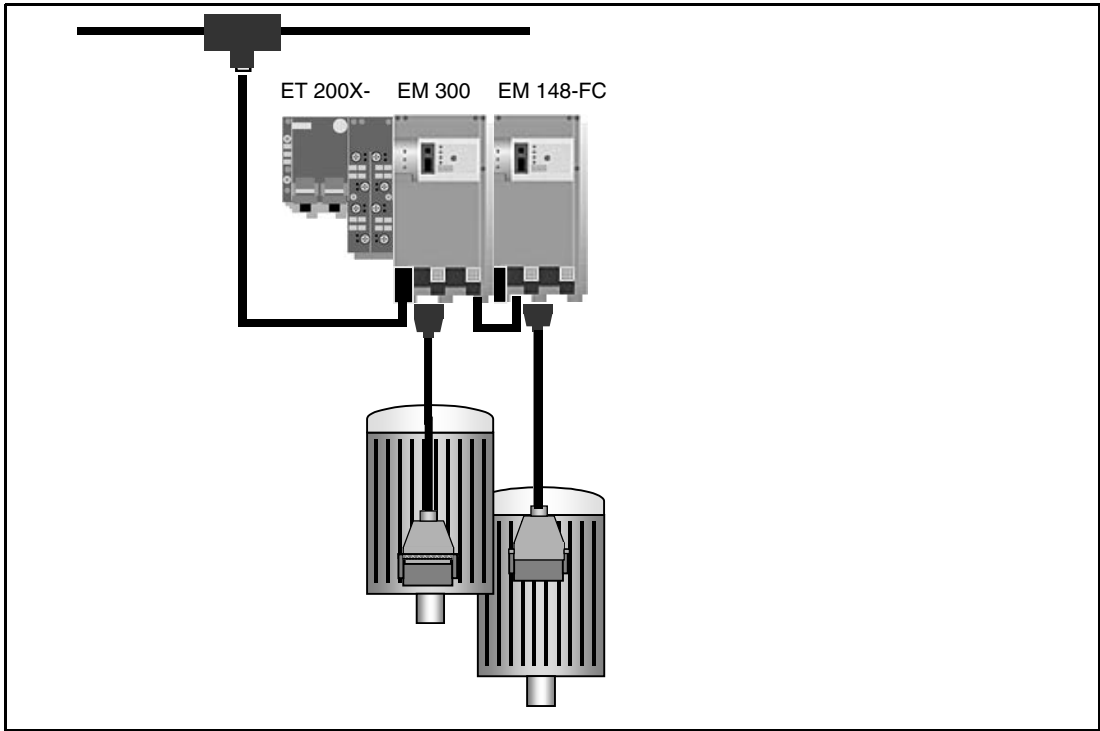


Fig. 3-13: ET 200X Sub-segment (with EM 300 motor starter and EM148C frequency converter)

Installation

4.1 Power & Control Module

4.1.1 Installation of the IP65 Version



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

Installation

Step	Description
1	<p>The PCM is designed for wall mounting. Choose a flat surface. Allow the specified minimum clearance to guarantee adequate convection.</p> <p>*) PCM with PROFIBUS-DP interface on the left-hand side: If you want to connect a PROFIBUS-DP cable with a straight plug, you must allow a clearance of approx. 150 mm around this plug.</p>
2	<p>Drill 4 holes for the screws.</p>

Table 4-1: Installing the PCM, IP65 Version

Step	Description
3	Screw the screws into the wall. The screws should protrude approx. 5 mm to enable the PCM to be mounted.
4	Hook the PCM onto the screws. Make sure it is fastened so that it is absolutely secure (it is very heavy!).
5	Tighten the screws.

Table 4-1:Installing the PCM, IP65 Version

4.1.2 Installation of the Cabinet Installation Version (IP00)



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

Installation

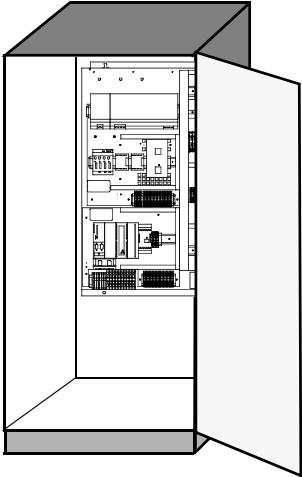
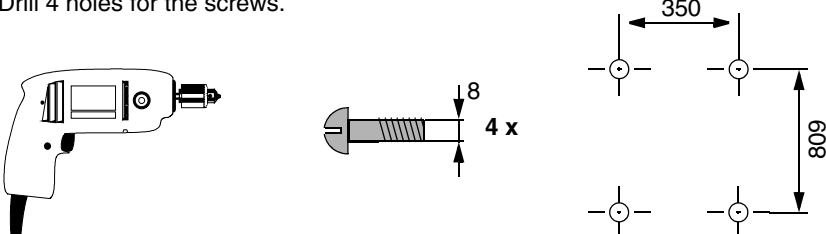
Step	Description
1	<p>The PCM is designed to be installed in control cabinets. The degree of protection of the control cabinet must be at least IP32.</p> 
2	<p>Drill 4 holes for the screws.</p> 

Table 4-2:Installing the PCM, Cabinet Installation Version

Step	Description
3	Screw the screws into the cabinet. The screws should protrude approx. 5 mm to enable the PCM to be mounted.
4	Hook the PCM onto the screws. Make sure it is fastened so that it is absolutely secure (it is very heavy!).
5	Tighten the screws.

Table 4-2: Installing the PCM, Cabinet Installation Version

4.2 Alternative Power supply

4.2.1 Simple Energy Unit (SEU)

To install the circuit-breaker or contactor, please follow the operating instructions enclosed with the device.

4.2.2 ET 200S Motor Starter

To install the ET 200S motor starter, please refer to the manual in the 6ES7151-1AA10-8AA0 documentation package.

4.3 Power Tee Clamp Connector



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

Procedure for installing the power tee clamp connectors

Step	Procedure
1	Connect the power tee clamp connector to the Han Q4/2 power terminal on the matching mating component (e.g. the consumer or the power supply). Secure the connection with the locking device.
2	If required, you can screw the fixing lugs on the power tee clamp connector onto a flat surface using screws with a diameter of 5 mm.
3	Loosen the four screws in the cover. Open the cover.
4	Unscrew the clamping screws.
5	Strip the insulation from the power cable over a length of approximately 130 mm. Take care not to damage the insulation of the individual wires!
6	Place the seal around the round cable in such a way that there is approx. 10 mm of unstripped cable between the seal and the stripped part of the cable.
7	Insert the individual wires in the insulation displacement terminations. Make sure the terminals are assigned correctly.
8	Insert the throughfeeds with the round cable. Align the stripped part of the cable centrally inside the housing.
9	Firmly secure the clamping screws. The individual wires are bonded via the insulation displacement terminations.
10	Close the cover. The power tee clamp connector is now installed and connected.

Tabelle 4-3: Installing the power tee clamp connector

4.4 Hybrid Field Bus Connections

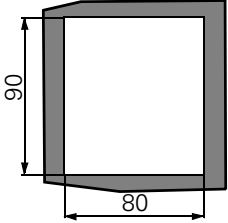
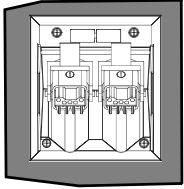
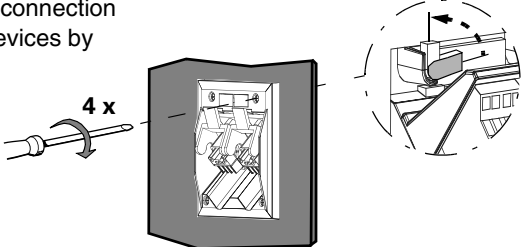
Step	Description
1	<p>Cut out the required section (90 mm x 80 mm) on the control cabinet.</p> <p>Note that the wall thickness must not exceed 5 mm.</p> 
2	<p>Place the hybrid field bus connection into the cut-out section.</p> 
3	<p>Secure the hybrid field bus connection using the quick-clamping devices by tightening the four screws.</p> 

Tabelle 4-4: Installing the hybrid field bus connection

4.5 Discriminating Module and Maintenance Switch

4.5.1 Discriminating Module

The table below lists the required components:

Item	Ordering data	Order No.
1	Discriminating Module	3RK1911-4AA.. depending on the version
2	2 fixing screws (dia. 4 mm), if necessary nuts, spring washers, plain washers	—
3	Power line with Han Q4/2 socket (discriminating module at input) preassembled or prepared by customer	3RK1911-0.. depending on the length and cross-section
4	Power line with Han Q4/2 pin (discriminating module at output) preassembled or prepared by customer	3RK1911-0.. depending on the length and cross-section
5	Optional: sensor cable	—
6	Optional: Line end covers for sealing open ends of lines (1 set = 10 pieces)	3RK1901-1MN00

Tabelle 4-5: Required components

Installation



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

To install the discriminating module, carry out the following steps:

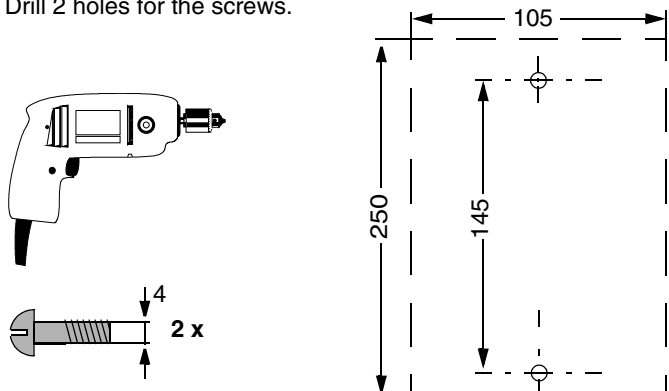
Step	Description
1	Choose a flat surface for installation. You can choose any mounting position.
2	Drill 2 holes for the screws. <div style="display: flex; align-items: center; justify-content: space-around;">  </div>
3	Screw the discriminating module onto the flat surface.
4	Connect the discriminating module to the power line with the Han Q4/2 pin (discriminating module at the output). Secure the connections with the locking devices.
6	Connect the discriminating module to the power line with the Han Q4/2 socket (discriminating module at the input). Secure the connections with the locking devices.

Tabelle 4-6: Installing the discriminating module

4.5.2 Maintenance Switch

To install the maintenance switch, please follow the instructions enclosed with the device.

Connections

5.1 Power & Control Module



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

5.1.1 Connections of the IP65 Version

Connections and throughfeeds on the underside of the PCM

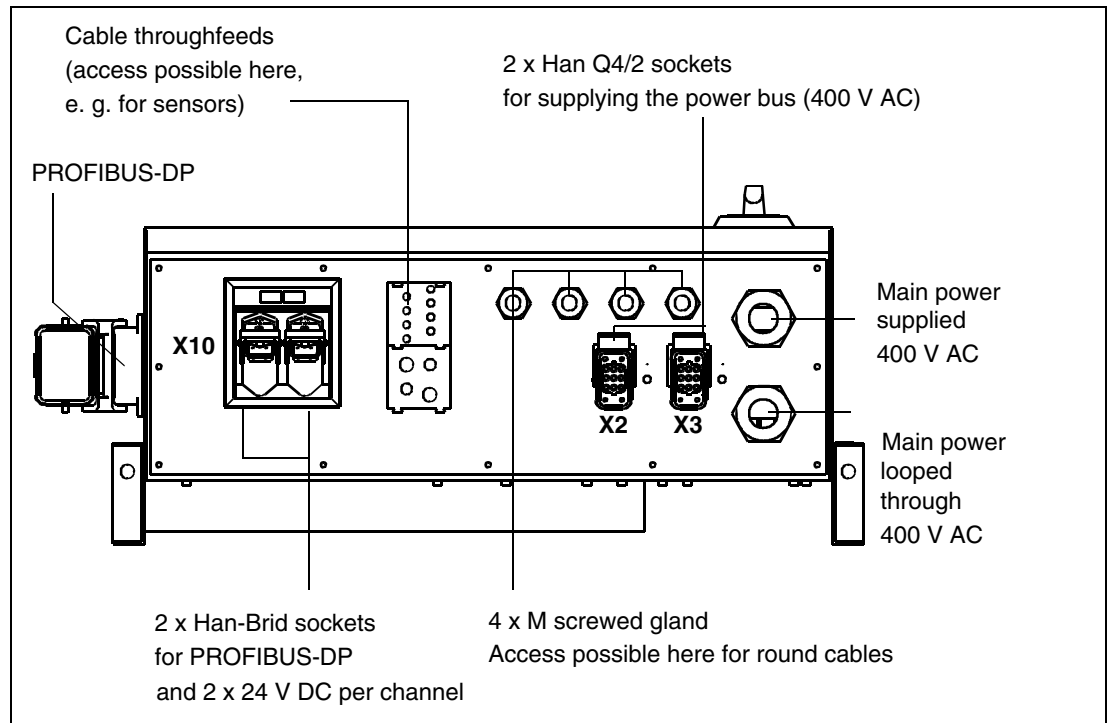


Fig. 5-1: Connections and throughfeeds on the underside of the PCM

Connections on the inside

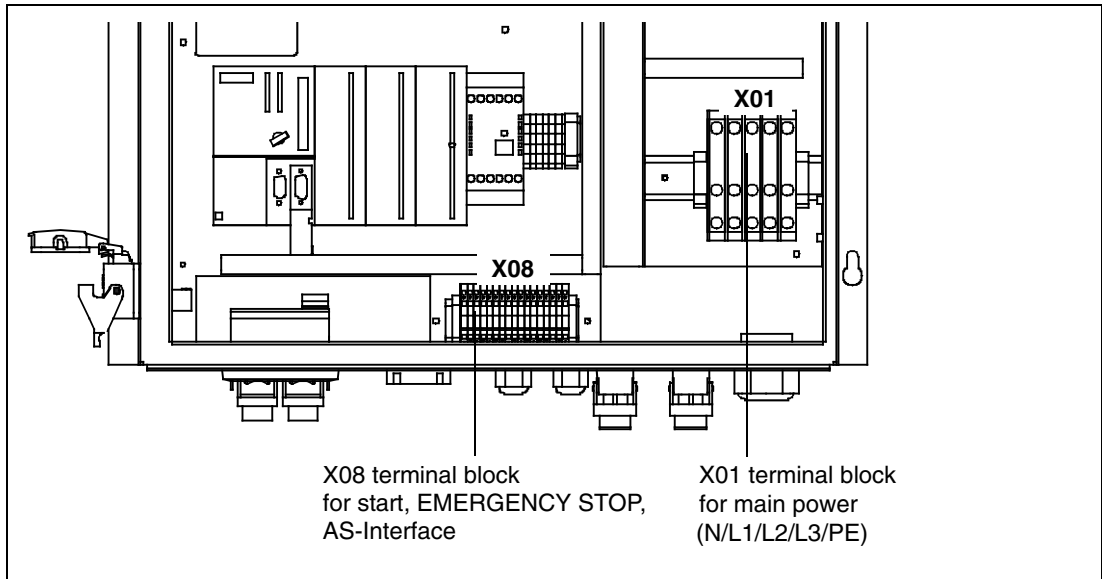


Fig. 5-2: Connections on the inside of the PCM

Schematic diagram

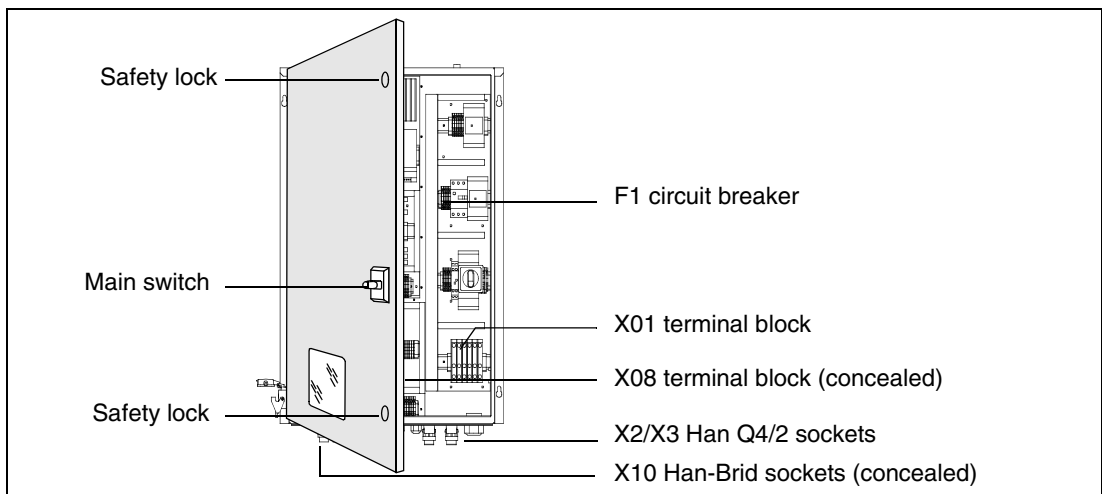


Fig. 5-3: Schematic diagram for wiring the PCM

X01 power supply

Supplying and looping through the main power.
Terminal block N/L1/L2/L3/PE

Notice

All 5 conductors (N/L1/L2/L3/PE) must be wired.

X2/X3 main circuit output

Output: 2 Han Q4/2 sockets, pin assignment acc. to DESINA:

Pin	Assignment	Comment
1	Phase L1	—
2	Phase L2	—
3	Phase L3	—
4	Neutral N	—
⊕	PE	—
11	—	Reserved
12	—	Reserved

Table 5-1: Pin assignment of the Han Q4/2 pin/socket

PROFIBUS-DP field bus:X10

2 x hybrid field bus socket connections, pin assignment acc. to DESINA:

Pin	Assignment	Comment
1	+ 24 V	Non switched
2	0 V DC	Corresponds to 1
3	0 V DC	Corresponds to 4
4	+ 24 V	Switched
A/B	Field bus	—

Table 5-2: Pin assignment of the hybrid field bus connection

5.1.2 Connections of the Cabinet Installation Version

Connections on the front side of the PCM

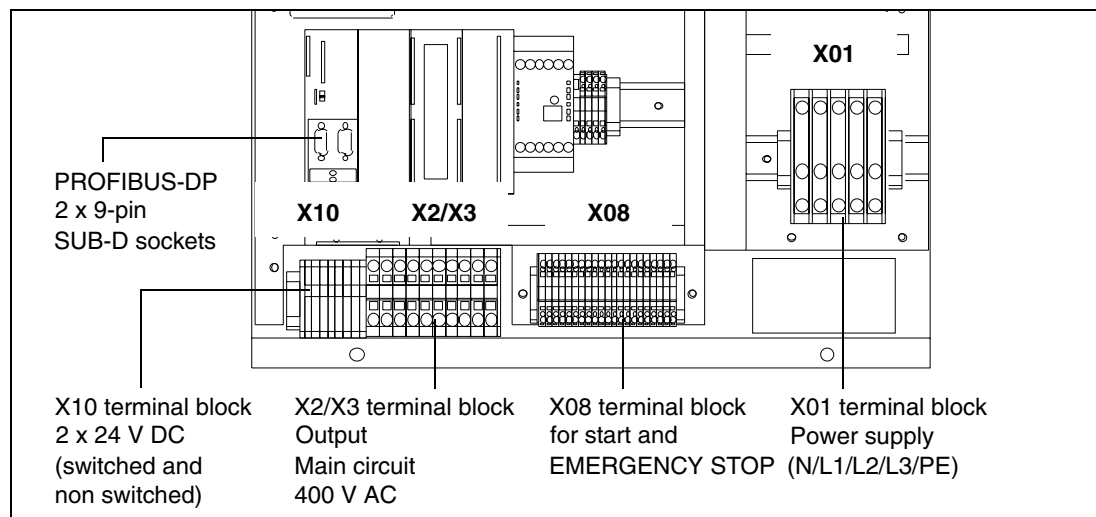


Fig. 5-4: Connections on the front side of the PCM (Cabinet Installation Version)

X01 power supply

Supplying and looping through the main power.
Terminal block N/L1/L2/L3/PE

Notice

All 5 conductors (N/L1/L2/L3/PE) must be wired.

X2/X3 main circuit output

To supply the power bus
2 x terminal block N/L1/L2/L3/PE

PROFIBUS-DP

2 x 9-pin SUB-D socket directly on PLC

Wiring

Step	Description
1	Strip the lines. For more information about the stripped lengths, cross-sections and terminal assignments, refer to the table on the next page. In the case of the IP65 model, please open the door of the PCM first. To do so, unlock the two safety locks and turn the main switch counter clockwise.
2	Insert the lines for Start, EMERGENCY STOP and, if necessary, the AS-Interface through the M screwed glands on the underside and into the PCM up to the X08 terminal block. Connect the lines to the X08 terminal block with Cage Clamps.
3	Insert the lines for the main power through the M screwed glands on the underside and into the PCM up to the X01 terminal block. Connect the lines to the X01 terminal block with cage clamps.
4	Connect the hybrid field bus cables (maximum of 2) to the X10 if you are using a PCM with PROFIBUS-DP
5	Connect a maximum of 2 power cables to X2 and X3.
6	Attach suitable screw caps to the underside of any unused throughfeeds to attain degree of protection IP65. Close the screw cap of the MPI plug on the left-hand side.
7	This completes wiring. Close the F1 circuit-breaker.

Table 5-3: Wiring of the PCM

Stripped lengths, cross-sections, terminal assignment

	X08 /		1-2		3-4		5 (+)6 (-)		7 (+)8 (-)		X01 /		L1 L2 L3 N PE		
				Start 0.08 ... 4 mm ² AWG 28...12		0.08 ... 4 mm ² AWG 28...12	AS-i 	AUX PWR 							0.2 ... 16 mm ² AWG 24...6
IP65				X	X	X	—	—	—	—				X	
				X	X	X	—	—	—	—				X	
				X	X	X	—	—	—	—				X	
				X	—	—	X	X	—	—				X	
IP00				X	X	X	—	—	—	—				X	
				X	X	X	—	—	—	—				X	
				X	X	X	—	—	—	—				X	
				X	—	—	X	X	—	—				X	
IP00	X10 /		1-2		3-4		X2/X3		L1 L2 L3 N PE						
				24 V DC +NS/-NS 0.08 ... 4 mm ² AWG 28...12	24 V DC +S/-S 0.08 ... 4 mm ² AWG 28...12										0.2 ... 10 mm ² AWG 24...8
				X	X	X	—	—	—	—					X
				X	X	X	—	—	—	—					X

Table 5-4: Stripped lengths, cross-sections, terminal assignment

5.2 Alternative Power Supply

5.2.1 Connections of the Simple Energy Unit (SEU)

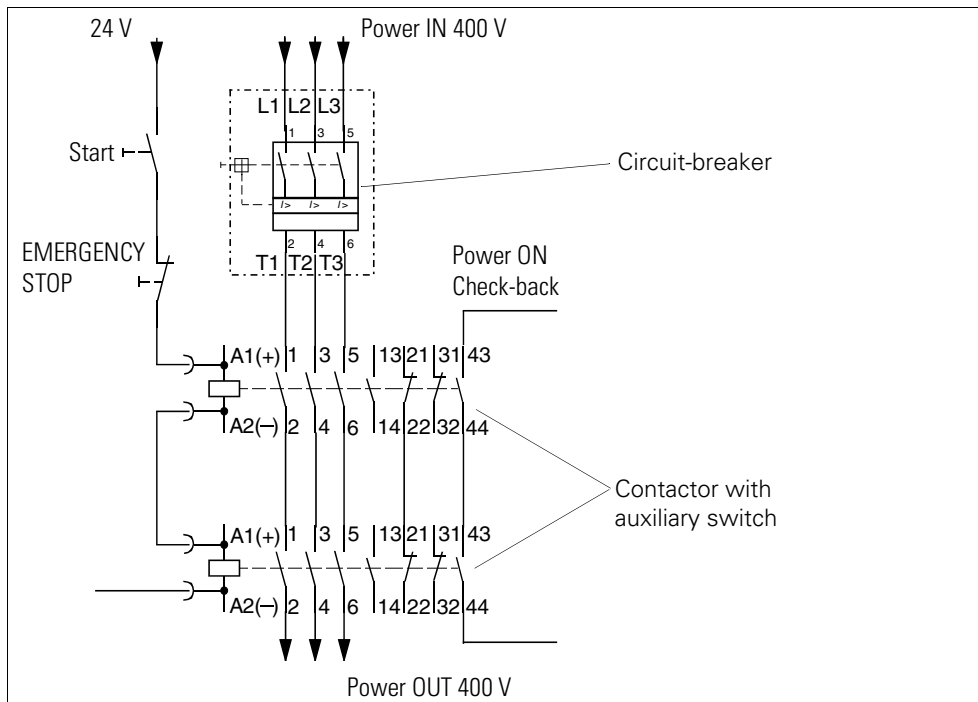


Fig. 5-5: Wiring diagram of a SEU (example) under the responsibility of the user

5.2.2 ET 200S Motor Starter

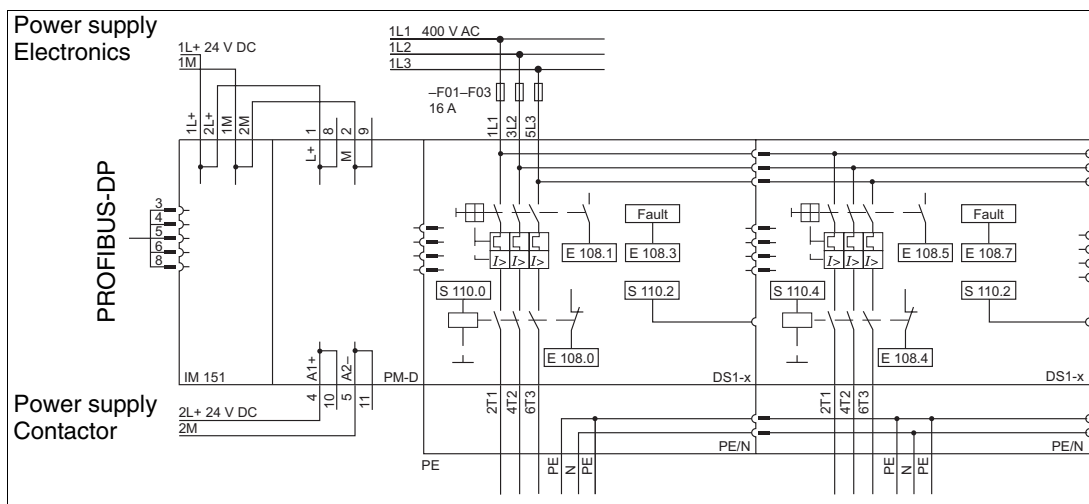


Fig. 5-6: Wiring scheme of a ET 200S motor starter (example) under the responsibility of the user

5.3 Power Tee Clamp Connector



Warning

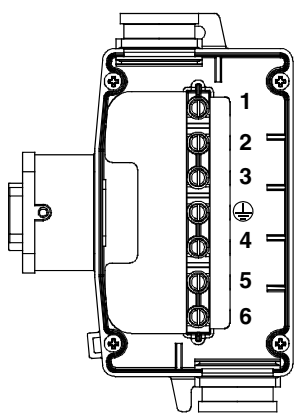
Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice


Refer to the information in the operating instructions.

Connections

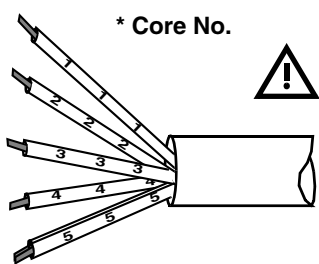
Power tee clamp connector



Terminal	Assignment	Core No.*
1	Phase L1	2 2 2
2	Phase L2	3 3 3
3	Phase L3	4 4 4
⊕	PE	
4	Neutral conductor N	1 1 1
5	Reserved	5 5 5
6	Reserved	6 6 6

 Terminal numbers and Han Q4/2 pin numbers do **not** have the same assignment

*** Core No.**



Caution
Note that core numbers and terminal numbers are **not** identical for preassembled power cables.

Fig. 5-7: Pin assignment for power tee clamp connector

5.4 Hybrid Field Bus Connections

Connections on the IP65 side

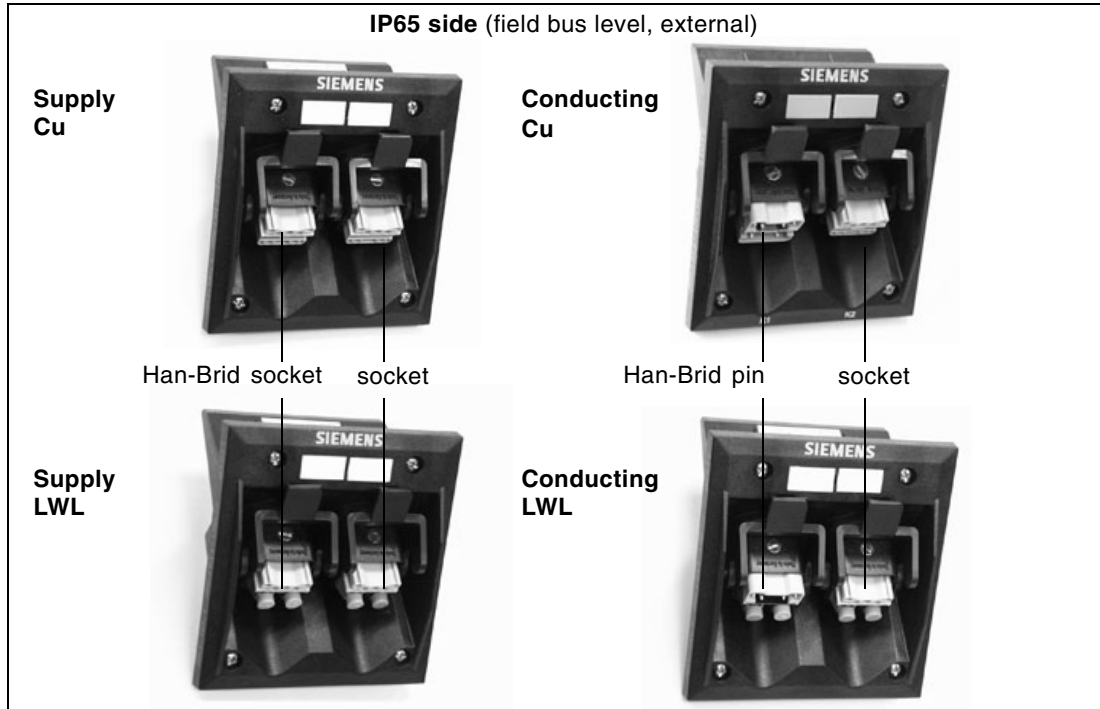


Fig. 5-8: Connections on the IP65 side

Connections on the IP20 side

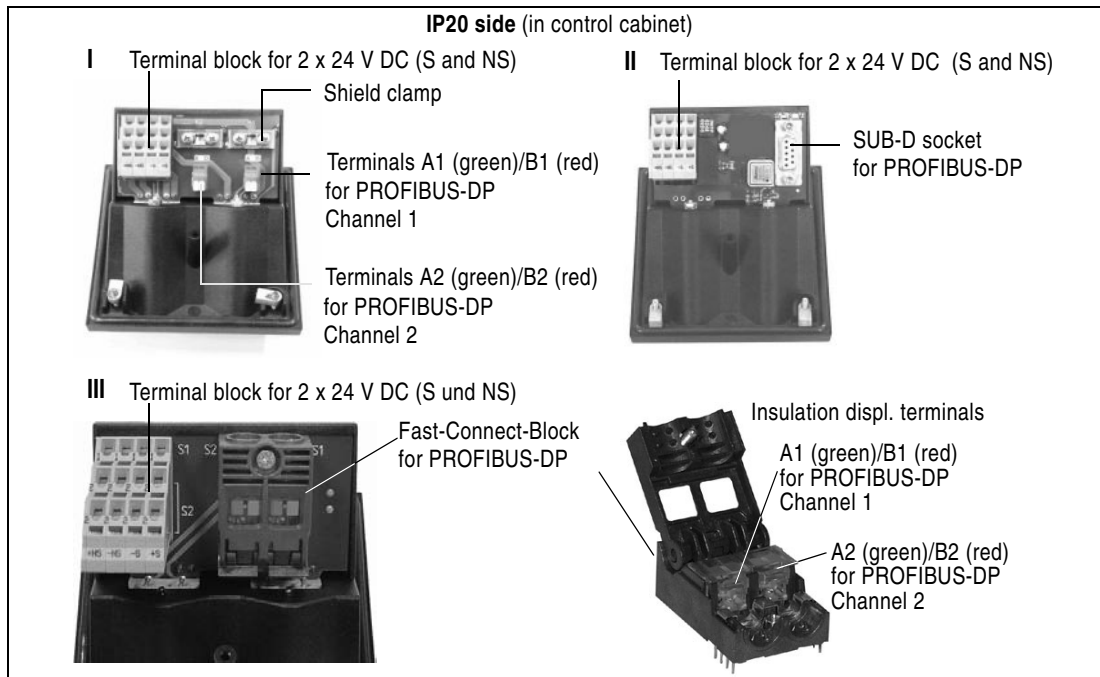


Fig. 5-9: Connections on the IP20 side

Connections for PROFIBUS-DP and 2 x 24 V DC (IP65 side)

2 x Han-Brid socket/socket or pin/socket, pin assignment acc. to DESINA:

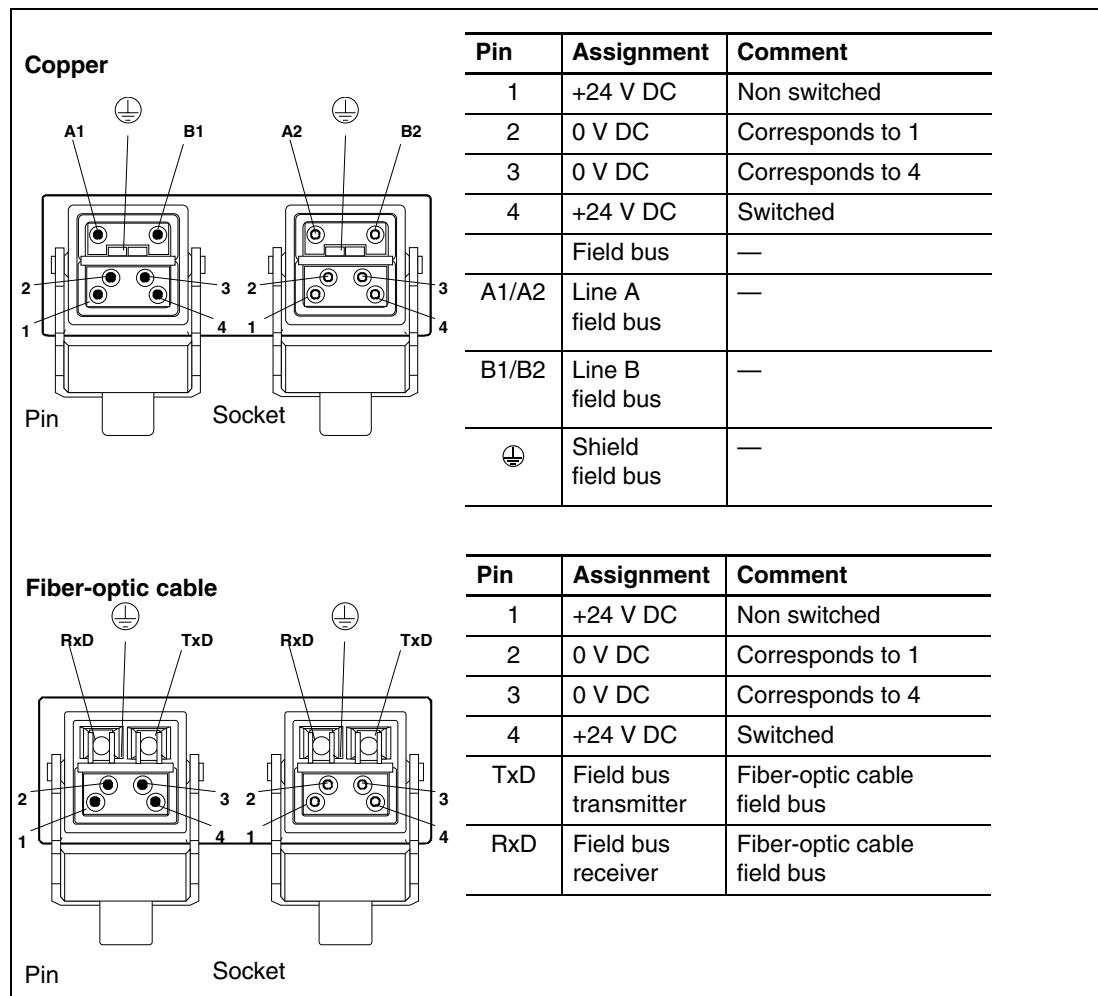


Fig. 5-10: Pin assignment for hybrid field bus connection (IP65 side)

Connections for passive hybrid field bus connection (IP20 side)

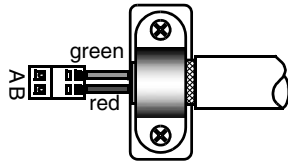

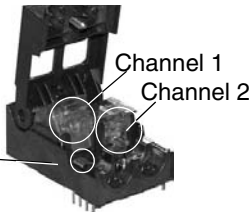
Connection	Assignment	Comment
Klemmenblock 24 V		
+NS	+24 V DC	Non switched
-NS	0 V DC	Corresponds to +NS
-S	0 V DC	Corresponds to +S
+S	+24 V DC	Switched
Terminal block A/B for PROFIBUS-DP		
A1/A2	Line A field bus	
B1/B2	Line B field bus	
	Shield field bus	
Fast-Connect-Block for PROFIBUS-DP		
A1/A2	Line A field bus (green)	
B1/B2	Line B field bus (red)	
	Shield field bus	

Table 5-5: Connections for passive hybrid field bus connection (IP20 side)

Connections for active hybrid field bus connection (IP20 side)

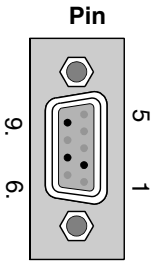
Connection	Assignment	Comment
Terminal block 24 V		
+NS	+24 V DC	Non switched
-NS	0 V DC	Corresponds to +NS
-S	0 V DC	Corresponds to +S
+S	+24 V DC	Switched
SUB-D socket for PROFIBUS-DP		
1	Shield \oplus	
2	—	
3	RxD/TxD-P (+)	
4	CNTR-P	
5	DGND	
6	VP	
7	—	
8	RxD/TxD-N (-)	

Table 5-6: Connections for active hybrid field bus connection (IP20 side)

Wiring

Step	Description	
1	Strip the lines. For more information on stripped lengths, cross-sections, and terminal assignments, refer to the table on the next page.	
2	Use the Cage Clamps to connect the 24 V DC cables (S and NS) to the 24 V DC terminal block.	
	Passive hybrid field bus connection Active hybrid field bus connection	
3	Use the Cage Clamps to connect the PROFIBUS-DP cables to terminals A1/B1 and A2/B2.	Connect the PROFIBUS-DP cable to the 9-pin SUB-D socket.
4	Connect the shield to the shield terminals.	—
5	If you want to connect a bus terminating connector, this must be supplied with 24 V DC. To do so, jumper terminals S1 and S2 of the non-switched (NS) 24 DC (see below).	
6	This completes the wiring.	

Table 5-7: Wiring the hybrid field bus connection

Steps for connecting the "Fast Connect Block"

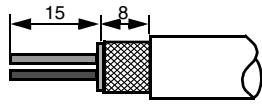



Step	Description	
1	Prepare the bus cable according to the drawing. Do not strip the cable ends!	
2	Unscrew the locking screw, open the cover and then lift the terminal block.	
3	Insert the cable end into the terminal and push the terminal block back down. The bus cable is contacted via the insulation piercing termination.	
4	Close the cover and tighten the locking screw. The shield is contacted via the pressure of the cover and the cable is relieved from strain.	
5	This completes the wiring.	

Table 5-8: Wiring of the Fast Connect Block

Schematic diagram

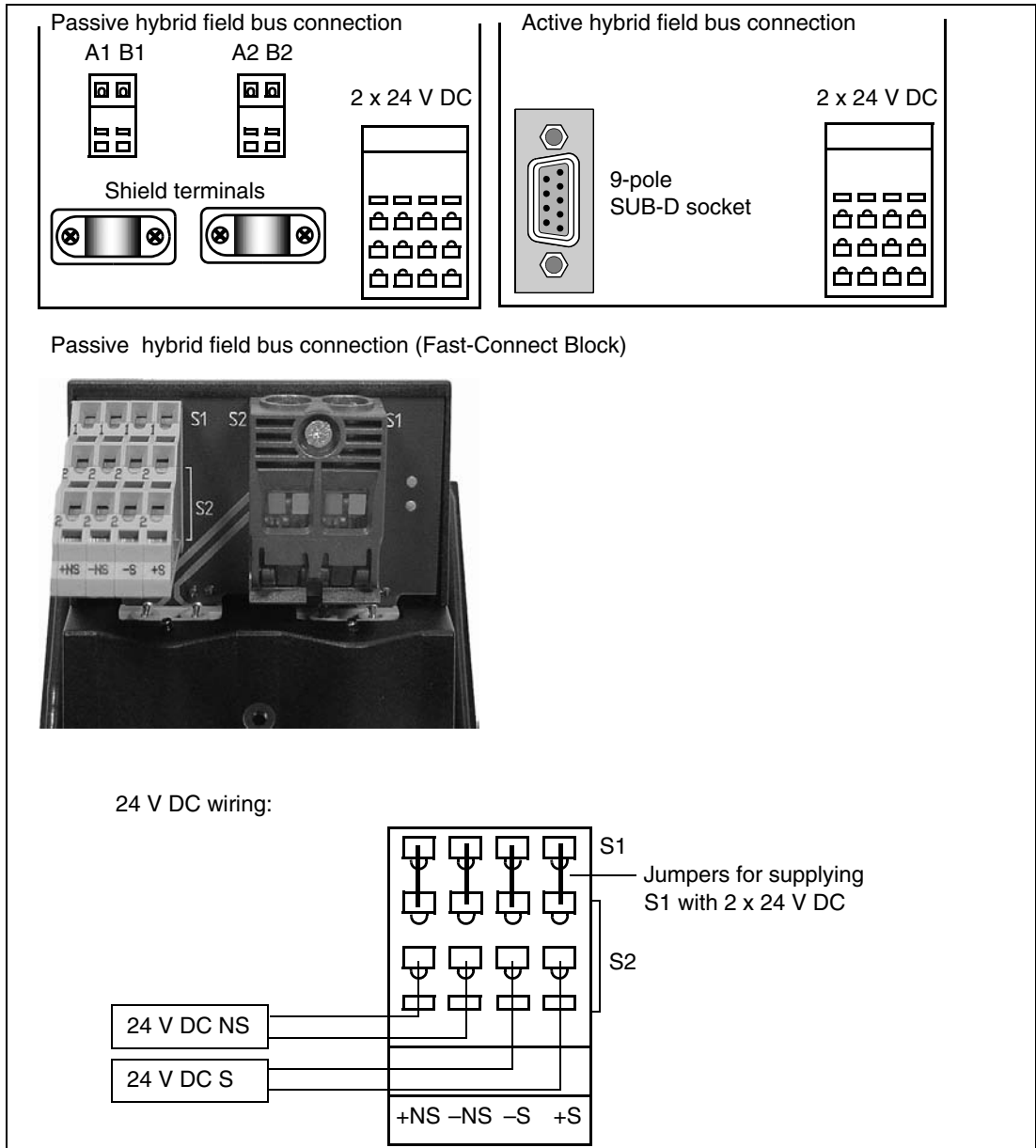
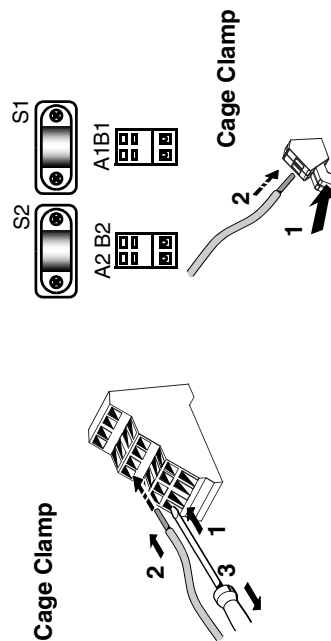


Fig. 5-11: Schematic diagram for wiring the hybrid field bus connection

Stripped lengths, cross-sections, terminal assignments

	2 x 24 V DC +NS - NS - S + S	PROFIBUS-DP A1 B1 A2 B2	PROFIBUS-DP "Fast-Connect"	PROFIBUS-DP 9-pin SUB-D
3RK1911-1AA22	X	X		
3RK1911-1AA32	X	X		
3RK1911-1AF22	X		X	
3RK1911-1AF32	X		X	
3RK1911-1AB22	X			X
3RK1911-1AB32	X			X
3RK1911-1AE22	X			X
3RK1911-1AE32	X			X

Table 5-9: Stripped lengths, cross-sections, terminal assignments



5.5 Data Tee Plug Connector

5.5.1 Pin Assignment

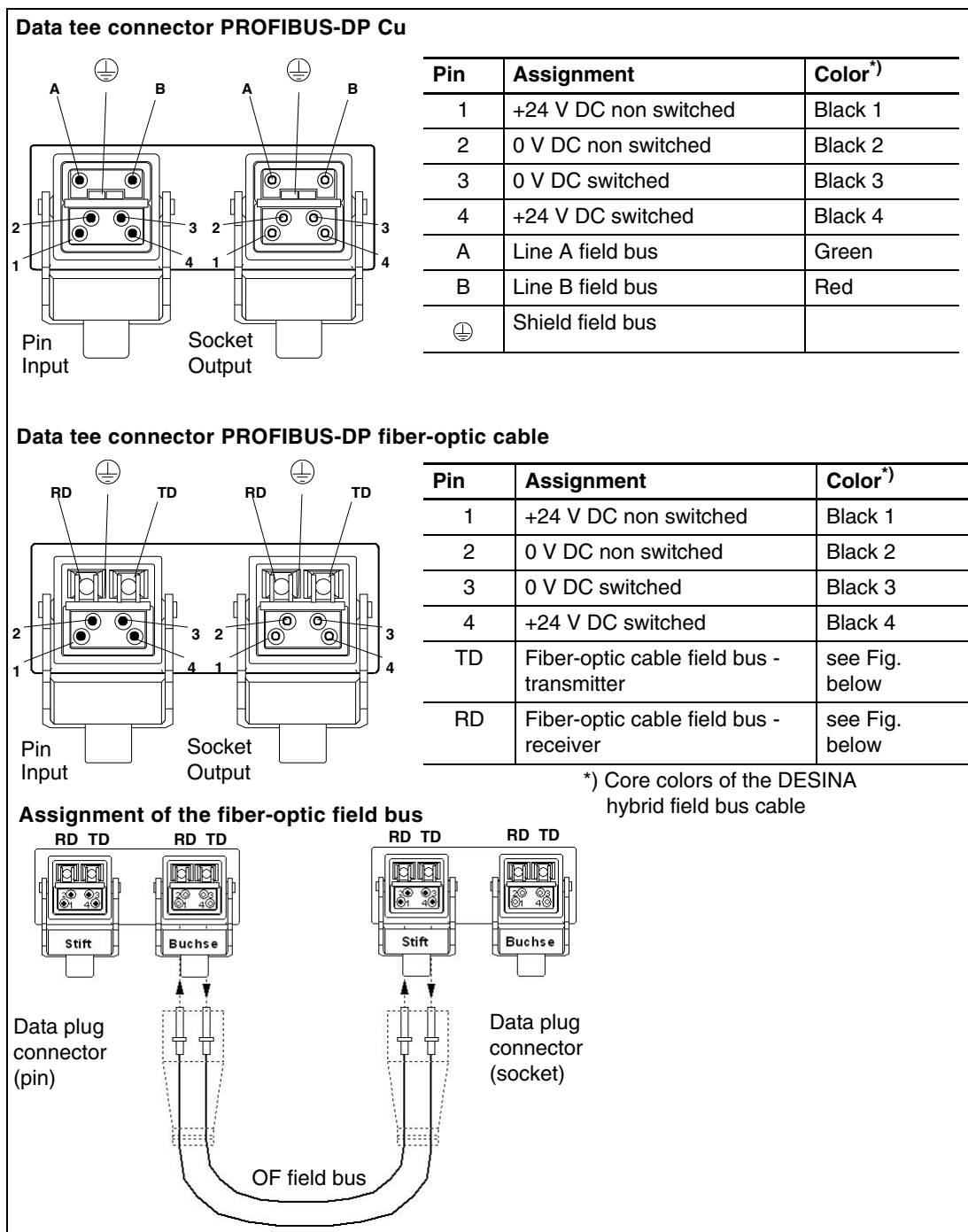


Fig. 5-12: Pin assignment for the data tee plug connector/core assignment for the hybrid field bus cable

5.6 Discriminating Module and Maintenance Switch



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

Power bus connection

Input: Han Q4/2 pin

Output: Han Q4/2 socket

Pin assignment acc. to DESINA:

Pin	Assignment	Comment
1	Phase L1	Switched
2	Phase L2	Switched
3	Phase L3	Switched
4	Neutral conductor N	Looped through
11	—	Reserved
12	—	Reserved
⊕	PE, ground	Looped through

Table 5-10: Pin assignment of the Han Q4/2 pin/socket

Check-back

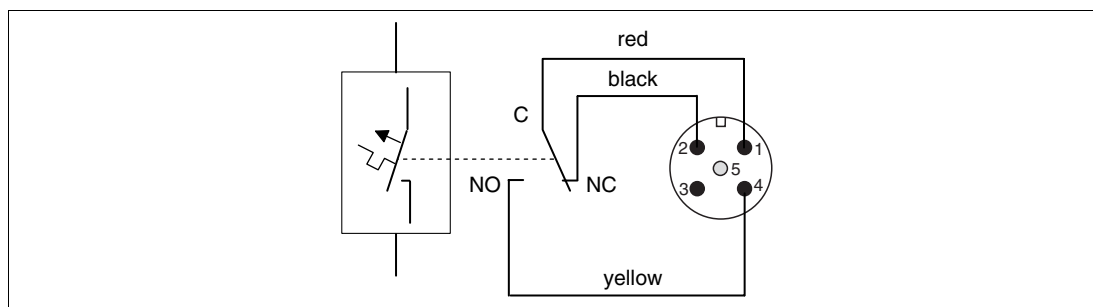


Fig. 5-13: M 12 connector (pin) for check-back signals

5.7 General Wiring and Interfaces

5.7.1 Rules for Wiring



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

Selecting the power leads

The core cross-section of the power leads must be matched to the respective ambient conditions. The decisive factors for choosing the core cross-section are as follows:

- set current on the device
- installation method
- ambient temperature
- type of material (PVC, rubber)

For PVC power leads installed in a cable duct, for example, the maximum current carrying capacity as a function of ambient temperature is as follows:

Ø TU	30 °C	40 °C	45 °C	50 °C	55 °C
1.5 mm ²	14 A	12.2 A	11.1 A	9.9 A	8.5 A
2.5 mm ²	19 A	16.5 A	15.0 A	13.5 A	11.6 A
4.0 mm ²	26 A	22.6 A	20.5 A	18.5 A	15.9 A
6.0 mm ²	33 A	28.7 A	26.0 A	23.4 A	20.1 A

Table 5-11: Reduction values for installation type B2 with three loaded cores

Observe the following rules when carrying out wiring:

Rules for flexible cables		Data	
Current carrying capacity of the plug connection as a function of the connectable core cross-sections and ambient temperature		T _u = 55 °C 40 °C	
	1.5 mm ²	12 A	15 A
	2.5 mm ²	20 A	25 A
	4.0 mm ²	30 A	35 A
	6.0 mm ²	48 A	54 A
Permissible outer diameter of the cable sealing insert	Green	7.0 to 10.5 mm	
	Red	9.0 to 13.0 mm	
	White	11.5 to 15.5 mm	
Length of insulation to strip from cores		8 mm	
Length of insulation to strip from cable sheath		20 mm	

Table 5-12: Rules for wiring

Unused Connections

Close off unused connections with screw caps; this is the only way of ensuring degree of protection IP65. Order number 3 RK1 902-0CJ00 (10 screw caps) or 3 RK1 902-0CK00 (1 screw cap).

5.7.2**Power Cables, Preassembled at One End**

Power cables which are preassembled at one end are available in different lengths (see appendix for order numbers). One end of the cable is fitted with a power plug connector with pins. The other end is free. Here, you can strip the cores and, for example, attach a plug connector or terminal block.

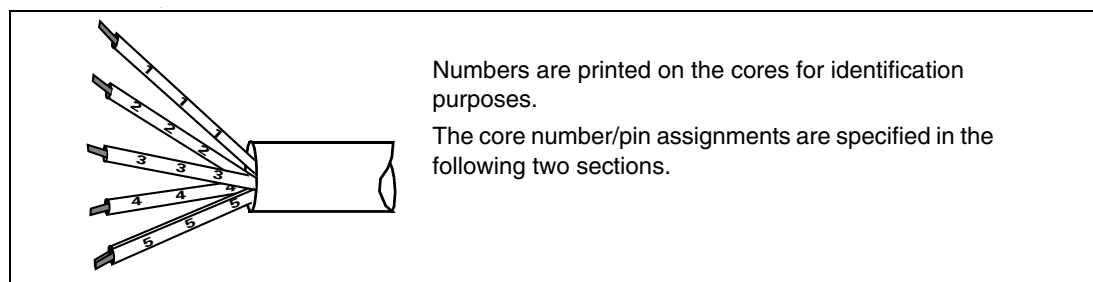


Fig. 5-14: Numbers printed on the power cable cores

Power cables, preassembled at one end with Han Q4/2 pin

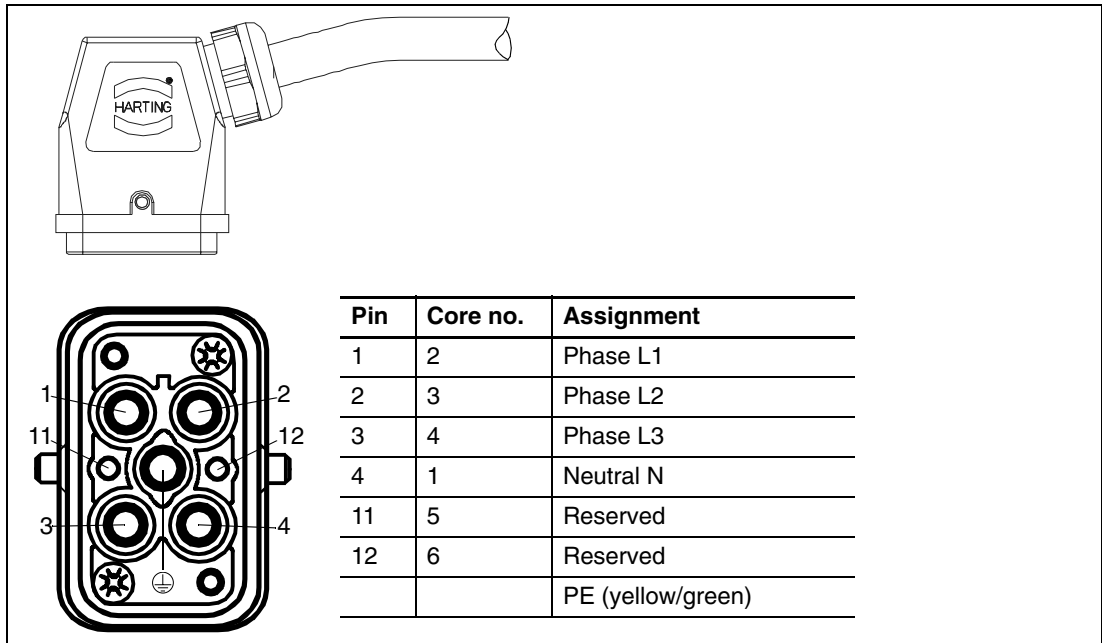


Fig. 5-15: Power cables, preassembled at one end with Han Q4/2 pin

Power cables, preassembled at one end with Han 10E pin

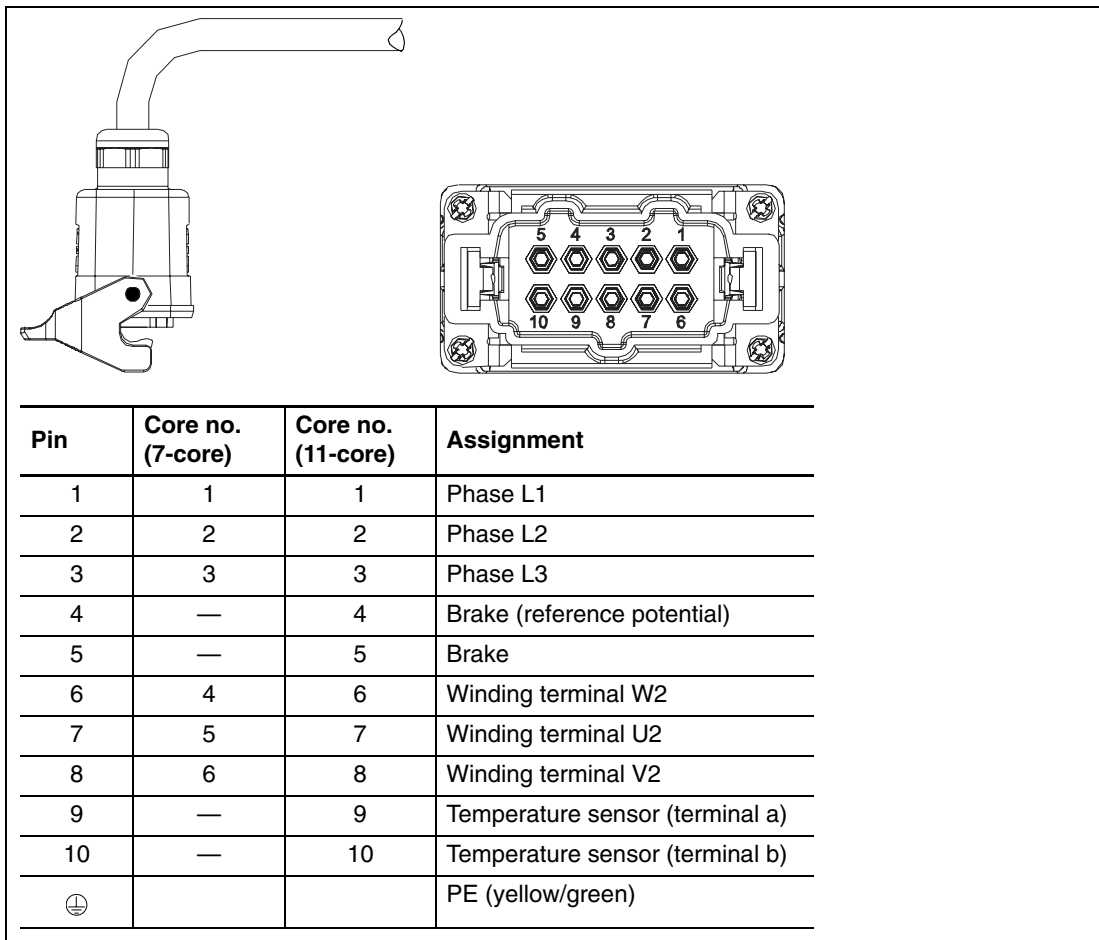


Fig. 5-16: Motor supply leads preassembled at one end with Han 10E pin

Notice

Shielded motor supply leads must be used for frequency converters.

Preassembled power cables (e. g. spur cable)

To prepare power cables, you need a crimping tool (soldering is possible as an alternative) and the accessories listed in the table.

Power cables with Han Q4/2

To connect the main power to the motor starter/power connector,	To loop through the main power from the power connector,
you need...	
a flexible Cu cable 5 x 2.5 mm ² (3 conductors + N + PE) 5 x 4 mm ² (3 conductors + N + PE) 5 x 6 mm ² (3 conductors + N + PE)	
Han Q4/2 socket (straight) <ul style="list-style-type: none"> • 2.5 mm²: 3RK1911-2BR50 • 4.0 mm²: 3RK1911-2BR10 • 6.0 mm²: 3RK1911-2BR30 	Han Q4/2 pin (straight) <ul style="list-style-type: none"> • 2.5 mm²: 3RK1911-2BS60 • 4.0 mm²: 3RK1911-2BS20 • 6.0 mm²: 3RK1911-2BS40
Han Q4/2 socket (angular) <ul style="list-style-type: none"> • 2.5 mm²: 3RK1911-2BE50 • 4.0 mm²: 3RK1911-2BE10 • 6.0 mm²: 3RK1911-2BE30 	Han Q4/2 pin (angular) <ul style="list-style-type: none"> • 2.5 mm²: 3RK1911-2BF60 • 4.0 mm²: 3RK1911-2BF20 • 6.0 mm²: 3RK1911-2BF40

Table 5-13: Preparing connecting leads with Han Q4/2

Han Q4/2 power connectors

The power connectors consist of the following components:

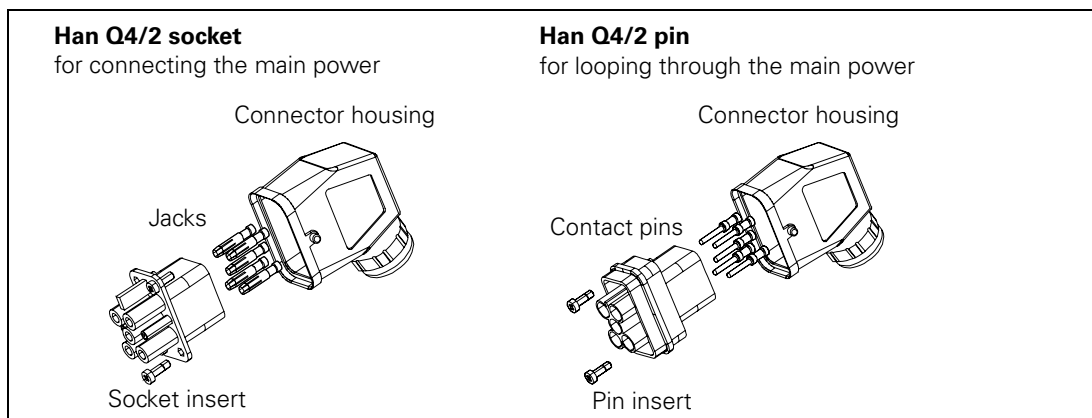


Fig. 5-17: Han Q4/2 power connector

5.7.3 AS-i Interface

Connection Techniques

The following AS-i cables are used:

- Yellow AS-i cable for AS-i communication and non-switched 24 V DC auxiliary power for supplying sensors and electronics
- Black AUX PWR AS-i cable for switched 24 V DC auxiliary power for supplying actuators

The diagram below shows the position and coding of the AS-i cables on the motor starter:

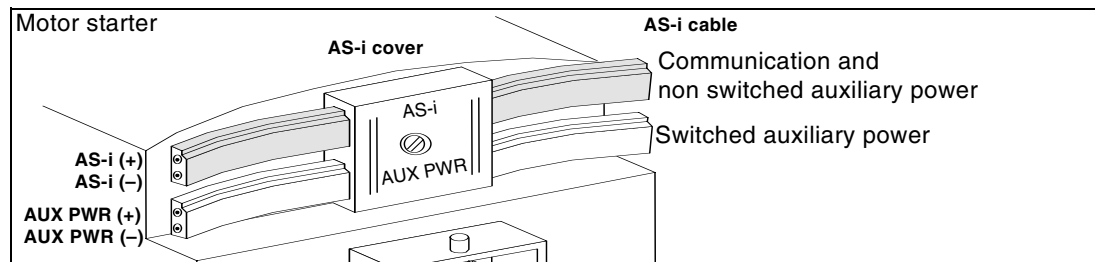


Fig. 5-18: AS Interface

Contacting

The AS-i cables are contacted automatically using the insulation piercing method when the AS-i cover is screwed on.

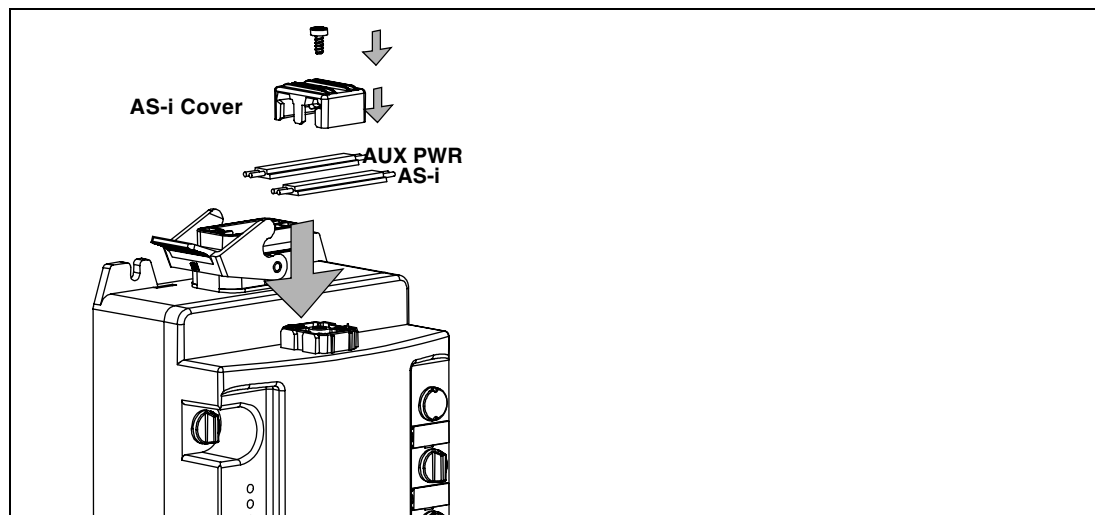


Fig. 5-19: Contacting the AS-i cables

24 V DC voltage supply (AS-i) non-switched (yellow AS-i cable)

This voltage is constantly available. It is required for:

- supplying the electronics in the motor starter
- interrogating the auxiliary contacts

The voltage is not disconnected in the event of an EMERGENCY STOP or safety shutdown, thereby ensuring that the system can always communicate with the ECOFAST component.

24 V DC voltage supply (AUX PWR) switched (black AS-i cable)

This voltage is not constantly available. It is only required for:

- driving the switching elements, e.g. a contactor

The voltage can be disconnected in the event of an EMERGENCA STOP or safety shutdown (category 1 according to EN 954-1), so that all switching elements are safely disconnected with the connected motors.

Response to undervoltage (24 V DC < 18.5 V) and power failure:

- In the event of prolonged undervoltage or power failure > 20 ms, the switching elements and the brake output are disconnected.
- When the power supply is restored, the disconnection command and the associated signal bits and error bits are acknowledged automatically.

Commissioning

6.1 Power & Control Module



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

IP65 Version:

Step	Description
1	Turn the rotary switch on the front of the CPU to "RUN".
2	If you are using motor starters without a thermal motor model and with a motor supply lead (installation in the vicinity of the motor), also observe the line protection guidelines in 3.5.5 on page 3-13.
3	Close the door of the PCM and lock both safety locks. Turn the main switch clockwise.
4	Switch on the 400 V AC main power supply.
5	Switch on the PCM.
6	Reset the external EMERG. STOP if necessary and actuate the external start switch. The power bus(es) and the field bus(es) are now supplied with power.
7	Configure the AS-i monitor if necessary. The factory-assigned password is "ECOFAST". Note the information below.

Table 6-1: Sequence of steps for commissioning the PCM, IP65 version

Control cabinet version:

Step	Description
1	If you are using motor starters without a thermal motor model and with a motor supply lead (installation in the vicinity of the motor), also observe the line protection guidelines in 3.5.5 on page 3-13.
2	Switch on the 400 V AC main power supply.
3	Reset the external EMERG. STOP if necessary and actuate the external start switch. The power bus(es) and the field bus(es) are now supplied with power

Table 6-2: Sequence of steps for commissioning the PCM, control cabinet version

Step	Description
4	Configure the AS-i monitor if necessary. The password assigned in the factory is "ECOFAST". Note the information below.

Table 6-2: Sequence of steps for commissioning the PCM, control cabinet version

Notice

The AS-i monitor "measures" the connected cables and saves the configuration. During commissioning, the factory default configuration is still stored. For this reason, the system displays a prompt after you have entered your password because the system has to be reconfigured.

6.1.1 Diagnostics

Missing voltages

Voltage missing	Shown by	Potential fault	Cause
400 V AC	D1/D2 E0.0 OFF	Q1 OFF	—
	D1/D2 E0.1 OFF	Q1 OFF	Overload
	D1/D2 E0.2 OFF	Q1 OFF	Short circuit
	D1/D2 E0.3 OFF	K1 and/or K2 AUS	EMERGENCY STOP, 24 V internal, D5 or K5
24 V internal	All OFF	Q1 OFF	—
	All OFF	F1 OFF	—
	F2/ channel 4 red	F2	Overload
	F2/ channel 4 red	F2, blade-type fuse defective	Short circuit
24 V switched	D1/D2 E0.4, D1/D2 E0.7 OFF	K3 and/or K4 OFF	D5 or K5, EMERGENCY STOP
	D1/D2 E0.7 OFF	F2/ channel 1 red	Overload
	D1/D2 E0.7 OFF	F2/ channel 1 red, blade-type fuse defective	Short circuit
24 V non switched	D1/D2 E0.6 OFF	F2/ channel 3 red	Overload
	D1/D2 E0.6 OFF	F2/ channel 3 red, blade-type fuse defective	Short circuit
24 V AS-i switched	D1/D2 E1.1, D1/D2 E0.4	K3 and/or K4 OFF	D5 or K5, EMERGENCY STOP
	E1.1	F2/ channel 2	Overload
	E1.1	F2/ channel 2, blade-type fuse defective	Short circuit
30 V AS-i non switched	D5 or D3	G2	Overload

Table 6-3: Diagnostics - missing voltages

Signal states

Signal	Was fehlt?	Möglicher Fehler	Ursache
D1/D2 E 0.0 OFF	All OFF	Q1 OFF	–
D1/D2 E 0.1 OFF	All OFF	Q1 Overload	–
D1/D2 E 0.2 OFF	All OFF	Q1 Short circuit	–
D1/D2 E 0.3 OFF	400 VAC	K1, K2 OFF	D5(K5), EMERGENCY STOP, 24 V internal
D1/D2 E 0.4 OFF	24 V switched		
24 V AS-i	K3, K4 OFF	D5(K5), EMERGENCY STOP, 24 V internal, F2/ channel 1	
D1/D2 E 0.5 OFF	400 V, 24 V switched, 24 V AS-i	K1, K2, K3, K4	EMERGENCY STOP
D1/D2 E 0.6 OFF	24 V non switched	F2/ channel 3	F2/ channel 3 over-loaded
D1/D2 E 0.7 OFF	24 V switched	F2/ channel 1	F2/ channel 2 over-loaded
D1/D2 E 1.0 OFF	All OFF	F1 OFF	Overload, Short circuit
D1/D2 E 1.1 OFF	24 V AS-i	F2/ channel 2	Overload, Short circuit
F2/ channel 1 red ON	24 V switched	F2/ channel 1	Overload, Short circuit
F2/ channel 2 red ON	24 V AS-i	F2/ channel 2	Overload, Short circuit
F2/ channel 3 red ON	24 V non switched	F2/ channel 3	Overload, Short circuit
F2/ channel 4 red ON	All OFF	F2/ channel 4	Overload, Short circuit

Table 6-4: Diagnostics - signal states

6.2 Alternative Power Supply

6.2.1 Simple Energy Unit (SEU)

For the commissioning of the circuit breakers and the contactors please refer to the instructions enclosed with the device.

6.2.2 ET 200S motor starter

For the commissioning of the motor starter ET 200S please refer to the manual in the 6ES7151-1AA10-8AA0 documentation package.

6.3 Hybrid Field Bus Connections

To commission the hybrid field bus connections carry out the following steps:

Step	Description
1	Connect up to 2 hybrid field bus cables.
2	Close the control cabinet.
3	Attach bus terminating connectors or screw caps to any unused connections.
4	Switch on the main power.

Table 6-5: Procedure for commissioning the hybrid field bus connection

Diagnostics

Certain faults are highlighted by 2 LEDs for the active hybrid field bus connections. The LEDs are located on the IP20 side (in the control cabinet) in front of the SUB-D socket.

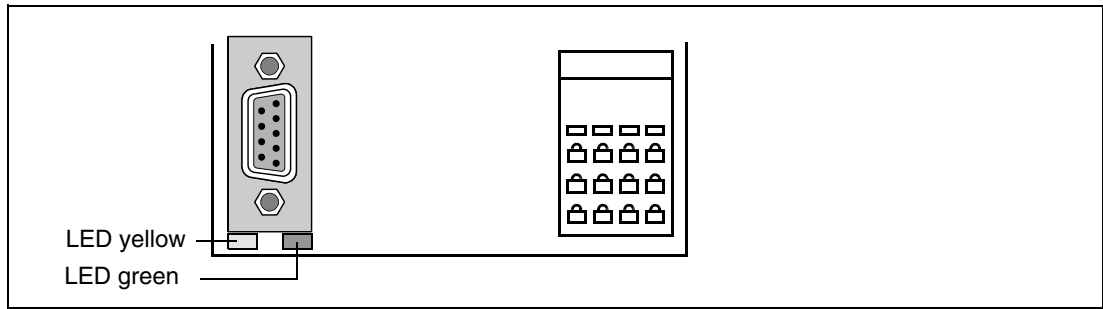


Fig. 6-1: Diagnostics LEDs for active hybrid field bus connections

Fault	Display/LED	Remedy
No supply voltage from 24 V DC (NS)	LED green OFF	Connect 24 V DC (NS) supply voltage
No supply voltage from 24 V DC (NS)	LED yellow OFF	Connect 24 V DC (NS) supply voltage
No signal from master		Check signal cable from master for interruption
Baud rate not recognized	LED yellow flickers	Plug in bus terminating connector
Baud rate not recognized		Plug in bus terminating connector Check bus station in direction of master fault

Table 6-6: Diagnostics for active hybrid field bus connections

Examples of typical hybrid field bus connections are listed on the following pages.

6.3.1 Passive Hybrid Field Bus Connection for Supply

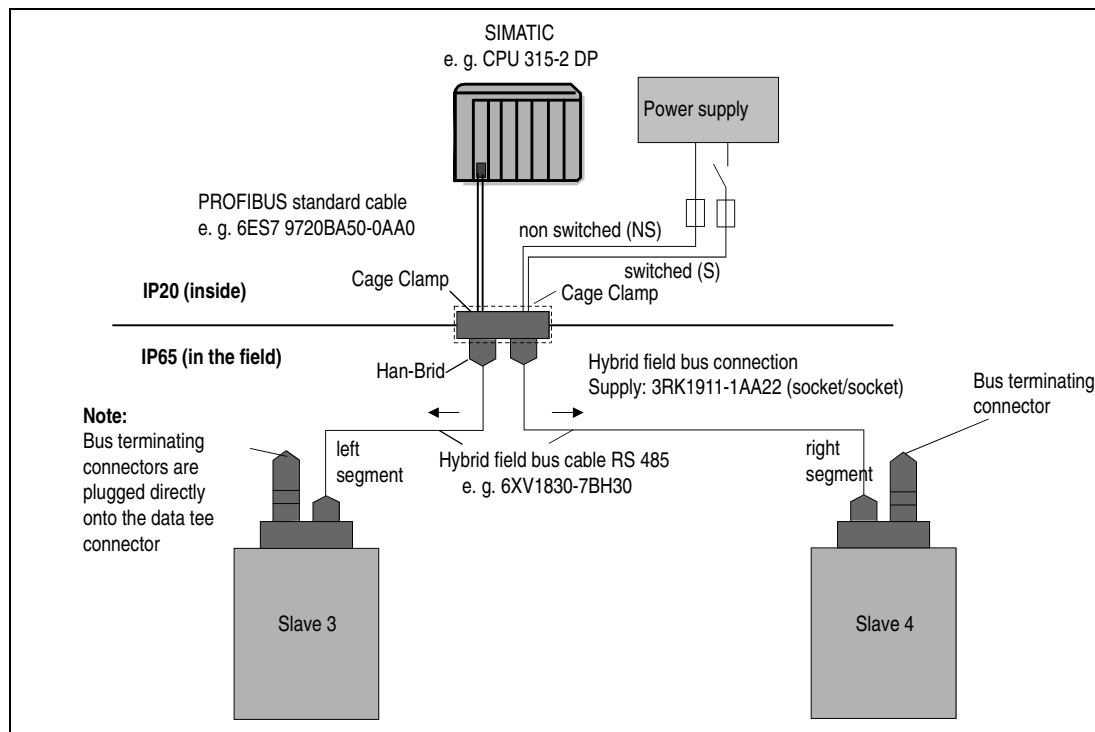


Fig. 6-2: 3RK1911-1AA22 passive hybrid field bus connection (socket/socket)

Typical set-up:

IP20 (inside):

- PLC/DP master/PROFIBUS-DP via RS 485
- Power supply for switched/non-switched voltage
- Passive hybrid field bus connection for combining
- PROFIBUS-DP (Cage Clamp) + power supplies (Cage Clamp)
- Segment divided between left and right

IP65 (in the field):

- Supply to PROFIBUS-DP in RS 485 in the left and right segments via Han Brid (sockets)
- Left and right bus terminating connectors on the last data tee Connectors of the left and right segments
- Supply to the power supplies (NS + S) via Han Brid (sockets)

6.3.2 Passive Hybrid Field Bus Connection for Conducting

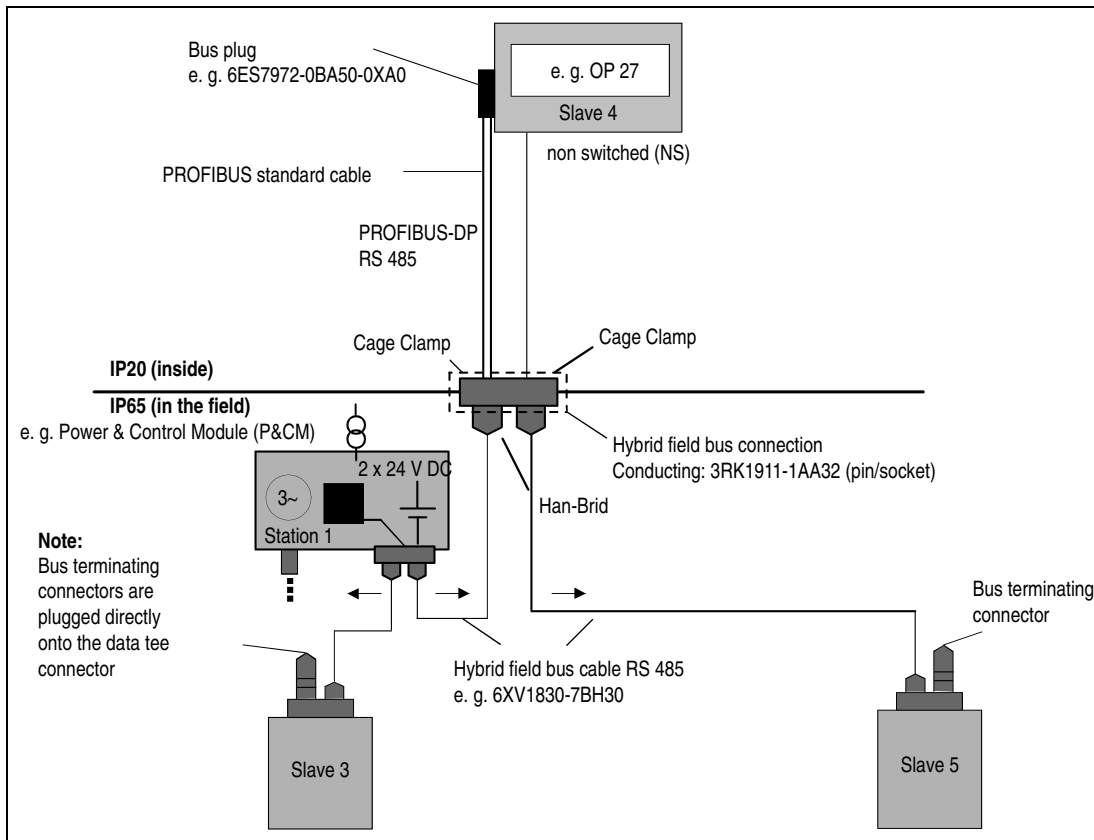


Fig. 6-3: 3RK1911-1AA32 passive hybrid field bus connection (pin/socket)

Typical set-up: Integration of an operator panel (OP)

IP20 (inside):

- PROFIBUS-DP and power supply to the components separated by the hybrid field bus connection
- Standard PROFIBUS-DP line connected to the hybrid field bus connection with Cage Clamp
- PROFIBUS-DP line connected to the component with a 9-pole SUB-D RS 485 bus plug
- Power supply to the component (e.g. operator panel) connected to the hybrid field bus connection with Cage Clamp (NS + S)
- Standard IP20 component (e.g. operator panel)

IP65 (in the field):

- Supply to PROFIBUS-DP in RS 485 and power supply via the hybrid field bus line to the pins of the hybrid field bus connection. PROFIBUS-DP and power supplies conducted into the hybrid field bus line via the sockets of the hybrid field bus connection
- Left and right bus terminating connectors on the last data tee connectors

6.3.3 Active Hybrid Field Bus Connection for Supply

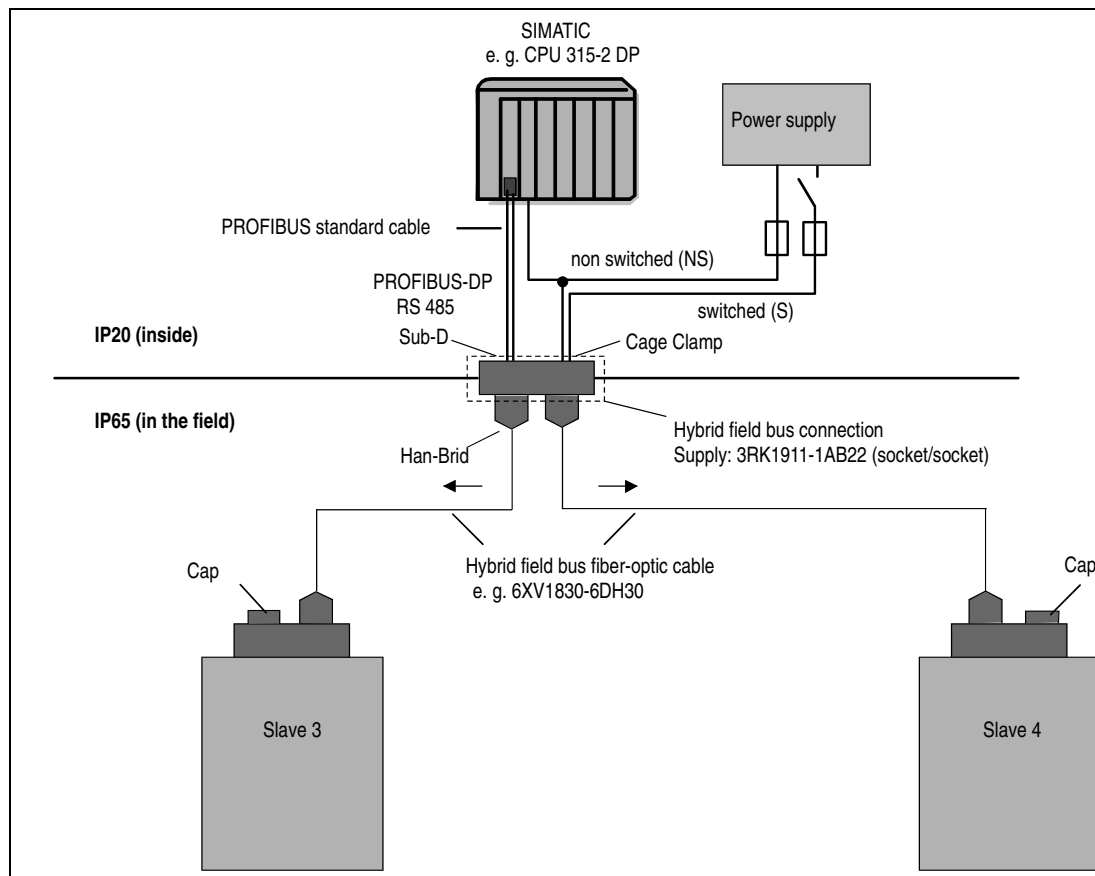


Fig. 6-4: 3RK1911-1AB22 active hybrid field bus connection (socket/socket)

Typical set-up:

IP20 (inside):

- PLC/DP master/PROFIBUS-DP via RS 485
- Power supply for switched/non-switched voltage
- Active hybrid field bus connection for combining PROFIBUS-DP 9-pin SUB-D (socket) + power supplies (terminals)
- Segment divided left and right

IP65 (in the field):

- PROFIBUS-DP supply with fiber-optic cables in the segment (left/right) via versatile link module
- Bus terminating connector (left/right) on the last data tee connector
- Power supply (NS + S) via Han-Brid (sockets)

6.3.4 Active Hybrid Field Bus Connection for Conducting

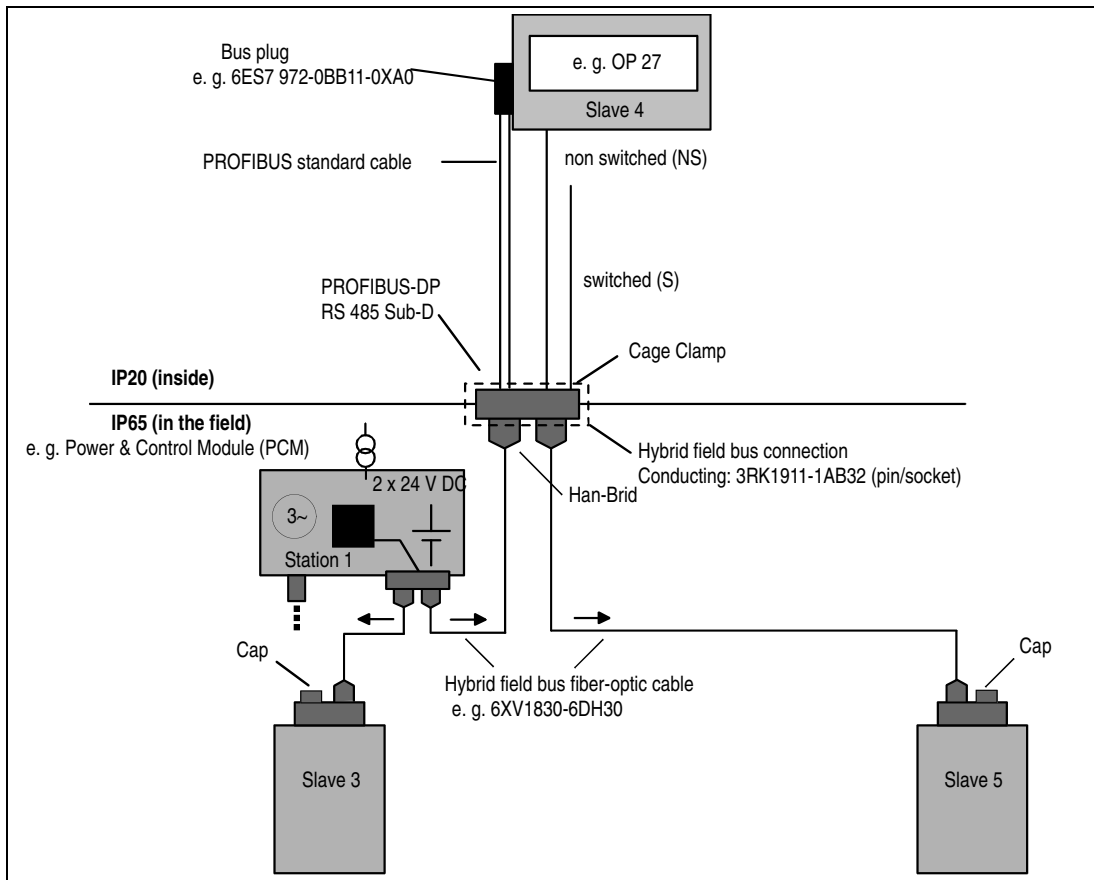


Fig. 6-5: 3RK1911-1AB32 active hybrid field bus connection (pin/socket)

Typical set-up: integrating an operator panel (OP)

IP20 (inside)

- Active hybrid field bus connection for separating PROFIBUS-DP and converting fiber-optic cable to RS 485 + power supplies (NS + S) for the components
- Standard PROFIBUS-DP cable connected to hybrid field bus connection with 9-pin SUB-D socket
- PROFIBUS-DP cable connected to the component with 9-pin SUB-D bus plug
- Component power supply (e.g. for operator panel) connected to hybrid field bus connection with cage clamp (NS + S)
- Standard IP20 component (e.g. operator panel)

IP65 (in the field):

- Supply to PROFIBUS-DP with fiber-optic cables and power supplies via hybrid field bus line to pins of hybrid field bus connection
- PROFIBUS-DP and power supplies conducted to hybrid field bus line via sockets of hybrid field bus connection
- Screw caps (left and right) on the last data tee connector

6.3.7 Active Hybrid Field Bus Connection for Supply

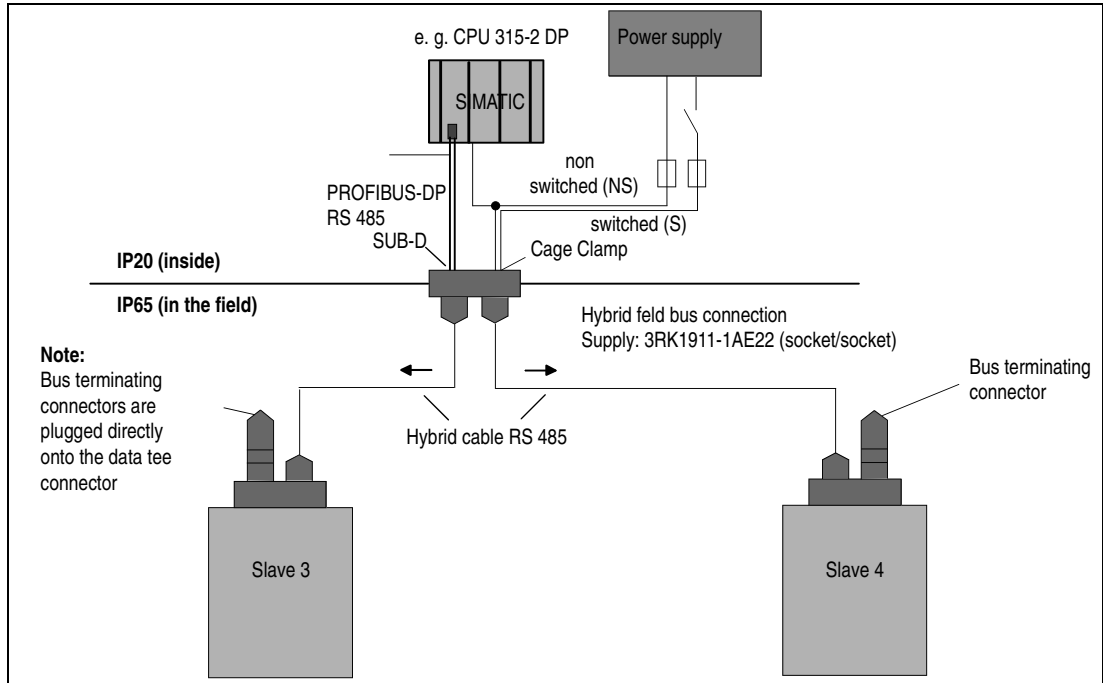


Fig. 6-7: 3RK1911-1AE22 active hybrid field bus connection (socket/socket)

Typical set-up:

IP20 (inside):

- PLC/DP master/PROFIBUS-DP via RS 485
- Power supply for switched/non-switched voltage
- Active hybrid field bus connection for combining PROFIBUS-DP 9-pin SUB-D (socket) + power supplies (Cage Clamp)
- Segment divided left and right

IP65 (in the field):

- PROFIBUS-DP supply with RS 485 in the segment (left and right) via Han-Brid (sockets)
- Bus terminating connector (left/right) on the last data tee connector
- Power supply (NS + S) via Han-Brid (sockets)

6.3.8 Active Hybrid Field Bus Connection for Supply

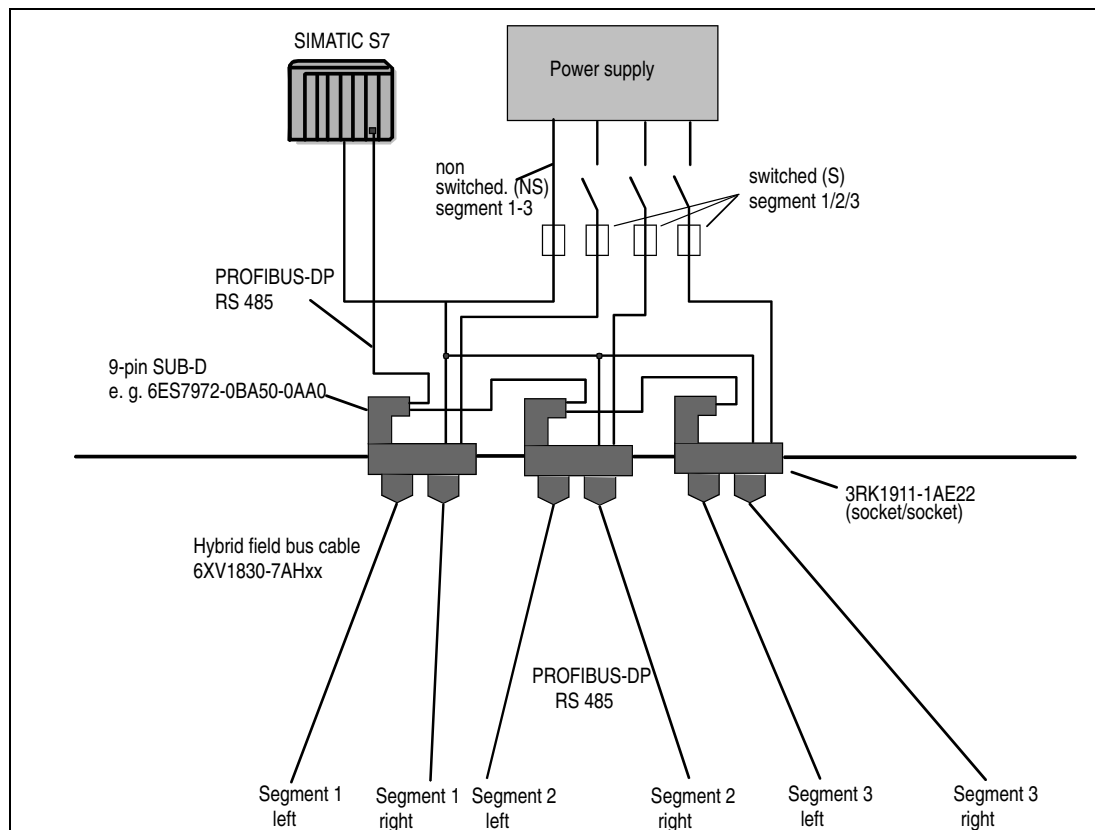


Fig. 6-8: 3RK1911-1AE22 active hybrid field bus connection (socket/socket)

Typical set-up:

IP20 (inside):

- PLC/DP master with PROFIBUS-DP via RS 485
- Power supply for several non-switched and independently-switched voltages (creation of several EMERGENCY STOP circuits, disconnection of individual segments) via cage clamp
- Linear design of PROFIBUS DP on the inside (IP20) of the hybrid field bus connections with terminating resistors for the last 9-pin SUB-D connector of the hybrid field bus connection and on the CP of SIMATIC S7

IP65 (in the field):

- PROFIBUS-DP supply with RS 485 in three segments (left/right) via Han-Brid (sockets)
- Bus terminating connector (left/right) on the last data tee connector
- Power supply (NS + S) via Han-Brid (sockets)

6.3.9 Conveyor Section With Hybrid Field Bus Connections for Supply and Conducting

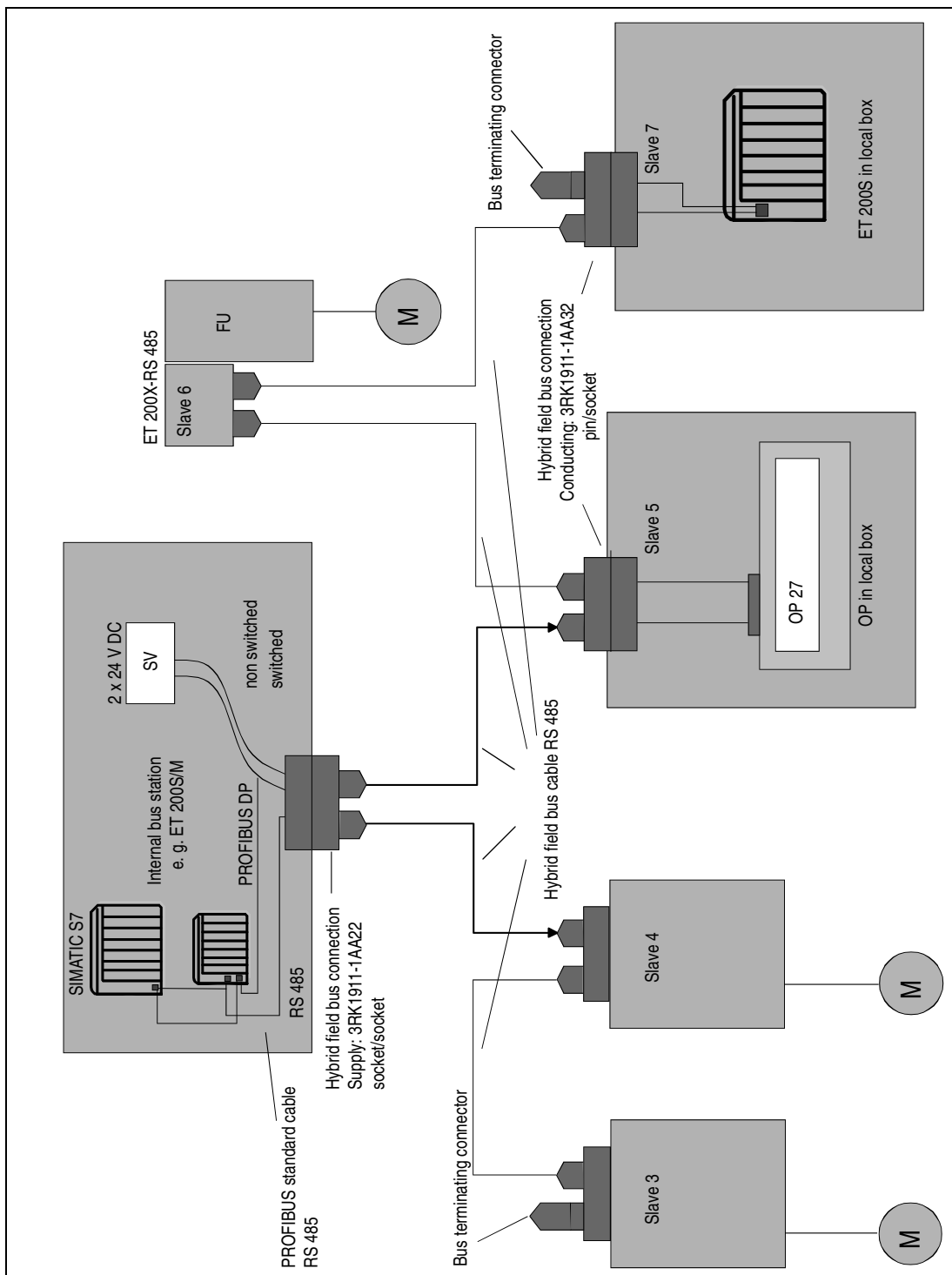


Fig. 6-9: Conveyor section with hybrid field bus connections for supply and conducting

6.3.10 Installation System with PROFIBUS-DP - Cu

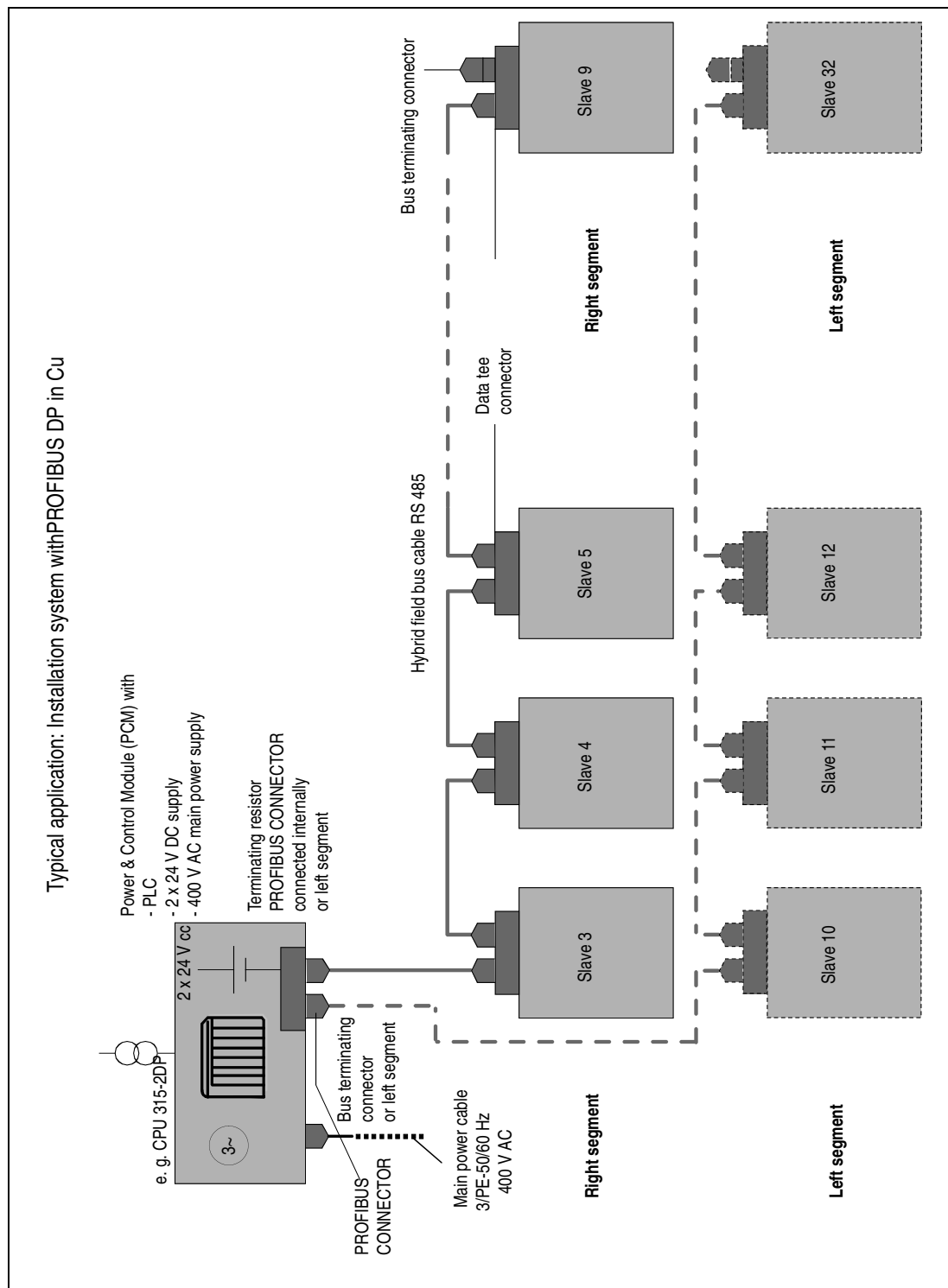


Fig. 6-10: Installation method with PROFIBUS-DP – Cu

6.3.11 PROFIBUS-DP – Fiber-optic Cable

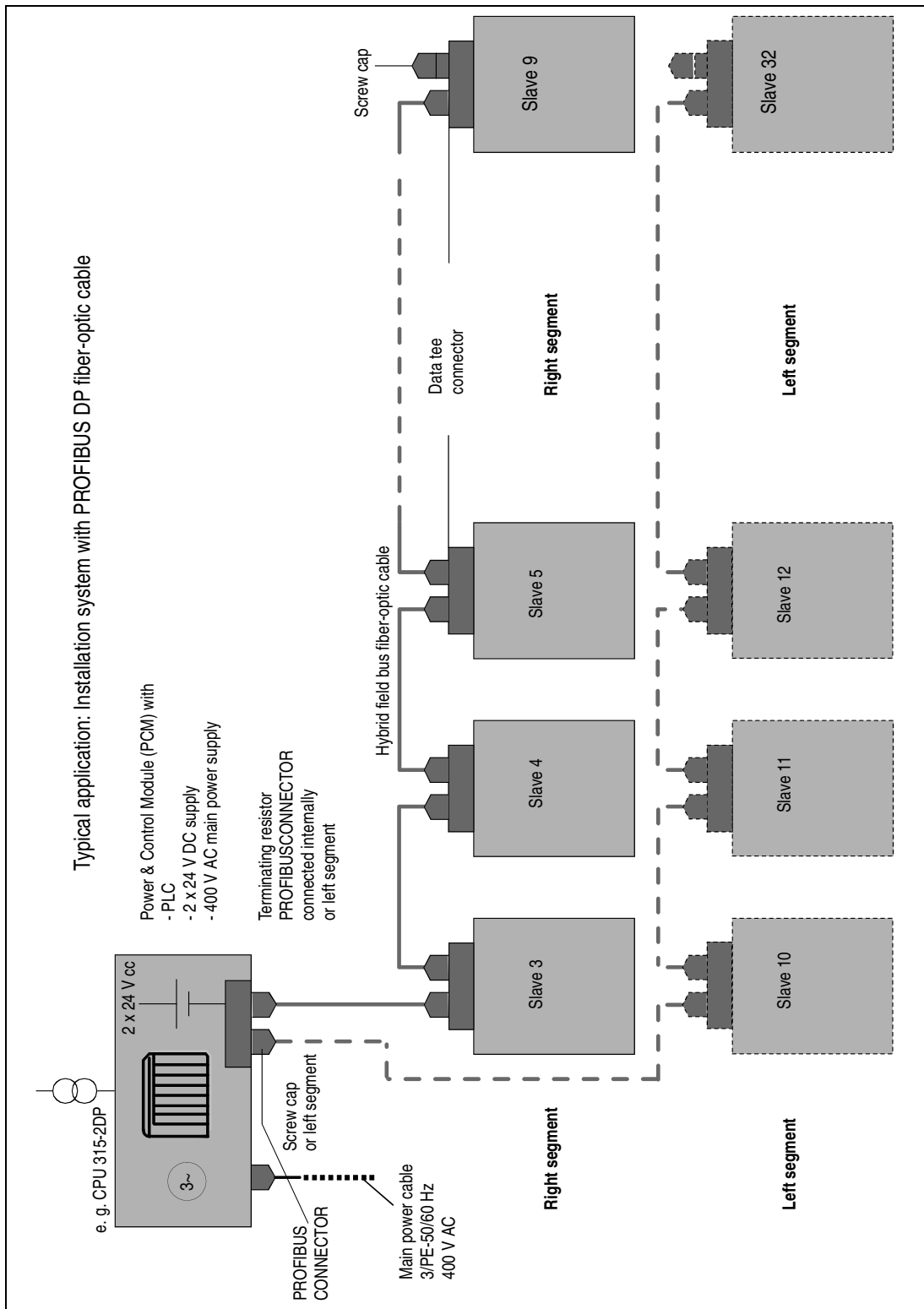


Fig. 6-11: Installation system with PROFIBUS DP fiber-optic cable

6.3.12 PROFIBUS-DP (Cu) and Passive Hybrid Field Bus Connections with 2 Separate Power Supplies

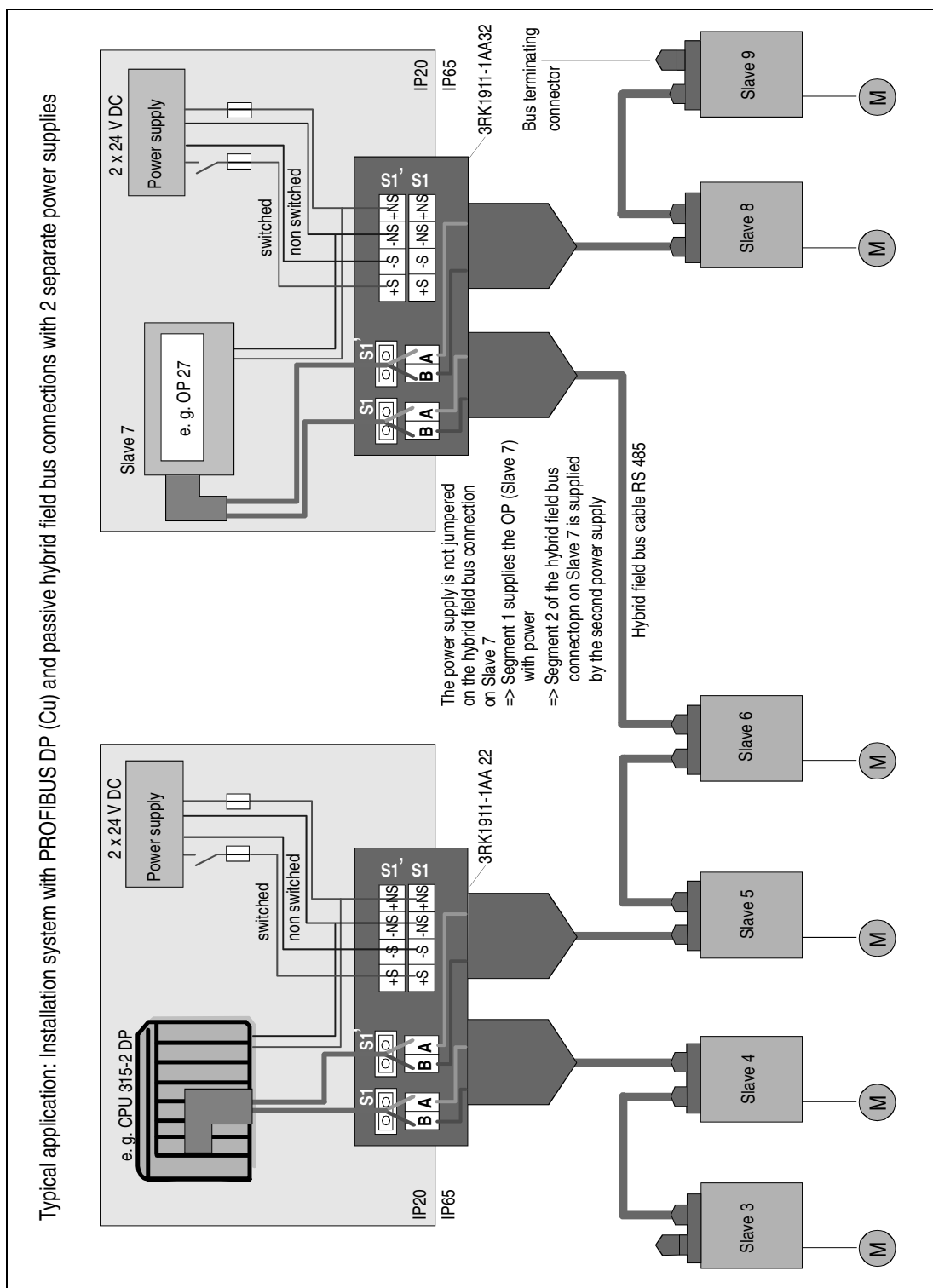


Fig. 6-12: PROFIBUS-DP (Cu) and passive hybrid field bus connections with 2 separate power supplies

6.3.13 PROFIBUS-DP (Cu) and Active Hybrid Field Bus Connections with 2 Separate Power Supplies

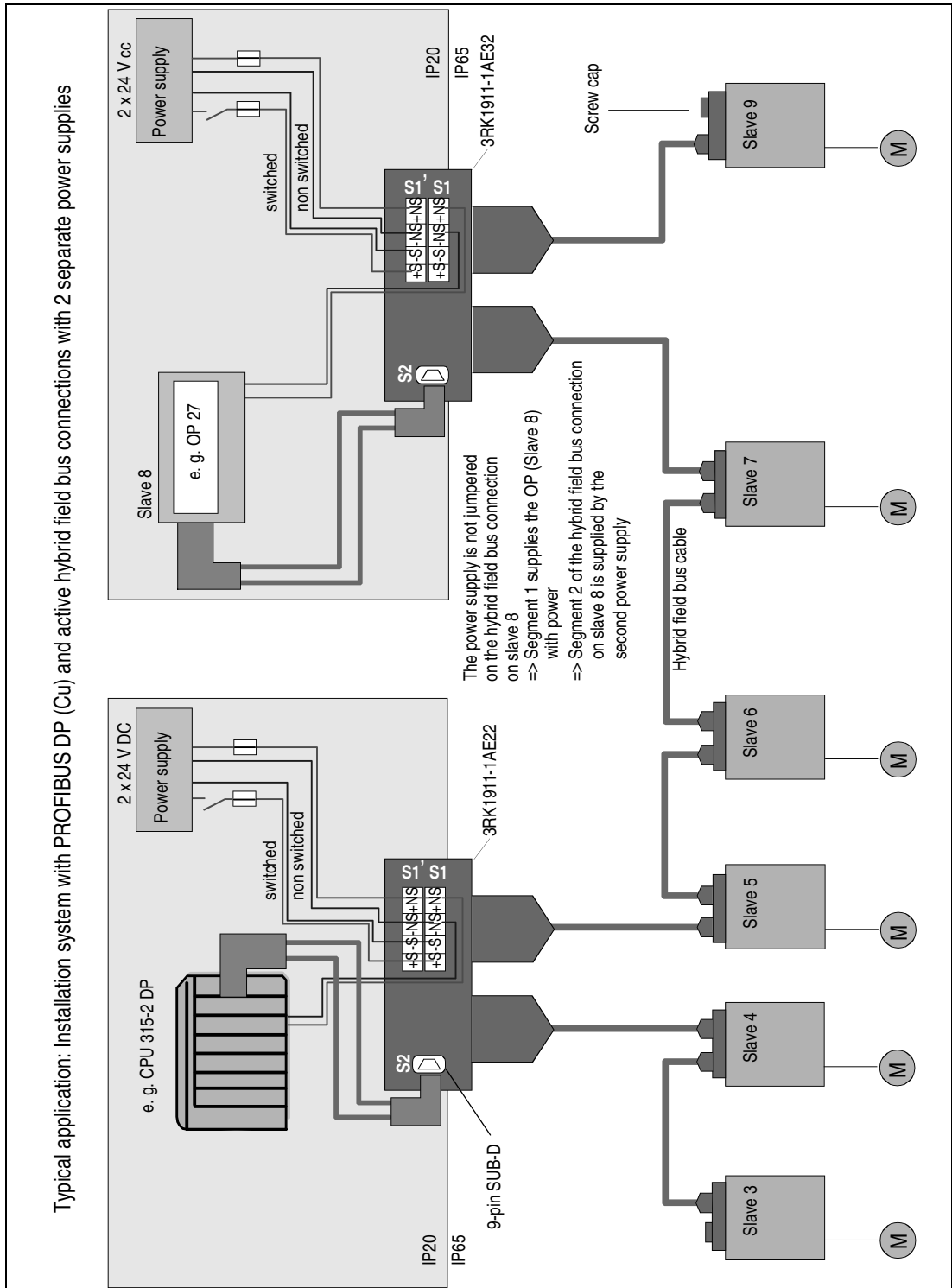


Fig. 6-13: PROFIBUS-DP (Cu) and active hybrid field bus connections with 2 separate power supplies

6.3.14

PROFIBUS-DP CU and Active Hybrid Field Bus Connections with 2 Separate Data Supplies

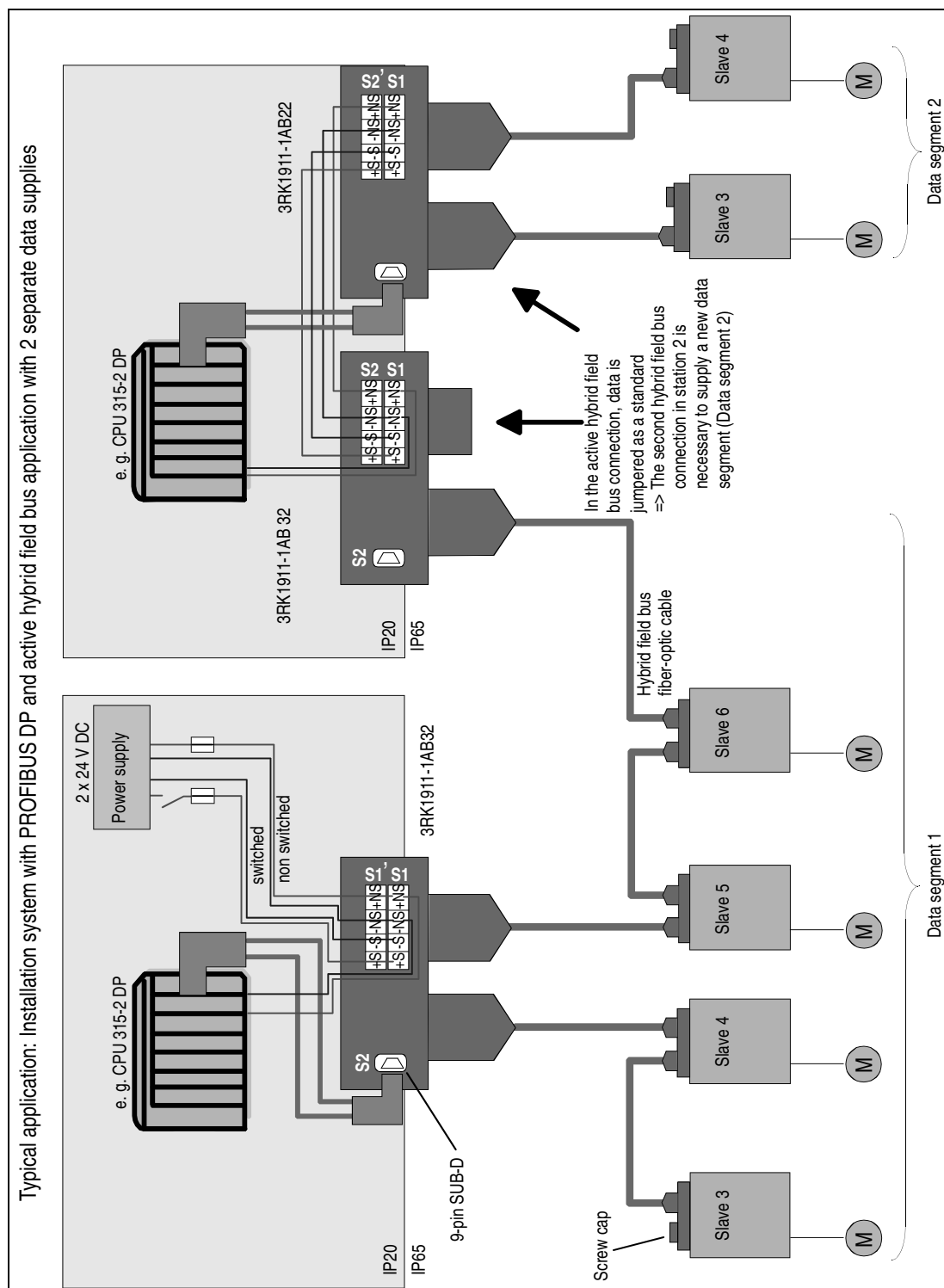


Fig. 6-14: PROFIBUS-DP CU and active hybrid field bus connections with 2 separate data supplies

6.4 Discriminating Module and Maintenance Switch



Warning

Hazardous electrical voltages! These may cause electric shock and burns. Disconnect the system and device from the power supply before starting work.

Notice

Refer to the information in the operating instructions.

To commission the discriminating module/maintenance switch, and thus also the downstream power bus (sub-)segment, carry out the following steps:

Step	Activity
1	If you are using motor starters without a thermal motor model and with a motor supply lead (installation in the vicinity of the motor), also observe the line protection guidelines in 3.5.5 on page 3-13.
2	Switch on the 400 V AC main power supply
3	Switch on the discriminating module/maintenance switch.

Table 6-7: Sequence of steps for commissioning the discriminating module/maintenance switch

Technical Data

7.1 Power & Control Module

7.1.1 IP65 Version

Order number	4FB2111-2A...-0AA0	4FB2121-2A...-0AA0	4FB2111-2A...-0AA1	4FB2112-2A...-0AA0
Ausführung				
Master/slave	PROFIBUS-DP (Master)	PROFIBUS-DP (Master) AS-Interface (Master)	PROFIBUS-DP (Slave)	PROFIBUS-DP (Master) AS-Interface (Master)
Protection	SIGUARD	SIGUARD	SIGUARD	AS-I monitor
Power supply				
Input voltage/range	3AC 400 V/-10% +6%			
System frequency/range	50, 60 Hz ± 5%			
Main power supply	See table "PCM device versions", on page 2-3			
Output main power circuit	3 AC 400 V			
24 V switched (24 V S)				
Output voltage	DC 24 V (20.4 V to 28.8 V)			
Output current	5 A DC when AS-Interface fitted 10 A DC when AS-Interface not fitted			
Residual ripple	< 5%			
Backup	min. 20 ms			
24 V DC non switched (24 V NS)				
Output voltage	DC 24 V (20.4 V to 28.8 V)			
Output current	DC 10 A	DC 10 A	DC 10 A	DC 10 A
Residual ripple	< 5%	< 5%	< 5%	< 5%
Backup	min. 20 ms	min. 20 ms	min. 20 ms	min. 20 ms
30 V DC non switched (AS-i)				
Output voltage AS-i	—	DC 30 V (29.5 V to 31.6 V)	—	DC 30 V (29.5 V to 31.6 V)
Output current	—	DC 2.4 A	—	DC 2.4 A
Residual ripple	—	< 300 mVss	—	< 300 mVss
Backup	—	min. 20 ms	—	min. 20 ms

Order number	4FB2111-2A...-0AA0	4FB2121-2A...-0AA0	4FB2111-2A...-0AA1	4FB2112-2A...-0AA0
Protection and monitoring				
Short circuit protection				
Main circuit	Built-in circuit-breaker			
Auxiliary circuits	Built-in residual current-operated protective device			
Signaling devices	Green (ready for operation) Yellow (power connected) Red (internal fault)			
Safety				
Degree of protection	IP65			
Approvals (in preparation)	CE, UL, CSA			
Safety class	I			
EMC				
Emitted interference	EN 55 081-2			
Noise immunity	EN 61000-6-2			
Temperatures				
Ambient temperature	0 °C to +40 °C, +50 °C with derating in the main circuit/auxiliary circuits			
Transport-/storage temperature	-25 °C to +70 °C			
Relative humidity	15% to 75% at 25°C (non-condensing)			
Air pressure	700 to 1060 hPa			
Mechanical environmental conditions				
Transport				
Vibratory load	3 g			
Shock	15 g with 11 ms			
Operation				
Vibratory load	f = 10 to 58 Hz, d = 0.075 mm/58 to 100 Hz, 10 g			
Shock	10 g with 6 ms/6 g with 10 ms			

Order number	4FB2111-2A...-0AA0	4FB2121-2A...-0AA0	4FB2111-2A...-0AA1	4FB2112-2A...-0AA0
Connections/throughfeeds				
Input connections	Cage – Clamp max. 2 x 16 mm ² max. current carrying capacity (Throughfeeds 2 x M40x1.5)			
Output connections Main circuit	2 x Han Q4/2 socket (DESINA)			
Output connections Auxiliary circuits/field bus	2 x Han-Brid socket/socket (DESINA)			
Output connections AS-Interface	—	Cage – Clamp, 2.5 mm ² Throughfeeds 4 x ASi-seal	Cage – Clamp, 2.5 mm ² Throughfeeds 4 x ASi-seal	—
Output connections EMERGENCY STOP	Cage – Clamp, 2.5 mm ² Throughfeeds via cable throughfeed flange	Cage – Clamp, 2.5 mm ² Throughfeeds via cable throughfeed flange	Cage – Clamp, 2.5 mm ² Throughfeeds via cable throughfeed flange	Cage – Clamp, 2.5 mm ² Throughfeeds via cable throughfeed flange
SIMATIC connections	Cage – Clamp, 1.5 mm ²			
Cable throughfeed flanges	8 x 3.8 to 6.3 mm			
	2 x 6.1 to 8.8 mm			
	2 x 7.8 to 10.7 mm			
Dimensions/weight				
Housing dimensions (WxHxD)	550 x 850 x 255			
Overall dimensions (WxHxD)	600 x 920 x 310			
Fixing dimensions (WxH)	575 x 695			
Fixing holes	4 x M8			
Weight	max. 77 kg			
Fasteners	Double-bit key			
SIMATIC				
Controller	S7-300, CPU 313C-2 DP I/O module	S7-300, CPU 313C-2 DP I/O module AS Interface master	S7-300, CPU 313C-2 DP I/O module AS Interface master	ET 200M I/O module
Data transfer rate	max. 12 Mbit/s			
Main memory EEPROM MMC	IM151, 64 KByte	IM151, 64 KByte	IM151, 64 KByte	—
MMC	Included	Included	Included	—
Unassigned SIMATIC inputs	6	6	6	6
Unassigned SIMATIC outputs	13	13	13	13
External interfaces	PROFIBUS-DP	PROFIBUS-DP	PROFIBUS-DP	PROFIBUS-DP

7.1.2 IP00 Version (Control Cabinet Version)

Order number	4FB2111-2A...-0AA2	4FB2121-2A...-0AA1	4FB2111-2A...-0AA3	4FB2112-2A...-0AA1
Ausführung				
Master/slave	PROFIBUS-DP (master)	PROFIBUS-DP (master) AS-Interface (master)	PROFIBUS-DP (slave)	PROFIBUS-DP (master) AS-Interface (master)
Protection	SIGUARD	SIGUARD	SIGUARD	AS-I monitor
Power supply				
Input voltage/range	3AC 400 V/-10% +6%			
System frequency/range	50, 60 Hz ± 5%			
Main power supply	See table "PCM device versions", on page 2-3			
Output/Main circuit	3 AC 400 V			
24 V switched (24 V S)				
Output voltage	DC 24 V (20.4 V to 28.8 V)			
Output current	5 A DC when AS-Interface fitted 10 A DC when AS-Interface not fitted			
Residual ripple	< 5%			
Backup	min. 20 ms			
24 V DC non switched (24 V NS)				
Output voltage	DC 24 V (20.4 V bis 28.8 V)			
Output current	DC 10 A	DC 10 A	DC 10 A	DC 10 A
Residual ripple	< 5%	< 5%	< 5%	< 5%
Backup	min. 20 ms	min. 20 ms	min. 20 ms	min. 20 ms
30 V DC non switched (AS-i)				
Output voltage AS-i	—	DC 30 V (29.5 V to 31.6 V)	—	DC 30V (29.5 V to 31.6 V)
Output current	—	DC 2.4 A	—	DC 2.4 A
Residual ripple	—	< 300 mVss	—	< 300 mVss
Backup	—	min. 20 ms	—	min. 20 ms
Protection and monitoring				
Short circuit protection				
Main circuit	Built in circuit-breaker			
Auxiliary circuit	Built in residual current-operated protective device			
Signaling devices	Green (ready for operation) Yellow (power connected) Red (internal fault)			

Order number	4FB2111-2A...-0AA2	4FB2121-2A...-0AA1	4FB2111-2A...-0AA3	4FB2112-2A...-0AA1
Safety				
Degree of protection	IP65			
Approvals (in preparation)	CE, UL, CSA			
Safety class	I			
EMC				
Emitted interference	EN 55 081-2			
Noise immunity	EN 61000-6-2			
Temperatures				
Ambient temperature	0 °C to +40 °C, +50 °C with derating in the main circuit/auxiliary circuits			
Transport/storage temperature	-25 °C to +70 °C			
Relative humidity	15% to 75% at 25 °C (non-condensing)			
Air pressure	700 to 1060 hPa			
Mechanical environmental conditions				
Transport				
Vibratory load	3 g			
Shock	15 g with 11 ms			
Operation				
Vibratory load	f = 10 to 58 Hz, d = 0.075 mm/58 to 100 Hz, 10 g			
Shock	10 g with 6 ms/6 g with 10 ms			
Connections/throughfeeds				
Input connections	Cage – Clamp max. 2 x 16 mm ² max. current carrying capacity			
Output connections Main circuit	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²
Output connections Auxiliary circuits	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²
Output connections AS-Interface	—	Cage – Clamp, 2.5 mm ² Throughfeeds 4 x ASi-Dichtung	Cage – Clamp, 2.5 mm ² Throughfeeds 4 x ASi-Dichtung	—
Output connections EMERGENCY STOP	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²	Cage – Clamp, 2.5 mm ²
SIMATIC connections	Cage – Clamp, 1.5 mm ²			
Dimensions/weight				
Dimensions (WxHxD)	520 x 830 x 240			
Fixing dimensions (WxH)	350 x 809			
Fixing holes	4 x M8			
Weight	max. 55 kg			

Order number	4FB2111-2A...-0AA2	4FB2121-2A...-0AA1	4FB2111-2A...-0AA3	4FB2112-2A...-0AA1
SIMATIC				
Controllers	S7-300, CPU 313C-2 DP I/O module	S7-300, CPU 313C-2 DP I/O module AS-interface master	S7-300, CPU 313C-2 DP I/O module AS-interface master	ET 200M I/O module
Data transfer rate	to 12 Mbit/s			
Main memoryEEPROM MMC	IM151, 64 KByte	IM151, 64 KByte	IM151, 64 KByte	—
MMC	Included	Included	Included	—
Unassigned SIMATIC inputs	6	6	6	6
Unassigned SIMATIC outputs	13	13	13	13
External interfaces	PROFIBUS-DP	PROFIBUS-DP	PROFIBUS-DP	PROFIBUS-DP

7.2 Alternative Power Supplies

7.2.1 Simple Energy Unit (SEU)

For the technical data of the circuit-breaker and the contactor, please refer to the manual enclosed with the device.

7.2.2 ET 200S Motor Starter

For the technical data of the motor starter ET 200S, please refer to the manual in the 6ES7151-1AA10-8AA0 documentation package.

7.3 Hybrid Field Bus Connections

General technical Data		
Location	On the system	Mounted directly on the control cabinet
Installation position		Any
Degree of protection	Control cabinet Field bus	IP20 IP65/67
Enclosure dimensions (HxWxD)	103 x 93 x 65	
Weight	ca. 250 g	
Operating temperature	-25 °C to +50 °C	
Storage-/transport temperature	-40 °C to +80 °C	
Vibratory load	5 g	
Rated insulation voltage	500 V AC	
Standards, approvals	DIN VDE 0627, DIN EN 61984, DIN EN 60529, DIN VDE 0160, DIN EN 50178, DIN EN 50170	UL 1977, CSA in preparation
Electrical Data Auxiliary Power		
Rated voltage		
24 V DC, non-switched (NS)	24 V DC -25%/+50%	18 V to 36 V
24 V DC, switched (S)	24 V DC -25%/+50%	18 V to 36 V
Rated current	max. 10 A	For each rated voltage
Voltage supply	from 24 V DC non-switched	(NS)
Current consumption	max. 130 mA	
Voltage failure bypass	> 20 ms	

Electrical Data for Communication			
	Passive	Active	
	RS 485 version	RS 485 version	Fiber-optic cable version
Baud rates supported	12,000 kBd 6,000 kBd 3,000 kBd 1,500 kBd 500 kBd 187.5 kBd 93.75 kBd 45.45 kBd 19.2 kBd 9.6 kBd	12,000 kBd 6,000 kBd 3,000 kBd 1,500 kBd 500 kBd 187.5 kBd 93.75 kBd 45.45 kBd 19.2 kBd 9.6 kBd	12,000 kBd (6,000 kBd) not permitted (3,000 kBd) not permitted 1,500 kBd 500 kBd 187.5 kBd 93.75 kBd 45.45 kBd 19.2 kBd 9.6 kBd
Cascade depth ^{*)}	–	3	9 at 12,000 kBd 32 at other baud rates
Maximum permissible RS 485/ fiber-optic cable length (POF) between 2 stations	–	Depending on the baud rate	50 m

*) Maximum number of hybrid field bus connections in the RS 485/fiber-optic cable segment.
If the DP master for a fiber-optic cable system is located centrally with regard to topology, the maximum cascade depth is permissible at each fiber-optic cable segment connected to the DP master.

7.4 Data Tee Plug Connector

General Technical Data		
Location	On the system	Connected to motor starter
Installation position		Any
Degree of protection	IP65/67	Watertight acc. to IEC 529 (DIN 40050)
Cooling	Convection	No additional cooling required
Weight	105 g 100 g	Copper variante Fibe-optic cable variant
Operating temperature	–20 °C to + 40 °C	Non condensing Max. 55 °C with reduktion of I _{DC24V-NS} and I _{DC24V-S} each with je 0.3 A per K
Storage/transport temperature	–40 °C to +80 °C	
Relative humidity	5% to 95%	Non condensing
Site altitude	2000 m	No restrictions
Vibratory load	f = 5 to 26 Hz; d = 0.75 mm 10 Zyklen/f = 26 to 150 Hz; a = 2 g	
Shock	a = 150 m/s ² (15 g) with 11 ms each with 3 shocks in all axes (=18)	
ESD	8 kV air discharge 6 kV contact discharge	IEC 1000-4-2 Severity 3
Electromagnetic fields	10 V/m	IEC 1000-4-3 Severity 3

General Technical Data		
BURST	2 kV/5 kHz supply voltage 1 kV/5 kHz data cables 2 kV/5 kHz process cables	IEC 1000-4-4 Severity 3
Emitted interference	Limit value class A	EN 55011

Electrical Data Auxiliary Power		
	Non switched Voltage, DC24V-NS	Switched Voltage DC24V-S
Voltage range	20.4 V DC to 28.8V DC standard power supply acc. to DIN 19240	
Maximum current-carrying capacity from Han-brid to Han-brid	10 A	10 A
Polarity protection	no	no
Short circuit protection/ overload protection	no	no
Insulation voltage	500 V DC between auxiliary voltages and PE	

Electrical Data for Communication		
	Copper Variant	Fiber-optic Cable Variante
Baud rates supported	12,000 kBd 6,000 kBd 3,000 kBd 1,500 kBd 500 kBd 187.5 kBd 93.75 kBd 45.45 kBd 19.2 kBd 9.6 kBd	12,000 kBd (6,000 kBd) not permitted (3,000 kBd) not permitted 1,500 kBd 500 kBd 187.5 kBd 93.75 kBd 45.45 kBd 19.2 kBd 9.6 kBd
Cascade depth ^{*)}	–	9 at 12,000 kBd 32 at other baud rates
Maximum permissible fiber-optic cable length (POF) between 2 stations	–	50 m

*) Maximum number of data tee connectors in the fiber-optic cable segment.
If the DP master for a fiber-optic cable system is located centrally with regard to topology, the maximum cascade depth is permissible at each fiber-optic cable segment connected to the DP master.

7.5 Discriminating Module

General Technical Data		
Location	On the system	Wall mounting Mounted directly on the ECOFAST consumer ^{*)}
Installation position		Any
Degree of protection	IP65/67	Watertight acc. to IEC 529 (DIN 40050)
Enclosure dimensions (HxWxD)	205 x 105 x 140	
Weight	1.5 kg	
Operating temperature	-20 °C to +40 °C	
Storage-/transport temperature	-40 °C to +80 °C	
Vibratory load	5 g	
Rated insulation voltage	500 V AC	
Locking device	3 padlocks	acc. to IEC 60 204-1
Standards, approvals	IEC 69 947, IEC 60 204-1, DIN VDE 0627	UL 1977, CSA

*) Not possible if ECOFAST motor starters are operated with PROFIBUS-DP

Dimension Drawings

8.1 Power & Control Module

8.1.1 IP65 Version

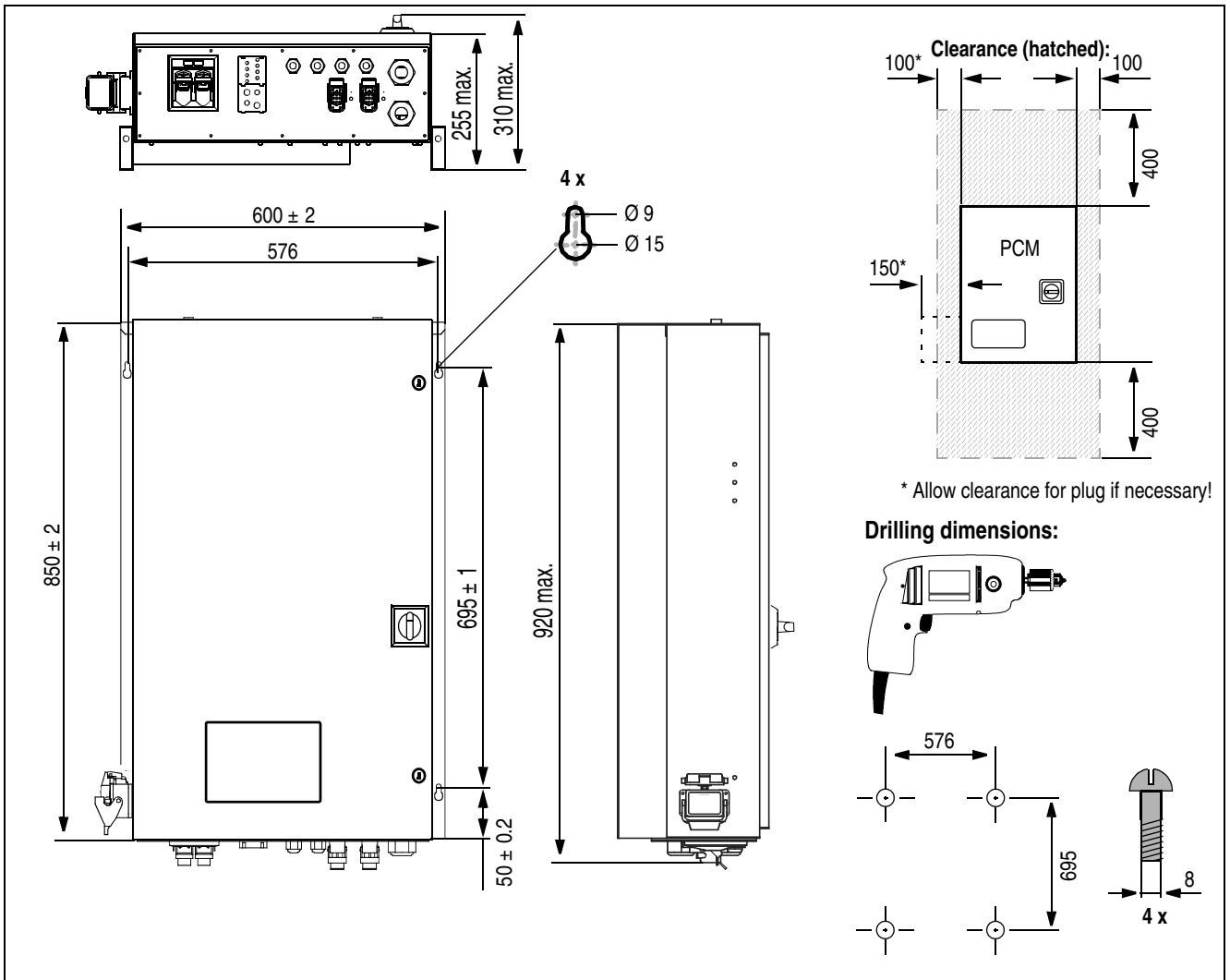


Fig. 8-1: Power & Control Module, IP65 version

8.1.2 IP00 Version (Control Cabinet Version)

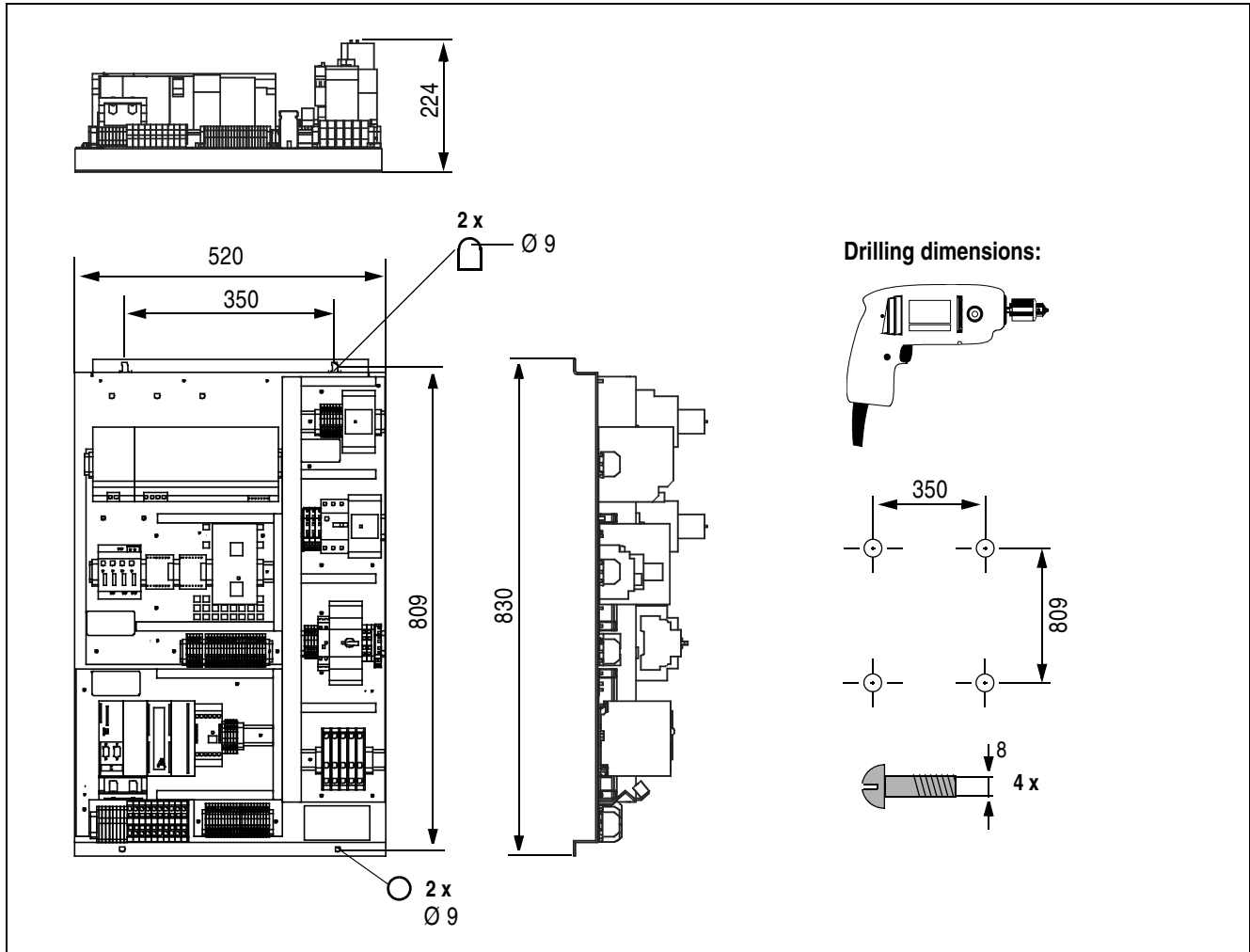


Fig. 8-2: Power & Control Module, IP00 version (control cabinet version)

8.2 Alternative Power Supplies

8.2.1 Simple Energy Unit (SEU)

Circuit-breaker

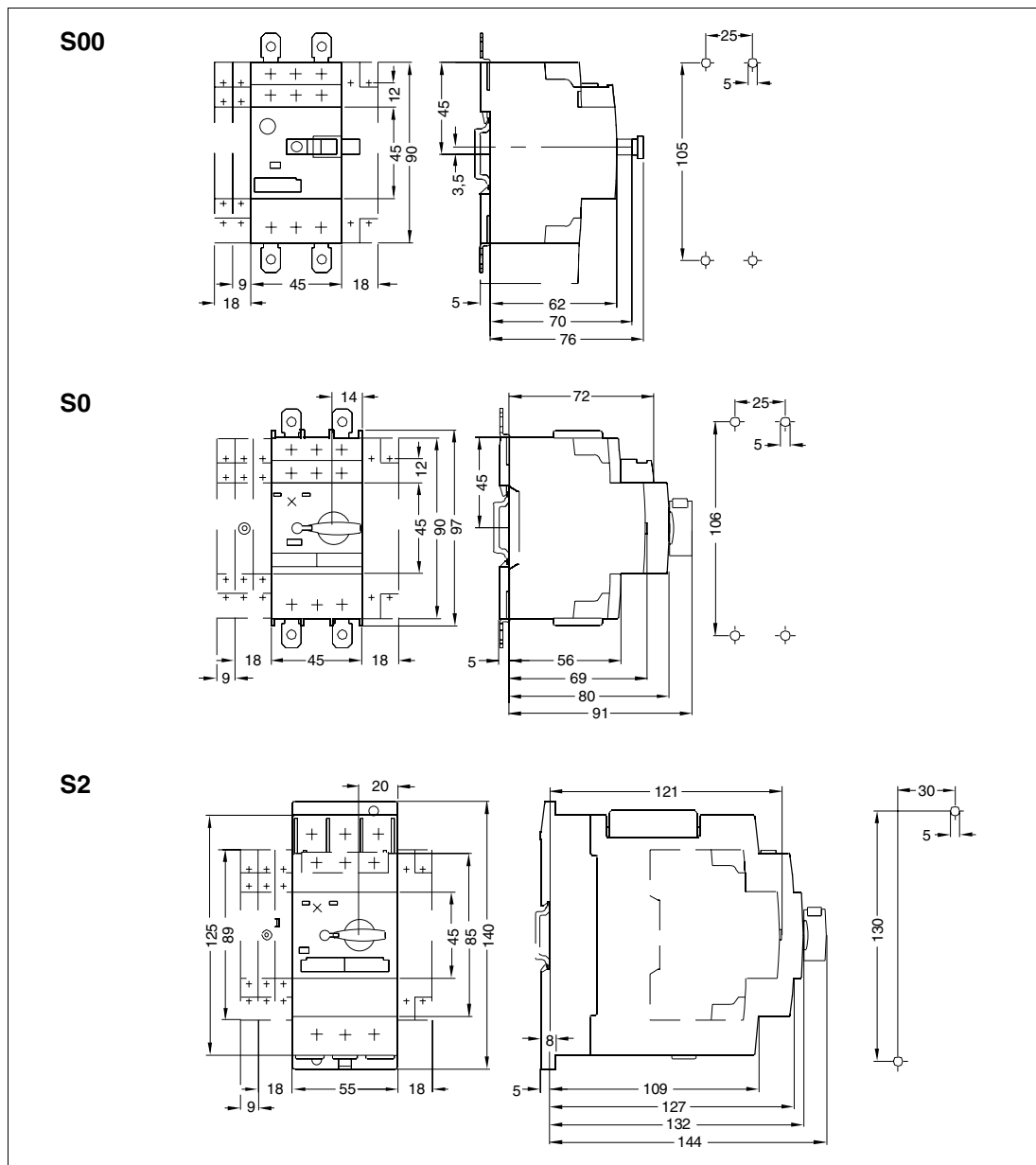


Fig. 8-3: 3RV10.. circuit-breaker

Contactors

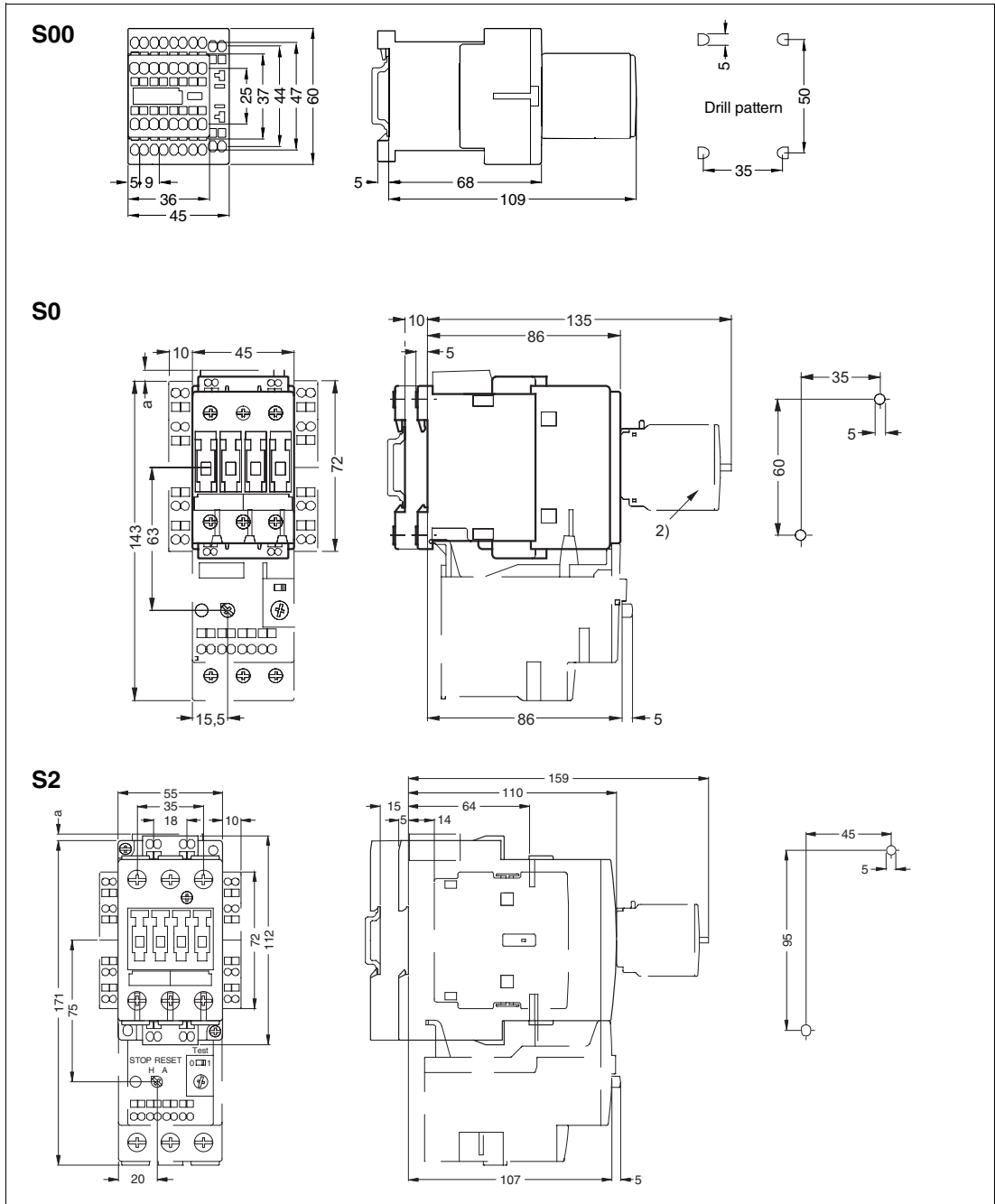


Fig. 8-4: Contactors 3RT10..

8.2.2 ET 200S Motor Starter

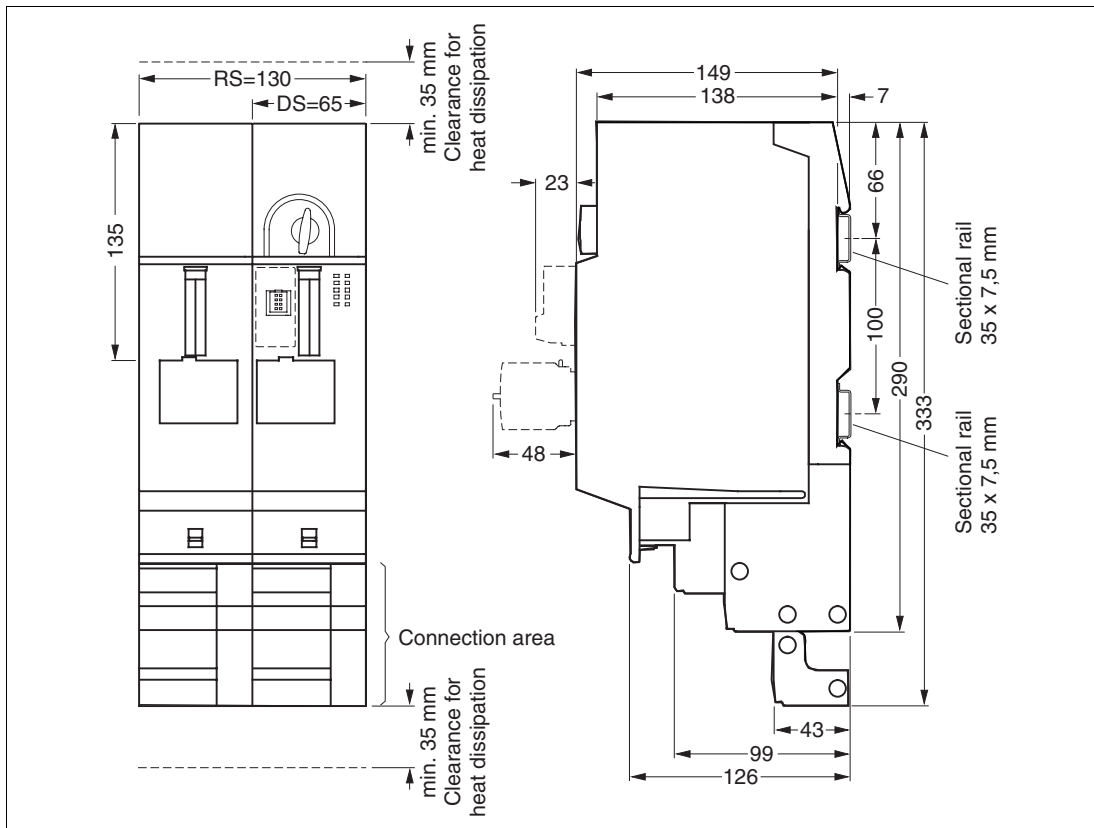


Fig. 8-5: ET 200S motor starter

8.3 Power Tee Clamp Connector

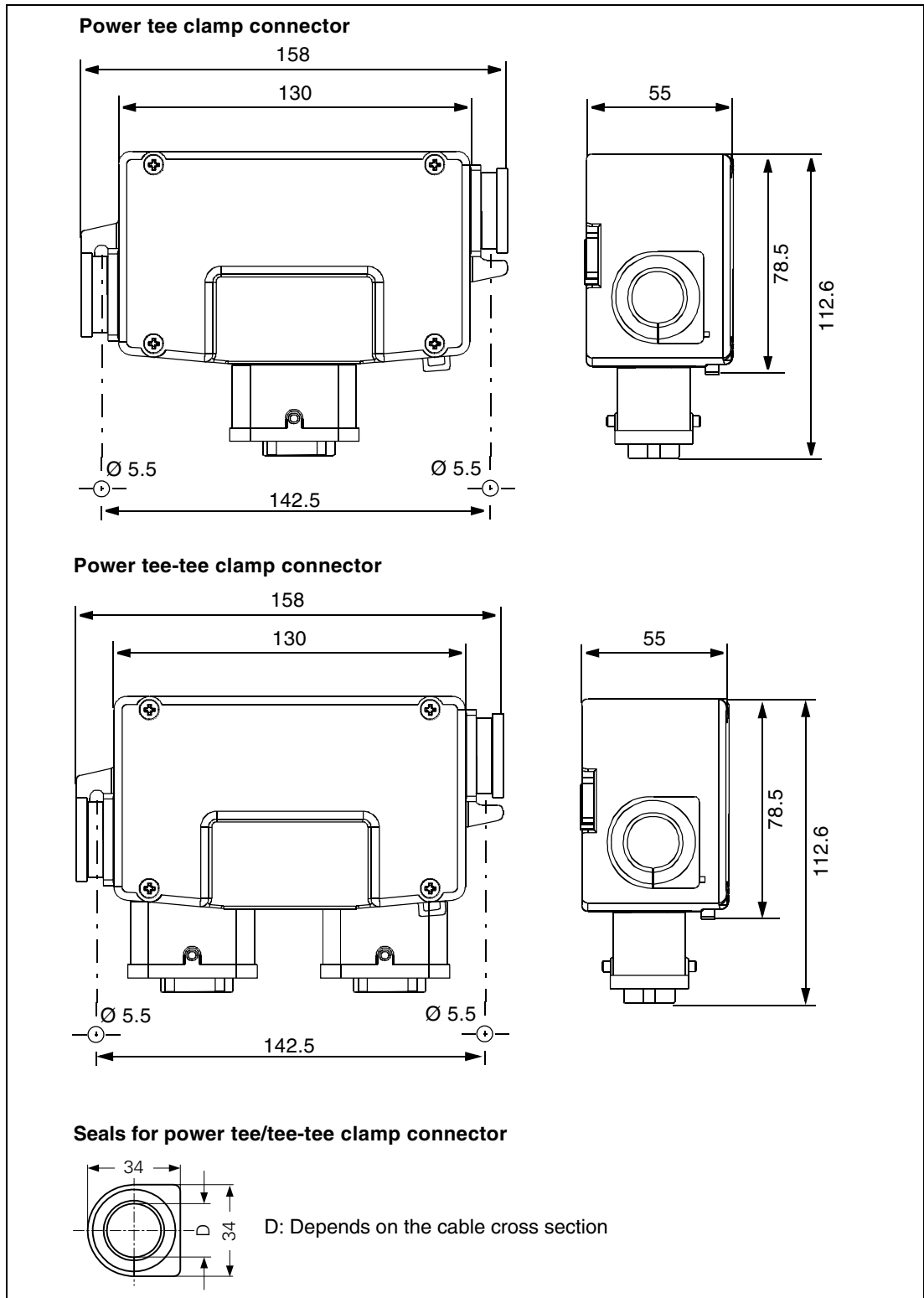


Fig. 8-6: Power tee/tee-tee clamp connector

8.4 Hybrid Field Bus Connections

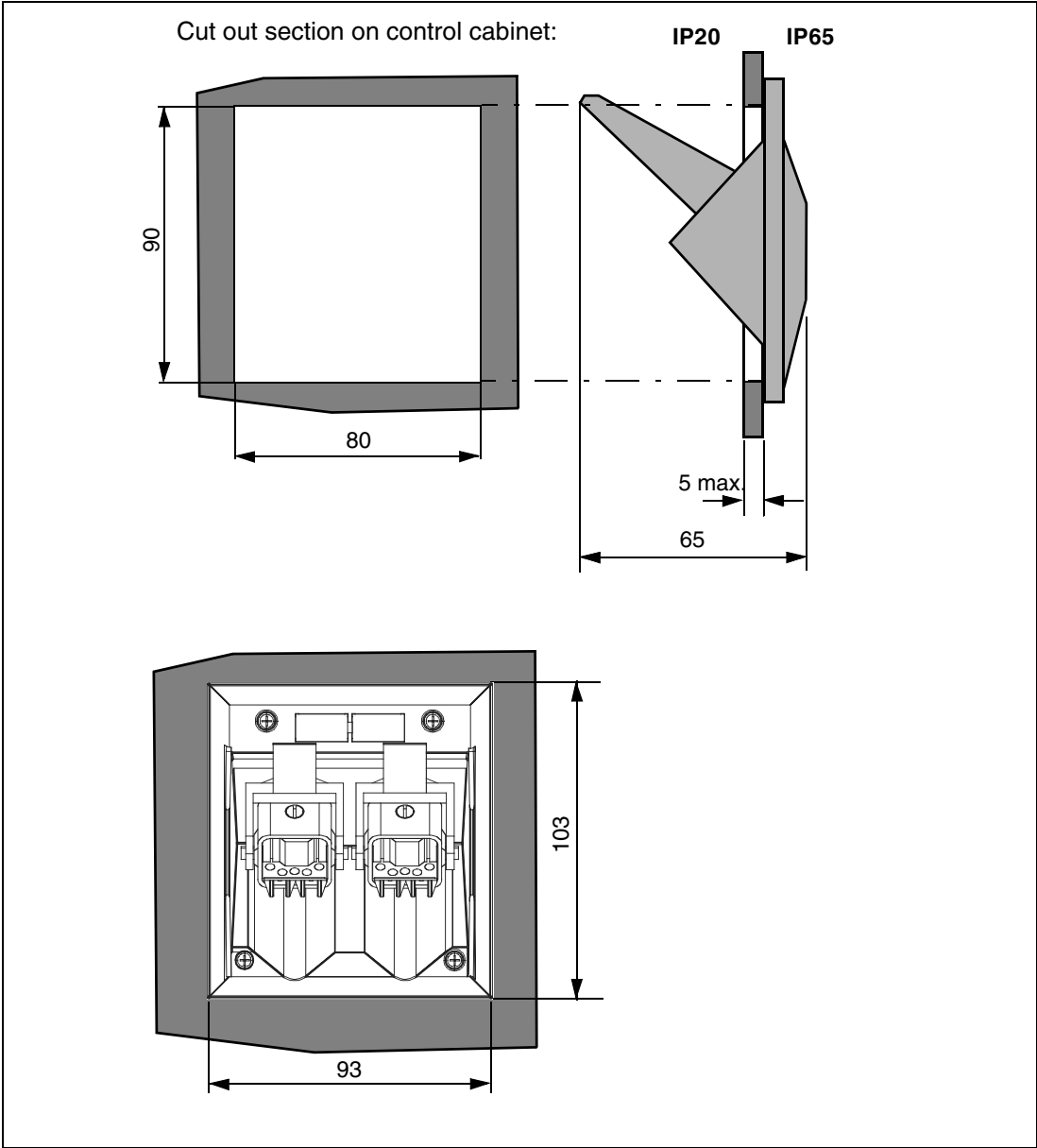


Fig. 8-7: Dimension drawing of the hybrid field bus connection

8.5 Data Tee Plug Connector

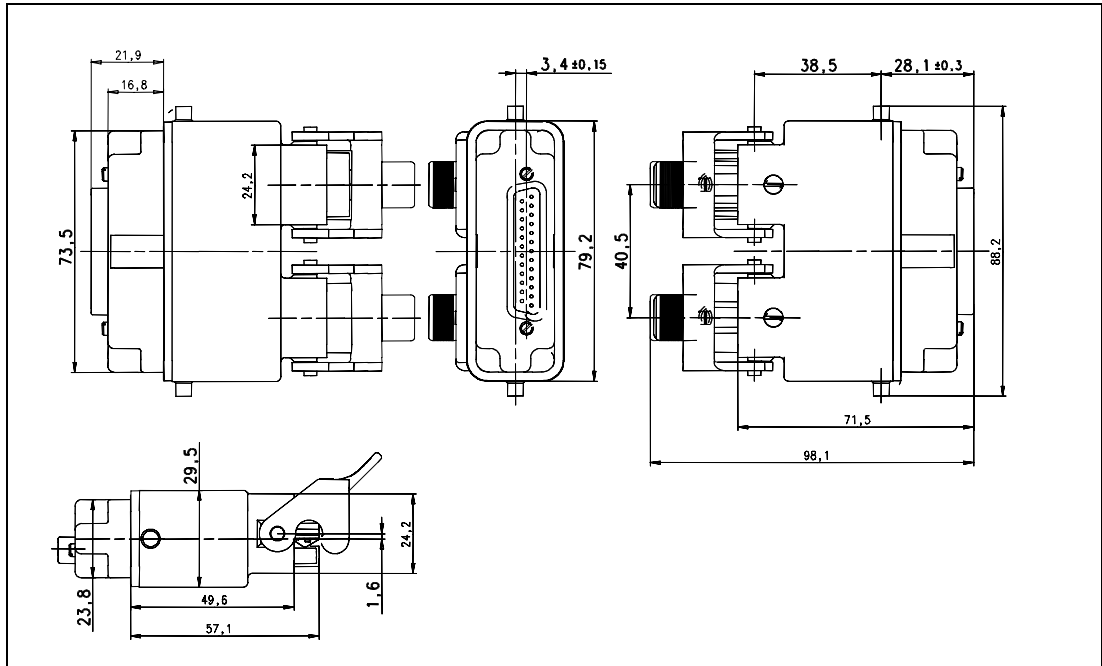


Fig. 8-8: Dimension drawing of the data tee plug connector

8.6 Discriminating Module and Maintenance switch

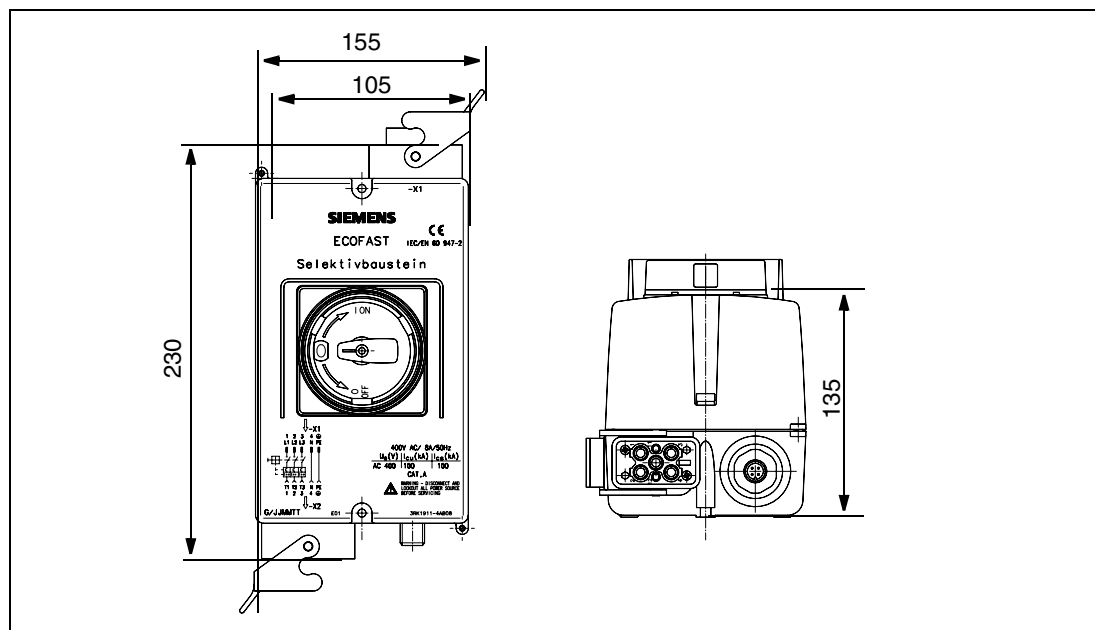


Fig. 8-9: Discriminating module with M12 connector

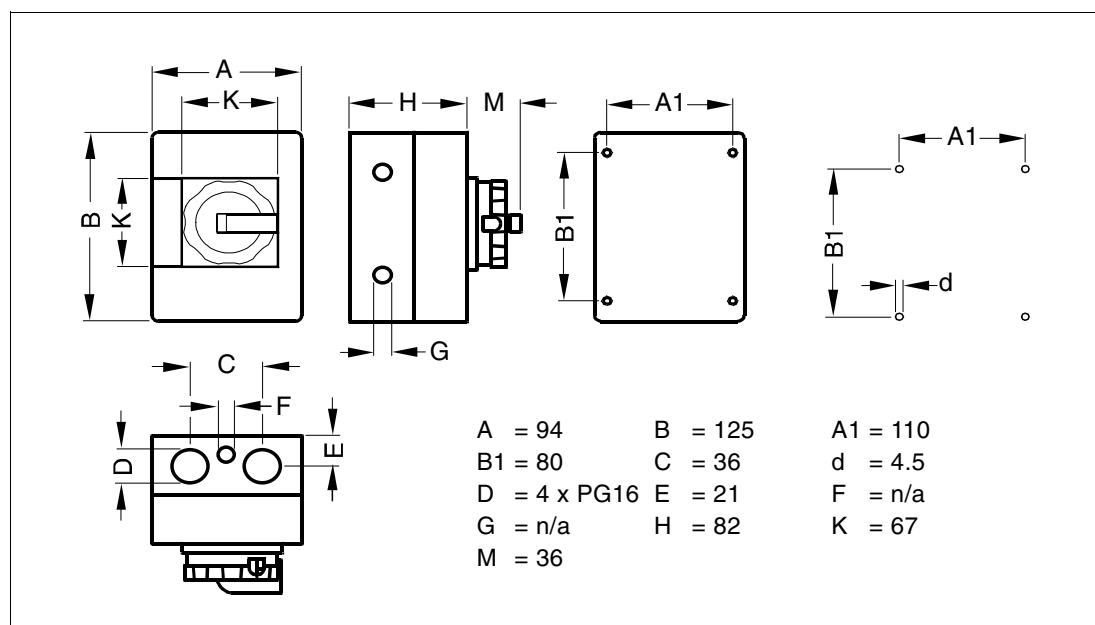


Fig. 8-10: Maintenance switch

Order Numbers

9.1 Motor Starters (Reversing Starters)

Setting Range *	Motor Protection/ Switching Technology	Brake	Field Bus	Order Number
ECOFAST Motor Starters				
0.3 A - 9 A (4 kW)	Temperature sensor/ Mechanical	400 V AC	AS-Interface	3RK1323-2AS54-1AA0
			AS-Interface	3RK1323-2AS54-1AA3
0.3 A - 9 A (4 kW)	Temperature sensor/ Mechanical	400 V AC	PROFIBUS-DP	3RK1303-2AS54-1AA0
			PROFIBUS-DP	3RK1303-2AS54-1AA3
ECOFAST Motor Starter High Feature				
0.3 A - 3 A (1.1 kW)	Thermal Motor Model/ Mechanical	400 V AC	PROFIBUS-DP	3RK1303-5BS44-3AA0
2.4 A - 9 A (4 kW)			PROFIBUS-DP	3RK1303-5CS44-3AA0
0.3 A - 3 A (1.1 kW)			PROFIBUS-DP	3RK1303-5BS44-3AA3
2.4 A - 9 A (4 kW)			PROFIBUS-DP	3RK1303-5CS44-3AA3
0.3 A - 3 A (1.1 kW)	Thermal Motor Model/ Mechanical	400 V AC	AS-Interface	3RK1323-5BS44-3AA0
2.4 A - 9 A (4 kW)			AS-Interface	3RK1323-5CS44-3AA0
0.3 A - 3 A (1.1 kW)			AS-Interface	3RK1323-5BS44-3AA3
2.4 A - 9 A (4 kW)			AS-Interface	3RK1323-5CS44-3AA3
0.3 A - 3 A (1.1 kW)	Full Motor Protection/ Electronic-Soft	400 V AC	PROFIBUS-DP	3RK1303-6BS74-3AA0
2.4 A - 12 A (5.5 kW)			PROFIBUS-DP	3RK1303-6DS74-3AA0
0.3 A - 3 A (1.1 kW)			PROFIBUS-DP	3RK1303-6BS74-3AA3
2.4 A - 12 A (5.5 kW)			PROFIBUS-DP	3RK1303-6DS74-3AA3
0.3 A - 3 A (1.1 kW)	Full Motor Protection/ Electronic-Soft	400 V AC	AS-Interface	3RK1323-6BS74-3AA0
2.4 A - 12 A (5.5 kW)			AS-Interface	3RK1323-6DS74-3AA0
0.3 A - 3 A (1.1 kW)			AS-Interface	3RK1323-6BS74-3AA3
2.4 A - 12 A (5.5 kW)			AS-Interface	3RK1323-6DS74-3AA3
0.6 A - 4 A (1.5 kW)	Full Motor Protection/ Electronic-Soft (Duo-Reversing Soft)	400 V AC	AS-Interface	3RK1323-6ES84-3AA3
0.6 A - 4 A (1.5 kW)		400 V AC	PROFIBUS-DP	3RK1303-6ES84-3AA3

*) Power descriptions are valid for 400 V AC

9.2 Motor Connection Cables

Description	Order No.
Motor Connection Cables (not shielded)	
Han 10 E pin on one side to connect the motor starter with the motor (for mounting in the vicinity of the motor) <ul style="list-style-type: none"> - 7 x 1.5 mm² 1.5 m - 7 x 1.5 mm² < 3 m, any length - 7 x 1.5 mm² 3.0 m - 7 x 1.5 mm² > 3 m to < 5 m, any length - 7 x 1.5 mm² 5.0 m 	3RK1911-0BG10 3RK1911-0CG20 3RK1911-0BG20 3RK1911-0CG30 3RK1911-0BG30
Han 10 E pin on one side to connect the motor starter with the motor (for mounting in the vicinity of the motor) <ul style="list-style-type: none"> - 11 x 1.5 mm² 1.5 m - 11 x 1.5 mm² < 3 m, any length - 11 x 1.5 mm² 3.0 m - 11 x 1.5 mm² > 3 m to < 5 m, any length - 11 x 1.5 mm² 5.0 m 	3RK1911-0BJ10 3RK1911-0CJ20 3RK1911-0BJ20 3RK1911-0CJ30 3RK1911-0BJ30
Han 10 E on both sides to connect the motor starter with the motor (for mounting in the vicinity of the motor) <ul style="list-style-type: none"> - 7 x 1.5 mm² 1.5 m - 7 x 1.5 mm² < 3 m, any length - 7 x 1.5 mm² 3.0 m - 7 x 1.5 mm² > 3 m to < 5 m, any length - 7 x 1.5 mm² 5.0 m 	3RK1911-0BH10 3RK1911-0CH20 3RK1911-0BH20 3RK1911-0CH30 3RK1911-0BH30
Han 10 E on both sides to connect the motor starter with the motor (for mounting in the vicinity of the motor) <ul style="list-style-type: none"> - 11 x 1.5 mm² 1.5 m - 11 x 1.5 mm² < 3 m, any length - 11 x 1.5 mm² 3.0 m - 11 x 1.5 mm² > 3 m to < 5 m, any length - 11 x 1.5 mm² 5.0 m 	3RK1911-0BK10 3RK1911-0CK20 3RK1911-0BK20 3RK1911-0CK30 3RK1911-0BK30
Motor Connection Cables (shielded)	
Han 10 E pin on one side to connect the motor starter with the motor (for mounting in the vicinity of the motor) <ul style="list-style-type: none"> - 8 x 1.5 mm² < 1.5 m - 8 x 1.5 mm² 1.5 m - 8 x 1.5 mm² < 3 m, any length - 8 x 1.5 mm² 3.0 m - 8 x 1.5 mm² > 3 m to < 5 m, any length - 8 x 1.5 mm² 5.0 m 	3RK1911-0CV10 3RK1911-0BV10 3RK1911-0CV20 3RK1911-0BV20 3RK1911-0CV30 3RK1911-0BV30

Description	Order No.
Motor Connection Cables (shielded)	
Han 10 E on both sides to connect the motor starter with the motor (for mounting in the vicinity of the motor)	
- 8 x 1.5 mm ² < 1.5 m	3RK1911-0CU10
- 8 x 1.5 mm ² 1.5 m	3RK1911-0BU10
- 8 x 1.5 mm ² < 3 m, any length	3RK1911-0CU20
- 8 x 1.5 mm ² 3.0 m	3RK1911-0BU20
- 8 x 1.5 mm ² > 3 m to < 5 m, any length	3RK1911-0CU30
- 8 x 1.5 mm ² 5.0 m	3RK1911-0BU30
Unassembled	
- 8 x 1.5 mm ² 20 m	3RK1911-0BW60
- 8 x 1.5 mm ² 50 m	3RK1911-0BW70
- 8 x 1.5 mm ² 100 m	3RK1911-0BW80

9.3

Power Cables

Description	Order No.
Spur cables	
Han Q4/2 pin/Han Q4/2 socket	
- 5 x 4.0 mm ² < 3 m, any length	3RK1911-0CP21
- 5 x 4.0 mm ² > 3 m to < 5 m, any length	3RK1911-0CP31
- 5 x 4.0 mm ² > 5 m to < 10, any length	3RK1911-0CP41
- 5 x 4.0 mm ² > 10 m to < 15 m, any length	3RK1911-0CP51
- 5 x 6 mm ² < 3 m, any length	3RK1911-0CP22
- 5 x 6 mm ² > 3 m to < 5 m, any length	3RK1911-0CP32
- 5 x 6 mm ² > 5 m to < 10 m, any length	3RK1911-0CP42
- 5 x 6 mm ² > 10 m to < 15m, any length	3RK1911-0CP52
ET200X sub-segment lines	
Han Q4/2 pin/Han Q8/0 socket	
- 5 x 4.0 mm ² < 3 m, any length	3RK1911-0CR21
- 5 x 4.0 mm ² > 3 m to < 5 m, any length	3RK1911-0CR31
- 5 x 4.0 mm ² > 5 m to < 10, any length	3RK1911-0CR41
- 5 x 4.0 mm ² > 10 m to < 15 m, any length	3RK1911-0CR51
Cut-to-length	
- 5 x 4.0 mm ² 20 m	3RK1911-0AG60
- 5 x 4.0 mm ² 50 m	3RK1911-0AG70
- 5 x 4.0 mm ² 100 m	3RK1911-0AG80
- 5 x 6.0 mm ² 20 m	3RK1911-0AH60
- 5 x 6.0 mm ² 50 m	3RK1911-0AH70
- 5 x 6.0 mm ² 100 m	3RK1911-0AH80

9.4 Power & Control Modules (Infeed Modules)

Description	Order No.
PROFIBUS S7-300 (Master) Main power supply 3 AC 400 V, 40 A Auxiliary power supply 2x DC 24 V Rotary actuator with main switch functions SIGUARD contactor safety combination Autostart Dimensions (W x H x D) in mm: 400 x 650 x 248	4FB2111-2AE01-0AA0
PROFIBUS S7-300 (Master) and AS-i-Bus (Master) Main power supply 3 AC 400 V, 40 A Auxiliary power supply 2 x DC 24 V, 1x AS-i Rotary actuator with main switch functions SIGUARD contactor safety combination Autostart Dimensions (W x H x D) in mm: 400 x 650 x 248	4FB2121-2AE01-0AA0
PROFIBUS S7-300 (Master) und AS-i-Bus (Master) Main power supply 3 AC 400 V, 25 A Auxiliary power supply 2x DC 24 V, 1x AS-i Rotary actuator with EMERGENCY STOP functions AS-i monitor for SAFETY AT WORK Dimensions (W x H x D) in mm: 400 x 650 x 248	4FB2112-2AC01-0AA0
PROFIBUS ET 200B (Slave) Main power supply 3 AC 400 V, 40 A Auxiliary power supply 2x DC 24 V Rotary actuator with main switch functions SIGUARD contactor safety combination Autostart Dimensions (W x H x D) in mm: 400 x 650 x 248	4FB2111-2AE01-0AA1

9.5 Simple Energy Unit (SEU)

Description	Circuit-Breaker	Contactor with Aux. Switch
S00 8.00 A	3RV10 11-1HA10	3RT1015-1BB44-3MA
S0 8.00 A	3RV10 21-1HA10	3RT1024-1BB44-3MA
S2 16.00 A	3RV10 31-4AA10	3RT1026-1BB44-3MA0
S2 20.00 A	3RV10 31-4BA10	3RT1026-1BB44-3MA0
S2 25.00 A	3RV10 31-4DA10	3RT1034-1BB44
S2 32.00 A	3RV10 31-4EA10	3RT1034-1BB44
S2 40.00 A	3RV10 31-4FA10	3RT1035-1BB44
S2 50.00 A	3RV1031-4HA10	3RT1036-1BB44

9.6 Discriminating Modules

Description	Order No.
Discriminating Module <ul style="list-style-type: none"> • Used to selectively disconnect feeders with a repair switch function in order to protect the line in case of a change in cross-section and to increase the size of the segments. Connected to AS-Interface. <ul style="list-style-type: none"> – for 400 V AC, 8 A – for 400 V AC, 16 A – for 400 V AC, 25 A 	3RK1911-4AB08 3RK1911-4AB16 3RK1911-4AB25

9.7 Maintenance Switch

Description	Order No.
Maintenance switch with M12 connector 25 A rated current	6AG1264-1GP51-6AA0

9.8 Hybrid Field Bus Cables

Description	Order No.
PROFIBUS ECOFAST Hybrid field bus fiber-optic cable Trailing cable (PUR casing) with two plastic FO conductors for PROFIBUS-DP and four copper cores with 1.5 mm ² (DESINA-compatible)	
Pre-assembled with two ECOFAST connectors	
1.5 m	6XV1 830-7DH15
3 m	6XV1 830-7DH30
5 m	6XV1830-7DH50
10 m	6XV1830-7DN10
15 m	6XV1830-7DN15
Unassembled cable	
20 m	6XV1830-7CN20
50 m	6XV1830-7CN50
100 m	6XV1830-7CT10

AS-Interface Shaped Cable

Description	Order No.
PROFIBUS ECOFAST Hybrid Cable – Copper Trailing cable (PUR casing) with two shielded copper conductors for PROFIBUS-DP and four copper cores with 1.5 mm ²	
Pre-assembled with two ECOFAST connectors	
1.5 m	6XV1830-7BH15
3 m	6XV1830-7BH30
5 m	6XV1830-7BH50
10 m	6XV1830-7BN10
15 m	6XV1830-7BN15
20 m	6XV1830-7BN20
25 m	6XV1830-7BN25
30 m	6XV1830-7BN30
35 m	6XV1830-7BN35
40 m	6XV1830-7BN40
45 m	6XV1830-7BN45
50 m	6XV1830-7BN50
Unassembled cable	
Cut-to-length	6XV1830-7AH10
20 m	6XV1830-7AN20
50 m	6XV1830-7AN50
100 m	6XV1830-7AT10

9.9 AS-Interface Shaped Cable

Description			Order No.
Material	Color	Quantity	
Rubber	Yellow (AS-Interface)	100 m roller	3RX9010-0AA00
		1 km drum	3RX9012-0AA00
	Black (DC 24 V)	100 m roller	3RX9020-0AA00
		1 km drum	3RX9022-0AA00
TPE	Yellow (AS-Interface)	100 m roller	3RX9013-0AA00
		1 km drum	3RX9014-0AA00
	Black (DC 24 V)	100 m roller	3RX9023-0AA00
		1 km drum	3RX9024-0AA00
TPE Special design acc. to UL Class2	Yellow (AS-Interface)	100 m roller	3RX9017-0AA00
	Black (DC 24 V)	100 m roller	3RX9027-0AA00
PUR	Yellow (AS-Interface)	100 m roller	3RX9015-0AA00
		1 km drum	3RX9016-0AA00
	Black (DC 24 V)	100 m roller	3RX9025-0AA00
		1 km drum	3RX9026-0AA00

9.10 Hybrid Field Bus Connections

Description	Order No.
Hybrid field bus connection Interface between control cabinet/infeed module (IP20) and the field IP67 Data via 2 x copper shielded/FO 2 x 24 V DC for switched/non-switched voltage Infeeding of data and 2 x 24 V into the hybrid fieldbus cable, 2 channels	
Hybrid field bus connection Cu/Cu, socket/socket for supply	3RK1911-1AA22
Hybrid field bus connection Cu/Cu, pin/socket conducting	3RK1911-1AA32
Hybrid field bus connection Cu//FO, socket/socket for supply (active)	3RK1911-1AB22
Hybrid field bus connection Cu/FO, pin/socket conducting (active)	3RK1911-1AB32
Hybrid field bus connection Cu/Cu, socket/socket for supply (active)	3RK1911-1AE22
Hybrid field bus connection Cu/Cu, pin/socket conducting (active)	3RK1911-1AE32
Hybrid field bus connection Cu/Cu, Fast Connect, for supply	3RK1911-1AF22
Hybrid field bus connection Cu/Cu, Fast Connect, conducting	3RK1911-1AF32

9.11 Connectors

Description	Order No.
Data + 24 V	
Data tee Connector Cu	3RK1911-2AG00
Data tee Connector FO	3RK1911-2AH00
Bus terminating connector for PROFIBUS-DP, 1 piece	6GK1905-0DA10
Bus terminating connector for PROFIBUS-DP, 5 pieces	6GK1905-0DA00
PROFIBUS FO plug connector FO, 5 pieces with 2x plastic FO and 4x copper conductors 1.5 mm ² with pin insert	6GK1905-0BA00
with socket insert	6GK1905-0BB00
PROFIBUS copper-cable plug connector, 5 pieces with 2x shielded copper and 4x copper conductors 1.5 mm ² with pin insert	6GK1905-0CA00
with socket insert	6GK1905-0CN00

Connectors

Description	Order No.
Power	
Power tee clamp connector (round cable adapter) for 400 V AC Used to connect feeders to any point on the power bus by means of standard round cables (insulation displacement method).	
Power tee clamp connector up to 4 mm ²	3RK1911-2BF01
Power tee clamp connector up to 6 mm ²	3RK1911-2BF02
Power tee-tee clamp connector up to 6 mm ²	3RK1911-2BG02
Seals for power tee clamp connector	
For power cable with Ø 10 to 13 mm	3RK1911-5BA00
For power cable with Ø 13 to 16 mm	3RK1911-5BA10
For power cable with Ø 16 to 19 mm	3RK1911-5BA20
For power cable with Ø 19 to 22 mm	3RK1911-5BA30
Filler plug	3RK1911-5BA50
Connector set Han 10E pin in thin coupling enclosure PG 16	3RK1911-2BK00
Connector set Han 10E pin in thick coupling enclosure PG 21	3RK1911-2BL00
Connector set Han 10E socket in thin funnel enclosure PG 16	3RK1911-2BM00
Connector set Han 10E socket in thick funnel enclosure PG 21	3RK1911-2BN00
Connector set Han 10E pin EMC	3RK1911-2BL10
Connector set Han 10E socket EMC	3RK1911-2BN10

9.12 Project Engineering Software and Documentation

Description	Order No.
Project Engineering Software	
ECOFAST ES <ul style="list-style-type: none"> • Graphical power bus configuration • Power bus dimensioning • Operator prompting for selection of Siemens A&D products • Norm-compliant power system design • Documentation 	3ZS1200-0CC13-0YA0
Switch ES <ul style="list-style-type: none"> • Switch ES Motor Starter 2004 <ul style="list-style-type: none"> – for parameterizing, visualizing, diagnosing and testing the – ECOFAST motor starters via PROFIBUS-DP – with online help – German/English selectable – tested for execution under Windows 95/98/2000/NT system – System requirements: – PROFIBUS-DP interface: CP5411 (ISA), CP5412 (ISA), CP5511 (PCMCIA) – P5611 (PCI), Smart Cable for serial communication via a serial interface and – Teleservice, CP5613 and CP5614 (new CP card) and MPI interface on PG7xx – and its driver software (view interactive catalog CA01) – CD-ROM drive • STEP7 object manager <ul style="list-style-type: none"> – for integrating the ECOFAST starter as an S7 slave in SIMATIC S7 – for calling Switch ES from STEP7 – System requirements: – SIMATIC: S7, M7, C7, PCS7 – STEP7: Version 5.0 or higher – CD-ROM drive 	3ZS1310-0CC20-0YA0
Upgrade Switch ES Motorstarter from Version 1.0 up to 2.0	3ZS1 310-0CC20-0YE0
Documentation	
ECOFAST Manual (German)	3RK1703-0AB18-0AA1
ECOFAST Manual (English)	3RK1703-0BB18-0AA1
ECOFAST Motor Starters Manual (German/English)	3RK1702-2GB18-0AA0
ECOFAST Motor Starters High Feature Manual (German)	3RK1702-3AB18-1AA0
ECOFAST Motor Starters High Feature Manual (English)	3RK1702-3BB18-1AA0

9.13 Tools, Connector Sets, Configuration

Description	Pieces per Package	Order No.
Crimping tool		
• for contact pins and sockets 1.5 to 2.5 mm ²	1	3RK1902-0AH00
• for contact pins and sockets 2.5 to 4.0 mm ²	1	3RK1902-0CT00
Disassembling tool for contact pins and sockets	1	3RK1902-0AJ00
Cover for power sockets Han Q8/0	1	3RK1902-0CK00
	10	3RK1902-0CJ00
Connector set for power infeed Han Q8/0 2.5 mm ² : 1 connector enclosure with PG 16, 1 socket insert and 9 contact sockets 2.5 mm ²	1	3RK1902-0CA00
Connector set for power infeed Han Q8/0 4.0 mm ² : 1 connector enclosure with PG 16, 1 socket insert and 9 contact sockets 4.0 mm ²	1	3RK1902-0CB00
Connector set for looping through power Han Q8/0 2.5 mm ² : 1 connector enclosure with PG 16, 1 pin insert and 9 contact pins 2.5 mm ²	1	3RK1902-0CC00
Connector set for looping through power Han Q8/0 4.0 mm ² : 1 connector enclosure with PG 16, 1 1 pin insert and 9 contact pins 4.0 mm ²	1	3RK1902-0CD00
Mounting plate (for motor plugged in)	1	3RK1911-3AA00
Identification Plug	1	6ES7194-1KB00-0XA0
PC cable with memory submodule	1	3RK1911-0BN20
Test connector set	1	3RK1911-2AM00
Cable end covers for AS-Interface shaped cable	1	3RK1901-1MN00
Addressing and diagnostic unit for AS-i	1	3RK1904-2AB01

Questions and Answers

A.1 Frequently Asked Questions

No.	Question	Answer
1	Is ECOFAST the DESINA system from Siemens?	No. ECOFAST is based on interfaces standardized by DESINA. ECOFAST goes beyond the DESINA specification, e.g. ECOFAST also includes transmission technology for the AS-Interface. In addition, ECOFAST can optionally be supplied with special configuring software.
2	Can components from other manufacturers also be integrated in ECOFAST?	Yes. ECOFAST is designed as an open system. ECOFAST is based on open bus systems (Profibus-DP, AS-Interface), and its interfaces (connections) are both standardized and open (in accordance with DESINA). Any manufacturer offering devices that comply with these specifications can thus easily be integrated in an ECOFAST system.
3	Can connectors from other manufacturers be used as well?	Yes. ECOFAST is an open system with standardized interfaces. Siemens currently cooperates with Harting as a connector manufacturer and supplier regarding connection techniques. Other connectors and cables from other manufacturers can, however, also be used at any time, providing their design and their pin assignment can be adapted to the specification (DESINA). Non-Siemens products can also be integrated in ECOFAST ES.
4	Can SIMOCODE be integrated?	Yes. SIMOCODE must be installed in a local switchbox. It is integrated in ECOFAST by means of the switch cabinet throughfeeds (hybrid field bus connections). If the maximum permissible current of the power bus (40 A) is exceeded, this feeder must be started separately on the power side.
5	Is ECOFAST suitable for sub-zero temperatures (outdoor applications, cold stores)?	No. ECOFAST is designed for ambient temperatures between 0 and 60 degrees Celsius.
6	Can ECOFAST be used in potentially explosive areas?	No. ECOFAST is not designed for use in potentially explosive areas.
7	How is the PLC integrated in ECOFAST?	The power & control module can optionally be supplied with an integrated PLC for ECOFAST. The S7 315-2 DP is planned in the first stage. The PLC can, of course, also be accommodated in a conventional control cabinet. In this case it is integrated into the system by means of control cabinet throughfeeds (hybrid field bus connections).

Frequently Asked Questions

No.	Question	Answer
8	Are frequency converters available for ECOFAST?	Yes. A frequency converter up to 1.5 kW is available for the ET 200X which can also be operated as stand-alone. Furthermore, the Combi 411 and R28S are also available.
9	If ECOFAST is based on DESINA, how can it be connected to a SINUMERIK?	It is connected by means of the control cabinet throughfeeds (hybrid field bus connections), i.e. the control cabinet can be factory-wired (interface to SINUMERIK) and the peripheral devices (I/Os and starter) are then connected externally.
10	If ECOFAST is based on DESINA, does this mean that it is only designed for machine tools?	No. Machine tools are only one target industry. Since DESINA pursues the same objective of cutting overall costs and already has standardized interfaces, we decided to use it as a basis for ECOFAST. ECOFAST is more versatile than DESINA, however, being designed for use across industry boundaries. Conveyor systems and production machines are among our other target markets.
11	What about the safety technology interface via bus systems (Profisafe, Safety at work)?	EMERGENCY STOP circuits can be connected to the power & control module. The AS-I motor for Safety at Work can also be installed in this module. Safety-oriented (two-channel) modules are required to transmit safety-oriented signals via Profibus-DP. They will be integrated depending on availability (e.g. in the ET 200X). We are unable to provide a definite date at the present time. Compatible with Safety/Profisafe.
12	Can components with the IP20 degree of protection (e.g. SIMOCODE or ET 200S) also be integrated into ECOFAST?	Yes. These components can also be connected to ECOFAST. The switchbox can be factory-wired with plug-in control cabinet throughfeeds (hybrid field bus connections). The switchbox can be factory-wired on the inside; the plug-in connections are located on the outside. Integration into the complete system is thus very straightforward.
13	How can the bus and the power supplies (24 V auxiliary voltages) be combined in the hybrid cable?	The bus (PROFIBUS-DP) and the 24 V power supplies are combined by means of the hybrid field bus connections (control cabinet throughfeeds). These are available in several different versions (for copper, fiber-optic, active and passive). In other words, no additional terminal blocks are required in the control cabinet or the switchbox.
14	How can an OP be integrated for visualization purposes?	OPs are normally designed with the IP20 degree of protection and are therefore installed either in a control cabinet or in a local box. They can be integrated in an ECOFAST system by means of the control cabinet throughfeeds (hybrid field bus connections).
15	How many feeders fit into one segment?	Very easily. The communication and power components are simply hooked onto the PROFIBUS or the power bus. The communication components must, of course, be configured with STEP7 or COM PROFIBUS (software integration). The power components can be integrated and tested with ECOFAST ES. The wiring can be reoptimized, or the existing wiring tested and documented, taking account of the newly connected consumer.
16	How can switching devices with a higher power than ECOFAST starters (4 kW) be integrated?	Switching devices of this kind can be integrated in local boxes as IP20 components by means of the control cabinet throughfeeds (hybrid field bus connections). If the maximum permissible current of the "power bus" (40 A) is exceeded, this feeder must be started separately on the power side.

No.	Question	Answer
17	Is a repair switch provided? Do the starters have a repair switch?	There is a lockable repair switch on the power & control module, in other words the connected segment is disconnected. The starters themselves are not fitted with a repair switch. There is also a lockable version for the connector on the motor. The discriminating module can be used as a repair switch. A maintenance switch will be available in Autumn 2004.
18	How can a system built with ECOFAST be extended?	Very easily. The communication and power components are simply hooked onto the PROFIBUS or the power bus. The communication components must, of course, be configured with STEP7 or COM PROFIBUS (software integration). The power components can be integrated and tested with ECOFAST ES. The wiring can be reoptimized, or the existing wiring tested and documented, taking account of the newly connected consumer.
19	What is the maximum power allowed for the electronic starter (soft starter)?	Soft starters in output classes of up to 1.1 kW and of up to 5.5 kW can be supplied.
20	Is ECOFAST UL-listed?	The individual components (devices) of ECOFAST are UL-listed. As far as ECOFAST's UL listing as a complete system is concerned, we are still negotiating with the responsible bodies, because the handling of acceptances and certifications for complete systems varies considerably from one system to another. Importance is attached, for instance, to the definition of a self-contained unit (complete machine or system?). The same applies to the cable laying types (the cables do not necessarily have to be "piped" in self-contained units), for example in concatenated units.
21	Is a metal version of the connectors also available?	Only molded-plastic versions of the bus and power connectors are available at present. Metal versions of motor feeder connectors are also available (for FUs, due to shielded motor line). Metal versions of the plug cases can be requested from Harting.
22	What is the situation regarding Ethernet communication?	The ECOFAST communication philosophy is based on Profibus-DP and AS-Interface. With regard to Ethernet, a considerable amount of work still needs to be invested in industry-standard connection methods. The ECOFAST devices, such as ECOFAST starters, have a modular internal set-up, so that additional bus interfaces can be implemented easily as and when necessary (which is not the case with Ethernet).
23	Is it true that ECOFAST starters compete with the starters of the ET 200X?	No. Different ECOFAST solutions are offered intentionally to facilitate maximum adaptability to each particular application. The following solutions are possible: <ul style="list-style-type: none"> • Standalone starters (1 starter = 1 bus station) for branch drives • Isolated solutions (ET 200X) for drives that are physically close together • Installation near the motor • Integration in the motor (starter on motor)
24	Is ECOFAST very expensive?	Although the connector technique is slightly more expensive than simple terminals, it is important to consider the overall costs of ECOFAST, namely both material and installation costs. The potential savings concern the costs of installation and servicing.

ECOFAST Pilot Projects

B.1 Production Line for SIRIUS 2 - Siemens Cham

Production planning

- Location: Siemens Cham
- Application: Production line for SIRIUS 3RT contactors
- Task: Conveyor system with 5 autonomous cells for screwing, testing, inscribing and repairing
- Set-up: Power & control module with S7-300 PLC, PROFIBUS-DP and AS-i.
Total of 21 motor starters for 0.18 and 0.3 kW motors
- Objective: To replace central drive systems with distributed peripheral devices in an installation system with diagnostics-capable motor starters and preassembled connections.

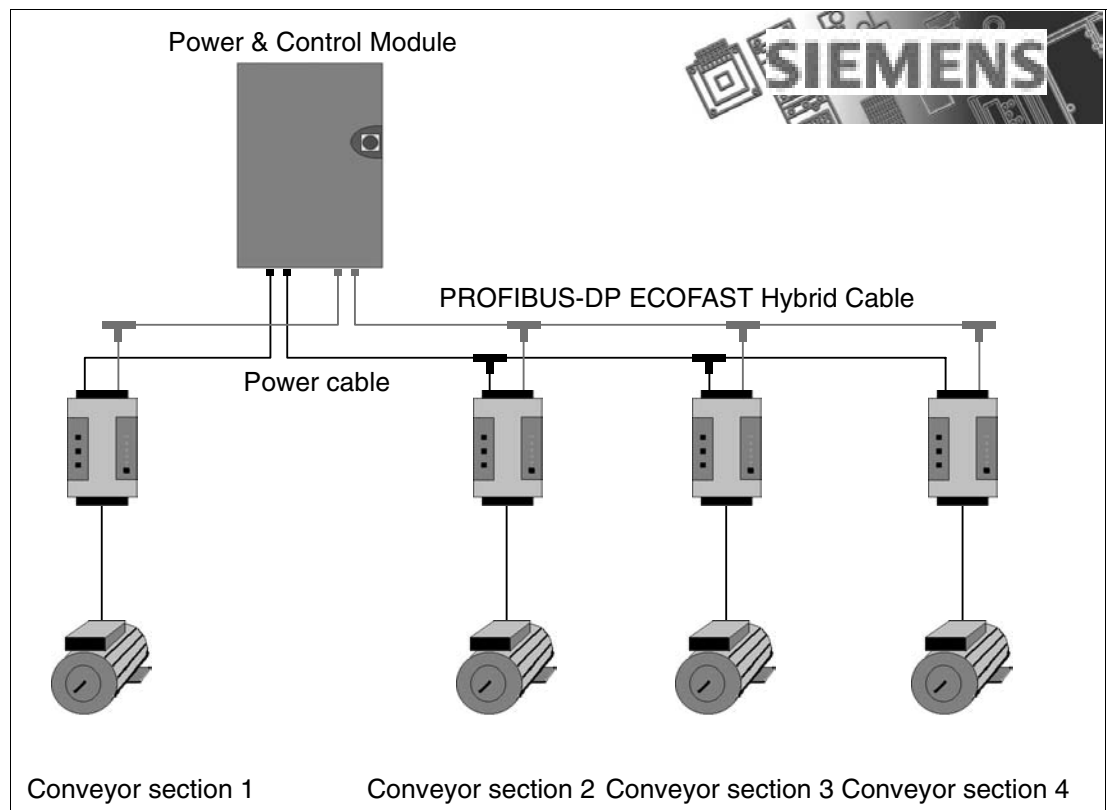


Fig. B-1: SIRIUS 2 pilot system - production

Production

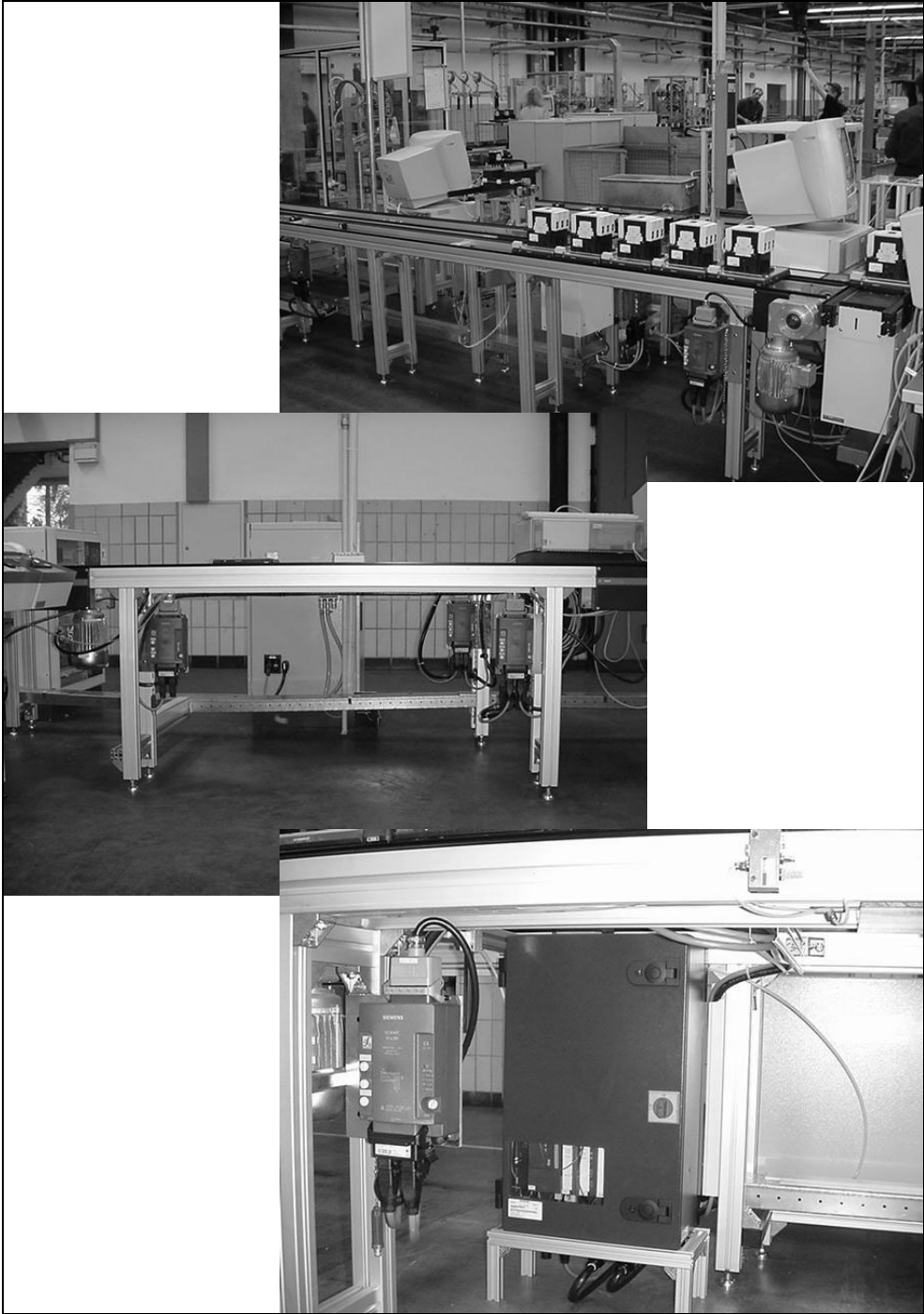


Fig. B-3: SIRIUS 2 pilot system - production

B.2

Configuration in the Automotive Industry - Production Planning

Production planning

Application: Production of wheel hubs

Task: Conveyor system with 4 cells

Set-up: Power & control module with S7-300 PLC, PROFIBUS-DP, AS-interface and AS-interface monitor (Safety at Work)
Total of 6 motor starters for motors with 0.55 KW

Objective: To replace centrally controlled drive technology with a distributed installation system.
To integrate pneumatics and EMERGENCY STOP functionality in a single system technology.

Configuration with ECOFAST ES

The screenshot displays the ECOFAST ES software interface. On the left, a project configuration window is open, showing details for 'Segment1'. The window is divided into several sections:

- Projekt:** Teilprojekt: ohne Teilprojekt, Version: 0.3, erstellt: 02.04.2001 09:57:16, letzte Änderung: 06.12.2002 12:40:42, Bearbeiter: Max Mustermann, Aktenzeichen: 5050-1
- Energiebussegment:** Version: 0.3, erstellt: 02.04.2001 09:56:30, letzte Änderung: 16.10.2001 17:40:25, Bearbeiter: Max Mustermann, Aktenzeichen: 5050
- Einspeisung [V/Hz]:** 400 / 50
- Vorimpedanz [mOhm]:** 100
- Max. Spannungsfall [%]:** 3.00
- Max. Ausschaltzeit (Kurzschluss) [s]:** 5.00
- Gleichzeitigkeitsfaktor [%]:** 100.0

Below these sections are checkboxes for 'Segment erfolgreich dimensioniert und überprüft' and a table of checked options: Adu, Erdungsdimensionieren, Erdungsdimensionieren, Konditionierung, Überspannung (vorgeschaltet), Kurzschlusschutz, Abschaltbedingung, and Spannungsfall.

The main area of the software shows a detailed busbar layout diagram. The diagram illustrates a main busbar with several branches. Each branch is labeled with its length, current, and voltage drop percentage. For example, the first branch is 22.30 m long, carries 0.94 A, and has a 0.02% voltage drop. The busbar is equipped with circuit breakers (RS) and switches (SS) at various points. The diagram also shows the connection to motors (M) and their respective power ratings and current values. The busbar is supported by rollers (A1-A4) and has a total length of 15.20 m. The diagram is titled 'Segment1' and includes a legend for the components used.

Fig. B-4: Configuration with ECOFAST ES

Glossary

3-phase AC current for contactor	The 3-phase AC current for the contactor is the rated operational current for switch off during the operation of the squirrel-cage motors.
Baud rate	The baud rate is the rate of data transmission and indicates the number of bits transmitted per second (baud rate = bit rate). Baud rates of 9.6 kilobaud to 12 megabaud are possible with PROFIBUS-DP
Bus	Common transmission path via which all stations are connected. It has two defined ends. With PROFIBUS, the bus is a two-wire line (copper wire) or a fiber-optic cable.
Bus segment	See Segment
Bus system	The bus system comprises all the stations that are physically connected via a bus cable.
Current limit	You can set an upper and/or a lower current limit. Example: “Substance for mixing too thick”, that is, the upper current limit has been exceeded. “No-load operation because drive belt is torn”, that is, the lower current limit has been undershot. The current limits and the block protection are not activated in order to bypass start-up until the class time has elapsed (e.g. after 10 seconds for class 10). If the current limits are violated, the motor starter responds with either a shutdown or warning. Setting range for lower current limit: 20%..0.100% of the rated operational current. Setting range for upper current limit: 50%...150% of the rated operational current.
Data tee connectors	Data tee connectors connect the components of an automation system with PROFIBUS-DP. Two data tee connectors are available in the ECOFAST system: <ul style="list-style-type: none">• With copper cable (PROFIBUS-DP Cu)• With fiber-optic cable (PROFIBUS-DP fiber-optic cable)
DESINA	Decentralized and standardized installation system for machine tools: Developed by the Association of Machine Tool Manufacturers with the aim of defining a standard for the design and installation of machine tool components.
DMD	Device master data (DMD) contains DP slave descriptions in a standardized format. The use of DMD makes configuring the master and the DP slave easier.
DP master	The DP master is a master that functions in accordance with EN 50 170, Volume 2, PROFIBUS, and uses the DP protocol.
DP slave	The DP slave is a slave that is operated on the PROFIBUS bus with the PROFIBUS-DP protocol and functions in accordance with EN 50 170 standard, Volume 2, PROFIBUS.
DP standard	The DP standard is the bus protocol of the ET 200 distributed I/O system based on the EN 50 170 standard, Volume 2, PROFIBUS.
ECOFAST	Energy and Communication Field Installation System: A system that decentralizes and modularizes installation to a large extent and permits extensive diagnostics on the component level.

ECOFAST certified	Confirms that devices from different manufacturers are compatible with ECOFAST specifications.
ECOFAST ES	The ECOFAST ES configuration tool supports power-engineering system design.
ECOFAST integrated	In addition to Siemens components, devices from other manufacturers can be integrated in this configuration tool. Their integration and conformity is confirmed by the “ECOFAST integrated” certificate.
Host	A host is a system or unit that contains at least one DP Master. For example, the programmable controller with the CPU is the host, and the IM 308-C is the DP master.
Hybrid field bus connector	The hybrid field bus connector is the physical connection between the station and the bus cable.
IM 308-C	The IM 308-C is a DP master for the ET 200 distributed I/O system. The IM 308-C can be used together with COM PROFIBUS and plugged into the S5-115U, S5-135U and S5-155U programmable controllers.
IrDA	Infrared Data Association: standard for an infrared interface driver.
Load feeder	A load feeder is a branch from the main circuit to the load with “Switching” and “Protection” functions. The “Protection” function comprises: <ul style="list-style-type: none"> • Protection of the line from the load feeder to the load (line protection), • Protection of the load against overloading (load protection).
Master	When they are in possession of the token, masters can send data to other stations and request data from these stations (= active station).
Master interface	Module for a distributed configuration. The distributed inputs and outputs are “connected” to the programmable controller via the master interface C.
Master system	All slaves that are assigned to a master with a reading and writing function form a master system together with the master.
Master-slave method	A bus access method whereby only one station at a time is the master and all other stations are slaves.
Power bus	Linear, primary power distribution bus.
Power tee clamp connector	Power tee clamp connectors connect ECOFAST components to the power bus. The power bus is not interrupted when the ECOFAST component is unplugged.
Process image	An “image” of the states of all inputs (= PII) or all outputs (= PIO) at a particular instant in time. You can access the process image in the controller program.
PROFIBUS	PRO cess FI eld BUS , European process and fieldbus standard which is defined in the PROFIBUS standard (EN 50 170, Volume 2, PROFIBUS). It specifies functional, electrical and mechanical properties for a one-bit, serial fieldbus system. PROFIBUS is a bus system which networks PROFIBUS-compatible automation systems and field devices at the cell and field levels. PROFIBUS is available with the following protocols: DP (= Distributed Input/Output), FMS (= Fieldbus Message Specification), PA (Process Automation) and TF (= Technological Functions).
PROFIBUS address	Each station must be assigned a PROFIBUS address for the purpose of unique identification. The PC/PU or the ET 200 hand-held unit have the PROFIBUS address “0”. The master and slaves have a PROFIBUS address within the range from 1 to 125.

PROFIBUS-DP	PROFIBUS bus system with the DP protocol. DP stands for distributed I/O system. The primary task of PROFIBUS-DP is fast cyclical exchange of data between the central DP Master and the peripheral devices.
Segment	The bus line between two terminating resistors forms a segment. A segment contains 0 to 32 stations. Segments can be coupled via RS 485 repeaters.
Slave	A slave can only exchange data with a master after being requested to do so by the master. Slaves include, for example, all DP slaves, such as motor starters, frequency converters, etc.
Station	A station is a device that can send, receive, or amplify data via the bus (e.g. a master, a slave, an RS 485 repeater, or an active star coupler).
Station number	See PROFIBUS address.
Terminating resistor	Each bus line connecting the individual motor starters to each other must be terminated with a resistor at the beginning and end. This prevents line reflections.



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ECOFAST System Manual

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Please use this form to tell us about them.

We would also welcome any ideas and suggestions you may have.

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