# PROFIBUS
## according to IEC 61158/EN 50170

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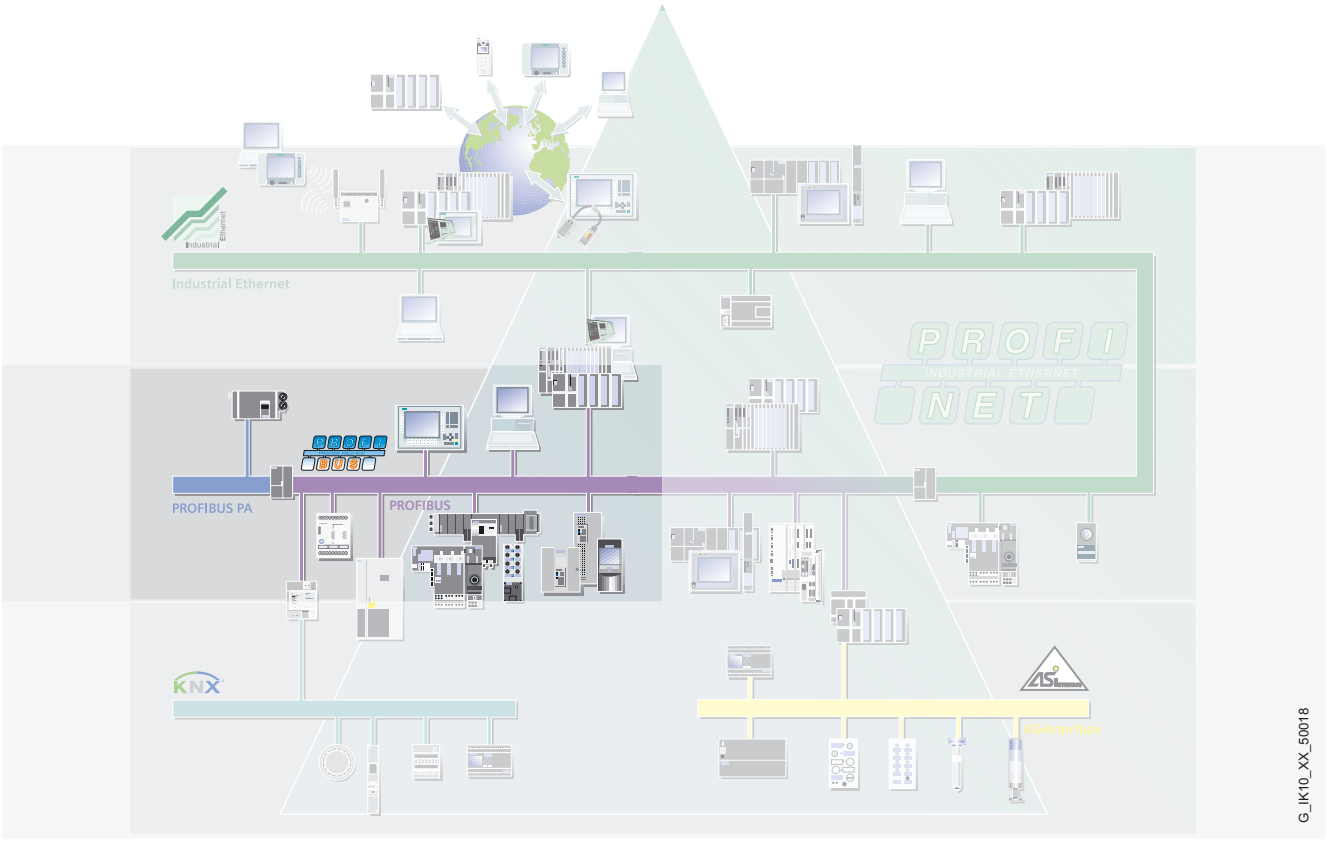
## Standard to IEC 61158/EN 50170

### Overview

- Bus system
  - For process and field communication in cell networks with a small number of stations and with field devices
  - and for data communication acc. to IEC 61 158/EN 50 170
- Offers openness for interfacing to standardized non-Siemens components
- PROFIBUS – the fieldbus standard in production and process engineering comprises:
  - Specification of the standards for the physical characteristics of the bus and the access procedure
  - Specification of the user protocol and the user interface
- Process or field communication
  - PROFIBUS DP for fast, cyclic data exchange with field devices
  - PROFIBUS PA for applications in process automation and in the intrinsically safe area
- Data communication
  - PROFIBUS FMS for data communication between programmable controllers of different manufacturers




PROFIBUS in the SIMATIC NET communication landscape

### Benefits

get Designed for Industry

- PROFIBUS is a powerful, open and rugged bus system that ensures problem-free communication.
- The system is fully standardized which enables problem-free connection of standardized components from different manufacturers.
- Configuration, startup and troubleshooting can be performed from any point on the network. This means that the freely selectable communication links are extremely flexible, easy to implement and easy to modify.
- Rapid preassembly and fast start-up on site through FastConnect cabling system.
- Constant monitoring of network components through a simple and effective alarm concept.
- High investment protection: existing installations can be expanded without affecting their operation.
- High availability due to ring redundancy with OLM.

## Overview

### Communication functions

Process or field communication (PROFIBUS DP, PROFIBUS PA) is used to link field devices to a programmable controller, HMI system or control system.

Interfacing is performed over integrated interfaces on the CPU or through interface modules (IMs) and communication processors (CPs).

With modern high-performance programmable controllers it is often more effective to link more than one PROFIBUS DP line to one programmable controller, not just to increase the number of I/O stations that can be connected, but also to enable individual production areas to be handled independently (segmentation).

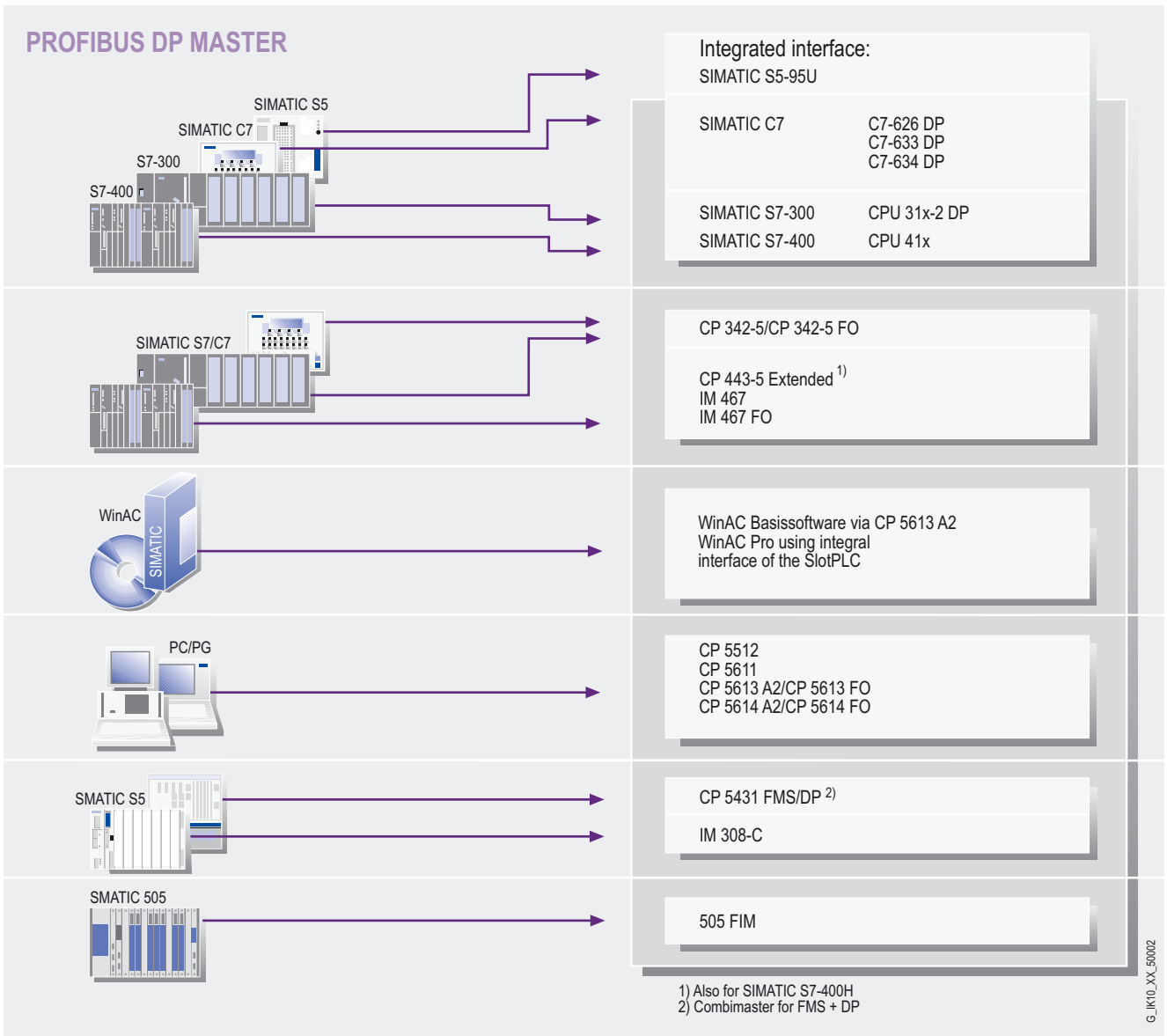
PROFIBUS standardized to IEC 61158/EN 50 170 is a high-performance, open, rugged fieldbus system with short response times and the following protocols:

*PROFIBUS DP*

(Distributed I/O) is used to connect distributed I/O stations, such as SIMATIC ET 200 with extremely fast response times in accordance with the IEC 61158/EN 50170 standard.

*PROFIBUS PA*

(Process Automation) extends PROFIBUS DP with failsafe transmission technology in accordance with the international standard IEC 61158-2.


PROFIBUS DP master

## Process or field communication

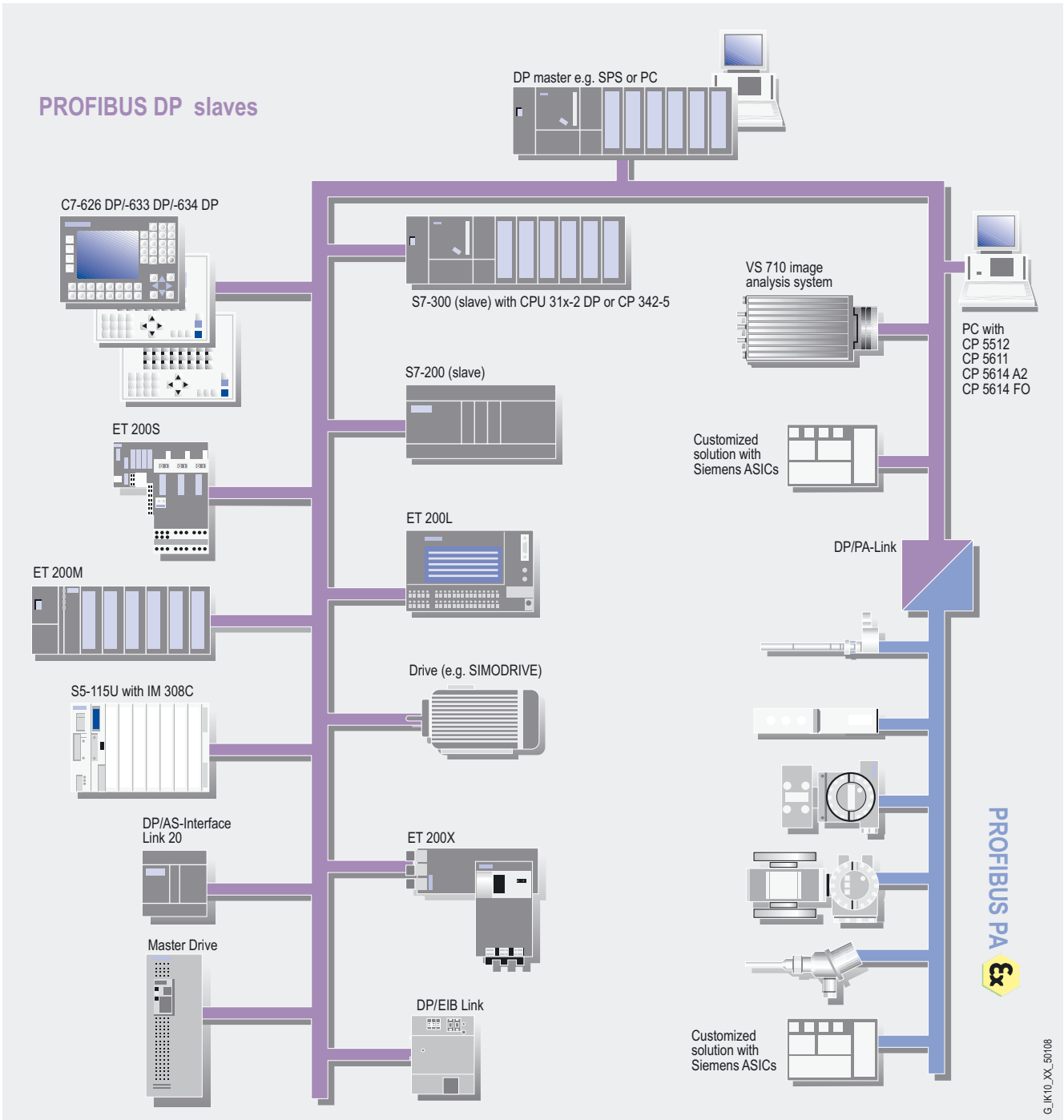
**Overview** (continued)

PROFIBUS DP/PA is used to link field devices such as distributed I/O stations or drives with automation systems such as SIMATIC S7 or PCs.

PROFIBUS DP/PA is used when I/O devices are widely distributed on the machine or in the plant (e.g. at the field level) and can be combined into one station (e.g. ET 200), more than 16 inputs/outputs.

The actuators and sensors are connected to field devices. The field devices are supplied with output data in accordance with the master/slave technique and transfer input data to the programmable controller or PC.

High-performance tools such as STEP 7 and COM PROFIBUS are available for configuring and parameterizing the I/O devices. Testing and start-up is possible over PROFIBUS DP from any connection point using these tools.




PROFIBUS DP slaves

**Overview** (continued)

**DP device types**

PROFIBUS DP distinguishes between two different master classes and different DP functions:

*DP master Class 1*

The DP master Class 1 is the central component on PROFIBUS DP. The central controller or PC exchanges information with distributed stations (DP slaves) in a fixed, repeated message cycle.

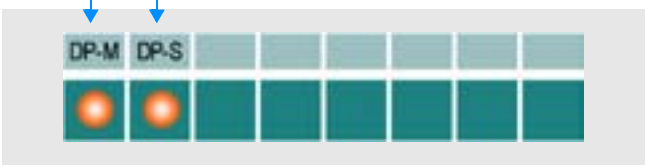
*DP master Class 2*

Devices of this type are used (programming, configuration or control devices) during start-up, for configuring the DP system or for controlling the plant during normal operation (diagnostics). A DP master Class 2 can be used, for example, to read the input, output, diagnostics and configuration data of the slaves.

*DP slave*

A DP slave is an I/O station that reads in input data and transfers output data to the I/O. The volume of input and output data depends on the device and can be up to 244 bytes.

The functional scope can differ between DP masters of Class 1 and 2 or DP slaves. This determines the performance and availability of a communications processor.




*DP-V0*

The DP master functions (DP-V0) comprise configuration, parameterization, read input data and write outputs in cycles, read diagnostics data.

*DP-V1*

The additional DP function expansions (DP-V 1) make it possible to perform non-isochrone read and write functions as well as acknowledgement of alarms at the same time as processing cyclic data communication. These extended DP functions comprise acyclic access to the parameters and measured values of a slave (e.g. field devices of process automation and intelligent HMI devices). This type of slave must be supplied with extensive parameter data during start-up and during normal operation. Data transferred in acyclic mode (e.g. parameterization data) are only rarely changed, in comparison to the cyclic measured values, and are transferred at lower priority in parallel with the cyclic high-speed useful data transfer. Alarm acknowledgement by the master ensures reliable transfer of the alarms from DP slaves.

*DP-V2*

The DP master functions (DP-V2) comprise functions for isochrone mode and direct data communication between DP slaves.

*Isochrone mode*

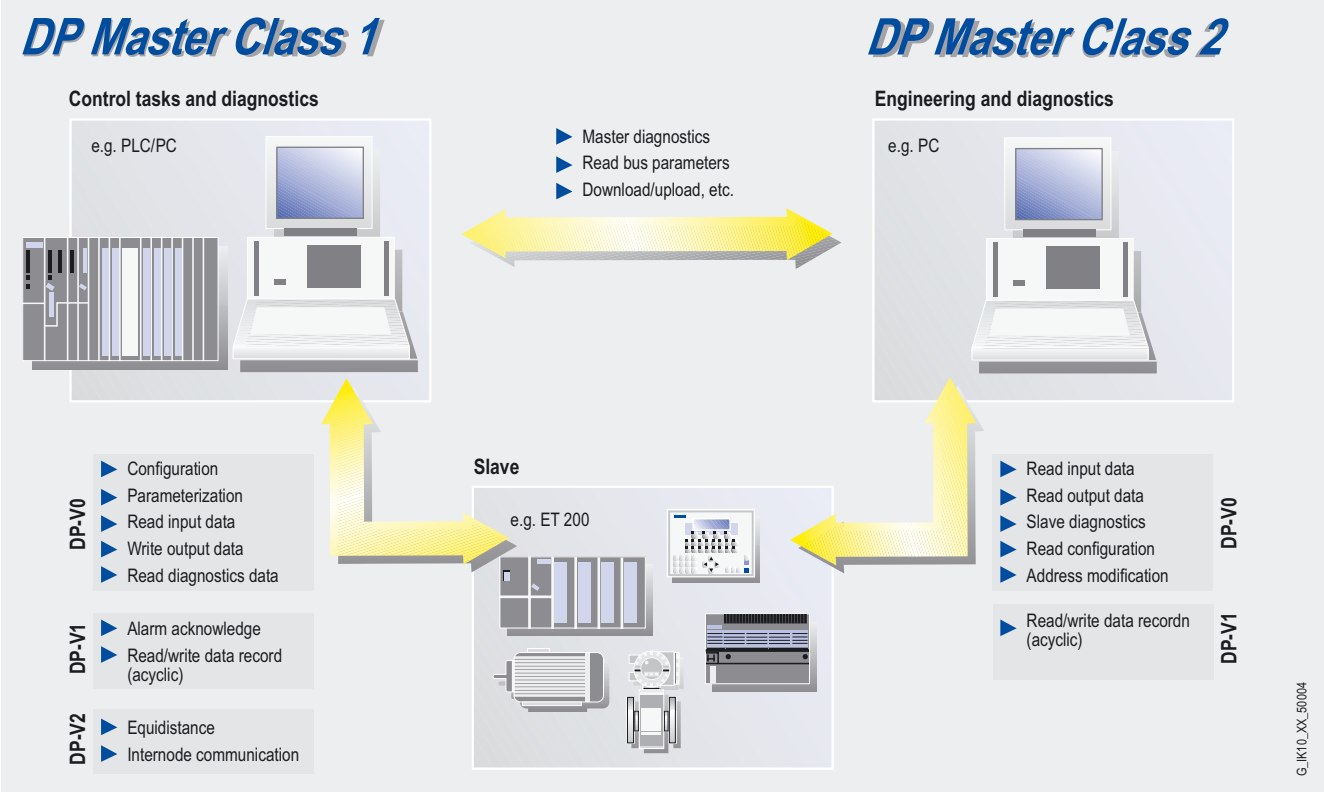
Isochrone mode is implemented by means of a signal with a constant bus cycle for the bus system. This isochrone, constant cycle is sent by the master to all bus stations in the form of a global control message. The master and slave can then synchronize their applications with this signal. The jitter of this signal from cycle to cycle must be less than 1 µs for typical drive applications.

*Direct data communication between DP slaves*

The publisher/subscriber model is used to implement the direct data communication between slaves. Slaves declared as publishers make their input data (corresponds to response message to their own master) available to other slaves, the subscribers, for reading. Direct slave-to-slave communication is performed cyclically.

## Process or field communication

### Integration




DP Master Classes

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## Overview

### Communication functions

Data communication (e.g. PROFIBUS FMS) serves to exchange data between programmable controllers or between a programmable controller and intelligent partners (PC, computers, etc.).

The following communication functions are available for this purpose:

*PG/OP communication*

Comprises integral communication functions that are used by the SIMATIC programmable controllers to perform data communication with HMI devices (e.g. TD/OP) and SIMATIC PG (STEP 7). PG/OP communication is supported by MPI, PROFIBUS and Industrial Ethernet networks.

*S7 routing*

Using S7 routing it is possible to use the programming device communication across networks.

*S7 communication*

S7 communication is the integral communications function that has been optimized within the SIMATIC S7/C7. It enables PCs and workstations to be connected. The maximum volume of useful data per task is 64 KB. S7 communication offers simple, powerful communication services and provides a network-independent software interface for MPI, PROFIBUS and Industrial Ethernet networks.

*S5-compatible communication (SEND/RECEIVE)*

The SEND/RECEIVE interface (with PROFIBUS over FDL) is optimized for communication between SIMATIC S5 and S7 controls and therefore facilitates migration of SIMATIC S5, SIMATIC S7 controls and PCs over PROFIBUS and Industrial Ethernet.

*Standard communication*

This comprises standardized protocols for data communication .

- PROFIBUS FMS (Fieldbus Message Specification)

This is ideally suited to communication from different automation systems (e.g. PLCs, PCs) from different manufacturers at the cell level with only a few stations (max. 16). Communication with field devices using the FMS interface is also possible.

With the FMS services READ, WRITE and INFORMATION REPORT, read or write access to variables of the communication partner is possible from the user program by means of a variable index or variable name, or the user program can transfer its own variable values to a communications partner. Partial access to variables is supported. The communication is processed over acyclic connections (master-to-master, master-to-slave), over acyclic connections with a slave initiative or with cyclic connections (master-to-slave). The INFORMATION REPORT is can also be used to send a message to all stations on the network using a broadcast service. The FMS service IDENTIFY (request for identification characteristics of the partner) and STATUS (request partner status) can also be activated.

*OPC server*

The basic principle of OPC (OLE for Process Control) is that OPC client applications communicate with the OPC server over a standardized, open and manufacturer-independent interface.

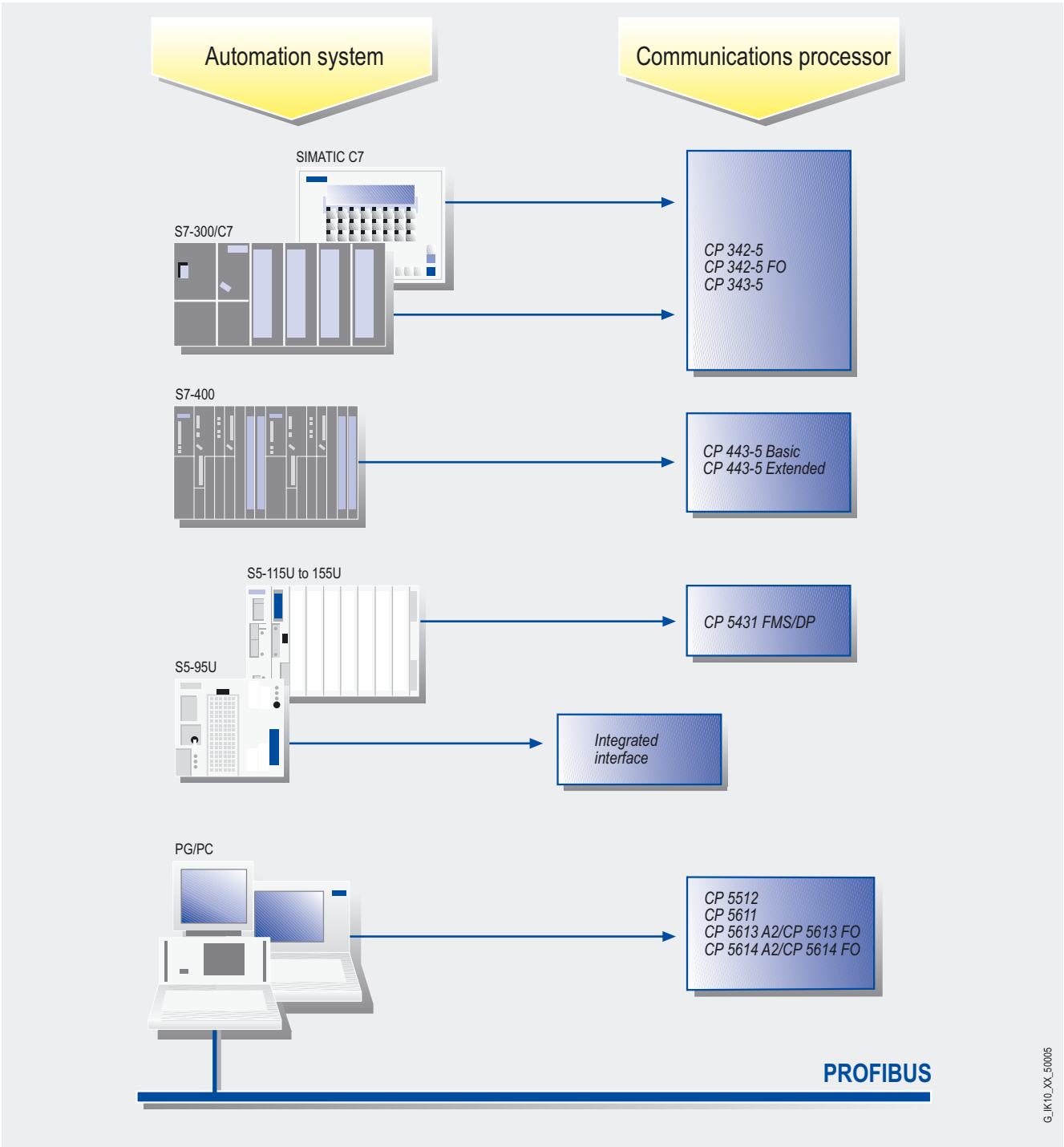
IT communication can be implemented over the OPC XML DA interface.

The appropriate OPC servers are included in the scope of supply of the respective communication software.

**Overview** (continued)

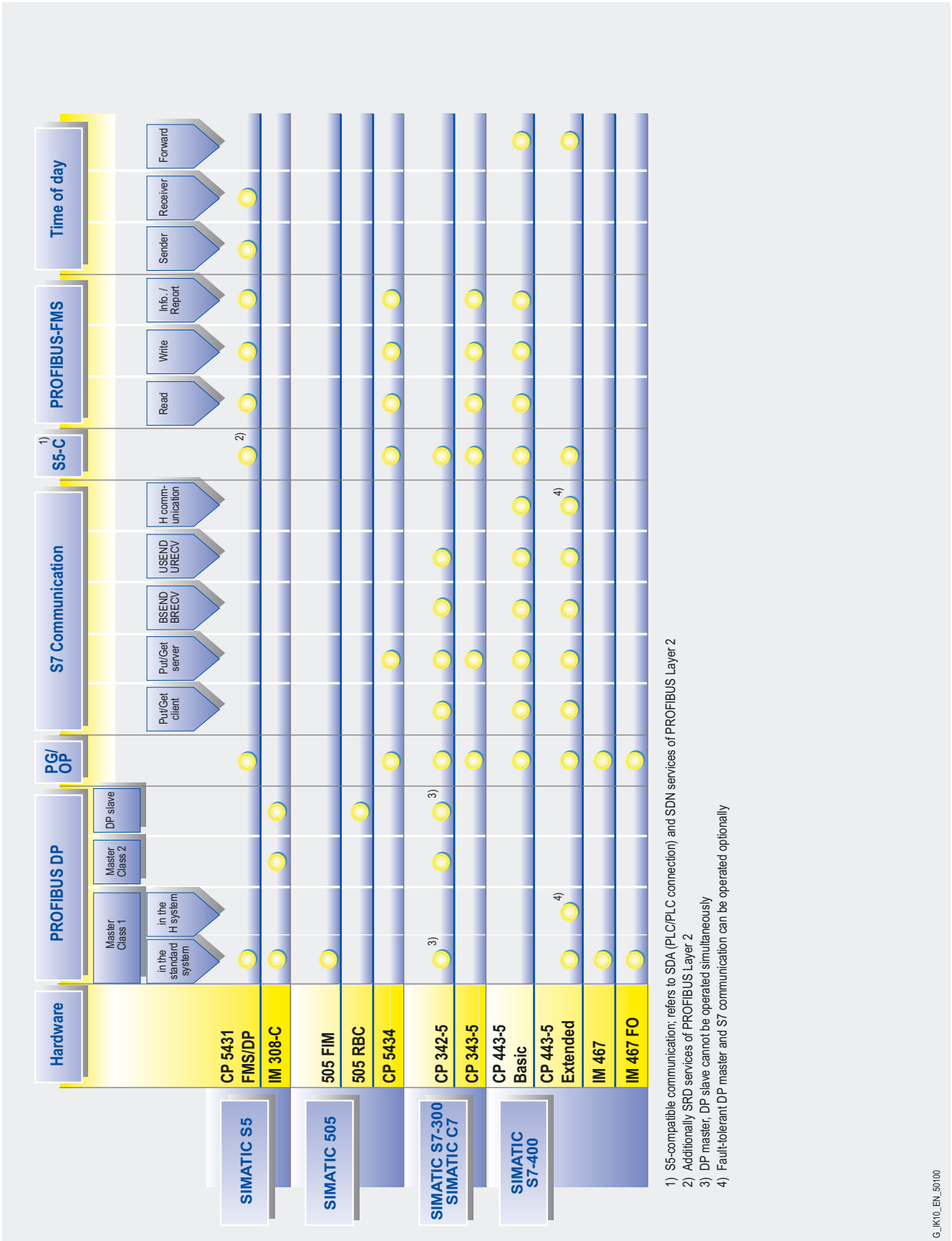
**System interfacing**

For many data terminals, communications processors (CPs) are available that already have the communications functions implemented in the firmware and that therefore relieve the data terminal of communications tasks (e.g. flow control, blocking, etc.).




Data communication for SIMATIC and the PC

## Function




Communications overview for SIMATIC

Communications overview for PG/PC

| Hardware | Software | Operating system | | | PG/ OP | OPC 6) | PROFIBUS DP | | | S7 communication | | | | | S5-C | PROFIBUS FMS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Windows 2000 Pro | Windows XP Pro | Win 2003 Server | | | Master Klasse 1 | Master Klasse 2 | DP-Slave | Put/Get Client | Put/Get Server | BSEND/ BRECV | USEND/ URECV | H com-muni-cation | | Read | Write | Info/ Report |
| **CP 5613 A2**<br>**CP 5613 FO**<br>**CP 5614 A2**<br>**CP 5614 FO**<br>(PCI 32 bit) | CP with DP-Base 1) 4) | ● | ● | ● | ● | ● | ● | | ● 5) | | | | | | ● | | | |
| | DP-5613 4) | ● | ● | ● | ● | ● | ● | ● | | | | | | | ● | | | |
| | S7-5613 | ● | ● | ● | ● | ● | | | | ● | a.s. | ● | ● | | ● | | | |
| | FMS-5613 | ● | ● | ● | ● | ● | | | | | | | | | ● | ● | ● | ● |
| **CP 5511**<br>(PCMCIA 16 bit)<br>**CP 5611**<br>(PCI 32 bit) | SOFTNET-DP | ● | ● | ● | | ● | ● 2) 3) | ● 2) 3) | | | | | | | ● | | | |
| | SOFTNET-DP Slave | ● | ● | ● | | ● | | | ● 2) | | | | | | | | | |
| | SOFTNET-S7 | ● | ● | ● | | ● | | | | ● | a.s. | ● | ● | | ● | | | |
| | STEP 7 | ● | ● | | ● | | | | | | | | | | | | | |
| **CP 5512**<br>(CardBus 32 bit) | SOFTNET-DP | | ● | ● | | ● | ● 2) 3) | ● 2) 3) | | | | | | | ● | | | |
| | SOFTNET-DP Slave | | ● | ● | | ● | | | ● 2) | | | | | | | | | |
| | SOFTNET-S7 | | ● | ● | | ● | | | | ● | a.s. | ● | ● | | ● | | | |
| | STEP 7 | ● | ● | | ● | | | | | | | | | | | | | |

You can find more information in the Internet.
http://www.siemens.de/automation/net/ik-info

a.s. = available soon

1) Included in the scope of supply CP 5613/A2/CP 5613FO/CP 5614 A2/CP 5614 FO
2) DP master and DP slave cannot be operated simultaneously
3) Master Class 1 and Master Class 2 cannot be operated simultaneously on one CP
4) DP-Base and CP-5613 cannot be operated simultaneously
5) On CP 5614 only
6) Including XML DA interface for data access

You can find application examples on the Quick Start CD

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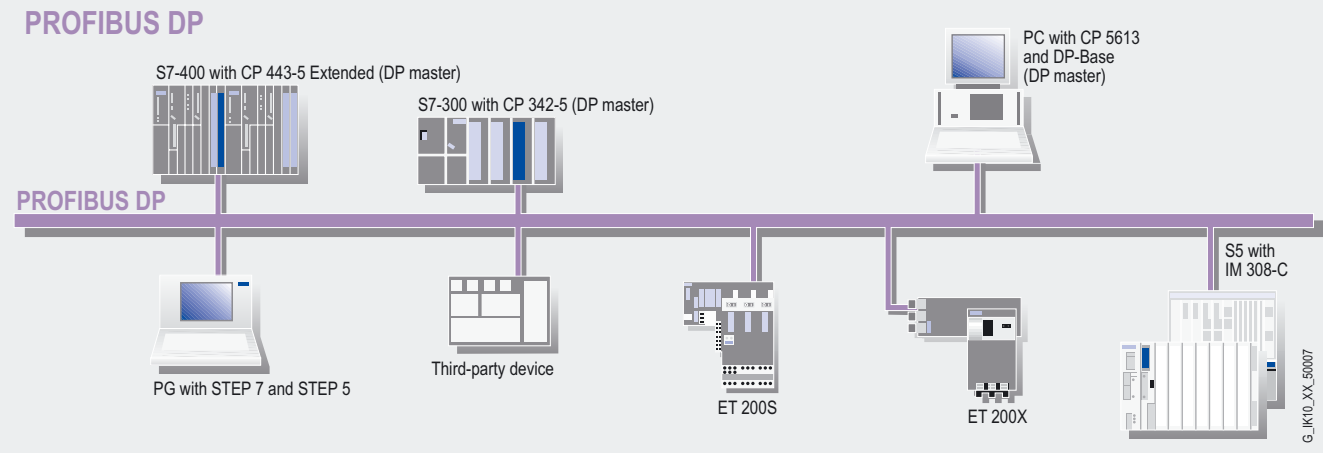
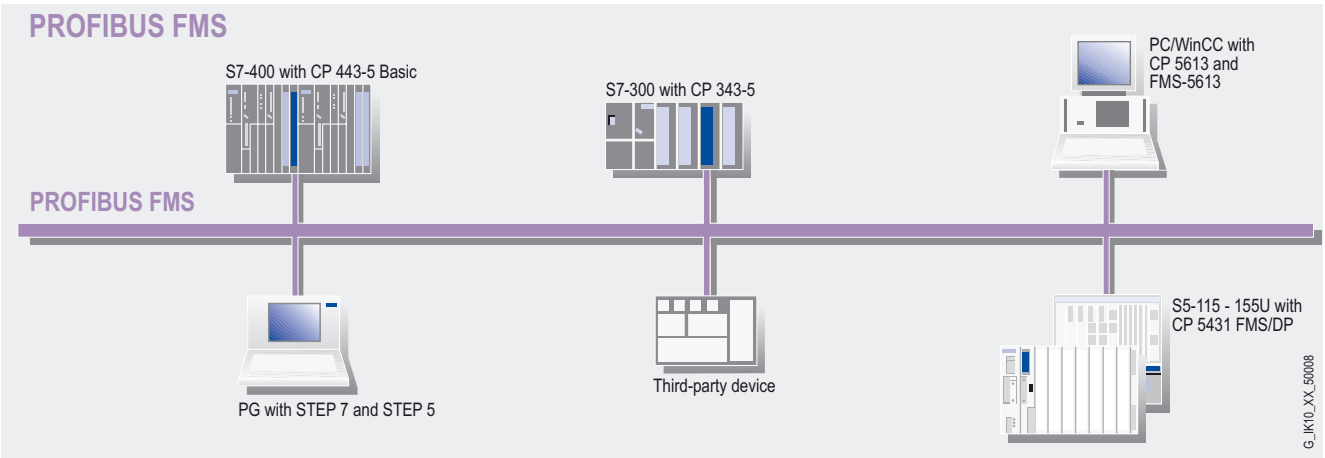
## Integration

### Configuration example for process or field communication



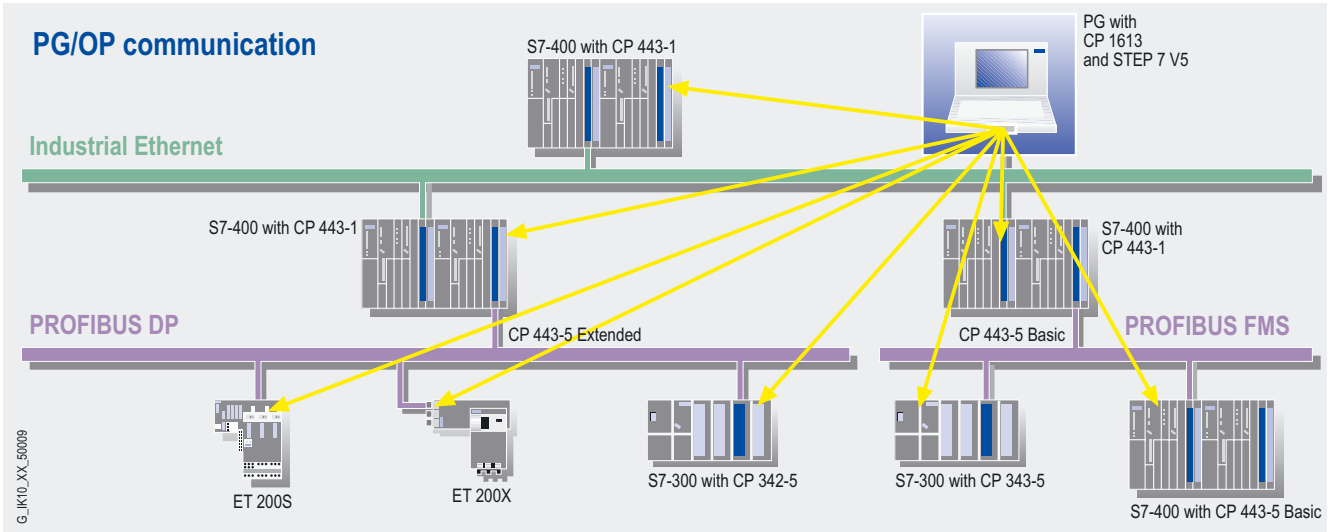

PROFIBUS DP configuration for SIMATIC S5/S7 and PG/PC

### Configuration example for data communication




PROFIBUS FMS configuration for SIMATIC S5/S7 and PG/PC

### Configuration example for programming device/operator panel communication




PG/OP communication with S7 routing

## Topologies

### Overview

Siemens offers a comprehensive range of PROFIBUS network components for electrical and optical transmission technology.

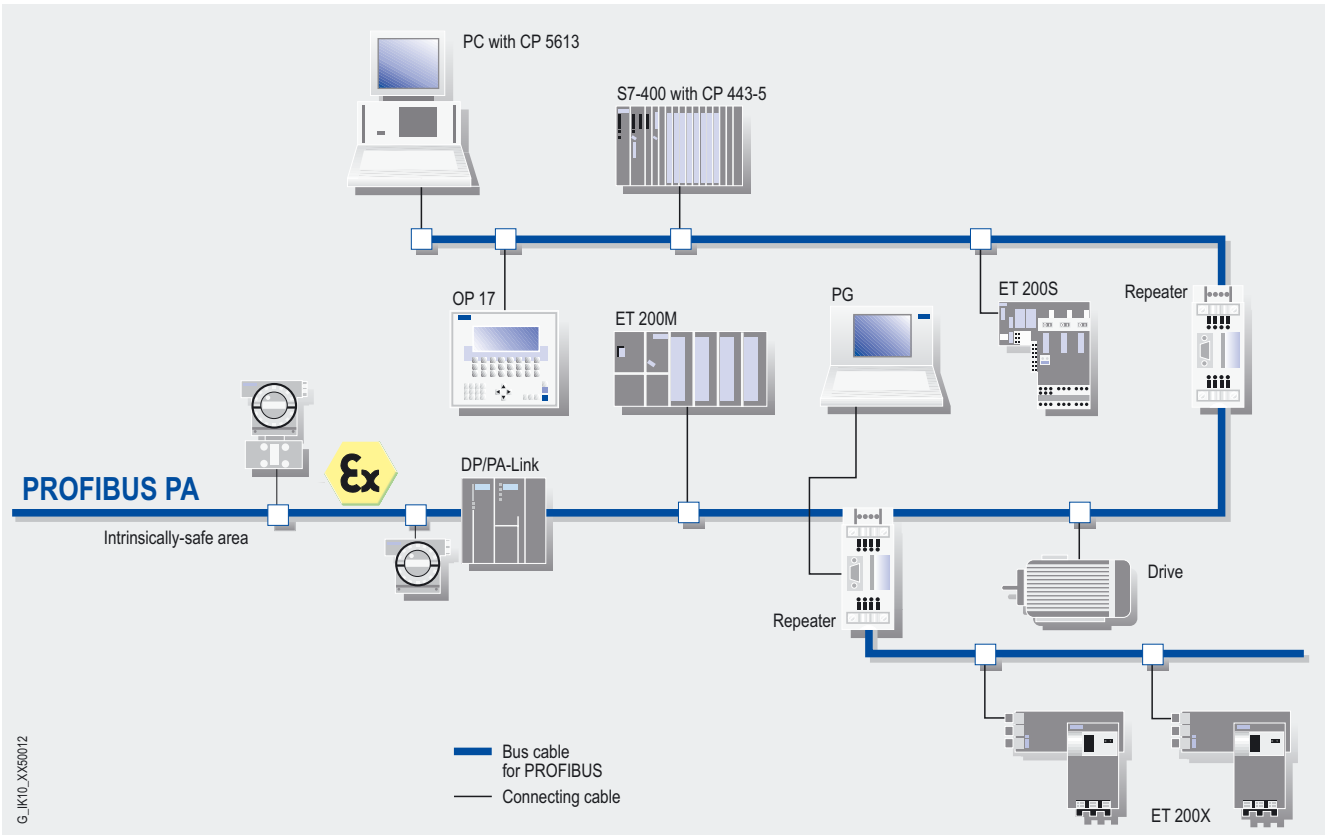
PROFIBUS is standardized to IEC 61158/EN 50170 for universal automation (PROFIBUS FMS and PROFIBUS DP) as well as to IEC 61158-2 for process automation (PROFIBUS PA).

**Electrical network**

- The electrical network uses a shielded, twisted-pair cable. The RS 485 interface operates with voltage differences. It is therefore more insensitive to disturbances than a voltage or current interface. With PROFIBUS, the stations are connected to the bus through a bus terminal or a bus connector (max. 32 stations per segment).
- The individual segments are connected through repeaters.
- The transmission rate can be set in steps from 9.6 kbit/s to 12 Mbit/s.
- The maximum segment length depends on the transmission rate.
- The electrical network can be configured as a bus or with a tree topology
- For intrinsically safe applications, PROFIBUS PA offers transmission technology to IEC 61158-2. In this case the transmission rate is 31.25 kbit/s.

*Features*

- High-quality bus cable
- Transmission procedure: RS 485 (to EIA)
- Bus structure with bus terminals and bus connector for connecting the PROFIBUS stations
- Transmission procedure to IEC 61158/EN 50170 for universal automation (PROFIBUS FMS/DP) as well as IEC 61158-2 for failsafe applications (PROFIBUS PA)
- The network components (DP/PA coupler or DP/PA Link) convert the DP transmission technique from RS 485 (bit coding by means of voltage difference signals) to IEC 61158-2 (bit coding by means of current signals)
- Simple, system-wide installation and grounding concept
- Easy installation.




Network configuration of electrical PROFIBUS network

## Overview (continued)

### Optical network

The fiber-optic variant of PROFIBUS has the following features:

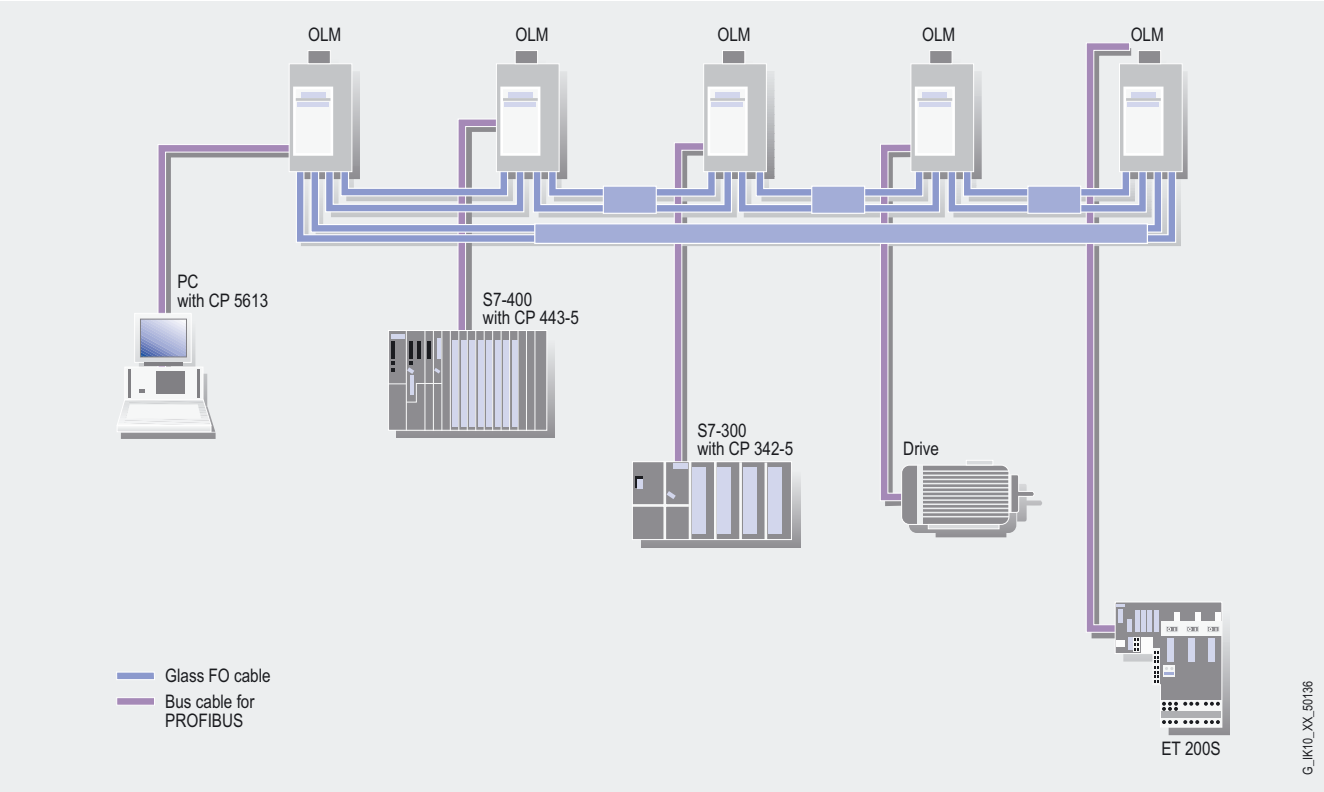
- The transmission path is insensitive to electromagnetic interference
- Suitable for long distances
- Electrical isolation
- Uses plastic, PCF or glass fiber-optic cables

*Optical PROFIBUS with OLMs*

Optical Link Modules (OLMs) can be used to construct an optical network in line, ring and star topology. The maximum distance between two OLMs can be up to 15 km. The transmission rate can be set in steps from 9.6 kbit/s to 12 Mbit/s.

*Optical PROFIBUS with integrated interface and OBT*

The optical PROFIBUS with an integrated interface and OBT has a line topology. A cost-effective solution in the form of devices with an integral optical interface is available for this purpose. Data terminals with an RS 485 interface can be connected over an Optical Bus Terminal (OBT). The maximum spacing between two stations is 50 m for a plastic fiber-optic cable. Special fiber-optic cables are offered for bridging distances of up to 300 m.




Network configuration for optical PROFIBUS with OLMs

## Topologies

**Overview** (continued)

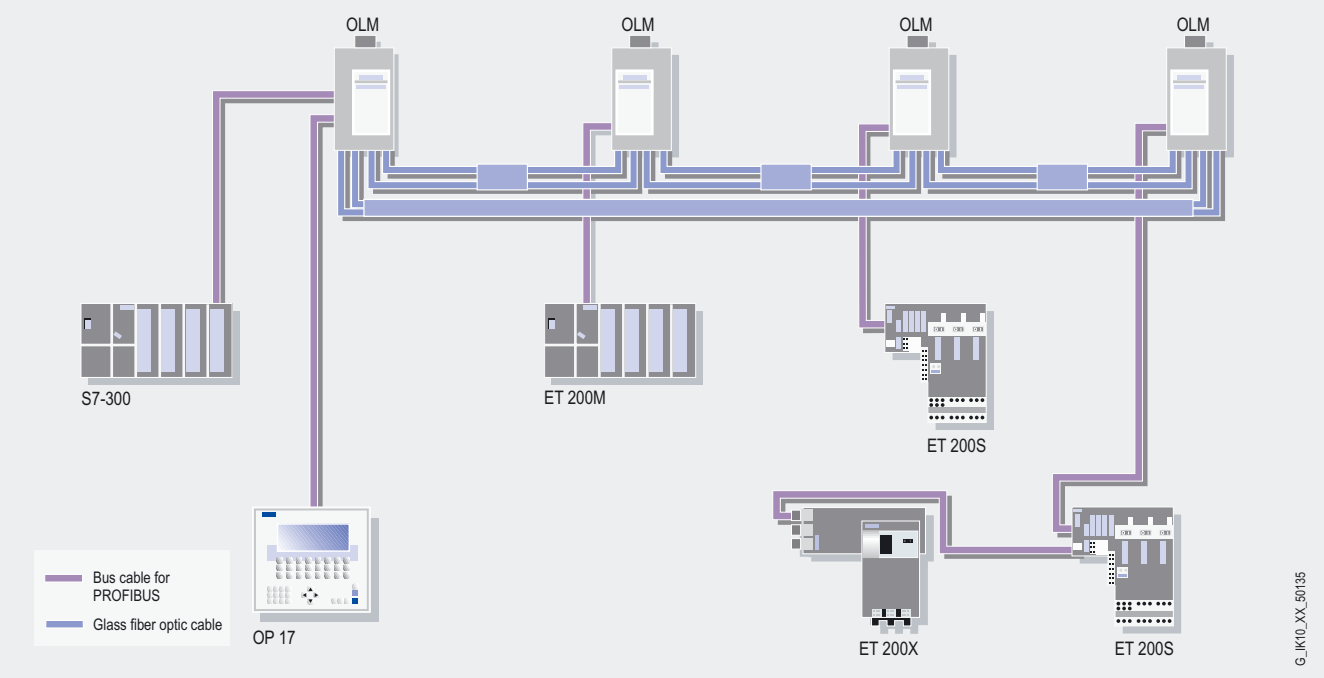
### Hybrid network

Hybrid electrical and optical networks are possible. The transition between both media is implemented by the OLM.

There is no difference between the two-wire technology and fiber-optic technology with regard to communication between the stations on the bus. Up to 127 stations can be connected to a PROFIBUS network.

The optical transmission technology offers the following advantages:

- Fiber-optic conductors made of plastic or glass are insensitive to electromagnetic fields, so there is no need for the EMC measures that are necessary with electrical networks
- In outdoor applications, there is no need for additional lightning protection
- The electrical potentials on the modules are electrically isolated thanks to the properties of the conductors
- Fiber-optic cables can be used to bridge long distances to field devices.

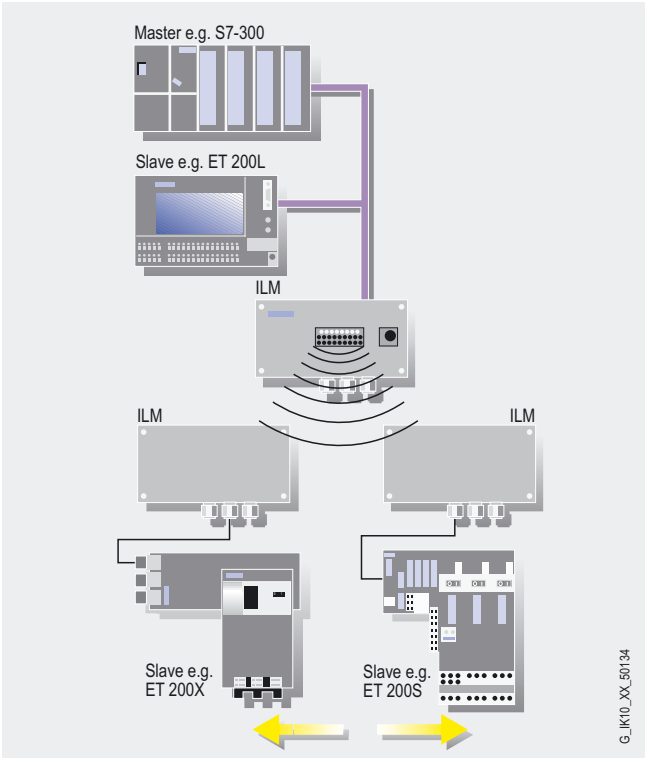



Network configurations as a combination of the electrical and optical PROFIBUS

## Overview (continued)

### Wireless link

Using the PROFIBUS Infrared Link Module (ILM), individual or multiple PROFIBUS slaves or slave segments can be connected wirelessly. For a maximum transmission rate of 1.5 Mbit/s and a maximum range of 15 m, communication to moving parts, e.g. to automated guided vehicles, and the replacement of systems subject to wear (sliprings or slipconductors) are possible.




Link to moving parts

## More information

Additional language versions and manuals can be found for the various products at:

Additional information can be found in the Internet under:

http://www.siemens.com/automation/csi/net

Please note the operating framework conditions in each case for the specified SIMATIC NET products (Order No. 6GK..., 6XV1...), which you will find on the Internet page listed below.

Additional information can be found in the Internet under:

http://www.siemens.com/simatic-net/ik-info

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## Topologies

### Technical specifications

| | |
|---|---|
| Standard | PROFIBUS according to IEC 61 158/EN 50 170 Volume 2 |
| Topology | |
| • Electrical network | Bus, tree |
| • Optical network | Bus, tree, ring |
| • Wireless Link | Point-to-point; point-to-multipoint |
| Transmission medium | |
| • Electrical network | Shielded two-wire cable |
| • Optical network | Fiber-optic cable (glass, PCF and plastic) |
| • Wireless Link | Infrared |
| Network size | |
| • Electrical network | Max. 9.6 km |
| • Optical network | Max. 90 km |
| • Wireless Link | Max. 15 m |
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s (selectable) including 31.25 kbit/s for (PROFIBUS PA) |
| Number of stations | Max. 127 |
| Access procedure | Token passing with lower level master/slave |
| Protocols | PROFIBUS DP<br>PG/OP communication<br>S7 communication<br>S5-compatible communication (SEND/RECEIVE)<br>PROFIBUS FMS |

### Ordering data

| Ordering data | Order No. |
|---|---|
| **Manual for PROFIBUS networks** | |
| Network architecture, configuring, network components, installation | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET manual collection** | **6GK1 975-1AA00-3AA0** |
| Electronic manuals for communication systems, protocols, products | |
| on CD-ROM German/English | |

### More information

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## Overview

The table contains network selection criteria for transmission media.


Transmission media at a glance

## Network selection criteria

**Overview** (continued)

Selection criteria for electrical and optical networks are shown in the table below.

| Criteria | | Electrical network | Optical network | |
|---|---|---|---|---|
| | | Electrical PROFIBUS | with OLM | with integr. interface/OBT |
| Transmission media | Plastic [1] | — | ○ | ○ |
| | PCF | — | ○ | ○ |
| | Glass | — | ○ | — |
| | Shielded twisted-pair cable | ○ | — | — |
| Distances | maximum network size | 9.6 km [5] | 90 km | 9.6 km |
| | between 2 nodes | up to 1 km [3] | up to 15 km [2] | up to 300 m [2] |
| Topology | Bus | ○ | — | — |
| | Linear bus | — | ○ | ○ |
| | Tree | ○ | ○ | — |
| | Ring | — | ○ | — |
| Transmission protocol | | All | All | DP |
| Connection of nodes via | OLM | — | ○ | — |
| | Integral interfaces | ○ | — | ○ [4] |
| | Bus terminal | ○ | — | ○ |
| | Bus connector | ○ | — | — |
| Electrical network segments can be connected | | ○ | ○ | — |

1) Plastic fiber optic cable is also called polymer optical fiber (POF)
2) Depending on cable type used
3) Depending on data rate and performance type used
4) Integral interfaces (ET 200M, ET 200X)
5) For PROFIBUS PA 1.9 km

— Not relevant for this application

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Selection criteria for electrical and optical networks

## Overview (continued)

The following tables provide an overview of the PROFIBUS network components and accessories as well as the transition points between the transmission media.

| | Electrical network | | Optical network | | Wireless link |
|---|---|---|---|---|---|
| | RS 485 in accordance with IEC 61158/EN 50170 | IEC 61158-2 (PA) | with OLM | with integral interface/ OBT | |
| Network topology | Bus, tree | Bus, tree | Linear bus, star, ring | Linear bus | Point-to-point<br>Point-to-multipoint |
| Transmission media | Shielded twisted-pair cable | Shielded twisted-pair cable for intrinsically-safe and non-intrinsically-safe areas | Plastic fiber optic cable<br>PCF optic cable<br>Glass fiber optic cable | Plastic fiber optic cable<br>PCF optic cable | Wireless, infrared |
| Tools and accessories | FastConnect stripping tool | FastConnect stripping tool | Tools for preparing BFOC connectors for plastic fiber optic cables | Tools for preparing Simplex connectors for plastic fiber optic cables | — |
| Connectors | Bus connector | SpliTConnect system | BFOC connector | Simplex connector | Integral terminals |
| Connection components | Bus terminal | SpliTConnect system | OLM | OBT | ILM |
| Prepared cables | 830-1T connecting cable<br>830-2 connecting cable | — | INDOOR cable with BFOC<br>Standard glass cable with BFOC<br>Trailing cable with BFOC<br>Standard PCF cable with BFOC<br>Standard plastic cable with BFOC | Standard PCF cable with Simplex connectors and pull cord feature | — |
| Lightning protection | Primary protection<br>Secondary protection | to be implemented through design measures | Not required | Not required | — |
| Electrical network segment can be connected via | repeaters | — | Optical Link Module (OLM) | Optical Bus Terminal (OBT) | Infrared Link Module (ILM) |
| Diagnostics tool | BT 200 hardware test device | Not available | Signal contact and integral measuring sockets; level measuring device on request | Level measuring device on request | Signal contact and display of signal strength |
| Documentation | Manual for PROFIBUS networks | Manual for PROFIBUS networks | Manual for PROFIBUS networks | Manual for PROFIBUS networks | Manual for PROFIBUS networks |

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Overview: PROFIBUS network components and accessories

## Network selection criteria

### Integration

| | Electrical PROFIBUS | Opt. PROFIBUS/ OLM | Opt. PROFIBUS/ int./OBT | Wireless link |
|---|---|---|---|---|
| Electrical PROFIBUS | Repeater | OLM | OBT | ILM |
| Optical PROFIBUS/OLM | OLM | OLM | OBT + OLM | OLM + ILM |
| Optical PROFIBUS/int./OBT | OBT | OBT + OLM | OBT, integr. optics | OBT + ILM |
| Wireless link | ILM | OLM + ILM | OBT + ILM | ILM |

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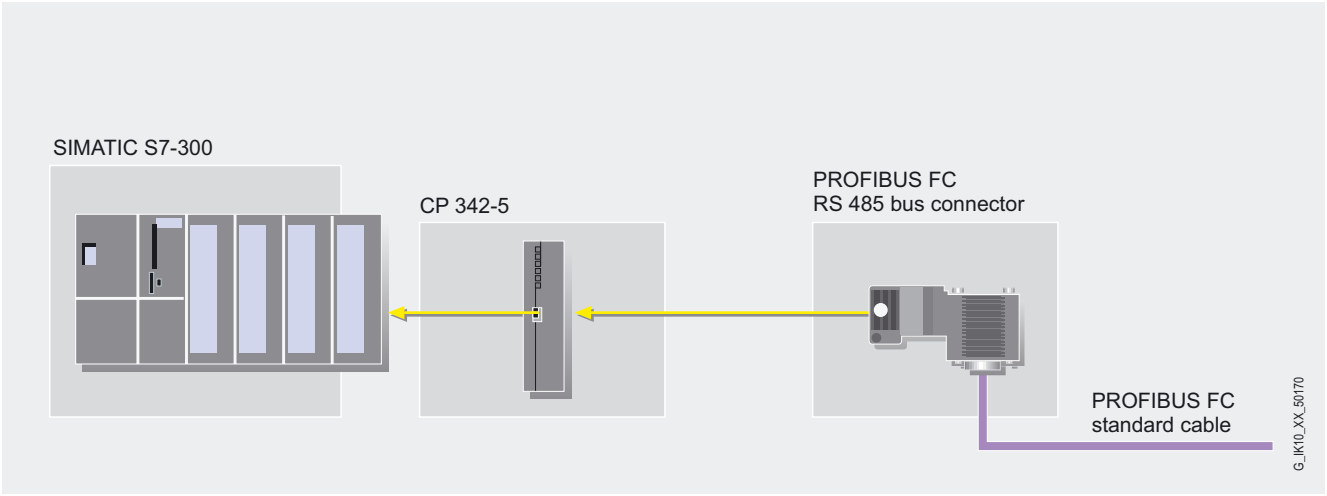
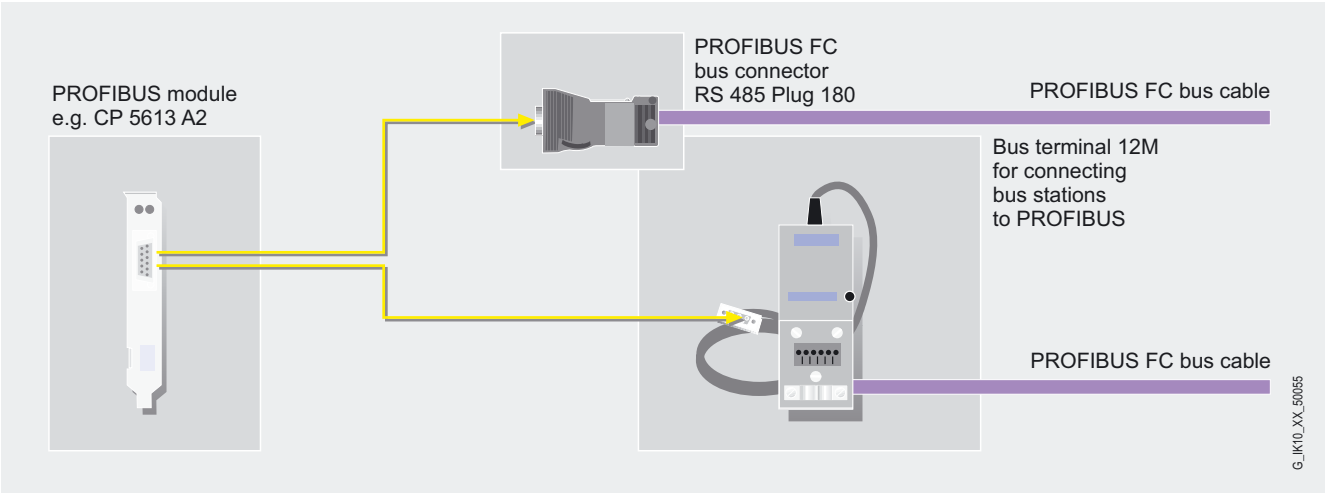
Transitions between the transmission media

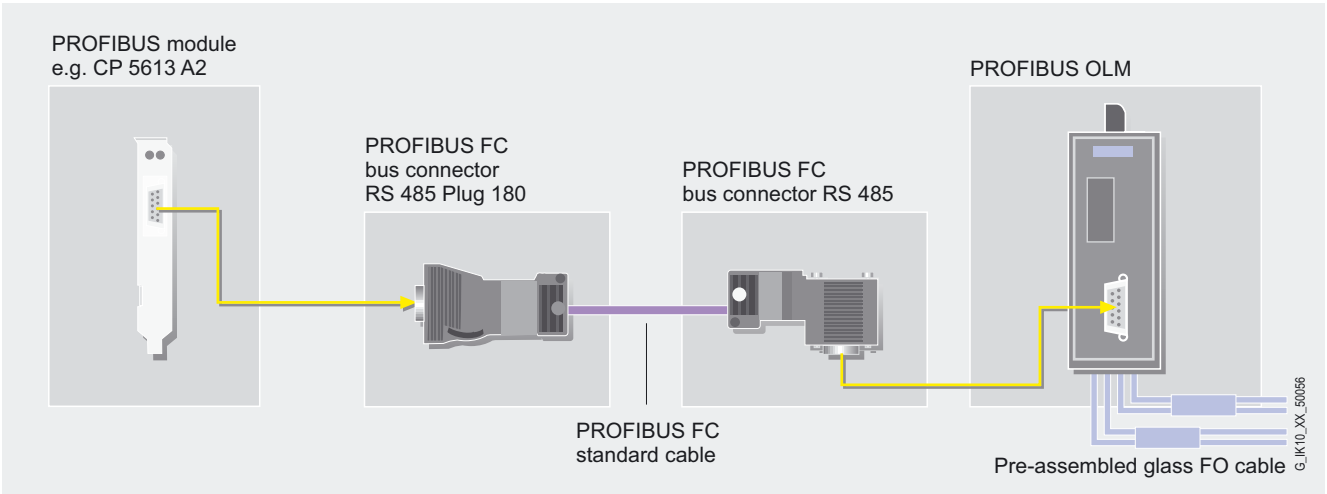
## Integration




Connection example for electrical networking with PROFIBUS FastConnect bus connector RS 485



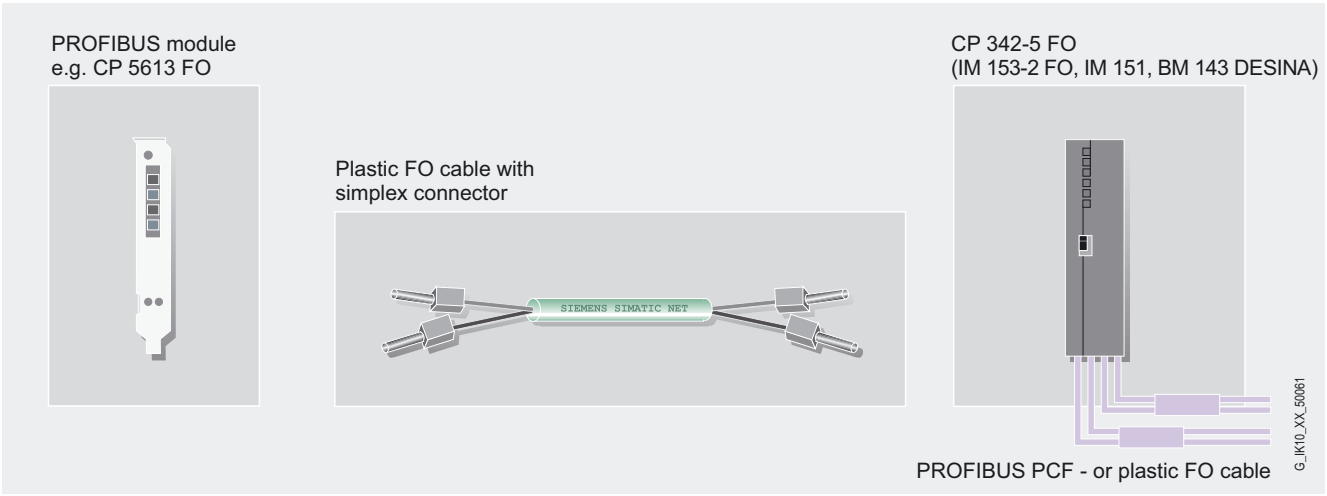

Connection example for electrical networking with PROFIBUS FastConnect bus connector RS 485 or bus terminal



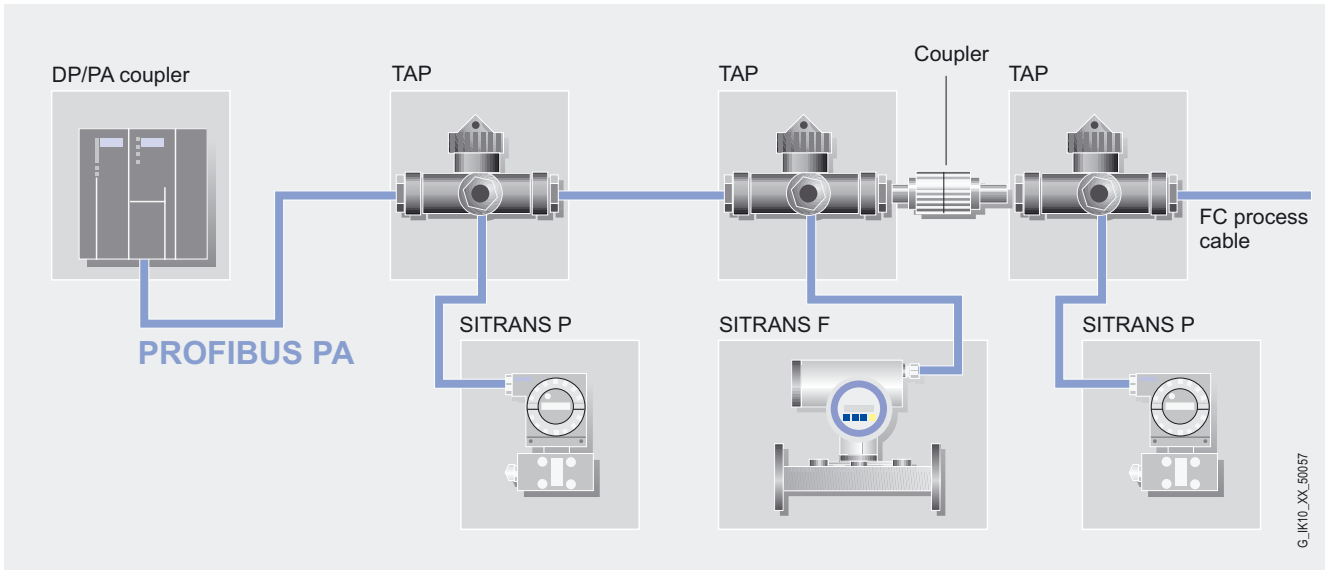

Connection example for optical networking

## Connection examples

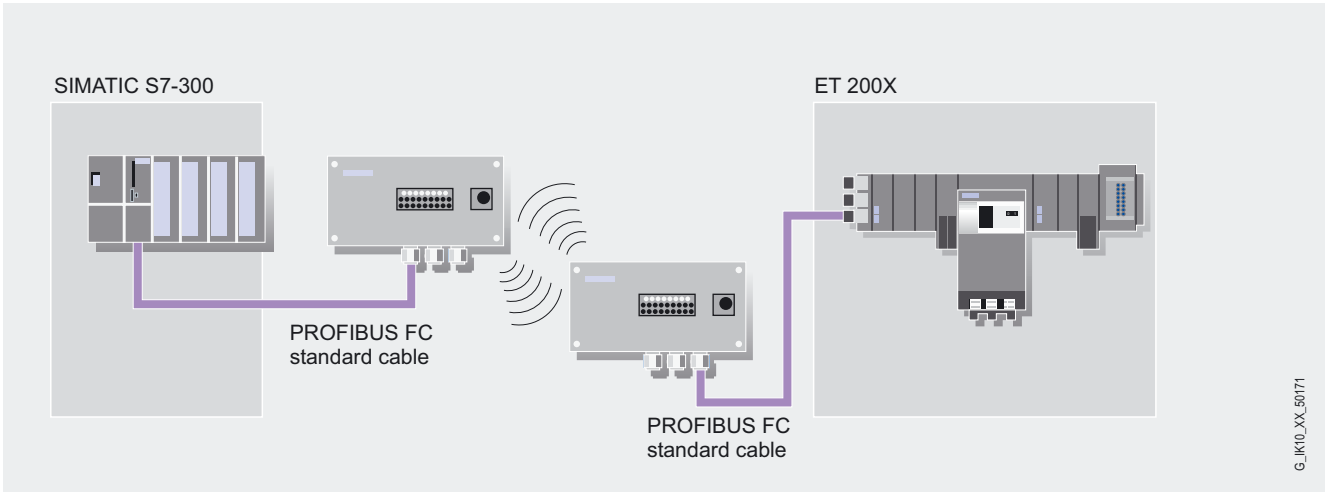
**Integration** (continued)




Connection example for optical networking with plastic fiber-optic cables




Connection example for an intrinsically safe network




Connection example for wireless data transmission with ILM

## Overview


- Quick and easy assembly of PROFIBUS copper cables
- Assembly mistakes such as short-circuits between the shield and core are excluded

## Benefits

get Designed for Industry

- Shorter connection times for terminals by stripping of the outer cladding and woven shield in one step
- Installation faults, such as short-circuits between the shield and cores, are excluded
- Easy assembly due to preset insulation stripping tool (FC stripping tool)
- Termination can be checked in the assembled state through the transparent cover for the insulation piercing terminals thanks to color coding.

## Design

The system comprises 3 compatible components:

- FastConnect bus cables for rapid installation
- FastConnect stripping tool
- FastConnect bus connector for PROFIBUS

The PROFIBUS FastConnect bus cables can also be connected to conventional bus connectors.

## Function

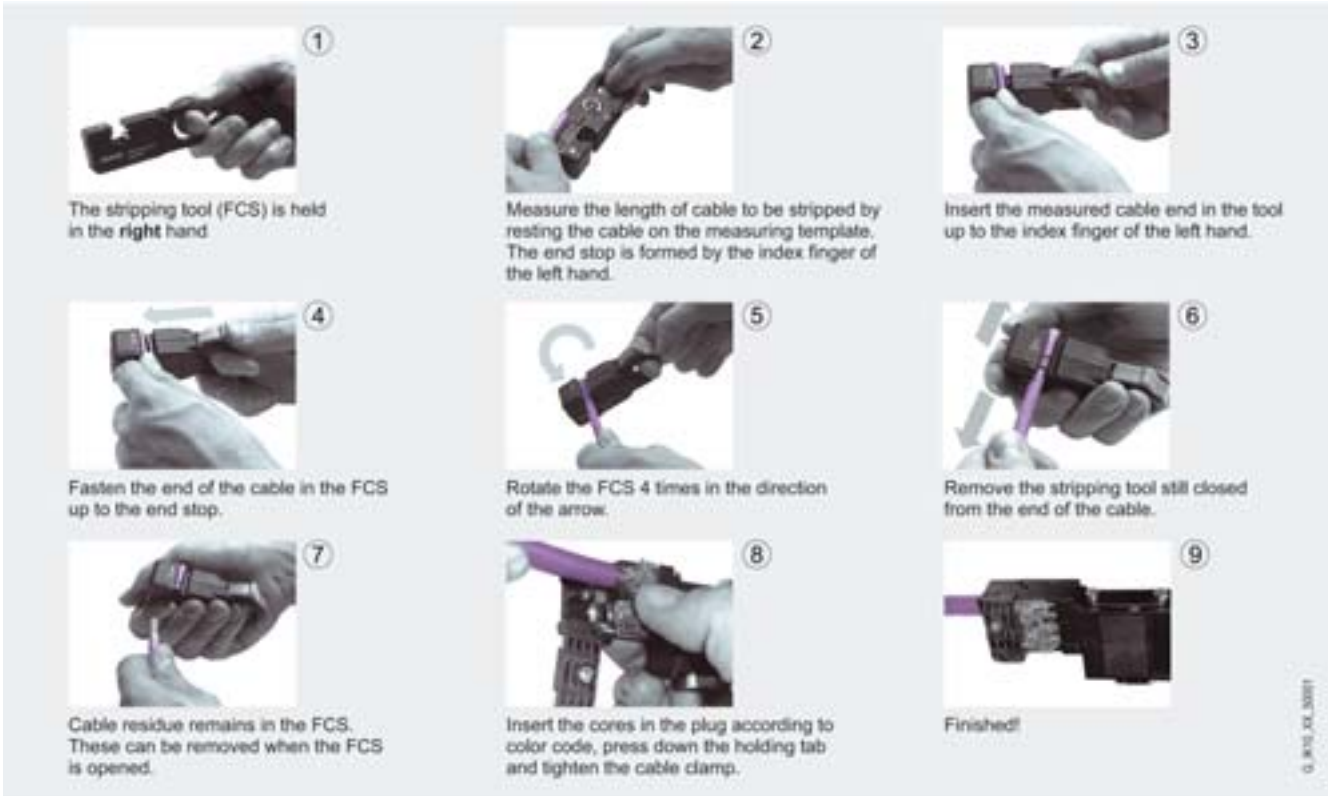
The FastConnect stripping method enables fast and easy connection of PROFIBUS connectors to the PROFIBUS cables.

The special structure of the FastConnect bus cables enables the use of the FastConnect stripping tool with which the outer casing and the woven shield can be stripped in one operation with perfect precision. The cable prepared in this way is connected in the FastConnect bus connector using the insulation displacement method.

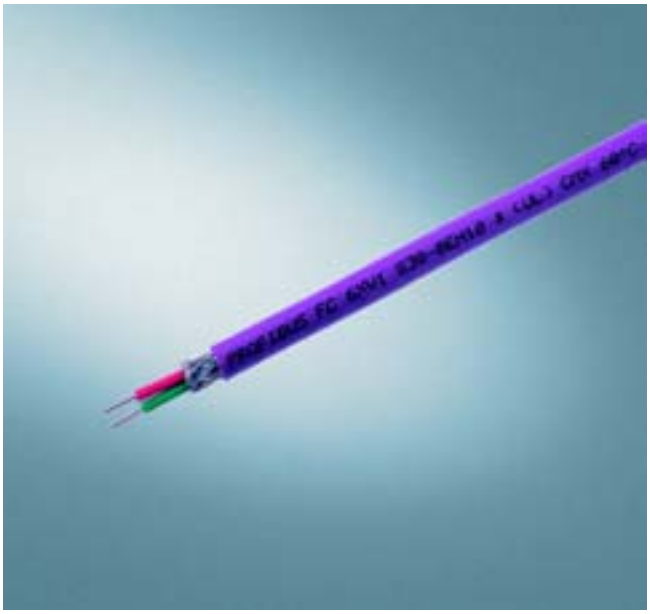
## PROFIBUS FastConnect

### Application

PROFIBUS FastConnect is a system for quick and easy assembly of copper PROFIBUS cables.



## Overview



- Different variants for different fields of application (e.g. underground cables, trailing cables)
- High interference immunity thanks to double shielding
- Flame-retardant bus cable (halogen-free)
- Easy length measurement thanks to printed meter markings
- Hybrid cable for the shared transmission of data and power supply

## Benefits

get Designed for Industry

- Wide range of applications due to special bus cables.
- Resistance of network to interference due to double shielded cables and integrated grounding concept.
- Time saved by simple and fast connector mounting with FastConnect cables
- One cable (ECOFAST hybrid cable) for common transmission of data and power supply
- Silicone-free, thus particularly suitable for use in the automotive industry (e.g. spraying lines)

## Application

Different types of cables are available for the different application options for configuring PROFIBUS networks. Generally, the cables listed should be used. For further details on network configuration, refer to the PROFIBUS network manual. The ECOFAST hybrid cable is particularly suitable for connecting locally installed ECOFAST components.

### *UL approvals*

Different cable variants with the appropriate UL approvals for installation in cable bundles and cable racks, according to the NEC guidelines (National Electrical Code) Article 800/725.

## Design

Shielded, twisted-pair cable with circular cross-section

The following applies for all PROFIBUS bus cables:

- The double shield makes it especially suitable for routing through industrial areas with strong electro-magnetic fields
- System-wide grounding concept can be implemented using the external shield of the bus cable and the grounding terminals on the bus terminal
- Printed meter marks

### Cable types

The shape of the new Fast Connect (FC) bus cables is radially symmetric which allows an insulation stripping tool to be used. This means that bus connectors can be assembled quickly and easily.

- PROFIBUS FC Standard Cable:
  Standard bus cable specially designed for fast installation.
- PROFIBUS FC Robust Cable:
  Special cable for use in corrosive atmospheres and under severe mechanical loading.
- PROFIBUS FC Food Cable:
  The PE casing of the cable makes this cable suitable for use in the food and tobacco industry.
- PROFIBUS FC Ground Cable:
  Special cable for laying underground. It differs from the PROFIBUS bus cable in that it has an additional sheath.
- PROFIBUS FC Trailing Cable:
  Bus cable specially designed for forced motion control in a trailing cable, e.g. with continuously moving machine parts (stranded core).
- PROFIBUS FC FRNC Cable:
  Two-core, shielded, flame-retardant, halogen-free bus cable with Copolymer outer sheath FRNC (Flame Retardant Non Corrosive).

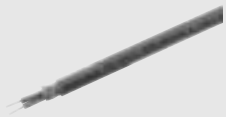
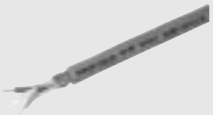
Bus cables without FastConnect technology (due to type of construction)

- PROFIBUS Festoon Cable:
  Flexible bus cable (stranded cores) specially designed for festoon suspension.
  For round cables, cable-carrying trolleys are recommended.
- PROFIBUS Flexible Cable
  Bus cable for highly flexible applications:
  Special cable (stranded cores) for use on moving parts of machines
  (5 mill. torsion movements on 1 m length of cable, ± 180 °).
- PROFIBUS ECOFAST
  Hybrid Cable
  Rugged hybrid cable, can be trailed, contains two copper cables for data transfer and four copper cables for supplying power to ECOFAST stations.
- SIENOPYR FR marine cable
  Halogen-free, non-crush, flame-retardant, marine-approved cable for permanent installation on ships and offshore platforms indoors and on open deck. Sold by the meter.

5

## PROFIBUS bus cables

### Technical specifications

| Cable type [1] | PROFIBUS FC Standard Cable | PROFIBUS FC Robust Cable | PROFIBUS FC Food Cable |
|---|---|---|---|
| |  |  |  |
| Applications | Universally implementable | In corrosive atmospheres and under severe mechanical stress | Food, beverages and tobacco industries |
| Attenuation | | | |
| • at 16 MHz | < 42 dB/km | < 42 dB/km | < 42 dB/km |
| • at 4 MHz | < 22 dB/km | < 22 dB/km | < 22 dB/km |
| • at 9.6 kHz | < 2.5 dB/km | < 2.5 dB/km | < 2.5 dB/km |
| Characteristic impedance | | | |
| • at 9.6 kHz | 270 ± 27 Ω | 270 ± 27 Ω | 270 ± 27 Ω |
| • at 38.4 kHz | 185 ± 18.5 Ω | 185 ± 18.5 Ω | 185 ± 18.5 Ω |
| • at 3 to 20 MHz | 150 ± 15 Ω | 150 ± 15 Ω | 150 ± 15 Ω |
| Rated value | 150 Ω | 150 Ω | 150 Ω |
| Loop resistance | ≤ 110 Ω/km | ≤ 110 Ω/km | ≤ 110 Ω/km |
| Shield resistance | ≤ 9.5 Ω/km | ≤ 9.5 Ω/km | ≤ 9.5 Ω/km |
| Effective capacitance at 1 kHz | approx. 28.5 nF/km | approx. 28.5 nF/km | approx. 28.5 nF/km |
| Operating voltage (rms value) | ≤ 100 V | ≤ 100 V | ≤ 100 V |
| Cable type (standard designation) | 02YSY (ST) CY 1 × 2 × 0.64/2.55-150 KF 40 FR VI | 02YSY (ST) CY 1 × 2 × 0.64/2.55-150 KF 40 FR VI | 02YSY (ST) CY 1 × 2 × 0.64/2.55-150 KF 40 FR VI |
| Sheath | | | |
| • Material | PVC | PUR | PE |
| • Diameter | 8.0 ± 0.4 mm | 8.0 ± 0.4 mm | 8.0 ± 0.4 mm |
| • Color | Violet | Violet | Black |
| Perm. ambient conditions | | | |
| • Operating temperature | –40 °C to +60 °C | –40 °C to +60 °C | –40 °C to +60 °C |
| • Transport/storage temperature | –40 °C to +60 °C | –40 °C to +60 °C | –40 °C to +60 °C |
| • Installation temperature | –40 °C to +60 °C | –40 °C to +60 °C | –40 °C to +60 °C |
| Bending radii | | | |
| • Single bend | ≥ 75 mm | ≥ 75 mm | ≥ 75 mm |
| • Multiple bends | ≥ 150 mm | ≥ 150 mm | ≥ 150 mm |
| Permissible tensile force | 100 N | 100 N | 100 N |
| Weight | 76 kg/km | 73 kg/km | 67 kg/km |
| Halogen-free | No | No | No |
| Behavior in fire | Flame-retardant to VDE 0482-266-2-4, IEC 60332-3-24 | Flame-retardant to VDE 0482-265-2-1, IEC 60332-1 | Inflammable |
| UL listing / 300 V rating | Yes / CM/CMG/PLTC/Sun Res | Yes / CMX | No |
| UL style / 600 V rating | Yes | No | No |
| Resistance to mineral oils and grease | Limited resistance | Highly resistant | Limited resistance |
| UV-resistant | Yes | Yes | Yes |
| No silicone | Yes | Yes | Yes |
| FastConnect cable installation | Yes | Yes | Yes |

1) Electrical characteristics at 20 °C, tests according to DIN 47 250 Part 4 or DIN VDE 0472

## Technical specifications (continued)

| Cable type [1] | PROFIBUS FC Ground Cable | PROFIBUS FC Trailing Cable [2] [3] | PROFIBUS Festoon Cable [3] |
|---|---|---|---|
| |  |  |  |
| Applications | Underground laying | Trailing cables | Festoon suspension |
| Attenuation | | | |
| • at 16 MHz | < 42 dB/km | < 49 dB/km | < 49 dB/km |
| • at 4 MHz | < 22 dB/km | < 25 dB/km | < 25 dB/km |
| • at 9.6 kHz | < 2.5 dB/km | < 3 dB/km | < 3 dB/km |
| Characteristic impedance | | | |
| • at 9.6 kHz | 270 ± 27 Ω | 270 ± 27 Ω | 270 ± 27 Ω |
| • at 38.4 kHz | 185 ± 18.5 Ω | 185 ± 18.5 Ω | 185 ± 18.5 Ω |
| • at 3 to 20 MHz | 150 ± 15 Ω | 150 ± 15 Ω | 150 ± 15 Ω |
| Rated value | 150 Ω | 150 Ω | 150 Ω |
| Loop resistance | ≤ 110 Ω/km | ≤ 133 Ω/km | ≤ 133 Ω/km |
| Shield resistance | ≤ 9.5 Ω/km | ≤ 14 Ω/km | ≤ 19 Ω/km |
| Effective capacitance at 1 kHz | approx. 28.5 nF/km | approx. 28.5 nF/km | approx. 28 nF/km |
| Operating voltage (rms value) | ≤ 100 V | ≤ 100 V | ≤ 100 V |
| Cable type (standard designation) | 02YSY (ST) CY2Y<br>1 x 2 x 0.64/2.55-150 KF 40 SW | 02YY (ST) C11Y<br>1 x 2 x 0.64/2.55-150 LI KF 40 FR petrol | 02Y (ST) CY<br>1 x 2 x 0.65/2.56-150 LI petrol FR |
| Sheath | | | |
| • Material | PE/PVC | PUR | PVC |
| • Diameter | 10.8 ± 0.5 mm [4] | 8.0 ± 0.4 mm | 8.0 ± 0.3 mm |
| • Color | Black | Petrol | Petrol |
| Perm. ambient conditions | | | |
| • Operating temperature | –40 °C to +60 °C | –40 °C to +60 °C | –40 °C to +80 °C |
| • Transport/storage temperature | –40 °C to +60 °C | –40 °C to +60 °C | –40 °C to +80 °C |
| • Installation temperature | –40 °C to +60 °C | –40 °C to +60 °C | –40 °C to +80 °C |
| Bending radii | | | |
| • Single bend | ≥ 80 mm | ≥ 40 mm | ≥ 30 mm |
| • Multiple bends | ≥ 150 mm | ≥ 60 mm | ≥ 70 mm |
| Permissible tensile force | 100 N | 100 N | 80 N |
| Weight | 117 kg/km | 74 kg/km | 56 kg/km |
| Halogen-free | No | No | No |
| Behavior in fire | Inflammable | Flame-retardant to VDE 0482-265-2-1, IEC 60332-1 | Flame-retardant to VDE 0482-265-2-1, IEC 60332-1 |
| UL listing / 300 V rating | No | Yes / CMX | Yes/ CM/CMG/PLCT/ Sun Res/Oil Res |
| UL style / 600 V rating | No | No | Yes |
| Resistance to mineral oils and grease | Limited resistance | Highly resistant | Limited resistance |
| UV-resistant | Yes | Yes | Yes |
| No silicone | Yes | Yes | Yes |
| FastConnect cable installation | Yes | Yes | No |

1) Electrical characteristics at 20 °C, tests according to DIN 47 250 Part 4 or DIN VDE 0472

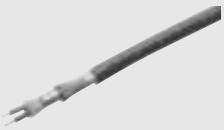
2) Trailing cables for the following requirements: Min. 3 million bending cycles for the specified bending radius and an acceleration of max. 4 m/s2

3) Limited segment length (see manual for PROFIBUS networks)

4) Outer diameter >8 mm; bus connectors can only be connected after the outer sheath has been stripped

## PROFIBUS bus cables

### Technical specifications (continued)

| Cable type [1] | PROFIBUS FC FRNC Cable | PROFIBUS Flexible Cable [2] [3] | SIENOPYR FR shipboard cable [6] |
|---|---|---|---|
| |  |  |  |
| Applications | Halogen-free and flame-retardant applications | Moving machine parts | Shipbuilding |
| Attenuation | | | |
| • at 16 MHz | < 42 dB/km | < 82 dB/km | < 45 dB/km |
| • at 4 MHz | < 22 dB/km | < 28 dB/km | < 22 dB/km |
| • 38.4 kHz | | | < 5 dB/km |
| • at 9.6 kHz | < 2.5 dB/km | < 2.5 dB/km | < 3 dB/km |
| Characteristic impedance | | | |
| • at 9.6 kHz | 270 ± 27 Ω | 270 ± 27 Ω | 250 ± 25 Ω |
| • at 38.4 kHz | 185 ± 18.5 Ω | 185 ± 18.5 Ω | 185 ± 18.5 Ω |
| • at 3 to 20 MHz | 150 ± 15 Ω | 150 ± 15 Ω | 150 ± 15 Ω |
| Rated value | 150 Ω | 150 Ω | 150 Ω |
| Loop resistance | ≤ 110 Ω/km | ≤ 98 Ω/km | ≤ 110 Ω/km |
| Shield resistance | ≤ 9.5 Ω/km | ≤ 14 Ω/km | – |
| Effective capacitance at 1 kHz | approx. 29 nF/km | approx. 29 nF/km | approx. 30 nF/km [4] |
| Operating voltage (rms value) | ≤ 100 V | ≤ 100 V | ≤ 100 V |
| Cable type (standard designation) | 02Y (ST) C 11YH<br>1 x 2 x 0.64/2.55-150 VI KF 25 FRNC | 02Y (ST) C 11Y<br>1 x 2 x 0.65/2.56-150 LI FR VI | M-02Y (ST) CH X<br>1 x 2 x 0.35 100 V |
| Sheath | | | |
| • Material | FRNC | PUR | Polymer [5] |
| • Diameter | 8.0 ± 0.4 mm | 8.0 ± 0.4 mm | 10.3 ± 0.5 mm |
| • Color | Light violet | Violet | Black |
| Perm. ambient conditions | | | |
| • Operating temperature | –25 °C to +80 °C | –40 °C to +60 °C | –40 °C to +80 °C |
| • Transport/storage temperature | –25 °C to +80 °C | –40 °C to +60 °C | –40 °C to +80 °C |
| • Installation temperature | –25 °C to +80 °C | –40 °C to +60 °C | –10 °C to +50 °C |
| Bending radii | | | |
| • Single bend | ≥ 40 mm | ≥ 60 mm | ≥ 108 mm |
| • Multiple bends | ≥ 75 mm | ≥ 120 mm | ≥ 216 mm |
| Permissible tensile force | 100 N | 100 N | 100 N |
| Weight | 67 kg/km | 65 kg/km | Approx. 109 kg/km |
| Halogen-free | Yes | No | Yes |
| Behavior in fire | Flame-retardant to VDE 0482-266-2-4, IEC 60332-3-24 | Flame-retardant to VDE 0482-265-2-1, IEC 60332-1 | Flame-retardant to VDE 0482-266-2-4, IEC 60332-3-24 |
| UL listing / 300 V rating | Yes/ CM / PLTC / Sun Res | Yes / CMX | No |
| UL style / 600 V rating | No | No | No |
| Resistance to mineral oils and grease | Limited resistance | Highly resistant | Extremely highly resistant |
| UV-resistant | Yes | Yes | Yes |
| No silicone | Yes | Yes | Yes |
| FastConnect cable installation | Yes | No | No |

1) Electrical characteristics at 20 °C, tests according to DIN 47 250 Part 4 or DIN VDE 0472
2) Limited segment length (see manual for PROFIBUS networks)
3) Torsion-resistant cables for the following requirements: Min. 5 million torsional movements along 1 m length of cable ±180°
4) At 800 Hz
5) Outer diameter >8 mm; bus connectors can only be connected after the outer sheath has been stripped
6) Marine approvals: Lloyds Register of Shipping, Germanischer Lloyd

## Technical specifications (continued)

| Cable type [1] | PROFIBUS cable for ET 200X | Energy Cable |
|---|---|---|
| |  |  |
| Applications | ET 200X | ET 200eco |
| Attenuation | | |
| • at 16 MHz | – | – |
| • at 4 MHz | – | – |
| • at 9.6 kHz | – | – |
| Characteristic impedance | | |
| • at 9.6 kHz | – | – |
| • at 38.4 kHz | – | – |
| • at 3 to 20 MHz | 135 – 165 Ω | – |
| Rated value | – | – |
| Loop resistance | – | – |
| Shield resistance | – | – |
| Effective capacitance at 1 kHz | 30 pF/m | – |
| Operating voltage (rms value) | 35 V | 600 V |
| Power cores (stranded) diameter | 0.75 $mm^2$ | 1.5 $mm^2$ |
| • Current carrying capability of the power cores | | 12 A |
| • Sheath color | – | Black |
| Cable type (standard designation) | 02Y (ST)C 1 x 2 x 0.65/2.56 –150 LI<br>LIY-J Y 3 x 1 x 0.75 VI KF30 | L-Y11Y-JZ 5x1x1.5 GR |
| Sheath | | |
| • Material | PUR | PUR |
| • Diameter | Approx. 9.5 mm | 10.5 + 0.5 –0.3 |
| • Color | Petrol | Gray |
| Perm. ambient conditions | | |
| • Operating temperature | –30 °C to +60 °C | –40°C to +90°C |
| • Transport/storage temperature | –40 °C to +60 °C | –40°C to +90°C |
| • Installation temperature | –40 °C to +60 °C | –40°C to +90°C |
| Bending radii | | |
| • Single bend | 35 mm | 26 mm |
| • Multiple bends | 75 mm | 63 mm |
| Permissible tensile force | ≥ 300 N | ≤ 500 N |
| Weight | Approx. 105 kg/km | Approx. 149 kg/km |
| Halogen-free | No | No |
| Behavior in fire | Flame-retardant<br>acc. to IEC 60332-2-1 | Flame-retardant<br>to VDE 0482-265-2-1, IEC 60332-2-1 |
| UL listing / 300 V rating | Yes | No |
| UL style / 600 V rating | No | Yes |
| Resistance to mineral oils and grease | Limited | Limited |
| UV-resistant | No | Yes |
| No silicone | Yes | Yes |
| FastConnect cable installation | No | No |

1) Electrical characteristics at 20 °C, tests according to DIN 47 250 Part 4 or DIN VDE 0472

## PROFIBUS bus cables

| Ordering data | Order No. |
|---|---|
| **Bus cables for PROFIBUS:** | |
| **PROFIBUS FC Standard Cable**<br>Standard type with special attachment for fast installation, 2-core, shielded, sold by the meter; max. quantity 1,000 m; minimum order 20 m | **6XV1 830-0EH10** |
| **Preferred lengths** | |
| • 20 m | **6XV1 830-0EN20** |
| • 50 m | **6XV1 830-0EN50** |
| • 100 m | **6XV1 830-0ET10** |
| • 200 m | **6XV1 830-0ET20** |
| • 500 m | **6XV1 830-0ET50** |
| **PROFIBUS FC Robust Cable**<br>2-core shielded, sold by the meter: max. quantity 1,000 m; minimum order 20 m | **6XV1 830-0JH10** |
| **PROFIBUS FC Food Cable**<br>2-core shielded, sold by the meter: max. quantity 1,000 m; minimum order 20 m | **6XV1 830-0GH10** |
| **PROFIBUS FC Ground Cable**<br>2-core shielded, sold by the meter: max. quantity 1,000 m; minimum order 20 m | **6XV1 830-3FH10** |
| **PROFIBUS FC Trailing Cable**<br>2-core shielded, sold by the meter: max. quantity 1,000 m; minimum order 20 m | **6XV1 830-3EH10** |
| **PROFIBUS FastConnect Stripping Tool**<br>Preadjusted stripping tool for fast stripping of PROFIBUS FastConnect bus cables | **6GK1 905-6AA00** |
| **PROFIBUS FastConnect Blade Cassettes**<br>Spare blade cassettes for PROFIBUS FastConnect stripping tool, 5 units | **6GK1 905-6AB00** |

| | Order No. |
|---|---|
| **PROFIBUS FastConnect bus connector RS 485 with 90° cable outlet**<br>Insulation displacement | |
| • Without PG interface | **6ES7 972-0BA50-0XA0** |
| • with PG interface | **6ES7 972-0BB50-0XA0** |
| **PROFIBUS FastConnect bus connector RS 485 Plug 180**<br>With 180° cable outlet, insulation displacement | **6GK1 500-0FC00** |
| **PROFIBUS Festoon Cable**<br>2-core shielded, sold by the meter: max. quantity 1,000 m; minimum order 20 m | **6XV1 830-3GH10** |
| **PROFIBUS FC FRNC Cable**<br>2-core, shielded, nonflammable, with copolymer outer sheath FRNC, sold by the meter: max. quantity 1,000 m; minimum order 20 m | **6XV1 830-0LH10** |
| **PROFIBUS Flexible Cable**<br>2-core shielded, sold by the meter: max. quantity 1,000 m; minimum order 20 m | **6XV1 830-0PH10** |
| **PROFIBUS cable for ET 200X** | |
| • 5-core, sold by the meter, for bus signals, power supply: oil-resistant, partially weld-resistant, can be trailed, PUR material, minimum order quantity 10 m | **6ES7 194-1LY10-0AA0**<br>Length (specify in m) |
| • 5-core, sold by the meter, for bus signals, power supply: Standard, PVC material | **6ES7 194-1LY00-0AA0-Z,**<br>Z = length (specify in m) |
| **Energy Cable for ET200eco**<br>Trailing cable with 5 copper cores (1.5 $mm^2$); sold by the meter; max. quantity 1000 m, minimum order 20 m | **6XV1 830-8AH10** |

## Ordering data

| Ordering data | Order No. |
|---|---|
| **Special bus cables** | |
| **SIENOPYR PROFIBUS shipboard cable**<br>Fiber-optic cable for installation onboard ships and on offshore platforms, sold by the meter, max. quantity 1000 m, minimum order 20 m | **6XV1 830-0MH10** |
| **Manual for PROFIBUS networks** [1]<br>Network architecture, project management, network components, mounting | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **Lightning protection modules for reliable transmission between buildings with overvoltage protection** [2] | |
| • Basic protection | |
| - Basic section | **919506** |
| - Protection module Type B | **919510** |
| - Protective housing | **906055** |
| - Terminal element | **919508** |
| • Low-voltage protection | |
| - Basic section | **919506** |
| - Protection module | **919570** |
| - Terminal element | **919508** |
| **SIMATIC NET Manual Collection**<br>Electronic manuals for communication systems, communication protocols and communication products<br>on CD-ROM German/English | **6GK1 975-1AA00-3AA0** |

1) Additional language variants and manuals can be found with the various products under: http:// www.siemens.de/automation/csi/net

2) Can be ordered from:
DEHN & Söhne
Hans-Dehn-Str.1
92318 Neumarkt/Opf, Germany

## More information

### Installation instructions

The bus cables are supplied by the meter. If a bus segment must be assembled using two sections (e.g. > 1000 m segment length), bushings can be used for this purpose (low-impedance connection between cores with clamps, connect shields over a wide area).

*FastConnect*

The FastConnect stripping tool can be used to strip the outer sheath and shield of the new FastConnect bus cables to the right length in one step.
In this way, the bus connectors (except 6ES7 972-0BA30-0XA0) can be connected easily and quickly to the bus cable.

*Cable routing:*

During storage, transport and cable laying, keep both ends sealed with a shrink-on cap.

Comply with the permissible bending radii and tensile load!

An underground cable must be used if cables are laid outside buildings e.g. directly in the ground, in sand or in concrete building blocks or when routed through protective pipes made of steel or plastic above or below ground.

Comply with overvoltage protection guidelines for underground laying.

Note:
Additional components of the SIMATIC NET wiring range can be ordered from your local contact person.
For technical advice contact:
J. Hertlein, A&D SE PS
Tel.: +49 (0) 911/750 44 65
Fax.: +49 (0) 911/750 99 91
E-mail: juergen.hertlein@siemens.com

5

## ECOFAST bus cables

### Overview


In the ECOFAST system, all operational devices are connected to PROFIBUS DP using the bus cables.

The bus cables are implemented as hybrid cables and contain:

- PROFIBUS DP, either in fiber-optic or copper RS 485;
- Four additional copper cores for carrying 24 V DC:
  - 24 V DC, not switched (for electronics and inputs)
  - 24 V DC, switched (for outputs, disconnectable e.g. for EMERGENCY OFF)

The ECOFAST hybrid cables are sold by the meter or in fixed lengths preassembled with ECOFAST connector (Han Brid) and socket.

### Benefits

get Designed for Industry

- The standardized, distributed design to a high degree of protection (IP65) results in savings in
  - Configuration,
  - Wiring,
  - Mounting,
  - Commissioning and
  - During operation.
- Using ECOFAST, the duration of the tender, planning and project engineering phases for machines and plants can be shortened:
  - Modular planning of machines and plants.
  - Creation of tenders by combining previously created modules.
  - Faster assembly and installation.
  - Cabinetless design to a high degree of protection.
  - Use of pre-assembled and tested functional units.
  - Faster installation on site.
  - Smaller floor-space requirements in the plant.
- ECOFAST supports the fast, problem-free start-up of an automation and drive system:
  - Minimization of error sources thanks to standardized interfaces and connectors.
  - Comprehensive diagnostics at the device and over the bus.
  - Enhanced EMC due to direct coupling of the contact unit and drive.
- ECOFAST enhances the availability of the plant:
  - Downtimes are reduced thanks to fast and safe replacement of devices.
  - The power bus and fieldbus are not interrupted when devices are replaced.
  - Devices are automatically parameterized following replacement.
  - Comprehensive status and diagnostic information.
  - Transfer of operating parameters (e.g. current levels or status messages).

## Technical specifications

| Cable type [1] | PROFIBUS ECOFAST Hybrid Cable [1)2)] |
|---|---|
| |  |
| Applications | Connection for ECOFAST stations |
| Attenuation | |
| • at 16 MHz | < 49 dB/km |
| • at 4 MHz | < 25 dB/km |
| • at 9:6 kHz | < 3 dB/km |
| Characteristic impedance | |
| • at 9:6 kHz | 270 ± 27 Ω |
| • at 38.4 kHz | 185 ± 18.5 Ω |
| • at 3 to 20 MHz | 150 ± 15 Ω |
| Rated value | ≤ 150 Ω |
| Loop resistance | ≤ 138 Ω/km |
| Shield resistance | ≤ 15 Ω/km |
| Effective capacitance at 1 kHz | 30 pF/m |
| Operating voltage (rms value) | 100 V |
| Power cores (stranded) diameter | 1.5 mm$^2$ |
| • Current carrying capability of the power cores | 12 A |
| • Sheath color | Black |
| Cable type (standard designation) | |
| • ECOFAST Hybrid Cable | 02Y (ST)C 1 x 2 x 0.65/2.56 - 150 LI<br>LIH-Z 11Y 4 x 1 x 1.5 VI FRNC |
| • ECOFAST Hybrid Cable GP | 02Y (ST)C 1 x 2 x 0.65/2.56 –150 LI<br>LIY-Z Y 4 x 1 x 1.5 VI |

| | |
|---|---|
| Sheath | |
| • Material | |
| - ECOFAST Hybrid Cable | PUR |
| - ECOFAST Hybrid Cable GP | PVC |
| • Diameter | Approx. 11 mm |
| • Color | Violet |
| Perm. ambient conditions | |
| • Operating temperature | –40 °C to +60 °C |
| • Transport/storage temperature | –40 °C to +60 °C |
| • Installation temperature | –40 °C to +60 °C |
| Bending radii | |
| • Single bend | 38 mm |
| • Multiple bends | 55 mm |
| Permissible tensile force | ≤ 300 N |
| Weight | Approx. 154 kg/km |
| Halogen-free | Yes |
| Behavior in fire | Flame-retardant to VDE 0482-265-2-1, IEC 60332-2-1 |
| UL listing / 300 V rating | |
| • ECOFAST Hybrid Cable | No |
| • ECOFAST Hybrid Cable GP | CM/PLTC/Sun Res/Oil Res |
| UL style / 600 V rating | |
| • ECOFAST Hybrid Cable | No |
| • ECOFAST Hybrid Cable GP | Yes |
| Resistance to mineral oils and grease | Limited |
| UV-resistant | |
| • ECOFAST Hybrid Cable | No |
| • ECOFAST Hybrid Cable GP | Yes |
| Silicone-free | Yes |
| FastConnect cable installation | No |

1) Electrical characteristics at 20 °C, tests according to DIN 47 250 Part 4 or DIN VDE 0472

2) Trailing cable for the following requirements:
ECOFAST Hybrid Cable: min. 9 million bending cycles for the specified bending radius and an acceleration of max. 5 m/s$^2$;
ECOFAST Hybrid Cable GP: Min. 2 million bending cycles for the specified bending radius and an acceleration of max. 2.5 m/s$^2$

## ECOFAST bus cables

| Ordering data | Order No. |
|---|---|
| **PROFIBUS ECOFAST Hybrid Cable – FOC** Trailing cable (PUR sheath) with two plastic fiber-optic cables for PROFIBUS DP and four copper cores of 1.5 mm$^2$ cross-section (in compliance with DESINA); | |
| • Pre-assembled with ECOFAST male and female connectors | |
| - 1.5 m | **6XV1 830-6DH15** |
| - 3 m | **6XV1 830-6DH30** |
| - 5 m | **6XV1 830-6DH50** |
| - 10 m | **6XV1 830-6DN10** |
| - 15 m | **6XV1 830-6DN15** |
| • Non-assembled cable | |
| - Sold by the meter | **6XV1 830-6CH10** |
| - 20 m | **6XV1 830-6CN20** |
| - 50 m | **6XV1 830-6CN50** |
| - 100 m | **6XV1 830-6CT10** |
| **PROFIBUS ECOFAST Hybrid Cable – Cu** Trailing cable (PUR sheath) with two shielded copper cables for PROFIBUS DP and four copper cores of 1.5 mm$^2$ cross-section | |
| • Pre-assembled with ECOFAST male and female connector, fixed length | |
| - 0.5 m | **6XV1 830-7BH05** |
| - 1.0 m | **6XV1 830-7BH10** |
| - 1.5 m | **6XV1 830-7BH15** |
| - 3 m | **6XV1 830-7BH30** |
| - 5 m | **6XV1 830-7BH50** |
| - 10 m | **6XV1 830-7BN10** |
| - 15 m | **6XV1 830-7BN15** |
| - 20 m | **6XV1 830-7BN20** |
| - 25 m | **6XV1 830-7BN25** |
| - 30 m | **6XV1 830-7BN30** |
| - 35 m | **6XV1 830-7BN35** |
| - 40 m | **6XV1 830-7BN40** |
| - 45 m | **6XV1 830-7BN45** |
| - 50 m | **6XV1 830-7BN50** |
| • Pre-assembled with two ECOFAST male connectors, variable length [1] | |
| • Non-assembled cable | |
| - Sold by the meter | **6XV1 830-7AH10** |
| - 20 m | **6XV1 830-7AN20** |
| - 50 m | **6XV1 830-7AN50** |
| - 100 m | **6XV1 830-7AT10** |

| | Order No. |
|---|---|
| **PROFIBUS ECOFAST Hybrid Cable GP**; cable suitable for trailing with 4 x Cu and 2 x Cu, shielded with UL approval | |
| • Sold by the meter; max. length supplied 1000 m | **6XV1 860-2P** |
| • Non-assembled cable | |
| - 20 m | **6XV1 860-4PN20** |
| - 50 m | **6XV1 860-4PN50** |
| - 100 m | **6XV1 860-4PT10** |
| • Pre-assembled with 2 ECOFAST male connectors | |
| - 0.5 m | **6XV1 860-3PH05** |
| - 1 m | **6XV1 860-3PH10** |
| - 1.5 m | **6XV1 860-3PH15** |
| - 3 m | **6XV1 860-3PH30** |
| - 5 m | **6XV1 860-3PH50** |
| - 10 m | **6XV1 860-3PN10** |
| - 15 m | **6XV1 860-3PN15** |
| - 20 m | **6XV1 860-3PN20** |
| - 25 m | **6XV1 860-3PN25** |
| - 30 m | **6XV1 860-3PN30** |
| - 35 m | **6XV1 860-3PN35** |
| - 40 m | **6XV1 860-3PN40** |
| - 45 m | **6XV1 860-3PN45** |
| - 50 m | **6XV1 860-3PN50** |

1) You can order components supplementary to the SIMATIC NET cabling range from your local contact. For technical support, please contact:
J. Hertlein, A&D SE PS
Telephone: +49 (0) 911 / 750 44 65
Fax: +49 (0) 911 / 750 99 91
E-mail: juergen.hertlein@siemens.com

| Ordering data | Order No. |
|---|---|
| ***Additional components*** | |
| **Crimping tool** | |
| • for Hanbrid Cu | **6GK1 905-6BA00** |
| • for Hanbrid FOC | **6GK1 905-6BB00** |
| **PROFIBUS connector FOC** | |
| with 2 x plastic FOC and 4 x Cu 1.5 $mm^2$; type of contacts: POF, Han D for 24 V; tool: crimping tool, polishing set | |
| • with male pins | **6GK1 905-0BA00** |
| • with female pins | **6GK1 905-0BB00** |
| **PROFIBUS connector Cu** | |
| with 2 x Cu shielded and 4 x Cu 1.5 $mm^2$; type of contacts: POF, Han D for 24 V; tool: crimping tool, polishing set | |
| • with male pins | **6GK1 905-0CA00** |
| • with female pins | **6GK1 905-0CB00** |

| | Order No. |
|---|---|
| **PROFIBUS ECOFAST Hybrid Plug angled;** | |
| with 2 x Cu shielded and 4 x Cu 1.5 $mm^2$; 5 units; with installation instructions | |
| • Male pins | **6GK1 905-0CC00** |
| • Female pins; | **6GK1 905-0CD00** |
| **ECOFAST Terminating Plug** | |
| Bus termination plug-in connector for PROFIBUS DP; with 2 x Cu and 4 x Cu 1.5 $mm^2$; male pins, integrated termination resistors | |
| • Pack of 1 | **6GK1 905-0DA10** |
| • Pack of 5 | **6GK1 905-0DA00** |
| **Data T piece** | |
| For 2 x 24 V auxiliary voltage (switched and non-switched) and PROFIBUS DP | |
| • for Cu RS 485 | **3RK1 911-2AG00** |
| • for FOC | **3RK1 911-2AH00** |
| **Addressing plug** | |
| For setting the PROFIBUS DP addresses | **6ES7 194-1KB00-0XA0** |

# RS 485 bus connectors

## Overview

- This is used to connect PROFIBUS stations to the PROFIBUS bus cable
- Easy installation
- The insulation piercing method of the FastConnect connectors reduces installation time considerably
- Integrated matching resistors (not for 6ES7 972-0BA30-0XA0)
- Connection of PG using a special bus connector is possible without the need to install network nodes.

## Application

The RS 485 bus connector for PROFIBUS is used to connect to a PROFIBUS station or a PROFIBUS network component to the bus cable for PROFIBUS.

## Design

Different versions of the bus connector, optimized for the connected devices, are available:

- Bus connectors with axial cable outlet (180 °C) e.g. for PCs and SIMATIC HMI® OPs, for transmission rates up to 12 Mbit/s with integrated bus terminating resistor
- Bus connector with vertical cable outlet (90 °C)

This connector enables a vertical cable outlet (with and without PG interface) for transmission rates up to 12 Mbit/s with integrated bus terminating resistor. With transmission rates of 3, 6 or 12 Mbit/s, the SIMATIC S5/S7 connecting cable is required for the connection between the bus connector with additional PG interface and a programming device.

- Bus connector with 30° cable outlet (low-cost version) without PG interface for transmission rates up to 1.5 Mbit/s and without integrated bus terminating resistor.
- PROFIBUS FastConnect RS 485 bus connector (90° or 180° cable outlet) with transmission rates up to 12 Mbit/s for fast, easy mounting with insulation displacement method (for rigid and flexible wires).

## Function

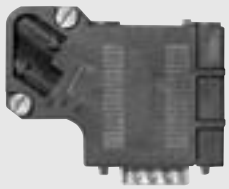
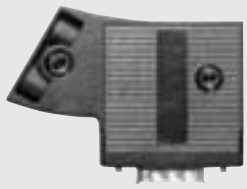
The bus connector is plugged directly to the PROFIBUS interface (9-pin Sub-D connector) of the PROFIBUS node or a PROFIBUS network component.

The incoming and outgoing PROFIBUS bus cable is connected through four terminals in the connector.

The line termination integrated in the bus connector can be connected through an externally accessible switch (not with 6ES7 972-0BA30-0XA0). Here, incoming and outgoing bus cables are separated in the connector (isolating function).

This is mandatory at both ends of a PROFIBUS segment.

## Technical specifications

| Bus connector | 6ES7 972-0BA12-0XA0<br>6ES7 972-0BB12-0XA0 | 6ES7 972-0BA41-0XA0<br>6ES7 972-0BB41-0XA0 | 6ES7 972-0BA30-0XA0 [1] |
|---|---|---|---|
| |  |  |  |
| Cable outlet | **90°** cable outlet | **35**° cable outlet | **30**° cable outlet |
| Data transmission rate | 9.6 kbit/s...12 Mbit/s | 9.6 kbit/s...12 Mbit/s | 9.6 kbit/s...1500 kbit/s |
| Terminating resistance | Integral resistor combination and isolator function that can be selected using a slide switch: When the resistor is connected, the outgoing bus is disconnected | Integral resistor combination and isolator function that can be selected using a slide switch: When the resistor is connected, the outgoing bus is disconnected | No terminating resistance, **cannot be used for first and last device in the bus segment** |
| Interfaces | | | |
| • PROFIBUS nodes | 9-pin Sub-D socket | 9-pin Sub-D socket | 9-pin Sub-D socket |
| • PROFIBUS bus cable | 4 terminal blocks for wires of up to 1.5 $mm^2$ | 4 terminal blocks for wires of up to 1.5 $mm^2$ | 4 insulation-piercing terminals for wires of 0.644 ± 0.040 mm2 |
| FastConnect insulation-piercing method | No | No | Yes |
| Supply voltage (must come from terminal unit) | 4.75 V to 5.25 V DC | 4.75 V to 5.25 V DC | – |
| Current consumption | Max. 5 mA | Max. 5 mA | – |
| Perm. ambient conditions | | | |
| • Operating temperature | 0 °C to +60 °C | 0 °C to +60 °C | 0 °C to +60 °C |
| • Transport/storage temperature | –25 °C to +80 °C | –25 °C to +80 °C | –25 °C to +80 °C |
| • Relative humidity | Max. 75% at +25 °C | Max. 75% at +25 °C | Max. 75% at +25 °C |
| Construction | | | |
| • Dimensions (W x H x D) in mm | 15.8 x 54 x 34 | 16 x 54 x 38 | 15 x 58 x 34 |
| • Weight | Approx. 40 g | Approx. 40 g | Approx. 30 g |
| PG connection socket | **0BA12: No; 0BB12: Yes** | **0BA41: No; 0BB41: Yes** | **No** |
| Degree of protection | IP20 | IP20 | IP20 |
| UL listing | Yes | Yes | Yes |
| **Used in PLC** | | | |
| S7-200/S7-300/S7-400® | ■ [2] | ■ | ■ |
| C7-633 DP, C7-634 DP, C7-635, C7-636 | ■ | ■ | ■ |
| S5-115U to S5-155U | ■ | ■ | ■ |
| **I/O station** | | | |
| ET 200M/ET 200B/ET 200L/ET 200S | ■ | ■ | ■ |
| **Programming device** | | | |
| PG 720/720C/PG 740/PG 760 | | ■ | ■ |
| **Interface** | | | |
| IM 308-C | ■ | ■ | ■ |
| CP 5431 FMS/DP | ■ | ■ | ■ |
| CP 342-5 | ■ | ■ | |
| CP 343-5 | ■ | ■ | |
| CP 443-5 | ■ | ■ | |
| IM 467 | ■ | ■ | |
| CP 5511/CP 5512/CP 5611/ CP 5613/CP 5614 | ■ | ■ | |
| **SIMATIC OP** | | | |
| **OLM/OBT** | ■ | ■ | |
| **RS 485 repeater** | ■ | ■ | ■ |

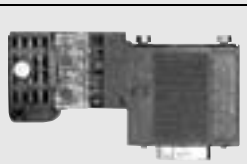
■ Suitable for application

1) Flexible bus cables cannot be used with this connector

2) S7-400: Not used with MPI/DP interface when DP interface is assigned; not used with 1FM1 interface when 1FM2 interface is assigned

## RS 485 bus connectors

### Technical specifications (continued)

| Bus connector | 6ES7 972-0BA50-0XA0<br>6ES7 972-0BB50-0XA0 | 6ES7 972-0BA60-0XA0<br>6ES7 972-0BB60-0XA0 | 6GK1 500-0FC00 | 6GK1 500-0EA02 |
|---|---|---|---|---|
| |  |  |  |  |
| Cable outlet | **90**° cable outlet | **35**° cable outlet | **180**° cable outlet | **180**° cable outlet |
| Data transmission rate | 9.6 kbit/s...12 Mbit/s | 9.6 kbit/s...12 Mbit/s | 9.6 kbit/s...12 Mbit/s | 9.6 kbit/s...12 Mbit/s |
| Terminating resistance | Integral resistor combination and isolator function that can be selected using a slide switch:<br>When the resistor is connected, the outgoing bus is disconnected Connection using insulation displacement method for FastConnect system | Integral resistor combination and isolator function that can be selected using a slide switch:<br>When the resistor is connected, the outgoing bus is disconnected Connection using insulation displacement method for FastConnect system | Integral resistor combination and isolator function that can be selected using a slide switch:<br>If the resistor is connected, the outgoing bus is disconnected.<br>Connection with insulation-piercing/clamp method for FastConnect system | Integral resistor combination and isolator function that can be selected using a slide switch:<br>When the resistor is connected, the outgoing bus is disconnected |
| Interfaces | | | | |
| • PROFIBUS nodes | 9-pin Sub-D socket | 9-pin Sub-D socket | 9-pin Sub-D socket | 9-pin Sub-D socket |
| • PROFIBUS bus cable | 4 insulation-piercing terminals for all FastConnect PROFIBUS cables (except for FC Process Cable) | 4 insulation-piercing terminals for all FastConnect PROFIBUS cables (except for FC Process Cable) | 4 insulation-piercing terminals for all FastConnect PROFIBUS cables (except for FC Process Cable) | 4 terminal blocks for wires of up to 1.5 $mm^2$ |
| FastConnect insulation-piercing method | Yes | Yes | Yes | No |
| Supply voltage (must come from terminal unit) | 4.75 V to 5.25 V DC | 4.75 V to 5.25 V DC | 4.75 V to 5.25 V DC | 4.75 V to 5.25 V DC |
| Current consumption | Max. 5 mA | Max. 5 mA | Max. 5 mA | Max. 5 mA |
| Perm. ambient conditions | | | | |
| • Operating temperature | 0 °C to +60 °C | 0 °C to +60 °C | 0 °C to +60 °C | 0 °C to +60 °C |
| • Transport/storage temperature | –25 °C to +80 °C | –25 °C to +80 °C | –25 °C to +80 °C | –25 °C to +80 °C |
| • Relative humidity | Max. 75% at +25 °C | Max. 75% at +25 °C | Max. 75% at +25 °C | Max. 75% at +25 °C |
| Construction | | | | |
| • Dimensions (W x H x D) in mm | 72.7 x 16 x 34 | 72.7 x 16 x 34 | 15.8 x 61.75 x 34.3 | 15 x 57 x 39 |
| • Weight | Approx. 50 g | Approx. 50 g | Approx. 100 g | Approx. 100 g |
| PG connection socket | 0BA50: No; 0BB50: Yes | 0BA60: No; 0BB60: Yes | No | No |
| Degree of protection | IP20 | IP20 | IP20 | IP20 |
| UL listing | Yes | Yes | Yes | No |
| **Use in PLC** | | | | |
| S7-200/-300/-400 | ■ | ■ | | |
| C7-633 DP, C7-634 DP, C7-635, C7-636 | ■ | ■ | | |
| S5-115U to S5-155U | ■ | ■ | | |
| **I/O station** | | | | |
| ET 200M/ET 200B/ ET 200L/ET 200S | ■ | ■ | | |
| **Programming device** | | | | |
| PG 720/720C/PG 740/PG 760 | | | ■ | ■ |
| **Interface** | | | | |
| IM 308-C | ■ | ■ | | |
| CP 5431® FMS/DP | ■ | ■ | | |
| CP 342-5/CP 343-5/CP 443-5 | ■ | ■ | | |
| IM 467 | ■ | ■ | | |
| CP 5511/CP 5512/CP 5611/ CP 5613 2/CP 5614 A2 | | | ■ | ■ |
| **SIMATIC OP** | | | ■ | ■ |
| **OLM/OBT** | ■ | ■ | ■ | ■ |
| **RS 485 repeater** | ■ | ■ | | |

■ Suitable for application

| Ordering data | Order No. |
|---|---|
| **Bus connector RS 485 with axial cable outlet (180°)**<br>For the industrial PC, SIMATIC HMI OP, OLM; max transmission rate 12 Mbit/s | **6GK1 500-0EA02** |
| **Bus connector RS 485 with 90° cable outlet**<br>With screw-type terminals, max. transmission rate 12 Mbit/s | |
| • Without PG interface | **6ES7 972-0BA12-0XA0** |
| • with PG interface | **6ES7 972-0BB12-0XA0** |
| **Bus connector RS 485 with angled cable outlet (35°)**<br>With screw-type terminals, max. transmission rate 12 Mbit/s | |
| • Without PG interface | **6ES7 972-0BA41-0XA0** |
| • with PG interface | **6ES7 972-0BB41-0XA0** |
| **Bus connector RS 485 with 30° cable outlet**<br>With screw-type terminals, low-cost variant, max. transmission rate 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| **PROFIBUS FastConnect bus connector RS 485 with 90° cable outlet**<br>With insulation displacement, max. transmission rate 12 Mbit/s | |
| • Without PG interface | **6ES7 972-0BA50-0XA0** |
| • with PG interface | **6ES7 972-0BB50-0XA0** |
| **PROFIBUS FastConnect bus connector RS 485 with 35° cable outlet**<br>With insulation displacement, max. transmission rate 12 Mbit/s | |
| • Without PG interface | **6ES7 972-0BA60-0XA0** |
| • with PG interface | **6ES7 972-0BB60-0XA0** |
| **PROFIBUS FastConnect bus connector RS 485 Plug 180**<br>With insulation displacement and 180° cable outlet for the industrial PC, SIMATIC HMI OP, OLM; max transmission rate 12 Mbit/s | **6GK1 500-0FC00** |

| | Order No. |
|---|---|
| **SIMATIC S5/S7 plug-in cable for PROFIBUS**<br>Preassembled with two 9-pole Sub-D connectors; max. transmission rate 12 Mbit/s; 3 m | **6ES7 901-4BD00-0XA0** |
| **Manual for PROFIBUS networks**<br>Paper version<br>Network architecture, project management, network components, mounting | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET Manual Collection**<br>Electronic manuals for communication systems, communication protocols and communication products<br>on CD-ROM German/English | **6GK1 975-1AA00-3AA0** |

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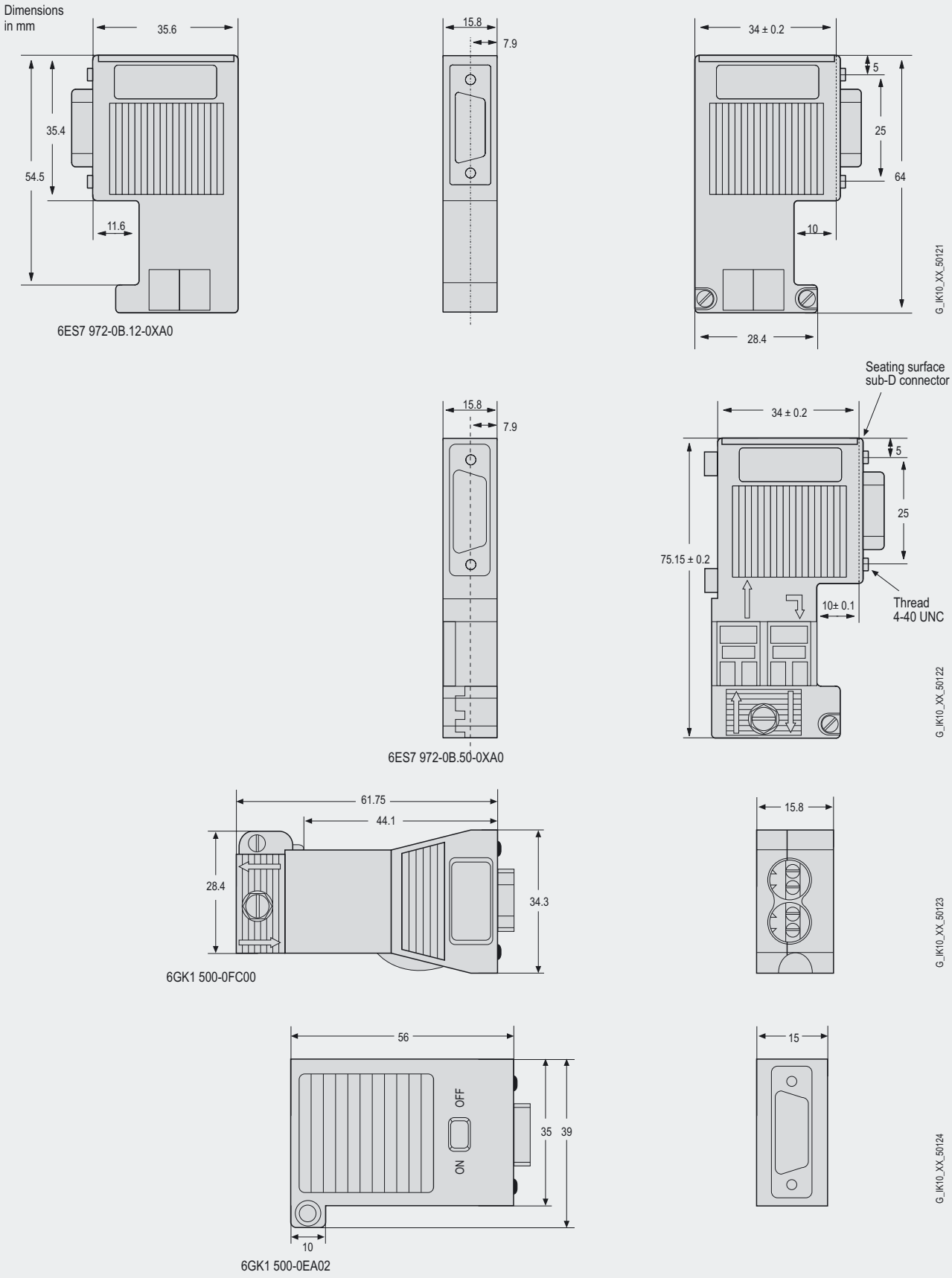
## Dimension drawings



## Overview

- Preassembled cable for fast, low-cost connection of PROFIBUS nodes to OLM or OBT
- Flexible PROFIBUS connecting cable

## Benefits

get Designed for Industry

- Trouble-free connection of end stations through preassembled connecting leads
- Reliable data transmission to the end station in EMC-exposed environment through direct cable shielding and termination.

## Design

The 830-1T connecting cable consists of a twisted-pair cable (wires made of stranded copper) with a woven shield.

It has a 9-pin Sub-D connector at both ends.

Both cable ends are terminated by a resistor combination (cannot be switched off).

## Function

The PROFIBUS 830-1T connecting cable is used for connecting the electrical PROFIBUS interface to the PROFIBUS nodes (OLM, OBT and data terminals) for data transmission rates of up to 12 Mbit/s.

| Ordering data | Order No. |
|---|---|
| **830-1T PROFIBUS connecting cable** for terminal connection, preassembled, with two Sub-D connectors, 9-pin terminated at both ends | |
| • 1.5 m long | **6XV1 830-1CH15** |
| • 3 m long | **6XV1 830-1CH30** |

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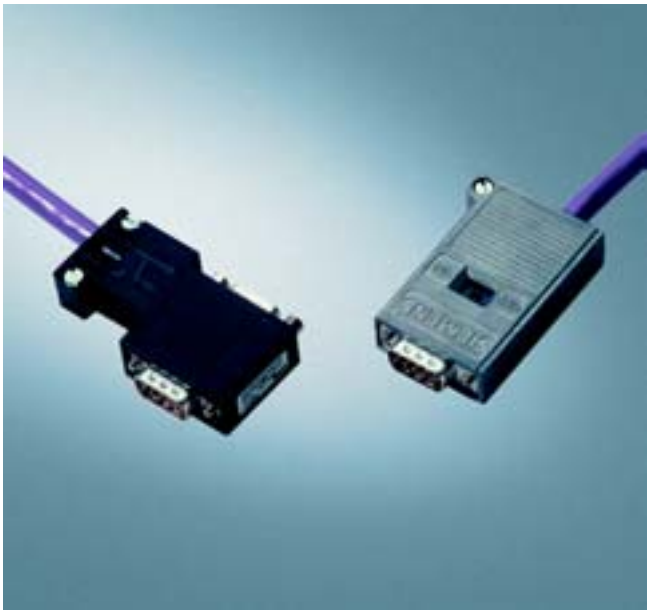
## 830-2 connecting cable

### Overview



- Preassembled cable for connecting PROFIBUS nodes (e.g. HMI) to automation devices
- Flexible PROFIBUS connecting cable up to 12 Mbit/s.

### Benefits

get Designed for Industry

- Trouble-free connection of end stations through preassembled connecting leads
- Direct connection of a PG through the PG interface without interrupting the connection between the stations.

### Design

The 830-2 connecting cable comprises a standard PROFIBUS bus cable. It is preassembled with two 9-pin connectors (6GK1 500-0EA02 and 6ES7 972-0BB11-0XA0). One plug of the preassembled connecting cable is equipped with a PG interface.

### Function

The 830-2 connecting cable is used to connect PROFIBUS nodes (e.g. HMI) to automation devices for transmission rates up to 12 Mbit/s.

| Ordering data | Order No. |
|---|---|
| **830-2 PROFIBUS connecting cable** | |
| Preassembled, with two 9-pin connectors | |
| • 3 m long | **6XV1 830-2AH30** |
| • 5 m long | **6XV1 830-2AH50** |
| • 10 m long | **6XV1 830-2AN10** |

## Overview


- For connecting PROFIBUS stations with an RS 485 interface to a segment
- Variants with transmission rates of 9.6 kbit/s to 12 Mbit/s
- Easy, transparent assembly (simply snap onto a standard rail)
- Unambiguous localization of faulty bus termination with the 12M bus terminal
- PG connection with a special bus terminal and PG connecting cable without the need to install network nodes for the RS 485 bus terminal.

## Benefits

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- Easy and clearly comprehensible connection of PROFIBUS stations thanks to preassembled, integrated connecting cable
- Simple cabinet pre-wiring by connecting the PROFIBUS connecting cable with integrated interfaces

## Application

The PROFIBUS bus terminals enable a bus station to be connected to a PROFIBUS network.

- Pre-wired device connection for PROFIBUS node
- Easy connection of stations to PROFIBUS networks through insertion of the radial line with Sub-D plug
- Implementation of multipoint connections by directly interconnecting several bus terminals (up to 32 stations per segment) with the 12M bus terminal.

## Design

Different versions are available:

- Up to 1.5 Mbit/s
  RS 485 bus terminal
- Up to 12 Mbit/s
  12M bus terminal.

The following is applicable to all variants:

- Housing with degree of protection IP20
- Wall mounting or mounting on deep standard mounting rail
- External 6-pin terminal block for connecting incoming and outgoing bus cable and equipotential bonding conductors
- Integrated connecting cable with Sub-D plug for connecting the nodes
- Terminating resistor combination can be connected through rotary switch

The 12M bus terminal has the following additional features:

- Ranges can be set for data transmission rates through a rotary switch.
- Supply of 12M bus terminal through connected PROFIBUS node (5 V DC/90 mA) using a 9-pin Sub-D connector
- For maximum segment lengths, see technical specifications.
- Incoming and outgoing bus cables are isolated when the terminating resistors are inserted.

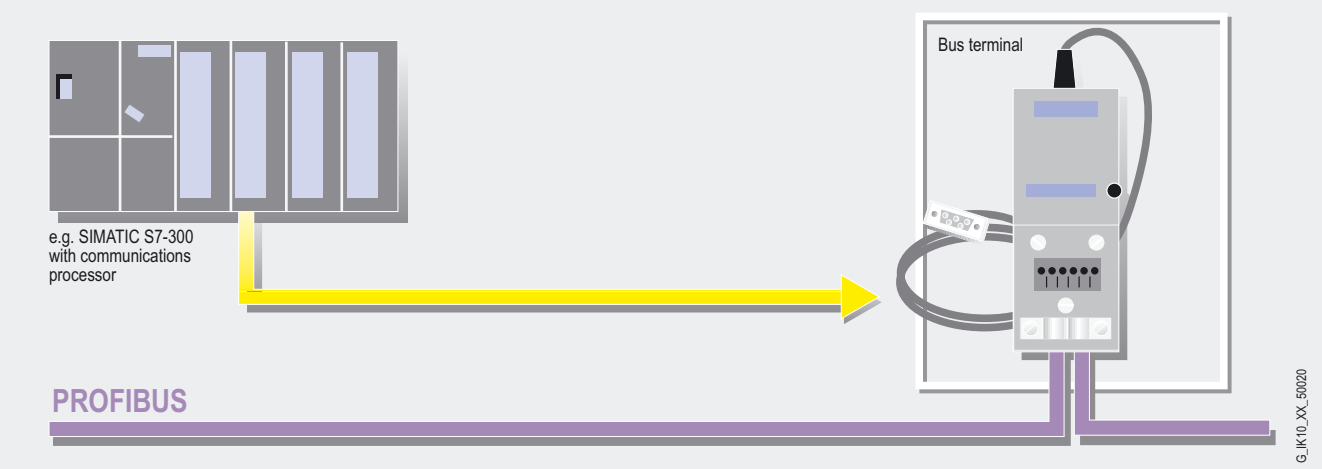
## Bus terminals

### Function

- Connection of stations over flexible connecting cable with Sub D connector
- Easy connection of the bus cable over the terminal block
- No bus interruption in response to a missing terminal
- Bus termination is possible over integral termination resistor combinations.

The following also applies to the 12M bus terminal

- Unique localization of faulty termination within a segment (the incoming and outgoing bus cables are cut for inserting the resistor combinations)
- When the 12M bus terminal is used in a segment with RS 485 bus terminals, the configuration rules for the RS 485 bus terminal apply (see manual for PROFIBUS networks).




System connection with PROFIBUS bus terminals e.g. for SIMATIC S7

## Technical specifications

### *Maximum segment lengths for 12M bus terminal*

| Data transmission rate | Maximum segment lengths |
|---|---|
| 9.6 to 187.5 kbit/s | 1000 m |
| 500 kbit/s | 400 m |
| 1.5 Mbit/s | 200 m |
| 3 to 12 MBit/s | 100 m |

### *Connectable systems for 12M bus terminal*

| System | BT 12M |
|---|---|
| **SIMATIC S5** | |
| IM 308 C | ✓ |
| CP 5431 FMS/DP | ✓ |
| S5-95U/DP | ✓ |
| **SIMATIC S7-200** | |
| CPU 215 | ✓ |
| **SIMATIC S7-300** | |
| CP 342-5 | ✓ |
| CP 343-5 | ✓ |
| CPU 313 | ✓ |
| CPU 314 | ✓ |
| CPU 315 | ✓ |
| CPU 316 | ✓ |
| CPU 315-2 DP | ✓ |
| **SIMATIC S7-400** | |
| CP 443-5 Basic | ✓ |
| CP 443-5 Extended | ✓ |
| IM 467 | ✓ |
| CPU 413-2 DP | ✓ |
| CPU 414-2 DP | ✓ |
| **PC modules** | |
| CP 5511 | – |
| CP 5512 | – |
| CP 5611 | ✓ |
| CP 5613 A2 | ✓ |
| CP 5614 A2 | ✓ |
| **SIMATIC DP** | |
| ET 200M, IM 153 | ✓ |
| ET 200U, IM 318-C | ✓ |
| ET 200B | ✓ |
| ET 200L | – |
| ET 200X | – |
| ET 200S | – |
| ET 200eco | – |
| **SIMATIC 505** | |
| SIMATIC 505 FIM | ✓ |
| SIMATIC 505 | – |
| PROFIBUS DP RBC | ✓ |
| **Miscellaneous** | |
| RS 485 repeater | ✓ |
| DP/AS-Interface Link 20E | ✓ |
| DP/RS 232 link | ✓ |

## Ordering data

| | Order No. |
|---|---|
| **RS 485 bus terminal for PROFIBUS**<br>Transmission rate 9.6 kbit/s to 1500 kbit/s with connecting cable 3.0 m in length | **6GK1 500-0AB00** |
| **RS 485 bus terminal for PROFIBUS**<br>With fitted PG interface and connecting cable 1.5 m in length | **6GK1 500-0DA00** |
| **PROFIBUS 12M bus terminal**<br>Bus terminal for connecting PROFIBUS nodes up to 12 Mbit/s with 1.5 m connecting cable | **6GK1 500-0AA10** |
| **Manual for PROFIBUS networks, paper version**<br>Network architecture, configuring, network components, installation | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET manual collection**<br>Electronic manuals for communication systems, protocols, products<br>on CD-ROM<br>German/English | **6GK1 975-1AA00-3AA0** |

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# Active RS 485 terminating element

## Overview


- Terminates bus segments at data transmission rates of 9.6 kbit/s to 12 Mbit/s
- Power supply independent of bus stations.

## Benefits

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- Terminal-independent bus termination through onboard power supply

## Application

The active RS485 terminating resistance is used to terminate bus segments. Power supply is independent of the stations. The terminating resistor is supplied with power separately from the other I/O components, either permanently or with a voltage applied ahead of the I/Os. By terminating the bus system the stations (e.g. ET 200S) can be coupled and decoupled selectively without malfunctions.

## Design

- 1 terminal block for the segment connection
- Terminal block for power supply (24 V DC external)

## Function

The active RS485 terminating element terminates the PROFIBUS and therefore ensures a defined level of the RS485 signal and suppression of reflections on the line. Since it is operated independently of the field devices, they can be decoupled from the bus without reactions.

## Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection for bus segment | Screw terminal block |
| • Connection for power supply | Screw terminal block |
| Supply voltage | |
| • Rated voltage | 24 V DC (20.4 V to 28.8 V) |
| Current consumption | ca. 30 mA |
| Perm. environmental conditions | |
| • Operating temperature | 0°C to +60°C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | max. 95% at +25 °C |
| Design | |
| • Dimensions (W x H x D) in mm | 60 x 70 x 43 |
| • Weight | Approx. 95 g |
| Degree of protection | IP20 |

| | |
|---|---|
| **Active RS 485 bus terminating element for PROFIBUS**<br>For terminating bus segments for data transmission rates of 9.6 kbit/s to 12 Mbit/s | **6ES7 972-0DA00-0AA0** |

# Repeater RS 485 for PROFIBUS

## Overview

- Automatic transmission rate search
- Data transfer rate of 45.45 kbit/s possible
- 24 V DC voltage display
- Display bus activity segment 1 and 2
- Isolation of segment 1 and 2 possible by switch
- Isolation of the right segment part when terminating resistor is inserted
- Decoupling of segment 1 and segment 2 in the event of static interference.

## Benefits

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- To increase the number of stations and the expansion
- Galvanic isolation of segments
- Startup assistance
  - Switch for disconnecting segments
  - Display of bus activity
  - Isolation of segment with wrongly inserted terminating resistor

Please also have a look at the diagnostics repeater which in addition to the normal repeater functionality also has comprehensive diagnostics functions for physical line diagnosis. It is described under "Distributed I/O/Diagnostics/Diagnostics repeater for PROFIBUS DP".

## Application

The RS485 IP20 repeater connects two PROFIBUS or MPI bus segments using the RS 485 system with up to 32 stations. Data transmission rates of 9.6 kbit/s to 12 Mbit/s are then possible.

## Design

- Housing to degree of protection IP20.
- 2 terminal blocks for connecting the segment
- Terminal block for supply voltage (24 V DC external).
- PG/OP interface.

## Function

### *Mode of operation*

- Increasing the number of stations (max. 127) and the coverage
- Regenerating the signals in amplitude and time
- Electrical isolation of the connected bus systems

| Data transmission rate | Max. segment length |
|---|---|
| 9.6 kbit/s | 1000 m |
| 19.2 kbit/s | 1000 m |
| 45.45 kbit/s | 1000 m |
| 93.75 kbit/s | 1000 m |
| 187.5 kbit/s | 1000 m |
| 500 kbit/s | 400 m |
| 1500 kbit/s | 200 m |
| 3000 kbit/s | 100 m |
| 6000 kbit/s | 100 m |
| 12000 kbit/s | 100 m |

## Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection for bus segment | 2 terminal blocks |
| • Connection for power supply | Terminal block |
| Supply voltage | |
| • Rated voltage | 24 V DC (20.4 V to 28.8 V) |
| Current consumption at rated voltage | |
| • Without load at PG/OP connector | 200 mA |
| • Load at PG/OP connector (5 V/90 mA) | 230 mA |
| • With load on PG/OP socket (24 V/90 mA) | 300 mA |
| Perm. environmental conditions | |
| • Operating temperature | 0°C to +60°C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | max. 95% at +25 °C |
| Design | |
| • Dimensions (W x H x D) in mm | 45 x 128 x 67 |
| • Weight | approx. 350 g |
| Degree of protection | IP20 |

| Ordering data | Order No. |
|---|---|
| **Repeater RS 485 for PROFIBUS**<br>Data transmission rate up to 12 Mbit/s 24 V DC, housing to IP20 | **6ES7 972-0AA01-0XA0** |

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# Diagnostics repeater for PROFIBUS DP

## Overview

- RS 485 repeater with online line diagnostics for PROFIBUS DP
- Standard PROFIBUS slave (DP-V1)
- Automatic determination of fault types and locations
- Data transmission rate 9.6 kbit/s to 12 Mbit/s
- Connection through FastConnect using the insulation displacement method

## Application

The diagnostic repeater for PROFIBUS DP connects PROFIBUS DP segments according to the RS 485 system. In addition, it offers physical online monitoring of copper bus cables.

In the event of a fault it sends a diagnostics message to the DP master containing detailed data on the fault type and fault location.

## Design

- Housing with degree of protection IP20
- Mounting on S7-300 sectional rails or DIN rail
- LEDs for the display of 24 V DC, bus activities and cable faults per segment
- Terminal block for 24 V DC (external) supply voltage
- 9-pin Sub-D socket for PG connection
- Connections for 3 bus segments using the FastConnect insulation displacement method
- The diagnostic repeater is integrated as a DP standard PROFIBUS slave in the bus system. It supports:
- Monitoring of 2 PROFIBUS DP segments
- Max. 31 stations per segment (max. 62 station per diagnostic repeater)
- Max. segment length 100 m
- Configuration of up to 9 diagnostic repeaters in series
- The diagnostics-capable segments must be connected with approved bus connectors (see ordering data/ accessories).
- The construction guidelines for 12 Mbaud networks must be adhered to.

## Function

### *Operating mode*

#### Repeater functionality

The diagnostic repeater is integrated in the bus system as an RS 485 repeater but has a separate PROFIBUS DP address:

- Increased number of stations (max. 127) and expansion in the bus system
- Regenerating the signals in amplitude and time
- Optical isolation of connected segments
- Configuration is executed through STEP® 7, COM PROFIBUS, or a GSD file.

#### Diagnostics functionality

Initiated by STEP 7 COM PROFIBUS or through the application program (SIMATIC S7-400), the diagnostic repeater determines the topology of the connected segments and saves it in the internal diagnostics memory.

In the event of a fault, the repeater automatically relays a standard diagnostics message to the bus master containing the following details:

- Affected segment
- Location of fault (between station X and Y)
- Distance of fault location in meters from station X or Y and from the repeater
- Fault type

The following faults can be diagnosed:

- Break in signal cables A or B
- Short-circuit in signal cables A or B to the shield
- Missing terminating resistors
- Unpermissible cascading depth
- Too many stations in a segment
- Stations too far away from the diagnostic repeater
- Faulty telegrams

**Sporadic** faults are also recognized.

The error messages are displayed graphically in STEP 7 and COM PROFIBUS. They are fully integrated into the SIMATIC system diagnostics (e.g. overview diagnostics, "report system error" function).

#### Display of network topology and statistics

The topology can be displayed in STEP 7 in Version 5.2 and newer. This display shows the stations and cable lengths.

An additional dispay shows the quality of the bus system in the form of statistical data.

### *Configuration*

The diagnostic repeater is configured as follows:

- STEP 7 V5.1 and newer, incl. Service Pack 2
- COM PROFIBUS V5.1, incl. Service Pack 2
- Third-party tools: through GSD file

If third-party masters are used, it is possible to determine the topology with COM PROFIBUS. A third-party configuration tool cannot determine the topology. However, if the topology was determined once with COM PROFIBUS, third-party configuration tools will then show information on error locations.

## Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection for bus segment | FastConnect insulation displacement |
| • Connection for power supply | Terminal block |
| Supply voltage | |
| • Rated voltage | 24 V DC (20.4 to 28.8 V) |
| Permissible ambient conditions | |
| • Operating temperature | 0°C to +60°C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | max. 95% at 25 °C |
| Design | |
| • Dimensions (W X H X D) | 80 x 125 x 67.5 |
| • Weight | 300 g |
| Degree of protection | IP20 |

## Ordering data

| | Order No. |
|---|---|
| **RS 485 diagnostic repeater**<br>For connection of up to 2 segments to PROFIBUS DP; with online diagnostics function for monitoring the bus cables | **6ES7 972-0AB01-0XA0** |
| ***Accessories*** | |
| **Manual for the RS 485 diagnostic repeater** | |
| • German | **6ES7 972-0AB00-8AA0** |
| • English | **6ES7 972-0AB00-8BA0** |
| • French | **6ES7 972-0AB00-8CA0** |
| **RS 485 bus connector with 90° cable outlet**<br>with insulation displacement method, max. data transmission rate 12 Mbit/s | |
| • Without PG interface | **6ES7 972-0BA12-0XA0** |
| • With PG interface | **6ES7 972-0BB12-0XA0** |
| **PROFIBUS FastConnect Bus Connector RS 485 with 90° cable outlet**<br>With insulation displacement method, max. data transmission rate 12 Mbit/s | |
| • Without PG interface | **6ES7 972-0BA50-0XA0** |
| • With PG interface | **6ES7 972-0BB50-0XA0** |
| **PROFIBUS FastConnect bus connector RS 485 Plug 180**<br>In insulation displacement technology with 180° cable outlet for industrial PCs, SIMATIC HMI OP, OLM; max. data transmission rate 12 Mbit/s | **6GK1 500-0FC00** |
| **RS 485 bus connector with angular cable outlet (35°)**<br>with insulation displacement method, max. data transmission rate 12 Mbit/s | |
| • Without PG interface | **6ES7 972-0BA41-0XA0** |
| • With PG interface | **6ES7 972-0BB41-0XA0** |

| | Order No. |
|---|---|
| **PROFIBUS FastConnect Stripping Tool**<br>Pre-set stripping tool for rapid stripping of insulation from PROFIBUS FastConnect bus cables | **6GK1 905-6AA00** |
| **PROFIBUS FC Standard Cable**<br>Standard type with special design for quick assembly, 2-core, shielded, meter goods; max. consignment 1000 m, minimum order 20 m | **6XV1 830-0EH10** |
| **S7 Manual Collection**<br>Electronic manuals on CD, multilingual: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection-Maintenance service for 1 year**<br>Scope of supply: CD containing the current S7 Manual Collection and the three subsequent updates | **6ES7 998-8XC01-8YE2** |
| **Manual for PROFIBUS networks** [1]<br>Network architecture, configuring, network components, installation | |
| German | **6GK1 970-5CA20-0AA0** |
| **BT 200 hardware test device**<br>with point-to-point cable for station testing, with test connector for wiring test, without charging unit, with operating instructions German/English/French | **6ES7 181-0AA01-0AA0** |
| **Connecting cable for PROFIBUS**<br>12 Mbit/s; for PG connection to PROFIBUS DP, preassembled with 2 x 9-pin SUB connector; 3.0 m | **6ES7 901-4BD00-0XA0** |

1) Additional language versions and manuals can be found for the various products at: http://www.siemens.com/automation/csi/net

## DP/DP couplers

### Overview

- Interconnecting two PROFIBUS DP networks
- The interchange of data between both DP networks takes place by internal copying in the coupler.

### Application

The PROFIBUS DP/DP coupler interconnects two PROFIBUS DP networks. Byte data (0-244 byte) are transferred from the DP master of the first network to the DP master of another network and vice versa.

The principle corresponds to the hardware wiring of inputs and outputs used today. The coupler has two independent DP interfaces with which the two DP networks are connected.

The DP/DP coupler is a slave on each DP network. The interchange of data between both DP networks takes place by internal copying in the coupler.

### Design

The DP/DP coupler is housed in a 40 mm casing of the S7-300 series. It can be mounted on a standard mounting rail (7.5 mm and 15 mm) as well as on a mounting rail for the S7 design.

The preferred arrangement is upright in a row, side by side, and without clearance.

The coupler is connected to the PROFIBUS DP networks through an integral 9-pin Sub-D connector.

### Function

The DP/DP coupler continuously copies the output data from one network to the input data of the other network (and vice versa).

#### *Functions*

- Data exchange of up to 244 byte of input and output data of which up to 128 >byte can be consistent
- Up to 16 input/output ranges for exchanging data
- If one side fails, the outputs on the other side maintain the previous value
- Support of DPV1 with full diagnostics
- Adjustment of DP/DP coupler either via switch or STEP 7
- Different baud rate settings are possible
- Electrical isolation between the two DP networks
- Power is supplied to both sides

#### *Parameter assignment*

The PROFIBUS DP addresses are set via two DIP switches on the top of the coupler.

The coupler is either configured with STEP 7 or with a configuring tool which integrates the DP/DP coupler with the help of a GSD file.

The data length is adjusted with the corresponding configuring tool.

### Technical specifications

| | |
|---|---|
| PROFIBUS transmission rate | max. 12 Mbit/s |
| Interfaces | |
| • PROFIBUS DP | 9-pin Sub-D connector |
| Supply voltage | 24 V DC |
| Current consumption typ. | 150 mA |
| Mounting | Upright (DIP switches above) |
| Perm. environmental conditions | |
| • Operating temperature | |
| - horizontal mounting | 0°C to +60°C |
| - all other mounting positions | 0°C to +40°C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | 10-95 % at +25 °C |
| Design | |
| • Dimensions (W x H x D) in mm | 40 x 127 x 117 |
| • Weight | Approx. 250 g |
| Degree of protection | IP20 |

| Ordering data | Order No. |
|---|---|
| **DP/DP coupler** | **6ES7 158-0AD01-0XA0** |

Note:
The manual is available on the Internet free of charge.

## PROFIBUS DP/RS 232C-Link

### Overview

- Adapter between an RS 232C (V.24) interface and PROFIBUS DP
- DP/RS 232C Link supports the following procedures:
  - 3964 R
  - Data communication with start and end characters
  - Character delay mode
  - Data traffic with fixed-length messages
- Devices with an RS 232C interface can be connected to PROFIBUS DP with the DP/RS 232C Link.

### Application

The DP/RS 232C link implements the conversion between an RS 232C (V.24) interface and PROFIBUS DP.

Devices with an RS 232C interface can be connected to PROFIBUS DP with the DP/RS 232C Link.

### Design

- Compact 70 mm housing for mounting on standard rails; for butt-mounting preferably vertically
- 9-pin Sub-D female connector for connection to PROFIBUS DP

### Function

PROFIBUS DP/RS 232C link is connected to the device through a point-to-point connection. Conversion to the PROFIBUS DP protocol takes place in the PROFIBUS DP/RS 232C link. The data is transferred consistently in both directions. Up to 224 byte of useful data can be transferred per message.

#### *Parameterization*

The PROFIBUS DP address can be set with two rotary switches on the front panel. Configuration is performed through the GSD file with the configuration tool of the connected device.

### Technical specifications

| | |
|---|---|
| PROFIBUS transmission rate, max. | 12 Mbit/s |
| Transmission rates via RS 232C max. | 19 200 bit/s, No, even or odd parity, 8 data bit, 1 stop bit |
| Interfaces | |
| • PROFIBUS DP | 9-pin Sub-D connector |
| • RS 232C | 9-pin Sub-D male connector |
| Supply voltage | 24 V DC |
| Power consumption max. | 300 mA |
| Perm. environmental conditions | |
| • Operating temperature | 0°C to +55°C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | 95% at +25 °C |
| Design | |
| • Dimensions (W x H x D) in mm | 70 x 95 x 80 |
| • Weight | approx. 300 g |
| Degree of protection | IP20 |

### Ordering data

| | Order No. |
|---|---|
| **PROFIBUS DP/RS 232C Link**<br>For coupling RS 232C devices to PROFIBUS DP, including GSD file and documentation file | **6ES7 158-0AA01-0XA0** |

#### *Accessories*

| | |
|---|---|
| **SIMATIC S5 Sub-D connector, 9-pin, female** | **6ES5 750-2AB11** |

Note:
The manual is available free of charge on the Internet.

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# Power rail booster

## Overview

- Device for cost-effective transmission of PROFIBUS DP via contact wires and slip rings with IP20 degree of protection
- Permissible baud rates of 9600 bit/s to 500 kbit/s, self-adjusting
- Permissible power rail length: from 25 m at 500 kbit/s to 1200 m at 9600 bit/s
- Up to 125 nodes per segment
- System transparent: The power rail booster does not occupy a DP address
- Easy assembly due to lack of terminating resistance and filter element
- Diagnostic LED for power supply, bus activity and group errors
- Isolated changeover contact for external group error display

## Application

The power rail booster supports connection of a PROFIBUS DP through a contact wire, such as can be implemented on monorail conveyors or high-bay storage and retrieval systems, thus ensuring continued use of the wide range of PROFIBUS DP system services, such as diagnostics and PROFIsafe safety engineering through a bus.

### Monorail conveyors

Vehicle control for monorail conveyors can be achieved cost-effectively with a concept based on SIMATIC standard components. High availability, short response times and easy expansion can be achieved by using distributed controllers, such as SIMATIC ET 200S with IM151-7/CPU. These can also be programmed by the user with SIMATIC STEP 7 via the contact wires.

### High-bay storage and retrieval systems

The maintenance-hungry data photoelectric barriers used in high-bay storage and retrieval systems can be replaced, thus increasing plant availability.

### Applications with slip rings

The power rail booster enables cost-effective routing of PROFIBUS DP through rotating axes even in the case of large diameters.

## Design

The power rail booster can be snapped on to a 15 mm or a 7.5 mm standard DIN rail.

## Function

### *Operating mode*

- For safe data transfer of the PROFIBUS DP signals via the contact wires, the signal levels are increased to interference-free levels and coupled to the contact wires.

### *Manual and Configuration*

The manual (V2.0) for the power rail booster can be downloaded from the Internet in German, English and French. The "PRB checker" software tool can be downloaded for simple configuration of contact wire networks.

## Technical specifications

| | |
|---|---|
| Dimensions (W x H x D, with connector) in mm | 90 x 132 x 75 |
| Supply voltage | 24 V DC |
| Power consumption | max. 20 W |
| Data transmission rate, max. | 500 kbit/s, self-adjusting |
| Cable length (depends on baud rate), max. | 1200 m |
| Shock-hazard protected voltage | Yes, to EN 61131-2 |
| Stations per PRB segment, max. | 125 |
| Operation without terminating resistance | Yes |
| Operation without filter | Yes |
| Wiring options: line / star | Yes / yes |

## Ordering data

| | Order No. |
|---|---|
| **Power rail booster**<br>Signal amplifier for PROFIBUS DP transfer via contact wires, max. 500 kbit/s | **6ES7 972-4AA01-0XA0** |

## BT 200 hardware test unit

### Overview

- Lets you check the bus cable, RS 485 interfaces and accessibility of slaves
- Compact and very easy to operate
- Choice of 6 languages
- For installers, start-up engineers and service personnel
- Optional logging kit for generating acceptance reports/documentation

Optional adapters for IP65/67 systems

- Connecting adapter, bus tester BT200 on M12
- Connecting adapter, bus tester BT200 on ECOFAST
- Connecting adapter for 24 V DC ECOFAST for supplying the station with 24 V DC for the station test

These connecting adapters can be purchased from

KnorrTec
Kapellenbergstraße 34
D-93176 Beratzhausen
Germany
Tel: +49 (0) 94 93/ 9 51 96 90
Fax: +49 (0) 94 93/ 9 51 96 79

E-Mail: info@knorrtec.de

Additional information can be found in the Internet under:

http://www.knorrtec.de/de/bt200_start.asp

### Benefits

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- Minimizing errors during installation and commissioning
- Shorter service and plant standstill times

### Application

During installation, the BT 200 test unit can be used to check the PROFIBUS cable. Wiring can also be checked when the stations are plugged in. Installation errors can be detected quickly and without any effort; no special knowledge of PROFIBUS is required.

Even before the system is commissioned, it is possible to test the PROFIBUS DP nodes' RS 485 interfaces with the BT 200. A listing of addressable slaves on the connected bus is also possible, even without a master on the PROFIBUS DP.

This permits advance function testing of single bus segments, which reduces commissioning times. In case of faults, these test functions are also useful for localizing the fault, thus minimizing plant down times.

With the help of the optional log generation kit, the individual tests are saved in BT 200 and transferred to a PC. The test results can then be printed in report form. This means, for example, that it is possible to edit an acceptance report in a quickly and easily.

### Function

Checking the PROFIBUS cable:

- Line interruption/shield interruption
- Short-circuiting among lines or line and shield
- Determining the location of fault in case of breakage/shorting of data lines
- Detecting reflections that may cause a fault
- Line change
- Determining the length of the installed cable

Checking slave accessibility:

- Listing of accessible slaves
- Specific addressing of individual slaves

Checking the RS 485 interface of the master and slave:

- RS 485 driver
- Power supply for line termination
- RTS signal
- Displaying PROFIBUS DP addresses

5

## BT 200 hardware test unit

### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interface: PROFIBUS DP | 9-pin Sub-D connector |
| Supply voltage | Through built-in NC battery |
| Languages | German, English, French, Spanish, Italian, Portuguese (adjustable) |
| Permissible ambient conditions | |
| • Operating temperature | +5 to 45 °C |
| • Transport and storage temperature | -20 to +60 °C |
| • Relative humidity, max. | 95% |
| Design | |
| Dimensions (W x H x D) in mm | 210 x 100 x 55 |
| Weight, approx. | 350 g |
| Degree of protection | IP20 |

### Ordering data

| | Order No. |
|---|---|
| **BT 200 hardware test device**<br>with point-to-point cable for station testing, with test connector for wiring test, without charging unit, with operating instructions German/English/French | **6ES7 181-0AA01-0AA0** |
| ***Accessories*** | |
| Charging unit for the rechargeable batteries: | |
| **Chargers** | |
| 230 V AC/2.4–10 V DC | **6ES7 193-8LA00-0AA0** |
| 110 V AC/2.4–10 V AC | **6ES7 193-8LB00-0AA0** |
| **Logging Kit BT 200**<br>comprising data transmission cable BT 200/PC and logging software for PC German/English/French | **6ES7 193-8MA00-0AA0** |
| **Test connector**<br>Spare part | **6EP8 106-0AC20** |
| **NiCd battery pack**<br>Spare part | **6EP8 106-0HA01** |
| **Point-to-point cable for station test**<br>Spare part | **6EP8 106-0HC01** |

## Overview

- This is used to install fieldbus segments according to IEC 61 158-2 (e. g. PROFIBUS PA) with field device connection points
- Easy installation of the bus cable using the FastConnect system (FastConnect Stripping Tool, FC Process Cable acc. to IEC 61 158-2)
- Terminal units can be connected over FC Process Cables acc. to IEC 61 158-2 or SpliTConnect M12 Outlet/M12 Jack
- Termination resistor combination can be integrated (SpliTConnect Terminator)

## Benefits

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- Easy terminal connection through use of the FastConnect connection system
- Wide range of applications due to the modular SpliTConnect system
- Reduction of types and parts thanks to a uniform connection system for PROFIBUS PA

## Application

- The SpliTConnect Tap supports the installation of fieldbus segments according to IEC 61 158-2 (e.g. PROFIBUS PA) with terminal unit connection points.
- Using the SpliTConnect Coupler, a PROFIBUS PA distributor can be constructed by cascading SpliTConnect Taps.
- By replacing the contact screw with the SpliTConnect Terminator, the SpliTConnect Tap can be used as a bus termination element.

## SpliTConnect

### Design


- Rugged plastic casing made of PBT in IP67 design
- Resistant to ultraviolet rays, thus suitable for outdoor use
- Full shielding through integrated metal housing
- Easy cable connection through use of FC Process Cable
- Contacting and connection of the FC Process Cable through insulation displacement contacts using contacting screw
- The SpliTConnect taps can be grounded through a contacting screw
- For DIN rail mounting or wall mounting

### Function

- The SpliTConnect tap enables configuration of fieldbus segments according to IEC 61158-2 (e.g. PROFIBUS PA) and connection of terminals
- Easy pre-assembly of the SpliTConnect taps through the FastConnect connection system (FastConnect stripping tool, FC Process Cable)
- Connection of the terminals directly through FC Process Cable or SpliTConnect M12 outlet

### Technical specifications

| | |
|---|---|
| Data transmission rate | 31.25 kbit/s |
| Type of connection | Insulation displacement |
| Cable gland | M22 |
| Casing material | PBT (polybutylentereftalate) |
| Perm. ambient temperature | |
| • Operating temperature | -40 °C to +85 °C |
| • Transport/storage temperature | -40 °C to +85 °C |
| For use in hazardous areas | EEx ia IIC IIB T6 |
| UV-resistant | Yes |
| Construction | |
| • Dimensions (W x H x D) in mm | 84 x 54 x 49 |
| • Weight | Approx. 170 g |
| Degree of protection | IP67 |
| UL listing | Yes |

### Ordering data

| | Order No. |
|---|---|
| **SpliTConnect Tap**<br>For assembling PROFIBUS PA segments and connecting PA field devices, insulation displacement method, IP67<br>Type of delivery:<br>1 packet = 10 pcs. | **6GK1 905-0AA00** |
| **SpliTConnect M12 outlet**<br>Element for direct connection of PROFIBUS PA field devices to the SpliTConnect tap through M12 connection<br>Type of delivery:<br>1 packet = 5 pcs. | **6GK1 905-0AB10** |
| **SpliTConnect coupler**<br>Coupling element for connecting SpliTConnect taps in series to configure star points<br>Type of delivery:<br>1 packet = 10 pcs. | **6GK1 905-0AC00** |
| **SpliTConnect terminator (Ex version)**<br>For terminating PROFIBUS PA segments, can be used in hazardous areas<br>Type of delivery:<br>1 packet = 5 pcs. | **6GK1 905-0AD00** |
| **SpliTConnect terminator (non-Ex version)**<br>For terminating PROFIBUS PA segments, cannot be used in hazardous area<br>Type of delivery:<br>1 packet = 5 pcs. | **6GK1 905-0AE00** |
| **SpliTConnect M12 jack**<br>Connector element for direct connection of PROFIBUS PA field devices to the PROFIBUS PA segment through M12 connection<br>Type of delivery:<br>1 packet = 5 pcs. | **6GK1 905-0AF00** |

## Overview


- Bus cable for fieldbus systems according to IEC 61158-2, e.g. PROFIBUS PA
- High interference immunity thanks to double shielding
- Different variants for different applications (hazardous areas, non-hazardous areas)
- Easy length measurement thanks to printed meter markings

## Benefits

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- Length can easily be determined due to meter length markings printed on the cable
- Complete range of cables for hazardous and non-hazardous areas
- Reduction of types and parts thanks to a uniform connection system for PROFIBUS PA

## Application

Color coded wires are available for assembling fieldbus networks according to IEC 61 158-2 (e.g. PROFIBUS PA) for different areas of applications (hazardous, non-hazardous areas).

### *UL approvals*

Different cable variants with the appropriate UL approvals for installation in cable bundles and cable racks, according to the NEC guidelines (National Electrical Code) Article 800/725.

## Design

- Shielded, twisted-pair cable with circular cross-section.
- Grounding continuity may be implemented through the outer shield of the bus cable and the ground terminals of the SpliT-Connect system.
- Meter length marking printed on the cable.

### Cable types

- FC Process Cable:
  Special bus cable according to IEC 61158-2 for use in hazardous areas (Ex version) and in non-hazardous areas (non-Ex version).
- The connection between the bus segments with RS 485 and IEC 61158-2 transmission method is made through the segment transceiver/link.

## Technical specifications

| **Cable type** [1] | **FC Process Cable** [2] |
|---|---|
| |  |
| Attenuation | |
| • At 38.4 kHz | ≤ 3 dB/km |
| Inductance | 0.7 mH/km |
| Impedance | |
| • At 38.4 kHz | 100 ± 20 Ω |
| Rated value | 100 Ω |
| Loop resistance | ≤ 44 Ω/km |
| Effective capacitance at 1 kHz | Approx. 90 nF/km |
| Operating voltage (rms value) | ≤ 100 V |
| Type of cable (standard code) | 02 Y SY CY<br>1 x 2 x 1.0/2.55-100 BL OE FR |
| Sheath | |
| • Material | PVC |
| • Diameter | 8.0 ± 0.4 mm |
| • Color | Blue or black |
| Perm. environmental conditions | |
| • Operating temperature | –40 °C to +80 °C |
| • Transport/storage temperature | –40 °C to +80 °C |
| • Installation temperature | –20 °C to +80 °C |
| Bending radii | |
| • First & final bending | ≥ 60 mm |
| • Repeated bending | ≥ 120 mm |
| Permissible tensile load | 100 N |
| Weight | 103 kg/km |
| Halogen-free | No |
| Behavior in fire | Flame-retardant acc. to<br>VDE 0482-265-2-1, IEC 60332-1 |
| UL listing/300 V rating | Yes/ CM/CMG/PLCT/<br>Sun Res/Oil Res |
| UL Style / 600 V Rating | Yes |
| Resistance to mineral oils and greases | Conditionally resisting |
| UV resistance | Yes |
| Silicone-free | Yes |

1) Electrical characteristics at 20 °C, tested according to DIN 47 250 Part 4 or DIN VDE 0472/FISCO

2) Data transmission rate 31.25 kbit/s.

## Bus cables

| Ordering data | Order No. |
|---|---|
| **PROFIBUS FC Process Cable**<br>Two-wire, shielded | |
| • Blue for applications in hazardous areas | **6XV1 830-5EH10** |
| • Black for applications in non-hazardous areas | **6XV1 830-5FH10** |
| Meter goods:<br>max. consignment 1000 m,<br>minimum order 20 m | |
| **PROFIBUS FastConnect stripping tool**<br>Stripping tool for rapid stripping of insulation from PROFIBUS FastConnect bus cables | **6GK1 905-6AA00** |
| **PROFIBUS FastConnect blade cassettes**<br>Spare blade cassettes for the PROFIBUS FastConnect stripping tool, 5 pcs | **6GK1 905-6AB00** |
| **Manual for PROFIBUS networks**<br>Paper version<br>Network architecture, configuring, network components, installation | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET manual collection**<br>Electronic manuals for communication systems, protocols, products<br>on CD-ROM<br>German/English | **6GK1 975-1AA00-3AA0** |

## More information

### Mounting instructions

*FastConnect*

The FastConnect stripping tool can be used to strip the sheath and shield of the FC Process Cable for PROFIBUS PA to the correct length.

Use of the FastConnect stripping tool and SpliTConnect tap makes, for example, connecting field devices to the PROFIBUS PA bus system easy.

*Cable routing*

During storage, transport and cable laying, keep both ends sealed with a shrink-on cap.

Comply with the permissible bending radii and tensile load!

Note:
Additional components of the SIMATIC NET wiring range can be ordered from your local contact person.
For technical advice contact:
J. Hertlein, A&D SE V22
Tel.: +49 (0) 911/750 44 65
Fax: +49 (0) 911/750 99 91
E-mail: juergen.hertlein@siemens.com

## Overview

- Implements the transition between PROFIBUS DP and PROFIBUS PA.
- Modular expansion
- Ex version available
- Non-Ex version available

## Benefits

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- Systemwide integration due to direct connection of the PA field devices to PROFIBUS DP

## Design

Modular design (DP/PA coupler and DP/PA link) in S7-300 design, swivel-mounted on a low-profile rail with screw mounting. The HOT SWAPPING function is possible with the high profile rail and the backplane modules BM 157 and BM DP/PA. The DP/PA coupler can be extended to become a DP/PA link.

### *DP/PA coupler:*

- Housing to degree of protection IP20.
- Two versions of the DP/PA coupler:
  Non-Ex versions with up to 400 mA output current for the PA cable; Ex version with up to 110 mA output current. The PA cable of the Ex-protected version can be used in the hazardous area. The DP/PA coupler must be installed outside of the Ex area (up to Ex Zone 2).
- The overall mounting depth is max. 130 mm, the height is 125 mm. The width of the DP/PA coupler is 80 mm.
- 4-pin screw terminal for connection of 24 V DC.
- 9-pin Sub-D female connector for connection to PROFIBUS DP.
- Non-failsafe versions:
  4 screw terminals for connection to PROFIBUS PA.
- Intrinsically safe versions:
  2 screw terminals for connection to PROFIBUS PA.
- The DP/PA coupler (Ex version) is always installed at the end of the PA cable. The terminating resistor integrated in the housing is always active. The DP/PA coupler (non-Ex version) has a terminating resistor which can be activated as required. This means that the PA cable can be looped through. In both versions, the shield termination for the PA cable also serves as strain relief.

### *DP/PA link*

- The DP/PA link is formed by the IM 157 interface module and one or more DP/PA couplers (Ex and non-Ex versions). All components of the DP/PA link are interconnected via the S7 backplane bus.
- Ex-protected and non-Ex versions of the DP/PA link can also be implemented by combining the IM 157 with Ex-protected or non-Ex versions of the DP/PA coupler.
- This modular system can be expanded to up to 5 PA lines.
- The overall mounting depth is max. 130 mm, the height is 125 mm. The width of the IM 157 is 40 mm. The overall width of the DP/PA link depends on the number of DP/PA couplers used.
- Connection to PROFIBUS DP only on the IM 157 via 9-pin Sub-D female connector.
- Redundancy mode possible on the S7-400H.

### *Possible applications*

The use of the DP/PA coupler and DP/PA link is governed by the control system in use and by the quantity framework (number of field devices per PLC or automation system).

### *DP/PA coupler*

The DP/PA coupler (stand alone) is used with small quantity frameworks and low time-related requirements.

When using the DP/PA coupler, the data rate on the PROFIBUS DP must be permanently set to 45.45 kbit/s. The quantity framework is determined either by the No. of maximum addressable slaves (field devices) or the maximum cycle time.

The field devices are addressed directly by the programmable controller; the DP/PA coupler is transparent. Configuration of the DP/PA is not necessary. The coupler is recommended for extending existing installations which are based on SIMATIC S5.

### *DP/PA link*

The DP/PA link is used for large quantity frameworks and high time-related requirements.

The DP/PA link works as a slave on the PROFIBUS DP and as a master on the PROFIBUS PA. The programmable controller or automation system addresses the field devices through the DP/PA link in the manner of a modular slave whose modules are the PA devices.

Configuration of the DP/PA link is easy using the STEP 7 configuration software (V4.02 and newer).

The DP/PA link can be operated on standard PROFIBUS DP masters.

The GSD file required for operation on standard PROFIBUS DP masters is available in the Internet.

## DP/PA coupler and link

### Function

#### *DP/PA coupler*

- Conversion of the data format from asynchronous (11 bits/character) to synchronous (8 bits/character) and conversion of the transmission rate.
- Powers field devices.
- Limits supply current with barriers.
- In the Ex version, the supply current is limited to 110 mA, with the non-Ex version to 400 mA .
- In combination with the PROFIBUS Master S7-400, the function CIR (Configuration in RUN) is supported. This makes it possible to integrate and remove field devices during normal operation.

The number of connectable slaves or field devices is limited by the power consumption of the field devices.

#### *DP/PA link*

Use of the DP/PA link allows subordinate PA lines with short cycle times to be set up.

Transmission of this data to the control system is made through PROFIBUS DP with up to 12 Mbit/s without any significant loss of time.

The DP/PA link is a gateway that interconnects PROFIBUS DP and PROFIBUS PA, but decouples the transmission rate.
It works as a slave on the PROFIBUS DP and as a master on the PROFIBUS PA. The PLC addresses the field devices indirectly through the DP/PA link.

The automation system regards the DP/PA link as a modular slave. The individual submodules of this slave are the field devices that are connected to the subordinate PA lines. In combination with the PROFIBUS Master S7-400, the function CIR (Configuration in RUN) is supported. This makes it possible to integrate and remove field devices during normal operation.

The DP/PA link can consist of:

- IM 157 and max. 5 DP/PA-couplers.

Together, the PA lines of a DP/PA link form a logical bus. The total number of all field devices on one DP/PA link is restricted to 64.

#### *Redundancy*

The S7-400H supports redundancy mode. Two IM 157 are plugged in for this purpose. The hot-swappable function is made possible by the backplane bus modules BM 157 and BM DP/PA and the sectional rail for active bus modules. This applies both to the IM157 as well as to the series-connected DP/PA coupler.

### Technical specifications

| **DP/PA coupler** | |
|---|---|
| Connection for PROFIBUS PA | |
| Function | Conversion of the data format from asynchronous (11 bits/character) to synchronous (8 bits/character) and conversion of the transmission rate.<br>Powers field devices.<br>Limits supply current with barriers.<br>Support for the functionality "Configuration during normal operation of the plant" in conjunction with S7-400 |
| • Intrinsically-safe version | 2-pole screw-type terminal, permanently integrated terminating resistor, max. output current 110 mA<br>Output voltage 13....14 V DC |
| • Non-intrinsically-safe version | 4-pole screw-type terminal, switchable terminating resistor, max. output current 400 mA<br>Output voltage 19 V DC |
| Connection for PROFIBUS DP | 9-pin Sub-D plug, contact assignment as described in IEC 61158/EN 50170 |
| Backplane bus | Connection through S7 backplane bus connector (only necessary for PA link), floating<br>For the hot-swapping function, the active bus modules BM DP/PA are required |
| Displays | Bus activity DP (yellow)<br>Bus activity PA (yellow) |
| Supply voltage | 24 V DC (green) |
| Current consumption | |
| • Ex version | Max. 400 mA |
| • Non-Ex version | Max. 750 mA |
| Power loss | |
| • Ex version | Approx. 7 Watt |
| • Non-Ex version | Approx. 7 Watt |
| Operating temperature | |
| • Ex version | 25 to 60 °C |
| • Non-Ex version | -25 to +60 °C |
| Dimensions (W x H x D) in mm | 80 x 125 x 130 |

## Technical specifications (continued)

| IM 157 | |
|---|---|
| Function | Bus link from PROFIBUS DP (9.6 kbit/s to 12 Mbit/s, slave functionality) and PROFIBUS PA with support for the functionality "Configuration during normal operation of the plant" in combination with S7-400.<br>The "DP/PA link" function is implemented by expanding the IM 157 with one/several DP/PA couplers. Stand-alone operation of the IM 157 is not possible.<br>Up to 5 DP/PA couplers<br>and up to 64 slaves can be connected.<br>Galvanic isolation to the higher-level DP master system. |
| Interfaces | |
| • Connection for PROFIBUS DP | 9-pin Sub-D plug, contact assignment as described in IEC 61158/EN 50170, Vol. 2 |
| • Backplane bus | Connection over S7 backplane bus connector, floating<br>In a redundant configuration, the active bus module BM IM 157 is required for the hot-swapping function. In a non-redundant configuration, this module is also required for replacing series-connected DP/PA couplers during normal operation. |
| Displays | SF (red)<br>BF DP (red)<br>BF PA (red)<br>Active (yellow)<br>DC 24 V (green) |
| Supply voltage | 24 V DC |
| Current consumption | Max. 100 mA (in the DP/PA link)<br>Max. 200 mA (in the Y link) |
| Power loss | Approx. 2 W (in the DP/PA link)<br>Approx. 4 W (in the Y link) |
| Bridging of power outages | 20 ms |
| Mechanical design | 4-pin screw terminal, short-circuiting link between PE and M24, for earth-free operation the short-circuiting link must be removed (independent of this, the DP interface is always earth-free). |
| Permissible operating temperature | -25 to +60 °C |
| Dimensions (W x H x D) in mm | 40 x 125 x 130 |
| Configuration | With STEP 7 Version 5.2 or on PROFIBUS standard masters with GSD file |

## Ordering data

| | Order No. |
|---|---|
| **DP/PA coupler** | |
| For transition of the transmission technology from RS 485 to IEC 1158-2 | |
| • Intrinsically safe version (Ex) | **6ES7 157-0AD82-0XA0** |
| • Non-intrinsically safe version (non-Ex) | **6ES7 157-0AC81-0XA0** |
| **IM 157** | **6ES7 157-0AA82-0XA0** |
| Interface module for DP/PA link and Y link | |
| ***Accessories*** | |
| PS 307 load power supply, incl. power connector; 120/230 V AC; 24 V DC | |
| • 2 A; 50 mm wide | **6ES7 307-1BA00-0AA0** |
| • 5 A; 80 mm wide | **6ES7 307-1EA00-0AA0** |
| • 5 A, extended temperature range; 80 mm wide | **6ES7 307-1EA80-0AA0** |
| • 10 A, 200 mm wide | **6ES7 307-1KA00-0AA0** |
| PS 305 load power supply, 24/48/60/110 V DC; 24 V DC | |
| • 2 A, expanded temperature range; 80 mm wide | **6ES7 305-1BA80-0AA0** |
| Standard sectional rail (without "hot swapping" function) | |
| • 482 mm (19 inches) wide | **6ES7 390-1AE80-0AA0** |
| • 530 mm wide | **6ES7 390-1AF30-0AA0** |
| **Manual** | |
| For DP/PA coupler/link | |
| • German | **6ES7 157-0AA00-8AA0** |
| • English | **6ES7 157-0AA00-8BA0** |
| ***Components for redundant configuration*** | |
| **Active bus modules for hot swapping** | |
| • BM IM 157 for 2 IM 157 modules, for redundant and non-redundant configuration, for extended temperature range, for "hot swapping", permissible operating temperature -25 to +60°C | **6ES7 195-7HD80-0XA0** |
| • BM DP/PA for 1 DP/PA coupler for extended temperature range for "hot swapping", permissible operating temperature -25 to+60°C | **6ES7 195-7HF80-0XA0** |
| **Sectional rail for hot swapping** | |
| For max. 5 active bus modules, for "hot swapping" | |
| • 482 mm (19 inches) long | **6ES7 195-1GA00-0XA0** |
| • 530 mm long | **6ES7 195-1GF30-0XA0** |
| • 620 mm long | **6ES7 195-1GG30-0XA0** |
| • 2000 mm long | **6ES7 195-1GC00-0XA0** |

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## Fiber-optic cables for PROFIBUS

### Overview

- Optical signal transmission
- No radiation along the cable
- Unaffected by external noise fields
- No grounding problems
- Electrical isolation
- Low weight
- Easy routing

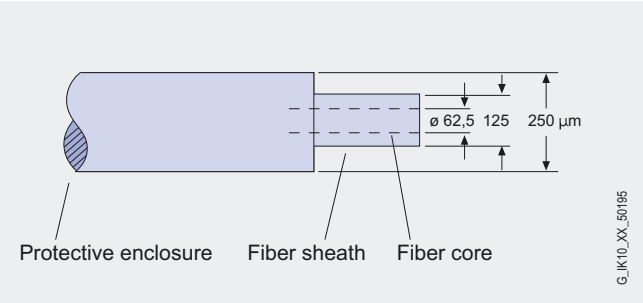
### Application

A fiber-optic cable serves to transmit signals by means of electromagnetic waves in the area of optical frequencies. The light beam is guided in the conductor and around bends by total reflection at the transition from the core to the fiber sheath, which has a lower refractive index than that of the core.

The fiber-optic cable has a protective outer coating. The term fiber-optic cable is also often abbreviated to FOC.

The optical PROFIBUS network is constructed with fiber-optic cables.

### Design




Structure of a fiber-optic cable

### Sheath materials

The fiber-optic cables are offered for PROFIBUS with plastic, PCF and glass fibers:

- Glass fiber-optic cable, 2-fiber cable for optical PROFIBUS networks indoors and outdoors
- Plastic fiber-optic cable, duplex or standard cable for indoor applications with cable lengths up to 80 m
- Plastic fiber-optic cable, standard cable for indoor applications with cable lengths up to 400 m
- ECOFAST Hybrid Cable fiber-optic for DESINA-compliant devices.

| Material | Polyethyl-ene | Polyvinyl chloride | Polyure-thane | High-polymeric (flame-retardant/ non-corrosive) | |
|---|---|---|---|---|---|
| Abbreviation | PE | PVC | PUR | FRNC Olefin/EVA | FRNC PUR |
| Short code | 2Y | Y | 11Y | H | 11Y |
| Operating temperature range (°C) | -40 to +70 | -20 to +70 | -50 to +80 | -25 to +90 | -40 to +80 |
| Halogen-free | Yes | No | No | Yes | Yes |
| Behavior in fire | Inflamma-ble | Self-extin-guishing | Self-extin-guishing | Self-extin-guishing | Self-extin-guishing |
| Oxygen index LOI (%) | 17 | 21 – 32 | 30 | 36 | 26 |
| Smoke density | Good | Bad | Bad | Good | Average |
| Resistant to: | | | | | |
| • UV radiation | Indifferent to good | Average | Indifferent to good | Average | Indifferent to good |
| • Oil (ASTM No. Oil 2) | Good | Average | Good | Bad | Good |
| • Water | Good | Good | Average | Good | Good |
| Abrasion resistance | Good | Average | Extremely good | Good | Good |
| Mechanical stability | Good | Average | Good | Good | Good |
| Chemical stability | Average to good | Bad | Average | Average | Average |

General characteristics of sheath materials for cables

Assessment:
Extremely good/good: suitable
Average: Suitable depending on the application
Bad: Not suitable

## Overview


- Used for the optical Industrial Ethernet and PROFIBUS networks
- Rugged design for industrial applications indoors and outdoors
- Halogen-free design for installation inside buildings
- Trailing cable for the special application of forced motion control
- High immunity to noise thanks to insensitivity to electro-magnetic fields
- Available preassembled
- Extensive approvals (UL)

## Benefits

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- Simple installation, due to
  - Availability of preassembled cables
  - Absence of grounding problems and
  - Light weight of FO cables.
- Secure against unauthorized listening due to lack of radiation from the cable.
- Silicon-free;
  therefore suitable for use in the automotive industry (e.g. on paint shop conveyors)

## Application

### Marine duplex fiber-optic cable SIENOPYR

Halogen-free, non-crush, flame-retardant, marine-approved fiber-optic cable for permanent installation on ships and on offshore platforms indoors and on open deck. Sold by the meter.

### Fiber-optic indoor cable

Halogen-free fiber-optic cable, non-crush, flame-retardant, for installation inside buildings (e.g. in production halls and in building automation). Supplied in fixed lengths, pre-assembled with 4 BFOC connectors.

### Fiber-optic standard cable

Fiber-optic cables for the following application areas indoors and outdoors

- For routing above ground
- For installation inside buildings.

Sold by the meter and in fixed lengths, pre-assembled with 4 BFOC connectors.

### Fiber-optic trailing cable

Fiber-optic cables for the special application of forced motion control, such as in continuously moving machine parts (in trailing cables) indoors and outdoors. Two cable variants are available for this application:

- FO Trailing Cable;
  Cable for high mechanical stress, PUR outer sheath, no UL approval
- FO Trailing Cable GP (general purpose);
  cable for low mechanical stress, PVC outer sheath, with UL approval

Sold by the meter and in fixed lengths, pre-assembled with 4 BFOC connectors.

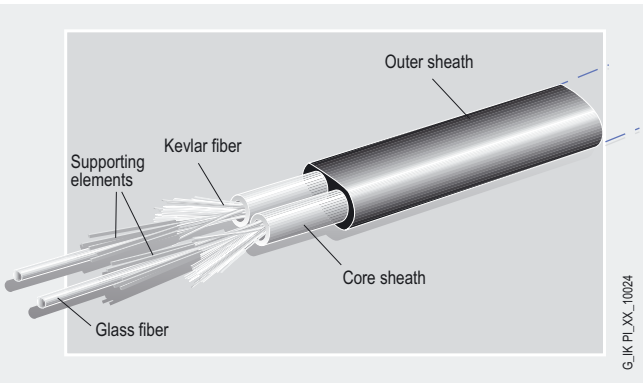
## Design

The following cable types are available in two variants, 50/125 µm and 62.5/125 µm:

- 100Base FX;
  62.5/125 µm fiber, 3,000 m
- 100Base FX;
  50/125 µm fiber, 3,000 m
- 1000Base SX;
  50/125 µm fiber, 750 m
- 1000Base LX;
  50/125 µm fiber, 2,000 m

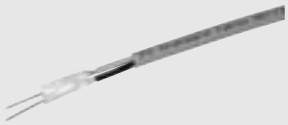
In the respective applications, the maximum cable lengths must be taken into account.

| Cable types | 50/125 µm | 62.5/125 µm |
|---|---|---|
| FO Standard Cable | ● | – |
| FO Trailing Cable | ● | – |
| FO Trailing Cable GP | ● | – |
| FO Ground Cable | ● | – |
| Fiber Optic Standard Cable | – | ● |
| INDOOR Fiber Optic Indoor Cable | – | ● |
| Flexible Fiber Optic Trailing Cable | – | ● |
| SIENOPYR marine duplex fiber-optic cable | – | ● |

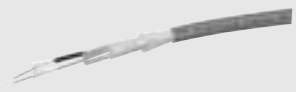


## Glass FOC

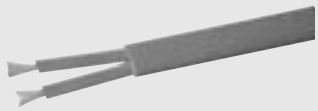
### Technical specifications

| Cable type | FO Standard Cable | FO Ground Cable |
|---|---|---|
| |  |  |
| Applications | Universal cable for installation indoors and outdoors | Waterproof cable (lengthwise and sideways) for use outdoors with non-metallic protection against rodents for laying into the ground. |
| Type of supply | | |
| Cable type (standard designation) | AT-W(ZN)YY 2x1G50/125 | AT-WQ(ZN)Y(ZN)B2Y 2G50/125 |
| Fiber type | Multimode graded-index fiber 50/125 mm | Multimode graded-index fiber 50/125 mm |
| Attenuation | | |
| • at 850 nm | ≤ 2.7 dB/km | ≤ 2.7 dB/km |
| • at 1300 nm | ≤ 0.7 dB/km | ≤ 0.7 dB/km |
| Modal bandwidth | | |
| • at 850 nm | ≥ 600 MHz *km | ≥ 600 MHz *km |
| • at 1300 nm | ≥ 1200 MHz *km | ≥ 1200 MHz *km |
| Number of fibers | 2 | 2 |
| Cable design | dividable | dividable |
| Core type | Hollow core, filled | Hollow core, filled |
| Materials | | |
| • Basic element | PVC, orange/black | PVC, orange/black |
| • Strain relief | Aramid fiber | Aramid fiber |
| • Outer sheath/color of cable | PVC, green | PE, black |
| Mechanical characteristics | | |
| • Dimensions of basic element | 2.9 mm Ø | 2.9 mm Ø |
| • Cable dimensions | 4.5 x 7.4 mm | 10.5 mm |
| • Cable weight | Approx. 40 kg/km | Approx. 90 kg/km |
| • Permissible tensile force | ≤ 500 N | ≤ 800 N |
| • Bending radius | 70 mm | 160 mm |
| • Bending cycles | – | – |
| • Resistant to lateral force | 300 N/cm | 300 N/cm |
| • Impact resistant (starting energy/number/hammer Ø) | – | – |
| Perm. ambient conditions | | |
| • Routing and installation temperature | –5 °C to +50 °C | –5 °C to +50 °C |
| • Operating temperature | –25 °C to +80 °C | –25 °C to +70 °C |
| • Storage temperature | –25 °C to +80 °C | –25 °C to +70 °C |
| Behavior in fire | – | – |
| Halogen-free | – | Yes |
| No silicone | Yes | Yes |
| Resistance to mineral oils and grease | Limited resistance | Highly resistant |
| UL/CSA approvals | OFNG, UL1651 FT4/IEEE1202 | – |
| UV-resistant | Yes | Yes |
| Rodent protection | – | Yes |
| Gigabit length | | |
| • 1000BaseSX | 750 m | 750 m |
| • 1000BaseLX | 2,000 m | 2,000 m |

## Technical specifications (continued)

| Cable type | FO Trailing Cable | FO Trailing Cable GP |
|---|---|---|
| |  |  |
| Applications | Cable for use in cable carriers for high mechanical loading, PUR outer sheath, no UL approval | Cable for use in cable carriers for low mechanical loading, PVC outer sheath, UL approval |
| Type of supply | | |
| Cable type (standard designation) | AT-W(ZN)Y(ZN)11Y 2G50/125 | AT-W(ZN)Y(ZN)Y 2G50/125 |
| Fiber type | Multimode graded-index fiber 50/125 mm | Multimode graded-index fiber 50/125 mm |
| Attenuation | | |
| • at 850 nm | ≤ 2.7 dB/km | ≤ 2.7 dB/km |
| • at 1300 nm | ≤ 0.7 dB/km | ≤ 0.7 dB/km |
| Modal bandwidth | | |
| • at 850 nm | ≥ 600 MHz *km | ≥ 600 MHz *km |
| • at 1300 nm | ≥ 1200 MHz *km | ≥ 1200 MHz *km |
| Number of fibers | 2 | 2 |
| Cable design | dividable | dividable |
| Core type | Hollow core, filled | Hollow core, filled |
| Materials | | |
| • Basic element | PVC, orange/black | PVC, orange/black |
| • Strain relief | Aramid fiber | Aramid fiber |
| • Outer sheath/color of cable | PUR, green | PVC, green |
| Mechanical characteristics | | |
| • Dimensions of basic element | 2.9 mm Ø | 2.9 mm Ø |
| • Cable dimensions | 10.5 mm | 10.5 mm |
| • Cable weight | Approx. 90 kg/km | Approx. 90 kg/km |
| • Permissible tensile force | ≤ 800 N | ≤ 800 N |
| • Bending radius | 200 mm | 200 mm |
| • Bending cycles | 5.000.000 | 1.000.000 |
| • Resistant to lateral force | 300 N/cm | 300 N/cm |
| • Impact resistant (starting energy/number/hammer Ø) | – | – |
| Perm. ambient conditions | | |
| • Routing and installation temperature | –5 °C to +50 °C | –5 °C to +50 °C |
| • Operating temperature | –25 °C to +80 °C | –25 °C to +80 °C |
| • Storage temperature | –25 °C to +80 °C | –25 °C to +80 °C |
| Behavior in fire | – | – |
| Halogen-free | – | – |
| No silicone | Yes | Yes |
| Resistance to mineral oils and grease | Highly resistant | Limited resistance |
| UL/CSA approvals | – | OFNG, UL1651 FT4/IEEE1202 |
| UV-resistant | Yes | Yes |
| Rodent protection | – | – |
| Gigabit length | | |
| • 1000BaseSX | 750 m | 750 m |
| • 1000BaseLX | 2,000 m | 2,000 m |

## Technical specifications (continued)

| Cable type | INDOOR Fiber Optic<br>Indoor cable | Fiber Optic<br>Standard cable |
|---|---|---|
| |  |  |
| Applications | Non-crush, halogen-free and fire-retardant cable for indoor installation | Universal cable for installation indoors and outdoors |
| Type of supply | Sold by the meter, pre-assembled with 4 BFOC connectors | Sold by the meter, pre-assembled with 4 BFOC connectors |
| Cable type (standard designation) | T-VHH 2G62.5/125<br>3.2B200+0.9F600 F TB3 OR FRNC | AT-VYY 2G62,5/125<br>3.1B200 + 0.8F600 F |
| Fiber type | Multimode graded-index fiber 62.5/125 mm | Multimode graded-index fiber 62.5/125 mm |
| Attenuation at 850 nm<br>Attenuation at 1300 nm | ≤ 3.5 dB/km<br>≤ 1.0 dB/km | ≤ 3.1 dB/km<br>≤ 0.8 dB/km |
| Modal bandwidth at 850 nm<br>Modal bandwidth at 1300 nm | ≥ 200 MHz *km<br>≥ 500 MHz *km | ≥ 200 MHz *km<br>≥ 600 MHz *km |
| Number of fibers | 2 | 2 |
| Cable design | Segmentable inner conductor | Segmentable outer conductor |
| Core type | Fixed core | Compact core |
| Materials | | |
| • Basic element | Copolymer, gray (FRNC) | PVC, gray |
| • Strain relief | Aramid fiber | Kevlar fiber and impregnated glass fiber |
| • Outer sheath/color of cable | Copolymer, light orange (FRNC) | PVC, black |
| Mechanical characteristics | | |
| • Dimensions of basic element | (2.9 ± 0.1) mm Ø | (3.5 ± 0.2) mm Ø |
| • Cable dimensions | (3.9 × 6.6) ± 0.2 mm | (6.3 × 9.8) ± 0.4 mm |
| • Cable weight | Approx. 27 kg/km | Approx. 74 kg/km |
| • Permissible tensile force | ≤ 800 N (temporary) | ≤ 500 N (temporary) |
| • Bending radius | ≥ 50 mm (when routing)<br>≥ 30 mm (during operation) only on the flat side | ≥ 100 mm only on the flat side |
| • Resistant to lateral force | 10.000 N/10 cm (temporary)[1)]<br>2.000 N/10 cm (continuous)[2)] | – |
| • Impact resistant (starting energy/number/hammer Ø) | 1.5 Nm/20 impacts/12.5 mm | – |
| Perm. ambient conditions | | |
| • Routing and installation temperature | –5 °C to +50 °C | –5 °C to +50 °C |
| • Operating temperature | –20 °C to +60 °C | –20 °C to +60 °C |
| • Storage temperature | –25 °C to +70 °C | –25 °C to +70 °C |
| Behavior in fire | Flame-retardant to IEC 60332-1 acc. to VDE 0482-265-2-1 | Flame-retardant to IEC 60332-3 acc. to VDE 0482-266-2-4 |
| Halogen-free | Yes | – |
| No silicone | Yes | Yes |
| Resistance to mineral oils and grease | – | – |
| UL approval | – | – |
| UV-resistant | – | – |
| Rodent protection | – | Yes |
| Gigabit length | | |
| • 1000BaseSX | – | – |
| • 1000BaseLX | – | – |

1) Attenuation change reversible max. 0.3 dB
2) Attenuation change reversible max. 0.1 dB

## Technical specifications (continued)

| Cable type | Flexible Fiber Optic Trailing cable | SIENOPYR Marine duplex fiber-optic cable [3] |
|---|---|---|
| |  |  |
| Applications | Flexible cable for routing in cable carriers indoors and outdoors | Fixed routing on ships and on offshore platforms in any room and on open deck; marine approval |
| Type of supply | Sold by the meter, pre-assembled with 4 BFOC connectors | Sold by the meter |
| Cable type (standard designation) | AT-W11Y (ZN) 11Y 2G62.5/125 3.1B200 + 0.8F600 F | MI-VHH 2G 62.5/125 3.1B200 + 0.8F600 + 2 x 1CU |
| Fiber type | Multimode gradient fiber 62.5/125 mm | Multimode gradient fiber 62.5/125 mm |
| Attenuation at 850 nm<br>Attenuation at 1300 nm | ≤ 3.1 dB/km<br>≤ 0.8 dB/km | ≤ 3.1 dB/km<br>≤ 0.8 dB/km |
| Modal bandwidth at 850 nm<br>Modal bandwidth at 1300 nm | ≥ 200 MHz *km<br>≥ 600 MHz *km | ≥ 200 MHz *km<br>≥ 600 MHz *km |
| Number of fibers | 2 | 2 |
| Cable design | Segmentable outer conductor | Segmentable outer conductor |
| Core type | Hollow core, filled | Full core |
| Materials | | |
| • Basic element | PUR, black | Polyolefin |
| • Strain relief | Aramid fiber, also GFP central element | Aramid fiber |
| • Outer sheath/color of cable | PUR, black | SHF1 mixture, black |
| Mechanical characteristics | | |
| • Dimensions of basic element | (3.5 ± 0.2) mm Ø | (2.9 ± 0.2) mm Ø |
| • Cable dimensions | 13.4 ± 0.4 mm (external diameter) | 13.3 ± 0.5 mm |
| • Cable weight | Approx. 135 kg/km | Approx. 220 kg/km |
| • Permissible tensile force | ≤ 2000 N (temporary)<br>≤ 1000 N (continuous) | ≤ 500 N (temporary)<br>≤ 250 N (continuous) |
| • Bending radius | ≥ 150 mm min. 100,000 bending cycles | 133 mm (once)<br>266 mm (more than once) |
| Perm. ambient conditions | | |
| • Routing and installation temperature | –5 °C to +50 °C | –10 °C to +50 °C |
| • Operating temperature | –30 °C to +60 °C | –40 °C to +80 °C [1]<br>–40 °C to +70 °C [2] |
| • Storage temperature | –30 °C to +70 °C | –40 °C to +80 °C |
| Behavior in fire | – | flame-retardant acc. to IEC 60332-3 Cat A |
| Halogen-free | – | Yes |
| Silicone-free | Yes | Yes |
| Resistance to mineral oils and grease | – | – |
| UL approval | – | – |
| UV-resistant | Yes | – |
| Rodent protection | – | – |
| Gigabit length | | |
| • 1000BaseSX | – | – |
| • 1000BaseLX | – | – |

1) With copper cores and no load

2) With copper cores and maximum load (6 A)

3) Marine approval
- Lloyd Register of Shipping
- Germanischer Lloyd
- Registro Staliano Navale
- Bureau Veritas

## Glass FOC

| Ordering data | Order No. |
|---|---|
| **FO Standard Cable** 50/125 [2] | |
| Sold by the meter; max. quantity 3000 m; minimum order 20 m; | **6XV1 873-2A** |
| Preferred lengths [1] pre-assembled with 4 SC connectors | |
| • 3 m | Available soon |
| • 5 m | Available soon |
| • 10 m | Available soon |
| • 20 m | Available soon |
| • 50 m | Available soon |
| • 100 m | Available soon |
| • 200 m | Available soon |
| • 300 m | Available soon |
| **FO Trailing Cable** 50/125 [2] | |
| Sold by the meter; max. quantity 3000 m; minimum order 20 m; | **6XV1 873-2C** |
| **FO Trailing Cable GP** 50/125 [2] | |
| Sold by the meter; max. quantity 3000 m; minimum order 20 m; | **6XV1 873-2D** |
| **FO Ground Cable** 50/125 [2] | |
| Sold by the meter; max. quantity 3000 m; minimum order 20 m; | **6XV1 873-2G** |
| **FIBER OPTIC CABLE standard cable** (62,5/125), splittable [2] | |
| Goods sold by the meter Delivery consignment max. 4000 m Minimum order quantity 20 m | **6XV1 820-5AH10** |
| Preferred lengths [1] Preassembled with 4 BFOC connectors | |
| • 1 m | **6XV1 820-5BH10** |
| • 2 m | **6XV1 820-5BH20** |
| • 3 m | **6XV1 820-5BH30** |
| • 4 m | **6XV1 820-5BH40** |
| • 5 m | **6XV1 820-5BH50** |
| • 10 m | **6XV1 820-5BN10** |
| • 15 m | **6XV1 820-5BN15** |
| • 20 m | **6XV1 820-5BN20** |
| • 30 m | **6XV1 820-5BN30** |
| • 40 m | **6XV1 820-5BN40** |
| • 50 m | **6XV1 820-5BN50** |
| • 55 m | **6XV1 820-5BN55** |
| • 60 m | **6XV1 820-5BN60** |
| • 65 m | **6XV1 820-5BN65** |
| • 70 m | **6XV1 820-5BN70** |
| • 75 m | **6XV1 820-5BN75** |
| • 80 m | **6XV1 820-5BN80** |
| • 100 m | **6XV1 820-5BT10** |
| • 120 m | **6XV1 820-5BT12** |
| • 130 m | **6XV1 820-5BT13** |
| • 150 m | **6XV1 820-5BT15** |
| • 200 m | **6XV1 820-5BT20** |
| • 250 m | **6XV1 820-5BT25** |
| • 300 m | **6XV1 820-5BT30** |

| | Order No. |
|---|---|
| **INDOOR FIBER OPTIC CABLE for indoor applications** (62,5/125), splittable [2] | |
| Meter goods Delivery consignment max. 2000 m Minimum order quantity 20 m | **6XV1 820-7AH10** |
| Preferred lengths Preassembled with 4 BFOC connectors | |
| • 0.5 m | **6XV1 820-7BH05** |
| • 1 m | **6XV1 820-7BH10** |
| • 2 m | **6XV1 820-7BH20** |
| • 3 m | **6XV1 820-7BH30** |
| • 5 m | **6XV1 820-7BH50** |
| • 10 m | **6XV1 820-7BN10** |
| • 15 m | **6XV1 820-7BN15** |
| • 20 m | **6XV1 820-7BN20** |
| • 25 m | **6XV1 820-7BN25** |
| • 50 m | **6XV1 820-7BN50** |
| • 75 m | **6XV1 820-7BN75** |
| • 100 m | **6XV1 820-7BT10** |
| **SIENOPYR Marine duplex fiber-optic cable** (62,5/125) FOC for installation on board ships and offshore units meter goods max. consignment 1000 m | **6XV1 830-0NH10** |
| **FLEXIBLE FIBER OPTIC CABLE trailing cable** (62,5/125), splittable [2] | |
| Meter goods Delivery consignment max. 2000 m Minimum order quantity 20 m | **6XV1 820-6AH10** |
| Preferred lengths Preassembled with 4 BFOC connectors | |
| • 1 m | **6XV1 820-6BH10** |
| • 2 m | **6XV1 820-6BH20** |
| • 3 m | **6XV1 820-6BH30** |
| • 5 m | **6XV1 820-6BH50** |
| • 10 m | **6XV1 820-6BN10** |
| • 15 m | **6XV1 820-6BN15** |
| • 20 m | **6XV1 820-6BN20** |
| • 30 m | **6XV1 820-6BN30** |
| • 50 m | **6XV1 820-6BN50** |
| • 75 m | **6XV1 820-6BN75** |
| • 100 m | **6XV1 820-6BT10** |

1) Special FO cables, lengths and accessories are available on request

2) Special tools and trained personnel are required to assemble glass fiber optic cable

3) Additional language versions and manuals can be found for the various products at: http://www.siemens.com/automation/csi/net

## Ordering data

| Ordering data | Order No. |
|---|---|
| ***Accessories*** | |
| **BFOC connector set**<br>for FIBER-OPTIC CABLE, standard, trailing cable, inner conductor and SIENOPYR marine duplex fiber-optic cable 20 pcs. | **6GK1 901-0DA20-0AA0** |
| **Manual for TP and FO networks**<br>Paper version<br>Network architecture, configuring, network components, installation | |
| • German | **6GK1 970-1BA10-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET manual collection**<br>Electronic manuals for communication systems, protocols, products<br>on CD-ROM<br>German/English | **6GK1 975-1AA00-3AA0** |

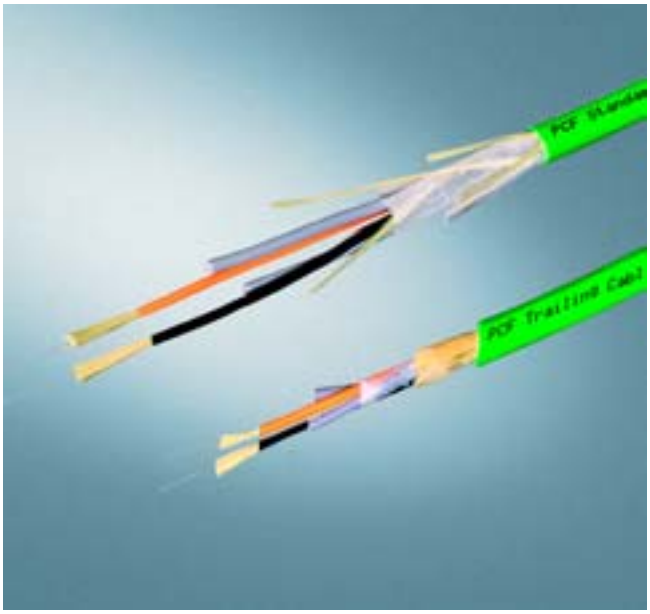
## More information

Additional components for the SIMATIC NET cable range can be ordered from your local contact.

For technical support, please contact:
J. Hertlein, A&D SE PS
Tel.: +49 911/750 44 65
Fax: +49 911/750 99 91
E-mail: juergen.hertlein@fthw.siemens.de

## Plastic and PCF fiber-optic cable

### Overview



- Electrical isolation of PROFIBUS devices and PROFIBUS segments
- Protection of the transmission path against electromagnetic interference
- Up to 80 m cable length with plastic fiber-optic cables and up to 400 m with PCF fiber-optic cables
- Rugged fiber-optic standard cables, designed for industrial applications
- Extensive approvals (UL)

### Benefits

get Designed for Industry

- Plastic and PCF fiber-optic cables can be pre-assembled on site
- Time savings on start-up thanks to pre-assembled cables
- Protection of the transmission path against electromagnetic interference
- Tap-proof, because the cable does not radiate

### Application

SIMATIC NET plastic and PCF fiber-optic cables are used in combination with OLM/P11 and OLM/P12 for constructing optical PROFIBUS networks or for the optical connection of segments in RS 485 technology in indoor applications.

Plastic fiber-optic cables and segmented PCF fiber-optic cables can be assembled on site with 2 x 2 BFOC connectors. The maximum cable length between two OLM/P11 or OLM/P12 is 80 m.

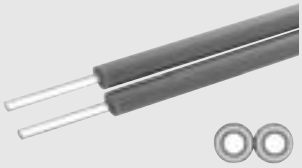
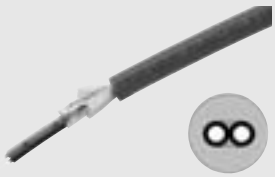
Longer cable lengths up to 400 m can be achieved using PCF fiber-optic cables. These cables are also available preassembled with 4 BFOC connectors.

### Design

Different types of plastic and PCF fiber-optic cables are offered:

- **Plastic FOC, duplex core;**
  two flat cores with PVC inner sheath and without outer sheath for indoor applications with low mechanical stress such as laboratory setups or inside cabinets. Cable lengths up to 50 m.
- **Plastic FOC, standard cable;**
  rugged round cable with violet PVC outer sheath and Kevlar tension components as well as two plastic fibers with a rugged polyamide inner sheath. For indoor applications with cable lengths up to 80 m.
- **PCF fiber-optic cable, standard cables:**
  - PCF Fiber Optic standard cable;
    rugged round cable with violet PVC outer sheath and Kevlar tension components for indoor applications with cable lengths of up to 400 m.
    The cable is not suitable for assembly in the field (only available pre-assembled with an insertion tool)
  - PCF Standard Cable;
    rugged round cable with green PVC outer sheath and Kevlar tension elements for indoor and outdoor applications with cable lengths of up to 400 m;
    the cable is suitable for assembly in the field.
- **PCF fiber-optic trailing cable;**
  rugged round cable with green outer sheath and Kevlar tension elements for trailing cable applications with cable lengths of up to 400 m. The cable is suitable for assembly in the field.
  Two cable variants are available for this application:
  - PCF Trailing Cable;
    cable for high mechanical stress, PUR outer sheath, no UL approval
  - PCF Trailing Cable GP (general purpose);
    cable for low mechanical stress, PVC outer sheath, with UL approval

## Technical specifications

| Cable type | PROFIBUS Plastic Fiber Optic Duplex Core | PROFIBUS Plastic Fiber Optic Standard Cable | PROFIBUS PCF Fiber Optic Standard Cable |
|---|---|---|---|
| Core cross-section |  |  |  |
| Applications | Indoor applications with low mechanical loading, such as laboratory setups or inside cabinets, with cable lengths up to 50 m | For indoor applications with cable lengths up to 80 m | For indoor applications with cable lengths up to 300 m |
| Type of supply | Sold by the meter; for assembly on site with 2 x 2 simplex connectors | Preassembled with 2 x 2 BFOC connectors or sold be the meter | Only preassembled with 2 x 2 BFOC plugs; cable is not suitable for assembly in the field. |
| Cable type (standard designation) | I-VY2P 980/1000 150A | I-VY4Y2P 980/1000 160A | I-VY2K 200/230 10A17+8B20 |
| Fiber type | Step-index fiber | Step-index fiber | Step-index fiber |
| Attenuation | | | |
| • at 660 nm | ≤ 230 dB/km | ≤ 230 dB/km | ≤ 10 dB/km |
| Number of fibers | 2 | 2 | 2 |
| Materials | | | |
| • Fiber core | Polymethylmethacrylate (PMMA) | Polymethylmethacrylate (PMMA) | Quartz glass |
| • Cladding | Fluoridated special polymer | Fluoridated special polymer | Fluoridated special polymer |
| • Inner sheath/color | PVC, gray | PA, black or orange | –[1] |
| • Outer sheath/color | – | PVC, violet | PVC, violet |
| • Strain relief | – | Kevlar fibers | Kevlar fibers |
| Mechanical characteristics | | | |
| • Diameter of fiber core | 980 µm | 980 µm | 200 µm |
| • Outer diameter of cladding | 1000 µm | 1000 µm | 230 µm |
| • Diameter of inner sheath | 2.2 ± 0.01 mm Ø | 2.2 ± 0.01 mm Ø | – |
| • Cable dimensions | 2.2 × 4.4 mm ± 0.01 mm | 7.8 ± 0.3 mm Ø | 4.7 ± 0.3 mm Ø |
| • Cable weight | 7.8 kg/km | 65 kg/km | 22 kg/km |
| • Maximum permissible tensile force | | | |
| - Temporary | ≤ 50 N | ≤ 100 N | ≤ 500 N |
| - Continuously | Not suitable for continuous tensile load | Not suitable for continuous tensile load | ≤ 100 N (only on strain relief, ≤ 50 N on plug or single core) |
| • Bending radius | | | |
| - Once without tensile force | ≥ 30 mm | ≥ 100 mm | ≥ 75 mm |
| - More than once with tensile force | ≥ 50 mm (only over flat side) | ≥ 150 mm | ≥ 75 mm |
| • Resistance to lateral force per 10 cm cable length (temporary) | ≤ 35 N/10 cm | ≤ 100 N/10 cm | ≤ 750 N/10 cm |
| • Resistant to | | | |
| - Mineral oil ASTM No. 2 | Limited | Limited | Limited |
| - Grease | Limited | Limited | Limited |
| - Water | Limited | Limited | Limited |
| - UV radiation | Not UV resistant | Limited | Limited |
| Perm. ambient conditions | | | |
| • Operating temperature | –30 °C to +70 °C | –30 °C to +70 °C | –20 °C to +70 °C |
| • Transport/storage temperature | –35 °C to +85 °C | –30 °C to +70 °C | –30 °C to +70 °C |
| • Routing | 0 °C to +50 °C | 0 °C to +50 °C | –5 °C to +50 °C |
| • In short-circuit on conductor | | | – |
| Behavior in fire | Flame-retardant acc. to Flame-Test VW-1 to UL 1581 | Flame-retardant acc. to Flame-Test VW-1 to UL 1581 | Flame-retardant acc. to flame test VW-1 to UL 1581 |
| Silicone-free | Contains small quantities of a non-migrating silicone elastomer | Yes | Yes |

1) Sold by the meter without inner sheath, not suitable for assembly in the field.

5

**Technical specifications** (continued) **– New PCF cables for assembly in the field**

| Cable type | PCF Standard Cable | PCF Trailing Cable | PCF Trailing Cable GP |
|---|---|---|---|
| Core cross-section |  |  |  |
| Applications | for permanent indoor and outdoor installation | for moving applications | for moving applications |
| Type of supply | Sold by the meter | Sold by the meter | Sold by the meter |
| Cable type (standard designation) | I-V(ZN)YY 2K200/230 | AT-V(ZN)Y(ZN)11Y 2K200/230 | AT-V(ZN)Y(ZN)Y 2K200/230 |
| Fiber type | Step index 200/230 | Step index 200/230 | Step index 200/230 |
| Attenuation | | | |
| • at 650 nm | 10 dB/km | 10 dB/km | 10 dB/km |
| Modal bandwidth | | | |
| • at 650 nm | 17 MHz * km | 17 MHz * km | 17 MHz * km |
| Number of fibers | 2 | 2 | 2 |
| Materials | | | |
| • Fiber core | Quartz glass | Quartz glass | Quartz glass |
| • Cladding | Special polymer | Special polymer | Special polymer |
| • Inner sheath/color | PVC, orange/black | PVC, orange/black | PVC, orange/black |
| • Outer sheath/color | PVC, green | PUR, green | PVC, green |
| • Strain relief | Aramid fiber | Aramid fiber | Aramid fiber |
| Mechanical characteristics | | | |
| • Diameter of fiber core | 200 µm | 200 µm | 200 µm |
| • Outer diameter of cladding | 230 µm | 230 µm | 230 µm |
| • Diameter of inner sheath | 2.2 mm Ø | 2.2 mm Ø | 2.2 mm Ø |
| • Cable dimensions | 7.2 mm | 9 mm | 9 mm |
| • Cable weight | 45 kg/km | 85 kg/km | 85 kg/km |
| • Maximum permissible tensile force | 100 N | 800 N | 800 N |
| • Bending radius | 105 mm | 200 mm | 200 mm |
| • Bending cycles | – | 5.000.000 | 1.000.000 |
| • Resistance to lateral force per 10 cm cable length (temporary) | 100 N/cm | 300 N/cm | 300 N/cm |
| • Resistant to | | | |
| - Mineral oil ASTM No. 2 | Limited resistance | Highly resistant | Limited resistance |
| - Grease | Limited resistance | Highly resistant | Limited resistance |
| - Water | - | - | - |
| - UV radiation | Yes | Yes | Yes |
| Perm. ambient conditions | | | |
| • Operating temperature | -25°C to 75°C | -25°C to 70°C | -25°C to 75°C |
| • Transport/storage temperature | -25°C to 75°C | -30°C to 75°C | -30°C to 75°C |
| • Routing | -5°C to 50°C | -5°C to 50°C | -5°C to 50°C |
| • In short-circuit on conductor | | | |
| Behavior in fire | | | |
| UL/CSA approvals | OFNG, UL1651 FT4/IEEE1202 | – | OFNG, UL1651 FT4/IEEE1202 |
| UV-resistant | Yes | Yes | Yes |
| No halogen | - | - | - |
| Silicone-free | Yes | Yes | Yes |

## Ordering data

| | Order No. |
|---|---|
| **PROFIBUS Plastic Fiber Optic, standard cable** | |
| Rugged round cable with 2 plastic fiber-optic cores, PVC outer sheath and PA inner sheath, without connector, for indoor use | |
| • Sold by the meter | **6XV1 821-0AH10** |
| • 50 m ring | **6XV1 821-0AN50** |
| • 100 m ring | **6XV1 821-0AT10** |
| **PROFIBUS Plastic Fiber Optic, standard cable** | |
| Rugged round cable with 2 plastic fiber-optic cores, PVC outer sheath and PA inner sheath, for indoor use, preassembled with 2 × 2 BFOC connectors, length of lashes 20 cm each, for connecting OLM/P.. | |
| **Preferred lengths** | |
| • 1 m | **6XV1 821-0BH10** |
| • 2 m | **6XV1 821-0BH20** |
| • 5 m | **6XV1 821-0BH50** |
| • 10 m | **6XV1 821-0BN10** |
| • 15 m | **6XV1 821-0BN15** |
| • 20 m | **6XV1 821-0BN20** |
| • 25 m | **6XV1 821-0BN25** |
| • 30 m | **6XV1 821-0BN30** |
| • 50 m | **6XV1 821-0BN50** |
| • 65 m | **6XV1 821-0BN65** |
| • 80 m | **6XV1 821-0BN80** |
| **PROFIBUS Plastic Fiber Optic, duplex core** | |
| Plastic fiber-optic cable with two cores, PVC sheath, without connector for use in environments with low mechanical stress | |
| 50 m ring | **6XV1 821-2AN50** |
| **PROFIBUS Plastic Fiber Optic, stripping tool set** | **6GK1 905-6PA10** |
| Tools for removing the outer sheath or core sheath of PROFIBUS Plastic Fiber Optic cables | |
| **PROFIBUS Plastic Fiber Optic, BFOC connector set** | **6GK1 905-1PA00** |
| 20 BFOC connectors for assembling PROFIBUS Plastic Fiber Optic cables for OLM/P.. | |
| **PROFIBUS Plastic Fiber Optic, BFOC crimping tool** | **6GK1 905-6PB00** |
| For connecting BFOC connectors to PROFIBUS Plastic Fiber Optic cables | |
| **PROFIBUS Plastic Fiber Optic, BFOC polishing set** | **6GK1 905-6PS00** |
| Polishing set for grinding and polishing the BFOC connector face ends for PROFIBUS Plastic Fiber Optic cables with OLM/P.. | |

| | Order No. |
|---|---|
| **PROFIBUS PCF Fiber Optic standard cable** | |
| PCF fiber-optic cable with 2 cores, PVC outer sheath, for bridging long distances up to 400 m, preassembled with 2 × 2 BFOC connectors, length of lashes 20 cm each, with insertion guide mounted at one end for connecting OLM/P.. | |
| **Preferred lengths** | |
| • 75 m | **6XV1 821-1BN75** |
| • 100 m | **6XV1 821-1BT10** |
| • 150 m | **6XV1 821-1BT15** |
| • 200 m | **6XV1 821-1BT20** |
| • 250 m | **6XV1 821-1BT25** |
| • 300 m | **6XV1 821-1BT30** |
| • 400 m | **6XV1 821-1BT40** |
| **PROFIBUS PCF Standard Cable 200/230** | **6XV1 861-2A** |
| Standard cable, segmentable, sold by the meter; max. quantity 2000 m; minimum order 20 m; | |
| **PROFIBUS PCF Trailing Cable 200/230** | **6XV1 861-2C** |
| Trailing cable, segmentable, sold by the meter; max. quantity 2000 m; minimum order 20 m; | |
| **PROFIBUS PCF Trailing Cable GP 200/230** | **6XV1 861-2D** |
| Trailing cable, segmentable, sold by the meter; max. quantity 2000 m; minimum order 20 m; | |
| **Manual for PROFIBUS networks** | |
| Paper version | |
| Network architecture, project management, network components, mounting | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET Manual Collection** | **6GK1 975-1AA00-3AA0** |
| Electronic manuals for communication systems, communication protocols and communication products | |
| on CD-ROM German/English | |

## More information

You can order components supplementary to the SIMATIC NET cabling range from your local contact.
For technical support, please contact:
J. Hertlein, A&D SE V22
Tel.: +49 911/750 44 65
Fax: +49 911/750 99 91
E-mail: juergen.hertlein@siemens.com

# PCF FOC termination kits

## Overview

- Compact, rugged assembly case for PCF fiber-optic cables
- Special versions for easy assembly of HP Simplex and BFOC plugs on PCF fiber-optic cables
- The quality of the assembly can be checked using the enclosed microscope

## Benefits

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- Easy installation of the unassembled cables in industrial plants
- Flexible assembly of connectors on PCF fiber-optic cables on site (HP Simplex, BFOC connectors)
- Mistakes are prevented with easy visual inspection of the assembled connector on site using a microscope
- PCF fiber-optic cables are easily repaired on site by installing a new PCF cable

## Application

SIMATIC NET PCF fiber-optic conductors are used to construct optical indoor and outdoor PROFIBUS DP networks. They are easily assembled on site with 2 x 2 Simplex connectors or 2 x 2 BFOC connectors. The maximum cable length between two DP devices is 300 m, and between two OLMs it is 400 m.

PROFIBUS DP devices that are equipped with an integral optical interface (Simplex connection) include OBT, CP 342-5 FO, CP 5613 FO, CP 5614 FO, IM 153-2 FO and IM 467 FO.

## Design

Two types of assembly cases for PCF fiber-optic cables are offered:

- Assembly case for HP Simplex connectors;
  for local assembly of HP Simplex connectors;
  comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, crimping tool and microscope
- Assembly case for BFOC connectors;
  for local assembly of BFOC connectors;
  comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, and microscope.

## Ordering data

| Ordering data | Order No. |
|---|---|
| **Termination Kit for Simplex connectors**<br>Assembly case for local assembly of PCF Simplex plugs; comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, crimping tool and microscope | **6GK1 900-0KL00-0AA0** |
| **Termination Kit for BFOC connectors**<br>Assembly case for local assembly of BFOC connectors; comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, and microscope | **6GK1 900-0HL00-0AA0** |
| ***Connector*** | |
| **Simplex connector**<br>with cleaning materials;<br>50 crimp connectors for assembly on PCF fiber-optic cables on site | **6GK1 900-0KB00-0AC0** |
| **BFOC connector**<br>with cleaning materials;<br>20 screw connectors for assembly on PCF fiber-optic cables on site | **6GK1 900-0HB00-0AC0** |

## More information

You can order components supplementary to the SIMATIC NET cabling range from your local contact.
For technical support, please contact:
J. Hertlein, A&D SE V22
Telephone: +49 (0) 911/750 44 65
Fax: +49 (0) 911/750 99 91
E-mail: juergen.hertlein@siemens.com

## Optical Link Module OLM

### Overview

- For constructing PROFIBUS networks (line, star and ring) with glass, PCF and plastic fiber-optic cables
- High availability can be achieved using redundant power supply and redundant cable routes
- Function monitoring through signaling contact
- All PROFIBUS data rates from 9.6 kbit/s to 12 Mbit/s including 45.45 kbit/s for PROFIBUS PA
- The fiber-optic routes can be checked with a voltmeter

### Benefits

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- High network availability through redundant optical ring topology
- Fast error localization through signal contact, LED and measuring jacks
- Wide range through use of glass fiber-optic cables up to a length of 15 km
- OLM/G12-EEC for use outdoors down to –20 °C

### Application

With the PROFIBUS OLM (Optical Link Modules) Version 3, optical PROFIBUS networks can be assembled in line, star and redundant ring topology.

The transmission rate of an FOC line depends on the distance and may be up to 12 Mbit/s.

Applications for OLM are for example:

- PROFIBUS-based system buses
- Inter-building networking with glass FO cables
- Mixed networks with electrical and optical segments
- Large expansion networks (road tunnels, traffic control systems)
- Networks with high availability requirements (redundant ring networks)

### Design

The OLMs have a compact metal housing. It is suitable for mounting on a standard mounting rail and for fixed mounting.

The 24 V supply is provided through a terminal block. Redundant power supply configurations are supported.

The signal contact can be used to transfer a digital signal for evaluation purposes to controllers or operator control and monitoring systems.

OLMs can be combined with each other and individual stations or whole electrical segments integrated in the optical PROFIBUS network through an electrical interface .

The OLMs are available with one or two FOC interfaces with BFOC connection method for various types of FO cables:

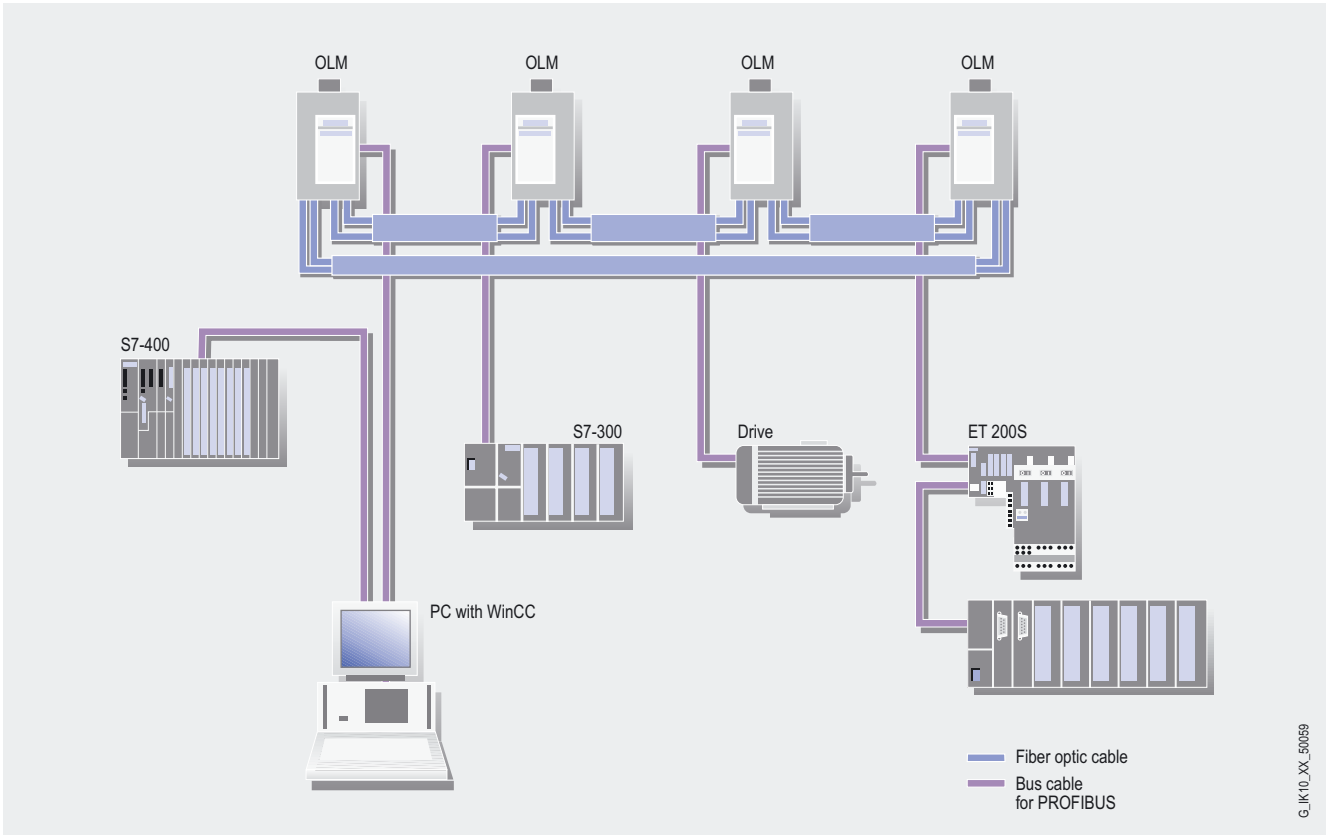
- Plastic FO cables (980/1000 µm) can be used for single line lengths up to 80 m. They can also be preassembled on site with BFOC connectors .
- PCF FO cables (200/230 µm) can be used for single line lengths up to 400 m. They are available preassembled with 4 BFOC connectors and an insertion aid.
- Glass fiber multimode FO cables (62.5/125 µm) like the SIMATIC NET fiber-optic cables can be used for long distances up to 3000 m. These cables are available preassembled with 4 BFOC plugs.
- Single mode FO cables (10/125 µm fibers) can be used for very long distances up to 15 km. They are available on request.

### Function

- Automatic recognition of all PROFIBUS transmission rates: 9.6 kbit/s to 12 Mbit/s including 45.45 kbit/s (PROFIBUS PA)
- Configuration of the following network topologies: line, star, redundant ring
- High availability through media redundancy. The distance between two OLMs in the redundant ring is limited only by the optical sensing range of the modules.
- Segmentable RS485 interface (Sub-D connector)
- Unlimited multimaster mode: extended segmenting function for error localization on fiber-optic cable and RS 485 segments
- Fast localization of faults:
  - Indication of module status through isolated signaling contact.
  - Inspection of the fiber-optic cable quality: measuring output for optical receivers for logging and validity check of the FOC line attenuation with a voltmeter
- High cascading depth: line and redundant ring up to 124 OLM (only limited by monitoring times)

## Optical Link Module OLM

### Integration




Example of a system configuration with OLM for PROFIBUS

## Technical specifications

| | | |
|---|---|---|
| Transmission rates | 9.6 kbit/s to 12 Mbit/s<br>45.45 kbit/s (PROFIBUS PA) | |
| Transit delay | 6 bit times | |
| Interfaces | | |
| • Connection for bus segment station or OLM | 9-pin Sub-D socket | |
| • Connection for power supply and signaling contact | 5-pole pluggable terminal block with detent lugs | |
| • Connection for FOC | 2 or 4 BFOC sockets | |
| • Measuring device connection | 3 test sockets for test plugs, 2 mm diameter | |
| Optical interfaces OLM/P11 and OLM/P12 | **Plastic optical fibers 980/1000 µm 230 dB/km** | **PCF optical fibers 200/230 µm 10 dB/km** |
| • Length of fiber-optic path | 0 to 80 m | 0 to 400 m |
| Optical interfaces OLM/G11, OLM/G12 and OLM/G12-EEC | **Optical glass fibers 62.5/125 µm 3.5 dB/km** | **Optical glass fibers 50/125 µm 3 dB/km** |
| • Wavelength | 860 nm | 860 nm |
| • Launchable transmitter power | -13 dBm | -15 dBm |
| • Receiver sensitivity | -28 dBm | -28 dBm |
| • Permissible fiber-optic path attenuation (system reserve 3 dB) | 12 dB | 10 dB |
| • Length of fiber-optic path | 0 to 3,000 m | 0 to 3,000 m |
| Optical interfaces OLM/G11-1300 and OLM/G12-1300 | **Optical glass fibers 62.5/125 µm 1 dB/km** | **Optical glass fibers 10/125 µm 0.5 dB/km** |
| • Wavelength | 1310 nm | 1310 nm |
| • Launchable transmitter power | -17 dBm | -19 dBm |
| • Receiver sensitivity | -29 dBm | -29 dBm |
| • Permissible fiber-optic path attenuation (system reserve 3 dB) | 10 dB | 8 dB |
| • Length of fiber-optic path | 0 to 10 km | 0 to 15 km |
| Power supply | 24 V DC (18 V to 30 V DC) | |
| Current consumption (at rated voltage) | Max. 200 mA | |
| Power consumption | max. 6 W | |
| Mounting | DIN rail or screwed cable glands | |
| Perm. ambient conditions | | |
| • Operating temperature except OLM/G12-EEC | 0 °C to +60 °C | |
| • OLM/G12-EEC | -20 °C to +60 °C | |
| • Transport/storage temperature | -40 °C to +70 °C | |
| • Relative humidity | Max. 95% at +25 °C | |
| Construction | | |
| • Dimensions (W x H x D) in mm | 39.5 x 110 x 73.2 | |
| • Weight | Approx. 500 g | |
| Degree of protection | IP40 | |

## Ordering data

| Ordering data | Order No. |
|---|---|
| **PROFIBUS OLM/P11**<br>Optical Link Module with 1 x RS 485 and 1 x plastic FOC interface (2 BFOC sockets), with signal contact and measuring output without BFOC connector | **6GK1 502-2CA10** |
| **PROFIBUS OLM/P12**<br>Optical Link Module with 1 x RS 485 and 2 x plastic FOC interface (4 BFOC sockets), with signal contact and measuring output without BFOC connector | **6GK1 502-3CA10** |
| **PROFIBUS OLM/G11**<br>Optical Link Module with 1 x RS 485- and 1 x glass FOC interface (2 BFOC sockets), for standard distances, with signal contact and measuring output | **6GK1 502-2CB10** |
| **PROFIBUS OLM/G12**<br>Optical Link Module with 1 x RS 485 and 2 x glass FOC interface (4 BFOC sockets), for standard distances up to 3000 m, with signal contact and measuring output | **6GK1 502-3CB10** |
| **PROFIBUS OLM/G12-EEC**<br>Optical Link Module with 1 x RS 485 and 2 x glass FOC interface (4 BFOC sockets), for standard distances up to 3000 m, for extended temperature range – 20 °C to +60 °C, with signal contact and measuring output | **6GK1 502-3CD10** |
| **PROFIBUS OLM/G11-1300**<br>Optical Link Module with 1 x RS 485 and 1 x glass FOC interface (2 BFOC sockets), 1300 nm wavelength for long distances up to 15 km, with signal contact and measuring output | **6GK1 502-2CC10** |
| **PROFIBUS OLM/G12-1300**<br>Optical Link Module with 1 x RS 485 and 2 x glass FOC interface (4 BFOC sockets), 1300 nm wavelength for long distances up to 15 km, with signal contact and measuring output | **6GK1 502-3CC10** |
| **Manual for PROFIBUS networks**<br>Paper version<br>Network architecture, configuring, network components, installation | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET manual collection**<br>Electronic manuals for communication systems, protocols, products<br>on CD-ROM<br>German/English | **6GK1 975-1AA00-3AA0** |

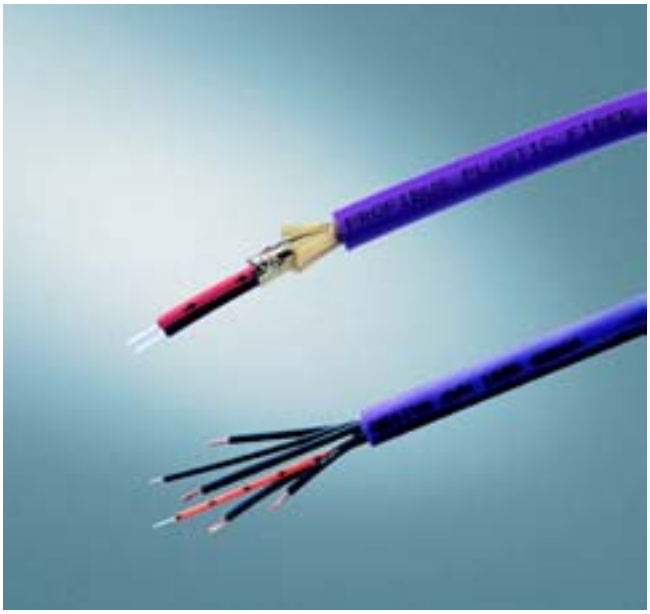
5

# Optical networks with OBT and integrated interface

## Plastic and PCF FOC/DESINA



### Overview



- Electrical isolation of DP devices
- Protection of the transmission path against electromagnetic interference
- Up to 50 m cable length with plastic fiber-optic cables and up to 300 m with PCF fiber-optic cables
- Rugged fiber-optic standard cables, designed for industrial applications
- Hybrid cable for the shared transmission of data and power supply
- Extensive approvals (UL)

### Benefits

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- Plastic and PCF fiber-optic cables can be pre-assembled on site
- Easy connector assembly on site
- Time savings on start-up thanks to pre-assembled cables
- Protection of the transmission path against electromagnetic interference
- Tap-proof, because the cable does not radiate
- A cable for the shared transmission of data and power

### Application

SIMATIC NET plastic and PCF fiber-optic conductors are used to construct optical indoor PROFIBUS DP networks.

Plastic fiber-optic cables and segmented PCF fiber-optic cables can be assembled easily on site with 2 x 2 simplex plugs. The maximum cable length between two DP devices is 50 m.

Longer cable lengths up to 300 m can be achieved using PCF fiber-optic cables. These cables are also available preassembled with 4 simplex plugs.

Devices that are equipped with an integral optical interface (simplex connection) include OBT, CP 342-5 FO, CP 5613 FO, CP 5614 FO, IM 153-2 FO and IM 467 FO.

The ECOFAST Fiber Optic Hybrid Cable is ideal for connecting DESINA components installed at machine level.

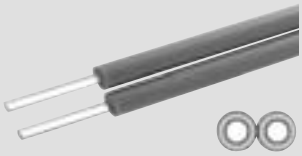
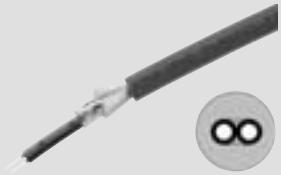
### Design

Different types of plastic and PCF fiber-optic cables are offered:

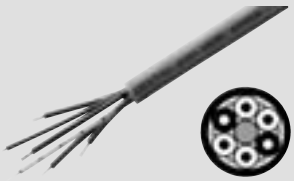
- **Plastic FOC, duplex core;**
  two flat cores with PVC inner sheath and without outer sheath for indoor applications with low mechanical stress such as laboratory setups or inside cabinets. Cable lengths up to 50 m.
- **Plastic FOC, standard cable;**
  rugged round cable with violet PVC outer sheath and Kevlar tension components as well as two plastic fibers with a rugged polyamide inner sheath. For indoor applications with cable lengths up to 50 m.
- **PCF fiber-optic cable, standard cables:**
  - PCF Fiber Optic standard cable;
    rugged round cable with violet PVC outer sheath and Kevlar tension components for indoor applications with cable lengths of up to 300 m.
    The cable is not suitable for assembly in the field (only available pre-assembled with an insertion tool)
  - PCF Standard Cable;
    rugged round cable with green PVC outer sheath and Kevlar tension elements for indoor and outdoor applications with cable lengths of up to 300 m;
    the cable is suitable for assembly in the field.
- **PCF fiber-optic trailing cable;**
  rugged round cable with green outer sheath and Kevlar tension elements for trailing cable applications with cable lengths of up to 300 m. The cable is suitable for assembly in the field. Two cable variants are available for this application:
  - PCF Trailing Cable;
    cable for high mechanical stress, PUR outer sheath, no UL approval
  - PCF Trailing Cable GP (general purpose);
    cable for low mechanical stress, PVC outer sheath, with UL approval
- **ECOFAST Fiber Optic Hybrid Cable**
  The rugged, hybrid trailing cable contains two plastic fiber-optic cables for data transmission and four copper wires (1.5 $mm^2$) for supplying power to DESINA [1] stations.

1) DESINA is the trademark for **DE**centralized and **S**tandardized **IN**stall**A**tion technology for machine tools.

## Technical specifications

| Cable type | PROFIBUS Plastic Fiber Optic Duplex Core | PROFIBUS Plastic Fiber Optic Standard Cable |
|---|---|---|
| Core cross-section |  |  |
| Applications | Indoor applications with low mechanical loading, such as laboratory setups or inside cabinets, with cable lengths up to 50 m | For indoor applications with cable lengths up to 50 m |
| Type of supply | Sold by the meter; for assembly on site with 2 x 2 simplex plugs | Sold by the meter; for assembly on site with 2 x 2 simplex plugs |
| Cable type (standard designation) | I-VY2P 980/1000 150A | I-VY4Y2P 980/1000 160A |
| Fiber type | Step-index fiber | Step-index fiber |
| Attenuation | | |
| • at 660 nm | ≤ 230 dB/km | ≤ 230 dB/km |
| Number of fibers | 2 | 2 |
| Materials | | |
| • Fiber core | Polymethylmethacrylate (PMMA) | Polymethylmethacrylate (PMMA) |
| • Cladding | Fluoridated special polymer | Fluoridated special polymer |
| • Inner sheath/color | PVC, gray | PA, black or orange |
| • Outer sheath/color | – | PVC, violet |
| • Strain relief | – | Kevlar thread |
| Mechanical characteristics | | |
| • Diameter of fiber core | 980 µm | 980 µm |
| • Outer diameter of cladding | 1000 µm | 1000 µm |
| • Diameter of inner sheath | 2.2 ± 0.01 mm Ø | 2.2 ± 0.01 mm Ø |
| • Cable dimensions | 2.2 × 4.4 mm ± 0.01 mm | 7.8 ± 0.3 mm Ø |
| • Cable weight | 7.8 kg/km | 65 kg/km |
| • Maximum permissible tensile force | | |
| - Temporary | ≤ 50 N | ≤ 100 N |
| - Continuously | Not suitable for continuous tensile load | Not suitable for continuous tensile load |
| • Bending radius | | |
| - Once without tensile force | ≥ 30 mm | ≥ 100 mm |
| - More than once with tensile force | ≥ 50 mm (only over flat side) | ≥ 150 mm |
| • Resistance to lateral force per 10 cm cable length (temporary) | ≤ 35 N/10 cm | ≤ 100 N/10 cm |
| • Resistant to | | |
| - Mineral oil ASTM No. 2 | Limited | Limited |
| - Mineral grease/water | Limited | Limited |
| - UV radiation | Not UV resistant | Limited |
| Perm. ambient conditions | | |
| • Operating temperature | –30 °C to +70 °C | –30 °C to +70 °C |
| • Transport/storage temperature | –35 °C to +85 °C | –30 °C to +70 °C |
| • Routing | 0 °C to +50 °C | 0 °C to +50 °C |
| Behavior in fire | Flame-retardant acc. to Flame-Test VW-1 to UL 1581 | Flame-retardant acc. to Flame-Test VW-1 to UL 1581 |
| UL/CSA approvals | No | No |
| UV-resistant | No | No |
| No halogen | No | No |
| No silicone | Yes | Yes |

## Technical specifications (continued)

| Cable type | PROFIBUS PCF Fiber Optic Standard Cable | ECOFAST Fiber Optic Hybrid Cable (DESINA-compatible) |
|---|---|---|
| Core cross-section |  |  |
| Applications | Pre-assembled cable for indoor applications with cable lengths up to 300 m; not suitable for connector assembly in the field. | DESINA-compatible devices, e.g. for ET 200X |
| Type of supply | Only preassembled with 2 x 2 simplex plugs | Sold by the meter; can be assembled on site with DESINA plugs or preassembled with 2 DESINA plugs |
| Cable type (standard designation) | I-VY2K 200/230 10A17+8B20 | J-V11Y 4Y2P980/1000 230A10 FFLIY 4 × 1.5 |
| Fiber type | Step-index fiber | Step-index fiber |
| Attenuation | | |
| • at 660 nm | ≤ 10 dB/km | ≤ 260 dB/km |
| Number of fibers | 2 | 2 × FOC, 4 × copper |
| Materials | | |
| • Fiber core | Quartz glass | Polymethylmethacrylate (PMMA) |
| • Cladding | Fluoridated special polymer | Fluoridated special polymer |
| • Inner sheath/color | –[1] | PA, black, orange |
| • Outer sheath/color | PVC, violet | PUR, violet |
| • Strain relief | Kevlar thread | – |
| • Copper cores | | |
| - Rated voltage | – | 300 V |
| - Current load | – | 10 A |
| - Nominal area | – | 1.5 $mm^2$ |
| - Sheath material/color | – | PVC, black |
| Mechanical characteristics | | |
| • Diameter of fiber core | 200 µm | 980 µm |
| • Outer diameter of cladding | 230 µm | 1000 µm |
| • Diameter of inner sheath | – | 2.2 ± 0.01 mm Ø |
| • Cable dimensions | 4.7 ± 0.3 mm Ø | 10.6 mm Ø |
| • Cable weight | 22 kg/km | 135 kg/km |
| • Maximum permissible tensile force | | |
| - Temporary | ≤ 500 N | ≤ 100 N |
| - Continuously | ≤ 100 N (only on strain relief, ≤ 50 N on plug or single core) | ≤ 30 N |
| • Bending radius | | |
| - Once without tensile force | ≥ 75 mm | – |
| - More than once with tensile force | ≥ 75 mm | ≥ 106 mm |
| • Resistance to lateral force per 10 cm cable length (temporary) | ≤ 750 N/10 cm | ≤ 100 N/10 cm |
| • Resistant to | | |
| - Mineral oil ASTM No. 2 | Limited | Limited |
| - Mineral grease/water | Limited | Limited |
| - UV radiation | Limited | No |
| Perm. ambient conditions | | |
| • Operating temperature | –20 °C to +70 °C | +5 °C to +70 °C |
| • Transport/storage temperature | –30 °C to +70 °C | –30 °C to +70 °C |
| • Routing | –5 °C to +50 °C | +5 °C to +70 °C |
| • In short-circuit on conductor | – | +160 °C (max. 5 s) |
| Behavior in fire | Flame-retardant acc. to Flame-Test VW-1 to UL 1581 | Flame-retardant acc. to Flame-Test VW-1 to UL 1581 |
| UL/CSA approvals | No | No |
| UV-resistant | No | No |
| No halogen | No | No |
| No silicone | Yes | Yes |

1) Sold by the meter without inner sheath, not suitable for assembly in the field.

## Technical specifications (continued) – New PCF cables for assembly in the field

| Cable type | PCF Standard Cable | PCF Trailing Cable | PCF Trailing Cable GP |
|---|---|---|---|
| Core cross-section |  |  |  |
| Applications | for permanent indoor and outdoor installation | for moving applications | for moving applications |
| Type of supply | Sold by the meter | Sold by the meter | Sold by the meter |
| Cable type (standard designation) | I-V(ZN)YY 2K200/230 | AT-V(ZN)Y(ZN)11Y 2K200/230 | AT-V(ZN)Y(ZN)Y 2K200/230 |
| Fiber type | Step index 200/230 | Step index 200/230 | Step index 200/230 |
| Attenuation | | | |
| • at 650 nm | 10 dB/km | 10 dB/km | 10 dB/km |
| Modal bandwidth | | | |
| • at 650 nm | 17 MHz * km | 17 MHz * km | 17 MHz * km |
| Number of fibers | 2 | 2 | 2 |
| Materials | | | |
| • Fiber core | Quartz glass | Quartz glass | Quartz glass |
| • Cladding | Special polymer | Special polymer | Special polymer |
| • Inner sheath/color | PVC, orange/black | PVC, orange/black | PVC, orange/black |
| • Outer sheath/color | PVC, green | PUR, green | PVC, green |
| • Strain relief | Aramid fiber | Aramid fiber | Aramid fiber |
| Mechanical characteristics | | | |
| • Diameter of fiber core | 200µm | 200µm | 200µm |
| • Outer diameter of cladding | 230 µm | 230 µm | 230 µm |
| • Diameter of inner sheath | 2.2 mm Ø | 2.2 mm Ø | 2.2 mm Ø |
| • Cable dimensions | 7.2 mm | 9 mm | 9 mm |
| • Cable weight | 45 kg/km | 85 kg/km | 85 kg/km |
| • Maximum permissible tensile force | 100 N | 800 N | 800 N |
| • Bending radius | 105 mm | 200 mm | 200 mm |
| • Bending cycles | – | 5.000.000 | 1.000.000 |
| • Resistance to lateral force per 10 cm cable length (temporary) | 100 N/cm | 300 N/cm | 300 N/cm |
| • Resistant to | | | |
| - Mineral oil ASTM No. 2 | Limited resistance | Highly resistant | Limited resistance |
| - Mineral grease/water | limited resistance | highly resistant | limited resistance |
| - UV radiation | Yes | Yes | Yes |
| Perm. ambient conditions | | | |
| • Operating temperature | -25°C to 75°C | -25°C to 70°C | -25°C to 75°C |
| • Transport/storage temperature | -25°C to 75°C | -30°C to 75°C | -30°C to 75°C |
| • Routing | -5°C to 50°C | -5°C to 50°C | -5°C to 50°C |
| • In short-circuit on conductor | | | |
| Behavior in fire | | | |
| UL/CSA approvals | OFNG, UL1651 FT4/IEEE1202 | – | OFNG, UL1651 FT4/IEEE1202 |
| UV-resistant | Yes | Yes | Yes |
| No halogen | – | – | – |
| No silicone | Yes | Yes | Yes |

## Plastic and PCF FOC/DESINA



| Ordering data | Order No. |
|---|---|
| **PROFIBUS Plastic Fiber Optic, standard cable** | |
| Rugged round cable with 2 plastic fiber-optic cores, PVC outer sheath and PA inner sheath, without connector, for indoor use | |
| • Sold by the meter | **6XV1 821-0AH10** |
| • 50 m ring | **6XV1 821-0AN50** |
| • 100 m ring | **6XV1 821-0AT10** |
| **PROFIBUS Plastic Fiber Optic, duplex core** | |
| Plastic fiber-optic cable with two cores, PVC sheath, without connector for use in environments with low mechanical stress | |
| • 50 m ring | **6XV1 821-2AN50** |
| **PROFIBUS Plastic Fiber Optic, simplex plug/polishing set** | **6GK1 901-0FB00-0AA0** |
| 100 simplex plugs and 5 polishing sets for assembling PROFIBUS Plastic Fiber Optic cables for the optical PROFIBUS DP | |
| **PROFIBUS Plastic Fiber Optic, stripping tool set** | **6GK1 905-6PA10** |
| Tools for removing the outer sheath or core sheath of Plastic Fiber Optic cables | |
| **PROFIBUS PCF Fiber Optic** | |
| PCF fiber-optic cable with 2 cores, PVC outer sheath, for bridging long distances up to 300 m, preassembled with 2 × 2 simplex plugs, length of lashes 30 cm each, with insertion guide mounted at one end, for connecting devices for the optical PROFIBUS DP | |
| **Preferred lengths** | |
| • 50 m | **6XV1 821-1CN50** |
| • 75 m | **6XV1 821-1CN75** |
| • 100 m | **6XV1 821-1CT10** |
| • 150 m | **6XV1 821-1CT15** |
| • 200 m | **6XV1 821-1CT20** |
| • 250 m | **6XV1 821-1CT25** |
| • 300 m | **6XV1 821-1CT30** |
| **PROFIBUS PCF Standard Cable 200/230** | |
| Standard cable, segmentable, sold by the meter; max. quantity 2000 m; minimum order 20 m; | **6XV1 861-2A** |
| **PROFIBUS PCF Trailing Cable 200/230** | |
| Trailing cable, segmentable, sold by the meter; max. quantity 2000 m; minimum order 20 m; | **6XV1 861-2C** |
| **PROFIBUS PCF Trailing Cable GP 200/230** | |
| Trailing cable, segmentable, sold by the meter; max. quantity 2000 m; minimum order 20 m; | **6XV1 861-2D** |
| **ECOFAST Fiber Optic Hybrid Cable (DESINA-compatible)** | |
| Trailing cable with 2 plastic fiber-optic conductors and 4 copper cores, 1.5 mm2 for use in DESINA-compatible devices only | |
| • Sold by the meter | **6XV1 830-6CH10** |
| • Not pre-assembled | |
| - 20 m | **6XV1 830-6CN20** |
| - 50 m | **6XV1 830-6CN50** |
| - 100 m | **6XV1 830-6CT10** |
| • Preassembled with 2 DESINA connectors | |
| - 1.5 m | **6XV1 830-6DH15** |
| - 3 m | **6XV1 830-6DH30** |
| - 5 m | **6XV1 830-6DH50** |
| - 10 m | **6XV1 830-6DN10** |
| - 15 m | **6XV1 830-6DN15** |
| **ECOFAST Fiber Optic Hybrid Plug 180, DESINA-compatible (ECOFAST FOC)** | |
| 2 x FO; 4 x 1.5 mm2 Cu | |
| With male pins (Hanbrid connector) | **6GK1 905-0BA00** |
| With female pins (Hanbrid connector) | **6GK1 905-0BB00** |
| **Plug-in adapter** | **6ES7 195-1BE00-0XA0** |
| For assembling the plastic Simplex connector in combination with IM 467 FO, CP 342-5 FO, IM 151 FO and IM 153-2 FO, 50 units | |
| **Termination Kit for Simplex plugs** Assembly case for local assembly of PCF Simplex plugs; comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, crimping tool and microscope | **6GK1 900-0KL00-0AA0** |
| **Termination Kit for BFOC plugs** Assembly case for local assembly of BFOC connectors; comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, and microscope | **6GK1 900-0HL00-0AA0** |

## Ordering data

| Ordering data | Order No. |
|---|---|
| ***Connector*** | |
| **Simplex plug**<br>with cleaning materials<br>50 crimp connectors for assembly on PCF fiber-optic cables on site | **6GK1 900-0KB00-0AC0** |
| **BFOC plug**<br>with cleaning materials<br>20 screw connectors for assembly on PCF fiber-optic cables on site | **6GK1 900-0HB00-0AC0** |
| **Manual for PROFIBUS networks** | |
| Paper version | |
| Network architecture, project management, network components, mounting | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA0** |
| **SIMATIC NET Manual Collection** | **6GK1 975-1AA00-3AA0** |
| Electronic manuals for communication systems, communication protocols and communication products | |
| on CD-ROM<br>German/English | |

## More information

You can order components supplementary to the SIMATIC NET cabling range from your local contact. Technical advice on this subject is available from:
J. Hertlein
Tel.: +49 (0) 911/750 44 65
Fax: +49 (0) 911/750 99 91
E-mail: juergen.hertlein@siemens.com

5

## PCF FOC termination kits

### Overview

- Compact, rugged assembly case for PCF fiber-optic cables
- Special versions for easy assembly of HP Simplex and BFOC plugs on PCF fiber-optic cables
- The quality of the assembly can be checked using the enclosed microscope

### Benefits

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- Easy installation of the unassembled cables in industrial plants
- Flexible assembly of connectors on PCF fiber-optic cables on site (HP Simplex, BFOC connectors)
- Mistakes are prevented with easy visual inspection of the assembled connector on site using a microscope
- PCF fiber-optic cables are easily repaired on site by installing a new PCF cable

### Application

SIMATIC NET PCF fiber-optic conductors are used to construct optical indoor and outdoor PROFIBUS DP networks. They are easily assembled on site with 2 x 2 Simplex connectors or 2 x 2 BFOC connectors. The maximum cable length between two DP devices is 300 m, and between two OLMs it is 400 m.

PROFIBUS DP devices that are equipped with an integral optical interface (Simplex connection) include OBT, CP 342-5 FO, CP 5613 FO, CP 5614 FO, IM 153-2 FO and IM 467 FO.

### Design

Two types of assembly cases for PCF fiber-optic cables are offered:

- Assembly case for HP Simplex connectors;
  for local assembly of HP Simplex connectors;
  comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, crimping tool and microscope
- Assembly case for BFOC connectors;
  for local assembly of BFOC connectors;
  comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, and microscope.

### Ordering data

| Ordering data | Order No. |
|---|---|
| **Termination Kit for Simplex connectors**<br>Assembly case for local assembly of PCF Simplex plugs; comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, crimping tool and microscope | **6GK1 900-0KL00-0AA0** |
| **Termination Kit for BFOC connectors**<br>Assembly case for local assembly of BFOC connectors; comprising a stripping tool, buffer stripping tool, Kevlar cutters, fiber breaking tool, and microscope | **6GK1 900-0HL00-0AA0** |
| ***Connector*** | |
| **Simplex connector**<br>with cleaning materials;<br>50 crimp connectors for assembly on PCF fiber-optic cables on site | **6GK1 900-0KB00-0AC0** |
| **BFOC connector**<br>with cleaning materials;<br>20 screw connectors for assembly on PCF fiber-optic cables on site | **6GK1 900-0HB00-0AC0** |

### More information

You can order components supplementary to the SIMATIC NET cabling range from your local contact.
For technical support, please contact:
J. Hertlein, A&D SE V22
Telephone: +49 (0) 911/750 44 65
Fax: +49 (0) 911/750 99 91
E-mail: juergen.hertlein@siemens.com

## Optical Bus Terminal OBT

### Overview

- For connecting a PROFIBUS station without an integrated fiber-optic cable interface or an RS 485 segment to an optical line
- Quick and easy installation of the plastic fiber-optic cable without the need for special tools

### Benefits

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- Option of connecting existing devices or an RS 485 segment with electrical interface to the optical PROFIBUS
- "Socket outlet" for connecting mobile devices (e.g. programming devices) without interruption of the bus
- Time saved through simple and fast connector mounting without special tools

### Application

The OBT (Optical Bus Terminal) connects a PROFIBUS station without integrated optical interface to an optical line with PROFIBUS stations with integrated interface and OBT. Existing DP devices therefore have the advantage of optical data transmission.

The PROFIBUS station is connected at an RS 485 interface through a connecting cable terminated at both ends, e.g. 830-1T connecting cable, to the RS 485 interface of the OBT. The OBT is integrated in the optical line through two optical interfaces.

The following optical transmission media can be connected to the OBT:

- Plastic fiber-optic cables can be used on single line lengths up to 50 m. They are particularly easy to pre-assemble on site with 2 x 2 simplex connectors.
- PCF[1] fiber-optic cables can be used for single line lengths up to 300 m. These cables are available preassembled. The OBT supports all typical PROFIBUS data transmission rates up to 12 Mbit/s.

1) Also known as HCS FOC:
HCS is a registered trademark of Lucent Technologies.

### Design

The OBT has compact plastic housing. Two tapped holes make it suitable for installation on standard DIN rails as well as for wall mounting.

The OBT has the following interfaces:

- 9-pin Sub-D connector for connecting the PROFIBUS DP station such as programming device, PC, Operator Panel (OP), S7-300 or station without integrated optics, e.g. ET 200S or PROFIBUS DP components from other manufacturers or an RS 485 segment
- Two optical interfaces for connecting plastic and PCF fiber-optic cables with simplex connectors (connection to CP 342-5 FO, CP 5613 FO, CP 5614 FO, IM 153-2 FO, IM 467 FO or to ET 200 with integrated optics)
- 24 V DC power supply.

### Function

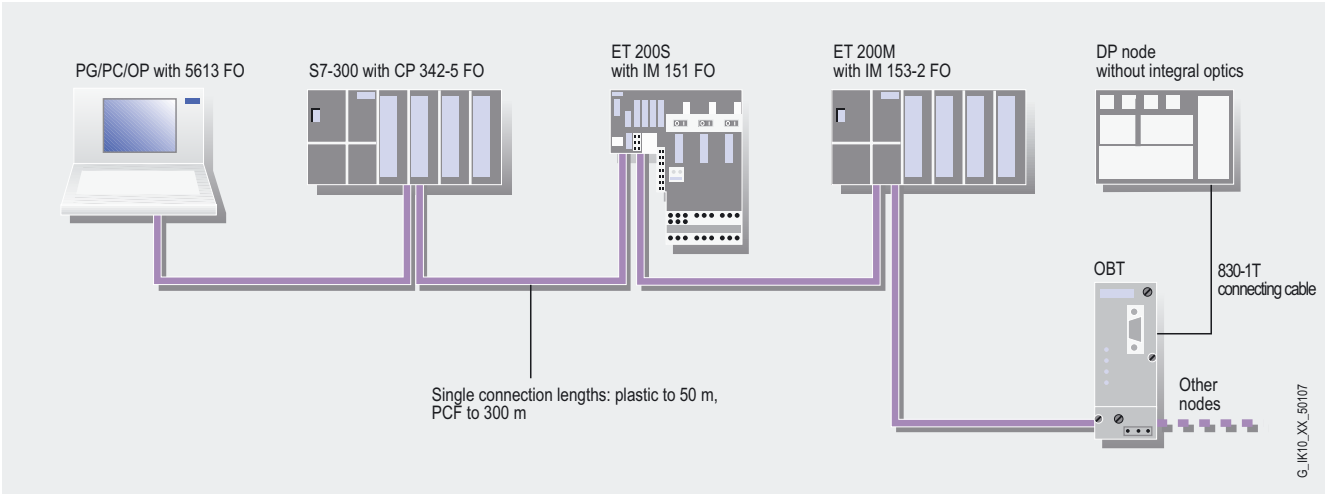
- Connection of a PROFIBUS DP station with RS 485 interface through 830-1T connecting cable or PROFIBUS cable with bus connectors (terminated both ends) or an RS 485 segment
- Provision of an electrical connection point on an optical line (e.g. programming device port for start-up and diagnosis)
- Supports all PROFIBUS DP transmission rates from 9.6 kbit/s to 12 Mbit/s including 45.45 kbit/s for PROFIBUS PA
- Regenerating the signals in amplitude and time
- Cascading depth up to 126 stations when using user-defined bus parameters
- Galvanic isolation of the station through fiber-optic cable

Diagnostics facilitated by LEDs for operating voltage and received data (CH1, CH2 and CH3).

# Optical networks with OBT and integrated interface

## Optical Bus Terminal OBT

### Integration




System configuration of optical PROFIBUS DP with PROFIBUS OBT

### Technical specifications

| | | |
|---|---|---|
| Data transmission rates | 9.6 kbit/s to 12 Mbit/s<br>45.45 kbit/s (PROFIBUS PA) | |
| Interfaces | | |
| • Connection for DP stations or a RS 485 segment | 9-pin Sub-D connector | |
| • Connection for power supply | 2-pin terminal | |
| • Connection for FOC | 2 duplex sockets | |
| Optical interfaces: | **Plastic fiber optic cable 980/1000** µm | **PCF fiber-optic cable 200/230** µm |
| • Wavelength | 640 to 660 nm | 640 to 660 nm |
| • Transmitter power | -5.9 dBm | -16 dB |
| • Receiver sensitivity | -20 dBm | -22 dBm |
| • Permissible FO path attenuation | 13 dB | 3 dB |
| Supply voltage | 24 V DC (18 V DC to 30 V DC) | |
| Current consumption (at rated voltage) | Max. 200 mA | |
| Power loss | 6 W | |
| Assembly | Standard DIN rail or wall mounting | |
| Perm. environmental conditions | | |
| • Operating temperature | 0 °C to +60 °C | |
| • Transport/storage temperature | -40 °C to +70 °C | |
| • Relative humidity | Max. 95% to +25 °C | |
| Design | | |
| • Dimensions (W x H x D) in mm | 50.5 x 138 x 78 | |
| • Weight | Approx. 400 g | |
| Degree of protection | IP30 | |

### Ordering data

| | Order No. |
|---|---|
| **PROFIBUS OBT**<br>Optical bus terminal for connecting a PROFIBUS station or an RS 485 segment without integrated optical interface to the optical PROFIBUS; without simplex connector | **6GK1 500-3AA00** |
| **830-1T PROFIBUS connecting cable**<br>For data terminal connection, completely preassembled with 2 Sub-D plugs, 9-pin | |
| • 1.5 m | **6XV1 830-1CH15** |
| • 3 m | **6XV1 830-1CH30** |
| **Manual for PROFIBUS networks**<br>Paper version<br>Network architecture, configuring, network components, installation | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET manual collection**<br>Electronic manuals and communication systems, protocols, products<br>on CD-ROM<br>German/English | **6GK1 975-1AA00-3AA0** |

## Infrared Link Module ILM

### Overview


- Wireless PROFIBUS link for all protocols
- Rugged design with IP65 degree of protection
- 15 m range at transmission rates up to 1.5 Mbit/s.

### Benefits

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- Mounting without adjusting tools thanks to large radiation angle
- Replacement of worn systems (slip rings or conductors) is possible
- Fast and easy module replacement in the event of a fault due to permanent wiring

### Application

- Wireless transmission from PROFIBUS at close range (≤ 15 m)
- For coupling individual stations in a segment or coupling two segments
- Communication with moving stations, e.g. automatically guided vehicles
- Communication with alternating stations, e.g. stations along conveyor belts
- Fast installation of plants and temporary configurations, e.g. test setups
- Replacement of systems subject to wear, e.g. sliprings or slip-conductors
- At a distance of 11 m from an ILM, the signal permeates a circle of 4 m in diameter.

### Design

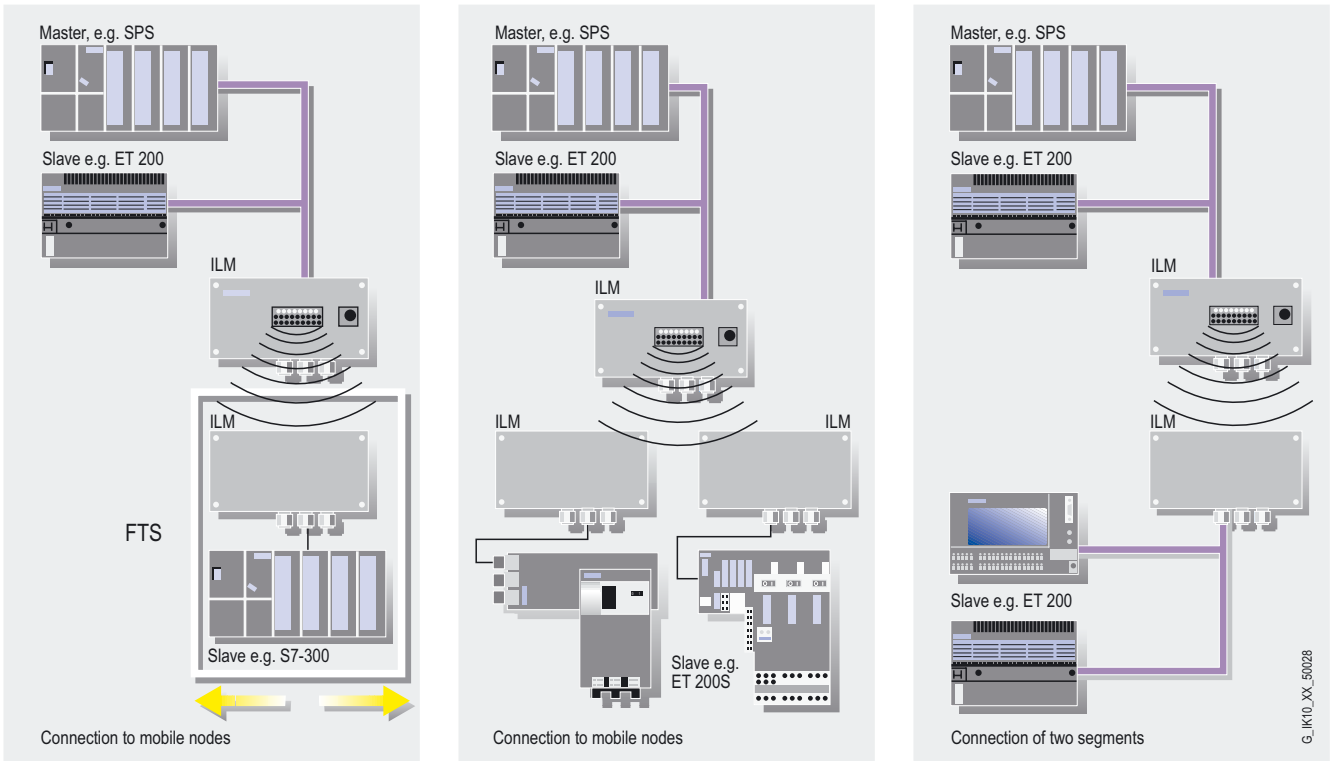
- Robust die-cast aluminium housing in degree of protection IP65
- 2 x 2-pin terminal block in housing (with cable connection through heavy gauge threaded joint) for connecting PROFIBUS segment
- 4-pin terminal block in housing (with cable connection through heavy gauge threaded joint) for connecting the power supply (24 V DC) and signal contact
- Permanent wiring, i.e. simple and fast replacement of electronics in the case of a fault
- Status display for operating states through LEDs
- Setting of data transmission rate through interior switch
- Protection from irritating ambient lighting through integral daylight filter
- Easy alignment due to area coverage (± 10°solid angle)

### Function

- Permits wireless connection to any PROFIBUS slaves within a range of 15 m
- Communication with several slaves at a distance from the master
- Transmission interruptions are detected and indicated through LED and signaling contact
- A reduction in transmission quality is indicated by an LED and signal contact before the data transmission is aborted
- The infrared link module (ILM) can be used in daylight thanks to an integrated filter which protects against stray lighting. When mounting the Infrared Link Module, make sure that there is an uninterruptible visible connection between the modules
- When using several ILM transmission lines mutual influencing of the lines must be ruled out by the constructional design and by observing minimum distances.

## Infrared Link Module ILM

### Integration




System configuration of ILM

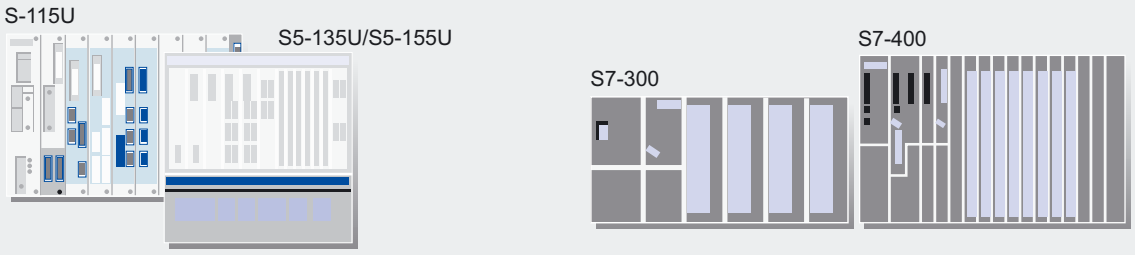
### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 1.5 Mbit/s |
| Interfaces | |
| • 2 connections for bus segments | 2 x 2-pin terminal block in housing |
| • Port for power supply and signal contact | 4-pin terminal block in housing |
| Supply voltage | 24 V DC |
| Power loss | 7.5 W |
| Assembly | 2 fixing holes |
| Degree of protection | IP65 |
| IR wave length | 880 nm |
| Minimum range | 0.5 m |
| Maximum range | 15 m |
| Perm. environmental conditions | |
| • Operating temperature | 0 °C to +60 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25 °C |
| Design | |
| • Dimensions (W x H x D) in mm | 175 x 80 x 57 |
| • Weight | Approx. 800 g |

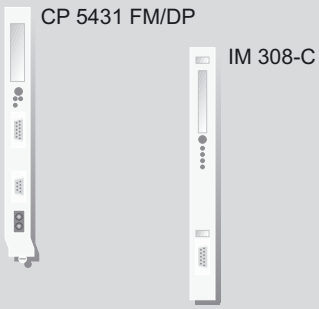
### Ordering data

| | Order No. |
|---|---|
| **PROFIBUS ILM**<br>Infrared link module for connecting PROFIBUS stations and segments without the need for wires | **6GK1 503-0AA00** |
| **Manual for PROFIBUS networks**<br>Paper version<br>Network architecture, configuring, network components, installation | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **SIMATIC NET manual collection**<br>Electronic manuals for communication systems, protocols, products<br>on CD-ROM<br>German/English | **6GK1 975-1AA00-3AA0** |

## Overview




### SIMATIC S5

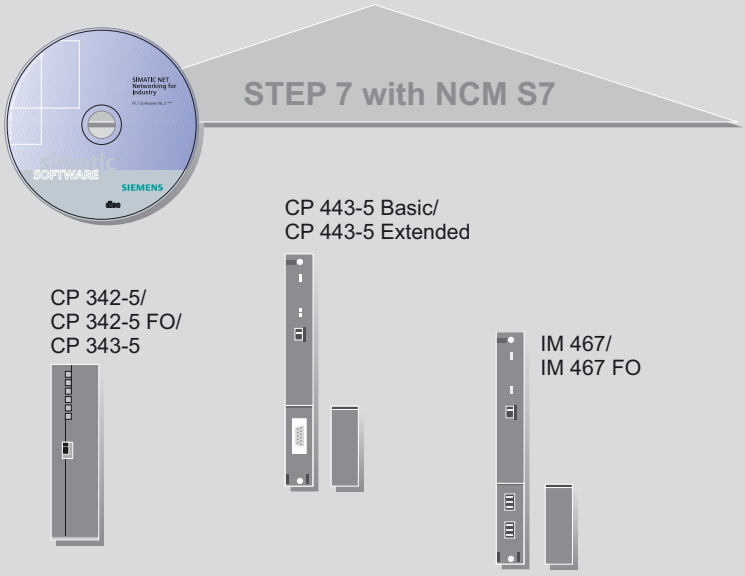

For the protocols

- ► DP
- ► PG/OP communication
- ► S5-compatible communication (SEND/RECEIVE)
- ► FMS

Multi-protocol:
All protocols of a CP can be operated simultaneously

Several CPs can be operated in an S5

### SIMATIC S7-300/S7-400




For the protocols

- ► DP
- ► PG/OP communication
- ► S7 communication
- ► S5-compatible communication
- ► (SEND/RECEIVE)
- ► FMS
- ► Time synchronization [1)]

Multi-protocol:
All protocols of a CP can be operated simultaneously

Several CPs can be operated in one S7-300 or S7-400

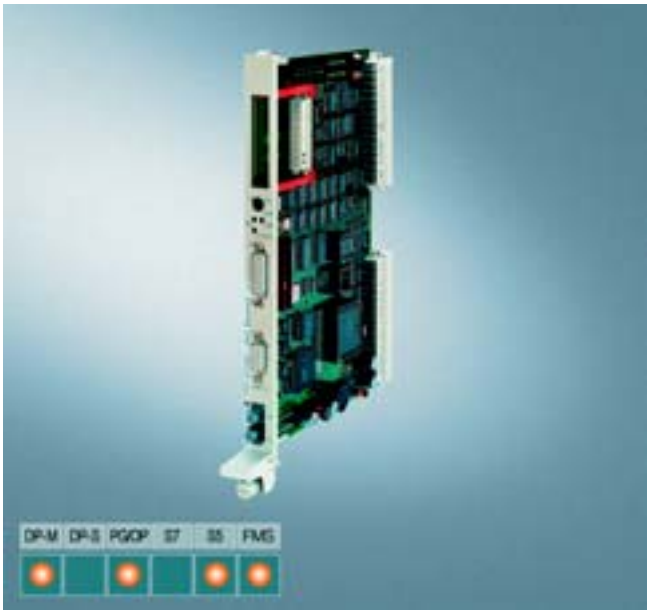
1) Only in the case of CP 443-5 Extended

G_IK10_XX_50185

System connection for SIMATIC S5/S7

## CP 5431 FMS/DP

### Overview




- Enables the SIMATIC S5-115U to -155U to be connected to PROFIBUS
- Combimaster according to IEC 61 158/EN 50 170 for
  - DP interface
  - PG/OP communication
  - S5-compatible communication (SEND/RECEIVE)
  - FMS interface
- Interface for simple and optimized homogeneous communication (e.g. PLC-to-PLC, GP)
- Remote programming through network possible

### Benefits

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- Easy interfacing of SIMATIC S5 in a multi-vendor automation network using PROFIBUS FMS
- Autonomous data conversion on the CP takes the load off the user of the PROFIBUS FMS specification
- Expansion of the process I/O on SIMATIC S5 thanks to multiple PROFIBUS DP interfaces
- Plant-wide time synchronization
- Subprocess-oriented configuration of an automation solution by using multiple CPs
- Universal application possibilities by using different communication services in parallel on a CP
- Integral fiber-optic interface supports targeted implementation in harsh industrial environments
- Fiber-optic technology is used when
  - the environment is subjected to strong electromagnetic fields and
  - there are large differences in potential.

### Application

With this interface module, the programmable controller acts as master. The maximum data transmission rate is 1.5 Mbit/s.

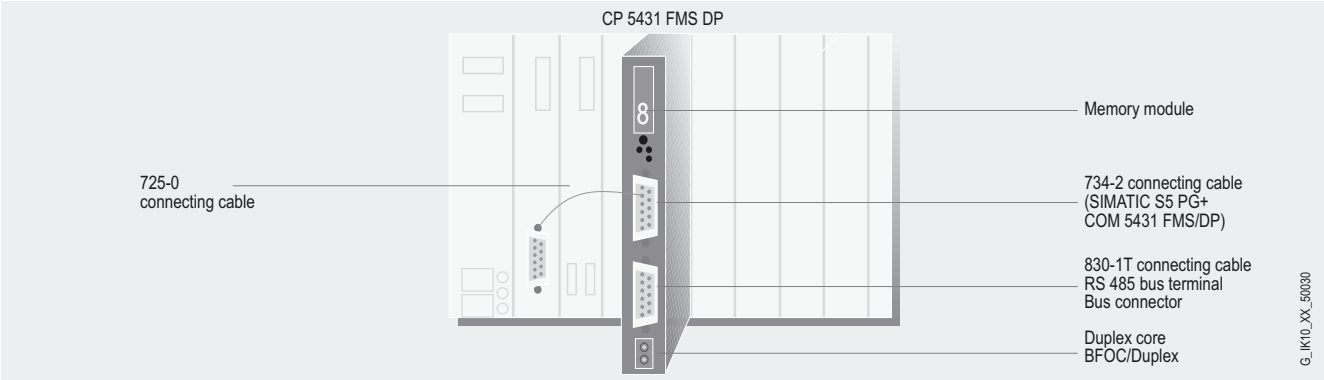
Remote programming and remote configuration through the network is possible. Two application interfaces can be operated simultaneously.

### Design

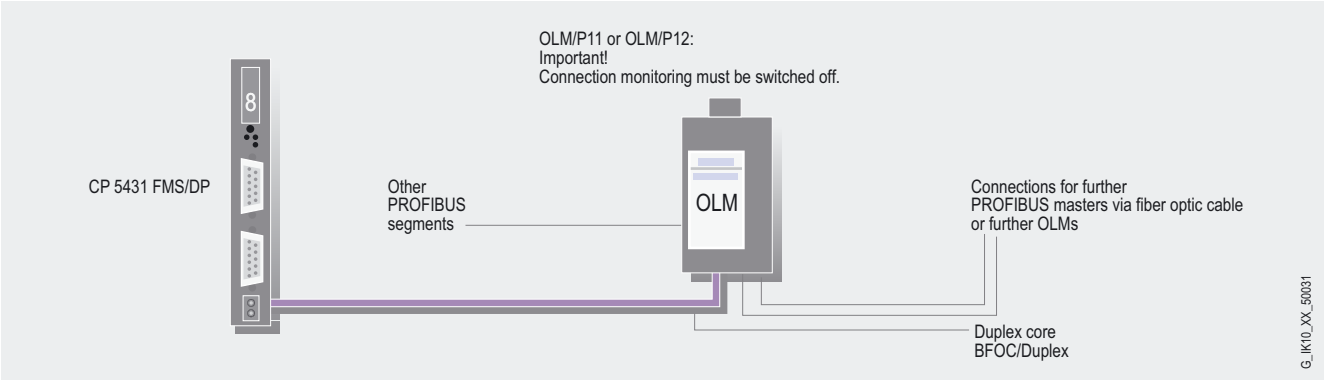
The CP 5431 FMS/DP is directly plugged into SIMATIC and requires a single-width slot.

- Double-height European format
- 15-pole Sub-D socket for connection of a SIMATIC S5 programming device for local and remote programming over the network
- 9-pin Sub-D socket for
  - connecting to PROFIBUS over an RS 485 bus terminal or bus connector that uses the RS 485 transmission procedure
  - connecting to OLM using the 830-IT connecting cable.
- Duplex socket for direct connection to the bus cable of an optical bus segment with plastic fibers.

## Design (continued)




Electrical interface CP 5431 FMS/DP




Optical interface CP 5431 FMS/DP

## Function

The CP 5431 FMS/DP is capable of operating the FMS and DP protocol profiles in parallel (Combimaster capability). In addition to other automation devices, it is thus also possible to communicate with field devices **over the same line**.

### PROFIBUS DP

- I/O transmission from SIMATIC S5 PLCs to PROFIBUS DP V0 slaves

### S5-compatible communication (SEND/RECEIVE)

- Process data communication over preconfigured PLC-to-PLC links by means of HTB handling modules (SEND, RECEIVE); process data communication over freely configurable links with direct access to FDL services by means of HTB handling modules (SEND, RECEIVE)

### PROFIBUS FMS

- ALI interface (Application Layer Interface):
  Message transfer with the FMS services READ, WRITE and INFORMATION REPORT
- ZI interface (cyclic interface):
  Cyclic I/O transmission from S5 PLCs to slaves using the "Cyclic interface" procedure

### Other interfaces /services

- GP interface:
  I/O transmission between S5 PLCs using the "Global I/O" procedure
- Programming device/operator panel communication:
  Remote programming of SIMATIC S5 over the PROFIBUS network
- Time-of-day functions:
  Time-of-day synchronization throughout the network to enable time-of-day stamping of messages, for example. The function of the time-of-day master is performed by a selected CP 5431 FMS/DP.

Network-specific parameters, links and assignments for the cyclic interface and the global I/O as well as for the DP interface are configured in the programming device using the COM 5431 FMS/DP system software.

Further information about interfacing to DP V0 slaves

Additional information can be found in the Internet under:


http://www4.ad.siemens.de/view/cs/de/17532371

The functional scope of COM 5431 FMS/DP is rounded off with extensive documentation, test and network management functions.

Note:
Due to the Combimaster capability of the CP, the response times that are possible using a Monomaster (e.g. IM 308-C) cannot be achieved for the DP services.

Services that are mirrored on I/O devices (DP, GP and ZI) are only permitted to be used alternatively.

## CP 5431 FMS/DP

### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 to 1500 kbit/s<br>Can be set during configuration |
| Interfaces | |
| • Connection to PROFIBUS (electrical) | 9-pin Sub-D socket[1] |
| • Connection to PROFIBUS (optical) | Duplex socket (plastic FOC)[1] |
| • PG/diagnostics | 15-pin Sub-D socket |
| Power supply | 5 V DC ±5%; 24 V DC +25%/-15% |
| Current consumption | |
| • From 5 V DC | 450 mA |
| • From 24 V DC | 70 mA with RS 485 (typ. 100 mA when using both current sources of the PG interface) |
| Power loss | 4.65 W |
| Perm. ambient conditions | |
| • Operating temperature | 0 °C to +60 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25 °C |
| Construction | |
| • Module format | Double-height European |
| • Dimensions (WxHxD) in mm | 60 x 70 x 43 |
| • Weight (memory module) | 0.38 kg (0.1 kg) |
| • Space requirements | 1 slot |
| Operation without fan | possible in S5-115U PLC; adapter casing is required |
| Configuring software | COM 5431 FMS/DP (for start-up) handling modules (for data transfer) |
| **Quantity framework/performance data (extract) FMS:** | |
| Number of ALI connections | Max. 32 |
| Number of ZI connections | Max. 32 |
| Length of a variable | Max. 233 byte |
| **Sum of ALI and ZN connections** | Max. 48 |
| **DP V0 master:** | |
| No. of connectable DP V0 slaves | Max. 32 |
| Number of inputs (total) | Max. 256 byte |
| Number of outputs (total) (no effect on GP connections) | Max. 256 byte |
| **FDL:** | |
| • Number of PLC-to-PLC connections | Max. 32 |
| • Number of FDL connections | max. 32 (55 without PLC-to-PLC and ALI) |
| **Total number of connections (FMS_ALI, AG/AG, FDL)** | **Max. 55** |
| Useful data length PLC-to-PLC | Max. 128 bytes/request |
| Useful data length for FDL | Max. 242 bytes/request |
| **Global Periphery (GP):** | |
| • Number of GP stations | Max. 32 |
| • Number of GP objects (in the overall network) | Max. 2048 byte |
| • Number of inputs (per GP station) | Max. 256 byte |
| • Number of outputs (per GP station) | Max. 64 byte |

1) Can only be used alternately
For further details, see the product manuals.

Notes:
The GP, ZI and DP interfaces can only be used alternatively. With the CP 5431 FMS/DP, communication to existing CP 5430 TF modules is possible provided that TF services are not being executed.

### Ordering data

| | Order No. |
|---|---|
| **CP 5431 FMS/DP communications processor**<br>For connecting SIMATIC S5-115U/H, -135U, -155U/H to PROFIBUS | **6GK1 543-1AA01** |
| **COM 5431 FMS/DP configuration software**<br>For CP 5431 FMS/DP on 3½" diskette with CP/COM 5431 FMS/DP manual | |
| • German | **6GK1 745-1AD00-0EA0** |
| • English | **6GK1 745-1AD01-0EA0** |
| • French | **6GK1 745-1AD02-0EA0** |
| • Italian | **6GK1 745-1AD04-0EA0** |
| **"CP/COM 5431 FMS/DP" manual**<br>Paper version | |
| • German | **6GK1 970-5AB01-0AA0** |
| • English | **6GK1 970-5AB01-0AA1** |
| **Firmware upgrade kit**<br>For upgrading a CP 5430 TF or CP 5431 FMS to CP 5431 FMS/DP | **6GK1 760-5FA00-2GA0** |
| **Adapter casing for S5-115U** | **6ES5 491-0LB11** |
| **Memory module 376 (EPROM)** | |
| • 16 KB | **6ES5 376-1AA11** |
| • 32 KB | **6ES5 376-1AA21** |
| • 64 KB | **6ES5 376-1AA31** |
| **Memory module 377 (RAM)** | |
| • 16 KB | **6ES5 377-0AA11** |
| • 32 KB | **6ES5 377-0AA21** |
| • 64 KB | **6ES5 377-0AA32** |
| **CUPOFLEX duplex core PVC UL 2.2 mm BFOC/duplex**<br>With 2 BFOC and 1 duplex connector, preassembled, 25 m | **6XV1 821-2BN25** |
| **725-0 connecting cable**<br>For point-to-point connection between CP 5431 FMS/DP and CPU (remote programming) | |
| • 0.9 m | **6ES5 725-0AK00** |
| • 2.5 m | **6ES5 725-0BC50** |
| **734-2 connecting cable**<br>For direct connection of a PG to CP 5431 FMS/DP | |
| • 5 m | **6ES5 734-2BF00** |
| • other lengths up to max. 1000 m | See Catalog ST 50 |

## Overview

- PROFIBUS DP master and/or slave module for SIMATIC S5-115U/H to S5-155U/H
- Communications services
  - PROFIBUS DP

## Application

The IM 308-C is a PROFIBUS DP master and/or slave module for SIMATIC S5-115U/H to S5-155U/H.

Up to 122 passive nodes such as, for example, standalone ET 200 I/O devices or field devices with PROFIBUS DP interface module, can be connected to an IM 308-C interface module.

The 308-C adapter kit enables the IM 308-C to also be used in central controllers 1, 2 and 3 of the SINUMERIK 840C. The adapter kit contains a printed-circuit board with the required electronics to convert the SINUMERIK 840C bus signals to the SIMATIC S5 bus system and the mechanical components for the assembly and installation of the adapter and IM-308-C.

## Design

The IM 308-C interface module must be inserted in the specified slot of the S5-115U/H programmable controller.

The module requires a single-width slot.

The PROFIBUS bus system is connected using

- an RS 485 bus coupler or
- an RS 485 bus terminal.

For operating the module, a 5-V memory card (256 KB) is required (included in the scope of supply).

## Function

Interface module IM 308-C coordinates channel access and data transmission over the PROFIBUS DP as a master module.

It can also operate as PROFIBUS DP slave and thus enables data exchange with other PROFIBUS DP masters.

The master and slave functionality can be implemented in combination, i.e. an IM 308-C receives data as slave from another PLC and simultaneously operates as master of, for example, ET 200 I/O devices.

- Global Control:
  Sync, freeze I/O devices
- Addressing range:
  per IM 308-C 13 KB data can be addressed by the CPU
- Shared Inputs
  The inputs of a slave can be read by several interface modules in the IM 308-C.

### *Configuration*

The configuration is performed with the COM PROFIBUS configuration package (see SIMATIC Industry Software).

## Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection for PROFIBUS | 9-pin Sub-D socket |
| Supply voltage | +5 V DC over backplane bus |
| Current consumption, approx. | 30 mA |
| Addressing range | 13 KB for inputs, outputs and diagnostics |
| Number of I/O devices that can be connected max. | 122<br>ET 200 U/B, S5-95U/DP and/or other field devices |
| Data volume | 244 byte inputs and outputs per slave |
| Perm. environmental conditions | |
| • Operating temperature | 0 °C to + 60 °C |
| • Transport/Storage temperature | - 40 °C to + 70 °C |
| • Relative humidity, max. | 95 % at + 25 °C |
| Structural design | |
| • Module format | Double-Europe |
| • Dimensions (W x H) in mm | 160 x 233.4 |
| • Weight approx. | 500 g |
| • Space requirements | 1 slot |

## Ordering data

| Ordering data | Order No. |
|---|---|
| **IM 308-C SIMATIC interface**<br>For connecting the SIMATIC S5-115U/H, S5-135U, S5-155U/H to PROFIBUS DP with memory card | **6ES5 308-3UC21** |
| **Memory Card** | |
| • EPROM 256 KB | **6ES5 374-1KH21** |
| • EPROM 1 MB | **6ES5 374-1KK21** |
| **IM 308-C adapter assembly kit**<br>For IM 308C for installation in SINUMERIK 840C central unit | **6FC5 147-0AA25-0AA0** |
| **SIMATIC S5 parameter assignment software COM PROFIBUS**<br>V5.1<br>For parameterizing PROFIBUS networks for Windows 95/98/NT/2000/ME, on CD-ROM in 5 languages, incl. documentation | **6ES5 895-6SE03** |
| **SIMATIC S5 parameter assignment software COM PROFIBUS upgrade**<br>From V5.0 to V5.1<br>For Windows 95/98/NT/2000/ME on CD-ROM in 5 languages, incl. documentation | **6ES5 895-6SE03-0UG4** |

## CP 342-5

### Overview


- PROFIBUS DP master or slave with electrical interface for connecting the SIMATIC S7-300 and the SIMATIC C7 to PROFIBUS at up to 12 Mbit/s (including 45.45 kbit/s)
- Communication services:
  - PROFIBUS DP-V0
  - PG/OP communication
  - S7 communication (client, server, multiplexing)
  - S5-compatible communication (SEND/RECEIVE)
- Easy configuration and programming over PROFIBUS
- Cross-network programming device communication through S7 routing
- Modules can be replaced without the need for a PG

### Benefits

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- Expansion of the process I/O at SIMATIC S7-300 by several PROFIBUS DP interfaces
- Flexible utilization of the process I/O through dynamic activation of DP slaves
- Subprocess-oriented configuration of an automation solution by implementing several CPs
- Optimization of applications and many application options through sending of data with S7 communication
- Comprehensive control and monitoring through multiplex function with OP communication
- Suitable for closed loop control tasks due to SYNC and FREEZE.

### Application

The CP 342-5 communications processor is the communications module of SIMATIC S7-300, and SIMATIC C7 for the bus system PROFIBUS DP.

The CP 342-5 relieves the CPU from communication tasks.

Communication possibilities of the S7-300 using communication modules:

- As DP master or slave for PROFIBUS DP according to IEC 61158/EN 50170
- Communication with programming devices and HMI devices
- Communication with other SIMATIC S7 systems
- Communication with SIMATIC S5 programmable controllers

The number of CPs that can be used is dependent on the performance range of the CPU and on the communications services used.

### Design

The CP 342-5 offers all the advantages of SIMATIC S7-300 system design:

- Compact design;
  single standard width of the SM modules of the SIMATIC S7-300
- 9-pin Sub-D socket for connection to PROFIBUS
- 4-pin terminal block for connecting the external supply voltage of 24 V DC
- Simple assembly;
  The CP 342-5 is mounted on the S7-300 DIN rail and connected to adjacent modules by means of the bus connectors. Slots 4 to 11 in subracks 0 to 3 (coupled through the IM 360/361) can be used for the CP 342-5
- In combination with IM 360/361, the CP 342-5 can also be used in an expansion rack (ER)
- User-friendly wiring;
  Sub-D socket and the terminal block are easily accessible.
- The CP 324-5 can be operated without a fan;
  a back-up battery or a memory module is not required

## Function

The CP 342-5 provides access to different communication services of the PROFIBUS bus system:

- PROFIBUS DP (acc. to IEC 61158/EN 50 170, master or slave)
- PG/OP communication
- S7 communication
- S5-compatible communication (SEND/RECEIVE).

### PROFIBUS DP master

The CP 342-5 operates as a DP-V0 master according to IEC 61158/EN 50 170, Volume 2, and processes the data transfer completely autonomously. It supports the services of master Classes 1 and 2.

The data areas of the distributed I/Os are transferred consistently between the CP and the CPU. This is the case whether the CP is used as a DP master or as a DP slave. As a DP master it can be connected to:

- SIMATIC S7-300, e.g. CP 342-5 as DP slave
- DP slaves of the central ET 200 I/O station (integrated as DP-V0 slave).

The CP 342-5 also offers the functions SYNC, FREEZE, Shared Input/Output as well as the activation/deactivation of DP slaves.

### PROFIBUS DP slave

With the CP 342-5 as a DP-V0 slave, the S7-300 can exchange data with other PROFIBUS masters. This supports a mixed configuration of SIMATIC S5/S7, PCs, ET 200 and other field devices to PROFIBUS DP. For DP communication, function calls are necessary. These function calls (DP-SEND/DP-RECV) must be integrated into the STEP 7 user program.

### PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing
  Using S7 routing it is possible to use programming device communication across networks.
  Using the CP 342-5, up to 16 text displays and operator panels can be combined on one S7-300 station. Only one connection resource is required in the S7 CPU (multiplex channel). Over the multiplex channel, the acyclic HMI services are supported.

### S7 communication

S7 communication is used for the coupling:

- between SIMATIC S7 programmable controllers
- to HMI devices (OPs)
- to PCs, e.g. with CP 5613 or CP 5511/CP 5512/CP 5611 and S7 OPC server.

Communication with the PG and OP is performed without the need for any additional configuration. Furthermore, the central controller can also be programmed and configured decentrally over the CP 342-5.

The client functionality is made available through loadable communication modules.

### S5-compatible communication (SEND/RECEIVE)

Based on Layer 2 (FDL) of PROFIBUS, the CP 342-5 offers a simple, optimized interface for process or field communication.

This interface offers uniform, high-performance communication between SIMATIC S5, SIMATIC S7, SIMATIC 505 and PC. In addition to the SDA service (PLC/PLC connections), SEND/RECEIVE also provides the SDN service (Broadcast, Multicast).

The communication partners are the programmable controllers:

- SIMATIC S7
  with CP 342-5, CP 343-5, CP 443-5
- SIMATIC S5
  with S5-95U with PROFIBUS interface, S5-115U/H, S5-135U, S5-155U/H with CP 5431 FMS/DP
- SIMATIC 505
  with CP 5434-FMS
- PCs
  with CP 5511, CP 5512, CP 5611, CP 5613, CP 5614
- Non-Siemens systems that are equipped with an FDL interface.

To use SEND/RECEIVE, function calls are required (PLC-SEND/PLC-RECEIVE), which must be integrated into the STEP 7 user program.

### Diagnostics

Extensive diagnostic options are available via STEP S7, including:

- Status of the CP
- General diagnostics and statistics functions
- Connection diagnostics
- Bus statistics
- Message buffer

STEP 7 is required for configuring the CP 342-5. In STEP 7 Version V5 and higher, the configuring data of the CPs can also be stored on the CPU in which case they are retained following supply failure. A module can therefore by replaced without having to reload the configuration data from a programming device. The CPU transfers the configuration data to the CP during start-up. Attention should therefore be paid to the memory capacity of the S7-CPU.

Configuration and programming of all SIMATIC S7 controllers connected to the network is possible over the network.

The function blocks for PROFIBUS DP are included in the standard library of STEP 7. The function blocks for using S5-compatible communication (SEND/RECEIVE) and S7 communication (S7 client) can be found in the SIMATIC NET library following installation of STEP 7.

## CP 342-5

### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection to PROFIBUS | 9-pin Sub-D connector (RS485) |
| • Cnnection to supply voltage | 4-pin terminal block |
| Supply voltage | 24 V DC |
| Current consumption | |
| • From backplane bus | 150 mA |
| • From 24 V DC | 250 mA |
| Power loss | 6.75 W |
| Perm. environmental conditions | |
| • Operating temperature | 0 °C to +60 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25 °C |
| Design | |
| • Module format | Compact assembly |
| • Dimensions (W x H x D) in mm | 40 x 125 x 120 |
| • Weight | Approx. 300 g |
| Number of CPs per S7-300 | 4 |
| **S7 communication performance data** | |
| • Number of usable connections | Max. 16 |
| **S5-compatible interface (SEND/RECEIVE)** | |
| • Number of usable connections | Max. 16 |
| • Useful data/connection | Max. 240 byte (transmit and receive) |
| **Multi-protocol operation** | |
| • Number of usable connections | Max. 32 (without DP); max. 28 (with DP) |
| • Size of the DP diagnostic data per connected slave | max. 240 byte |
| **DP master function** | |
| • DP master | DP V0 |
| • Number of DP slaves | 124 |
| • Total size of DP data ranges | |
| - DP input range | 2160 byte |
| - DP output range | 2160 byte |
| • Size of the DP data ranges per connected slave | |
| - DP input range | 244 byte |
| - DP output range | 244 byte |
| **DP slave function** | |
| • DP slave | DP V0 |
| Size of DP data ranges | |
| • DP input range | 240 byte |
| • DP output range | 240 byte |
| **PG/OP communication** | |
| • Number of operable OP connections (acyclic services) | 16 |

### Ordering data

| | Order No. |
|---|---|
| **CP 342-5 communications processor**<br>Communications processor for electrical connection of SIMATIC S7-300 to PROFIBUS to 12 Mbit/s with electronic manual on CD-ROM | **6GK7 342-5DA02-0XE0** |
| **NCM S7 configuration software for PROFIBUS**<br>Configuration software for PROFIBUS CPs for SIMATIC S7<br>• V5.1 and newer runs under STEP 7 V5.1; with electronic manual on CD-ROM English, French, German, Italian and Spanish | Included in STEP 7 Version 5 scope of supply |
| **"NCM S7 for PROFIBUS" manual**<br>Paper version<br>for V5.x (STEP 7 V5.x) | |
| • German | **6GK7 080-5AA04-8AA0** |
| • English | **6GK7 080-5AA04-8BA0** |
| • French | **6GK7 080-5AA04-8CA0** |
| • Spanish | **6GK7 080-5AA04-8DA0** |
| • Italian | **6GK7 080-5AA04-8EA0** |
| **PROFIBUS FastConnect RS 485 bus connector**<br>With 90° cable outlet; With insulation displacement method, max. data transmission rate 12 Mbit/s | |
| • without PG interface | **6ES7 972-0BA50-0XA0** |
| • with PG interface | **6ES7 972-0BB50-0XA0** |
| **PROFIBUS bus connector IP20**<br>For connection to PPI, MPI, PROFIBUS | |
| • without PG interface | **6ES7 972-0BA12-0XA0** |
| • with PG interface | **6ES7 972-0BB12-0XA0** |
| **PROFIBUS 12M bus terminal**<br>Bus terminal for connecting PROFIBUS stations up to 12 Mbit/s with connecting cable | **6GK1 500-0AA10** |
| **SIMATIC S7-300 DM 370**<br>Dummy module; used during module replacement | **6ES7 370-0AA01-0AA0** |
| **"Communication with SIMATIC" manual** | |
| • German | **6ES7 398-8EA00-8AA0** |
| • English | **6ES7 398-8EA00-8BA0** |
| • French | **6ES7 398-8EA00-8CA0** |
| • Spanish | **6ES7 398-8EA00-8DA0** |
| • Italian | **6ES7 398-8EA00-8EA0** |

## Overview

- PROFIBUS DP master or slave with optical interface for connecting the SIMATIC S7-300 and the SIMATIC C7 to PROFIBUS at up to 12 Mbit/s (including 45.45 kbit/s)
- Direct connection to the optical PROFIBUS network over the integrated fiber-optic interface for plastic and PCF fiber-optic cables
- Communication services:
  - PROFIBUS DP-V0
  - PG/OP communication
  - S7 communication (client, server, multiplexing)
  - S5-compatible communication (SEND/RECEIVE)
- Easy configuration and programming over PROFIBUS
- Cross-network programming device communication through S7 routing
- Modules can be replaced without the need for a PG

## Benefits

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- The fiber-optic technology is used when
  - the environment is subjected to strong EMC interference,
  - strong potential differences exist and
  - high transmission rates are required.
- The CP 342-5 FO is connected directly to the optical PROFIBUS and is therefore specially suited to harsh industrial environments
- Expansion of the process I/O at SIMATIC S7-300 by several PROFIBUS DP interfaces
- Optimization of applications and many application options through sending of data with S7 communication
- Comprehensive control and monitoring through multiplex function with OP communication
- Suitable for closed loop control tasks due to SYNC and FREEZE.

## Application

The CP 342-5 FO communications processor is the communications module of SIMATIC S7-300 and SIMATIC C7 for the optical bus system PROFIBUS DP.

The CP 342-5 FO is equipped with a fiber-optic interface that enable noise resistant connections in environments subjected to strong electro-magnetic fields.

It relieves the CPU from communication tasks.

Communication of SIMATIC S7-300 and SIMATIC C7 with:

- ET 200 distributed I/O station with integral optical interface
- SIMATIC S7-400 with IM 467 FO and CP 342-5 FO
- PC with CP 5613 FO/5614 FO
- Other PROFIBUS nodes over the optical bus terminal (OBT)

The number of CPs that can be used is dependent on the performance range of the CPU and on the communications services used.

## Design

The CP 342-5 FO offers all the advantages of SIMATIC S7-300 system design:

- Compact design;
  single standard width of the SM modules of the SIMATIC S7-300
- Integrated fiber-optic cable interface;
  2 female duplex connectors for direct connection to the optical PROFIBUS over 2 x 2 male simplex connectors and 2 plug-in adapters
- 4-pin terminal block for connecting the external supply voltage of 24 V DC
- Easy installation;
  The CP 342-5 FO is snap-mounted on the S7-300 DIN rail and connected to adjacent modules through the bus connectors. There are no slot rules.
- In combination with IM 360/361, the CP 342-5 FO can also be used in an expansion rack (ER).
- User-friendly wiring;
  female FOC connector and the terminal block are easily accessible.
- The CP 342-5 FO can be operated without a fan; a back-up battery or a memory module are not required.

## CP 342-5 FO

### Function

The CP 342-5 FO provides access to different communication services of the PROFIBUS bus system:

- PROFIBUS DP (acc. to IEC 61 158/EN 50 170, master or slave)
- PG/OP communication
- S7 communication
- S5-compatible communication (SEND/RECEIVE).

#### PROFIBUS DP master

The CP 342-5 FO operates as a DP-V0 master according to IEC 61,158/EN 50 170, Volume 2, and processes the data transfer completely autonomously. It supports the services of master Classes 1 and 2.

The data areas of the distributed I/Os are transferred consistently between the CP and the CPU. This is the case whether the CP is used as a DP master or as a DP slave. As a DP master it can be connected to:

- The ET 200 distributed I/O station with integral optical interface (integrate as DP-V0 slave)
- SIMATIC S7-300 with CP 342-5 FO as slave
- PC with CP 5614 FO as slave
- The other DP-V0 slaves over the optical bus terminal (OBT).

The CP 342-5 FO also offers the functions SYNC, FREEZE, Shared Input/Output as well as the activation/deactivation of DP slaves.

#### PROFIBUS DP slave

The CP 342-5 FO as DP-V0 slave supports data communication from SIMATIC S7-300 to SIMATIC S7-400 over the IM 467 FO and with the other DP masters over the OBT. This supports a mixed configuration of SIMATIC S5/S7, PCs, ET 200 and other field devices to PROFIBUS DP. For DP communication, both as master and as slave, function calls are required. These function calls (DP-SEND/DP-RECV) are supplied with STEP 7 and must be integrated into the user program.

#### PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing:
  Using S7 routing it is possible to use programming device communication across networks.
  Using the CP 342-5 FO, up to 16 text displays and operator panels can be combined on one S7-300 station. Only one connection resource is required in the S7 CPU (multiplex channel). Over the multiplex channel, the acyclic HMI services are supported.

#### S7 communication

S7 communication is used for the coupling

- between SIMATIC S7 programmable controllers
- to HMI devices (OPs)
- to PCs, e.g. with CP 5613 or CP 5511/CP 5512/CP 5611 and S7 OPC server.

Communication with the PG and OP is performed without the need for any additional configuration. Furthermore, the central controller can also be programmed and configured decentrally over the CP 342-5 FO.

The client functionality is made available through loadable communication modules.

#### S5-compatible communication (SEND/RECEIVE)

Based on Layer 2 (FDL) of PROFIBUS (IEC 61 158/EN 50170), the CP 342-5 FO offers a simple, optimized interface for process or field communication. This interface offers uniform, high-performance communication between SIMATIC S5, SIMATIC S7, SIMATIC 505 and PC.
In addition to the SDA service (PLC-to-PLC links), SEND/RECEIVE also provides the SDN service (Broadcast, Multicast).

The communication partners are the programmable controllers:

- SIMATIC S7
  with CP 342-5, CP 343-5, CP 443-5
- SIMATIC S5
  with S5-95U with PROFIBUS interface, S5-115U/H, S5-135U, S5-155U/H with CP 5431 FMS/DP
- SIMATIC 505
  with CP 5434-FMS
- PCs
  with CP 5511, CP 5512, CP 5611, CP 5613 FO, CP 5614 FO
- Non-Siemens systems that are equipped with an FDL interface.

To use SEND/RECEIVE, function calls are required (PLC-SEND/PLC-RECEIVE), which must be integrated into the STEP 7 user program.

#### Diagnostics

Extensive diagnostic options are available via STEP S7, including:

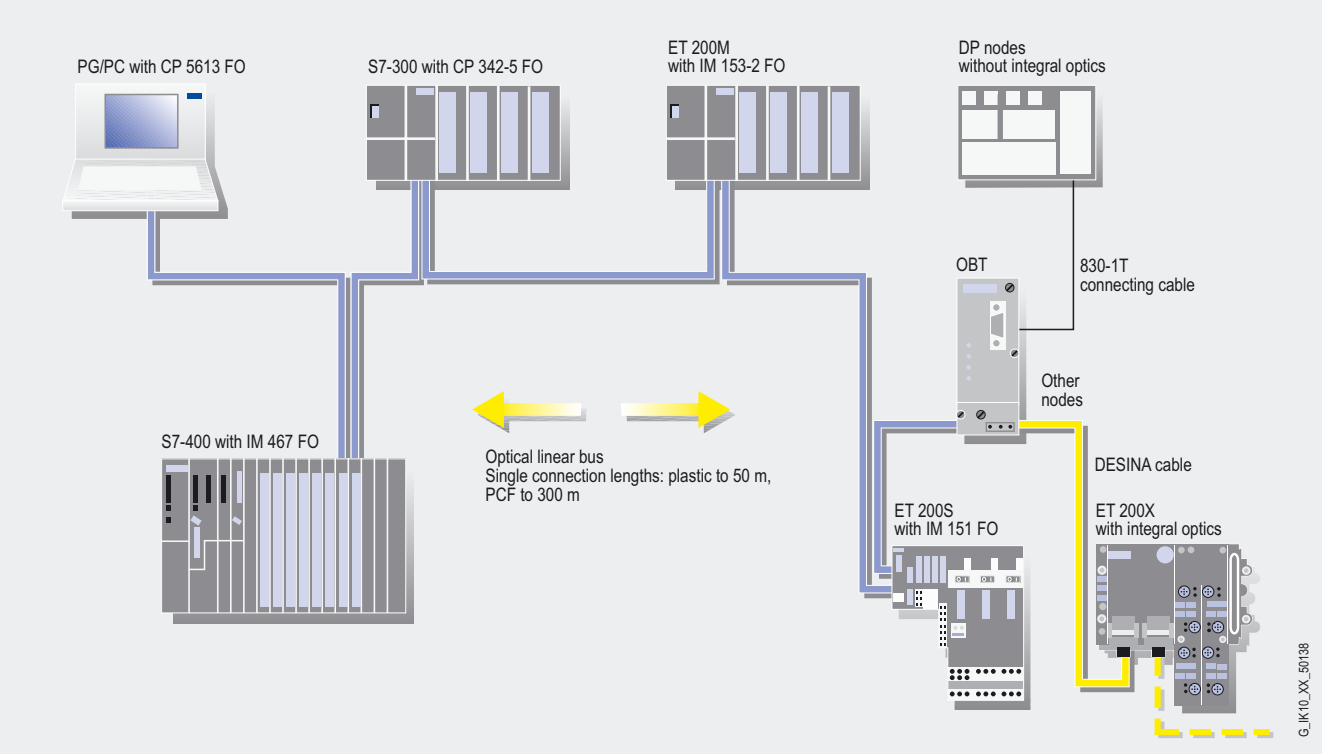
- Status of the CP
- General diagnostics and statistics functions
- Connection diagnostics
- Bus statistics
- Message buffer

STEP 7 is required for configuring the CP 342-5. In STEP 7 Version V5 and higher, the configuring data of the CPs can also be stored on the CPU in which case they are retained following supply failure. A module can therefore by replaced without having to reload the configuration data from a programming device. The CPU transfers the configuration data to the CP during start-up. Attention should therefore be paid to the memory capacity of the S7-CPU.

Configuration and programming of all SIMATIC S7 controllers connected to the network is possible over the network.

The function blocks for PROFIBUS DP are included in the standard library of STEP 7. The function blocks for using S5-compatible communication (SEND/RECEIVE) and S7 communication (S7 client) can be found in the SIMATIC NET library following installation of STEP 7.

## Function (continued)




System configuration of optical PROFIBUS DP with CP 342-5 FO

## CP 342-5 FO

### Technical specifications

| | |
|---|---|
| Data transmission rates | 9.6 kbit/s to 12 Mbit/s (exception: 3 and 6 Mbit/s) |
| Interfaces | |
| • Connection to PROFIBUS | 2 x duplex sockets |
| • Connection to supply voltage | 4-pin terminal block |
| Supply voltage | 24 V DC |
| Current consumption | |
| • From backplane bus | 150 mA |
| • From 24 V DC | 250 mA |
| Power loss | 6.75 W |
| Maximum distance between 2 adjacent network stations | |
| • Plastic FOC | Max. 50 m |
| • PCF FOC | Max. 300 m |
| Perm. environmental conditions | |
| • Operating temperature | 0°C to +60°C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25 °C |
| Design | |
| • Module format | Compact assembly |
| • Dimensions (W x H x D) in mm | 40 x 125 x 120 |
| • Weight | Approx. 300 g |
| • Number of CPs per S7-300 | 4 |
| **Performance data** | |
| **S7 communication** | |
| • Number of usable connections | Max. 16 |
| **S5-compatible communication (SEND/RECEIVE)** | |
| • Number of usable connections | Max. 16 |
| • Useful data/connection | Max. 240 byte (transmit and receive) |
| **Multi-protocol operation** | |
| • Number of usable connections | 32 (without DP); Max. 28 (with DP) |
| **DP master function** | |
| • DP master | DP V0 |
| • Number of DP slaves | 124 |
| • Total size of DP data ranges | |
| - DP input range | 2160 byte |
| - DP output range | 2160 byte |
| • Size of the DP data ranges per connected slave | |
| - DP input range | 244 byte |
| - DP output range | 244 byte |
| • Size of the DP diagnostic data per connected slave | max. 240 byte |
| **DP slave function** | |
| • DP slave | DP V0 |
| • Size of DP data ranges | |
| - DP input range | 240 byte |
| - DP output range | 240 byte |
| **PG/OP communication** | |
| • Number of operable OP connections (acyclic services) | 16 |

### Ordering data

| | Order No. |
|---|---|
| **CP 342-5 FO communications processor**<br>Communications processor for optical connection of SIMATIC S7-300 to PROFIBUS up to 12 Mbit/s with electronic manual on CD-ROM | **6GK7 342-5DF00-0XE0** |
| **NCM S7 configuration software for PROFIBUS**<br>Configuration software for PROFIBUS CPs for SIMATIC S7<br>V5.1 and newer runs under STEP 7 V5.1; including Service Pack 3; with electronic manual on CD-ROM English, French, German, Italian and Spanish | Included in STEP 7 Version 5 scope of supply |
| **"NCM S7 for PROFIBUS" manual**<br>Paper version<br>for V5.x (STEP 7 V5.x) | |
| • German | **6GK7 080-5AA04-8AA0** |
| • English | **6GK7 080-5AA04-8BA0** |
| • French | **6GK7 080-5AA04-8CA0** |
| • Spanish | **6GK7 080-5AA04-8DA0** |
| • Italian | **6GK7 080-5AA04-8EA0** |
| **Manual for PROFIBUS networks**<br>Paper version<br>Network architecture, components (OLM (V3), OBT, ILM), configuration and assembly | |
| • German | **6GK1 970-5CA20-0AA0** |
| • English | **6GK1 970-5CA20-0AA1** |
| **PROFIBUS plastic fiber-optic, simplex plug/polishing set**<br>100 simplex plugs and 5 polishing kits for assembling PROFIBUS plastic fiber-optic cables for the optical PROFIBUS DP | **6GK1 901-0FB00-0AA0** |
| **PROFIBUS plastic fiber-optic, stripping tool set**<br>Tools for stripping the outer casing and core casing of PROFIBUS plastic fiber-optic cables | **6GK1 905-6PA10** |
| **Connection adapters**<br>For installation of the plastic simplex plug in connection with CP 342-5 FO, IM 467 FO, IM 153-2 FO and IM 151 FO<br>50 pcs. | **6ES7 195-1BE00-0XA0** |

## Overview


Master connection of SIMATIC S7-300 and SIMATIC C7 to PROFIBUS up to 12 Mbit/s (incl. 45.45 kbit/s)

- Communication services:
  - PG/OP communication
  - S7 communication
  - S5-compatible communication (SEND/RECEIVE)
  - PROFIBUS FMS
- Simple configuration and programming using PROFIBUS
- Easily integrated into the S7-300 system
- PG communication between networks through S7 routing
- Module changeover without PG

## Benefits

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- Easy integration of SIMATIC S7 in a vendor-independent automation network using PROFIBUS FMS
- The user requires little knowledge of the PROFIBUS FMS specification due to simple configuration and autonomous data conversion on the CP
- Subprocess-oriented configuration of an automation solution by implementing several CPs
- Integration of SIMATIC S7-300 in existing installations due to S5-compatible communication
- Universal applications for the CP through using different communications services in parallel

## Application

The CP 343-5 communications processor is the module required for SIMATIC S7-300 and SIMATIC C7 for the PROFIBUS bus system.

It offloads communication tasks from the CPU.

S7-300 communication options using communication modules:

- FMS communication with PROFIBUS FMS stations through PROFIBUS
- Communication with programming devices, human machine interface devices
- Communication with other SIMATIC S7 systems
- Communication with SIMATIC S5 PLCs
- The number of CPs that can be operated depends on the performance range of the CPU and the communication services used.

## Design

The CP 343-5 offers all the advantages of the SIMATIC S7-300 system design:

- Compact design;
  single standard width of the SM modules of the SIMATIC S7-300
- If the adjacent modules do not join correctly when predecessor modules are exchanged, a space holder module must be installed.
- 9-pin Sub-D connector for connecting to PROFIBUS DP
- 4-pin terminal block for connecting the external supply voltage of 24 V DC
- Simple connection;
  The CP 343-5 is snap-mounted on the S7-300 DIN rail and connected to adjacent modules through the bus connectors. The slots 4 to 11 in the subracks 0 to 3 (coupled through IM 360/361) are permissible for the CP 343-5.
- In conjunction with the IM 360/361, the CP343-5 can also be operated in the expansion rack (ER).
- User-friendly wiring:
  Sub-D connector and terminal are easily accessible
- The CP 323-5 can be operated without a fan. Neither a backup battery nor a memory module are required.

## CP 343-5

### Function

The CP 343-5 provides the user with access to different communication services of the PROFIBUS bus system:

- PG/OP communication
- S7 communication (PG, OP, S7 controllers)
- S5-compatible communication (SEND/RECEIVE)
- PROFIBUS FMS (acc. to IEC 61 158/EN 50 170)

#### PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed

- S7 routing
  With the aid of routing it is possible to use programming device communication across networks.

#### S7 communication

S7 communication is used for the coupling

- Between SIMATIC S7 programmable controllers (CP 343-5 server only)
- to HMI devices (OPs)
- to SIMATIC 505
- to PCs, e.g. with CP 5613 or CP 5511/CP 5512/CP 5611 and S7 OPC server.

Communication with the PG and OP is performed without the need for any additional configuration. Furthermore, the central controller can also be programmed and configured decentrally over the CP 343-5.

#### S5-compatible communication (SEND/RECEIVE)

Based on Layer 2 (FDL) of PROFIBUS (IEC 61 158/EN 50,170), the CP 343-5 offers a simple, optimized interface for process or field communication.

This interface offers uniform, high-performance communication between SIMATIC S5, SIMATIC S7, SIMATIC 505 and PC. In addition to the SDA service (PLC/PLC connections), SEND/RECEIVE also provides the SDN service (Broadcast, Multicast).

The communication partners are the programmable controllers:

- SIMATIC S7
  with CP 342-5, CP 343-5, CP 443-5
- SIMATIC S5
  with S5-95U with PROFIBUS interface, S5-115U/H, S5-135U, S5-155U/H with CP 5431 FMS/DP,
- SIMATIC 505 with CP 5434-FMS
- PCs with CP 5511, CP 5512, CP 5611, CP 5613, CP 5614
- Non-Siemens systems that are equipped with an FDL interface.

To use SEND/RECEIVE, function calls are required (PLC-SEND/PLC-RECEIVE), which must be integrated into the STEP 7 user program.

#### PROFIBUS FMS

PROFIBUS FMS, according to PROFIBUS IEC 61 158/EN 50 170, supports message transfer to different FMS services:

- READ, WRITE;
  for reading or writing access to variables of communication partners from the user program (by means of variable index, variable names);
  for transferring local variable values to the communications partner. Partial access to variables is supported. The communication is processed over acyclic connections (master-to-master, master-to-slave), over acyclic connections with a slave initiative and with cyclic connections.
- INFORMATION REPORT;
  (signaling) allows an FMS server to perform unacknowledged transfer of variables. This type of request is used, in particular, for transmission on Broadcast FMS connections.
- IDENTIFY;
  to request the identification features of the communications partner
- STATUS;
  to request partner status

#### Diagnostics

Extensive diagnostic options are available via STEP S7, including:

- Status of the CP
- General diagnostics and statistics functions
- Connection diagnostics
- Bus statistics
- Message buffer

#### Configuring

STEP 7 is required for configuration. In STEP 7 Version V5 and higher, the configuring data of the CPs can also be stored on the CPU in which case they are retained following supply failure. A module can therefore by replaced without having to reload the configuration data from a programming device. The CPU transfers the configuration data to the CP during start-up. Attention should therefore be paid to the memory capacity of the S7-CPU.

Configuration and programming of all SIMATIC S7 controllers connected to the network is possible over the network.

The function blocks for using S5-compatible communication (SEND/RECEIVE) and FMS can be found in the SIMATIC NET library following installation of STEP 7.

## Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection to PROFIBUS | 9-pin Sub-D socket (RS 485) |
| • Connection to supply voltage | 4-pin terminal block |
| Power supply | 24 V DC |
| Current consumption | |
| • From backplane bus | 150 mA |
| • from 24 V | 250 mA |
| Power loss | 6.75 W |
| Perm. ambient conditions | |
| • Operating temperature | 0 °C to +60 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25°C |
| Construction | |
| • Module format | Compact module |
| • Dimensions (WxHxD) in mm | 40 x 125 x 120 |
| • Weight | Approx. 300 g |
| Number of CPs per S7-300 | 4 |
| **Performance data for S7 communication** | |
| • Number of connections that can be used | Max. 16 [1] |
| **Performance data for S5-compatible interface (SEND/RECEIVE)** | |
| • Number of connections that can be used | Max. 16 |
| • Useful data / connection | max. 240 byte (SEND and RECEIVE) |
| **Performance data for FMS function** | |
| • Number of connections that can be used | Max. 16 |
| Variable length for READ | 237 bytes |
| Variable length for WRITE and REPORT | 233 bytes |
| Configurable server variables | 256 |
| Variables that can be loaded from partners | 256 |
| **Multi-protocol operation** | |
| • Number of connections that can be used | Max. 48 |

1) Dependent on the CPU used

## Ordering data

| | Order No. |
|---|---|
| **CP 343-5 communications processor**<br>Communication processor for connecting S7-300 to PROFIBUS, FMS, S5-compatible communication, PG/OP and S7 communication; with electronic manual on CD-ROM | **6GK7 343-5FA01-0XE0** |
| **NCM S7 configuration software for PROFIBUS**<br>Configuration software for PROFIBUS CPs for SIMATIC S7<br>V5.x, runs under STEP 7 V5.x; with electronic manual on CD-ROM<br>English, French, German, Italian and Spanish | Included in STEP 7 Version 5 scope of supply |
| **"NCM S7 for PROFIBUS" manual**<br>Paper version<br>for V5.x (STEP 7 V5.x) | |
| • German | **6GK7 080-5AA04-8AA0** |
| • English | **6GK7 080-5AA04-8BA0** |
| • French | **6GK7 080-5AA04-8CA0** |
| • Spanish | **6GK7 080-5AA04-8DA0** |
| • Italian | **6GK7 080-5AA04-8EA0** |
| **PROFIBUS FastConnect RS 485 bus connector**<br>With 90° cable outlet; With insulation displacement method, max. data transmission rate 12 Mbit/s | |
| • without PG interface | **6ES7 972-0BA50-0XA0** |
| • with PG interface | **6ES7 972-0BB50-0XA0** |
| **PROFIBUS bus connector IP20**<br>For connection to PPI, MPI, PROFIBUS | |
| • without PG interface | **6ES7 972-0BA12-0XA0** |
| • with PG interface | **6ES7 972-0BB12-0XA0** |
| **PROFIBUS 12M bus terminal**<br>Bus terminal for connecting PROFIBUS stations up to 12 Mbit/s with connecting cable | **6GK1 500-0AA10** |
| **"Communication with SIMATIC" manual** | |
| • German | **6ES7 398-8EA00-8AA0** |
| • English | **6ES7 398-8EA00-8BA0** |
| • French | **6ES7 398-8EA00-8CA0** |
| • Spanish | **6ES7 398-8EA00-8DA0** |
| • Italian | **6ES7 398-8EA00-8EA0** |
| **SIMATIC S7-300 DM 370**<br>Dummy module; used during module replacement | **6ES7 370-0AA01-0AA0** |

## CP 443-5 Basic

### Overview


- Master connection of the S7-400 to PROFIBUS
- Communication services:
  - PG/OP communication
  - S7 communication
  - S5-compatible communication (SEND/RECEIVE)
  - PROFIBUS FMS
- Time-of-day synchronization
- Simple configuration and programming using PROFIBUS
- PG communication between networks through S7 routing
- Easy to integrate into the SIMATIC S7-400 system
- Module changeover without PG
- Operation in the SIMATIC H system for redundant S7 communication

### Benefits

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- Easy integration of SIMATIC S7 in a vendor-independent automation network using PROFIBUS FMS
- Suitable for use in high availability systems due to redundant S7 communication
- The user requires little knowledge of the PROFIBUS FMS specification due to simple configuration and autonomous data conversion on the CP
- A system-wide time synchronization
- Integration of SIMATIC S7-400 into existing installations using S5-compatible communication
- Universal applications for the CP through using different communications services in parallel

### Application

The CP 443-5 Basic communications processor is the module required for SIMATIC S7-400 for the PROFIBUS bus system.

It offloads communication tasks from the CPU.

Communications options of the S7-400 through communications modules:

- FMS communication with PROFIBUS stations through PROFIBUS
- Communication with programming devices, human machine interface devices
- Communication with other SIMATIC S7 systems
- Communication with SIMATIC S5 PLCs

The number of CPs that can be operated depends on the performance range of the CPU and the communication services used.

### Design

The CP 443-5 communications processor offers all the advantages of SIMATIC S7-400 design features:

- Compact design;
  9-pin Sub-D connector for connection to PROFIBUS
- Simple wide module
- Simple connection;
  The CP 443-5 is mounted on the S7-400 subrack and connected to the other S7-400 modules through the backplane bus. There are no slot rules.
- User-friendly wiring;
  the Sub-D connector is easily accessible and easy to use
- The CP 443-5 Basic can be operated without a fan. Neither a back up battery nor a memory module are required.
- When the SEND/RECEIVE interface is used, the number of operable modules depends on the S7-400 CPU in use.

## Function

The CP 443-5 Basic provides access to different communication services of the PROFIBUS bus system:

- PG/OP communication
- S7 communication (S7 controllers)
- S5-compatible communication (SEND/RECEIVE)
- PROFIBUS FMS (acc. to IEC 61 158/EN 50 170)
- Clock time synchronization

### PG/OP communication

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing
  With the aid of routing it is possible to use programming device communication across networks.

### S7 communication

S7 communication is used for the coupling

- between SIMATIC S7 programmable controllers
- to programming devices (PG/OP communication)
- to PCs,
  e.g. with CP 5613/5614 or CP 5511/5512/5611 and S7 OPC server.
- to HMI devices (OPs).
- For redundant S7 communication, the CP 443-5 Basic can also be used in SIMATIC H systems.

### S5-compatible communication (SEND/RECEIVE)

Based on Layer 2 (FDL) of PROFIBUS, the CP 443-5 Basic offers a simple, optimized interface for data communication. This interface offers uniform, high-performance communication between SIMATIC S5, SIMATIC S7 and the PC. It provides the services SDA (PLC/PLC connections) and SDN (Broadcast, Multicast).

The communication partners are the programmable controllers:

- SIMATIC S7
  with CP 342-5, CP 343-5, CP 443-5
- SIMATIC S5
  with S5-95U with PROFIBUS interface, S5-115U/H, S5-135U, S5-155U/H with CP 5431 FMS/DP
- SIMATIC 505
  with CP 5434-FMS
- PCs
  with CP 5511, CP 5512, CP 5611, CP 5613, CP 5614
- Non-Siemens systems that are equipped with an FDL interface

To use SEND/RECEIVE, function calls are required (PLC-SEND/PLC-RECEIVE), which must be integrated into the STEP 7 user program.

### PROFIBUS FMS

PROFIBUS FMS, to IEC 61 158/EN 50 170, supports message transfer to different FMS services:

- READ, WRITE;
  for read or write access to variables of communication partners from the user program (by means of variable index, variable names); for transferring local variable values to the communications partner.
  Partial access to variables is supported. The communication is processed over acyclic connections (master-to-master, master-to-slave), over acyclic connections with a slave initiative and with cyclic connections (master/slave).
- INFORMATION REPORT;
  (signaling) allows an FMS server to perform unacknowledged transfer of variables. This type of request is also used, in particular, for transmission on Broadcast FMS connections.
- IDENTIFY;
  to request the identification features of the communications partner
- STATUS;
  to request partner status

### Time-of-day synchronization

The CP 443-5 Basic is capable of forwarding the time of day of the S7-400 CPU to PROFIBUS. Conversely, the CP 443-5 Basic of the S7-400 CPU can make an existing time of day available on PROFIBUS.

### Diagnostics

Extensive diagnostic options are available via STEP S7, including:

- Status of the CP
- General diagnostics and statistics functions
- Connection diagnostics
- Bus statistics
- Message buffer

### Configuring

STEP 7 is required for configuring the CP 443-5 Basic. In STEP 7 Version V5 and higher, the configuring data of the CPs can also be stored on the CPU in which case they are retained following supply failure. A module can therefore by replaced without having to reload the configuration data from a programming device. The CPU transfers the configuration data to the CP during start-up.

Configuration and programming of all SIMATIC S7 controllers connected to the network is possible over the network.

The function blocks for using S5-compatible communication (SEND/RECEIVE) can be found in the SIMATIC NET library following installation of STEP 7.

## CP 443-5 Basic

### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interface | |
| • Connection to PROFIBUS | 9-pin Sub-D socket (RS 485) |
| Power supply | 5 V DC ± 5% |
| Current input from 5 V DC | 1.2 A |
| Power loss | 6.5 W |
| Perm. ambient conditions | |
| • Operating temperature | 0 °C to +60 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25°C |
| Construction | |
| • Dimensions (WxHxD) in mm | 25 x 290 x 210 |
| • Weight | Approx. 700 g |
| **Performance data for S7 communication** | |
| • Number of connections that can be used | 16 to 48[1)] |
| **S5-compatible communication (SEND/RECEIVE)** | |
| • Number of connections that can be used | Max. 32 |
| • Useful data / connection | max. 240 bytes (SEND and RECEIVE) |
| **Performance data for FMS function** | |
| • Number of connections that can be used | Max. 48 |
| • Variable length READ | Max. 237 byte |
| • Variable length WRITE | Max. 233 byte |
| • Configurable server variables | 512 |
| • Variables that can be loaded from partners | 2640 |
| **Multi-protocol operation** | |
| • Number of connections that can used (2 of which are reserved for PG/OP communication) | Max. 59 |

1) Dependent on CPU type

### Ordering data

| | Order No. |
|---|---|
| **CP 443-5 communications processor**<br>Communications processor for connecting S7-300 to PROFIBUS, FMS, S5-compatible communication, PG/OP and S7 communication; with electronic manual on CD-ROM | **6GK7 443-5FX01-0XE0** |
| **NCM S7 configuration software for PROFIBUS**<br>Configuration software for PROFIBUS CPs for SIMATIC S7<br>V5.x, executable under STEP 7 V5.x; with electronic manual on CD-ROM<br>English, French, German, Italian and Spanish | Included in STEP 7 Version 5 scope of supply |
| **"NCM S7 for PROFIBUS" manual**<br>Paper version<br>for V5.x (STEP 7 V5.x) | |
| • German | **6GK7 080-5AA04-8AA0** |
| • English | **6GK7 080-5AA04-8BA0** |
| • French | **6GK7 080-5AA04-8CA0** |
| • Spanish | **6GK7 080-5AA04-8DA0** |
| • Italian | **6GK7 080-5AA04-8EA0** |
| **PROFIBUS FastConnect RS 485 bus connector**<br>With 90° cable outlet; With insulation displacement method, max. data transmission rate 12 Mbit/s | |
| • without PG interface | **6ES7 972-0BA50-0XA0** |
| • with PG interface | **6ES7 972-0BB50-0XA0** |
| **PROFIBUS bus connector IP20**<br>For connection to PPI, MPI, PROFIBUS | |
| • without PG interface | **6ES7 972-0BA12-0XA0** |
| • with PG interface | **6ES7 972-0BB12-0XA0** |
| **PROFIBUS 12M bus terminal**<br>Bus terminal for connecting PROFIBUS stations up to 12 Mbit/s with connecting cable | **6GK1 500-0AA10** |
| **"Communication with SIMATIC" manual** | |
| • German | **6ES7 398-8EA00-8AA0** |
| • English | **6ES7 398-8EA00-8BA0** |
| • French | **6ES7 398-8EA00-8CA0** |
| • Spanish | **6ES7 398-8EA00-8DA0** |
| • Italian | **6ES7 398-8EA00-8EA0** |

## Overview


- DP V1 master connection of S7-400 to PROFIBUS
- For configuring additional PROFIBUS DP lines
- Communication services:
  - PROFIBUS DP
  - PG/OP communication
  - S7 communication
  - S5-compatible communication (SEND/RECEIVE)
- Time-of-day synchronization
- Simple configuration and programming using PROFIBUS
- PG communication between networks through S7 routing
- Easy to integrate into the SIMATIC S7-400 system
- Module replacement without the need for a programming device.
- Operation in the SIMATIC H system for redundant S7 communication or DP master communication
- Data record routing (PROFIBUS DP)
- Add or change distributed I/O during normal operation

## Benefits

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- Increase the system availability through redundant connection of the process I/Os (e.g. ET 200 M) in the SIMATIC S7-400 H system
- Particularly suitable for controlling tasks through SYNC/FREEZE and equidistant bus cycle
- Subprocess-oriented configuration of an automation solution by implementing several CPs
- A system-wide time synchronization
- Integration of SIMATIC S7-400 into existing installations using S5-compatible communication
- Universal applications for the CP through using different communications services in parallel
- Cost savings due to flexible, reaction-free start-up using CiR (Configuration in RUN)

## Application

The CP 443-5 Extended communications processor is the module required for SIMATIC S7-400 for the PROFIBUS bus system.

It offloads the CPU of communications tasks and enables further connections.

Communications options of the S7-400 through communications modules:

- As a master for PROFIBUS DP according to IEC 61158/EN 50170
- Communication with programming devices, human machine interface devices
- Communication with other SIMATIC S7 systems
- Communication with SIMATIC S5 PLCs
- The number of CPs that can be operated depends on the performance range of the CPU and the communication services used.

## Design

The CP 443-5 communications processor offers all the advantages of SIMATIC S7-400 design features:

- Compact design;
  9-pin Sub-D connector for connecting to PROFIBUS DP.
- Simple wide module
- Simple connection;
  The CP 443-5 is mounted on the S7-400 subrack and connected to the other S7-400 modules through the backplane bus.
- User-friendly wiring;
  the Sub-D connector is easily accessible and easy to use
- The CP 443-5 Extended can be operated without a fan. Neither a back up battery nor a memory module are required.
- Up to 14 CPs can be operated.

If the CP 443-5 Extended is implemented as a DP master, at least 4 and up to 10 additional PROFIBUS DP lines can be configured in the central rack. The number of permissible PROFIBUS DP lines is dependent on the SIMATIC S7-400 CPU used.

There are no slot rules when S7 communication is used. The number of S7 connections which can be operated is dependent on the S7-400 CPU.

When SEND/RECEIVE is used, the number of modules which can be operated is dependent on the S7-400 CPU.

## CP 443-5 Extended

### Function

The CP 443-5 Extended provides access to different communication services of the PROFIBUS bus system:

- PROFIBUS DP (acc. to IEC 61158/EN 50 170)
- PG/OP communication
- S7 communication (S7 controllers)
- S5-compatible communication (SEND/RECEIVE)
- Clock time synchronization

**Master for PROFIBUS DP**

The CP 443-5 Extended operates as DP-V1 master. It processes data transfer autonomously and allows slaves to be connected, such as CP 342-5 as DP slave, DP slaves of the ET 200 distributed I/O station, etc.. This means that the CP 443-5 Extended is able to connect the S7-400 station to PROFIBUS DP as well as providing the integral DP master interfaces of the S7-400 CPUs with the ideal expansion for establishing additional PROFIBUS DP lines.

The CP 443-5 Extended can also be used in the SIMATIC S7 H system as a redundant DP master.

The CP 443-5 Extended is a DP-V1 master, i.e. it also supports the acyclic standard services incl. interrupt handling.

The CP 443-5 Extended also supports the SYNC and FREEZE functions, constant bus cycle time, direct slave-to-slave traffic, data set routing and changes to the configuration of the assigned distributed I/O during normal operation.

During normal operation, it is also possible to activate or deactivate DP slaves. This supports the step-by-step start-up of subprocesses, for example.

The distributed I/O is handled like the central I/O from the user's point of view. This means that there are no differences between the CP 443-5 Extended and the integral DP master interface of the S7-400 CPU with regard to configuration and parameterization. Depending on the scale of the system, the CP 443-5 Extended has extremely short response times.

**PG/OP communication**

PG/OP communication allows all S7 stations connected to the network to be remotely programmed.

- S7 routing
  With the aid of routing it is possible to use programming device communication across networks.

**S7 communication**

S7 communication is used for the coupling

- between SIMATIC S7 programmable controllers
- to programming devices (PG/OP communication)
- to PCs
  e.g. with CP 5613 or CP 5511/CP 5512/CP 5611 and S7 OPC server
- to HMI devices (OPs).

For redundant S7 communication, the CP 443-5 Extended can also be used in SIMATIC H systems.

**S5-compatible communication (SEND/RECEIVE)**

Based on Layer 2 (FDL) of PROFIBUS, the CP 443-5 Extended offers a simple, optimized interface for process or field communication. This interface offers uniform, high-performance communication between SIMATIC S5, SIMATIC S7 and the PC. It provides the services SDA (PLC/PLC connections) and SDN (Broadcast, Multicast).

The communication partners are the programmable controllers

- SIMATIC S7
  with CP 342-5, CP 343-5, CP 443-5
- SIMATIC S5
  with S5-95U with PROFIBUS interface, S5-115U/H, S5-135U, S5-155U/H with CP 5431 FMS/DP
- SIMATIC 505
  with CP 5434-FMS
- PCs
  with CP 5511, CP 5512, CP 5611, CP 5613, CP 5614
- Non-Siemens systems that are equipped with an FDL interface.

To use SEND/RECEIVE, function calls are required (PLC-SEND/PLC-RECEIVE), which must be linked into the STEP 7 user program.

**Clock time synchronization**

The CP 443-5 Extended is capable of forwarding the time of day of the S7-400 CPU to PROFIBUS. Conversely, the CP of the S7-400 CPU can make an existing time of day available on PROFIBUS

The CP 443-5 Extended supports

- The time-stamping of distributed process signals in combination with IM 153
- Time status value, daylight-saving time changeover, synchronization status

**Data set routing**

The CP 443-5 Extended supports the data set routing function. With this option, the CP can be used as a router for data sets that have to be sent to field devices (DP slaves). SIMATIC PDM (Process Device Manager) is a tool that creates data sets of this type for parameterizing and diagnosing field devices.

Application:
It is possible, for example, to use SIMATIC PDM (on the PC) to set parameters and perform diagnostics for a PA field device over Industrial Ethernet, S7-400 (CP 443-1, CP 443-5 Extended) and DP/PA Coupler/Link.

**Function** (continued)

### Diagnostics

Extensive diagnostic options are available via STEP S7, including:

- Status of the CP
- General diagnostics and statistics functions
- Connection diagnostics
- Bus statistics
- Message buffer

### CiR – Configuration in RUN

With CiR, it is possible to add or modify distributed I/O devices during normal operation.

- Adding PROFIBUS DP/PA slaves
- Adding/removing modules (e.g. I/O modules) in a modular DP slave (e.g. ET 200M and DP/PA Link)

### Configuring

STEP 7 is required for configuring the CP 443-5 Extended.

DP configuration/programming is performed for the CP 443-5 Extended in the same manner as for DP configuration/programming of the integrated DP interfaces of the SIMATIC S7-400 CPUs with STEP 7.

In STEP 7 Version V5 and higher, the configuring data of the CPs can also be stored on the CPU in which case they are retained following supply failure. A module can therefore by replaced without having to reload the configuration data from a programming device. The CPU transfers the configuration data to the CP during start-up.

Configuration and programming of all SIMATIC S7 controllers connected to the network is possible over the network.

The function blocks for using S5-compatible communication (SEND/RECEIVE) can be found in the SIMATIC NET library following installation of STEP 7.

## CP 443-5 Extended

### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Ports | 9-pin Sub-D socket (RS 485) |
| Power supply | 5 V DC ± 5%<br>24 V DC ±5% |
| Current input from 5 V DC | 1.3 A |
| Power loss | 6.5 W |
| Perm. ambient conditions | |
| • Operating temperature | 0 °C to +60 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25°C |
| Construction | |
| • Dimensions (WxHxD) in mm | 25 x 290 x 210 |
| • Weight | Approx. 700 g |
| Number of external DP-lines in one central rack | 10 |
| **Performance data for DP master function** | |
| • DP master | DP-V1 |
| • Number of operable DP slaves | Max. 125 |
| • Size of DP data areas overall | |
| - DP input area | Max. 4 KB |
| - DP output range | Max. 4 KB |
| • Size of DP data areas per connected DP slave | |
| - DP input area | Max. 244 byte |
| - DP output range | Max. 244 byte |
| **Performance data for S7 communication** | |
| • Number of connections that can be used | 16 to 48[1)] |
| **Performance data for S5-compatible communication (SEND/RECEIVE)** | |
| • Number of connections that can be used | Max. 32 |
| • Useful data / connection | max. 240 byte (SEND and RECEIVE) |
| **Multi-protocol operation** | |
| • Number of connections that can used (2 of which are reserved for PG/OP communication) | |
| - Without DP | Max. 59 |
| - With DP | Max. 55 |

1) Dependent on CPU type

### Ordering data

| | Order No. |
|---|---|
| **CP 443-5 Extended communications processor**<br>For connection of SIMATIC S7-400 to PROFIBUS<br>Extended version for PROFIBUS DP; with electronic manual on CD-ROM | **6GK7 443-5DX03-0XE0** |
| **NCM S7 configuration software for PROFIBUS**<br>Configuration software for PROFIBUS CPs for SIMATIC S7<br>V5.1 and newer runs under STEP 7 V5.1; with electronic manual on CD-ROM English, French, German, Italian and Spanish | Included in STEP 7 Version 5 scope of supply |
| **"NCM S7 for PROFIBUS" manual**<br>Paper version<br>for V5.x (STEP 7 V5.x) | |
| • German | **6GK7 080-5AA04-8AA0** |
| • English | **6GK7 080-5AA04-8BA0** |
| • French | **6GK7 080-5AA04-8CA0** |
| • Spanish | **6GK7 080-5AA04-8DA0** |
| • Italian | **6GK7 080-5AA04-8EA0** |
| **PROFIBUS FastConnect RS 485 bus connector**<br>With 90° cable outlet; With insulation displacement method, max. data transmission rate 12 Mbit/s | |
| • without PG interface | **6ES7 972-0BA50-0XA0** |
| • with PG interface | **6ES7 972-0BB50-0XA0** |
| **PROFIBUS bus connector IP20**<br>For connection to PPI, MPI, PROFIBUS | |
| • without PG interface | **6ES7 972-0BA12-0XA0** |
| • with PG interface | **6ES7 972-0BB12-0XA0** |
| **PROFIBUS 12M bus terminal**<br>Bus terminal for connecting PROFIBUS stations up to 12 Mbit/s with connecting cable | **6GK1 500-0AA10** |
| **"Communication with SIMATIC" manual** | |
| • German | **6ES7 398-8EA00-8AA0** |
| • English | **6ES7 398-8EA00-8BA0** |
| • French | **6ES7 398-8EA00-8CA0** |
| • Spanish | **6ES7 398-8EA00-8DA0** |
| • Italian | **6ES7 398-8EA00-8EA0** |

## Overview

- For connection of the S7-400 as a master to PROFIBUS DP
- For setting up further PROFIBUS DP lines
- PROFIBUS DP communication services and PG/OP communication
- Simple programming and configuring via PROFIBUS
- Interfaces: RS 485 (IM 467) or integrated FO interface (IM 467 FO)

## Benefits


- Subprocess-oriented configuration of an automation solution through the use of several IMs
- Allows up to 14 additional DP bus lines to be connected to the S7-400
- Integrated fiber-optic interface

## Application

The IM 467/467 FO is the low-overhead SIMATIC S7-400 interface module for the PROFIBUS DP bus system. It off-loads communication tasks from the CPU and supports additional connections.

The IM 467 FO is always used in those cases where the advantages of fiber-optic cables (plastic and PCF) are required.

Communication modes for the S7-400 via IM 467/467 FO communication modules:

- As a master for the ET 200 distributed I/O station in accordance with EN 50170 and IEC 61158-3 Ed2
- Communication with programming devices and human machine interface devices

## Design

The IM 467/467 FO interface module features all the advantages of SIMATIC S7-400 configuration:

- Compact configuration:
  9-pin Sub-D socket or FO interface for connection to PROFIBUS DP
- Single-width module
- Easy installation:
  The IM 467/467 FO is plugged into the S7-400 rack and is connected with the other modules via the backplane bus.
- User-friendly wiring:
  The Sub-D socket/integrated FO interface is easily accessed.
- Rugged operation:
  The IM 467/467 FO can be operated without fans. A backup battery or memory module is not required.

If the IM 467/467 FO is used as a DP master, up to 10 additional PROFIBUS DP lines can be connected. The number of possible PROFIBUS DP lines depends on the SIMATIC S7-400 CPU used. There are no slot rules.

## Function

The IM 467/IM 467 FO provides different communication services of the PROFIBUS bus system:

- PROFIBUS DP (in accordance with EN 50170)
- PG/OP communication

### *PROFIBUS DP master*

The IM 467/467 FO operates as a DP master according to EN 50170, Volume 2. It implements data transmission completely autonomously and allows slaves to be connected, such as CP 342-5 as DP slave, DP slaves of the ET 200 distributed I/O system, etc. The IM 467/467 FO can therefore connect the S7-400 station to PROFIBUS DP or it complements the integrated DP master interfaces of the S7-400 CPU in order to establish additional PROFIBUS DP lines.

In addition, the IM 467/467 FO also supports the functions SYNC and FREEZE, equidistance and internode data traffic.

The distributed I/O is handled in the same manner as the central I/O from the viewpoint of the user. This means that for configuring and parameter assignment, there is no distinction between the IM 467/467 FO and the integrated DP master interface of the S7-400 CPU. Whatever the size of the plant, the IM 467/467 FO achieves the shortest possible response times.

### *PG/OP communication*

With the help of PG/OP communication, all the S7 stations connected to the network can be remote programmed.

- S7 routing:
  Routing enables PG/OP communication to be utilized across networks.

### *Configuring*

STEP 7 is necessary for configuring the IM 467/467 FO.

DP configuration and programming is performed for the IM 467/467 FO in the same manner as for the integrated DP master interfaces of the SIMATIC S7-400 CPUs with STEP 7 V4.0 or later (IM 467 FO with STEP 7 V5.0 or newer).

The IM configuration data are saved on the CPU and are retained even in the case of power outage. Modules can therefore be replaced having to reload the product information from a PG. During startup, the CPU transfers the configuration data to the IM.

It is possible to configure and program all SIMATIC S7 controllers connected to the network over the network.

## IM 467, IM 467 FO

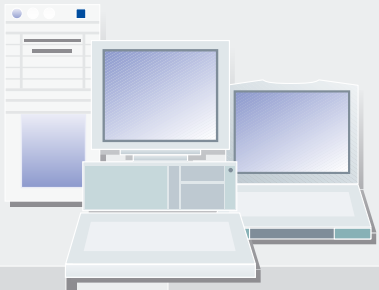
### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s (Except 3 and 6 Mbit/s in the case of IM 467 FO) |
| Interfaces | |
| • Transfer method | IM 467: RS 485<br>IM 467 FO: FOC/λ = 660 nm |
| • Connection to PROFIBUS DP | IM 467: 9-pin Sub-D socket<br>IM 467 FO: 2 x Duplex socket |
| Supply voltage | 5 V DC ± 5%<br>24 V DC ± 5% |
| Power consumption from 5 V | 1.3 A via backplane bus |
| Number of modules operable in SIMATIC S7-400, max. | 10 in the CR (Depending on CPU type) |
| Permissible ambient conditions | |
| • Operating temperature | 0°C to +60 °C |
| • Transport/storage temperature | -40 to +70 °C |
| • Operational height, max. | 3000 m above mean sea level |
| • Relative humidity max. | 95% at 25 °C |
| Design | |
| • Dimensions (W x H x D) in mm | 25 x 290 x 210 |
| • Weight, approx. | 700 g |
| **Performance data for PG/OP communication** | |
| • Number of usable connections, approx. | 32 |
| **DP master function performance data** | |
| Number of operable DP slaves, max. | 96 |
| • Total size of the DP data areas | |
| - DP input range, max. | 4 KB |
| - DP output range, max. | 4 KB |
| • Size of the DP data areas per connected DP slave | |
| - DP input area, max. | 244 byte |
| - DP output area, max. | 244 byte |

### Ordering data

| | Order No. |
|---|---|
| **IM 467 interface module**<br>for connection to PROFIBUS DP; RS 485 | **6ES7 467-5GJ02-0AB0** |
| **IM 467 FO interface module**<br>for connection to PROFIBUS DP; fiber-optic interface | **6ES7 467-5FJ00-0AB0** |
| **RS 485 bus terminal connector with 90° outgoing feeder cable for FastConnect system**<br>Max. transmission rate 12 Mbit/s | |
| • Without PG interface | **6ES7 972-0BA50-0XA0** |
| • With PG interface | **6ES7 972-0BB50-0XA0** |
| **Connection adapters**<br>pack of 50, for use of the simplex plugs with the IM 467 FO | **6ES7 195-1BE00-0XA0** |
| **Manual "SIMATIC S7-400 programmable controller"**<br>incl. operation list | |
| • German | **6ES7 498-8AA03-8AA0** |
| • English | **6ES7 498-8AA03-8BA0** |
| • French | **6ES7 498-8AA03-8CA0** |
| • Spanish | **6ES7 498-8AA03-8DA0** |
| • Italian | **6ES7 498-8AA03-8EA0** |
| **Manual "Communication for SIMATIC S7-300/-400"** | |
| • German | **6ES7 398-8EA00-8AA0** |
| • English | **6ES7 398-8EA00-8BA0** |
| • French | **6ES7 398-8EA00-8CA0** |
| • Spanish | **6ES7 398-8EA00-8DA0** |
| • Italian | **6ES7 398-8EA00-8EA0** |

## Overview



### SOFTWARE


You will find software for the PC products under Windows with the corresponding authorization diskettes on the SIMATIC NET software CD.

The necessary configuring tools are contained in all software packages.

Manuals in pdf format and extensive further information on SIMATIC NET products and communication can be found on the SIMATIC NET Manual Collection CD, enclosed with the software products.

SIMATIC NET Manual Collection CD


### HARDWARE

CP 5613 A2 (PCI)

CP 5613 FO (PCI)

CP 5614 A2 (PCI)

CP 5614 FO (PCI)

CP 5512 (PC-Card, CardBus)

CP 5611 (PCI)

**PC card with own microprocessor**

Recommended solution for:

- PC-based control systems (Soft Control, PLC, Numeric Control, Robot Control)
- Process control systems
- HMI
- PROFIBUS DP slave interface module (CP 5614 A2, CP 5614 FO)
- PROFIBUS systems with large quantity framework (more than 8 nodes)
- Multi-protocol mode
- Use of several CPs in one computer
- Versions with Fiber Optic interface (FO)

**PC card without own microprocessor**

Recommended solution for:

- Configuring tools (e.g. STEP 7)
- PROFIBUS DP diagnostics station (e.g. with COM PROFIBUS or as DP master class 2)
- PROFIBUS DP slave interface module
- PROFIBUS systems with up to 8 nodes
- Mono-protocol mode

G_IK10_EN_50184

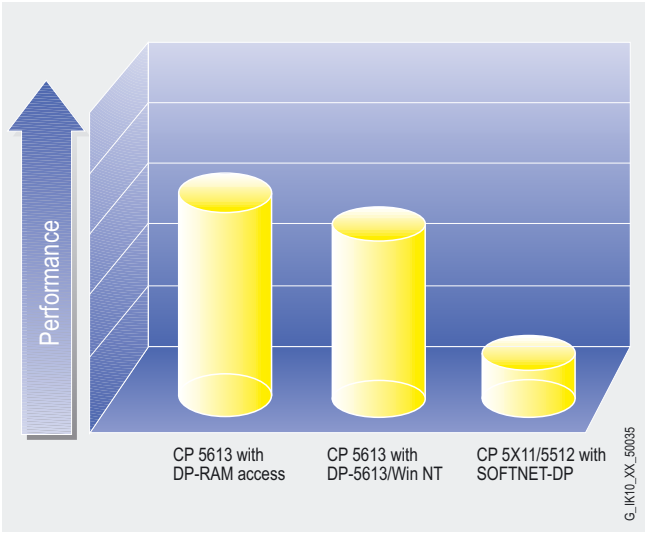
System interfacing for PG/PC

## Performance data

### Overview

#### Performance of PROFIBUS CPs

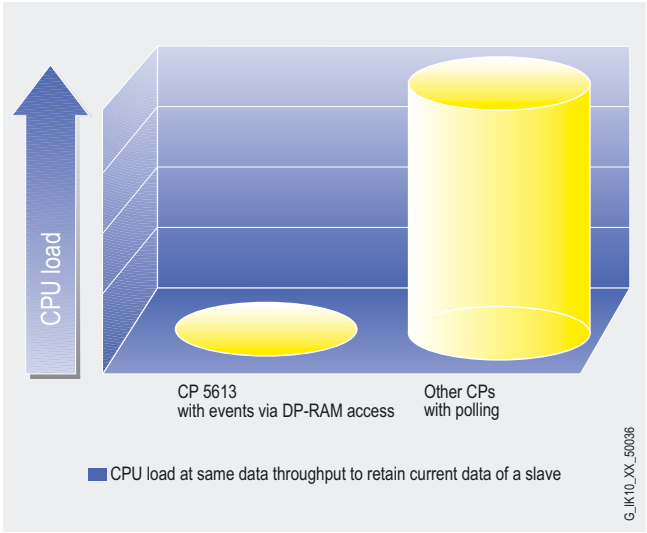
The maximum performance specifies how much digital input/output data can be read or written in 1 ms from the PROFIBUS application over the respective PROFIBUS CP (regardless of the physical characteristics of the bus).




Performance under almost identical CPU loading

#### CPU loading and access time

If event access (using interrupts) and polling access are compared, it can be shown that the CPU loading can be significantly reduced with the CP 5613 using the event/filter mechanism, for the same data throughput.




Comparison of loading on the CPU with event access and with polling access

**Performance data of PROFIBUS CPs**

| | | CP 5613 A2/CP 5613 FO | CP 5614/CP 5614 F0 | CP 5611/CP 5512 | CP 5511 |
|---|---|---|---|---|---|
| Number of connectable DP slaves | Max. | 122 | 122 | 60 | 32 [3] |
| Number of FDL tasks waiting | Max. | 120 | 120 | 100 | 32 |
| Number of PG/OP and S7 connections | Max. | 50 [1] | 50 [1] | 8 | 8 |
| Number of FMS connections | Max. | 40 [2] | 40 [2] | - | - |

Note:

1) for credit = 1; PDU size ≤ 480 byte

2) for credit = 1

3) Depends on the available memory in the adapter area of the notebook

## Overview (continued)

### *Advanced PC configuration for PROFIBUS*

- Supports a simplified OPC configuration
- Easy to handle thanks to automatic software installation (Plug & Play)
- Advanced PC configuration is included in the scope of supply of the communications software for the PC from Version 6.0 upwards; the configuration tool NCM PC as well as the configuration console are also supplied with it.

### *NCM PC*

NCM PC replaces the previous PC configuring tools. This means that the PC can be configured either in STEP 7 or in NCM PC Version V5.1+SP2 and higher. Both tools offer the same look and feel and create the same database. This means that uniform configuration is possible for the communication functions S5-compatible communication, S7 communication and for the DP protocol and FMS protocol. Data only has to be entered once and data consistency is assured.

- A configuration wizard integrated into NCM PC also supports user-driven configuration of the PC station.
- With NCM PC and STEP 7 from Version V5.1+SP2 upwards, a PC similar to a SIMATIC S7 station can be configured and loaded over a network. This applies both to the local station on which NCM PC or STEP 7 is installed and to the remote station that is addressed over the network.

Note:
NCM PC does not contain a conversion function for LDBs that were created using COML S7. Reconfiguration is necessary.

## More information

Additional information can be found in the Internet under:

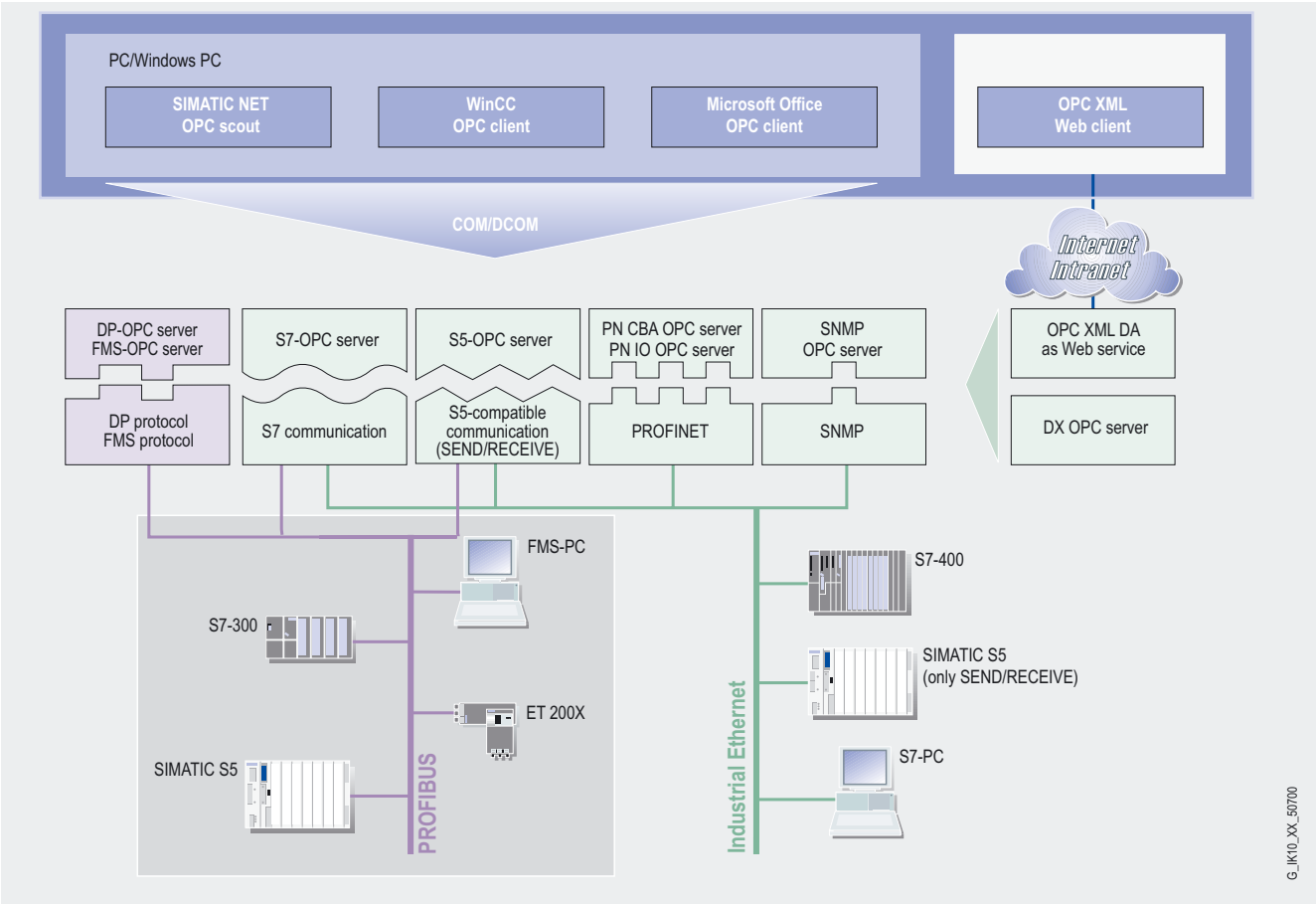
http://www.siemens.com/simatic-net/ik-info

5

## OPC server for PROFIBUS

### Overview

- Standardized, open, manufacturer-independent interface
- Interfacing of OPC-capable Windows applications to DP, FMS and S7-communication and S5-compatible communication functions (SEND/RECEIVE) based on the FDL interface
- OPC Scout with browser functions as OPC client and OCX Data Control
- The appropriate OPC servers are included in the scope of supply of the respective communication software




System integration with the OPC server

### Benefits

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- Different networks and protocols can be used easily thanks to the uniform interface
- Reduced training and familiarization costs
- Easy interfacing in the system environment and office applications over C++, Visual Basic and .NET interfaces
- Fast creation of applications
- Easy handling and cost-effective because the corresponding OPC server is included in the scope of supply of the respective communications software

## Application

OPC (OLE for Process Control) is implemented as an expansion of the COM (Component Object Model) communications interface and DCOM (Distributed COM) for the user software.

The basic principle of OPC is that OPC client applications communicate with the OPC server over a standardized, open and manufacturer-independent interface.

It is also possible to connect to OPC-capable Windows applications (Microsoft Office or HMI systems) that are already available on the market.

The following communications interfaces are available over OPC for PROFIBUS:

- DP communication for PROFIBUS DP
- DP-V0 master Class 1 and master Class 2
  DP-V1 master Class 1 and master Class 2
  PROFIdrive V3 interface for profile server
- FMS communication for PROFIBUS FMS
- S7 communication
- S5-compatible communication (SEND/RECEIVE) based on the FDL interface

The OPC server offers:

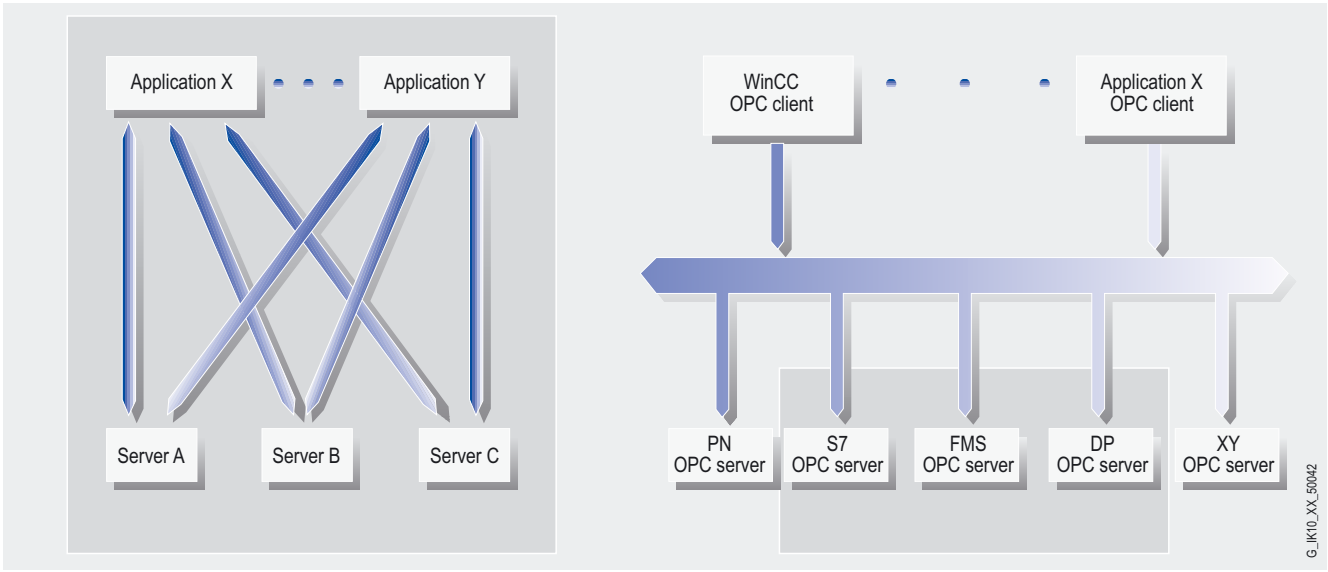
- Data Access interface 2.05
- Alarm&Event interface 1.1
- OPC XML DA interface 1.0
- Integration of automation products of different manufacturers
- The same, easy user interface for different components
- Can be accessed from every computer in the LAN
- High-performance data access over the Custom Interface (C++, NET)
- Easy to use with the “Automation Interface“ (VB, NET) or the supplied OCX Data Control
- Grouping of variables (items) which allows a large quantity of data to be processed in a short time.
- Other compilers can be used over the OPC server, but the compiler must support the COM interface (Microsoft component model)

## Function

- Open standardization of the addressing using logical names for objects from an automation component or an automation system
- Supports STEP 7 symbols
- Efficient data transfer from a process component to an application for further processing
- One client application can use several servers simultaneously
- Simultaneous execution of more than one client is possible on one OPC server
- The communication protocols can be operated in parallel
- Interfaces
  - "Custom Interface"; for high-performance C++/NET applications
  - "Automation Interface" for easily created Visual Basic applications (or similar)
  - OCX Data Control for direct embedding in Windows applications that support COM/DCOM
  - XML DA interface;
    Data access to S7 CPUs is therefore possible over the Internet.

### Configuring

The communication parameters are configured using only the tools of the installed software Advanced PC Configuration (configuration console, SIMATIC NCM PC or STEP 7 V5.1 + SP2 and higher)




Comparison of conventional client/server architecture with an OPC architecture

## OPC server for PROFIBUS

### Technical specifications

| | |
|---|---|
| Programming | • Synchronous and asynchronous reading and writing of variables<br>• Monitoring of variables using the OPC server with a signal to the client when a change occurs<br>• Use of quantity operations; so a large amount of data can be processed in a short time. |
| Interfaces | • Custom Interface (C++, .NET) for high OPC performance<br>• Automation Interface (VB, Excel, Access, Delphi, ...) for ease-of-use<br>• Graphics with OCX for configuring instead of programming<br>• OPC XML-Interface for Data Access |
| Protocols | • S7 communication<br>• S5-compatible communication (SEND/RECEIVE)<br>• PROFIBUS DP<br>• PROFIBUS FMS |

| **Product variants** | **include OPC servers for:** |
|---|---|
| DP-5613 | PROFIBUS DP, XML-DA |
| S7-5613 | S7 communication, XML-DA |
| FMS-5613 | FMS communication, XML-DA |
| SOFTNET-S7 for PROFIBUS | S7 communication, XML-DA |
| SOFTNET DP | PROFIBUS DP, XML-DA |
| SOFTNET-DP slave | PROFIBUS DP slave, XML-DA |
| CP 5613 A2/5614 A2 and CP 5613 FO/5614 FO with DP-Base software | S5-compatible communication (FDL) PROFIBUS DP master, access to DP slave of the CP 5614 A2, XML-DA |

## CP 5613 A2

### Overview


- PCI card (universal key 5 V/3.3 V) with microprocessor for system interfacing for PCs and SIMATIC programming devices/PC to PROFIBUS up to 12 Mbit/s
- Communication services:
  - PROFIBUS DP master according to IEC 61158/EN 50170
  - PG/OP communication with STEP 5 and STEP 7
  - S7 communication
  - S5-compatible communication (SEND/RECEIVE) on the basis of the FDL interface
  - PROFIBUS FMS according to IEC 61158/EN 50170
- Extensive diagnostic facilities for installation, commissioning and operation of the module
- High performance through direct dual port RAM access
- Event and filter mechanism for relieving the host CPU
- Multiple protocol operation and parallel operation of up to 4 CPs
- Implementation for motion control applications possible through support of the equidistant mode
- The corresponding OPC Server and configuration tools are included in the scope of supply of the respective communications software

### Benefits

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- Fast access to process data over dual-port RAM
- OPC as standard interface
- Consistent process data from a DP cycle
- More computing power is available in the PG/PC by taking the load off the host CPU
- Fast start-up through Plug&Play and diagnostic tools
- Implementation in Motion Control applications is possible because a constant bus cycle time is supported
- Simple porting to other operating system environments through dual port RAM interface
- Implementation is even possible in an industrial environment at high temperatures.
- Can be used flexibly in PG/PC due to PCI 3.3/5V, 33/66 MHz and compatibility to 64-bit PCI-X slot

### Application

OPC FOUNDATION MEMBER

Compliance Tested OPC FOUNDATION

The CP 5613® A2 supports the connection of a SIMATIC PG/PC and PCs with a PCI slot to PROFIBUS.

The CP 5613 A2 provides high-performance support for control tasks on the PC (PC based Control, Numeric Control, Robot Control).

### Design

- Short PCI card
- Suitable for 3.3 V and 5 V PCI slots (universal key)
- 33 MHz or 66 MHz PCI cycle
- Can be used as a 32-bit card in a 64-bit PCI-X slot
- 9-pin Sub-D socket for connection to PROFIBUS
- Diagnostic LEDs
- Parallel operation of max. 4 CPs [1)]

The module is installed using the standard PCI mechanisms (Plug&Play).

The electrical PROFIBUS is connected using

- Bus connector and PROFIBUS cable or
- Bus terminal (e.g. bus terminal 12 M) and PROFIBUS bus cable.

The optical PROFIBUS is connected using

- Bus cable with 2 bus connectors or
- PROFIBUS connecting cable 830-1T

to an OLM.

When the CP 5613 A2 is used as a DP master or in a PG/OP on PROFIBUS DP, the optical PROFIBUS is connected with an integrated interface and OBT using:

- Bus cable with 2 bus connectors or
- PROFIBUS connecting cable 830-1T

to an optical bus terminal (OBT) for PROFIBUS DP.

1) FMS-5613 supports up to 2 CP 5613 A2/5614 A2.

## CP 5613 A2

### Function

#### PROFIBUS DP

*Access to process data with DP-Base*

The CP 5613 A2 is operated as a PROFIBUS DP master module which holds the process image (input/output and diagnostic data) in the dual port RAM (memory area on the CP). The high-performance data exchange with the PROFIBUS slaves is handled independently by the CP 5613 A2 hardware. The user has direct access to the dual port RAM.
The process data of the slaves are always consistent, i.e. the user gets the data of a slave from one and the same DP cycle.

Parallel operation of DP 5613 software and DP-Base is not possible.

*Event/filter mechanism*

The user receives up-to-date data through two access mechanisms:

- Cyclic polling of the DP slaves (higher load on host CPU)
- Signaling by new kind of event/filter mode in the event of changes in the input data of a slave (minimum load on host CPU)

Both alternatives can be combined. Optimum utilization of the PC is therefore possible for the relevant application.

The new event/filter mechanism can also be used for

- Signaling by interrupt for diagnostic messages from slaves
- In equidistant mode signaling by interrupt:
  - Start DP cycle
  - End cyclic data transfer with the DP slaves (hardware version 3 and newer

*FastLogic*

FastLogic means that the CP 5613 A2 can react automatically to up to 4 plant states. A fast response time and independence of the host application is achieved here, for example, for rapid equipment shutdown.

*DP programming interface*

The DP programming interface (DP-Base) of the CP 5613 A2 has the following functions:

- DP Master Class 1 including acyclic DP extensions
- DP Master Class 2 including acyclic DP extensions

Access to the process data is directly through the dual port RAM. The dual port RAM interface not only offers fast access as a DP master but also a basis for portability to other operating system environments (e.g. VXWorks, QNX, RMOS, RTX).

A library (DP_BASE.DLL) offers administrative functional calls (initialization and management services.

#### DK-5613 development kit

The DK-5613 development kit offers access to the functions DP Master Class 1 including non-cyclic DP expansions.

With the DK-5613 software development kit the communications processors CP 5613 A2 and CP 5614 can be integrated in any operating system environments. The kit contains the necessary source code including the descriptions in PDF format and can be downloaded free of charge from the Internet.

#### Access to process data with DP-5613

- DP Master Class 1

The CP 5613 A2 operates as a DP Master Class 1 according to IEC 61158/EN 50170 and handles data transfer with the distributed stations (DP slaves) completely independently. In a fixed, repetitive message cycle, the central controller exchanges information with the DP slaves (e.g. ET 200S). The DP programming interface (DPLib.DLL) provides the PC programmer with function calls for data transfer. In addition, the DP interface offers the functions SYNC and FREEZE as well as the activation and deactivation of slaves.

The DP function expansions for Master Class 1 enable non-cyclic read and write functions (DS_READ, DS_WRITE) as well as alarm acknowledgement (ALARM_ACK) to be performed parallel to cyclic data traffic. The non-cyclic transmitted data (e.g. parameterization data) are changed very rarely in comparison with the cyclic measured values and are transmitted with low priority parallel to the fast cyclic useful data transfer. The interrupt acknowledgement in the master ensures reliable transmission of the interrupts from the DP slaves.

Parallel operation of DP-Base and DP-5613 software is not possible.

- DP Master Class 2

Apart from the DP Master Class 1 services, the CP 5613 A2 also offers, in combination with the DP programming interface, DP Master Class 2 services according to IEC 61158/EN 50170. Devices of this type (programming devices, configuration devices or operating devices) are used on startup, on configuring the DP system or for operating the system during normal operation (e.g. diagnostics). The DP programming interface provides the following services:

- Master diagnostics
- Slave diagnostics
- Read inputs/outputs of a slave
- Reading configuration data and
- Changing the slave address.

The extended DP functions also include non-cyclic access to the parameters and measured values of a slave (e.g. field devices of the process automation, intelligent HMI devices. This type of slave must be supplied with extensive parameter data during startup and normal operation (DS_READ, DS_WRITE, DS_DATA_TRANSPORT).

#### Software for PG/OP communication

This software allows programming of the SIMATIC S5 and S7 controllers (except for SIMATIC S5-95U) through PROFIBUS in conjunction with STEP 5/STEP 7. PG/OP communication for the CP 5613 A2 is available following installation of the CP 5613 (DP-Base). No additional software package is needed.

#### S5-compatible communication (SEND/RECEIVE based on the FDL interface)

SEND/RECEIVE (FDL interface) is already available after installation of the CP 5613 (DP-Base) and offers data exchange services for diagnostics and management. No additional software package is needed.

**Function** (continued)

### Software for S7 communication (S7-5613)

SIMATIC S7 system components communicate with each other through S7 communication. The S7 programming interface enables PG/PC application programs to access SIMATIC S7 system components. The SIMATIC S7 data can be accessed easily and flexibly.

The following services are available with S7 communication:

*Administrative services*

- Link management
- Mini database
- Trace

*Data transfer services*

- Reading/writing of variables
- BSEND/BRECEIVE (up to 64 KB per task)

### Software for PROFIBUS FMS (FMS-5613)

The FMS programming interface allows PG/PCs to exchange data with FMS-capable controllers (e.g. S5/S7) and field devices of other manufacturers. The use of the FMS protocol guarantees open communication.

The following services are available through the FMS interface:

- Administrative services
- CRL management services
- FMS connection management services
- Object directory management services for clients and server
- Variable services for clients and server (read, write, information report)
- Server functionality
- VFD (virtual field device) services for clients and server
- Bus access information services (live list)
- Trace and Mini database

### User interfaces

*OPC interface*

The OPC server contained in the respective software package can be used as a standard programming interface for the protocols PROFIBUS DP, S5-compatible communication, S7 communication and PROFIBUS FMS to connect automation applications to OPC-capable Windows applications (Office, HMI systems etc.).

*Programming interface through C-Library*

The programming interfaces for existing applications are implemented as a Dynamic Link Library (DLL). The following compilers can therefore be used in conjunction with the SIMATIC NET products:

- Microsoft Visual C/C++ V6.0
- Microsoft Visual Basic V6.0
- Microsoft Visual C V7.x

Partner solutions from AIXO are available for Borland programming interfaces (e.g. DELPHI).

For solutions for other operating systems, see the development kit DK-5613.

### Configuration

- Configuration of S7 communication protocols, S5-compatible communication, DP protocol (DP-V0/DP-V1/DP-V2) and FMS protocol is executed in STEP 7 or NCM PC.
- The configuring tool NCM PC is included in the scope of supply of the PROFIBUS software package.
- NCM PC is a component of Advanced PC Configuration.

### Diagnostics

Extensive diagnostic tools are available (for installation, commissioning and operation) for the module itself and for the PROFIBUS DP network. Therefore a PROFIBUS network can be started up quickly and easily with a CP 5613 A2.

## CP 5613 A2

### Technical specifications

| | |
|---|---|
| Data transmission rates | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection to PROFIBUS | 9-pin Sub-D connector |
| • Connection to PG/PC | PCI (32 bit; 3.3 V/5 V; universal keyed; 33/66 MHz) |
| Supply voltage (from PCI) | 5 V DC ± 5% |
| Power consumption from 5 V DC | 0.8 A |
| Power loss | 4 W |
| Perm. environmental conditions | |
| • Operating temperature | +5 °C to +50 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | max. 85 % at +30 °C |
| Design | |
| • Module format | short PCI card |
| • Dimensions (W x H) in mm | 107 x 168 |
| • Weight | approx. 105 g |
| • Space required | 1 x PCI slot (32 bit; 3.3 V/5 V; universal keyed; 33/66 MHz) |
| DP-Master | DP-V0, DP-V1, DP-V2 |
| **Performance data: Single protocol operation** | |
| • Number of connectable DP slaves | max. 124 |
| • Number of parallel FDL tasks to be processed | max. 120 |
| • Number of PG/OP and S7 connections | max. 50 [1] |
| • Number of FMS connections | max. 40 [2] |

1) For Credit = 1; PDU size ≤ 480 bytes

2) For Credit = 1

### Ordering data

| | Order No. |
|---|---|
| **CP 5613 A2 communications processor**<br>PCI card (32-bit; 3.3 V/5 V) for connection to PROFIBUS incl. DP-Base software with NCM PC; DP-RAM interface for DP master, incl. PG and FDL protocol; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, Class A, for 32-bit Windows 2000 Professional/Server; Windows XP Professional, 2003 Server, German/English | **6GK1 561-3AA01** |
| **Development Kit DK-5613**<br>Software development kit for CP 5613/CP 5614/CP 5613 A2/ CP 5614 A2/CP 56 13 FO/ CP 5614 FO for integration in other operating system environments on systems with a PCI slot | See *http://www.siemens.de/simatic-net/dk5613* |

### Ordering data (continued)

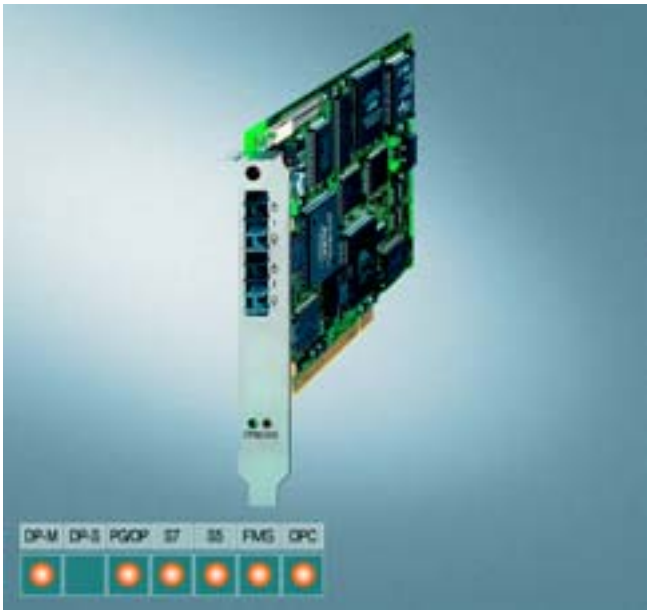
| | Order No. |
|---|---|
| **DP-5613 V6.2**<br>Software for DP, incl. PG and FDL protocol, OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows XP Professional; 2003 Server, 2000 Professional/Server, for CP 5613, CP 5613 A2, CP 5613 FO, CP 5614, CP 5614 A2, CP 5614 FO German/English | **6GK1 713-5DB62-3AA0** |
| **S7-5613 V6.2**<br>Software for S7 communication, incl. PG and FDL protocol, OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows XP Professional; 2003 Server, 2000 Professional/Server, for CP 5613, CP 5613 A2, CP 5613 FO, CP 5614, CP 5614 A2, CP 5614 FO German/English | **6GK1 713-5CB62-3AA0** |
| **FMS-5613 V6.2**<br>Software for FMS protocol, incl. PG/OP communication; FDL, FMS OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows XP Professional; 2003 Server, 2000 Professional/Server, for CP 5613, CP 5613 A2, CP 5613 FO, CP 5614, CP 5614 A2, CP 5614 FO German/English | **6GK1 713-5FB62-3AA0** |
| **PROFIBUS FastConnect bus connector RS 485 Plug 180**<br>With 180° cable outlet | **6GK1 500-0FC00** |
| **PROFIBUS bus terminal 12M**<br>Bus terminal for connection of PROFIBUS stations up to 12 Mbit/s with plug-in cable | **6GK1 500-0AA10** |
| **SIMATIC NET Software Update Service**<br>For Industrial Ethernet, PROFIBUS, OPC server, for one year service incl. manuals on CD-ROM<br>Requirement: SIMATIC NET PC/Windows products German/English | **6GK1 704-0AA00-3AA2** |

### More information

Additional information can be found in the Internet under:


*http://www.siemens..com/simatic-net/dk5613*

## Overview




- PCI card with microprocessor for system connection for PCs and SIMATIC PGs/PC to the optical PROFIBUS at up to 12 Mbit/s
- Integral fiber-optic interface for direct FO connection
- Communication services:
  - PROFIBUS DP masters according to IEC 61158/EN 50170
  - PG/OP communication with STEP 5 and STEP 7
  - S7 communication
  - S5-compatible communication (SEND/RECEIVE) based on the FDL interface
  - PROFIBUS FMS acc. to IEC 61158/EN 50170
- Comprehensive diagnostics possibilities for installation, start-up and operation of the module
- High performance over direct dual-port RAM access
- Event and filter mechanisms to reduce the loading on the host CPU
- Multi-protocol mode and parallel operation of up to 4 CPs
- Implementation in Motion Control applications is possible because a constant bus cycle time is supported
- The appropriate OPC server and configuration tools are included in the scope of supply of the respective communication software

## Benefits

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- Fastest possible access to process data through dual port RAM
- OPC as standard interface
- Process-consistent data from a DP cycle
- Direct connection to the optical PROFIBUS through integrated FOC interface
- Higher computing performance in the PC by relieving the host CPU
- Fast commissioning through Plug&Play and diagnostic tools
- Implementation for motion control applications possible through support of the equidistant mode
- Easy portability to other operating systems through a dual port RAM interface
- Can also be used in high temperature industrial environments

## Application

OPC FOUNDATION MEMBER

Compliance Tested OPC FOUNDATION

The CP 5613 FO provides a connection to the optical PROFIBUS for SIMATIC PG/PC and PCs with a PCI slot.

The CP 5613 FO provides high-performance support for control tasks on the PC (PC based Control, Numeric Control, Robot Control).

## Design

- Short PCI card
- 2 duplex sockets for connecting plastic and PCF fiber-optic cables with 2 simplex connectors each to the optical PROFIBUS
- Connection of the external supply through a plug-in power supply unit. This ensures that data communication over the optical line is not interrupted when the PC is shut down.
- Diagnostic LEDs
- Parallel operation of max. 4 CPs [1)]

The module is installed using the standard PCI mechanisms (Plug&Play).

When the CP 5613 FO is used as a DP master or in a PG/OP on PROFIBUS DP, the optical PROFIBUS is connected with an integrated interface using:

- Plastic and PCF fiber-optic cables with simplex plugs

1) FMS-5613 supports up to 2 CP 5613/5614.

## CP 5613 FO

### Function

#### PROFIBUS DP

*Access to process data with DP-Base*

The CP 5613 FO is operated as a PROFIBUS DP master module that stores the process image (input/output and diagnostics data) in the dual-port RAM (memory area on the CP). High-performance data transfer to and from the PROFIBUS slaves is performed autonomously by the hardware of the CP 5613 FO. The user accesses the dual-port RAM directly.

The process data of the slaves are always consistent, i.e. the user receives the data of a slave from one and the same DP cycle.

DP-Base and the DP 5613 software cannot be operated simultaneously.

*Event/filter mechanism*

The user receives up-to-date data over two access mechanisms:

- Cyclic polling of the DP slaves (higher loading for host CPU)
- Notification through event/filter mode on changing the input data of a slave (minimal loading for host CPU)

Both alternatives can be combined. This allows users to optimize use of the PC for their applications.

The event/filter mechanism can be used additionally for

- Notification by means of an interrupt of the diagnostic alarms from slaves
- During operation with constant bus cycle time, signaling by means of interrupt:
  - Start DP cycle
  - End cyclic data communication with DP slaves

Constant bus cycle time can be set for STEP 7 V5.1 + SP2 upwards or NCM PC V5.1+SP2.

DP programming interface

The DP programming interface (DP-Base) of the DP 5613 FO features the following functions:

- DP master class 1
  including non-cyclic DP expansions
- DP master class 2
  including acyclic expansions

The process data is accessed directly through the dual-port RAM. The dual-port RAM interface not only offers fast access as DP master but also easy porting to other operating system environments (e.g. VXWorks, QNX, RMOS, RTX).

Administrative function calls (initialization and management services) are offered in a library (DP_BASE.DLL).

#### Development Kit DK-5613

The Development Kit DK-5613 provides access to the functions DP master Class 1 including acyclic DP expansions

The Software Development Kit DK-5613 can be used to integrate the communication processors CP 5613/CP 5614 and CP 5613 FO/CP 5614 FO into operating system environments. The kit contains the necessary source code including the descriptions in PDF format and can be downloaded free of charge from the Internet.

#### Access to process data with DP-5613

- DP master Class 1
  The CP 5613 FO operates as DP master Class 1 to IEC 61158/EN 50170 and processes data communication with the distributed stations (DP slaves) completely autonomously. The central controller exchanges information with the DP slaves (e.g. ET 200S) in a specified, constantly repeating message cycle. The DP programming interface (DPLib.DLL) provides the PC programmer with function calls for data transfer. The DP interface also offers the SYNC and FREEZE functions as well as the activation and deactivation of slaves.
  The DP function expansions with respect to master Class 1 enable acyclic read and write functions (DS_READ, DS_WRITE) and alarm acknowledgements (ALARM_ACK) to be performed in parallel with the cyclic data communication. Data that are to be transferred in acyclic mode (e.g. parameterization data) are only rarely changed in comparison to the cyclic measured values, and are transferred at lower priority in parallel with the cyclic high-speed useful data transfer. The acknowledgement of alarms by the master ensures reliable transmission of the alarms of DP slaves.
  DP-Base and DP 5613 software cannot be used at the same time.
- DP master Class 2
  Apart from the DP master Class 1 services, the CP 5613 FO also offers DP master Class 2 services to IEC 61158/EN 50170 in conjunction with the DP programming interface. Devices of this type (programming, configuration or control devices) are used during start-up, for configuring the DP system or for controlling the system during normal operation (diagnostics). The DP programming interface provides the following services:
  - Master diagnostics
  - Slave diagnostics
  - Reading the inputs/outputs of a slave
  - Reading configuration data and
  - Changing slave addresses.

The extended DP functions comprise acyclic access to the parameters and measured values of a slave (e.g. field devices of process automation and intelligent HMI devices). This type of slave must be supplied with extensive parameter data during start-up and during normal operation (DS_READ, DS_WRITE, DS_DATA_TRANSPORT).

#### Software for PG/OP communication

This software supports programming of the SIMATIC S5/S7 controllers (with the exception of SIMATIC S5-95U) over PROFIBUS in combination with STEP 5/STEP 7. PG/OP communication for the CP 5613 FO is available as soon as the CP 5613 (DP-Base) has been installed. No additional software packages are required.

#### S5-compatible communication (SEND/RECEIVE based on the FDL interface)

SEND/RECEIVE (FDL interface) is already available following installation of the CP 5613 FO (DP-Base) and provides services for data transfer, diagnostics and management. No additional software packages are required.

## Function (continued)

### Software for S7 communication (S7-5613)

SIMATIC S7 system components communicate with each other using S7 communication functions. The S7 programming interface provides programming device/PC user programs with access to SIMATIC S7 system components. This provides easy, flexible access to the data of the SIMATIC S7 controller.

The following services are available with S7 communication:

*Administrative services*

- Connection management
- Mini database
- Trace

*Data transfer services*

- Read/write variables
- BSEND/BRECEIVE (up to 64 KB per task)

### Software for PROFIBUS FMS (FMS-5613)

With the FMS programming interface, PCs can exchange different manufacturer data with FMS-capable controllers (e.g. S5 and S7) and field devices. Open communication is made possible by using the FMS interface.

The FMS interface offers the following services:

- Administrative services
- CRL management services
- FMS connection management services
- Object directory management services for clients and server
- Variable services for clients and servers (Read, Write, Information Report)
- Server functionality
- VFD services (Virtual Field Device) for clients and servers
- Bus access information services (Live list)
- Trace and mini database

### User interfaces

- OPC interface

The OPC server included in the respective software package can be used as the standard programming interface for the PROFIBUS DP, S5-compatible communication, S7 communication and PROFIBUS FMS protocols for linking automation technology applications to OPC-capable Windows applications (Office, HMI systems, etc.).

- Programming interface through C library

The programming interfaces for existing applications are implemented as Dynamic Link Libraries (DLL). This means that the following compilers can be used in combination with the SIMATIC NET products:

- Microsoft Visual C/C++ V6.0
- Microsoft Visual Basic V6.0
- Microsoft Visual C V7.x

For Borland programming interfaces (e.g. DELPHI), partner solutions from AIXO are offered.

For solutions for other operating systems, see Development Kit DK-5613.

### Configuring

- S7 communication protocol, S5-compatible communication protocol, DP protocol (DP-V0/DP-V1/DP-V2) and FMS protocol are configured in STEP 7/NCM PC V5.1+SP2 and higher.
- The configuring tool NCM PC is included in the PROFIBUS software packages.
- NCM PC is a component part of Advanced PC Configuration

### Diagnostics

Comprehensive diagnostic tools are available (for installation, start-up and operation) for the module itself and for the PROFIBUS network.

These tools can be used for quick and easy start-up of a PROFIBUS network with a CP 5613 FO.

## CP 5613 FO

### Technical specifications

| | |
|---|---|
| Data transmission rates | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection to PROFIBUS | 2 x duplex socket (FO) |
| • Connection to PG/PC | PCI (32 bit) |
| • External power supply (optical) through standard external power supply | Low voltage socket 3.5 mm/1.3 mm |
| Supply voltage from PCI | 5 V DC +/- 5 %<br>12 V DC +/- 5 % |
| Current consumption | |
| • From 5 V DC | 1.4 A |
| • From 12 V DC | 0.3 A |
| Power loss | 7 W |
| Supply voltage (optional) | 9 to 12 V DC |
| • Current consumption | 0.4 A |
| • Power loss | 3.6 to 4.8 W |
| Perm. environmental conditions | |
| • Operating temperature | |
| - Without fan | +5°C to +40°C |
| - With fan (air flow 0.5 m/s) | +5°C to +60°C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25 °C |
| Design | |
| • Module format | PCI card |
| • Dimensions (W x H) in mm | 107 x 168 |
| • Weight | Approx. 250 g |
| • Space required | 1 x PCI slot (32 bits; 5 V) |
| DP master | DP V0, DP V1, DP V2 |
| **Performance data:<br>Single protocol operation** | |
| • Number of connectable DP slaves | Max. 122 |
| • Number of parallel FDL tasks to be processed | Max. 120 |
| • Number of PG/OP and S7 connections | Max. 50 [1] |
| • Number of FMS connections | Max. 40 [2] |

1) For Credit = 1; PDU size ≤ 480 byte

2) For Credit = 1;

### Ordering data

| | Order No. |
|---|---|
| **CP 5613 FO communications processor**<br>PCI card (32-bit; 5 V) for connection to optical PROFIBUS incl. DP-Base software with NCM PC; DP-RAM interface for DP master, incl. PG and FDL protocol; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, Class A, for 32-bit Windows 2000 Professional/Server: Windows XP Professional, 2003 Server German/English | **6GK1 561-3FA00** |

### Ordering data (continued)

| | Order No. |
|---|---|
| **Development Kit DK-5613**<br>Software Development Kit for CP 5613/CP 5614 for integration in other operating system environments on systems with a PCI slot | You can find the DK-5613 on the Internet at: http://www.siemens.de/simatic-net/dk5613 |
| **DP-5613 V6.2**<br>Software for DP, incl. PG and FDL protocol, OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows XP Professional, 2003 Server, Windows 2000 Professional/Server, for CP 5613, CP 5613 FO, CP 5614, CP 5614 FO German/English | **6GK1 713-5DB62-3AA0** |
| **S7-5613 V6.2**<br>Software for S7 communication, incl. PG and FDL protocol, OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows XP Professional, 2003 Server, Windows 2000 Professional/Server, for CP 5613, CP 5613 FO, CP 5614, CP 5614 FO German/English | **6GK1 713-5CB62-3AA0** |
| **FMS-5613 V6.2**<br>Software for FMS protocol, incl. PG/OP communication; FDL, FMS OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows XP Professional, 2003 Server, Windows 2000 Professional/Server, for CP 5613, CP 5613 FO, CP 5614, CP 5614 FO German/English | **6GK1 713-5FB62-3AA0** |
| **SIMATIC NET Software Update Service**<br>For Industrial Ethernet, PROFIBUS, OPC server, for one year service incl. manuals on CD-ROM<br>Requirement: SIMATIC NET PC/Windows products German/English | **6GK1 704-0AA00-3AA2** |

### More information

The DK-5613 can be found in the Internet at:

Additional information can be found in the Internet under:


http://www.siemens.com/simatic-net/dk5613

## CP 5614 A2

### Overview


- PCI card (universal key 5 V/3.3 V) with microprocessor for system interfacing for PCs and SIMATIC programming devices/PC to PROFIBUS up to 12 Mbit/s
- Communication services:
  - PROFIBUS DP master according to IEC 61158/EN 50170 on a PCI card
  - PG/OP communication with STEP 5 and STEP 7
  - S7 communication
  - S5-compatible communication (SEND/RECEIVE) on the basis of the FDL interface
  - PROFIBUS FMS according to IEC 61158/EN 50170
- Extensive diagnostic facilities for installation, commissioning and operation of the module
- High performance through direct dual port RAM access
- Event and filter mechanism for relieving the host CPU
- Multiple protocol operation and parallel operation of up to 4 CPs
- Implementation for motion control applications possible through support of the equidistant mode
- The corresponding OPC Server and configuration tools are included in the scope of supply of the respective communications software

### Benefits

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- Only one slot is necessary for master and slave
- Fast access to process data over dual-port RAM
- OPC as standard interface
- Consistent process data from a DP cycle
- More computing power is available in the PG/PC by taking the load off the host CPU
- Fast start-up through Plug&Play and diagnostic tools
- Implementation in Motion Control applications is possible because a constant bus cycle time is supported
- Simple porting to other operating system environments through dual port RAM interface
- Implementation is even possible in an industrial environment at high temperatures.
- Can be used flexibly in PG/PC due to PCI 3.3/5V, 33/66 MHz and compatibility to 64-bit PCI-X slot

### Application

OPC FOUNDATION MEMBER

Compliance Tested OPC FOUNDATION

The CP 5614® A2 supports the connection of a SIMATIC PG/PC and PCs with a PCI slot to PROFIBUS. It can be either a DP master or a DP slave.

Two different PROFIBUS networks can then be connected in a hierarchic structure on a PC with a PROFIBUS card and data can be transferred between the two.

The CP 5614 A2 provides high-performance support for control tasks on the PC (PC based Control, Numeric Control, Robot Control).

### Design

- Short PCI card
- Suitable for 3.3 V and 5 V PCI slots (universal key)
- 33 MHz or 66 MHz PCI cycle
- Can be used as a 32-bit card in a 64-bit PCI-X slot
- 2 x 9-pin Sub-D socket for connection to PROFIBUS
- Diagnostic LEDs
- Parallel operation of max. 4 CPs [1)]

The module is installed using the standard PCI mechanisms (Plug&Play).

The electrical PROFIBUS is connected using

- Bus connector and PROFIBUS cable or
- Bus terminal (e.g. bus terminal 12 M) and PROFIBUS bus cable

The optical PROFIBUS is connected using

- Bus cable with 2 bus connectors or
- PROFIBUS connecting cable 830-1

to an OLM.

Connection to the optical PROFIBUS with integrated interface and OBT is implemented using

- Bus cable with 2 bus connectors or
- PROFIBUS connecting cable 830-1T

to an OLM.

When the CP 5614 A2 is used as a DP master, DP slave or in a PG/OP on PROFIBUS DP, the optical PROFIBUS is connected with an integrated interface and OBT using:

- Bus cable with 2 bus connectors or
- PROFIBUS connecting cable 830-1T

to an optical bus terminal (OBT) for PROFIBUS DP.

1) FMS-5613 supports up to 2 CP 5613 A2/5614 A2.

5

## CP 5614 A2

### Function

#### PROFIBUS DP

*Access to process data*

The CP 5614 A2 is operated as a PROFIBUS DP master and DP slave module which holds the process image (input/output and diagnostic data) in the dual port RAM. The high-performance data exchange with the PROFIBUS slaves is handled independently by the CP 5614 A2 hardware. The user has direct access to the dual port RAM.

The process data of the slaves are always consistent, i.e. the user gets the data of a slave from one and the same DP cycle.

Parallel operation of DP 5613 software (DP master) and DP-Base (DP master, DP slave) is not possible.

*Event/filter mechanism*

The user receives up-to-date data through two access mechanisms:

- Cyclic polling of the DP slaves (high load on host CPU)
- Signaling by new kind of event/filter mode in the event of changes in the input data of a slave (minimum load on host CPU)

Both alternatives can be combined. Optimum utilization of the PC is therefore possible for the relevant application.

The new event/filter mechanism can also be used for

- Signaling by interrupt for diagnostic messages from slaves
- In equidistant mode signaling by interrupt:
  - Start DP cycle
  - End of cyclic data exchange with the DP slaves

*FastLogic*

FastLogic means that the CP 5614 A2 can react automatically to up to 4 plant states. A fast response time and independence of the host application is achieved here, for example, for rapid equipment shutdown.

*DP programming interface*

The DP master programming interfaces of the CP 5613 A2 and CP 5614 A2 are identical.

The DP programming interface of the CP 5614 A2 has the following functional scope:

- DP slave
- DP Master Class 1 including acyclic DP extensions
- DP Master Class 2 including acyclic DP extensions

The process data is accessed directly through the DP RAM. The DP RAM interface not only offers fast access as a DP master/slave but also a basis for portability to other operating system environments (e.g. VXWorks, QNX, RMOS, RTX).

A DP master and a DP slave library (DP_BASE.DLL or DPS_BASE.DLL) offer administrative function calls (initialization and management services as well as diagnostic functions).

A transfer mechanism (application in the PC) can be set through software as a link for data exchange between the master and slave interface.

In this manner, defined I/O data can be transmitted between the master interface and the slave interface.

The two connected PROFIBUS networks can be operated with different PROFIBUS bus parameters due to their mutual independence.

#### DK-5613 development kit

The DK-5613 development kit offers access to the functions DP Master Class 1 and DP slave (including non-cyclic DP expansions).

With the DK-5613 software development kit the CP 5613 A2 and CP 5614 A2 communications processors can be integrated in any other operating system environments. The kit contains the necessary source code including the descriptions in PDF format and can be downloaded free of charge from the Internet.

#### Access to process data with DP-5613

- DP Master Class 1

The CP 5614 A2 operates as a DP Master Class 1 according to IEC 61158/EN 50170 and handles data transfer with the distributed stations (DP slaves) completely independently. In a fixed, repetitive message cycle, the central controller exchanges information with the DP slaves (e.g. ET 200S). The DP programming interface (DPLib.DLL) provides the PC programmer with function calls for data transfer. In addition, the DP interface offers the functions SYNC and FREEZE as well as the activation and deactivation of slaves.

The DP function expansions for Master Class 1 enable non-cyclic read and write functions (DS_READ, DS_WRITE) as well as alarm acknowledgement (ALARM_ACK) to be performed parallel to cyclic data traffic. The non-cyclic transmitted data (e.g. parameterization data) are changed very rarely in comparison with the cyclic measured values and are transmitted with low priority parallel to the fast cyclic useful data transfer. Interrupt acknowledgment in the master ensures reliable transfer of the interrupts from DP slaves (DS_READ, DS_WRITE, DS_DATA_TRANSPORT).

Parallel operation of DP-Base software and DP-5613 is not possible.

- DP Master Class 2

Apart from the DP Master Class 1 services, the CP 5614 A2 also offers, in combination with the DP programming interface, DP Master Class 2 services according to IEC 61158/EN 50170. Devices of this type (programming devices, configuration devices or operating devices) are used on startup, on configuring the DP system or for operating the system during normal operation (e.g. diagnostics).

The DP programming interface provides the following services:

- Master diagnostics
- Slave diagnostics
- Read inputs/outputs of a slave
- Reading configuration data and
- Changing the slave address.

The extended DP functions also include non-cyclic access to the parameters and measured values of a slave (e.g. field devices of the process automation, intelligent HMI devices. This type of slave has to be supplied with extensive parameter data during startup and normal operation (DS_READ, DS_WRITE, DS_DATA_TRANSPORT).

**Function** (continued)

### Software for PG/OP communication

This software allows programming of the SIMATIC S5 and S7 controllers (except for SIMATIC S5-95U) through PROFIBUS in conjunction with STEP 5/STEP 7. PG/OP communication for the CP 5614 A2 5614 is available following installation of the CP 5614 A2 (DP-Base). No additional software package is needed.

### S5-compatible communication (SEND/RECEIVE based on the FDL interface)

SEND/RECEIVE (FDL interface) is already available after installation of the CP 5614 A2 (DP-Base) and offers data exchange services for diagnostics and management. No additional software package is needed.

### Software for S7 communication (S7-5613)

SIMATIC S7 system components communicate with each other through S7 communication. The S7 programming interface enables PG/PC application programs to access SIMATIC S7 system components. The SIMATIC S7 data can be accessed easily and flexibly.

The following services are available with S7 communication:

*Administrative services*

- Link management
- Mini database
- Trace

*Data transfer services*

- Reading/writing of variables
- BSEND/BRECEIVE (up to 64 KB per task)

### Software for PROFIBUS FMS (FMS-5613)

The FMS programming interface allows PG/PCs to exchange data with FMS-capable controllers (e.g. S5/S7) and field devices of other manufacturers. The use of the FMS protocol guarantees open communication.

The following services are available through the FMS interface:

- Administrative services
- CRL management services
- FMS connection management services
- Object directory management services for clients and server
- Variable services for clients and server (read, write, information report)
- Server functionality
- VFD (virtual field device) services for clients and server
- Bus access information services (live list)
- Trace and Mini database

### User interfaces

- OPC interface

The OPC server contained in the respective software package can be used as a standard programming interface for the protocols PROFIBUS DP (DP master and DP slave), S5-compatible communication, S7 communication and PROFIBUS FMS to connect automation applications to OPC-capable Windows applications (Office, HMI systems etc).

- Programming interface through C-Library

The programming interfaces for existing applications are implemented as a Dynamic Link Library (DLL). The following compilers can therefore be used in conjunction with the SIMATIC NET products:

- Microsoft Visual C/C++ V6.0
- Microsoft Visual Basic V6.0
- Microsoft Visual C V7.x

Partner solutions from AIXO are available for Borland programming interfaces (e.g. DELPHI).

For solutions for other operating systems, see the DK-5613 development kit.

### Configuration

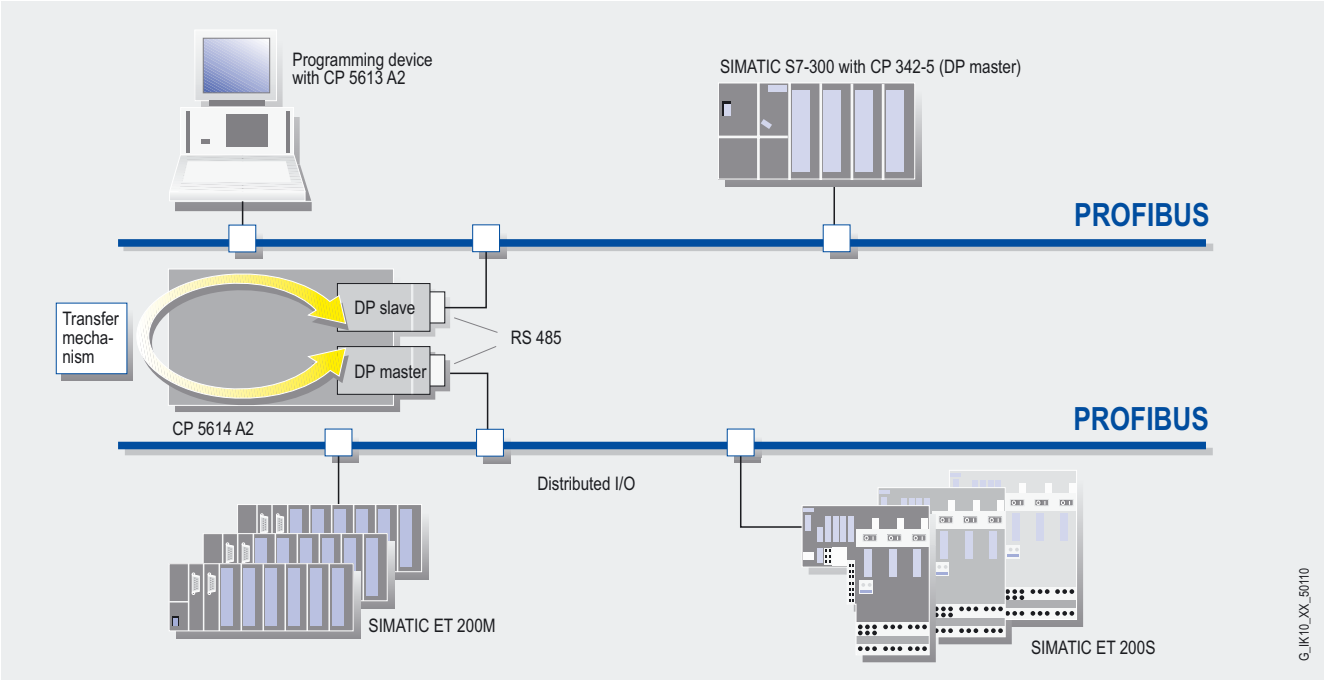
- Configuration of S7 communication protocols, S5-compatible communication, DP protocol (DP-V0/DP-V1/DP-V2) and FMS protocol is executed in STEP 7 or NCM PC, V5.1+SP2 or newer.
- The configuring tool NCM PC is included in the scope of supply of the PROFIBUS software package.
- NCM PC is a component of Advanced PC Configuration.

### Diagnostics

Extensive diagnostic tools are available (for installation, commissioning and operation) for the module itself and for the PROFIBUS DP network. Therefore a PROFIBUS DP network can be started up quickly and easily with a CP 5614 A2.

## CP 5614 A2

### Function (continued)




Confguration example with CP 5614 A2

### Technical specifications

| | |
|---|---|
| Transmission rates | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection to PROFIBUS DP (master) | 9-pin Sub-D socket |
| • Connection to PROFIBUS DP (slave) | 9-pin Sub-D socket |
| • Connection to PG/PC | PCI (32-bit; 3.3 V/5 V; universal keyed; 33/66 MHz) |
| Supply voltage (from PCI) | 5 V DC ± -5 % |
| Current input from 5 V DC | Approx. 0.9 A |
| Power loss | Approximately 4.5 W |
| Perm. ambient conditions | |
| • Operating temperature | +5 °C to +50 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 85 % at + 30 °C |
| Construction | |
| • Module format | Short PCI card |
| • Dimensions (W x D) in mm | 107 x 168 |
| • Weight | approx. 120 g |
| • Space requirements | 1 x PCI slot (32-bit; 3.3 V/5 V; universal keyed; 33/66 MHz) |
| DP master | DP-V0, DP-V1, DP-V2 |
| DP slave | DP-V0, DP-V1 |

| **Performance data for mono-protocol operation** | |
|---|---|
| • Number of connectable DP slaves | Max. 124 |
| • Data area of the slave interface: Input data, output data, diagnostics data | 244 byte each |
| • Number of parallel FDL tasks waiting | Max. 120 |
| • Number of PG/OP and S7 connections | Max. 50 [1] |
| • Number of FMS connections | Max. 40 [2] |

1) For credit = 1; PDU size ≤ 480 byte

2) For credit = 1

## Ordering data

| | Order No. |
|---|---|
| **CP 5614 A2 communications processor**<br>PCI card (32-bit; 3.3 V/5 V) master and slave connection to PROFIBUS incl. DP-Base software with NCM PC; DP-RAM interface for DP master, incl. PG and FDL protocol; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, Class A, for 32-bit Windows 2000 Professional/Server; Windows XP Professional, 2003 Server, German/English | **6GK1 561-4AA01** |
| **Development Kit DK-5613**<br>Software development kit for CP 5613/CP 5614/CP 5613 A2/ CP 5614 A2/CP 56 13 FO/ CP 5614 FO for integration in other operating system environments on systems with a PCI slot | See http://www.siemens.de/simatic-net/dk5613 |
| **DP-5613 V6.2**<br>Software for DP, incl. PG and FDL protocol, OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5613, CP 5613 A2, CP 5613 FO, CP 5614, CP 5614 A2, CP 5614 FO German/English | **6GK1 713-5DB62-3AA0** |
| **S7-5613 V6.2**<br>Software for S7 communication, incl. PG and FDL protocol, OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, for CP 5613, CP 5613 A2, CP 5613 FO, CP 5614, CP 5614 A2, CP 5614 FO German/English | **6GK1 713-5CB62-3AA0** |
| **FMS-5613 V6.2**<br>Software for FMS protocol, incl. PG/OP communication; FDL, FMS OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5613, CP 5613 A2, CP 5613 FO, CP 5614, CP 5614 A2, CP 5614 FO German/English | **6GK1 713-5FB62-3AA0** |
| **PROFIBUS FastConnect bus connector RS 485 Plug 180**<br>With 180° cable outlet | **6GK1 500-0FC00** |
| **PROFIBUS bus terminal 12M**<br>Bus terminal for connection of PROFIBUS stations up to 12 Mbit/s with plug-in cable | **6GK1 500-0AA10** |
| **SIMATIC NET Software Update Service**<br>For Industrial Ethernet, PROFIBUS, OPC server, for one year service incl. manuals on CD-ROM<br>Requirement: SIMATIC NET PC/Windows products German/English | **6GK1 704-0AA00-3AA2** |

## More information

Additional information can be found in the Internet under:


http://www.siemens.com/simatic-net/dk5613

# CP 5614 FO

## Overview


PCI card with microprocessor for system connection for PCs and SIMATIC PGs/PC to the electrical and optical PROFIBUS at up to 12 Mbit/s

- Integral fiber-optic interface for FO direct connection; can be operated as a DP master or DP slave as required
- Communication services:
  - PROFIBUS DP master and slave interface according to IEC 61158/ EN 50170 on a PCI card
  - PG/OP communication with STEP 5 and STEP 7
  - S7 communication
  - S5-compatible communication (SEND/RECEIVE) based on FDL
  - PROFIBUS FMS acc. to IEC 61158/EN 50170
- Comprehensive diagnostics possibilities for installation, start-up and operation of the module
- High performance over direct dual-port RAM access
- Event and filter mechanisms to reduce the loading on the host CPU
- Multi-protocol mode and parallel operation of up to 4 CPs
- Implementation in Motion Control applications is possible because a constant bus cycle time is supported
- The appropriate OPC server and configuration tools are included in the scope of supply of the respective communication software

## Benefits

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- Only one slot is necessary for master and slave
- Direct connection to the optical PROFIBUS through the integral fiber-optic interface
- Fast access to process data over dual-port RAM
- OPC as standard interface
- Consistent process data from a DP cycle
- More computing power is available in the PC by taking the load off the host CPU
- Fast start-up through Plug&Play and diagnostic tools
- Simple porting to other operating system environments through dual port RAM interface
- Implementation in Motion Control applications is possible because a constant bus cycle time is supported
- Implementation is even possible in an industrial environment at high temperatures.
- Flexible implementation thanks to selectable assignment of the optical and electrical interface to the master and slave

## Application

OPC FOUNDATION MEMBER

Compliance Tested OPC FOUNDATION

The CP 5614 FO supports the connection of SIMATIC PG/PC with a PCI slot to PROFIBUS.

It can be either a DP master or a DP slave. Two different PROFIBUS networks can then be connected in a hierarchic structure on a PC with a PROFIBUS card and data can be transferred between the two. The CP 5614 FO provides high-performance support for control tasks on the PC (PC based Control, Numeric Control, Robot Control).

## Design

- Short PCI card
- 2 duplex sockets for connecting plastic and PCF fiber-optic cables with 2 simplex connectors each to the optical PROFIBUS
- 9-pin Sub-D socket for connection to PROFIBUS
- Connection of the external supply through a plug-in power supply unit. This ensures that data communication over the optical line is not interrupted when the PC is shut down.
- Diagnostic LEDs
- Parallel operation of max. 4 CPs [1].
- A software switch can be used to change the assignment of the master and slave to the optical and electrical interface.

The module is installed using the standard PCI mechanisms (Plug&Play).

When the CP 5614 FO is used as a DP master, DP slave or in a PG/OP on PROFIBUS DP, it is connected with an integrated interface and OBT using:

- Plastic and PCF fiber-optic cables with simplex plugs.

A software switch can be used to change the assignment of the optical and electrical master and slave.

1) FMS-5613 supports up to 2 CP 5613/5614.

## Function

### PROFIBUS DP

*Access to process data*

The CP 5614 FO is operated as a PROFIBUS DP master and DP slave module that stores the process image (input/output and diagnostics data) in the dual-port RAM. High-performance data transfer to and from the PROFIBUS slaves is performed autonomously by the hardware of the CP 5614 FO. The user accesses the dual-port RAM directly.

The process data of the slaves are always consistent, i.e. the user receives the data of a slave from one and the same DP cycle.

Parallel operation of DP 5613 (DP master) and DP Base (DP master, DP slave) is not possible.

*Event/filter mechanism*

The user receives up-to-date data over two access mechanisms:

- Cyclic polling of the DP slaves (higher loading for host CPU)
- Notification through event/filter mode on changing the input data of a slave (minimal loading for host CPU).

Both alternatives can be combined. This allows users to optimize use of the PC for their applications.

The event/filter mechanism can be used additionally for

- Notification by means of an interrupt of the diagnostic alarms from slaves
- During operation with constant bus cycle time, signaling by means of interrupt:
  - Start DP cycle
  - End cyclic data communication with DP slaves

Constant bus cycle time can be set for STEP 7 V5.1 and higher or NCM PC V5.1+SP2.

*DP programming interface*

The DP programming interfaces of the CP 5614 and CP 5614 FO are identical.

The DP programming interface of the CP 5614 FO features the following functions:

- DP slave
- DP master class 1 including acyclic DP expansions
- DP Class 2 including acyclic expansions

The process data is accessed directly through the dual-port RAM. The dual-port RAM interface not only offers fast access as DP master/slave, but also easy porting to other operating system environments (e.g. VXWorks, QNX, RMOS, RTX).

Administrative function calls (initialization and management services as well as diagnostic functions) are provided through a DP master and DP slave library (DP_BASE.DLL and DPS_BASE.DLL).

A transfer mechanism (PC application) can be activated in the software as a linking component for data transfer between the master and slave interface.

Defined I/O data can be transferred in this manner between the master interface and the slave interface.

The two connected PROFIBUS networks can be operated with different PROFIBUS bus parameters because they are independent of each other.

### Development Kit DK-5613

The Development Kit DK-5613 provides access to the functions DP master Class 1 and DP slave (incl. acyclic DP expansions)

The Software Development Kit DK-5613 is used to integrate the CP 5613 and CP 5614 communication processors into any operating system environment. The kit contains the necessary source code including the descriptions in PDF format and can be downloaded free of charge from the Internet.

### Access to process data with DP-5613

- DP master Class 1

The CP 5614 FO operates as a DP master Class 1 according to IEC 61158/EN 50170 and processes data communication with the distributed stations (DP slaves) completely autonomously. The central controller exchanges information with the DP slaves (e.g. ET 200S) in a fixed, repeating message cycle. The DP programming interface (DPLib.DLL) provides the PC programmer with function calls for data transfer. The DP interface also provides the SYNC and FREEZE functions as well as activation and deactivation of slaves.

The DP function expansions for masters Class 1 make it possible to perform acyclic read and write functions (DS_READ, DS_WRITE) as well as acknowledgement of alarms (ALARM_ACK) at the same time as processing cyclic data communication. Data that are to be transferred in non-isochrone mode (e.g. parameterization data) are only rarely changed, in comparison to the cyclic measured values, and are transferred at lower priority in parallel with the cyclic high-speed useful data transfer. Alarm acknowledgement by the master ensures reliable transfer of the alarms from DP slaves (DS_READ, DS_WRITE, DS_DATA_TRANSPORT).

DP-Base and the DP 5613 software cannot be operated simultaneously.

- DP master Class 2

Apart from the DP master Class 1 services, the CP 5614 FO also offers DP master class 2 services to IEC 61158/EN 50170 in conjunction with the DP programming interface. Devices of this type (programming, configuration or operating devices) are used during start-up, for configuring the DP system or for operating the system during normal operation (diagnostics).

The DP programming interface provides the following services:

- Master diagnostics
- Slave diagnostics
- Reading the inputs/outputs of a slave
- Reading configuration data and
- Changing slave addresses.

The extended DP functions comprise acyclic access to the parameters and measured values of a slave (e.g. field devices of process automation and intelligent HMI devices). This type of slave must be supplied with extensive parameter data during start-up and during normal operation. (DS_READ, DS_WRITE, DS_DATA_TRANSPORT).

## CP 5614 FO

**Function** (continued)

### Software for PG/OP communication

This software supports programming of the SIMATIC S5/S7 controllers (with the exception of SIMATIC S5-95U) over PROFIBUS in combination with STEP 5/STEP 7. PG/OP communication for the CP 5614 FO is available as soon as the CP 5614 (DP-Base) has been installed. No additional software packages are required.

### S5-compatible communication (SEND/RECEIVE based on the FDL interface)

SEND/RECEIVE (FDL interface) is already available following installation of the CP 5614 FO (DP-Base) and provides services for data transfer, diagnostics and management. No additional software packages are required.

### Software for S7 communication (S7-5613)

SIMATIC S7 system components communicate with each other using S7 communication functions. The S7 programming interface provides programming device/PC user programs with access to SIMATIC S7 system components. This provides easy, flexible access to the data of the SIMATIC S7 controller.

The following services are available with S7 communication:

Administrative services

- Connection management
- Mini database
- Trace

Data transfer services

- Read/write variables
- BSEND/BRECEIVE (up to 64 KB per task)

### Software for PROFIBUS FMS (FMS-5613)

With the FMS programming interface, PCs can exchange different manufacturer data with FMS-capable controllers (e.g. S5 and S7) and field devices. Open communication is assured by using the FMS interface.

The FMS interface offers the following services:

- Administrative services
- CRL management services
- FMS connection management services
- Object directory management services for clients and server
- Variable services for clients and servers (Read, Write, Information Report)
- Server functionality
- VFD services (Virtual Field Device) for clients and servers
- Bus access information services (Live list)
- Trace and mini database

### User interfaces

- OPC interface

The OPC server included in the respective software package can be used as the standard programming interface for the PROFIBUS DP (DP master and DP slave), S5-compatible communication, S7 communication and PROFIBUS FMS protocols for linking automation technology applications to OPC-capable Windows applications (Office, HMI systems, etc.).

- Programming interface through C library

The programming interfaces for existing applications are implemented as Dynamic Link Libraries (DLL). This means that the following compilers can be used in combination with the SIMATIC NET products:

- Microsoft Visual C/C++ V6.0
- Microsoft Visual Basic V6.0
- Microsoft Visual C V7.x

For Borland programming interfaces (e.g. DELPHI) partner solutions from the AIXO company are offered.

For solutions for other operating systems, see Development Kit DK-5613.

### Configuring

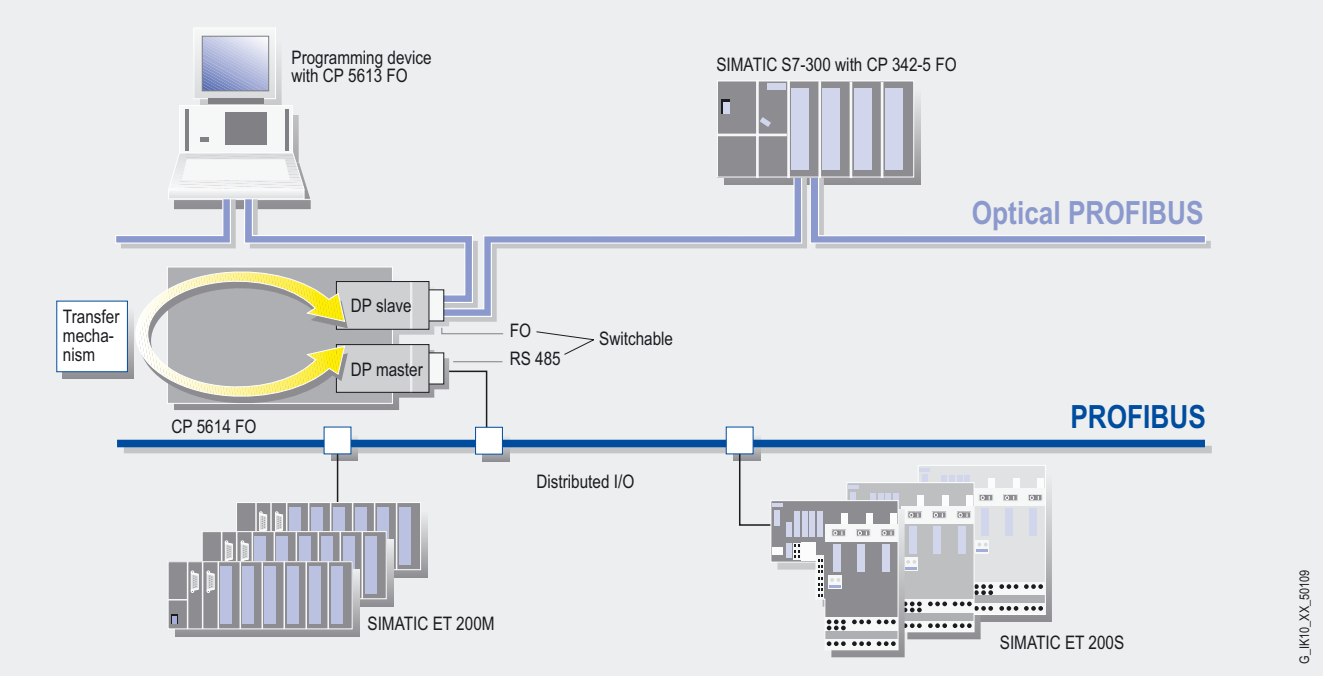
- S7 communication protocol, S5-compatible communication protocol, DP protocol (DP V0/DP V1/DP V2) and FMS protocol are configured in STEP 7/NCM PC V5.1+SP2 and higher.
- The configuration tool NCM PC is included in the PROFIBUS software packages.
- NCM PC is a component part of Advanced PC Configuration.

### Diagnostics

Comprehensive diagnostic tools are available (for installation, start-up and operation) for the module itself and for the PROFIBUS network.

These tools can be used for quick and easy start-up of a PROFIBUS network with a CP 5614 FO.

## Function (continued)




Configuration example for CP 5614 FO

## Technical specifications

| | |
|---|---|
| Data transmission rates | 9.6 kbit/s to 12 Mbit/s |
| Basic interface setting | |
| • PROFIBUS master | 2 x duplex socket (FO) |
| • PROFIBUS slave | 9-pin Sub-D connector |
| Interfaces switchable through software call | |
| • PROFIBUS master | 9-pin Sub-D connector |
| • PROFIBUS slave | 2 x duplex socket (FO) |
| • Connection to PG/PC | PCI (32 bit; 5 V) |
| • External power supply (optional) through standard external power supply | Low voltage socket 3.5 mm/1.3 mm |
| Supply voltage (from PCI) | 5 V DC +/- 5 %<br>12 V DC +/- 5 % |
| Current consumption | |
| • From 5 V DC | 1.6 A |
| • From 12 V DC | 0.3 A |
| Power loss | 8 W |
| Supply voltage (optional) external power supply | 9 to 12 V DC |
| • Current consumption | 0.4 A |
| • Power loss | 3.6 to 4.8 W |
| Perm. environmental conditions | |
| • Operating temperature | |
| - Without fan | +5°C to +40°C |
| - With fan (air flow 0.5 m/s) | +5°C to +60°C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | Max. 95% at +25 °C |

| | |
|---|---|
| Design | |
| • Module format | PCI card |
| • Dimensions (W x H) in mm | 107 x 168 |
| • Weight | Approx. 300 g |
| • Space required | 1 x PCI slot |
| DP master | DP V0, DP V1, DP V2 |
| DP slave | DP V0, DP V1 |
| **Performance data: Single protocol operation** | |
| • Number of connectable DP slaves | Max. 122 |
| • Data area of slave interface: input data, output data, diagnostics data | 244 byte each |
| • Number of parallel FDL tasks to be processed | Max. 120 |
| • Number of PG/OP and S7 connections | Max. 50 [1] |
| • Number of FMS connections | Max. 40 [2] |

1) For Credit = 1; PDU size ≤ 480 byte
2) For Credit = 1;

## CP 5614 FO

### Ordering data

| | Order No. |
|---|---|
| **CP 5614 FO communications processor**<br>PCI card (32-bit; 5 V) master and slave connection to electrical and optical PROFIBUS incl. DP-Base software with NCM PC; DP-RAM interface for DP master, incl. PG and FDL protocol; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, Class A, for 32-bit Windows 2000 Professional/Server; Windows XP Professional, 2003 Server, German/English | **6GK1 561-4FA00** |
| **Development Kit DK-5613**<br>Software development kit for CP 5613 A2/CP 5614 A2/ CP 5613 FO/CP 5614 FO for integration in other operating system environments on systems with a PCI slot | You can find the DK-5613 on the Internet at: *http://www.siemens.de/simatic-net/dk5613* |
| **DP-5613 V6.2**<br>Software for DP, incl. PG and FDL protocol, OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5613, CP 5613 FO, CP 5614, CP 5614 FO German/English | **6GK1 713-5DB62-3AA0** |
| **S7-5613 V6.2**<br>Software for S7 communication, incl. PG and FDL protocol, OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5613 A2, CP 5613 FO, CP 5614 A2, CP 5614 FO German/English | **6GK1 713-5CB62-3AA0** |
| **FMS-5613 V6.2**<br>Software for FMS protocol incl. PG/OP communication; FDL, FMS OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows XP Professional incl. V6.0 for 32-bit Windows 2000 Professional/ Server, Windows XP Professional, 2003 Server, for CP 5613 A2, CP 5613 FO, CP 5614 A2, CP 5614 FO German/English | **6GK1 713-5FB62-3AA0** |

| | Order No. |
|---|---|
| **PROFIBUS FastConnect bus connector RS 485 Plug 180** | **6GK1 500-0FC00** |
| **PROFIBUS bus terminal 12M** | **6GK1 500-0AA10** |
| **PROFIBUS Plastic Fiber Optic, simplex plug/polishing set** | **6GK1 901-0FB00-0AA0** |
| **PROFIBUS Plastic Fiber Optic, stripping tool set** | **6GK1 905-6PA10** |
| **Plug-in adapter**<br>• 50 unit | **6ES7 195-1BE00-0XA0** |
| **SIMATIC NET Software Update Service**<br>For Industrial Ethernet, PROFIBUS, OPC server, for one year service incl. manuals on CD-ROM, requirements: SIMATIC NET PC/Windows products German/English | **6GK1 704-0AA00-3AA2** |

### More information

The DK-5613 can be found in the Internet at:


*http://www.siemens.com/simatic-net/dk5613*

## Overview


- For connecting programming devices, PCs and notebook computers with a PC slot (CardBus 32-bit) to PROFIBUS and the MPI of SIMATIC S7
- Communication services:
  - PROFIBUS DP master Class 1 including acyclic DP expansions with SOFTNET-DP
  - PROFIBUS DP master Class 2 including acyclic DP expansions with SOFTNET-DP
  - PROFIBUS DP slave with SOFTNET-DP slave
  - PG/OP communication
  - S7 communication with SOFTNET-S7
  - S5-compatible communication (SEND/RECEIVE based on the FDL interface) with SOFTNET-DP or SOFTNET-S7
- PC card Type II (CardBus 32-bit); for programming device/PC with PC card slot and notebook computers
  - Can be used with:
    STEP 7 and NCM PC; (ProTool®, Micro/Win, ProTool/Pro®, SIMATIC PDM for PG/OP communication available soon)
  - SOFTNET-S7 (for S7 communication)
  - SOFTNET-DP, SOFTNET-DP slave (for DP)
- The appropriate OPC servers are included in the scope of supply of the respective communication software

## Benefits

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- Connection for notebooks or other portable PCs to PROFIBUS (e.g. for diagnostics and commissioning)
- Easy installation and commissioning
- Optimized for SOFTNET.
- OPC as standard interface
- Uniform procedure and configuration functionality with NCM PC and STEP 7.

## Application

OPC FOUNDATION MEMBER

Compliance Tested OPC FOUNDATION

The CP 5512 is used to connect programming devices and notebook computers with a PC card slot for CardBus (32-bit) to PROFIBUS and to the multipoint MPI interface of SIMATIC S7.

## Design

- PC card Typ II for CardBus (32 bit)
- Adapter with 9-pin Sub-D connector for connection to PROFIBUS

## Function

Various different software packages can be used to operate the CP 5512 and it allows the user to execute programming device functions and PC functions over PROFIBUS and the multipoint interface MPI.

Only one CP can be used per PG, PC or notebook computer. Similarly only one protocol (PROFIBUS DP, S7 communication or FDL) can be used per CP.

The following software packages support the CP 5512:

- STEP 7 V5.2 and higher
  Drivers for the CP 5512 that execute under Windows 2000 Professional and XP Professional are included in the scope of supply of STEP 7.
- SOFTNET-S7 V6.1 and higher
  With this package, the S7 programming interface under Windows XP Professional can be used (Windows 2000 Professional from SOFTNET-S7 V6.1 SP1 upwards).
- SOFTNET-DP V6.1 and higher
  The CP 5512 can be used as a PROFIBUS DP master Class 1 or 2 under Windows XP Professional (Windows 2000 Professional from SOFTNET-DP V6.1 SP1 upwards).
- SOFTNET-DP slave V6.1 and higher
  For using the CP 5512 as a PROFIBUS DP slave under Windows XP Professional (Windows 2000 Professional from SOFTNET-DP slave V6.1 SP1 upwards).
- STEP 7-Micro/WIN V3.2 SP4 and higher
  Hardware basis for the programming software of the SIMATIC S7-200 programmable controller.
- ProTool, ProTool/Pro V6.0 SP2
  The CP 5512 can be used as a hardware basis for the configuration tool for SIMATIC Operator Panels, Touch Panels and Text Displays (available soon).
- NCM PC V5.2 and higher
  under Windows XP Professional.

5

## CP 5512

### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection to PROFIBUS | 9-pin Sub-D connector |
| • Connection to PG/PC | PC Card Type II (CardBus 32 bit); |
| Supply voltage | 3.0 V to 3.6 V DC |
| Current consumption | Typ. 520 mA |
| Power loss | 1.8 W |
| Perm. environmental conditions | |
| • Operating temperature | +5°C to +45°C |
| • Transport/storage temperature | -20 °C to +60 °C |
| • Relative humidity | 95% at +25 °C |
| Design | |
| • Module format | PC card Typ II for CardBus (32 bit) |
| • Dimensions (W x H x D) in mm | 54 x 85 x 5 |
| • Weight | |
| - Without adapter | Approx. 30 g |
| - With adapter | Approx. 130 g |
| • Space required | 1 x PC Card slot Type II (CardBus 32 bit) |
| DP master | DP V0, DP V1 (with SOFTNET DP) |
| DP slave | DP V0, DP V1 (with SOFTNET DP slave) |

### Ordering data

| Ordering data | Order No. |
|---|---|
| **CP 5512 communications processor**<br>PC card (CardBus, 32-bit) for connecting a programming device or Notebook computer to PROFIBUS or MPI, with 32-bit Windows XP Professional (Windows 2000 Professional available soon), executable under 32-bit Windows 2000 Professional and Windows XP Professional in conjunction with STEP 7 V5.2 German/English | **6GK1 551-2AA00** |
| **SOFTNET-S7 V6.2**<br>Software for S7 communication, incl. FDL protocol with OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5CW62-3AA0** |
| **SOFTNET-DP V6.2**<br>Software for DP protocol (Master-Class 1 and 2), incl. FDL protocol with OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5DW62-3AA0** |
| **SOFTNET-DP slave V6.2**<br>Software for DP slave, with DP OPC server and NCM PC, single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5SW62-3AA0** |
| **PROFIBUS FastConnect bus connector RS 485 Plug 180**<br>With 180° cable outlet | **6GK1 500-0FC00** |
| **SIMATIC NET Software Update Service**<br>For Industrial Ethernet, PROFIBUS, OPC server, for one year warranty incl. manuals on CD-ROM<br>Requirement: SIMATIC NET PC/Windows products German/English | **6GK1 704-0AA00-3AA2** |

## Overview


- For connecting the programming device or PC to PROFIBUS and the MPI of SIMATIC S7
- Communication services:
  - PROFIBUS DP master Class 1 including acyclic DP expansions with SOFTNET-DP
  - PROFIBUS DP master Class 2 including acyclic DP expansions with SOFTNET-DP
  - PROFIBUS DP slave with SOFTNET-DP slave
  - PG/OP communication
  - S7 communication with SOFTNET-S7
  - S5-compatible communication (SEND/RECEIVE based on the FDL interface) with SOFTNET-DP or SOFTNET-S7
- Short PCI card; for programming devices and PCs with a PCI slot (32 bits)
- Can be used with:
  - STEP 7, STEP 7-Micro/Win, ProTool, ProTool/Pro, SIMATIC PDM (for PG/OP communication)
  - COM PROFIBUS
  - SOFTNET-S7 (for S7 communication)
  - SOFTNET-DP, SOFTNET-DP slave (for DP)
- The appropriate OPC server and configuration tools are included in the scope of supply of the respective communication software

## Benefits

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- Connection for portable PCs (e.g. for diagnostics and commissioning)
- Easy installation and commissioning
- Optimized for SOFTNET.
- OPC as standard interface
- Uniform procedure and configuration functionality with NCM PC and STEP 7.

## Application

The CP 5611 is used to connect programming devices and PCs to PROFIBUS and to the multipoint MPI interface of SIMATIC S7:

- for programming devices and PCs with a PCI slot

## Design

- Short PCI card
- 9-pin Sub-D connector for connection to PROFIBUS

## Function

Various different software packages can be used to operate the CP 5611 and it allows the user to execute programming device functions and PC functions over PROFIBUS and the multipoint interface MPI.

Only one CP can be used per PG or PC. Similarly only one protocol (PROFIBUS DP, S7 communication or FDL) can be used per CP.

The following software packages support the CP 5611:

- STEP 7 V3.2 and higher
  Drivers for the CP 5611 are included in the scope of supply of STEP 7.
- SOFTNET-S7
  This package allows the S7 programming interface to be used.
- SOFTNET-DP
  The CP 5611 can be used as a PROFIBUS DP master Class 1 or 2.
- SOFTNET DP slave
  For using the CP 5611 as a PROFIBUS DP slave.
- COM PROFIBUS V3.3 and higher
  The CP 5611 can be used in combination with this package for start-up or diagnostics (DP online functions) for PROFIBUS DP systems.
- STEP 7-Micro/WIN V2.1 and higher;
  Hardware basis for the programming software of the SIMATIC S7-200 programmable controller
- ProTool, ProTool/Pro;
  The CP 5611 can be used as a hardware basis for the configuration tool for all SIMATIC Operator Panels, Touch Panels and Text Displays.
- NCM PC
  Drivers for the CP 5611 are included in the scope of supply

5

## CP 5611

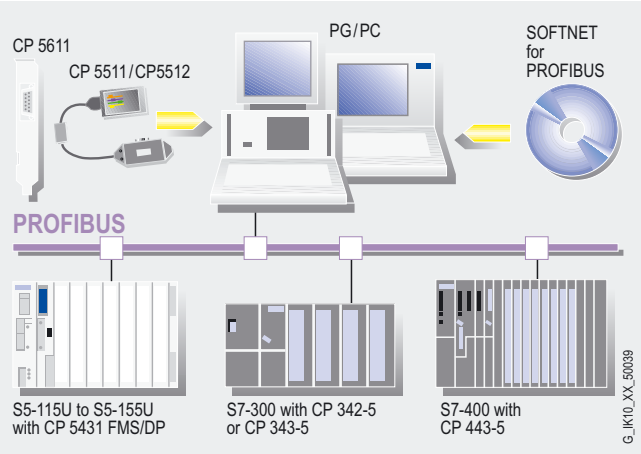
### Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s |
| Interfaces | |
| • Connection to PROFIBUS | 9-pin Sub-D socket |
| • Connection to PG/PC | PCI (32-bit) |
| Power supply | +5 V DC ± 5 % |
| Current consumption | 0.5 A |
| Power loss | 2.0 W |
| Perm. ambient conditions | |
| • Operating temperature | +5 °C to +40 °C |
| • Transport/storage temperature | -20 °C to +60 °C |
| • Relative humidity | Max. 95% at +25 °C |
| Construction | |
| • Module format | PCI card |
| • Dimensions (W x H x D) in mm | 102 x 130 |
| • Weight | Approx. 100 g |
| • Space requirements | 1 x PCI slot |
| DP master | DP-V0, DP-V1 with SOFTNET-DP |
| DP slave | DP-V0, DP-V1 with SOFTNET-DP slave |

### Ordering data

| Ordering data | Order No. |
|---|---|
| **CP 5611 communications processor**<br>PCI card (32-bit) for connection of a programming device or PC to PROFIBUS | **6GK1 561-1AA00** |
| **CP 5611 MPI communications processor**<br>Comprising a PCI card (32-bit) CP 5611 and MPI cable, 5 m | **6GK1 561-1AM00** |
| **SOFTNET-S7 V6.2**<br>Software for S7 communication, incl. FDL protocol with OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5CW62-3AA0** |
| **SOFTNET-DP V6.2**<br>Software for DP protocol (Master-Class 1 and 2), incl. FDL protocol with OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5DW62-3AA0** |
| **SOFTNET-DP slave V6.2**<br>Software for DP slave, with DP OPC server and NCM PC, single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5SW62-3AA0** |
| **PROFIBUS FastConnect bus connector RS 485 Plug 180**<br>With 180° cable outlet | **6GK1 500-0FC00** |
| **PROFIBUS bus terminal 12M**<br>Bus terminal for connection of PROFIBUS stations up to 12 Mbit/s with plug-in cable | **6GK1 500-0AA10** |
| **SIMATIC NET Software Update Service**<br>For Industrial Ethernet, PROFIBUS, OPC server, for one year warranty incl. manuals on CD-ROM<br>Requirement: SIMATIC NET PC/Windows products German/English | **6GK1 704-0AA00-3AA2** |

## Overview




- Software for coupling PCs/programming devices and notebooks to programmable controllers
- For use in combination with CP 5511 (PCMCIA) and CP 5512 (PC-Card, 32-bit CardBus). CP 5611 (PCI) and integral PROFIBUS interface of the SIMATIC PG/PC
- Communication services:
  - PROFIBUS DP master Class 1 and 2 with acyclic expansions
  - PROFIBUS DP slave
  - PG/OP communication
  - S7 communication
  - S5-compatible communication (SEND/RECEIVE based on the FDL interface)
- The appropriate OPC servers are included in the scope of supply of the respective communication software

## Benefits

get Designed for Industry

- Low-cost integration
  - as PROFIBUS DP Master Class 1 or Master Class 2 with SOFTNET DP
  - as a PROFIBUS DP slave with SOFTNET DP slave
  - S7 communication with SOFTNET S7
- OPC as standard interface
- Uniform procedure and configuration functionality with NCM PC and STEP 7.

## Application

With SOFTNET® for PROFIBUS, PCs can be connected to programmable controllers, such as SIMATIC S7, over PROFIBUS.

The following user interfaces are available:

- DP protocol
- PG/OP communication for SIMATIC S7
- S7 communication
- S5-compatible communication (SEND/RECEIVE based on the FDL interface)

SOFTNET is available for the following interfaces:

- CP 5511 (PCMCIA card)
- CP 5512 (PC card, CardBus 32-bit)
- CP 5611 (PCI card)
- Integral PROFIBUS interfaces of SIMATIC PGs/PCs

The operating systems that are supported are listed in the ordering data for the SOFTNET software.

## SOFTNET for PROFIBUS

### Function

**Software for DP protocol (SOFTNET-DP)**

- DP master Class 1

SOFTNET-DP provides DP master Class 1 functionality in combination with the CP 5511, CP 5512 or CP 5611. The central controller exchanges information with the DP slaves (e.g. ET 200S) in a fixed, repeating message cycle. The DP programming interface (DPLib.DLL) provides the PC programmer with function calls for data transfer. The DP interface also provides the SYNC and FREEZE functions as well as activation and deactivation of slaves.

The DP function expansions for masters of Class 1 make it possible to perform read and write functions (DS_READ, DS_WRITE) as well as acknowledgement of alarms (ALARM_ACK) at the same time as processing cyclic data communication. Data that are to be transferred in non-isochrone mode (e.g. parameterization data) are only rarely changed, in comparison to the cyclic measured values, and are transferred at lower priority in parallel with the cyclic high-speed useful data transfer. Alarm acknowledgement by the master ensures reliable transfer of the alarms from DP slaves (DS_READ, DS_WRITE, DS_DATA_TRANSPORT).

- DP master Class 2

In addition to DP master Class 1 services, SOFTNET-DP also provides DP master Class 2 services. Devices of this type are used (programming, configuration or control devices) during start-up, for configuring the DP system or for controlling the plant during normal operation (diagnostics). The DP programming interface provides the following services: Reading master diagnostics, slave diagnostics, inputs/outputs of a slave, configuration data and modifying slave addresses. These extended DP functions comprise non-isochrone access to the parameters and measured values of a slave (e.g. field devices of process automation and intelligent HMI devices). This type of slave must be supplied with extensive parameter data during start-up and during normal operation (DS_READ, DS_WRITE, DS_DATA_TRANSPORT).

- DP slave (SOFTNET-DP slave)

A DP slave is an I/O station that reads in input data and transfers output data to the I/O. The volume of input and output information is determined by the user application and can be a maximum of 122 bytes each. For the slave interface, a simple example GSD file is provided that can be adapted by the user to the slave application. This GSD file can be configured using any configuration tool which complies with the PROFIBUS DP specification IEC 61158/EN 50170, e.g. STEP 7, NCM PC or COM PROFIBUS.

**Software for PG/OP communication**

Special programming device packages are not required for CP 5511, CP 5512 and CP 5611 because the drivers are included in the STEP 7 scope of supply.

**Software for S7 communication (SOFTNET-S7)**

SIMATIC S7 system components communicate with each other using S7 communication functions. The S7 programming interface provides programming device/PC user programs with access to SIMATIC S7 system components. This provides easy, flexible access to the data of the SIMATIC S7 controller.

The following services are available with S7 communication:

Administrative services

- Connection management
- Mini database
- Trace

Data transfer services

- Read/write variables
- BSEND/BRECEIVE (up to 64 KB per task)

**Software for S5-compatible communication (SEND/RECEIVE based on the FDL interface)**

This interface based on Layer 2 is used for communication between

- PG/PC and SIMATIC S5
- PG/PC and SIMATIC S7
- PG/PC and PG/PC

SEND/RECEIVE offers the following services:

- Management services
- Connection establishment services
- Data transfer services

This interface is included in SOFTNET-DP and SOFTNET-S7. No configuration is necessary.

**User interfaces**

- OPC interface

The OPC server included in the respective software package can be used as the standard programming interface for the PROFIBUS DP, S5-compatible communication and S7 communication protocols for linking automation technology applications to OPC-capable Windows applications (Office, HMI systems, etc.).

- Programming interface through C library

The programming interfaces for existing applications are implemented as Dynamic Link Libraries (DLL). This means that the following compilers can be used in combination with the SIMATIC NET products:

- Microsoft Visual C/C++ Version 6.0
- Microsoft Visual Basic Version 6.0
- Microsoft Visual C V7.x

For Borland programming interfaces (e.g. DELPHI), partner solutions from AIXO are offered.

**Principle of operation**

With SOFTNET, the complete protocol stack is processed in the PC.

This architecture means that in contrast to the CP 5613 or CP 5614 products, the performance of the SOFTNET packages is dependent on the configuration or loading of the PC used.

**Configuring**

- The S7 communication protocol, S5-compatible communication protocol and DP protocol are configured in STEP 7/NCM PC V5.1+SP2 and higher.
- The configuration tool NCM PC is included in the PROFIBUS software packages.
- NCM PC is a component part of Advanced PC Configuration.

## Technical specifications

| Performance data: Single protocol operation | CP 5511 | CP 5611/ CP 5512 |
|---|---|---|
| Number of connectable DP slaves | ≤ 32 [1] | Max. 60 |
| Number of parallel FDL tasks to be processed | Max. 32 | Max. 100 |
| Number of PG/OP and S7 connections | Max. 8 | Max. 8 |
| • DP master | DP V0, DP V1 with SOFTNET DP | |
| • DP slave | DP V0, DP V1 with SOFTNET DP slave | |

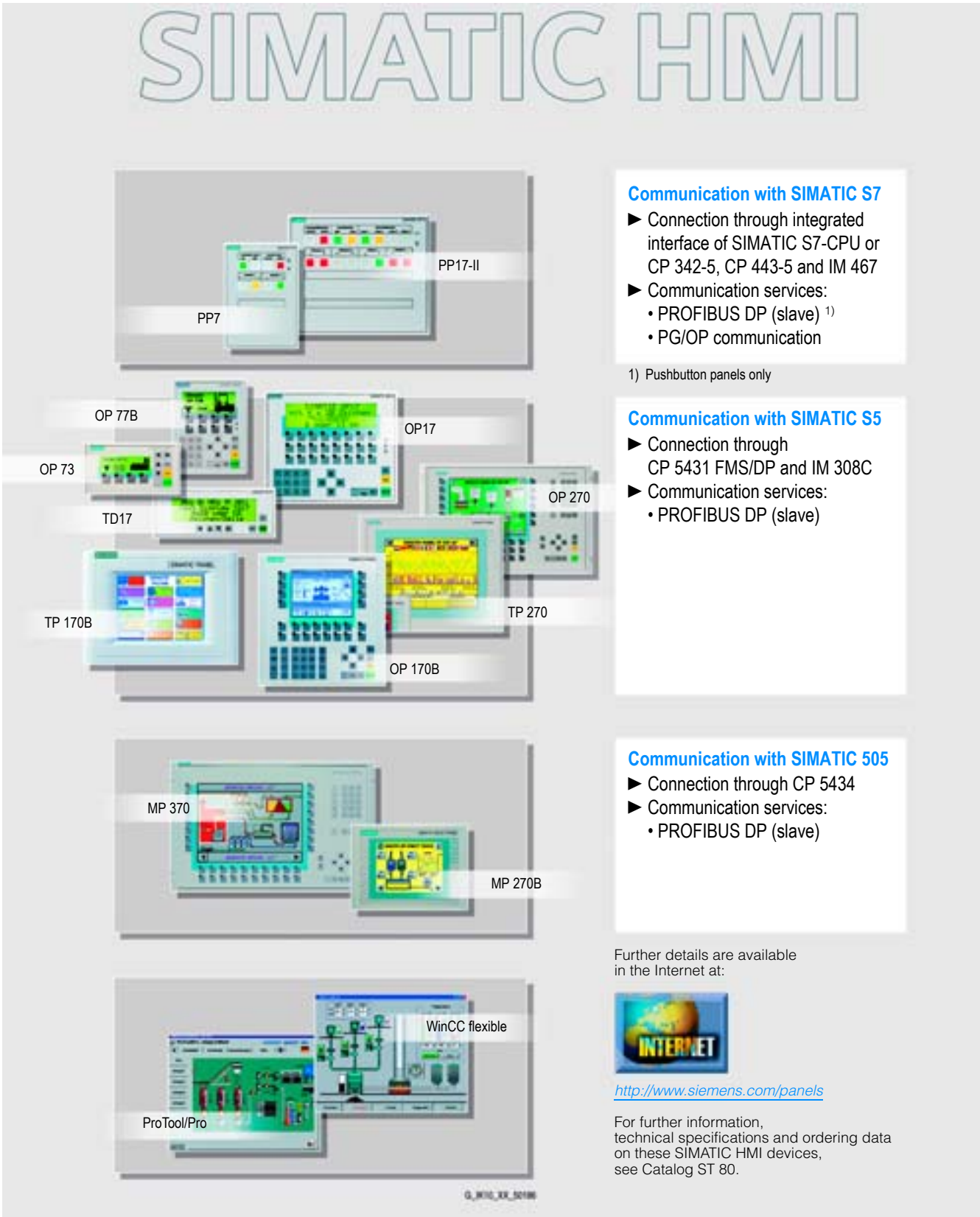
1) dependent on available memory in the adapter area of the notebook

## Ordering data

| | Order No. |
|---|---|
| **SOFTNET-S7 V6.2**<br>Software for S7 communication, incl. FDL protocol with OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5CW62-3AA0** |
| **SOFTNET-DP V6.2**<br>Software for DP protocol (Master-Class 1 and 2), incl. FDL protocol with OPC server and NCM PC; single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5DW62-3AA0** |
| **SOFTNET-DP slave V6.2**<br>Software for DP slave, with DP OPC server and NCM PC, single license for 1 installation, runtime software, software and electronic manual on CD-ROM, license key on diskette, Class A, for 32-bit Windows 2000 Professional/Server, Windows XP Professional, 2003 Server, for CP 5512, CP 5611 German/English | **6GK1 704-5SW62-3AA0** |
| **SIMATIC NET Software Update Service**<br>For Industrial Ethernet, PROFIBUS, OPC server, for one year warranty incl. manuals on CD-ROM<br>Requirement: SIMATIC NET PC/Windows products German/English | **6GK1 704-0AA00-3AA2** |

## Overview

### System interfacing to SIMATIC HMI




**Communication with SIMATIC S7**

- Connection through integrated interface of SIMATIC S7-CPU or CP 342-5, CP 443-5 and IM 467
- Communication services:
  - PROFIBUS DP (slave) [1]
  - PG/OP communication

1) Pushbutton panels only

**Communication with SIMATIC S5**

- Connection through CP 5431 FMS/DP and IM 308C
- Communication services:
  - PROFIBUS DP (slave)

**Communication with SIMATIC 505**

- Connection through CP 5434
- Communication services:
  - PROFIBUS DP (slave)

Further details are available in the Internet at:

http://www.siemens.com/panels

For further information, technical specifications and ordering data on these SIMATIC HMI devices, see Catalog ST 80.

System interfacing to SIMATIC HMI

## Communication

• Communication with SIMATIC S5

Communication between PP/OP/TD/TP (DP/slave) and SIMATIC S5 (DP/master) takes place with PROFIBUS DP frames according to IEC 61158/EN 50170 with superimposed profile which is handled in the programmable controller by the appropriate standard function block.

With respect to the SIMATIC panels the PROFIBUS connection is always a logic point-to-point connection, i.e. a SIMATIC panel is always permanently assigned to a programmable controller.

• Communication with SIMATIC S7

The communication with SIMATIC S7 is a client-server communication. The SIMATIC panels are S7/clients, while the S7 CPU is the S7/server. The panels are therefore active PROFIBUS nodes.

Connection is through PG/OP communication through the multi-point-capable communication interfaces of the SIMATIC panels and SIMATIC S7. A standard FB such as in SIMATIC S5 is not necessary.

• Communication with SIMATIC 505 (only possible in Windows-based systems)

Communication between OP/TP/MP (DP/slave) and SIMATIC 505 (DP/master) takes place through PROFIBUS DP frames according to IEC 61158/EN 50170 with superimposed profile.

With respect to the SIMATIC panel the PROFIBUS the connection is always a logical point-to-point connection, i.e. a SIMATIC panel is always permanently assigned to a programmable controller.

For further information and ordering data see Catalog ST 80.

## System interfacing through PROFIBUS

| Logic control | SIMATIC HMI | | |
|---|---|---|---|
| **Destination hardware (PROTOCOL) (Connector/physical characteristics)** | **PP7** [4] | **PP17** [3] | |
| | | **I** | **II** |
| **SIMATIC S7 (PP = MPI as a master)** | | | |
| **S7-200/-300/-400** through MPI interface [1] [2] | ● | ● | ● |
| **SIMATIC S5/S7 (PP = DP standard PROFIBUS slave)** | | | |
| Through **PROFIBUS** at max. 1 × **S7-200** CPU 215-DP using the MPI protocol<br>**S7-300, -400** with intergr. PROFIBUS interface<br>**S7-300** with CP 342-5<br>**S7-400** with CP 443-5 | ● | ● | ● |
| Through **PROFIBUS DP** to **S5-95U/**PROFIBUS DP master (6ES5 095-8ME02**)**<br>**S5-115U, -135U, -155U** with IM 308C,<br>**S5-115U, -135U,-155U** with CP 5431 FMS/DP | ● | ● | ● |

● System interfacing possible

1) S7-200 only per MPI (CPU 212 not possible).

2) S7-CPU 215-DP also possible at PROFIBUS DP interface using MPI protocol.

3) Max. 12 Mbit/s

4) Max. 1.5 Mbit/s

## Overview

### System interfacing through PROFIBUS (continued)

| Logic control | SIMATIC HMI | | |
|---|---|---|---|
| **Destination hardware (PROTOCOL) (Connector/physical characteristics)** | **TD17** | **OP7 / OP17 with versions** | |
| | | **/DP** | **/DP-12** |
| **SIMATIC S5 (PROFIBUS DP + Profile)** | | | |
| Through **PROFIBUS DP** to **S5-95U/L2 DP/master** (6ES5 928-3UA11) | ● | ● | ● |
| Through **PROFIBUS DP** to **S5-115U, -135U, -155U** with **IM 308-B/IM 308-C** except CPU 922 < release number 9, except CPU 928 (6ES5 928-3UA11), except CPU 946/947 (6ES5 94•-3UA11), except CPU 946/947 (6ES5 94•-3UA21), except CPU 946/947 (6ES5 94•-3UA22 < release number 5) | ● | ● | ● |
| Through **PROFIBUS DP** to **S5-115U, -135U, -155U** with **CP 5430/CP 5431 FMS/DP** except CPU 922 < release number 9, except CPU 928 (6ES5 928-3UA11), except CPU 946/947 (6ES5 94•-3UA11), except CPU 946/947 (6ES5 94•-3UA21), except CPU 946/947 (6ES5 94•-3UA22 < release number 5) | ● | ● | ● |
| **SIMATIC S7 (MPI)** | | | |
| Through **PROFIBUS network** **(PG/OP communication)** to max. 4 × **S7-300, -400, WinAC** | ● | ● | ● |

● System interfacing possible

| Logic control | SIMATIC HMI | | | |
|---|---|---|---|---|
| **Destination hardware (PROTOCOL)** | **OP 73 / OP 77A TP 177A** | **Mobile Panel 170 OP 77B / TP 170A TP 170B / OP 170B TP 270 / OP 270 MP 270B** | **MP 370** | **ProTool/Pro-Runtime WinCC flexible Runtime** |
| **SIMATIC S5 (PROFIBUS DP + HMI)** | | | | |
| Through **PROFIBUS DP** to 1 × **S5-95U/L2-DP/master** (6ES5 095-8ME02) | | ● | ● | ● 1) |
| Through **PROFIBUS DP** to **S5-115U, -135U, -155U** with **IM 308C** except CPU 922 < release number 9, except CPU 928 (6ES5 928-3UA11), except CPU 946/947 (6ES5 94•-3UA11), except CPU 946/947 (6ES5 94•-3UA21), except CPU 946/947 (6ES5 94•-3UA22 < release number 5) | | ● | ● | ● 1) |
| Through **PROFIBUS DP** to **S5-115U, -135U, -155U** with **CP 5431 FMS/DP** except CPU 922 < release number 9, except CPU 928 (6ES5 928-3UA11), except CPU 946/947 (6ES5 94•-3UA11), except CPU 946/947 (6ES5 94•-3UA21), except CPU 946/947 (6ES5 94•-3UA22 < release number 5) | | ● | ● | ● 1) |
| **SIMATIC S7 (PPI/MPI)** | | | | |
| Through **PROFIBUS network** **(PG/OP communication)** to max. 4 × **S7-200, -300, -400, WinAC** | ● 2) | ● 4) | ● 3) | ● 1) 3) |

● System interfacing possible

1) Connection through integrated MPI/PROFIBUS interface; the CP 5611 should be used in a standard PC
2) Max. 1.5 Mbit/s; OP 73 only 2 x S7-300, -400, WinAC possible.
3) Depending on the scope of configuration (communication) up to max. 8 connections.
4) TP 170A max. 1,5 Mbit/s; with ProTool only 1 x S7-300, -400, WinAC possible.

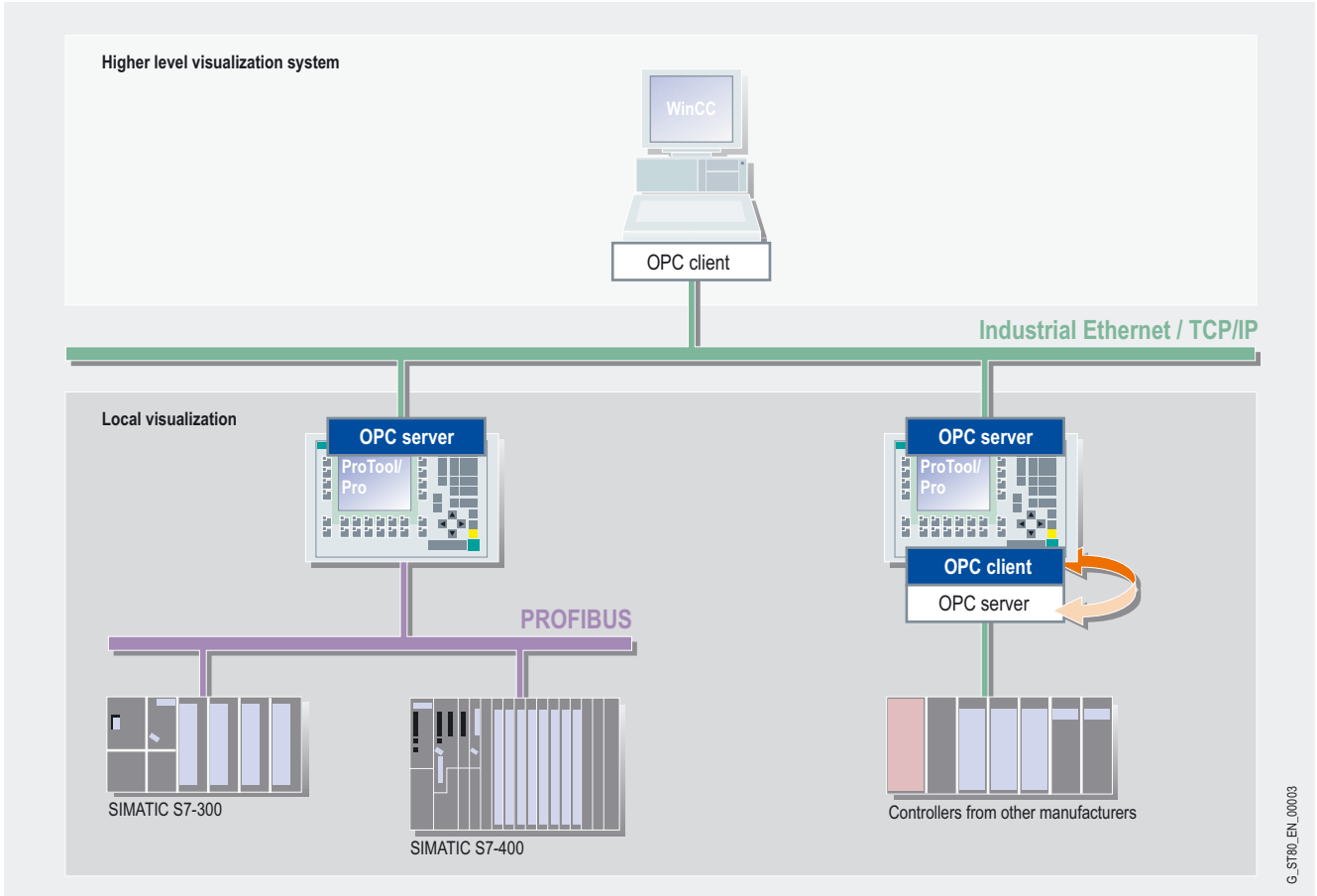
## Overview

- PC-based HMI solution at machine level which runs under Windows 98/SE/ME and Windows NT 4.0/2000/XP Professional
- As a branch and technology neutral HMI software, ProTool/Pro can be used universally
- SIMATIC ProTool/Pro consists of:
  - Configuration software SIMATIC ProTool/ Pro Configuration (CS)
  - Runtime software SIMATIC ProTool/Pro Runtime (RT)
- ProTool/Pro includes the proven functions of ProTool for configuring all SIMATIC Panels, but also enables implementation of simple visualization tasks with PC-based systems
- Through PROFIBUS DP, ProTool/Pro Runtime enables connection not only to S5/S7 programmable controllers but also to controllers of other manufacturers

## More information

For further details, see Catalog ST80.
Further details are available in the Internet at:

http://www.siemens.com/protoolpro




SIMATIC ProTool/Pro application examples

## SIMATIC WinCC flexible

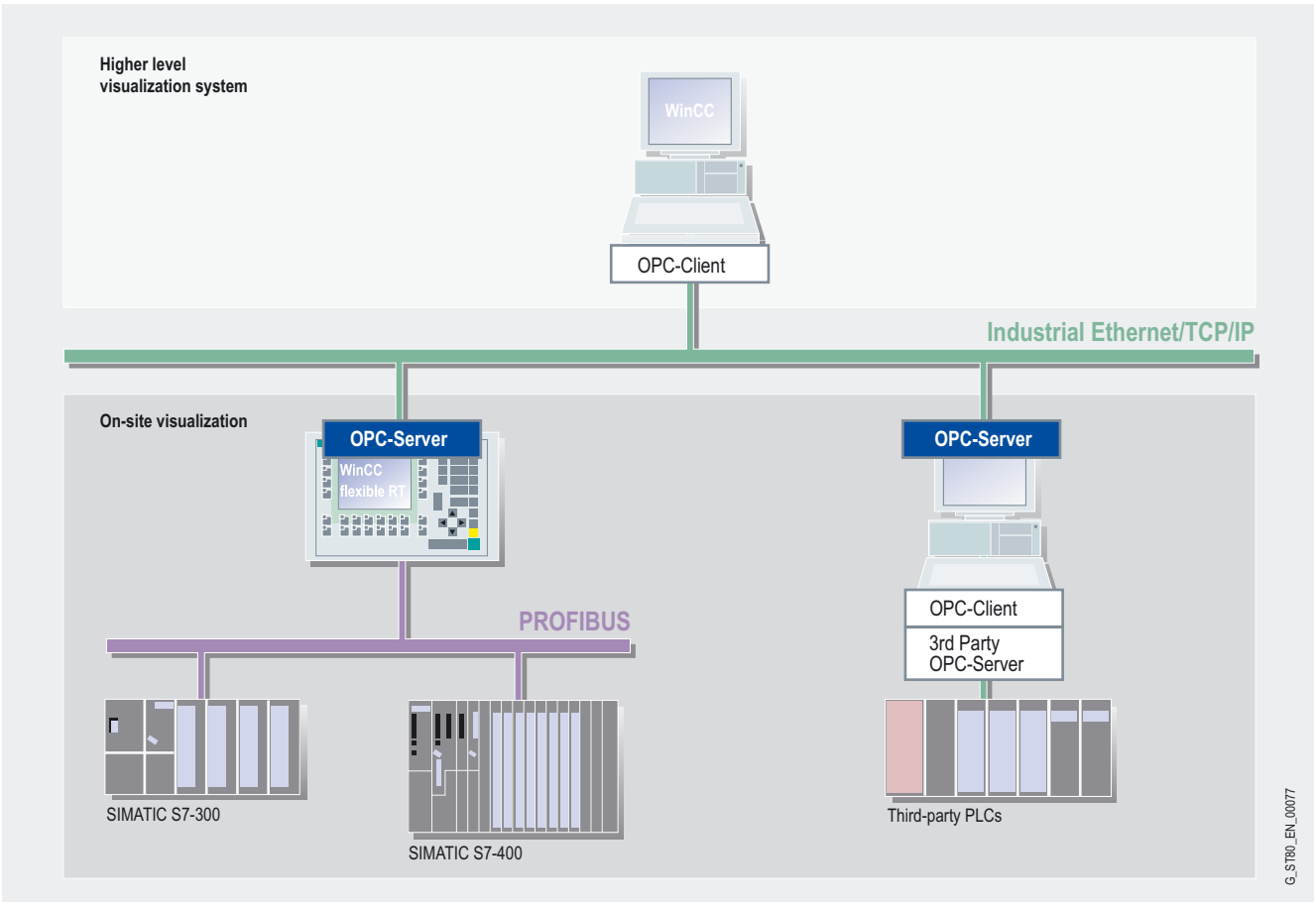
### Overview

- **PC-based visualization software** for simple, visualization tasks at the machine. It can be used as a single-user solution for all automation applications in production automation, process automation and building services automation.
- Functions for all visualization tasks:
- Operator functions, graphics and curve displays, signaling system, log system, archiving (option), recipe management (option), process fault diagnostics (option)
- Flexible runtime functionality by means of visual basic scripts
- Innovative service concepts with remote operation, diagnostics, and administration via Intranet/Internet as well as e-mail communication increase availability (option)
- Support of simple distributed automation solutions based on TCP/IP networks in the machine environment (option)
- Executable under Windows 2000/XP Professional
- Via PROFIBUS DP, WinCC flexible RT permits coupling both to SIMATIC S5/S7 programmable logic controllers and to non-Siemens controllers

### More information

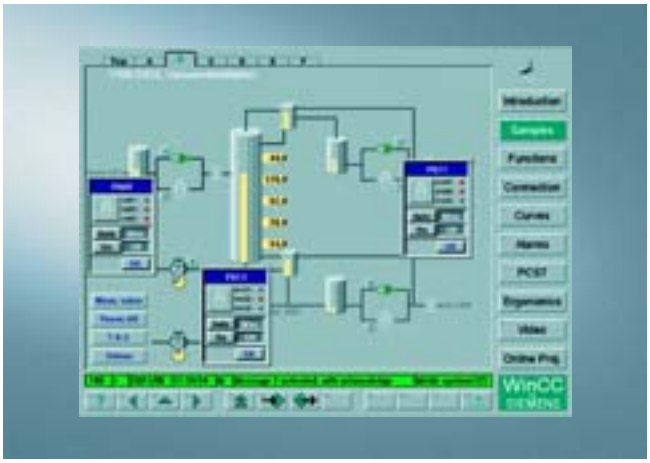
For further details, see Catalog ST 80.
Further details are available in the Internet at:

http://www.siemens.de/wincc-flexible




SIMATIC WinCC flexible application examples

## Overview



- PC-based HMI system with many options for implementing automation solutions:
  - Client-server structures with simple installation
  - Safety in process operation and data integrity through redundancy
  - Expansion of functions through linking of ActiveX elements
  - Open communication through OPC (OLE for Process Control)
  - Simple and fast configuration through integration with SIMATIC STEP 7
  - Web-based access to system data and images
  - Integrated Historian functionality for fast, centralized data archiving
  - Analysis tools for evaluation of process data
- Communication options with SIMATIC S5/S7 programmable logic controllers and with non-Siemens devices e.g. via PROFIBUS.

## Design

SIMATIC WinCC can be used as a single-user system or be extended to a multi-user system in networked client-server configurations.

The operator stations in the multi-user system are automatically coordinated during operation, e.g. for alarm acknowledgment.

The operating system basis for SIMATIC WinCC is Windows NT 4.0/2000 (WinCC 5.1) or Windows 2000/XP Professional (WinCC V6.0) from Microsoft.

Users are given access to third-party control systems with PROFIBUS interfaces through the FMS interface.

WinCC communication through PROFIBUS is performed through:

- DP-5613/Windows XP Prof.; 2000 Prof./Server
- FMS-5613/Windows XP Prof.; 2000 Prof./Server

The S7 communication is effected with

- S7-5613/Windows XP Prof.; 2000 Prof./Server

OPC communication for interfacing to other systems using the following standards

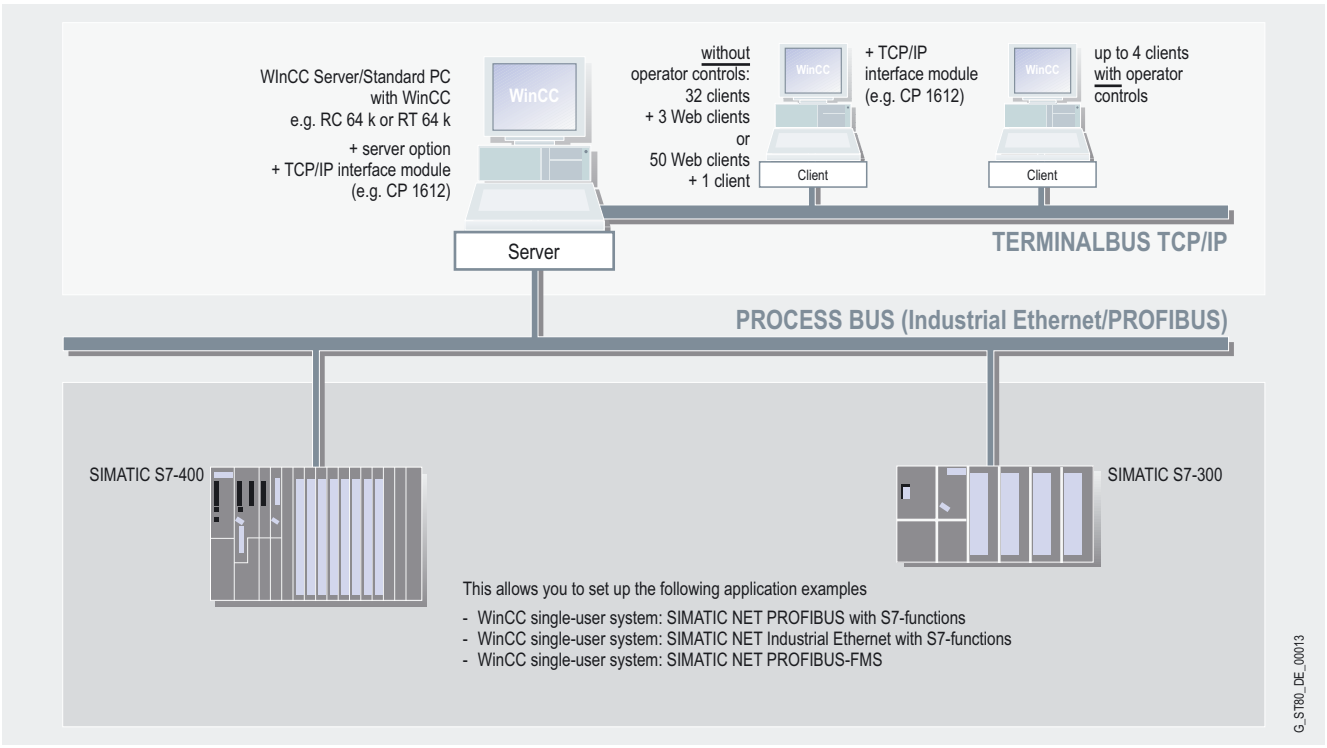
- Data access for online data
- A&E for alarms
- HDA for archive data

## More information

You can find further information in Catalog ST 80 and the Internet:

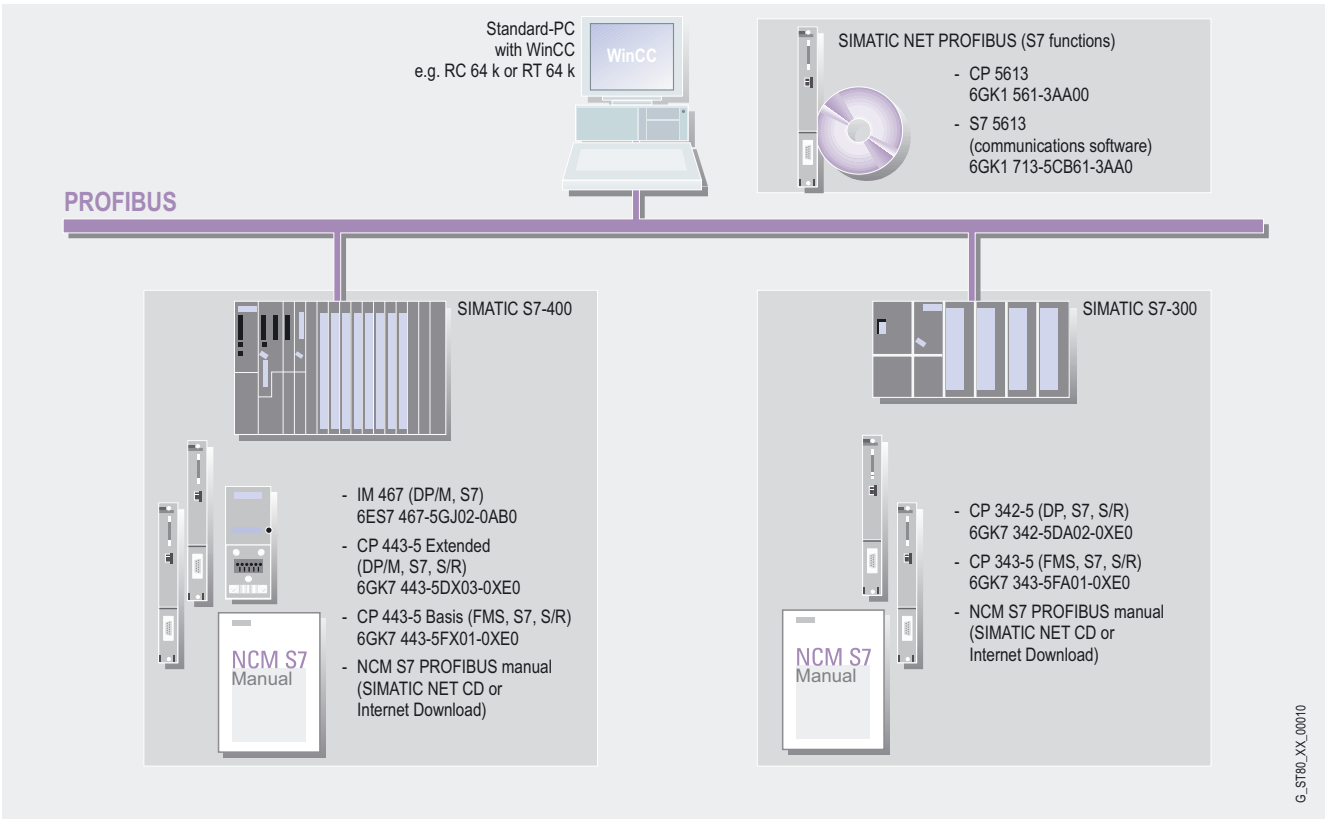

http://www.siemens.de/wincc

## Application examples

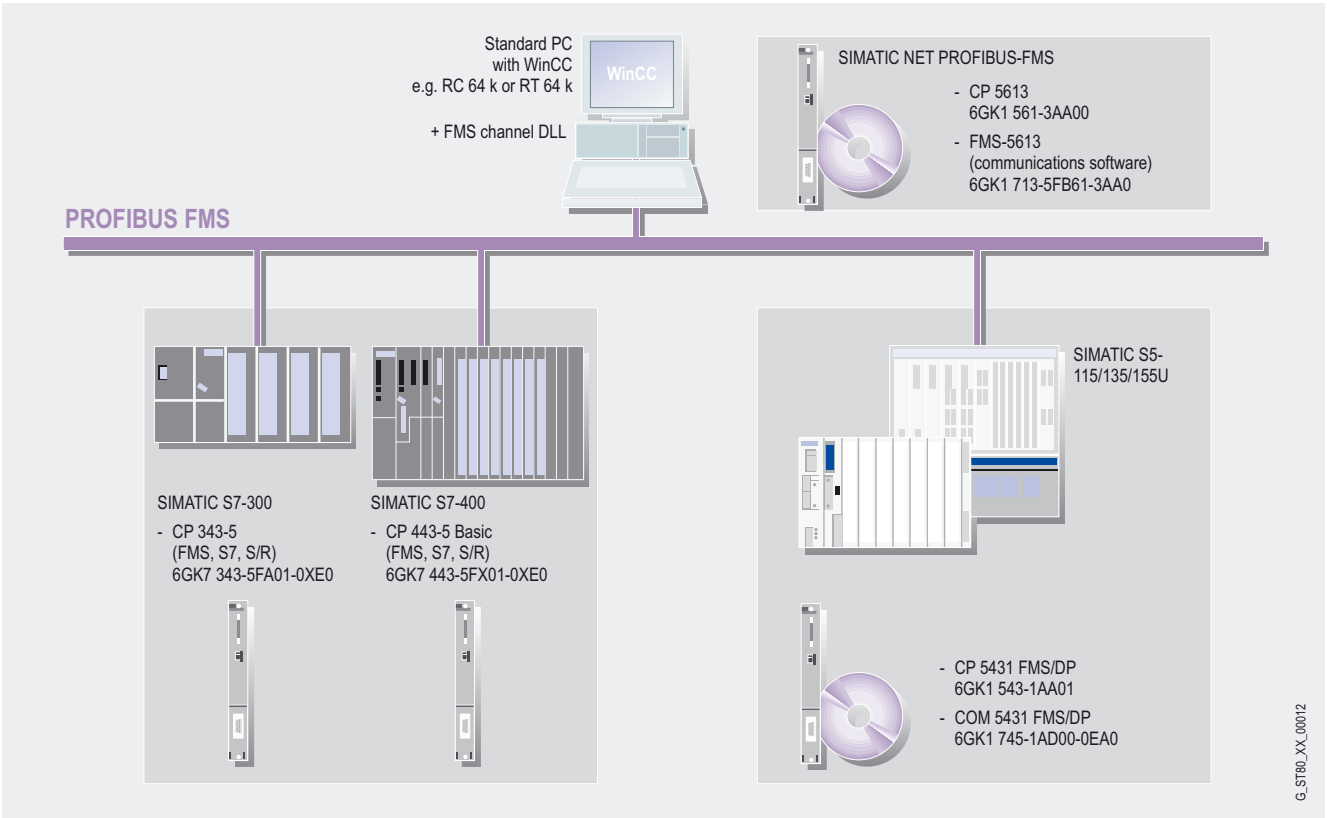



WinCC multi-user system with operator-controllable server (for WinCC V6)

## Application examples (continued)




WinCC single-user station system: PROFIBUS with S7 communication




WinCC single-user station system: PROFIBUS FMS

## Communication components for PG/PC to SIMATIC (WinCC V6.0 or higher)

| PROFIBUS | SIMATIC S5 PROFIBUS FDL | SIMATIC S7 Protocol Suite | PROFIBUS DP | PROFIBUS FMS | Order No. |
|---|---|---|---|---|---|
| **WinCC – channel DLL** | | | | | |
| **SIMATIC S5 PROFIBUS FDL**<br>Channel DLL for S5-FDL | ● | | | | Contained in the basic pack |
| **SIMATIC S7 Protocol Suite**<br>Channel DLL for S7 functions | | ● | | | Contained in the basic pack |
| **PROFIBUS DP**<br>Channel DLL for PROFIBUS DP | | | ● | | Contained in the basic pack |
| **PROFIBUS FMS**<br>Channel DLL for PROFIBUS FMS | | | | ● | Contained in the basic pack |
| **Communication components to supplement OS/OP** | | | | | |
| **CP 5611**<br>PCI card for connecting PG/PC to PROFIBUS or MPI (communications software contained in the WinCC basic pack) | | ● | | | **6GK1 561-1AA00** |
| **CP 5511**<br>PCMCA card for connecting PG/PC to PROFIBUS or MPI (communications software contained in the WinCC basic pack) | | ● | | | **6GK1 551-1AA00** |
| **CP 5512**<br>PCMCIA card (32 bit cardbus) for connecting PG/PC to PROFIBUS or MPI (Communication software contained in the WinCC Basic Package) | | ● | | | **6GK1 551-2AA00** |
| **PC/MPI-Adapter**<br>RS 232, 9-pin, plug with RS 232/MPI converter max. 19.2 kbit/s | | ● | | | **6ES7 972-0CA23-0XA0** |
| **CP 5613**<br>PCI card for connecting PC to PROFIBUS (communications software must be ordered separately) | ● | ● | ● | ● | **6GK1 561-3AA00** |
| **CP 5613 A2**<br>PCI card for connection of PC to PROFIBUS (communications software must be ordered separately) | ● | ● | ● | ● | **6GK1 561-3AA01** |
| **S7-5613**<br>Communications software for S7 functions + FDL<br>• for Windows NT4.0/2000/XP | ● | ● | | | **6GK1 713-5CB62-3AA0** |
| **DP-5613**<br>Communications software for DP-master + FDL<br>• for Windows NT4.0/2000/XP | ● | | ● | | **6GK1 713-5DB62-3AA0** |
| **FMS-5613**<br>Communications software for PROFIBUS FMS + FDL<br>• for Windows NT4.0/2000/XP | ● | | | ● | **6GK1 713-5FB62-3AA0** |

● System interfacing possible

5

## SIMOCODE-DP motor protection and control devices

### Overview

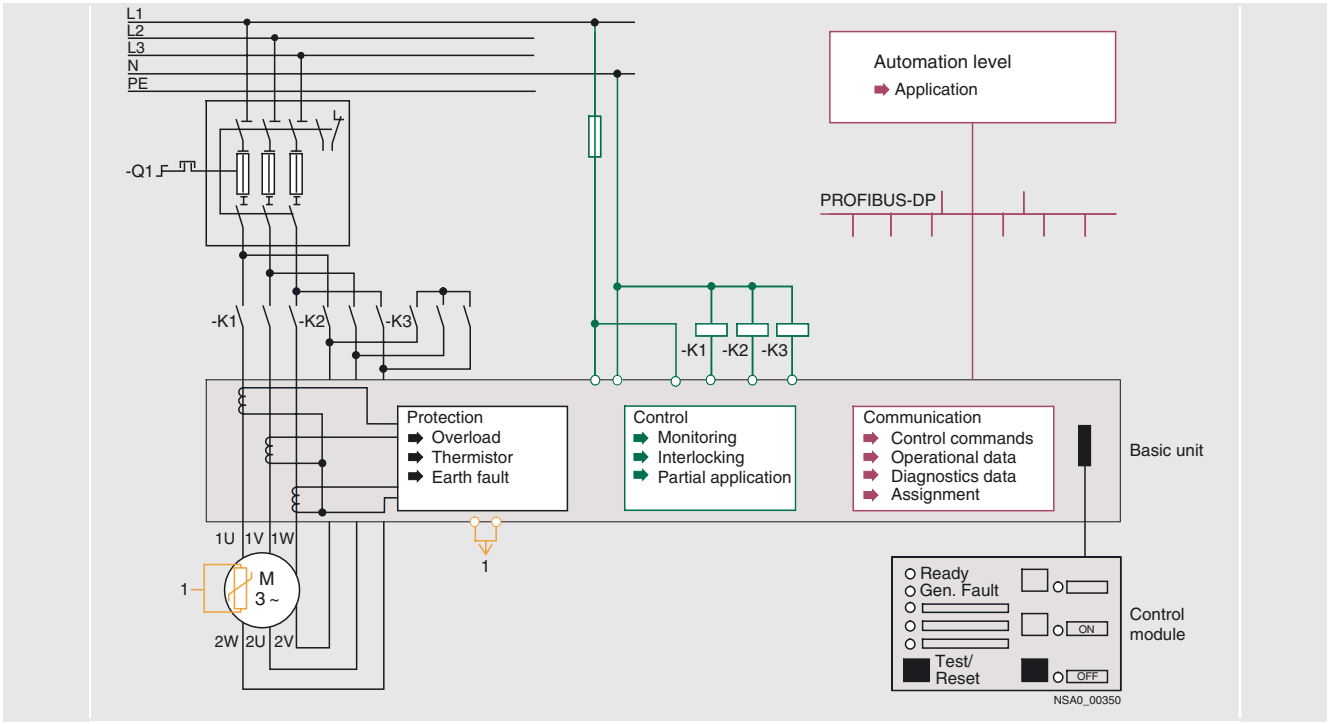
SIMOCODE-DP Basic Unit, Expansion Module and Operator Module

The communication-capable SIMOCODE-DP 3UF5 Motor Protection and Control Unit is used, in particular, in low-voltage switchgear for motor control centers in the process engineering industry and forms the intelligent connection between the motor feeder (motors with constant speed) and the process control system.

*With this technology, plant availability can be increased and at the same time, cost savings are achieved for construction, commissioning and during operation of a plant.*

SIMOCODE-DP offers the solution for a wide range of different tasks in a single unit:

- Multifunctional, electronic motor protection and plant monitoring
- Comprehensive motor and plant diagnostics
- Integrated control programs (instead of extensive hardware wiring)
- Open communication via PROFIBUS DP, the standard for fieldbus systems




Easy construction of a motor feeder with SIMOCODE-DP

**Overview** (continued)

### *Multifunctional, electronic motor protection and plant monitoring*

SIMOCODE-DP features a combination of numerous protective mechanisms such as

- Current-sensitive motor protection (Class 5-30),
- Thermistor motor protection,
- Rotor locking protection
- Earth-fault monitoring, as well as
- Monitoring adjustable current limits

to ensure problem-free processes.

The current transformer for measuring the motor current is already built into SIMOCODE-DP.

Rated motor currents from 0.25 to 820 A are supported by just six variants.

### *Comprehensive motor and plant diagnostics*

SIMOCODE-DP provides a variety of operating, service and diagnostic data, such as

- The currently flowing phase current
- Switching state of the motor
- Motor operating hours
- Number of switching cycles of the motor
- Number of overload tripping operations, as well as
- Detailed early warning messages or error messages.

The following advantages result:

- Faults can be prevented
- The plant electrician or process operator is comprehensively informed about the operational status of the load feeder
- Errors can be diagnosed and rectified quickly

### *Integrated control programs (instead of extensive hardware wiring)*

In SIMOCODE-DP, many predefined motor control functions can be called up, such as

- Direct on-line starter
- Reversing starter
- Star-delta starter
- Two speeds, motors with a separate winding
- Two speeds, motors with a separate Dahlander winding
- Gate valve control
- Solenoid valve or
- Soft starter

All the interlocks and logic operations necessary for operation of the required motor controls are included in their software and switch the motor contactors on or off directly by means of the SIMOCODE-DP relay outputs.

These ready-to-use control functions can also be adapted to each customized variant of a motor feeder by means of freely-parameterizable elements, such as timers, counters, logic operations (AND, OR, NOR, etc.).

Wiring overhead for the control circuit is reduced considerably and a high level of standardization is achieved for the motor feeder in terms of hardware structure and circuit diagrams.

### *Open communication via PROFIBUS DP, the standard for fieldbus systems*

SIMOCODE-DP with its integrated PROFIBUS DP interface replaces the complete system of single wires including marshalling racks, which would otherwise be necessary for data transfer to and from the higher-level automation system.

The otherwise complex and expensive cabling is thus reduced to a single 2-wire cable.

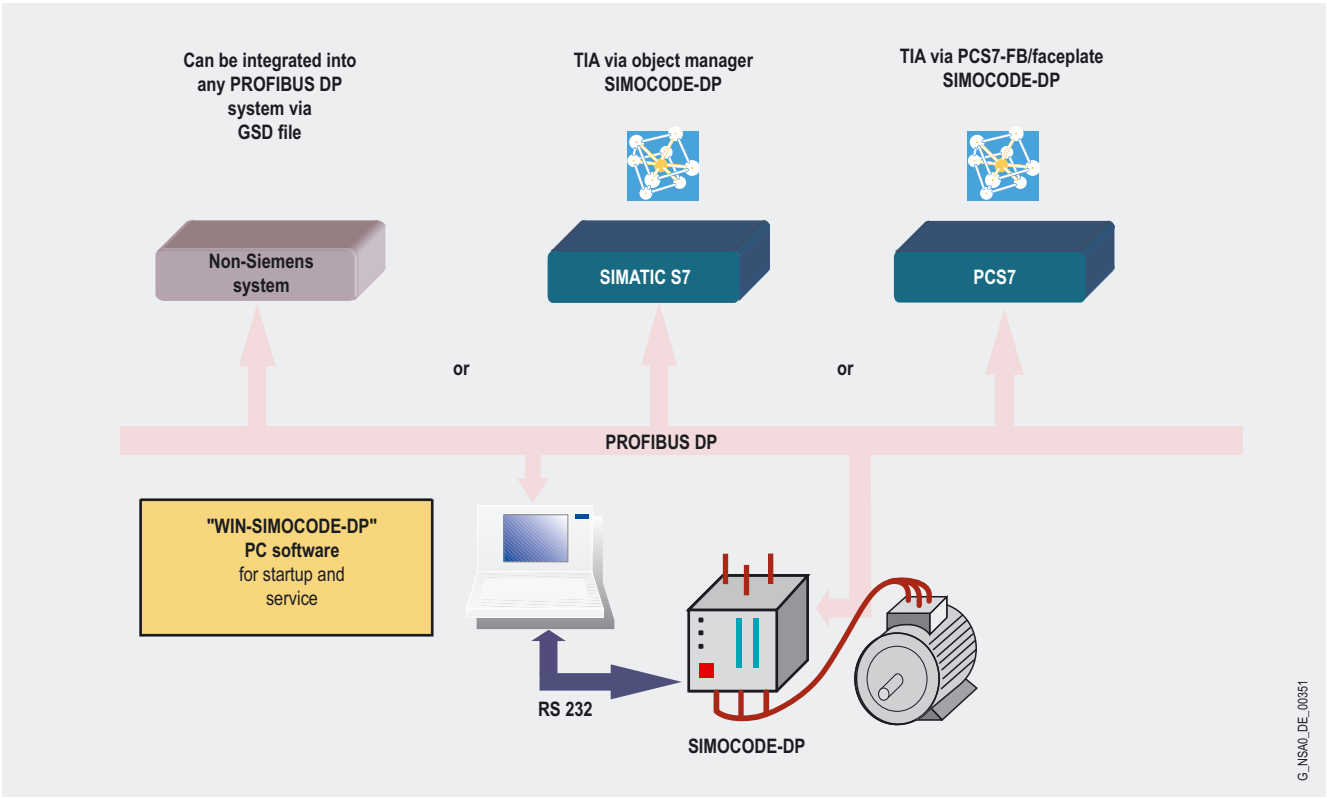
SIMOCODE-DP supports the communications functions of

- DP-V0 (cyclic data transfer, GSD configuration, diagnostics) and
- DP-V1 (non-cyclic data transfer, integration into engineering tools with EDD, interrupts).

With SIMOCODE-DP, the following baud rates (Kbits/s) are possible:

- 9.6
- 45.45
- 93.75
- 187.5
- 500
- 1500

## Integration




Universal application of SIMOCODE-DP in any automation system

**Integration** (continued)

In communication-capable controlgear, over and above the device function and hardware design a great deal of emphasis is placed on system integration, i.e. optimal integration capability in various different system configurations and process automation systems.

For this reason, the SIMOCODE-DP modular system offers as options a wide range of software packages for system-wide and time-saving configuring and diagnostics:

- PC software Win-SIMOCODE-DP for start-up and service
- Object manager OM-SIMOCODE for "total integration“ in SIMATIC S7
- Function block FB-SIMOCODE for "total integration“ in PCS7

### *PC software Win-SIMOCODE-DP for start-up and service*

Win-SIMOCODE-DP is "Plug and Play“-capable, process independent standard PC software for start-up and service.

It offers a user-friendly and convenient user-interface for

- Parameterization
- Display and diagnostics
- Test functions
- Motor control

Win-SIMOCODE-DP is available in two versions:

- *Win-SIMOCODE-DP / Smart*
  Interfacing to SIMOCODE-DP via the RS232 interface, i.e. point-to-point
- *Win-SIMOCODE-DP / Professional*
  Interfacing to SIMOCODE-DP selectable
  - Distributed via RS232
  - Centrally via PROFIBUS DP (V1)

### *Object manager OM-SIMOCODE for "total integration“ in SIMATIC S7*

SIMOCODE-DP can be integrated into SIMATIC S7 in two different ways:

- *Conventionally via GSD files*
  i.e. integration in SIMATIC S7 is identical to integration in any other DP standard master system
- *Via the OM-SIMOCODE-DP object manager*
  i.e. SIMOCODE-DP becomes an integral component of STEP 7, the object manager OM-SIMOCODE-DP should, in this case, always be combined with the start-up and service software Win-SIMOCODE-DP/Professional

Both software packages must be installed on the PG/PC on which the hardware configuration of SIMATIC S7 is performed.

This ensures that Win-SIMOCODE-DP/Professional can be called up directly from HW-Config.

Parameter sets created with Win-SIMOCODE-DP/Professional are loaded into the STEP 7 data storage by means of OM and automatically transferred to SIMOCODE-DP during start-up.

Functions specific to SIMATIC S7, such as diagnostic and hardware interrupts are supported, which means easier S7-wide configuration as well as optimal performance in the transfer of diagnostic data

### *Function block FB-SIMOCODE for "total integration“ in PCS 7*

System-compatible integration into the PCS 7 process control system requires the appropriate function blocks and faceplates for the respective field device.

The PCS 7-FB SIMOCODE-DP supports standard processing of the SIMOCODE-DP-specific data in the application program of the automation system.

The faceplate (picture block) SIMOCODE-DP offers a standardized user interface for SIMOCODE-DP on the Operator Station of PCS 7.

It is then easy to integrate SIMOCODE-DP into PCS 7 and time-savings are achieved during configuration.

The Process Device Manager "PDM“ supports centralized parameterization and diagnosis of all field devices on PROFIBUS DP or using the Hart protocol from the PCS 7 Engineering Station.

SIMOCODE-DP is integrated into PDM via an appropriate device description. The functional scope corresponds to that of Win-SIMOCODE-DP, the user-interface is, however, uniform for all the different types of field devices.

## Technical specifications

### *Technical data of basic unit / expansion module / operator module*

| | |
|---|---|
| Permissible ambient temperature in °C | -25 ... +60 |
| Permissible storage temperature in °C | -40 ... +80 |
| Installation altitude above sea-level in m | ≤ 2000 |
| Protection (to IEC 60529) | IP20 max. operational current $I_e$ ≤ 100 A; IP00 max. operational current $I_e$ > 100 A |
| Shock resistance (sine pulse) | 10 g/5 ms |
| Mounting position | Any |
| Mounting | |
| • Max. operational current $I_e$ ≤ 100 A | Snap-on mounting onto 35 mm standard rail or screw mounting with push-in lugs. |
| • Max. operational current $I_e$ > 100 A | Screw mounting directly onto contactor or screw mounting |
| EMC interference immunity | |
| • Line-induced interference, burst to IEC 61000-4-4 | 2 kV (corresponds to degree of severity 3) |
| • Line-induced interference, surge to IEC 61000-4-5 | 2 kV (corresponds to degree of severity 3) |
| • Electrostatic discharge to IEC 61000-4-2 | 8 kV (corresponds to degree of severity 3) |
| • Field-related interference to IEC 61000-4-3 | 10 V/m (corresponds to degree of severity 3) |
| EMC emitted interference | Emission limit class B to DIN VDE 0875 Part 11/ EN 55011 |
| Safe isolation acc. to DIN VDE 0100 / 0106 / 0160 (product version 12 upwards, start of delivery 01/2000) | • All circuits in SIMOCODE-DP are safely isolated from each other, they are designed with doubled creepage paths and clearances<br>• Power circuit from the control/electronic circuits: Safe isolation up to 690 V or 1000 V between control and electronic circuits:<br>• Safe isolation up to 300 V<br>• Observe notes of test report "Safe Isolation" No. 1610a. |

### *Basic unit*

| | |
|---|---|
| Displays | |
| • Green LED "Ready" | Continuous light: “Ready"; Off: “No control supply voltage" or "Function test not OK; unit is disabled" |
| • Green LED "Bus" | Continuous light: “Bus operation" |
| • Red LED "General fault" | Continuous light/flashing light: “Feeder fault", e.g. overload tripping |
| Test/Reset button | By pressing the Test/Reset button, the device can be reset following a trip or its functions can be tested |
| System interface | RS 232 for connecting the expansion module, operator module or PC |
| PROFIBUS DP interface | RS 485 for connecting the PROFIBUS DP line via terminals (conductor cross-sections as for auxiliary contacts) or 9-pole SUB D socket |
| **Main circuit** | |
| Rated insulation voltage $U_i$ (for pollution severity 3) in V | |
| • For uninsulated conductors (3UF5 001 to 3UF5 021) | 690 |
| • For insulated conductors (3UF5 001 to 3UF5 021) | 1000 |
| • For uninsulated and insulated conductors (3UF5 031 to 3UF5 051) | 1000 |
| Rated impulse withstand voltage $U_{imp}$ in kV | |
| • 3UF50 001 to 3UF50 021 | 6 |
| • 3UF5 031 to 3UF5 051 | 8 |
| Rated frequency in Hz | 50 / 60 |
| Type of current | Three-phase |
| Short-circuit protection | See table *Short-circuit protection with fuses for motor feeders ....* |
| Diameter of feed-through openings (max. $I_e$ = 100 A) in mm | |
| • Devices with max. operational current $I_e$ ≤ 25 A | 10 |
| • Devices with max. operational current $I_e$ ≤ 100 A | 15 |
| • Devices with max. operational current $I_e$ > 100 A | Construction with connecting bars |

| Bar connection | | | |
|---|---|---|---|
| • Current range in A | 50 ... 205 | 125 ... 500 | 200 ... 820 |
| • Tightening torque in Nm | M 8: 10 ... 14 | M 10: 14 ... 24 | M 10: 14 ... 24; M 12: 20 ... 35 |
| • Finely stranded with cable lug in mm$^2$ | 35 ... 95 | 50 ... 240 | 50 ... 240 |
| • Stranded with cable lug in mm$^2$ | 50 ... 120 | 70 ... 240 | 70 ... 240 |

## Technical specifications (continued)

| | | |
|---|---|---|
| **Auxiliary circuit/control circuit** | | |
| Rated control supply voltage $U_s$ | AC 50/60 Hz<br>115 V and 230 V | DC 24 V |
| Operating range | AC 50/60 Hz<br>0.85 ... 1.1 x $U_s$ | DC 24 V<br>0.85 ... 1.2 × $U_s$ (DIN 19240) |
| Power consumption | AC 50/60 Hz, 5 VA | DC 24 V, 5 W |
| Rated insulation voltage $U_i$ in V | 300 (at pollution degree 3) | |
| Rated impulse withstand voltage $U_{imp}$ in kV | 4 | |
| Outputs | | |
| • Number | 4 monostable/bistable outputs depending on the variant | |
| • Auxiliary contacts of the 4 outputs | NC contact response can be parameterized with internal signal conditioning, 3 outputs are jointly and 1 is separately connected to a common potential; they can be freely assigned to the control functions (e.g. for activating mains, star and delta contactors and signaling the operating status) | |
| • Specified short-circuit protection for auxiliary contacts (outputs) | Fuse links, utilization category gL/gA 6 A, quick-acting 10 A; circuit-breaker, 1.6 A, C characteristic | |
| Continuous rated current in A | 5 | |
| Rated operational current (switching capacity) | AC-15; 6 A/24 V; 6 A/120 V; 3 A/230 V<br>DC-13; 2 A/24 V; 0.55 A/60 V; 0.25 A/125 V | |
| Inputs | 4 inputs, supplied by the device electronics (DC 24 V), jointly connected to a common potential, for injecting process signals such as local control points, key-operated switches or limit switches | |
| Thermistor motor protection (binary PTC thermistor) | | |
| • Total cold resistance in kΩ | 1.5 | |
| • Response value in kΩ | 2.7 ... 3.1 | |
| • Return value in kΩ | 1.5 ... 1.65 | |
| Conductor cross-sections | | |
| • Tightening torque in Nm | 0.8 ... 1.2 | |
| • Solid and stranded in mm² | 1 × (0.5 ... 4.0); 2 × (0.5 ... 2.5) | |
| • Finely stranded with/without end sleeve in mm² | 1 × (0.5 ... 2.5); 2 × (0.5 ... 1.5) | |
| ***Expansion module*** | | |
| System interface | RS 232 as connection to the basic unit and for connecting the operator module or PC | |
| Rated insulation voltage $U_i$ in V | 300 (at pollution degree 3) | |
| Rated impulse withstand voltage $U_{imp}$ in kV | 4 | |
| Outputs | | |
| • Number | 4 bistable outputs | |
| • Auxiliary contacts of the 4 outputs | Each with 1 floating NO contact, NC contact response can be parameterized via internal signal conditioning; 3 outputs jointly and 1 separately connected to common potential; they can be freely assigned to the control functions (e.g. for activating mains, star and delta contactors and for signaling the operating status) | |
| • Specified short-circuit protection for auxiliary contacts (outputs) | Fuse links, utilization category gL/gA 6 A, quick-acting 10 A;<br>Circuit-breaker, 1.6 A, C characteristic | |
| Continuous rated current in A | 5 | |
| Rated operational current (switching capacity) | AC-15; 6 A/24 V; 6 A/120 V; 3 A/230 V<br>DC-13; 2 A/24 V; 0.55 A/60 V; 0.25 A/125 V | |
| Inputs | 8 externally supplied 24 V DC, 115 V AC, 230 V AC jointly connected to a common potential,<br>for injecting process signals such as local control points, key-operated switches or limit switches | |
| Conductor cross-sections | | |
| • Tightening torque in Nm | 0.8 ... 1.2 | |
| • Solid and stranded in mm² | 1 × (0.5 ... 4.0); 2 × (0.5 ... 2.5) | |
| • Finely stranded with/without end sleeve in mm² | 1 × (0.5 ... 2.5); 2 × (0.5 ... 1.5) | |
| ***Control module*** | | |
| Displays | | |
| • Green "Ready" LED | Continuous light: "Ready"<br>Off: "No control supply voltage" or "Function test not OK; unit is disabled" | |
| • Red LED "General fault" | Continuous light/steady light: "Feeder fault", e.g. overload tripping | |
| • 3 green and 3 yellow LEDs | Feeder-specific displays, freely-assignable, e.g. manual/automatic mode,<br>tripping of thermistor protection, clockwise/counterclockwise rotation etc. | |
| Buttons | | |
| • Test/Reset | By pressing the Test/Reset button, the device can be reset following a trip or its functions can be tested | |
| • Control keys | For controlling the motor feeder, freely programmable. | |
| System interface | RS 232 as connection to the basic unit or expansion module and for connection to a PC | |

***Short-circuit protection with fuses for motor feeders with short-circuit currents up to 50 kA at 690 V for 3RB1 2 and 3UF5 0, Part 1***

| Overload relay | Contactor | Class | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5 and 10 | | | 15 | | | 20 | | | 25 | | | 30 | | |
| | | Rated operational current $I_e$ AC-3 in A at ... V | | | | | | | | | | | | | | |
| | | 400 | 500 | 690 | 400 | 500 | 690 | 400 | 500 | 690 | 400 | 500 | 690 | 400 | 500 | 690 |
| ***Setting range 1.25 ... 6.3 A*** | | | | | | | | | | | | | | | | |
| 3UF5 00 | 3RT1 015 | 6.3 | 5.0 | 4.0 | 6.3 | 5.0 | 4.0 | 6.3 | 5.0 | 4.0 | 6.3 | 5.0 | 4.0 | 6.3 | 5.0 | 4.0 |
| | 3RT1 016 | 6.3 | 6.3 | 5.2 | 6.3 | 6.3 | 5.2 | 6.3 | 6.3 | 5.2 | 6.3 | 6.3 | 5.2 | 6.3 | 6.3 | 5.2 |
| | 3RT1 017 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 |
| ***Setting range 6.3 ... 25 A*** | | | | | | | | | | | | | | | | |
| 3UF5 01 | 3RT1 015 | 7.0 | | | 7.0 | | | 7.0 | | | 7.0 | | | 7.0 | | |
| | 3RT1 016 | 9.0 | 6.5 | | 9.0 | 6.5 | | 9.0 | 6.5 | | 9.0 | 6.5 | | 9.0 | 6.5 | |
| | 3RT1 017 | 12.0 | 9.0 | 6.3 | 11.0 | 9.0 | 6.3 | 10.0 | 9.0 | 6.3 | 9.5 | 9.0 | 6.3 | 9.0 | 9.0 | 6.3 |
| | 3RT1 024 | 12.0 | 12.0 | 9.0 | 12.0 | 12.0 | 9.0 | 12.0 | 12.0 | 9.0 | 12.0 | 12.0 | 9.0 | 12.0 | 12.0 | 9.0 |
| | 3RT1 025 | 17.0 | 17.0 | 13.0 | 17.0 | 17.0 | 13.0 | 16.0 | 16.0 | 13.0 | 15.0 | 15.0 | 13.0 | 14.0 | 14.0 | 13.0 |
| | 3RT1 026 | 25.0 | 18.0 | 13.0 | 18.0 | 18.0 | 13.0 | 16.0 | 16.0 | 13.0 | 15.0 | 15.0 | 13.0 | 14.0 | 14.0 | 13.0 |
| | 3RT1 034 | 25.0 | 25.0 | 20.0 | 25.0 | 25.0 | 20.0 | 22.3 | 22.3 | 20.0 | 20.3 | 20.3 | 20.3 | 19.1 | 19.1 | 19.1 |
| | 3RT1 035 | 25.0 | 25.0 | 24.0 | 25.0 | 25.0 | 24.0 | 25.0 | 25.0 | 24.0 | 25.0 | 25.0 | 24.0 | 25.0 | 25.0 | 24.0 |
| ***Setting range 25 ... 100 A*** | | | | | | | | | | | | | | | | |
| 3UF5 02 | 3RT1 034 | 32.0 | 32.0 | 20.0 | 25.5 | 25.5 | 20.0 | 22.3 | 22.3 | 20.0 | 20.3 | 20.3 | 20.0 | 19.1 | 19.1 | 19.1 |
| | 3RT1 035 | 40.0 | 40.0 | 24.0 | 33.0 | 33.0 | 24.0 | 29.4 | 29.4 | 24.0 | 28.0 | 28.0 | 24.0 | 26.5 | 26.5 | 24.0 |
| | 3RT1 036 | 50.0 | 50.0 | 24.0 | 38.5 | 38.5 | 24.0 | 32.7 | 32.7 | 24.0 | 29.4 | 29.4 | 24.0 | 26.5 | 26.5 | 24.0 |
| | 3RT1 044 | 65.0 | 65.0 | 47.0 | 56.0 | 56.0 | 47.0 | 49.0 | 49.0 | 47.0 | 45.0 | 45.0 | 45.0 | 41.7 | 41.7 | 41.7 |
| | 3RT1 045 | 80 | 80 | 58 | 61 | 61 | 58 | 53 | 53 | 53 | 47 | 47 | 47 | 45 | 45 | 45 |
| | 3RT1 046 | 95 | 95 | 58 | 69 | 69 | 58 | 59 | 59 | 58 | 53 | 53 | 53 | 50 | 50 | 50 |
| ***Setting range 50 ... 205 A*** | | | | | | | | | | | | | | | | |
| 3UF5 03 | 3RT1 054 | 115 | 115 | 115 | 93 | 93 | 93 | 82 | 82 | 82 | 75 | 75 | 75 | 69 | 69 | 69 |
| | 3RT1 055 | 150 | 150 | 150 | 122 | 122 | 122 | 107 | 107 | 107 | 98 | 98 | 98 | 90 | 90 | 90 |
| | 3RT1 056 | 185 | 185 | 170 | 150 | 150 | 150 | 131 | 131 | 131 | 120 | 120 | 120 | 111 | 111 | 111 |
| ***Setting range 125 ... 500 A*** | | | | | | | | | | | | | | | | |
| 3UF5 04 | 3RT1 064 | 225 | 225 | 225 | 182 | 182 | 182 | 160 | 160 | 160 | 146 | 146 | 146 | 135 | 135 | 135 |
| | 3RT1 065 | 265 | 265 | 265 | 215 | 215 | 215 | 188 | 188 | 188 | 172 | 172 | 172 | 159 | 159 | 159 |
| | 3RT1 066 | 300 | 300 | 280 | 243 | 243 | 243 | 213 | 213 | 213 | 195 | 195 | 195 | 180 | 180 | 180 |
| | 3RT1 075 | 400 | 400 | 400 | 324 | 324 | 324 | 284 | 284 | 284 | 260 | 260 | 260 | 240 | 240 | 240 |
| | 3RT1 076 | 500 | 500 | 450 | 405 | 405 | 405 | 355 | 355 | 355 | 325 | 325 | 325 | 300 | 300 | 300 |
| | 3RT1 264 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 194 | 194 | 194 | 173 | 173 | 173 |
| | 3RT1 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 228 | 228 | 228 | 204 | 204 | 204 |
| | 3RT1 266 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 258 | 258 | 258 | 231 | 231 | 231 |
| | 3RT1 275 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 344 | 344 | 344 | 308 | 308 | 308 |
| | 3RT1 276 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 430 | 430 | 430 | 385 | 385 | 385 |
| ***Setting range 200 ... 820 A*** | | | | | | | | | | | | | | | | |
| 3UF5 05 | 3TF6 8 [1] | 630 | 630 | 630 | 502 | 502 | 502 | 440 | 440 | 440 | 408 | 408 | 408 | 376 | 376 | 376 |
| | 3TF6 9 [1] | 820 | 820 | 820 | 662 | 662 | 662 | 572 | 572 | 572 | 531 | 531 | 531 | 500 | 500 | 500 |

1) Mounting onto contactor is possible.

***Short-circuit protection with fuses for motor feeders with short-circuit currents up to 50 kA at 690 V for 3RB1 2 and 3UF5 0. Part 2***

| Overload relay | Contactor | Fuse inserts [2] | | | | |
|---|---|---|---|---|---|---|
| | | 690 V | | | 415 V | 600 V |
| | | NH DIAZED NEOZED dutycategory gL (gG) | Typ 3NA Typ 5SB Typ 5SE | Typ 3ND aM | British Standards BS88 fuses Typ T | $U_L$-listed RK5 fuses |
| | | Type of coordination [3] | | | | |
| | | 1 | 2 | | | |
| ***Setting range 1.25 ... 6.3 A*** | | | | | | |
| 3UF5 00 | 3RT1 015 | 35 | 20 | | 20 | 25 |
| | 3RT1 016 | 35 | 20 | | 20 | 25 |
| | 3RT1 017 | 35 | 20 | | 20 | 25 |
| ***Setting range 6.3 ... 25 A*** | | | | | | |
| 3UF5 01 | 3RT1 015 | 35 | 20 | | 20 | 60 |
| | 3RT1 016 | 35 | 20 | | 20 | 60 |
| | 3RT1 017 | 35 | 20 | | 20 | 60 |
| | 3RT1 024 | 63 | 25 | 20 | 25 | 70 |
| | 3RT1 025 | 63 | 25 | 20 | 25 | 70 |
| | 3RT1 026 | 100 | 35 | 20 | 25 | 100 |
| | 3RT1 034 | 125 | 63 | 50 | 63 | 100 |
| | 3RT1 035 | 125 | 63 | 50 | 63 | 100 |
| ***Setting range 25 ... 100 A*** | | | | | | |
| 3UF5 02 | 3RT1 034 | 125 | 63 | 50 | 63 | 125 |
| | 3RT1 035 | 125 | 63 | 50 | 63 | 150 |
| | 3RT1 036 | 160 | 80 | 50 | 80 | 200 |
| | 3RT1 044 | 250 | 125 | 63 | 125 | 250 |
| | 3RT1 045 | 250 | 160 | 80 | 160 | 250 |
| | 3RT1 046 | 250 | 160 | 100 | 160 | 350 |
| ***Setting range 50 ... 205 A*** | | | | | | |
| 3UF5 03 | 3RT1 054 | 355 | 315 | 160 | 250 | 450 |
| | 3RT1 055 | 355 | 315 | 200 | 315 | 500 |
| | 3RT1 056 | 355 | 315 | 200 | 315 | 500 |
| ***Setting range 125 ... 500 A*** | | | | | | |
| 3UF5 04 | 3RT1 064 | 500 | 400 | 250 | - | 700 |
| | 3RT1 065 | 500 | 400 | 315 | - | 800 |
| | 3RT1 066 | 500 | 400 | 315 | - | 800 |
| | 3RT1 075 | 630 | 400 | 400 | - | 1000 |
| | 3RT1 076 | 630 | 500 | 500 | - | 1200 |
| | 3RT1 264 | 500 | 500 | 400 | - | 800 |
| | 3RT1 265 | 500 | 500 | 400 | - | 800 |
| | 3RT1 266 | 500 | 500 | 400 | - | 800 |
| | 3RT1 275 | 800 | 800 | 630 | - | 1200 |
| | 3RT1 276 | 800 | 800 | 630 | - | 1200 |
| ***Setting range 200 ... 820 A*** | | | | | | |
| 3UF5 05 | 3TF6 8 [1] | 1000 | 500 [4] | 630 | 500 | 1200 |
| | 3TF6 9 [1] | 1250 | 630 [4] | 630 | 630 | 2000 CLASS L |

1) Mounting onto contactor is possible.

2) Observe operating voltage.

3) Type of coordination and short-circuit protection devices according to IEC 947-4-1/DIN VDE 660 Part 102:
- Type of coordination "1": In the event of a short-circuit, the contactor or starter must not endanger persons or the installation. They do not have to be suitable for further operation without repair and the replacement of parts.
- Type of coordination "2": In the event of a short-circuit, the contactor or starter must not endanger persons or the installation.They must be suitable for further operation. There is a danger of contact welding.

4) Ensure that the maximum AC-3 operating current is sufficiently different from the rated fuse current.

## Selection and Ordering data

| | Design | | | Order No. |
|---|---|---|---|---|
|  Basic unit 3UF5 001 to 021 | **Basic unit**<br>4 inputs, 4 outputs<br>For snapping on to 35 mm standard rail to DIN EN 50 022 | | | |
| | *Contactors that can be mounted externally* | *Overall width* | *Setting range* | |
| | *Type* | *mm* | *A* | |
| | -- | 70 | 1.25 [1] ... 6.3 | **3UF5 001-3 ■■■ 0-1** |
| | -- | 70 | 6.3 ... 25 | **3UF5 011-3 ■■■ 0-1** |
| | -- | 70 | 25 ... 100 | **3UF5 021-3 ■■■ 0-1** |
| | 3RT1 05 | 120 | 50 ... 205 | **3UF5 031-3 ■■■ 0-1** |
| | 3RT1 06, 3RT1 07<br>3RT1 26, 3RT1 27 | 145 | 125 ... 500 | **3UF5 041-3 ■■■ 0-1** |
| | 3TF6 8, 3TF6 9 | 230 | 200 ... 820 | **3UF5 051-3 ■■■ 0-1** |
|  Basic unit 3UF5 031 to 051 | *Inputs* | | | |
| | • Input for thermistor motor protection | | | **A** |
| | • Earth-fault detection input (external)<br>(sensing of earth fault currents levels of 0.3 A, 0.5 A and 1 A with summation current transformers 3UL2 20.-A, see section *Switchgear and Controlgear for Load Feeders)* | | | **B** |
| | *Rated control voltage* | | | |
| | • 24 V DC | | | **B** |
| | • 115 V AC | | | **J** |
| | • 230 V AC | | | **N** |
| | *Response of the outputs to acontrol supply voltage failure* | | | |
| | • monostable | | | **0** |
| | • bistable | | | **1** |
|  Expansion module | **Expansion module**<br>8 inputs, 4 outputs<br>For snapping onto 35 mm standard rail to DIN EN 50 022<br>External supply for inputs | | | |
| | • 230 V AC | | | **3UF5 100-0AN00** |
| | • 115 V AC | | | **3UF5 100-0AJ00** |
| | • 24 V DC | | | **3UF5 100-0AB00** |
|  Control module | **Control module**<br>For installation in control cabinet door<br>only for connection to basic unit or expansion module | | | **3UF5 202-1AA00-1** |

1) The current setting range from 0.25 to 1.25 A is attained by looping the main conducting paths.

## Selection and Ordering data (continued)

| | | | Order No. |
|---|---|---|---|
| *Configuration software* | | | |
|  3UF5 710-0AA00-0 | **Win-SIMOCODE-DP/Professional** | | **3UF5 710-0AA00-0** |
| | Parameter setting, operating, monitoring and testing: | Via PROFIBUS DPV1 or via RS 232 | |
| | PC/PG requirements: | Windows 95/98/2000/NT/ME or Windows XP | |
| | PC/PG interface requirements: | PROFIBUS system interface from Siemens or RS 232 with compatible interface cable 3RW2 920-1DA00 | |
| | SIMOCODE-DP requirements: | Delivery stage E10 (as of June 1998) | |
| | Type of delivery: | CD, English/German (selectable) Incl. online Help and example parameter files, single licence | |
|  3UF5 711-0AA00-0 | **Win-SIMOCODE-DP/Smart** | | **3UF5 711-0AA00-0** |
| | Parameter setting, operating, monitoring and testing: | Via RS 232 | |
| | PC/PG requirements: | Windows 95/98/2000/NT/ME or Windows XP | |
| | PC/PG interface requirements: | RS 232 with compatible 3RW29 920-1DA00 interface cable | |
| | Type of delivery: | CD-ROM, English/German (selectable) Incl. online Help and example parameter files, single licence | |
| | **OM-SIMOCODE-DP** STEP 7 object manager for integrating SIMOCODE-DP as an S7 slave and for calling Win-SIMOCODE-DP/Professional from STEP 7 | | **3UF5 712-0AA00-0** |
| | Requirements: | STEP 7, Version 4.0 or higher | |
| | SIMOCODE-DP requirements: | Delivery stage E10 (as of June 1998) | |
| | Type of delivery: | CD-ROM, English/German (selectable) incl. online Help, single licence | |
| | **PCS7 function block SIMOCODE-DP** Function block for integrating SIMOCODE-DP into the PCS7 user program and for visualizing the SIMOCODE-DP-specific data in a faceplate | | |
| | SIMOCODE-DP requirements: | Delivery stage E10 and higher (since June 1998) | |
| | Type of delivery: | CD-ROM, German/English, single-user license | |
| | PCS7 requirements: | PCS7 Version 4.2 to 5.2 | **3UF5 720-0AA00-0** |
| | | PCS7 Version 6.0 | **3UF5 720-0AA10-0** |
| *Documentation* | **System manual** Containing a description of the communication procedure over PROFIBUS DP and a configuring example, available for a nominal charge | | |
| | • German | | **3UF5 700-0AA00-0** |
| | • English | | **3UF5 700-0AA00-1** |
| ***Upgrade Configuring software*** | **Win-SIMOCODE-DP/Professional** Parameterization and Service software for SIMOCODE-DP (3UF5) Interfaces: DPV1 and RS232 Runs on PG/PC under Windows 95/98/2000/ME/XP or Windows NT 4.x; Delivery form: CD Upgrade V1.0/V1.1/V1.2 to V1.3 | | **3UF5 710-0AA00-2** |
| | **Win-SIMOCODE-DP/Smart** Parameterization and Service software for SIMOCODE-DP (3UF5) Interfaces: DPV1 and RS232 Runs on PG/PC under Windows 95/98/2000/ME/XP or Windows NT 4.x; Delivery form: CD Upgrade V1.0/V1.1/V1.2 to V1.3 | | **3UF5 711-0AA00-2** |

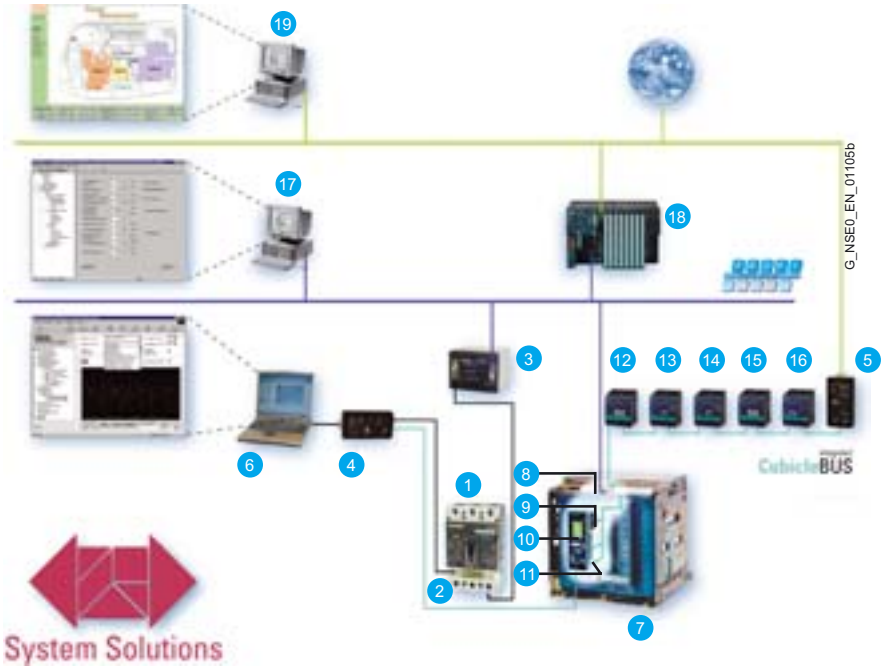
5

## Selection and Ordering data (continued)

| *Connecting cable, installation material* | | Order No. |
|---|---|---|
| | **Connecting cable**<br>For PC communication via the RS 232 system interface<br>5 m long | **3RW2 920-1DA00** |
|  <br>3UF1 900-1A<br>3UF1 900-1B<br>3UF1 900-1C | **Connecting plug/connecting cable**<br>With 3UF5 9 / 3UF1 9 connectors | |
| | • For connecting the basic unit to the expansion unit, 9-pole, 0.03 m tab connector, shielded | **3UF5 900-1AA00** |
| | • For connecting the basic unit to the expansion unit or operator module, 9-pole | |
| | - 0.5 m long, shielded plug 45° angular | **3UF1 900-1AA00** |
| | - 2.0 m long, shielded plug 45° angular | **3UF1 900-1BA00** |
| | - 2.5 m long, shielded plug 45° angular | **3UF1 900-1CA00** |
| | - 0.5 m long, with flat plug, shielded | **3UF1 900-1DA00** |
| | - 1.0 m long, with flat plug, shielded | **3UF1 900-1EA00** |
|  <br>3UF1 900-1D<br>3UF1 900-1E | • For connecting basic unit / expansion module to the control cabinet door<br>It is possible to set parameters, operate and monitor using the PC from the control cabinet door, 9-pole | |
| | - 0.5 m long, with flat plug and socket, shielded | **3UF5 900-0AA00** |
| | - 1.0 m long, with flat plug and socket, shielded | **3UF5 900-0BA00** |
| | **T terminal**<br>Terminal for bus connection on PROFIBUS DP - RS 485 | **3UF5 900-1GA00** |
| | **Bus termination**<br>Bus termination module with separate supply voltage for terminating the bus following the last unit on the bus line<br>Supply voltage: | |
| | • 115/230 V AC | **3UF1 900-1KA00** |
| | • 24 V DC | **3UF1 900-1KB00** |
|  <br>3RB1 900-0B | **Insertable tabs**<br>For screw-mounting on mounting plate<br>2 units are required for each 3UF5 0 | **3RB1 900-0B** |
| | **Terminal cover** | |
|  <br>3TX7 506-0A | • For individual mounting or on the outgoing side with direct mounting | |
| | - 3UF5 031 | **3TX7 506-0A** |
| | - 3UF5 041 | **3TX7 536-0A** |
| | - 3UF5 051 with 3TF6 8 | **3TX7 686-0A** |
| | - 3UF5 051 with 3TF6 9 | **3TX7 696-0A** |
| | • Between contactor and overload relay for direct mounting | |
| | - 3UF5 031 | **3TX7 506-0B** |
| | - 3UF5 041 | **3TX7 536-0B** |
|  <br>3TX7 506-0B | - 3UF5 051 with 3TF6 8 | **3TX7 686-0B** |
| | - 3UF5 051 with 3TF6 9 | **3TX7 696-0B** |
| | **Communications processors for SIMATIC S7** | See ST 70 Catalog |
| | **Bus cables for PROFIBUS** | See page 5/25 |
| | **9-pole bus connector with bus termination resistor** | See page 5/36 |
| | **Components for optical-fiber connection** | See page 5/62 |

## Overview

1 SENTRON VL
2 LCD ETU release
3 COM10 PROFIBUS module including short-time grading control (ZSI module)
4 Breaker Data Adapter (BDA)
5 BDA *Plus* with Ethernet interface
6 Browser-capable input and output device (e.g. notebook)
7 SENTRON WL
8 COM15 PROFIBUS module
9 Breaker Status Sensor (BSS)
10 Electronic release ETU
11 Metering function or Metering function *Plus*
12 Short-time grading control (ZSI module)
13 Digital output module with relay contacts
14 Digital output module with relay contacts, configurable
15 Analog output module
16 Digital input module
17 Switch ES Power on PC
18 PLC e.g. SIMATIC S7
19 Power Management software




For more information on the communication-capable SENTRON circuit-breakers see
- Catalog LV 30, Section 3
- A&D Mall, Section *Protective Devices / Communication-Capable Circuit-Breakers*

## PROFIBUS DP LEDs

### Technical specifications

| | PROFIBUS DP LED displays | |
|---|---|---|
| | **Numerical** | **Alphanumeric** |
| Type of display | LED 7-segment | LED dot-matrix display |
| Color of light | Red or green | |
| Operating voltage in V | 24 DC (for AS-Interface via AS-i bus) | 24 DC |
| Power consumption for digit height | | |
| • 13 mm | 0.15 W per digit | -- |
| • 17 mm | -- | 0.2 W per digit |
| • 30 mm | 0.3 W per digit | 0.3 W per digit |
| Display with PROFIBUS DP | 0 to 9 and A, b, C, d, E, F, H, L, o, P, r, U | ASCII code |
| Addresses | One address per display. | |
| Baudrate with PROFIBUS DP in Mbaud | 12 | 1.5 |
| Housing | Bay housing acc. to DIN, metal | |
| Mounting | Screw bracket acc. to DIN | |
| Protection | IP54 to the front | |
| Ambient temperature | | |
| • During operation in °C | 0 ... +50 | 0 ... +45 |
| • During storage in °C | -25 ... +70 | -10 ... +60 |
| EMC | Acc. to the specifications of the 89/336/EWG (or EMVG) guideline | |
| Emitted interference | Basic technical standard EN 50 081-2, July 1993<br>EditionProduct standard EN 55 011, Group 1/2, Class A, March 1991 Edition<br>Limit value curve identical to EN 55 022 | |
| Noise immunity | Basic technical standard EN 50 082-2, March 1995 Edition | |

### Selection and Ordering data

| | Design | Order No. |
|---|---|---|
| | **PROFIBUS DP LED displays, numerical**<br>For installation with PROFIBUS DP [1]<br>Number of characters: 6<br>Color: red<br>Digit height: 13 mm | **3SF4 103-1BG** |
|  <br>3SF4 113-1HJ | **PROFIBUS DP LED displays, alphanumeric**<br>For installation with PROFIBUS DP [1]<br>Number of characters: 8<br>Color: red | |
| | • Digit height: 17 mm | **3SF4 113-1EJ** |
| | • Digit height: 30 mm | **3SF4 113-1HJ** |

1) The GSD file is supplied with every delivery.

## LS4 laser scanner PROFIBUS DP

### Overview


The PROFIBUS laser scanner SIGUARD LS4 is an optical distance sensor. The sensor periodically emits light pulses within a range of 190°. If the pulses encounter an obstacle or person, the light is reflected and received and evaluated by the laser scanner.

The scanner calculates the exact coordinates of the detected obstacle by means of the light propagation time. If the obstacle or person is within a certain defined area, a stop function is triggered. The laser scanner reliably detects persons up to a distance of 4 m even if the person is wearing very dark clothes. Objects which are not relevant to safety can be detected up to a distance of 15 m.

Up to four programmable protective zone pairs, which are switchable during operation, permit the protection area to be optimally adapted to the application.

The laser scanner is available in three versions which allow optimal integration into different systems. The standard scanner is equipped with failsafe, self-monitoring semiconductor outputs for conventional integration into the safety circuit.

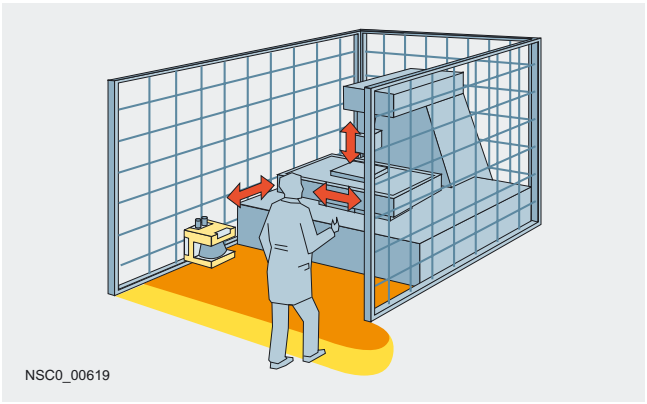
The communication-capable versions for PROFIBUS with PROFIsafe profile as well as AS-Interface Safety at Work permit direct connection to the corresponding bus system as a safe station.

Additional information can be found in the Internet under:


http://www.siemens.com/laserscanner

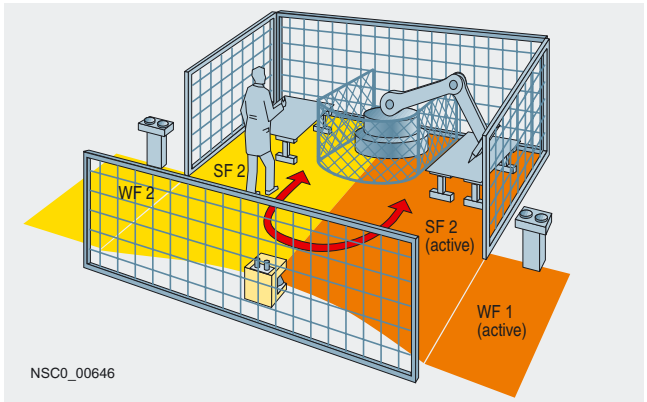
### Application

#### *Horizontal danger zone protection*



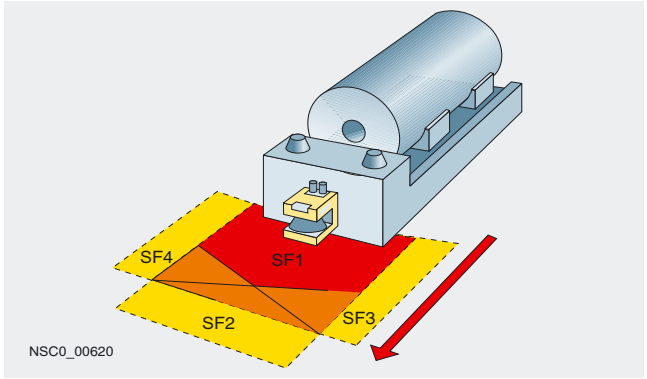

- Reliable detection of persons and objects in danger zones around machines and plants.
- Flexible programming of almost any protection and warning zones.

#### *Horizontal danger zone protection with more than one protective field*




- Reliable detection of persons in different danger zones by switching between protective fields.
- Increased availability due to accurate protection of just the fields that are currently active.

#### *Route monitoring for automatic guided vehicle systems*

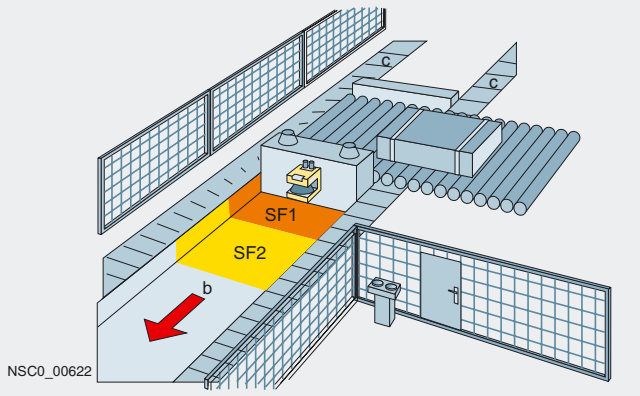



- Reliable detection of persons and objects approaching the vehicle.
- The laser scanner offers a greater protection range than bumpers and, therefore, permits higher speeds.

## LS4 laser scanner PROFIBUS DP

### Application (continued)

#### *Collision protection for shifting units*



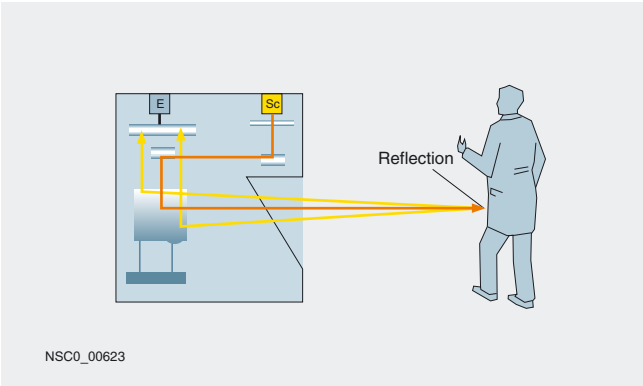

- Reliable protection of persons in the path of the vehicle.
- Objects in the path of the vehicle are detected in good time and damage to the vehicle or its load is prevented.

#### *Other applications*

- Many different types of hazardous area protection
- Protection for rooms and entrances
- Projecting object monitoring to protect machines and personnel
- Non-safety-relevant measuring or detection tasks (e.g. determining distances, positions, or contours).

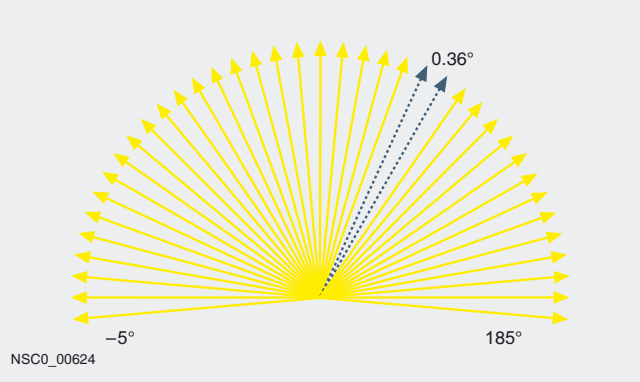
### Function

The SIGUARD LS4 laser scanner is an optical, non-contact area scanner, which is principally designed for protecting personnel.




Using a laser diode with transmission optics, the laser scanner generates continuous bundled light pulses that are scattered throughout the operating range by an integrated rotating mirror. If objects or persons enter the field, it evaluates the reflected light pulses and calculates the exact position coordinates continuously on the basis of the light propagation time. If the defined personnel protective field is penetrated, the laser scanner stops the machine immediately (within the system response time). The Stop function is reset when the protective field is free again either automatically or following acknowledgement (depending on the operating mode).

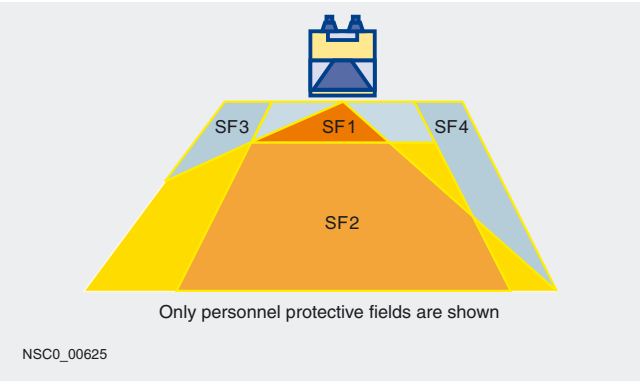
The operating range of the LS4 laser scanner spans 190° and is subdivided into angle segments of 0.36°.




The scan rate is 25 scans/second (i.e. one light pulse every 40 ms in each segment). A special algorithm ensures that objects larger than 70 mm (i.e. the scanner resolution) can be reliably detected and that contamination (e.g. dust) does not reduce system availability. The LS4 laser scanner detects people (even if they are wearing dark clothing) at a distance of up to 4 m (fail safe). People or objects can, however, be detected at a distance of up to 15 m so that a warning can be output, for example (not safety relevant).

#### *Four protective field/warning field pairs*

Four variable protective field pairs for the personnel protective field and warning field, which can be set on the PC, ensure that the LS4 laser scanner can be adapted to suit any requirements.



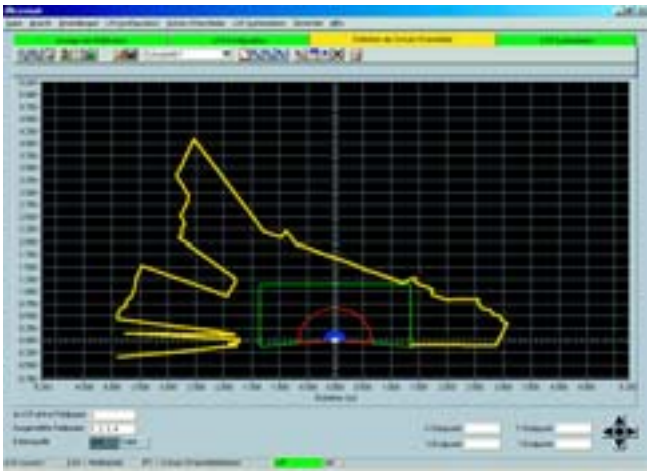

It can be implemented in stationary applications (machines and installations) or mobile applications (vehicles, automatic guided vehicle systems, or shifting units). In the case of a robot, for example, different operating ranges can be protected, whereby the laser scanner functions one after the other with regard to time and space. In the case of automatic guided vehicle systems, four programmable protective fields can be protected (e.g. rapid travel, slow travel, turning left, turning right).

## Function (continued)

### *LS4soft operating software*

Thanks to the PC operating software LS4soft, it could not be easier to optimize the laser scanner settings. The following functions have been integrated:

- User-friendly configuration of the protective field using a PC or laptop
- Configuration of additional functions (e.g. protective field selection, restart inhibit, etc.) by means of a software Wizard
- Comprehensive range of displays (e.g. defined protective fields, current scan contours, system settings, etc.), reliable, password-protected access with different authorization levels
- Executable under Microsoft Windows 95/98/NT/2000/XP



## Technical specifications

| Type | 3SF7 834-6PB00 |
|---|---|
| **Protective field** | |
| • Detection range | 0 ... 4 m |
| • Luminance factor | Min.. 1.8 % |
| • Object size and diameter | 70 mm (cylindrical test body) |
| • Response time | |
| - dual evaluation (2 scans) | 80 ms (only laser scanner without PROFIBUS system times) |
| - adjustable up to 16 scans | 640 ms (only laser scanner without PROFIBUS system times) |
| • Number | 4 (can be switched via PROFIBUS) |
| • Safety category | Category 3 to EN 954-1, type 3 to IEC 61496-1 or EN 61496-3 |
| • Output | PROFIBUS (PROFIsafe profile) |
| • Start | Start test and start inhibit can be set separately |
| • Restart | 160 ms ... 10 s (can be set or is manual) |
| Protective field supplement | |
| • For deactivated dust suppression | 83 mm |
| • For activated dust suppression | |
| - protective field size < 3.5 mm | 83 mm |
| - protective field size > 3.5 mm | 100 mm |
| • Additional supplement in the case of retro-reflectors or highly reflective surfaces (e.g. certain metals or ceramics) in the scan plane | |
| - over 1.2 m behind the protective field line | 0 mm |
| - in protective field or up to 1.2 m behind the protective field line | 110 mm |
| **Warning field** | |
| • Detection range | 0 ... 15 m |
| • Luminance factor | Min.. 20 % |
| • Object size | 150 × 150 mm |
| • Response time | |
| - dual evaluation (2 scans) | 80 ms (only laser scanner without PROFIBUS system times) |
| - adjustable up to 16 scans | 640 ms (only laser scanner without PROFIBUS system times) |
| • No. of warning fields | 4 (can be switched via PROFIBUS) |
| • Output | PROFIBUS |

| Type | 3SF7 834-6PB00 |
|---|---|
| Contour measurement | |
| • Detection range | 0 ... 50 m |
| • Luminance factor | Min.. 20 % |
| • Output | RS 232 serial interface via infrared interface |
| • Radial resolution | 5 mm |
| • Lateral resolution | 0.36° |
| Supply voltage | |
| • Via external supply | 24 V DC (+20 % / -30 %) |
| • Note | The power pack for the external power supply must have a safe line separation to IEC 60742 and must bridge brief power failures of up to 20 ms. |
| Overcurrent protection | Fuse 1.25 A (medium slow) |
| Current consumption | Typ. 350 mA |
| Inputs | |
| • Restart/reset | Connection of a command device for "with restart inhibit" mode and/or device resets, monitored dynamically |
| • Signal definition | |
| - High (logical 1) | 16 ... 30 V |
| - Low (logical 0) | < 3 V |
| Control cable | |
| • Length | Max. 50 m (cable cross-section: 0.5 $mm^2$, shielded) |
| Field pair changeover | Field pair switchover via PROFIBUS (PROFIsafe profile) |
| RS232 interfaces via infrared interface | For device parameterization and field definition |

## LS4 laser scanner PROFIBUS DP

### Technical specifications (continued)

| Typ | 3SF7 834-6PB00 |
|---|---|
| Optics | |
| • Angular range | 190 ° |
| • Angle resolution | 0.36 ° |
| • Lateral tolerance | |
| - without assembly system (for rear of enclosure) | ± 0.18 ° |
| - with assembly system (for mounting surface) | ± 0.22 ° |
| • Scan rate | 25 scans/s or 40 ms/scan |
| • Laser protection class | |
| - to standard | EN 60825-1, class 1 (eye safe) |
| - wavelength | 905 nm |
| - beam divergence | 2 mrad |
| - time base | 100 s |
| Degree of protection | IP65 |
| Ambient temperature | |
| • Operation | 0 ... +50 °C |
| • Storage | -20 ... +60°C |
| Enclosure insulation class | Protection class 2 |
| Humidity | To DIN 40040, table 10, code E (fairly dry) |

| Typ | 3SF7 834-6PB00 |
|---|---|
| Dimensions (W × H × D) in mm | 141 × 167 × 168 |
| Transmitter | Infrared laser diode (λ = 905 nm) |
| Enclosure | Cast aluminum, plastic, steel connection plate |
| Vibratory load over 3 axes to IEC 60068, part 2-6 | 10 ... 150 Hz, max. 5 g |
| Continuous shock over 3 axes to IEC 60068, part 2-29 | 10 g, 16 ms |
| Drive for rotating mirror | Brushless DC motor |
| Bearing for rotating mirror | Maintenance-free ball bearing |

### Ordering data

| | Order No. |
|---|---|
| **PROFIBUS DP LS4-4 laser scanner**<br>Including LS4soft software | **3SF7 834-6PB00** |

*Accessories*

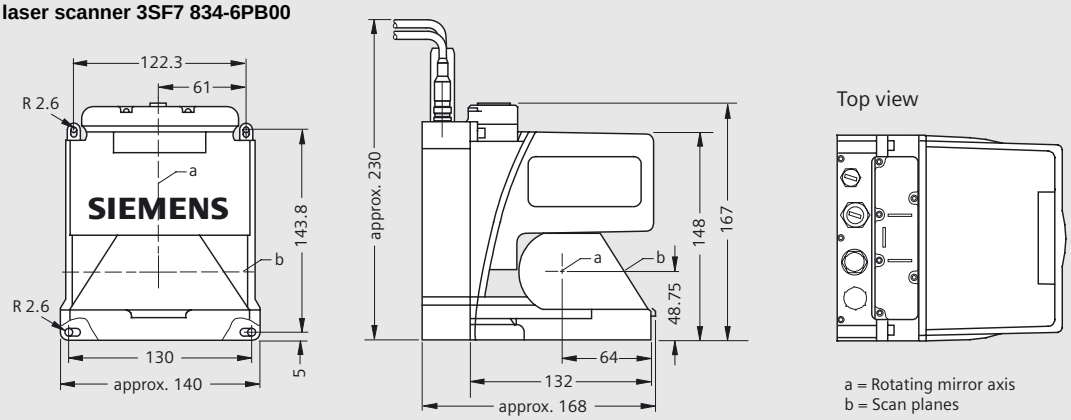
| | |
|---|---|
| **Assembly system**<br>twistable,<br>for simple adjustment | **3RG7 838-1AA** |

| | |
|---|---|
| **Adapter plate for PLS mounting support** | **3RG7 838-1AB** |
| **Cleaning set**<br>Includes<br>cleaning fluid (1000 ml),<br>cloths (x 100) | **3RG7 838-7RS** |

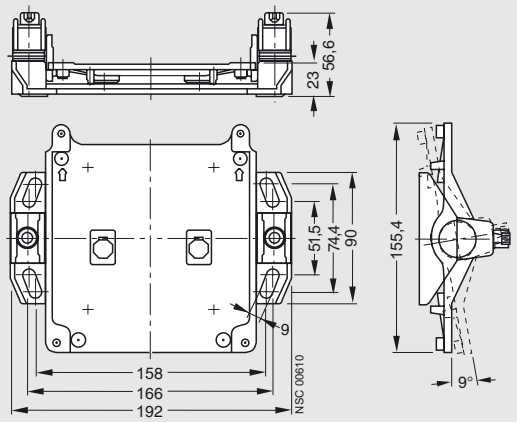
| | Order No. |
|---|---|
| *Connectors and cables* | |
| **PC connection cable for LS4 AS-Interface and PROFIBUS,**<br>including plug (9-pin),<br>and optical interface | **3RG7 838-1DC** |
| **PROFIBUS M12 terminating connector**<br>For PROFIBUS DP<br>1 packet = 5 items | **6GK1 905-0EC00** |
| **PROFIBUS M12 connectors**<br>1 pack = 5 items | |
| • Pin insert | **6GK1 905-0EA00** |
| • Socket insert | **6GK1 905-3EB00** |
| **PROFIBUS M12 plug-in cables**<br>2-core (inverted coding) preassembled, with M12 connectors, in different lengths: | |
| • 0.5 m | **6XV1 830-3DE50** |
| • 1.5 m | **6XV1 830-3DH15** |
| • 3.0 m | **6XV1 830-3DH30** |
| • 5.0 m | **6XV1 830-3DH50** |
| • 10.0 m | **6XV1 830-3DN10** |
| • 15.0 m | **6XV1 830-3DN15** |
| *Test body (cylindrical)* | |
| • Length: 500 mm; diameter: 70 mm (stationary applications) | **3RG7 838-7GB** |
| • Length: 1,000 mm; diameter: 200 mm (mobile applications) | **3RG7 838-7GD** |

## Dimension drawings

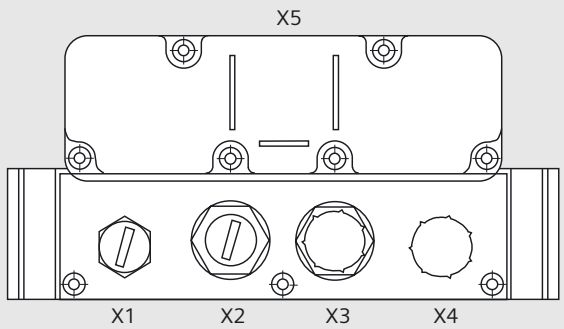
**PROFIBUS laser scanner 3SF7 834-6PB00**




**Assembly system 3RG7 838-1AA**



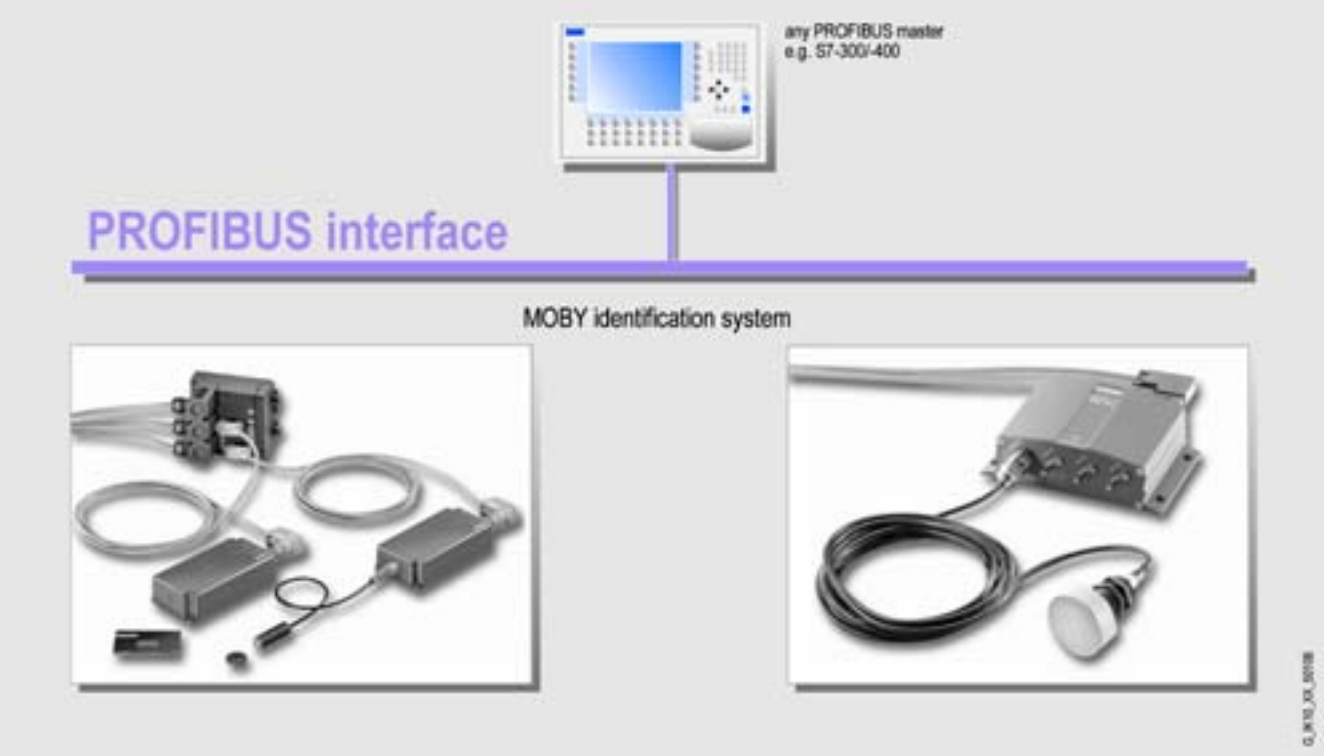

## Schematics




X1 Connection restart button
X2 PROFIBUS output wire link
X3 PROFIBUS input wire link
X4 Connection supply voltage
X5 Optical PC Interface

## ASM interface modules

### Overview




System configuration with MOBY

A range of powerful and **low-cost interface modules (ASMs)** are available that allow integration of the MOBY identification systems in SIMATIC, SINUMERIK and PROFIBUS DP. The appropriate software modules (FB, FC and libraries) ensure fast and easy integration in the application.

MOBY identification systems are in world-wide use for the optimization and control ofmaterial flow in production, manufacturing, distribution and logistics.

Up to 4 write/read devices (depending on the ASM) can be serially connected to one ASM.

### MOBY-ASM with PROFIBUS DP interface

| ASM | Write/read components | MOBY identification system | Available software |
|---|---|---|---|
| **ASM 450** | 2 × SLG (multiplex operation) | MOBY F, E, I, V | FB240 (for SIMATIC S5)<br>FC45 or FC44 (for S7) |
| ASM 452 (with file handler) | 1 × SLG 4x (MOBY U only one SLG) | MOBY U, I, E, F, D | FC45, F56 (MOBY U only) |
| ASM 454 max. | 2 × SLG 4x | MOBY I | FC45 (SIMATIC S7 only) |
| ASM 754 max. | 4 × SLA 71 | MOBY E | FC45 (SIMATIC S7 only) |
| ASM 850/ASM 854 | 4 × SLA 8x | MOBY F | FC45 (SIMATIC S7 only) |

### Ordering data

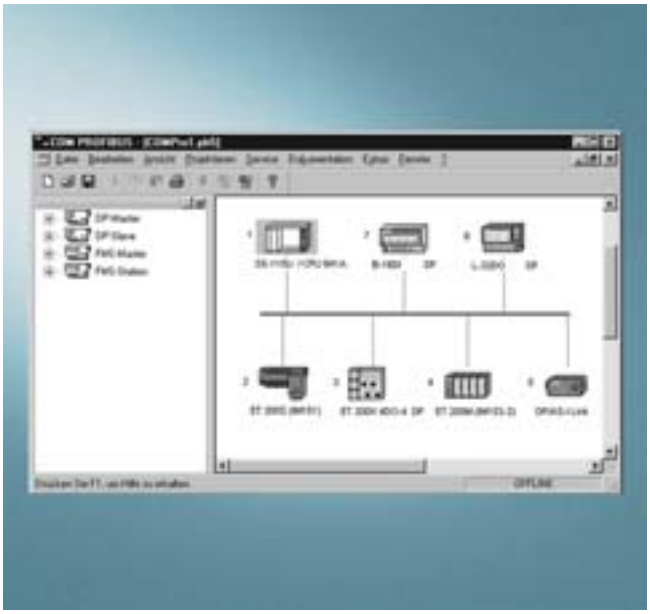
| | Order No. |
|---|---|
| **ASM 450 interface module** [1]<br>without connector | **6GT2 002-0EB00** |
| **ASM 452 interface module** [2]<br>without connector | **6GT2 002-0EB20** |
| **Plugs**<br>for ASM 450/452<br>3 pcs. necessary | **6ES7 194-1AA00-0XA0** |

| | Order No. |
|---|---|
| **ASM 454 interface module** [2] | **6GT2 002 - 2EE00** |
| **ASM 754 interface module** [2] | **6GT2 302 - 2EE00** |
| **ASM 854 interface module** [2] | **6GT2 402 - 2BB00** |

1) with PROFIBUS DP interface
2) with PROFIBUS DP-V1 interface

You will find further information on these components Catalog FS 10 or in the Internet:
http://www.siemens.de/moby

## Overview



COM PROFIBUS makes it easy to configure and commission PROFIBUS DP and PROFIBUS FM.

- Functions:
  - Simple configuration of DP masters and DP slaves
  - Simple configuration of FMS masters and FMS stations
  - Set data transmission rate for PROFIBUS
  - Direct data transmission from and to the master (export/import)
  - Commissioning supported by diagnostic functions
  - Display status of inputs and outputs, set defined outputs (control)
  - Documentation of configuration



## Application

Examples of configurable DP master with COM PROFIBUS:

- IM 308 C
- S5-95U with DP master interface
- SIMATIC NET modules CP 5412 (A2), CP 5411, CP 5511, CP 5611, CP 5611 onboard (in PG 7x0), CP 5613, CP 5613 FO, CP 5614, CP 5614 FO
- IM 180 etc.

The following PROFIBUS FMS stations can be parameterized:

- ET 200U DP/FMS
- SIMOCODE FMS
- CP 5412(A2) (also configurable as FMS master)
- CP 5431 FMS
- S7-300 with CP 343-5 as FMS station
- S7-400 with CP 443-5 as FMS station

The following PROFIBUS DP stations can be configured:

- ET 200
- All existing DP slaves from Siemens that have a GSD file

COM PROFIBUS runs under MS Windows 95/98/NT/2000/ME

The following PC cards are currently supported:

| PC interface module | Windows 95 | Windows 98 | Windows NT | Windows 2000 | Windows Me |
|---|---|---|---|---|---|
| CP 5411 | Yes | Yes | Yes | No | No |
| CP 5511 | Yes | Yes | Yes | Yes | Yes |
| CP 5512 [1] | No | No | No | Yes | No |
| CP 5611 | Yes | Yes | Yes | Yes | Yes |
| MPI ISA (external) | Yes | Yes | Yes | No | No |
| MPI ISA (internal) | Yes | Yes | Yes | No | No |
| CP 5412 (A2) [2] | Yes | Yes | Yes | No | No |
| CP 5613 [2] | No | No | Yes | Yes | No |
| CP 5613 FO [2] | No | No | Yes | Yes | No |
| CP 5614 [2] | No | No | Yes | Yes | No |
| CP 5614 FO [2] | No | No | Yes | Yes | No |

1) COM PROFIBUS Version 5.1.2.3 and higher

2) When using CP5412, CP5613/FO and CP5614/FO with COM PROFIBUS V5, the drivers for the CPs must also be installed. Only the following drivers are approved for this purpose: DP-5412 V5.2, CP5613/14 V2.1 and DPO-5713 V2.1 (SIMATIC NET CD 05/2000).

## COM PROFIBUS

### Function

COM PROFIBUS is installed on the PG/ PC. It allows simple and operator prompted creation of the address list and the parameters for the slave devices.

The following settings can be carried out:

- PROFIBUS address.
- Addressing range in which the I/O modules should be addressed.
- Initial addresses of the I/O modules
- Slave-specific parameterization, e.g. measuring range of an analog input channel.

The following can also be performed:

- Setting the transmission rate
- Setting the shutdown response
- Supporting the diagnostic repeater (starting to determine the topology)

With COM PROFIBUS, errors can be traced during commissioning or operation with an online connection between PG/ PC and PROFIBUS DP.

When using the diagnostic repeater in the DP network, the fault location and type can be displayed graphically in COM PROFIBUS.

#### *Operating mode*

**Connection to IM 308-C**

The specified configuration of PROFIBUS DP is stored on a memory card. The memory card is programmed directly through the programming device or PC (with EPROM/ EEPROM programming device).

The data is downloaded through the PC modules CP 5511, CP 5611 or the MPI interface.

**Connection to third-party master modules**

In the case of connection to master modules that are not parameterized with COM PROFIBUS or STEP 7, a fixed preassigned GSD file can be created with COM PROFIBUS version 3.1 or newer.

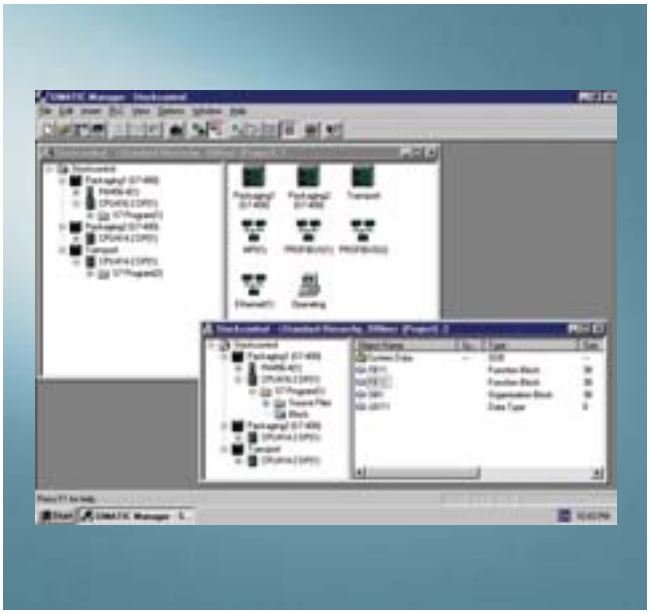
This file is then loaded into the configuration tool of the third-party manufacturer and can be used for simple parameter assignment of the station.

This allows use of COM PROFIBUS's user-friendly plaintext parameterization. There is no need for hexadecimal code inputs in the manufacturer's configuration tool.

### Ordering data

| Ordering data | Order No. |
|---|---|
| **SIMATIC S5 parameterization software COM PROFIBUS** V5.1<br>For parameterizing PROFIBUS networks for Windows 95/98/NT/2000/ME, on CD-ROM in 5 languages, incl. documentation | **6ES5 895-6SE03** |
| **SIMATIC S5 parameterization software COM PROFIBUS Upgrade** from V5.0 to V5.1<br>For Windows 95/98/NT/2000/ME on CD-ROM in 5 languages, incl. documentation | **6ES5 895-6SE03-0UG4** |

## Overview



- STEP 7 basic software:
  The standard tool for the SIMATIC S7, SIMATIC C7 and SIMATIC WinAC automation systems.
- Makes use of the full performance capabilities of the systems
- User-friendly functions for all phases of an automation project:
  - Configuring and parameterizing the hardware
  - Definition of communication
  - Programming
  - Testing, commissioning and service
  - Documentation, archiving
  - Operating, diagnostics functions

## Application

STEP 7 is installed as standard on the Field PG and Power PG. It is also available as a software package for PC installation. For execution on the PC, a PC module or a PC adapter will be required. STEP 7 permits several users to work on a project simultaneously. In this case, write access is denied to more than one user.

## Integration

***Components for connection of the PC to MPI and PROFIBUS***

The PC modules described below support, in combination with STEP 7, the connection of programming devices and AT-compatible PCs or notebooks to PROFIBUS and the MPI of SIMATIC S7.

**CP 5511**

- For PGs/PCs/notebooks with PCMCIA slot
- PCMCIA card type II (16-bit)
- Incl. adapter with 9-pin Sub-D socket for connection to PROFIBUS

**CP 5512**

- For PGs/PCs/notebooks with PCMCIA slot
- PCMCIA card type II (Cardbus 32-bit)
- Incl. adapter with 9-pin Sub-D socket for connection to PROFIBUS

**CP 5611 or CP 5611-MPI**

- For PGs/PCs with a PCI slot
- Short PCI card (32-bit)
- CP 5611 MPI including MPI cable

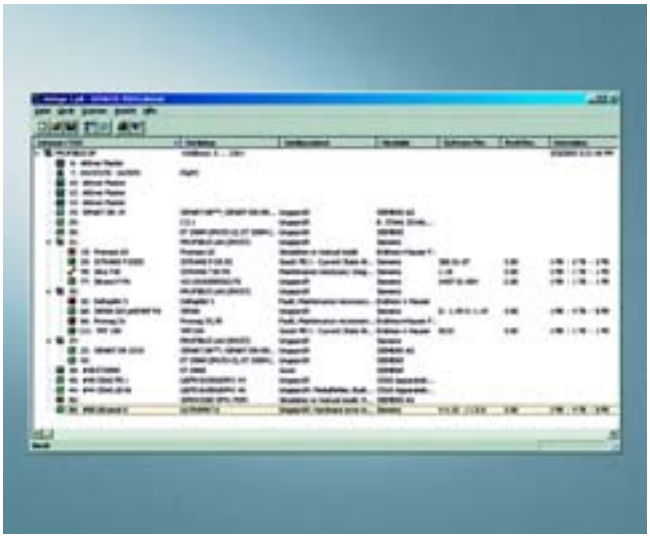
## STEP 7

| Ordering data | Order No. |
|---|---|
| **STEP 7 Version 5.3** | |
| *Target system:*<br>SIMATIC S7-300/-400,<br>SIMATIC C7, SIMATIC WinAC<br>*Prerequisite:*<br>Windows 2000 Prof./XP Prof.<br>*Delivery package:*<br>German, English, French,<br>Spanish, Italian;<br>incl. 3.5" automation disk,<br>without documentation | |
| • Floating license on CD | **6ES7 810-4CC07-0YA5** |
| • Software Update Service on CD | **6ES7 810-4BC01-0YX2** |
| • Upgrade floating license V2.x/3.x/4.x/5.x on V5.3; on CD | **6ES7 810-4CC07-0YE5** |
| • Powerpack STEP 7 Lite according to STEP 7 V5.3; Floating license on CD | **6ES7 810-4CC07-0YC5** |
| • Trial license STEP 7 V5.3; on CD, can be used for 14 days | **6ES7 810-4CC07-0YA7** |
| **STEP 7 Basic Knowledge documentation package**<br>consisting of Getting Started, Hardware Configuration Manual, Programming Manual, Migration Manual | |
| • German | **6ES7 810-4CA07-8AW0** |
| • English | **6ES7 810-4CA07-8BW0** |
| • French | **6ES7 810-4CA07-8CW0** |
| • Spanish | **6ES7 810-4CA07-8DW0** |
| • Italian | **6ES7 810-4CA07-8EW0** |
| **STEP 7 reference manuals**<br>consisting of IL, LAD and CSF manuals as well as reference manual for standard and system functions for SIMATIC S7-300/400 | |
| • German | **6ES7 810-4CA07-8AW1** |
| • English | **6ES7 810-4CA07-8BW1** |
| • French | **6ES7 810-4CA07-8CW1** |
| • Spanish | **6ES7 810-4CA07-8DW1** |
| • Italian | **6ES7 810-4CA07-8EW1** |
| **SIMATIC Manual Collection**<br>Electronic manuals on CD-ROM, 5 languages: S7-200/300/400, C7, LOGO!, SIMATIC DP, PC, PG, STEP 7, Engineering Software, Runtime Software, PCS 7, SIMATIC HMI, SIMATIC NET | **6ES7 998-8XC01-8YE0** |
| **SIMATIC Manual Collection update service for 1 year**<br>Up-to-date Manual Collection CD as well as the three subsequent updates | **6ES7 998-8XC01-8YE2** |
| **EPROM programming device USB Prommer**<br>for programming SIMATIC memory cards and EPROM modules | **6ES7 792-0AA00-0XA0** |
| **MPI cable**<br>for connecting SIMATIC S7 and CP via MPI (5 m) | **6ES7 901-0BF00-0AA0** |

| | Order No. |
|---|---|
| ***Components for connection of the PC to MPI and PROFIBUS*** | |
| For a PC with a free PCI slot | |
| **CP 5611** | **6GK1 561-1AA00** |
| **CP 5611 MPI**<br>incl. MPI cable (5 m) | **6GK1 561-1AM00** |
| For a PC with a free PCMCIA slot: | |
| **CP 5511** | **6GK1 551-1AA00** |
| **CP 5512** | **6GK1 551-2AA00** |
| **For Windows XP Professional** | |
| For a PC without a free PCI slot | |
| **PC adapter USB**<br>for connecting a PC to a S7 300/400/C7 via the USB interface; with an USB cable (5 m) | **6ES7 972-0CB20-0XA0** |
| **PC adapter**<br>RS 232, 9-pin, male;<br>with RS 232/MPI converter max. 38.4 kbit/s | **6ES7 972-0CA23-0XA0** |
| **RS 232 cable (zero modem cable)**<br>9-pin female/9-pin female | **6ES7 901-1BF00-0XA0** |
| ***Components for connecting the PC to Industrial Ethernet*** | |
| For a PC with a free PCI slot | |
| **CP 1612** | **6GK1 161-2AA00** |
| For a PC with a free PCMCIA slot: | |
| **CP 1512** | **6GK1 151-2AA00** |
| **SOFTNET PG V6.2** | **6GK1 704-1PW62-3AA0** |

Note:
For additional information about STEP 7 see Catalog ST 70.

## Function



PDM Lifelist with status and diagnostics display

SIMATIC PDM can be operated as a stand-alone version on a PC/PG with Microsoft Windows 95, 98, ME, NT, 2000 or XP Professional operating system

The SIMATIC PDM basic software for the operation and parameterization of process devices supports communication through PROFIBUS DP/PA, HART modem and RS 232, and is designed for 4 TAGs. The number of TAGs can be increased through PDM TAG options.

The functionality of the SIMATIC PDM basic software can be expanded with the following options:

- Integration in STEP 7/PCS 7 (is only necessary if it is intended to use the integration of SIMATIC PDM in HWconfig )
- Routing through S7-400
- Communication through standard HART multiplexer

The functionality of SIMATIC PDM can be tested with a demo version, which can be used without restriction for 60 days.

### *Requirements for stand-alone operation*

For SIMATIC PDM to run on a stand-alone computer (PC/PG) the following minimum requirements have to be fulfilled:

| Operating system | Processor | RAM | Hard disk memory |
|---|---|---|---|
| Windows 95c + Internet Explorer and Windows 98 SE | Pentium 133 | 128 MB | 250 MB |
| Windows ME | Pentium 150 | 256 MB | 250 MB |
| Windows NT 4.0 Workstation with Service Pack 6a and Windows 2000 Professional with Service Pack 1 | Pentium 233 | 256 MB | 250 MB |
| Windows XP Professional (Service Pack 1 recommended) | Pentium 333 | 256 MB | 250 MB |

Software requirements

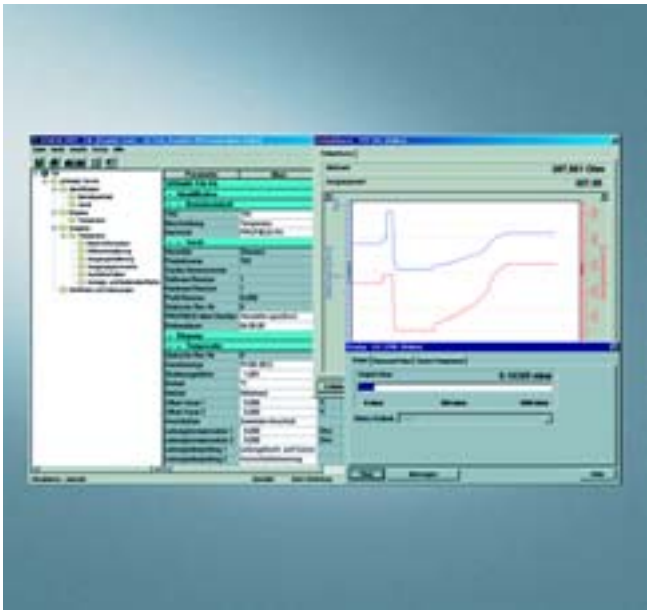
- SIMATIC PDM without STEP 7:
  SIMATIC Manager V5.2 (available on SIMATIC PDM CD)
- SIMATIC PDM integrated in STEP 7:
  STEP 7 V5.0 and higher with ServicePack 4 or higher; order separately

## Ordering data

| Ordering data | Order No. |
|---|---|
| **SIMATIC PDM Basic Software V5.2**<br>Basic software for the operation and parameterization of process devices and components, in 5 languages (German, English, French, Italian and Spanish), incl.<br>• communication through HART modem,<br>• communication through RS 232,<br>• communication through PROFIBUS DP/PA<br>• 4 TAGs<br>• SIMATIC PDM documentation | **6ES7 658-3AX05-0YC0** |
| ***Supplementary Software*** | |
| Extensions to SIMATIC PDM basic software | |
| **Integration in STEP 7 / SIMATIC PCS 7**<br>is only required if it is intended to use the integration of SIMATIC PDM in HW Config in 5 languages (German, English, French, Italian and Spanish) | **6ES7 658-3BX00-2XD0** |
| **Routing through S7-400**<br>in 5 languages (German, English, French, Italian and Spanish) | **6ES7 658-3CX00-2XD0** |
| **Communication through standard HART multiplexer**<br>in 1 language (English) | **6ES7 658-3EX00-2XD0** |
| **SIMATIC PDM TAG Options** | |
| • Up to 128 TAGs | **6ES7 658-3XA00-2XD0** |
| • Up to 512 TAGs | **6ES7 658-3XB00-2XD0** |
| • Up to 1,024 TAGs | **6ES7 658-3XC00-2XD0** |
| • Up to 2,048 TAGs | **6ES7 658-3XD00-2XD0** |
| • TAGs unlimited | **6ES7 658-3XH05-2XD0** |
| • PowerPacks | |
| - From 128 TAGs to 512 TAGs | **6ES7 658-3XB05-2XD5** |
| - From 512 TAGs to 1024 TAGs | **6ES7 658-3XC05-2XD5** |
| - From 1024 TAGs to 2048 TAGs | **6ES7 658-3XD05-2XD5** |
| - From 2048 TAGs to TAGs unlimited | **6ES7 658-3XH05-2XD5** |
| ***Demo Software*** | |
| **SIMATIC PDM Demo Version V5.2**<br>in 5 languages (German, English, French, Italian and Spanish), can be used for 60 days without restriction | **6ES7 658-3GX05-0YC8** |
| ***Update*** | |
| **SIMATIC PDM Update from V5.1 to V5.2**<br>in 5 languages (German, English, French, Italian and Spanish), works on all combinations of supplementary software and options | **6ES7 658-3AX05-0YC3** |

## SIMATIC PDM package for PCS 7

### Application



Parameter view of SIMATIC PDM with curve and online display

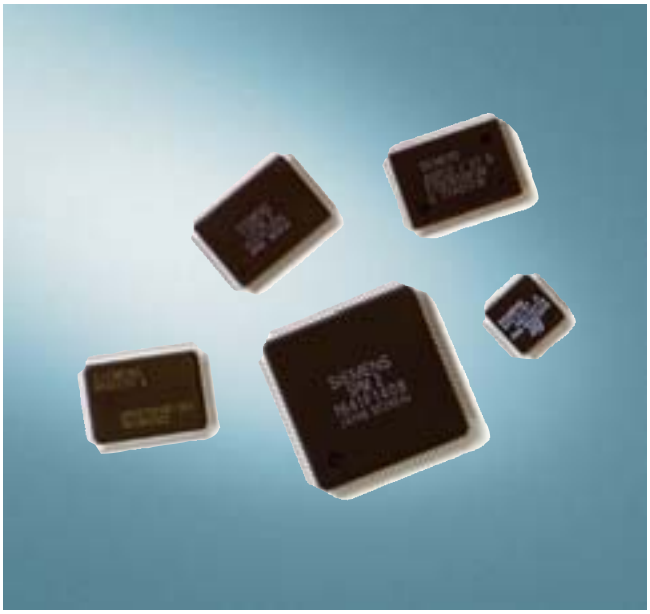
The SIMATIC PDM package for PCS 7 is integrated in the engineering system of SIMATIC PCS 7 as a tool for the configuration, parameterization, commissioning, diagnostics and servicing of intelligent process devices.

This is a SIMATIC PDM bundle for porjects with up to 128 TAGS which is optimized for integration in the central engineering system of SIMATIC PCS 7. In addition to the "SIMATIC PDM Basic Software" it already contains teh options "Integration in STEP 7/PCS 7" an "Routing through S7-400" (for details of these software components see section "SIMATIC PDM Stand-alone Version").

### Ordering data

| Ordering data | Order No. |
|---|---|
| **SIMATIC PDM Starter Package V5.2 for SIMATIC PCS 7**<br>Preferred version for SIMATIC PCS 7, in 5 languages (German, English, French, Italian and Spanish), with<br>• Basic software for SIMATIC PDM (incl. communication through PROFIBUS DP/PA, HART modem and RS 232)<br>• Integration in STEP 7 / PCS 7<br>• Routing through S7-400<br>• 128 TAGs<br>• SIMATIC PDM documentation | **6ES7 658-3PX05-0YC0** |
| **SIMATIC PDM TAG options**<br>Power Pack | |
| • From 128 TAGs to 512 TAGs | **6ES7 658-3XB05-2XD5** |
| • From 512 TAGs to 1024 TAGs | **6ES7 658-3XC05-2XD5** |
| • From 1024 TAGs to 2048 TAGs | **6ES7 658-3XD05-2XD5** |
| • From 2048 TAGs to TAGs unlimited | **6ES7 658-3XH05-2XD5** |
| ***Supplementary Software*** | |
| **Communication through standard HART multiplexer**<br>in 1 language (English) | **6ES7 658-3EX00-2XD0** |
| ***Demo Software*** | |
| **SIMATIC PDM Demo V5.2**<br>In 5 languages (German, English, French, Italian and Spanish) | **6ES7 658-3GX05-0YC8** |
| ***Update*** | |
| **SIMATIC PDM Update from V5.1 to V5.2**<br>in 5 languages (German, English, French, Italian and Spanish), works on basic software, all combinations of the supplementary software and the PDM starter package | **6ES7 658-3AX05-0YC3** |

## Overview



- Simple connection of field devices to PROFIBUS FMS/ DP/ PA
- Low Power Management is integrated for SPC 4-2, DPC 31® and SIM 1
- Various ASICs are available for different functional requirements and applications.

## Application

The PROFIBUS DP ASICs allow third-party manufacturers easy connection of their devices to PROFIBUS.

They can be used for a data transmission rate of up to 12 Mbit/s.

Various ASICs are available for different functional requirements and applications:

- Master applications:
  ASPC 2 for PROFIBUS DP and FMS with hardware-controlled bus access.
- Intelligent slaves:
  SPC 3 for PROFIBUS DP with hardware-controlled bus access;
  DPC 31 for PROFIBUS DP and PROFIBUS PA with integral 8031 core;
  SPC 4-2 for PROFIBUS DP,
  PROFIBUS FMS and PROFIBUS PA (intrinsically safe range) with hardware-controlled bus access.
- Connection in intrinsically safe systems:
  SIM 1 for physical connection in intrinsically safe field bus systems as Medium Attachment Unit for IEC 61158-2 at 31.25 kbit/s. In particular, also together with the SPC 4-2 and DPC 31.
- Simple slaves:
  SPM 2 with 64 I/O bit;
  LSPM 2 with 32 I/O bit for low space requirement
- Connection to fiber optic cable:
  FOCSI
  module for electrical preprocessing of incoming/outgoing signals. The block ensures a clean electrical recovery (retime / retrigger) of the optically transmitted signals

For original developments, an order quantity of 5 ASICs is allowed (not suitable for series assembly because the packaging can cause damage to the ASIC pins; please use packaging units of more than five!)

The number of ASICs per packing unit depends on the ASIC type (refer to ordering data).

## PROFIBUS DP ASICs

### Design

#### *ASPC 2*

The ASPC 2 is a preprocessing communications chip for master applications with a maximum transmission rate of 12 Mbit/s. The ASIC is not certified. The pinout and electrical properties of the ASPC 2 are described in the product description. For operation, a separate microprocessor and the appropriate firmware are necessary. The firmware is adapted to the processor 80C165 and can be purchased by license.

#### *SPC 3*

The SPC 3 is a preprocessing communications chip with processor interface. The SPC 3 handles the frame and address recognition, processing of data backup sequences and protocol processing for PROFIBUS DP.

An additional firmware is available for the SPC 3 (see ordering data).

#### *DPC 31*

The DPC 31 is a preprocessing communications chip with a processor interface and integrated processor core (C31 core).

It enables the connection of intelligent field devices as slaves to PROFIBUS DP and PROFIBUS PA.

The DPC 31 processes all communications tasks totally independently and also has an integrated C31 core for further applications. It combines the communication characteristics of the SPC3 and SPC4-2 ASICs in a single chip. Moreover, the integrated C31 core can be user-programmed. Firmware is also available for the Siemens ASIC DPC 31 (see ordering data).

#### *SPC 4-2*

The SPC 4-2 is a preprocessing communications chip with processor interface. It has been designed for combined applications. Owing to its low-power management, it is particularly suited for use in intrinsically safe systems. A firmware package[1)] is available for the SPC 4-2 from TMG itec. Signals are adapted to PROFIBUS PA by the SIM 1 chip.

1) Order from:
TMG itec
76137 Karlsruhe
Tel. +49 (0) 7 21-82 80 60
or
Softing AG
Richard-Reitzner-Allee 6
D-85540 Haar
Tel. +49 (0) 8 94-56 56-3 40

#### *SIM 1*

SIM 1 complements the SPC 4-2 or DPC 31.

Only a few external components are needed in addition to these ASICs to connect field devices to a failsafe network to the PROFIBUS PA standard.

Implementation with the SPC 4-2 or DPC 31 allows execution of PROFIBUS PA slave functions, from physical connection to communications control.

The SIM 1 supports all send and receive functions as well as the high-impedance isolation of the auxiliary power from the bus cable. It provides three stabilized supply voltages and permits the implementation of an isolated power supply.

It can be connected to all Manchester encoder/decoders according to IEC 61 158-2.

#### *SPM 2*

The SPM 2 is a single-chip solution with 64 input/output bits. The SPM 2 handles all data traffic independently.

There is no need for an additional microprocessor or firmware.

#### *LSPM 2*

LSPM 2 is functionally identical to SPM 2. But it only has 32 input/output bits. Because of its smaller chip housing, it is particularly suitable for applications with small space requirements.

#### *FOCSI*

This ASIC acts as a supplement to the existing PROFIBUS ASICs. The FOCSI block (fiber-optic controller from Siemens) ensures clean, electric preparation and forwarding of received/sent optical signals. In order to inject the signal into a fiber-optic cable the relevant optical transmitter and receiver are required as well as FOCSI. FOCSI can be implemented with the aforementioned PROFIBUS DP ASICs.

**Additional ordering data on request**

## Technical specifications

| | LSPM 2 | SPM 2 | SPC 3 | DPC 31 |
|---|---|---|---|---|
| Protocol | PROFIBUS DP | PROFIBUS DP | PROFIBUS DP | PROFIBUS DP, PROFIBUS PA |
| Application | Simple slave application | Simple slave application | Intelligent slave application | Intelligent slave application |
| Transmission rate, max. | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s |
| Bus access | In ASIC | In ASIC | In ASIC | In ASIC |
| Transmission rate autosensing | Yes | Yes | Yes | Yes |
| Microprocessor necessary | No | No | Yes | integrated |
| Firmware size | Not necessary | Not necessary | 4 to 24 KB | 4 to 24 KB |
| Message frame memory | - | - | 1.5 KB | 6 KB |
| Power supply | 5 V DC | 5 V DC | 5 V DC | 3.3 V DC |
| Power loss, max. | 0.35 W | 0.5 W | 0.5 W | 0.2 W |
| Permissible ambient temperature | - 40 to +75 °C | - 40 to +55 °C (worst case at full load) | - 40 to +85°C | - 40 to +85 5 °C |
| Package | MQFP, 80-pin | PQFP, 120-pin | PQFP, 44-pin | PQFP, 100-pin |
| Housing size | 4 $cm^2$ | 10 $cm^2$ | 2 $cm^2$ | 4 $cm^2$ |
| Delivery amount in units | 5/66/330/4950 | 5/24/100 | 5/96/480/4800 | 5/60/300 |

| | SPC 4-2 | ASPC 2 | SIM 1 | FOCSI |
|---|---|---|---|---|
| Protocol | PROFIBUS DP<br>PROFIBUS FMS<br>PROFIBUS PA | PROFIBUS DP<br>PROFIBUS FMS<br>PROFIBUS PA | PROFIBUS PA | - |
| Application range | Intelligent slave application | Master application | Medium attachment | Medium Management Unit |
| Data transfer rate, max. | 12 Mbit/s | 12 Mbit/s | 31.25 kbit/s | 12 Mbit/s |
| Bus access | In ASIC | In ASIC | - | - |
| Automatic determination of transmission rate | Yes | Yes | - | - |
| Microprocessor necessary | Yes | Yes | - | - |
| Firmware size | 3 to 30 KB | 80 KB | Not necessary | Not necessary |
| Message memory | 3 KB | 1 Mbyte (externally) | - | - |
| Power supply | 5 V DC, 3.3 V | 5 V DC | Through bus | 3.3 V DC |
| Power loss, max. | 0.6 W at 5V<br>0.01 W at 3.3 V | 0.9 W | 0.1 W | 0.75 W |
| Permissible ambient temperature | - 40 to +85°C | - 40 to +85°C | - 40 to +85°C | - 40 to +85°C |
| Package | TQFP, 44-pin | P-MQFP, 100-pin | TQFP, 44-pin | TQFP, 44-pin |
| Housing size | 2 $cm^2$ | 4 $cm^2$ | 2 $cm^2$ | 2 $cm^2$ |
| Supply quantities (units) | 5/60/300 | 5/66/660/4620 | 5/160/960/1000 | 10/160 |

## PROFIBUS DP ASICs

| Ordering data | Order No. |
|---|---|
| **ASIC ASPC 2** | |
| For configuring master interfaces (quantity discounts) | |
| • 5 units | **6ES7 195-0AA04-0XA0** |
| • 66 units | **6ES7 195-0AA14-0XA0** |
| • 660 units | **6ES7 195-0AA24-0XA0** |
| • 4620 units | **6ES7 195-0AA34-0XA0** |
| **ASIC LSPM 2** | |
| For configuring simple slave interfaces (quantity discounts) | |
| • 5 units | **6ES7 195-0BA01-0XA0** |
| • 66 units | **6ES7 195-0BA11-0XA0** |
| • 330 units | **6ES7 195-0BA21-0XA0** |
| • 4950 units | **6ES7 195-0BA31-0XA0** |
| **ASIC SPM 2** | |
| For configuring simple slave interfaces (quantity discounts) | |
| • 5 units | **6ES7 195-0BB00-0XA0** |
| • 24 units | **6ES7 195-0BB10-0XA0** |
| • 100 units | **6ES7 195-0BB20-0XA0** |
| • 500 units | **6ES7 195-0BB30-0XA0** |
| **ASIC SPC 3** | |
| For configuring intelligent slave interfaces (quantity discounts) | |
| • 5 units | **6ES7 195-0BD02-0XA0** |
| • 96 units | **6ES7 195-0BD12-0XA0** |
| • 480 units | **6ES7 195-0BD23-0XA0** |
| • 4800 units | **6ES7 195-0BD33-0XA0** |
| **ASIC FOCSI** | |
| Fiber Optic Controller from Siemens for conditioning signals in the optical PROFIBUS | |
| • 10 units | **6ES7 195-0EA00-0XA0** |
| • 160 units | **6ES7 195-0EA10-0XA0** |

| | Order No. |
|---|---|
| **ASIC DPC 31 STEP B** | |
| For configuring intelligent slave interfaces (quantity discounts) | |
| • 5 units | **6ES7 195-0BE01-0XA0** |
| • 60 units | **6ES7 195-0BE11-0XA0** |
| • 300 units | **6ES7 195-0BE21-0XA0** |
| • 5100 units | **6ES7 195-0BE31-0XA0** |
| **ASIC SPC 4-2** | |
| For configuring intelligent slave interfaces (quantity discounts) | |
| • 5 units for laboratory development | **6GK1 588-2AA00** |
| • 60 units (1 tray) | **6GK1 588-2AA10** |
| • 300 units (1 tray box) | **6GK1 588-2AA20** |
| **ASIC SIM 1** | |
| For connecting in accordance with IEC H1 with a data transfer rate of 31.25 kbit/s | |
| • 5 units for laboratory development | **6GK1 588-2BA00** |
| • 160 units (1 tray) | **6GK1 588-2BA16** |
| • 960 units (6 trays) | **6GK1 588-2BA20** |
| • 1000 units (taped and rolled) | **6GK1 588-2BA21** |
| ***Accessories*** | |
| **Firmware for Siemens ASIC SPC 3** | |
| • DP firmware | **6ES7 195-2BA00-0XA0** |
| • DPV1 firmware | **6ES7 195-2BA01-0XA0** |
| • Upgrade DPV1 firmware | **6ES7 195-2BA02-0XA0** |
| **Firmware for Siemens ASIC DPC 31** | |
| • DPV1 firmware | **6ES7 195-2BB00-0XA0** |

## Application

The PROFIBUS DP interface modules make it easy to connect devices to PROFIBUS DP. They are based on the described ASICs from the Siemens AG. The interface modules can be used for a data transmission rate of up to 12 Mbit/s.

Various interface modules are available for different functional requirements and applications.

**Interface modules for master:**

- IM 180 to connect a field device to PROFIBUS DP in the form of a master
- IM 181 PC carrier board to adapt the IM 180 to the ISA bus of a PC

**Interface modules for slaves:**

- IM 182-1PC slave board to connect AT-compatible PCs as DP slaves
- IM 183-1 to connect a field device to the PROFIBUS DP as a slave
- IM 184 to connect a simple third-party device to the PROFIBUS DP as a slave

## Design

### *IM 180 interface module*

The IM 180 interface module consists primarily of an 80C165 microprocessor, an ASPC 2 ASIC, an OTP-EEPROM and RAM.

A dual port RAM interfaces the module to the host system.

### *IM 181-1 PC carrier board*

The IM 181 -1 PC carrier board is used to accommodate the IM 180 if this is to be operated in a PC system with ISA bus.

Drivers for Windows NT and demo software are available as accessories to demonstrate incorporation of the IM 180/IM 181 -1 into the DOS environment.

### *IM 182-1 PC slave board*

The single PC slave card (ISA bus) IM 182-1 is based on the ASIC SPC 3. It contains all physical bus components. A 9-pin Sub-D plug is used for connection to PROFIBUS DP. The firmware of the SPC 3 can be used in the PC as an accessory. The 1.5 KB RAM of the SPC 3 forms the interface to the host system. A driver for Windows NT is also available.

### *IM 183-1 interface module*

The IM 183-1 interface module consists primarily of the SPC 3 ASIC, the 80C32 microprocessor, an OTP EEPROM as well as an RS 485 interface for connection to the PROFIBUS DP.

An additional RS 232 interface is located on the module.

### *IM 184 interface module*

The IM 184 interface module consists primarily of the LSPM 2 ASIC, OTP EEPROM memory as well as an RS 485 interface for connection to the PROFIBUS DP.

The IM 184 can provide 32 input/output bit.

For further details, see the product brief "PROFIBUS Technology Components", Order No.: 6ZB5310-0CT01-0BA7.

Manuals for PROFIBUS DP interface modules are available for free in the Internet.

Additional information can be found in the Internet under:


http://www.ad.siemens.de/csi/dp

(German)

- Distributed I/Os
- Others
- Technology components, manuals

Additional information can be found in the Internet under:


http://www.ad.siemens.com/csi_e/dp

(English)

- Distributed I/O
- Others
- Development components, manuals

## Interface modules

### Technical specifications

***PROFIBUS DP interface modules***

| Interface modules | IM 180 | IM 181 | IM 182-1 | IM 183-1 | IM 184 |
|---|---|---|---|---|---|
| Area of application | Master applications | Carrier board for IM 180 interface module | Slave applications | Slave applications | Simple slave applications |
| Data transmission rate, max. | 12 Mbit/s | - | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s |
| Protocols | PROFIBUS DP | - | PROFIBUS DP | PROFIBUS DP | PROFIBUS DP |
| ASIC | ASPC 2 | - | SPC 3 | SPC 3 | LSPM 2 |
| Microprocessor | 80C165 (40 MHz) | - | Processor of the PC/PG | 80C32 (20 MHz) | Not necessary |
| Firmware size | 80 KB | - | 4 to 24 KB (incl. test program) | 4 to 24 KB (incl. test program) | Not necessary |
| RAM configuration | 2 x 128 Kbyte | - | - | 32 KB SRAM; 64 KB EPROM | - |
| Host interface | Dual port RAM | - | - | - | - |
| Permissible environmental temperature | 0 to +70 °C | - | 0 to + 60°C | 0 to +70 °C | 0 to +70 °C |
| Power supply | 5 V DC | - | 5 V DC | 5 V DC | 5 V DC |
| Power consumption, typ. | 250 mA | - | 250 mA | 250 mA | 150 mA |
| Board size in mm | 100 x 100 mm | 168 x 105 mm | 168 x 105 mm | 86 x 76 mm | 85 x 64 mm |

### Ordering data

| Ordering data | Order No. |
|---|---|
| **SIMATIC S5/S7 IM 180 master module**<br>For PROFIBUS DP, max. 12 Mbit/s | **6ES7 180-0AA00-0XA0** |
| **IM 181 PC carrier module for IM 180**<br>max. 12 Mbit/s | **6ES7 181-0AA01-0XA0** |
| **SIMATIC S5/S7 IM 182-1 PC slave board**<br>For PROFIBUS DP, max. 12 Mbit/s | **6ES7 182-0AA01-0XA0** |
| **SIMATIC S5/S7 IM 183-1 slave module**<br>For PROFIBUS DP, max. 12 Mbit/s | **6ES7 183-0AA01-0XA0** |
| **SIMATIC S5/S7 IM 184 slave module**<br>For PROFIBUS DP, max. 12 Mbit/s | **6ES7 184-0AA00-0XA0** |
| ***Accessories*** | |
| **Demonstration software**<br>Demonstration of the supply to the DPR interface of the IM 180/IM 181 under MS-DOS | **6ES7 195-2AA00-0XA0** |
| **Windows NT driver for IM 180 and IM 182** | **6ES7 195-2AC00-0XA0** |

## Overview

### *Development packages*

Development packages permit development and testing of PROFIBUS hardware and software applications using various PROFIBUS-ASICs or the included interface modules (IMs).

The wide range of well matched hardware and software components reduces the development overhead for a PROFIBUS device considerably.

The packages offer a functional developing environment which the developers can use as a basis for their special hardware and software requirements.

The documentation of the packages is enclosed on CD in German and English.

The packages make Siemens PROFIBUS know-how available to users of non-Siemens systems. Our development team also supports new users in developing their own systems – this consulting service forms part of the development packages.

On completion of a development, the devices may be certified by our specialist PROFIBUS interface center on request– we can also support new users in this respect.

### *Development package 4*

For PROFIBUS-ASIC SPC 3, IM 183-1, IM 184 and IM 180/181

Development package 4 enables the development and testing of master and slave applications for connection to PROFIBUS DP.

**Hardware included**

- IM 180 master interface module and IM 181 carrier board
- IM 181-1 slave interface module (intelligent slave with ASIC SPC 3)
- IM 184 slave disconnect
- Bus connector and cable

**Software included**

- COM PROFIBUS (for configuring the bus system or the IM 180 interface module)
- Firmware for IM 183-1 (original firmware for ASIC SPC 3, including development license)
- Simulation software for development package 4 (for testing and operating the components of the development package)

**Development of slaves**

The package contains all components required for developing a PROFIBUS slave with the ASIC SPC 3.

Accordingly, the IM 183-1 (as piggy-back for separate electronics) can be used directly for the development of PROFIBUS slaves.

**Master system with IM 180**

The IM180 and the included simulation software are used to configure a functional PROFIBUS master. This example and the use of the IM 180 (as piggy-back for separate electronics) enables fast implementation of a master application.

**Own master systems**

If the IM 180 is not to be implemented as basic hardware (as a so-called piggy-back module), the ASPC 2 master firmware set can be obtained with a corresponding license. It is available as object code or source code. The firmware has been created for the 80C165 processor.

The license and software are not part of the development package. Consult our experts at the interface centers if necessary.

## Development Kits

### Overview (continued)

***PROFIBUS DP/PA development package***

The package permits the configuration of PROFIBUS slaves in accordance with various PROFIBUS standards:

- PROFIBUS DP V1 (RS 485)
- PROFIBUS PA (IEC 1158) and
- PROFIBUS based on fiber-optic conductors

The development environment shows the implementation of applications using the PROFIBUS-ASICs DPC 31.

The use of the ASICs SIM1 as a Medium Attachment Unit for adapting to PROFIBUS PA Physics in accordance with IEC 1158-2 is also explained.

**Hardware included:**

- DPC 31 development board; for developing/testing proprietary applications
- CP 5613; serves as a master interface for the PC (PCI card)
- Optical bus terminal; for conversion between copper cables and fiber-optic conductors
- Prefabricated PROFIBUS cables

**Software included:**

- Test and simulation software under WinNT for using on the PC in connection with the master module CP 5613
- Demo program for the DPC 31 board
- DPC 31 DPV1 original firmware, including developer license
- Parameterization software for CP 5613 "COM PROFIBUS“ for DP operation
- PDM demo software (PDM = Process Device Manager) for PA operation

If you want to develop PROFIBUS PA applications, a PROFIBUS DP/PA coupler (6ES7 157-0AC80-0XA0) is required, which must be ordered separately.

The DP/PA coupler implements the transition between PROFIBUS DP and PROFIBUS PA.

This module is not part of the development package.

### Ordering data

| | Order No. |
|---|---|
| **Development package 4**<br>For PROFIBUS ASIC SPC 3, IM 183-1 and IM 180/181, English/German | **6ES7 195-3BA00-0YA0** |
| **DP/PA development package**<br>For PROFIBUS ASIC DPC 31 and SIM1, English/German | **6ES7 195-3BA10-0YA0** |
| **PROFIsafe starter kit V3.2**<br>SIMATIC DP/PA development package (6ES7195-3BA10-0YA0) is required | **6ES7 195-3BF00-0YA0** |

# PROFIBUS SCOPE diagnostics software

## Overview

- Use with CP 5511 (PCMCIA), CP 5512 (PC-Card CardBus 32 bit) or CP 5611 (PCI) or PGs with integral PROFIBUS DP interface (CP 5611-compatible)
- Supports the analysis of the PROFIBUS protocols DP-V0, DP-V1, DP-V2, FMS, FDL/MPI, PA
- Reaction-free integration in existing networks during operation
- Quick checking of network for immediate analysis
- Creation of test logs e.g. for plant acceptance testing with documentation of the network status
- Passing on of information by e-mail
- Comprehensive filter and trigger functions as well as live list
- Graphic network diagnostics
- Direct recording of all PROFIBUS DP I/O data or signals and display using y-t chart
- Diagnostics and long-term measurements for maintenance and servicing
- Tool for basic and further training

## Application

PROFIBUS SCOPE makes commissioning, diagnostics, troubleshooting and permanent monitoring of PROFIBUS systems simple and convenient. The easy-to-use diagnostics software provides information on the status of the bus stations.

Various operating loads are available for the different requirements such as analysis, diagnostics, signal evaluation or permanent recording of message frames. It is then possible to specifically check the network.

Typical faults such as double station address, short-circuits, wrongly connected wires or incorrect bus terminators can be rapidly recognized because of their characteristic fault patterns.

Preventative maintenance measures can be taken through regular or even continuous network monitoring. This reduces downtimes an increases plant avialability:

- Intelligent bus diagnosis
- Fault minimization during commissioning
- Shortened servicing and plant downtimes
- Qualification, validation
- Plant acceptance testing of PROFIBUS networks

## Design

Hardware requirements:

- Processor: Pentium 133 MHz (or better)
- RAM: 32 MB (64 MB or more recommended)
- CD-ROM or diskette drive for the installation

Communications processor:

- CP 5512 (PC-Card slot type II, CardBus 32 bit)
- CP 5611 (PCI)
- PG with integral CP 5611

Software requirements:

- Windows 98/NT/2000/XP

## Functions

### *Diagnostics mode:*

The PROFIBUS network is displayed graphically. The network structure can be recognized at a glance. The integral quick checking of the network permits immediate analysis which can be documented as a test report. Verification of network status for acceptance is provided.

Passing on of information by e-mail can take place following defined events.

### *Signal mode:*

Recording of I/O data for PROFIBUS DP. The display is made in a y-t chart, permitting individual measuring points and signals to be evaluated like with a recorder.

### *Message frame mode:*

Classical bus monitor with comprehensive trigger and retrigger functions (down to one bit), recording and view filters, and search functions. These permit complex fault detection and troubleshooting. Interpretation of the protocol can be carried out for the respective PROFIBUS version FDL, DP-V0, DP-V1 or DP-V2.

### *Continuous measurement mode:*

Permanent measurement/recording of the PROFIBUS network of all stations or only of selected stations.

### *General:*

- Automatic detection of baud rate
- Operation up to max. 12 Mbit/s possible
- Live list
- German/English version
- Online and offline mode
- Online help

## Ordering data

| Ordering data | Order No. |
|---|---|
| **Diagnostics software PROFIBUS SCOPE**<br>Executes under Windows 98/ Windows NT/2000/XP Including start help | Order directly from:<br>Trebing & Himstedt Prozeßautomation GmbH & Co. KG<br>Wilhelm-Hennemann-Str. 13<br>D-19061 Schwerin<br>Tel.: +49 (0)385 3 95 72-0<br>Fax: +49 (0)385 3 95 72-22<br>E-Mail: sales@t-h.de<br>Internet: http://www.t-h.de |

## More information

You can find further information on the Internet at:

Internet: http://www.t-h.de

# SNAP-DP and SNAP-S7 for Borland Delphi

## Overview

The SNAP software products offer object-oriented interfaces for Delphi developments with access to PROFIBUS.

The following protocols are available:

- PROFIBUS DP (SNAP-DP)
  for the software DP-5613 with CP 5613/CP 5614 or SOFTNET DP with CP 5511 or CP 5611
- S7 communication (SNAP-S7)
  for the software S7-5613 with CP 5613/CP 5614 or SOFTNET-S7 with CP 5511/ CP 5611

SNAP forms the real stations of the PROFIBUS network such as PC, SIMATIC S7 or DP slaves on Delphi components.

SNAP provides the following benefits for developers:

- Fast and effective application development through visual combination of the appropriate components on a Delphi form.
- Simplified initialization through definition of object properties
- User-friendly, object-oriented access to the PROFIBUS devices

## Benefits

get Designed for Industry

- Interface for the Borland environment to SIMATIC NET
- Visual programming using Delphi components
- Developed applications can be run on PCs with PCI or PCMCIA slots

## Technical specifications

| | |
|---|---|
| System requirements | • Borland Delphi 3.0 or higher or Borland C++ Builder<br>• Windows 95, Windows 98, Windows NT 4.0, Windows 2000 Professional Windows XP Professional<br>• CP 5511, CP 5512[1)], CP 5611, CP 5613/CP 5614<br>• Software packages for CP 5613/CP 5614 or CP 5511, CP 5512[1)], CP 5611 |

1) CP 5512 runs under Windows XP Professional only

## Ordering data

| | Order No. |
|---|---|
| **SNAP-DP for Borland Delphi**<br>Runs under Windows 95, Windows 98, Windows NT 4.0, Windows 2000 Professional, including demo program, German documentation | **SNAP-DP** |
| **SNAP-S7 for Borland Delphi or C++-Builder**<br>Runs under Windows 95, Windows 98, Windows NT 4.0, Windows 2000 Professional, including demo program, German documentation | **SNAP-S7-PB** |
| **For further details, contact:** | Aixo Informationstechnologie GmbH<br>Contact partner for sales, service and training<br>Carsten Buchloh<br>Auf der Hüls 190<br>D-52068 Aachen, Germany<br>Tel.: +49 (0)2 41 44 64 0<br>Fax: +49 (0)2 41 44 64 101<br>E-mail:<br>carsten.buchloh@aixo.com |

Note:
A demo version can be downloaded from the Internet.
The complete version of SNAP-DP and SNAP-S7 can also be ordered online.


http://www.Aixo.com