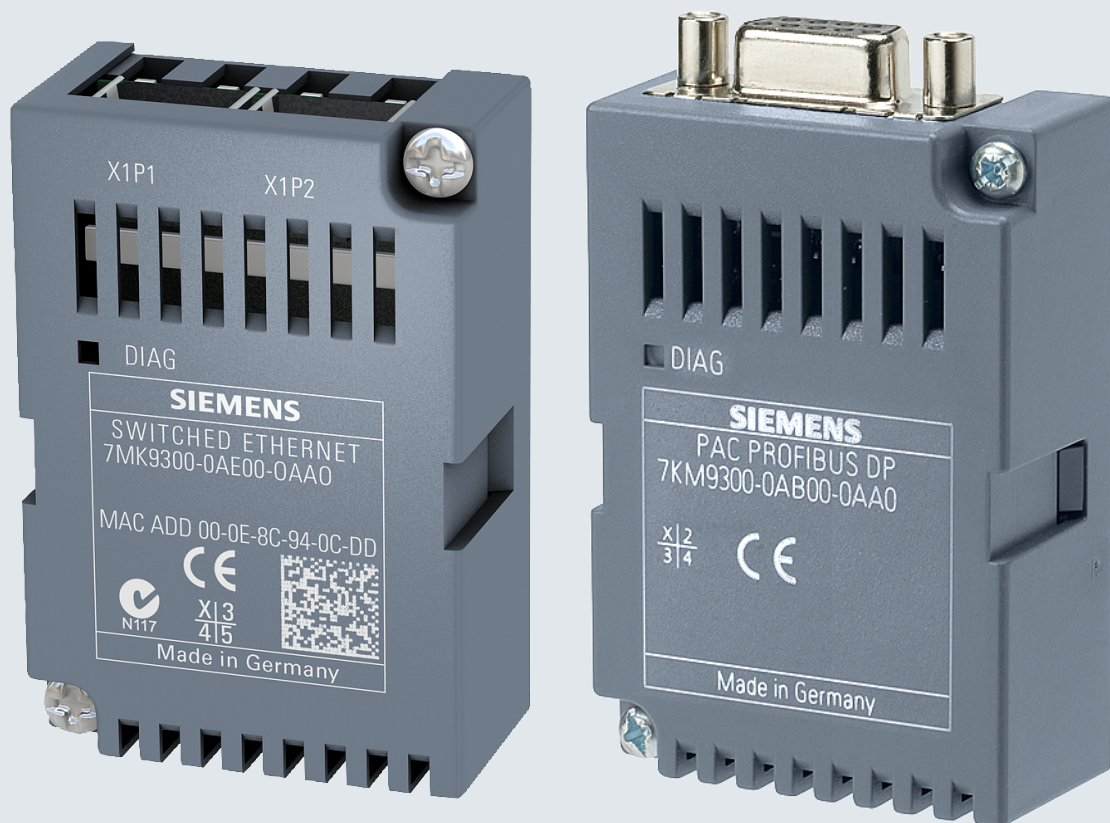


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SENTRON

Expansion modules

7KM PAC PROFIBUS DP, 7KM PAC SWITCHED ETHERNET PROFINET

Manual

Edition

10/2013

Answers for infrastructure and cities.

Low-voltage power distribution and electrical installation engineering

Expansion modules 7KM PAC PROFIBUS DP, 7KM PAC SWITCHED ETHERNET PROFINET

Manual

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

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

WARNING

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

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Introduction

1.1 Purpose of this document

This manual is intended for:

- Planners
- Plant operators
- Commissioning engineers
- Service and maintenance personnel

This manual contains:

- Version details of the 7KM PAC PROFIBUS DP expansion module
- Permissible conditions of use for the 7KM PAC PROFIBUS DP expansion module
- Version details of the 7KM PAC Switched Ethernet PROFINET expansion module
- Permissible conditions of use for the 7KM PAC Switched Ethernet PROFINET expansion module

Required basic knowledge

General knowledge of the field of automation, and basic knowledge of PROFIBUS and PROFINET are required to understand this manual.

1.2 Orientation aids

General information

The manual includes the following orientation aids:

- Table of contents
- List of figures and tables
- List of abbreviations
- Glossary
- Index

1.3 Components of the product

1.3.1 Scope of delivery of the 7KM PAC PROFIBUS DP expansion module

Description

The package includes:

- The 7KM PAC PROFIBUS DP expansion module
- The operating instructions for the 7KM PAC PROFIBUS DP expansion module

1.3.2 Scope of delivery of the 7KM PAC Switched Ethernet PROFINET expansion module

Description

The package includes:

- The 7KM PAC Switched Ethernet PROFINET expansion module
- The operating instructions for the 7KM PAC Switched Ethernet PROFINET expansion module

1.4 Technical Support

You can find further support on the Internet at:

Technical Support (<http://www.siemens.com/lowvoltage/technical-support>)

1.5 Further documentation

Overview

You can find more information, e.g. parameters, values, and setting options for the 7KM PAC measuring device in the following manuals:

- Manual for the 7KM PAC measuring device
- Operating instructions for the 7KM PAC measuring device

You can find more information on SIMATIC in the following manuals:

- SIMATIC NET "PROFIBUS Network Manual"
- SIMATIC "Configuring Hardware and Connections with STEP 7"
- "SIMATIC PCS 7 Library PAC3200"
- "Library 7KM PAC3200 for SIMATIC WinCC"

Support (<http://support.automation.siemens.com>)

You can find more information on PROFIBUS and PROFINET at:

- PROFIBUS RS485-IS User and Installation Guide
(<http://www.profibus.com/pall/meta/downloads/article/00332/>)
- PROFIBUS and PROFINET documentation from PI International
(<http://www.profibus.com/>)
- PROFIenergy profile (<http://www.profibus.com/nc/downloads/downloads/common-application-profile-profienergy/display/>)

You can find more information on the 7KM PAC PROFIBUS DP expansion module in the operating instructions for the 7KM PAC PROFIBUS DP expansion module.

You can find more information on the 7KM PAC Switched Ethernet PROFINET expansion module in the operating instructions for the 7KM PAC Switched Ethernet PROFINET expansion module.

Safety instructions

2.1 Safety notes

General safety notes



DANGER

Danger! High voltage

Will cause death or serious injury.

Turn off and lock out all power supplying this device before working on this device.

Note

Damage due to moisture

Moisture or wetness can affect the operating capability of the module. Make sure that no moisture or wetness can find its way into the module.

Do not operate the module in an environment affected by high humidity or wetness. Pay attention to the device's ambient conditions.

Description

3.1 Area of application

The 7KM PAC PROFIBUS DP expansion module and the 7KM PAC Switched Ethernet PROFINET are intended for use with a 7KM PAC measuring device. The guidelines for the 7KM PAC measuring device also apply to the 7KM PAC PROFIBUS DP expansion module and to the 7KM PAC Switched Ethernet PROFINET.

Area of application of the 7KM PAC PROFIBUS DPV1 expansion module

The 7KM PAC PROFIBUS DPV1 expansion module connects the 7KM PAC measuring device to the PROFIBUS network. This integrates the 7KM PAC measuring device into power management systems and automation systems, e.g.:

- TIA environment
- SIMATIC, with, for example:
 - The block libraries display the measured values in faceplates and make these available in the SIMATIC S7 for further processing.
 - SIMATIC S7 CPUs contain system function blocks (SFB 52, SFB 53, SFB 54). With these, the CPUs can read and write the data records, and read the alarm messages.

Area of application of the 7KM PAC Switched Ethernet PROFINET expansion module

The 7KM PAC Switched Ethernet PROFINET expansion module connects the 7KM PAC measuring device to PROFINET including IRT (Isochronous Real-Time). This integrates the 7KM PAC measuring device into power management systems and automation systems, e.g.:

- TIA environment
- SIMATIC, for example:
 - PROFlenergy (<http://support.automation.siemens.com/WW/view/en/41986454>)
 - With the SFB 52, SFB 53 and SFB 54 system function blocks, users can program the PROFlenergy protocol themselves.

The 7KM PAC Switched Ethernet PROFINET expansion module supports the PROFlenergy profile. This allows values to be communicated acyclically via PROFINET.

- Other systems that support PROFlenergy "Query_Measurement" can access the measured values.

See also

Further documentation (Page 11)

3.2 Features of the 7KM PAC PROFIBUS DPV1 expansion module

You can use the 7KM PAC PROFIBUS DPV1 expansion module to access the 7KM PAC measuring devices during operation.

Overview

Features include:

- Communication based on the 7KM PAC PROFIBUS DPV1 master-slave principle:
The 7KM PAC PROFIBUS DPV1 expansion module provides measured values of the 7KM PAC measuring device for the 7KM PAC PROFIBUS DPV1 master. It receives information, e.g. commands, from the 7KM PAC PROFIBUS DPV1 master and sends them to the 7KM PAC measuring device.
- Function: 7KM PAC PROFIBUS DP slave
- Communication with the DPV1 master and the class 2 masters
- Cyclic data transfer
- Acyclic data transfer
- Specific GSD file for every measuring device type and the 3VA circuit breakers. This allows correct integration in the controller.
- Automatic detection of the baud rate
- Clock synchronization depending on the device type
- Setting the PROFIBUS address:
 - At the device
 - With powerconfig parameterization software
 - Per PROFIBUS
- Generation of diagnostic interrupts and process interrupts
- Diagnostics also via the local display for the 7KM PAC measuring device
- Status display via LED
- Galvanic isolation between the 7KM PAC measuring device and the 7KM PAC PROFIBUS.

3.3 Features of the 7KM PAC Switched Ethernet PROFINET module

You can use the 7KM PAC Switched Ethernet PROFINET expansion module to access the 7KM PAC measuring devices during operation.

Overview

The 7KM PAC Switched Ethernet PROFINET expansion module has the following features:

- Plug-in communication module for SENTRON devices
- Direct connection between the SENTRON devices and other Ethernet nodes thanks to the integral Ethernet switch
- Support for ring redundancy thanks to the integral Ethernet switch
- The SENTRON devices communicate direct with SIMATIC S7 and SIMOTION via PROFINET IO. This means:
The 7KM PAC Switched Ethernet PROFINET expansion module (PROFINET IO device) provides measured variables and states of the SENTRON devices for the PROFINET IO controller. The module receives information, e.g. commands, from the PROFINET IO controller and forwards this information to the SENTRON devices.
- Thanks to support for PROFINET IRT, the SENTRON devices can be used direct in production automation networks, e.g. alongside SIMATIC S7, SINUMERIK, SINAMICS and SIMOTION.
- With the 7KM PAC Switched Ethernet PROFINET expansion module, the measured variables of the SENTRON devices can be read out and addressed via the standard PROFIenergy with the "Query_Measurement" service.
- Simple engineering with SIMATIC STEP 7 or other programming systems thanks to the use of the GDSML files
- Optimal use of the process image of a controller thanks to the selection of individual measured variables and states
- You can use all the previous functions of the SENTRON devices via the 7KM PAC Switched Ethernet PROFINET expansion module. This allows use of powermanager and of powerconfig.
- Data transfer rates of 10 and 100 Mbit/s are supported via the two RJ 45 sockets.
- No external supply voltage required
- Clock synchronization, if supported by the SENTRON device
- IP settings: IP address, subnet, gateway
 - At the device
 - With the powerconfig parameterization software
 - Via PROFINET, e.g. in the STEP 7 HW Config
- Generating diagnostic interrupts
- Diagnostics also via the local display

- Status display via LED
- Galvanic isolation between SENTRON devices and the 7KM PAC Switched Ethernet.

3.4 Structure

Structure of the 7KM PAC PROFIBUS DP expansion module

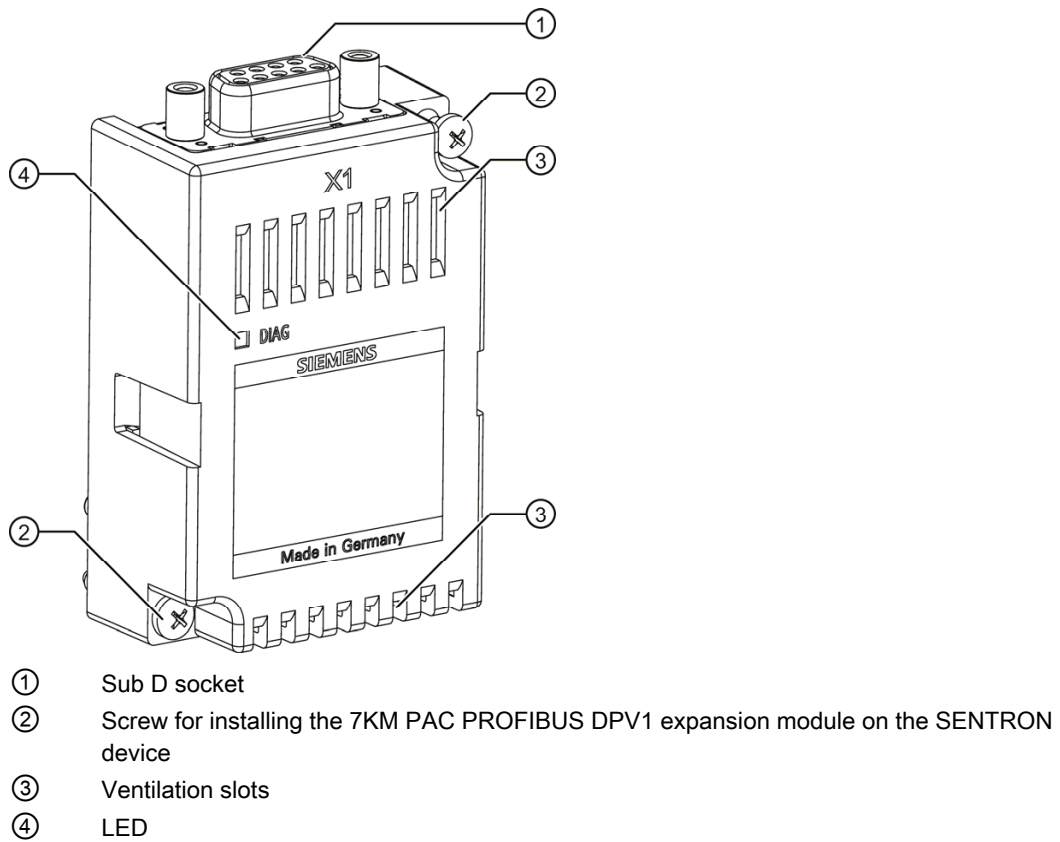
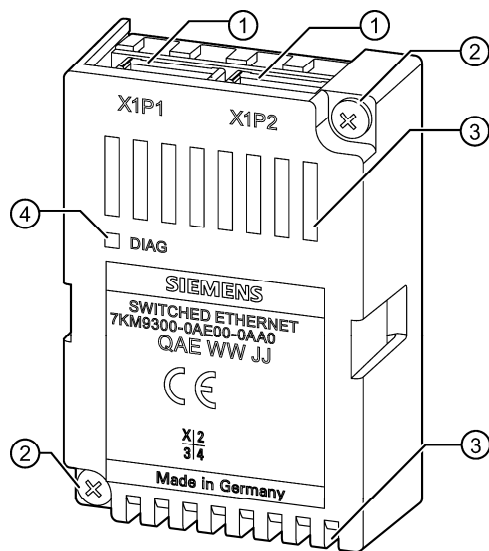


Figure 3-1 Schematic view of the side and front of the 7KM PROFIBUS DPV1 expansion module

Structure of the 7KM PAC Switched Ethernet PROFINET expansion module



- ① RJ 45 socket
- ② Screw for installing the 7KM PAC Switched Ethernet PROFINET expansion module
- ③ Ventilation slots
- ④ LED

Figure 3-2 Schematic view of the side and front of the 7KM PAC Switched Ethernet PROFINET expansion module

3.5 PROFIBUS functions

3.5.1 Functions with limited support

Functions with limited support

You can operate the SENTRON device downstream of a Y link in the DPV0 mode only. Downstream of the Y link, the device can only be configured as a DPV0 slave. All acyclic services and interrupts are switched off, as is usual with DPV0. As a result, the SENTRON device does not supply any interrupts. Instead of interrupts, the master evaluates the device diagnostics messages.

3.5.2 Unsupported functions

Unsupported functions

The following PROFIBUS functions are not supported:

- SYNC / UNSYNC
- FREEZE / UNFREEZE

Installation

4.1 Procedure for installation and commissioning

The following system configuration information must be available:

- Installation location of the device
- Planned PROFIBUS address or PROFINET NameOfStation

Procedure

1. Assemble the SENTRON device and the expansion module.
2. Connect the SENTRON device.
3. Connect the expansion module to the PROFIBUS/PROFINET network.
4. Check all connections and settings.
5. Apply supply voltage to the SENTRON device. The SENTRON device and expansion module are then ready for operation.
6. Parameterize the SENTRON device as described in the SENTRON device manual.
7. 7KM PAC PROFIBUS DP expansion module:
Set the planned address on the SENTRON device.

7KM PAC Switched Ethernet PROFINET expansion module:
Make the necessary settings on the SENTRON device.
8. Configure the expansion module. The STEP 7 HW Config, for example, can be used as the configuring tool.
 - Assign the SENTRON device to the PROFIBUS/PROFINET network.
 - 7KM PAC PROFIBUS DPV1 expansion module:
Integrate the device-specific GSD file.
 - 7KM PAC Switched Ethernet PROFINET expansion module:
Integrate the GSDML file.
 - Select the basic types or the desired measured variables for the SENTRON device.
 - Transfer the parameter assignment to the PROFIBUS DP master or the PROFINET IO controller.

See also

Unpacking (Page 22)

Installation and connection (Page 23)

Measures to be performed prior to start-up (Page 27)

Default settings (Page 85)

Configuration scenarios (Page 86)

Changing the address of the 7KM PAC PROFIBUS DP expansion module (Page 87)

Information and settings for the 7KM Switched Ethernet PROFINET expansion module on the 7KM PAC measuring device (Page 98)

Configuring by means of the GSD/GSDML file (Page 88)

Cyclic data traffic (Page 31)

4.2 Unpacking

Observe the ESD Guidelines. Open the packaging with care. Do not use excessive force.

Checks

After receiving the module, and before installing it, you should make the following checks:

- Check the packaging for damage.
- Make sure that the package contents are complete.
- Check the module for external damage.

Please contact your Siemens sales partner in the following cases:

- The packaging is damaged
- The contents of the package are not complete
- The module is damaged

Storage

Store the modules in a dry place.

Note

Formation of condensation

Store the device in the service room for at least two hours before applying voltage to the device for the first time. This will equalize the temperature and prevent the formation of condensation.

See also

Electrostatic sensitive devices (ESD) (Page 127)

4.3 Installation and connection

Tools

You will need the following tools to install the expansion module:

- A PZ1 cross-tip screwdriver, 2.9 mm, 0.5 Nm cal. ISO 6789
- Grounding clamps for grounding the communication cables

General points to note with the 7KM PAC Switched Ethernet PROFINET expansion module

Note**Faults are possible in the device**

Use the 7KM Switched Ethernet PROFINET expansion module only if all connected nodes are located within one building and are supplied via one power supply system:

- In one LAN
 - In one segment of the LAN
-

General points to note with the 7KM PAC PROFIBUS DPV1 expansion module

Note**Bus terminating resistor**

When using the 7KM PROFIBUS DPV1 expansion module, ensure correct connection of bus terminating resistors.

Please note:

- The PROFIBUS installation guidelines in "PROFIBUS RS485-IS User and Installation Guideline"
- The "SIMATIC NET PROFIBUS Network Manual"

Assembly

Install the expansion module before starting up the SENTRON device. Observe the ESD Guidelines.

NOTICE

Impairment and endangering of operation
--

Damaged components can impair and endanger operation. Never use damaged components.

NOTICE

In the case of faulty sub-D connectors, faulty RJ 45 sockets, and faulty connectors to the SENTRON device
--

Dirty or bent pins can affect the function of the connectors and the socket. The connectors and the socket can be destroyed. Do not allow the pins to become dirty.

Make sure that:

- | |
|---|
| <ul style="list-style-type: none">• There are no metal parts between the pins.• There are no metal parts adhering to the pins.• The pins do not bend. |
|---|

Do not touch the pins.

Note

Do not cover the ventilation slots

If the ventilation slots are covered, the expansion module can overheat. Make sure that the ventilation slots are not covered.

Mounting the 7KM PAC PROFIBUS DP expansion module

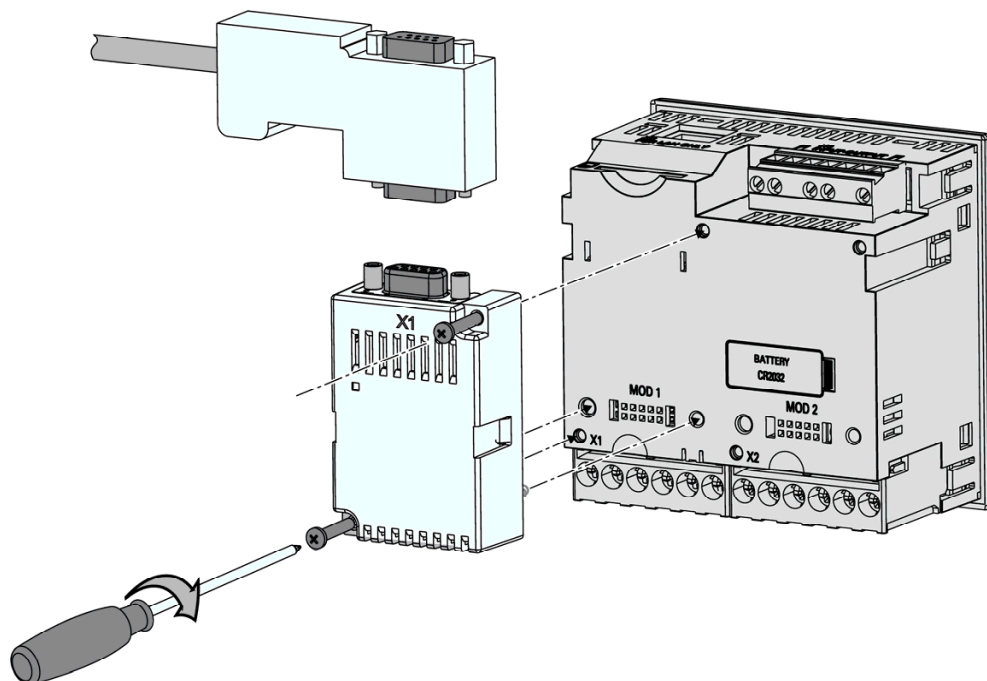


Figure 4-1 Mounting the 7KM PAC PROFIBUS DP expansion module

1. Ensure safe isolation from supply.
2. Discharge yourself.
3. Mount the SENTRON device.
4. Ensure that the current terminals and voltage terminals are installed on the 7KM PAC before installing the expansion module.
5. Always hold the 7KM PAC PROFIBUS DPV1 expansion module by the plastic enclosure only.
6. Connect the 7KM PAC PROFIBUS DPV1 expansion module to the SENTRON device. The guide for correct position of the guide pins will help you to plug in the 7KM PROFIBUS DPV1 expansion module correctly. You can find more information about the slot in the manual 7KM PAC.
7. Tighten the SN62217-B3x22 screws of the 7KM PAC PROFIBUS DP expansion module with a torque of 0.5 Nm on the 7KM PAC.
8. Plug the sub D connector into the sub D socket.
9. Screw the sub D connector into place.
10. Provide sufficient mechanical strain relief for the PROFIBUS cable. Ground the shield of the cable in the immediate vicinity of the device using a grounding clamp.
11. Ground the shield of the cable at both ends.

Mounting the 7KM PAC Switched Ethernet PROFINET expansion module

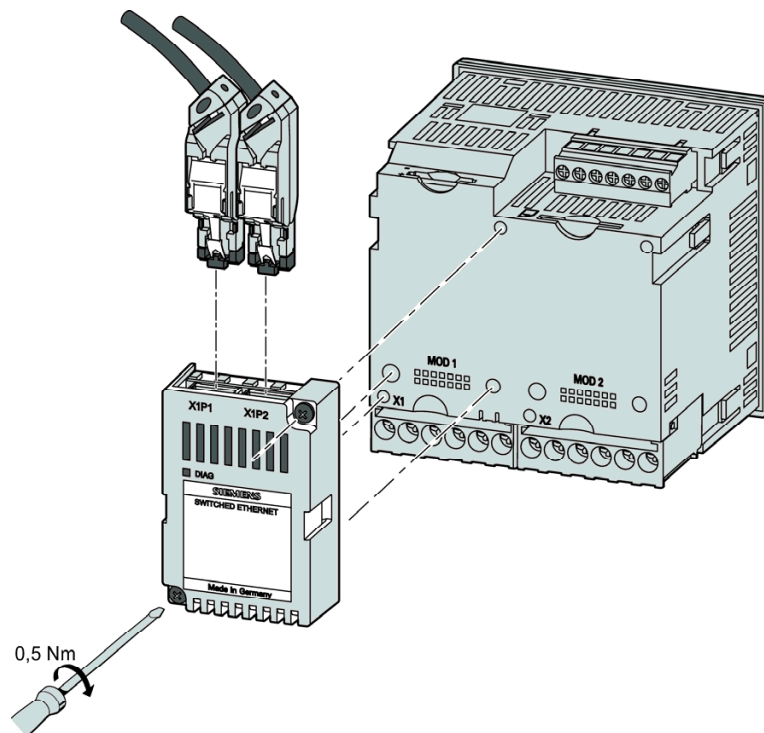


Figure 4-2 Mounting the 7KM PAC Switched Ethernet PROFINET expansion module

1. Ensure safe isolation from supply.
2. Discharge yourself.
3. Mount the SENTRON device.
4. Ensure that the current terminals and voltage terminals are installed on the 7KM PAC before installing the module.
5. Always hold the 7KM PAC Switched Ethernet PROFINET expansion module by the plastic enclosure only.
6. Connect the 7KM PAC Switched Ethernet PROFINET expansion module to the SENTRON device. The guide for correct position of the guide pins will help you to plug in the 7KM PAC Switched Ethernet PROFINET expansion module correctly. You can find more information about the slot in the manual 7KM PAC
7. Tighten the SN62217-B3x22 screws connecting the 7KM PAC Switched Ethernet PROFINET expansion module to the SENTRON device with a torque of 0.5 Nm.
8. Plug the RJ 45 connectors into the RJ 45 sockets.

9. Provide sufficient mechanical strain relief for the two Ethernet cables. Ground the shield of each cable in the immediate vicinity of the device using a grounding clamp.
10. Ground the shield of each cable at both ends.

Note**About mounting SENTRON devices**

You can find information on how to install the SENTRON device in the operating instructions and manual for the SENTRON device.

See also

- Further documentation (Page 11)
- Safety notes (Page 13)
- Electrostatic sensitive devices (ESD) (Page 127)
- Unpacking (Page 22)
- Measures to be performed prior to start-up (Page 27)

4.4 Measures to be performed prior to start-up

Checks

Once you have correctly installed the expansion module, carry out the following checks:

1. Check that the expansion module is correctly connected to the SENTRON device.
2. 7KM PAC PROFIBUS DPV1 expansion module:
Check that the connector of the PROFIBUS cable is plugged into the sub-D socket of the 7KM PAC PROFIBUS DPV1 expansion module correctly and screwed on tight.

7KM PAC Switched Ethernet PROFINET expansion module:
Check that the connectors of the Ethernet cable are correctly plugged into the RJ 45 sockets of the 7KM PAC Switched Ethernet PROFINET expansion module.
3. Check that the ventilation slots are not covered.
4. Ensure sufficient mechanical strain relief is guaranteed for the cabling.

4.4 Measures to be performed prior to start-up

Parameter assignment/Addressing

5.1 Measured variables

The measured variables and status information of the SENTRON device are available to the higher-level power management system or automation system via PROFIBUS or PROFINET.

PROFINET

PROFINET offers two alternatives for this:

- Cyclic data traffic via PROFINET IO
- Acyclic data traffic via PROFINET IO with PROFINergy

Information on the measured variables

The measured variables include, for example:

- The measured values
- The maximum/minimum values of the measured values
- The energy values

The status information includes, for example:

- The set limit values
- The device statuses

You can find a detailed description of the measured variables in the manuals of the relevant SENTRON device. In this manual, you will find the measured variables for PROFIBUS DP and PROFINET.

The measured variables and status information are offered both in cyclic data traffic and acyclic data traffic.

In cyclic data traffic, the measured variables and status information are offered as:

- Pre-defined structure, the basic types
- Individual measured variables

In acyclic data traffic, the measured variables and status information are offered as data records.

Note

Block libraries for SIMATIC

The SENTRON device offers extensive and diverse measured variables and status information. The 7KM/7KT PAC block libraries for SIMATIC simplify and facilitate integration into the TIA environment and the SIMATIC environment.

See also

Introduction (Page 9)

Energy counters (Page 78)

Further documentation (Page 11)

5.2 Cyclic data traffic

5.2.1 Cyclic data traffic on PROFIBUS DP

Description

In cyclic data traffic, each message frame transfers an optional number of user data. Cyclic data exchange is especially suitable for transferring information that is required continuously and quickly. The time interval between two message frames depends on:

- The number of nodes
- The data volume
- The baud rate

All available data types that PROFIBUS can transfer are defined in the GSD file for the SENTRON device. There are three basic types with predefined measured variables for time-saving commissioning and efficient data transfer. The user can also define individual measured variables to be transferred.

Choosing the basic type

You can configure each SENTRON device individually. During the configuration process, you use the PROFIBUS DP configuring tool to select the following from the GSD file:

- A suitable combination of basic type 1, basic type 2 and other measured variables
- A suitable combination of basic type 3, and other measured variables

Note

Note the quantity structure

In the case of 7KM9300-0AB00-0AA0, the maximum quantity structure of the SENTRON devices for PROFIBUS is 244 bytes of input data and 2 bytes of output data.

In the case of 7KM9300-0AB01, input data consists of a maximum of 240 bytes and there are 2 bytes of output data.

See also

Standards (Page 115)

Further documentation (Page 11)

5.2.2 Cyclic data traffic on PROFINET IO

Description

In cyclic data traffic, each message frame transfers an optional number of user data. Cyclic data exchange is especially suitable for transferring information that is required continuously and quickly. The 7KM PAC Switched Ethernet PROFINET expansion module fits into the time control of PROFINET Real-Time (RT).

- The PROFINET IO controller specifies the parameterizable updating time.
- The 7KM PAC Switched Ethernet PROFINET expansion module supports updating times from 1 to 512 ms.

All available data types that PROFINET can transfer are defined in the GSDML file for the respective SENTRON device. There are basic types with predefined measured variables for time-saving commissioning and efficient data transfer. The user can also define individual measured variables to be transferred.

Choosing the basic type

You can configure each SENTRON device individually. During the configuration process, use the configuring tool to select the following from the GSDML file:

- A suitable combination of basic type 1 or basic type 2 in the case of 7KM PAC and other measured variables
- A suitable combination of basic type 3 in the case of 7KM PAC , and other measured variables

Note

Note the quantity structure

The maximum quantity structure of the 7KM PAC for PROFINET IO is 240 bytes of input data and 2 bytes of output data.

5.2.3 Basic type 1

Structure

The structure of basic type 1 is fixed. The length of basic type 1 is 20 bytes of input data and 2 control bytes (output data). The following information is transferred in basic type 1.

Table 5- 1 Structure of basic type 1

Byte	Data value	Format	Unit
0 ... 3	Status information	Unsigned long	—
4 ... 7	Current a	Float	A
8 ... 11	Current b	Float	A
12 ... 15	Current c	Float	A
16 ... 19	Total active power	Float	W

Sample configuration for the 7KM PAC with basic type 1

Note

Parameterization of the 7KM PAC Switched Ethernet PROFINET expansion module

You parameterize the 7KM PAC Switched Ethernet PROFINET expansion module analogously to the 7KM PAC PROFIBUS DP expansion module.

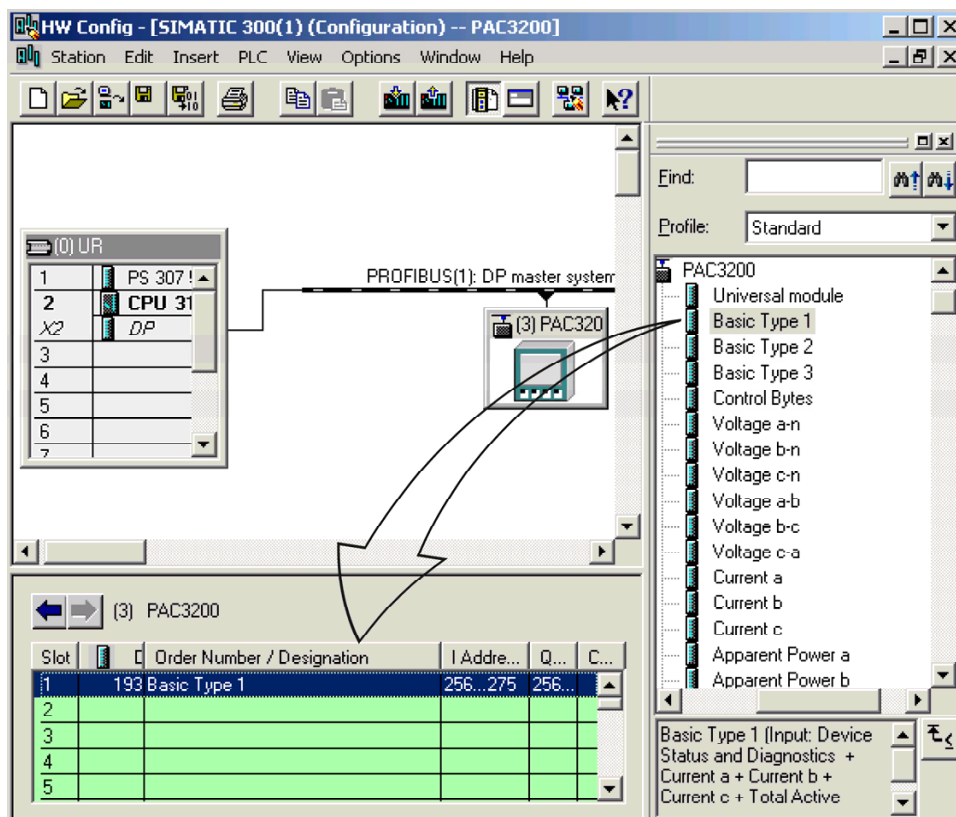


Figure 5-1 Parameterizing the 7KM PROFIBUS DPV1 expansion module - example 1: Add basic type 1 to slot 1

See also

Status information in the cyclic channel (Page 40)

Control bytes (Page 41)

Basic type 2 (Page 35)

Basic type 1 and basic type 2 DS51 (Page 47)

5.2.4 Basic type 2

Structure

Basic type 2 is an extension of basic type 1. This means that you can easily add basic type 1 and basic type 2 during the project design phase. You can also use basic type 2 as a separate unit. The structure of basic type 2 is fixed. Basic type 2 is 24 bytes.

Table 5- 2 Basic type 2 transfers the following input data

Byte	Data value	Format	Unit
0 ... 3	Voltage a-b	Float	V
4 ... 7	Voltage b-c	Float	V
8 ... 11	Voltage c-a	Float	V
12 ... 19	Active energy import tariff 1	Double Float	Wh
20 ... 23	Total power factor	Float	—

See also

Basic type 1 (Page 33)

Basic type 1 and basic type 2 DS51 (Page 47)

5.2.5 Basic type 3

Structure

The structure of basic type 3 is fixed. Basic type 3 contains the control bytes.

Table 5- 3 Length of basic type 3

Device	Length in byte
PAC3200	112
PAC4200	116

Table 5- 4 Basic type 3 transfers the following input data:

Byte	Data value	Format	Unit
0 ... 3	Status information	Unsigned long	—
4 ... 7	Voltage a-n	Float	V
8 ... 11	Voltage b-n	Float	V
12 ... 15	Voltage c-n	Float	V
16 ... 19	Voltage a-b	Float	V
20 ... 23	Voltage b-c	Float	V
24 ... 27	Voltage c-a	Float	V
28 ... 31	Current a	Float	A
32 ... 35	Current b	Float	A
36 ... 39	Current c	Float	A
40 ... 43	Power factor a	Float	—
44 ... 47	Power factor b	Float	—
48 ... 51	Power factor c	Float	—
52 ... 55	THD voltage a ¹⁾	Float	%
56 ... 59	THD voltage b ¹⁾	Float	%
60 ... 63	THD voltage c ¹⁾	Float	%
64 ... 67	THD current a ¹⁾	Float	%
68 ... 71	THD current b ¹⁾	Float	%
72 ... 75	THD current c ¹⁾	Float	%
76 ... 79	Line frequency	Float	Hz
80 ... 83	3-phase average current	Float	A
84 ... 87	Total apparent power	Float	VA
88 ... 91	Total active power	Float	W
92 ... 95	Total reactive power (VARn)	Float	Var
96 ... 99	Total power factor	Float	—
100 ... 103	Amplitude unbalance voltage	Float	%
104 ... 107	Amplitude unbalance current	Float	%
108 ... 111	Length of last period	Unsigned long	s
112 ... 115	Neutral conductor current ²⁾	Float	A

1) On the 7KM PAC3200 THD-R

2) Not on 7KM PAC3200

See also

Status information in the cyclic channel (Page 40)

Control bytes (Page 41)

5.2.6 Free choice of measured variables**Procedure**

In cyclic mode, you can specify other individual measured variables to be transferred.

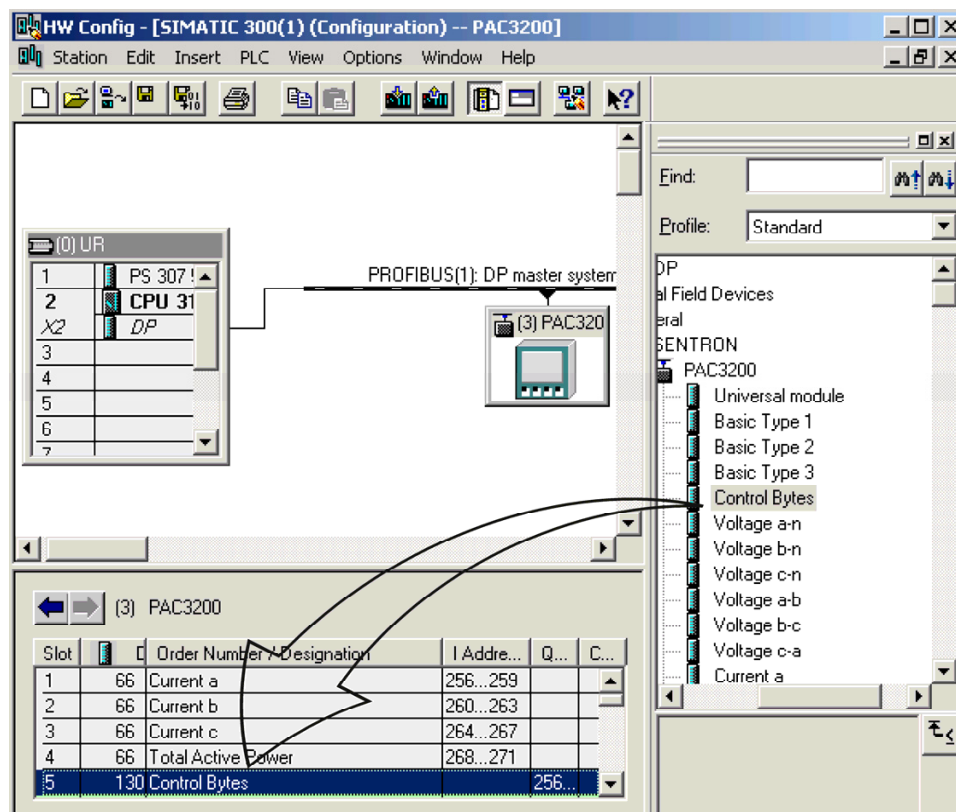


Figure 5-2 Configuring the 7KM PAC PROFIBUS DP expansion module - example 2: Inserting measured variables

Note

You parameterize the 7KM PAC Switched Ethernet PROFINET expansion module in the same way.

5.2.7 Digital inputs and digital outputs on the PAC4200

Procedure

You can read the digital inputs and digital outputs of the 7KM PAC 4DI/2DO expansion module via PROFIBUS DP/PROFINET IO.

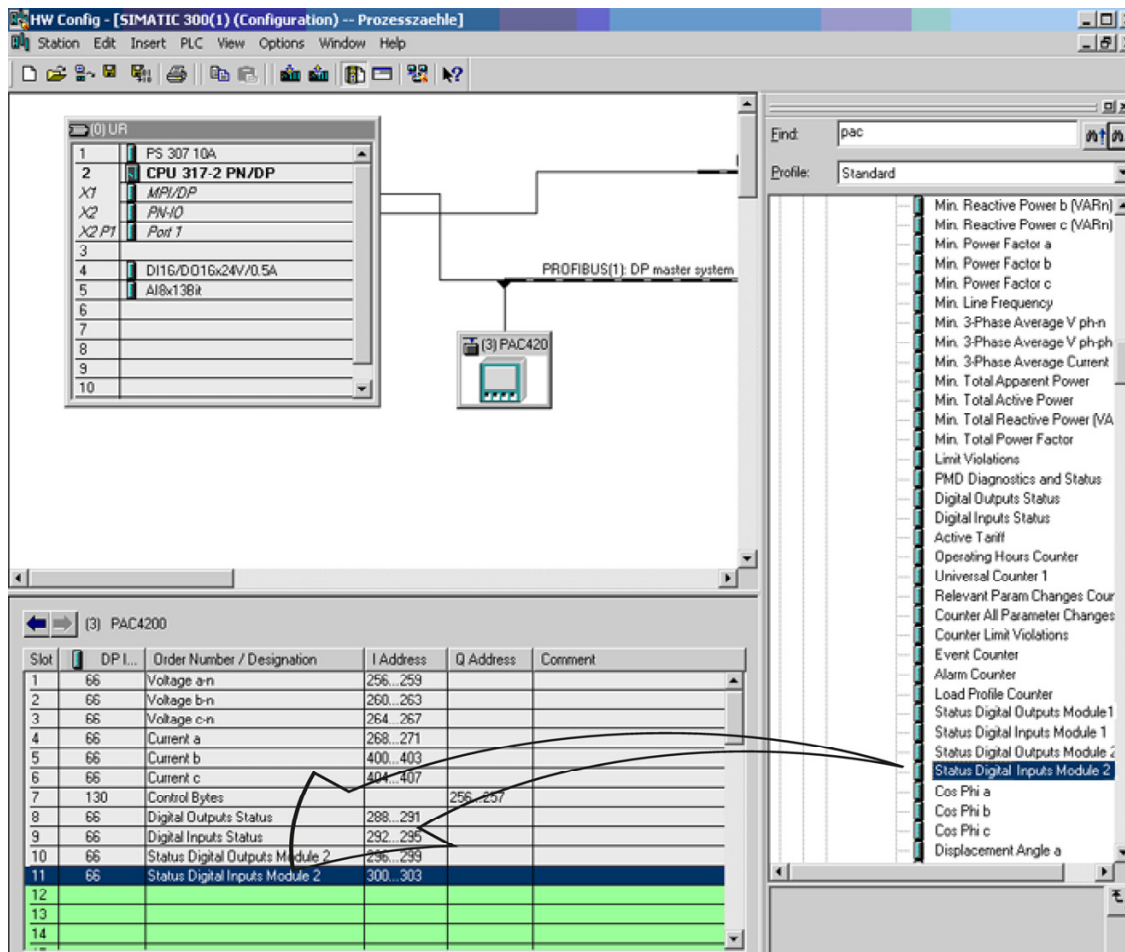


Figure 5-3 Configuring the digital inputs and digital outputs on the 7KM PAC4200 via PROFIBUS DP

Note

You parameterize the 7KM PAC Switched Ethernet PROFINET expansion module in the same way.

Digital inputs status and digital outputs status

The following are available via PROFIBUS/PROFINET:

- The input status of the internal inputs of the SENTRON device
- The output status of the internal outputs of the SENTRON device
- The input status of the relevant 7KM PAC 4DI/2DO expansion module
- The output status of the relevant 7KM PAC 4DI/2DO expansion module

Table 5- 5 Scheme: Digital input status and digital output status of the 7KM PAC measuring device

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	MSB	—	—	—	—	—	—	—
Byte 1	—	—	—	—	—	—	—	—
Byte 2	—	—	—	—	—	—	—	—
Byte 3 ³⁾	—	—	—	—	—	—	DI / DO 0.1 ^{1) 2)}	DI / DO 0.0 ^{1) 2)} , LSB
Byte 3 ⁴⁾	—	—	—	—	DI / DO x.3	DI / DO x.2	DI / DO x.1 ^{1) 2)}	DI / DO x.0 ^{1) 2)} , LSB

1) = Read access

2) "0" = OFF; "1" = ON¹⁾

3) Integral digital inputs and digital outputs

4) Digital inputs and digital outputs of the relevant expansion module 7KM PAC 4DI/2DO

Abbreviation	Meaning
LSB	Least significant byte
MSB	Most significant byte

5.2.8 Status information in the cyclic channel

Status information

In cyclic data traffic, the status information is sent on every data exchange at the beginning of a basic type 1 and basic type 3 data structure. You can add the status information during the configuration phase. The status information is treated as diagnostics data for the device.

Table 5- 6 Structure of the 4 bytes of the status information - static diagnostics

Byte	Bit	Description
Byte n System status	0	Synchronization for the average power value is missing or has failed
	1	Device configuration is active
	2	Voltage out of range
	3	Current out of range
	4	Reserved
	5	Reserved
	6	Write protection activated
Byte n + 1 Device status	7	Reserved
	8	Reserved
	9	Maximum pulse rate exceeded
	10	Reserved
	11	Reserved
	12	Reserved
	13	Reserved
Byte n + 2 Device diagnostics	14	Reserved
	15	Reserved
	16	Basic configuration changed
	17	Upper or lower limit violation incoming or outgoing
	18	Maximum pulse rate exceeded
	19	Reserved
	20	Reserved
Byte n + 3 Component diagnostics	21	Reserved
	22	Reserved
	23	Reserved
	24	Reserved
	25	Reserved
	26	Reserved
	27	Reserved
	28	Reserved
	29	Reserved
	30	Reserved
	31	Reserved

The diagnostics information remains active until acknowledged. The status information remains active as long as the cause exists. Status information is not acknowledged.

5.2.9 Control bytes

Description

The control bytes are delivered with basic type 1 and basic type 3 as standard. Alternatively, you can add the control bytes during the configuration phase.

These commands can be used to clear the memory contents or to change the tariff, for example. When you set a bit, the function belonging to the bit is activated. You must reset the control bit afterwards. The class 1 master/PROFINET IO controller sends these commands to the PROFIBUS DP slave/PROFINET IO device.

Note

Commands can be lost

If you change a bit of the control byte with a cycle < 1 second, commands can be lost. Changes to bits only become effective with a cycle of ≥ 1 second.

Structure

Table 5- 7 Structure of the control bytes

Byte	Bit	Activation	Description
Byte n	0	Rising edge transition ¹⁾	Reset the maximum values
	1	Rising edge transition ¹⁾	Reset the minimum values
	2	Rising edge transition ¹⁾	Resetting the energy counters
	3	Rising edge transition ¹⁾	Acknowledge device diagnostics
	4	Rising edge transition ¹⁾	Synchronization of the demand period
	5	Level sensitive	Process counter start/stop
	6	Rising edge transition ¹⁾	Copy and reset process counter
	7	Rising edge transition ¹⁾	Reset process counter
Byte n + 1	0	Rising edge transition ¹⁾	Switch to high tariff (HT)
	1	Rising edge transition ¹⁾	Switch to low tariff (LT)
	2	Level sensitive	Switch output 0.0: <ul style="list-style-type: none"> • ON = 1 • OFF = 0
	3	Level sensitive	Switch output 0.1 ²⁾ : <ul style="list-style-type: none"> • ON = 1 • OFF = 0
	4	—	Reserved
	5	—	Reserved
	6	—	Reserved
	7	—	Reserved

1) Only a change from 0 to 1 activates this function, e.g., changing bit 8 from 0 to 1 brings about a changeover to the highest tariff. The value 1 or a reset from 1 to 0 has no effect.

2) 7KM PAC4200 and higher

Note

Only one set of control bytes

There can only be one set of control bytes per device. If you add basic type 1 or basic type 3 during the parameterization stage, then you must not add control bytes separately.

See also

Basic type 1 (Page 33)

5.3 Acyclic data traffic on PROFIBUS DP

5.3.1 Introduction

Requirements

For acyclic data traffic, you require a DPV1-enabled class 1 master or a DPV1-enabled class 2 master.

Description

In addition to cyclic data traffic, acyclic data can be transferred, e.g. parameters, diagnostics information, commands, further data. Acyclic data transfer takes place in parallel with cyclic data traffic.

You can use acyclic data traffic with the following methods:

- The 7KM PAC block libraries for SIMATIC display the measured values in faceplates and make these available in the SIMATIC S7 for further processing.
- SIMATIC S7 CPUs contain system function blocks (SFB 52, SFB 53, SFB 54). With these, the CPUs can read and write the data records individually, and read the alarm messages.
- Every other PROFIBUS DP master can implement the data records.

Note

Acyclic connections to masters

The expansion module supports up to five acyclic connections simultaneously: up to four with class 2 masters and one with a class 1 master.

5.3.2 Content of the DPV1 data records

Definition of the DPV1 data records

The DPV1 data records are defined in a similar way to the VL / WL circuit breakers. The system has a modular design.

Data records for the 7KM PAC devices

Table 5- 8 Data records of the 7KM PAC devices addressed via slot number 1

Data record number	Description	Only 7KM PAC3200 with 7KM9300-0AB00-0AA0	All 7KM PAC with 7KM9300-0AB01-0AA0	Access
DS1	System diagnostics	X	X	R
DS51	Basic type 1 and basic type 2	X	X	R
DS68	Status of the output signals	X	—	RW
DS69	Status of the input signals	X	—	R
DS72	Minimum and maximum current values	X	—	R
DS73	Minimum and maximum voltage values	X	—	R
DS74	Minimum and maximum power values	X	—	R
DS76	Minimum and maximum line frequency, THD values	X	—	R
DS92	Status and diagnostics	X	—	R
DS93	Commands	X	X	W
DS94	Current measured values, voltage measured values, and power measured values	X	—	R
DS95	Working hours counter and universal counter	X	—	RW
DS131	Settings for the 7KM PAC	X	—	RW
DS132	Limit value settings	X	—	RW
DS202	Current	X	—	R
DS203	Voltage	X	—	R
DS204	Power	X	—	R
DS205	Energy counters	X	X	RW
DS206	Average power values over a demand period	X	—	R
DS255	I&M device identification	X	X	IM0: R IM1 to IM4: RW

Data records for the 7KM PAC PROFIBUS DP expansion module

In addition, there is a data record for the 7KM PAC PROFIBUS DP expansion module itself. You address this via slot number 0.

Table 5- 9 DPV1 data records for the PAC PROFIBUS DP expansion module

Data record number	Description	Access
DS255	I&M data records	RW

Abbreviation	Meaning
R	Read
W	Write
RW	Read and write

See also

Addressing parameter (Page 71)

5.3.3 System diagnostics DS1

DS1

Data record DS1 contains the data for system diagnostics.

Table 5- 10 Structure of data record DS1 - read access only

Byte	Bit position	Length in bits	Format	Description
0	—	32	Unsigned char	Header
4	—	32	Unsigned long	Reserved
8	—	16	Unsigned short	Reserved
10	—	8	Unsigned char	Length of the diagnostics signal
11	—	8	Unsigned char	Status type of the diagnostics
12	—	8	Unsigned char	Slot number of the diagnostics
13	—	8	Unsigned char	Specifier for the diagnostics
14	0	1	Bit	Reserved
	1	1	Bit	Reserved
	2	1	Bit	Reserved
	3	1	Bit	Reserved
	4	1	Bit	Reserved
	5	1	Bit	Reserved
	6	1	Bit	Reserved
	7	1	Bit	The device diagnostics data is available.
15	0	1	Bit	Internal communication not ready
	1	1	Bit	Internal communication is faulty
	2	1	Bit	Reserved
	3	1	Bit	Data invalid - internal fault (CRC error)
	4	1	Bit	Reserved
	5	1	Bit	Data invalid - internal fault (frame error)
	6	1	Bit	Data invalid - internal fault (timeout)
	7	1	Bit	Firmware PAC, Module incompatible
16	0	1	Bit	Voltage out of range
	1	1	Bit	Current out of range
	2	1	Bit	Maximum pulse rate exceeded
	3	1	Bit	Limit violations
	4	1	Bit	Reserved
	5	1	Bit	Reserved
	6	1	Bit	Reserved
	7	1	Bit	Reserved

Byte	Bit position	Length in bits	Format	Description
17	0	1	Bit	Output not remote operated
	1	1	Bit	Invalid val. for Op.Hrs/Univ.Cnt ¹⁾
	2	1	Bit	Invalid value for energy counter
	3	1	Bit	Invalid settings for PMD ¹⁾
	4	1	Bit	Invalid setting for limits ¹⁾
	5	1	Bit	Reserved (invalid data for DSxx)
	6	1	Bit	Reserved (invalid data for DSxx)
	7	1	Bit	Reserved (invalid data for DSxx)
Total bytes: 18				

1) On 7KM PAC3200 only

5.3.4 Basic type 1 and basic type 2 DS51

DS51

Data record DS51 contains basic type 1 and basic type 2.

Table 5- 11 Structure of data record DS51 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	160	Struct	Basic type 1
30	192	Struct	Basic type 2
Total bytes: 54			

See also

Basic type 1 (Page 33)

Basic type 2 (Page 35)

Reading data records DS51 and DS205 (Page 76)

5.3.5 Status of the output signals DS68

DS68

Data record DS68 contains the output signals.

It applies only to 7KM9300-0AB00-0AA0

Table 5- 12 Structure of data record DS68 - read access and write access

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Unsigned long	Status of the digital outputs (bit-coded)
14	32	Unsigned long	Reserved
18	32	Unsigned long	Reserved
22	32	Unsigned long	Reserved
Total bytes: 26			

See also

Digital inputs status and digital outputs status (Page 80)

5.3.6 Status of the DS69 input signals

DS69

Data record DS69 contains the output signals.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 13 Structure of data record DS69 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Unsigned long	Status of the digital inputs (bit-coded)
14	32	Unsigned long	Reserved
18	32	Unsigned long	Reserved
22	32	Unsigned long	Reserved
Total bytes: 26			

See also

Digital inputs status and digital outputs status (Page 80)

5.3.7 Minimum and maximum current values DS72

DS72

Data record DS72 contains the maximum and minimum current values.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 14 Structure of data record DS72 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Float	Maximum current a
14	32	Float	Maximum current b
18	32	Float	Maximum current c
22	32	Float	Max. 3-phase average current
26	32	Float	Minimum current a
30	32	Float	Minimum current b
34	32	Float	Minimum current c
38	32	Float	Min. 3-phase average current
Total bytes: 42			

5.3.8 Minimum and maximum voltage values DS73

DS73

Data record DS73 contains the maximum and minimum voltage values.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 15 Structure of data record DS73 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Float	Maximum voltage a-n
14	32	Float	Maximum voltage b-n
18	32	Float	Maximum voltage c-n
22	32	Float	Max. voltage a-b
26	32	Float	Max. voltage a-c
30	32	Float	Max. voltage c-a
34	32	Float	Max. 3-phase average voltage ph-n
38	32	Float	Max. 3-phase average voltage ph-ph
42	32	Float	Minimum voltage a-n
46	32	Float	Minimum voltage b-n
50	32	Float	Minimum voltage c-n
54	32	Float	Min. voltage a-b
58	32	Float	Min. voltage b-c
62	32	Float	Min. voltage c-a
66	32	Float	Min. 3-phase average voltage ph-n
70	32	Float	Min. 3-phase average voltage ph-ph
Total bytes: 74			

5.3.9 Minimum and maximum power values DS74

DS74

Data record DS74 contains the maximum and minimum power values.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 16 Structure of data record DS74 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Float	Maximum apparent power a
14	32	Float	Maximum apparent power b
18	32	Float	Maximum apparent power c
22	32	Float	Maximum active power a
26	32	Float	Maximum active power b
30	32	Float	Maximum active power c
34	32	Float	Maximum reactive power a
38	32	Float	Maximum reactive power b
42	32	Float	Maximum reactive power c
46	32	Float	Maximum power factor a
50	32	Float	Maximum power factor b
54	32	Float	Maximum power factor c
58	32	Float	Max. total apparent power
62	32	Float	Max. total active power
66	32	Float	Max. total reactive power
70	32	Float	Max. total power factor
74	32	Float	Minimum apparent power a
78	32	Float	Minimum apparent power b
82	32	Float	Minimum apparent power c
86	32	Float	Minimum active power a
90	32	Float	Minimum active power b
94	32	Float	Minimum active power c
98	32	Float	Minimum reactive power a
102	32	Float	Minimum reactive power b
106	32	Float	Minimum reactive power c
110	32	Float	Minimum power factor a
114	32	Float	Minimum power factor b
118	32	Float	Minimum power factor c
122	32	Float	Min. total apparent power
126	32	Float	Min. total active power
130	32	Float	Min. total reactive power
134	32	Float	Min. total power factor
Total bytes: 138			

5.3.10 Minimum and maximum line frequency and THD values DS76

DS76

Data record DS76 contains the maximum and minimum line frequency values and the THD values.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 17 Structure of data record DS76 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigend short	Reserved
10	32	Float	Maximum THD-R voltage a
14	32	Float	Maximum THD-R voltage b
18	32	Float	Maximum THD-R voltage c
22	32	Float	Maximum THD-R current a
26	32	Float	Maximum THD-R current b
30	32	Float	Maximum THD-R current c
34	32	Float	Max. line frequency
38	32	Float	Min. line frequency
Total bytes: 42			

5.3.11 Status and diagnostics DS92

DS92

Data record DS92 contains status information and diagnostic information.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 18 Structure of data record DS92 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Unsigned long	Device diagnostics and device status (bit-coded)
14	32	Unsigned long	Limit violations (bit-coded)
18	32	Unsigned long	Relevant parameter changes counter
22	32	Unsigned long	Counter all parameter changes
26	32	Unsigned long	Counter limit violations
Total bytes: 30			

5.3.12 Commands DS93

DS93

Data record DS93 contains command information.

Table 5- 19 Structure of data record DS93 - write access only

Byte	Bit position	Number of bits	Format	Description
0	—	32	Struct	Header
4	—	32	Unsigned long	Reserved
8	—	16	Unsigned short	Reserved
10	—	8	Unsigned char	Command counter
11	0	1 ¹⁾	Bit	Reset the maximum values
	1	1 ¹⁾	Bit	Reset the minimum values
	2	1 ¹⁾	Bit	Resetting the energy counters
	3	1 ¹⁾	Bit	Acknowledge device diagnostics
	4	1 ¹⁾	Bit	Synchronization of the demand period
	5	1	Bit	Process counter start/stop
	6	1	Bit	Copy and reset process counter
	7	1	Bit	Reset process counter
12	0	1 ¹⁾	Bit	Switch to high tariff (HT)
	1	1 ¹⁾	Bit	Switch to low tariff (LT)
	2	1 ²⁾	Bit	Switch output 0.0 ³⁾ (if parameterized)
	3	1 ²⁾	Bit	Switch output 0.1 ^{3) 4)} (if parameterized)
	4	1	Bit	Reserved
	5	1	Bit	Reserved
	6	1	Bit	Reserved
	7	1	Bit	Reserved
13	0	1 ¹⁾	Bit	Reset the device to the factory settings
	1	1 ¹⁾	Bit	Reset the device (no change to the IP address)
	2	1	Bit	Reset the PAC PROFIBUS DP expansion module to the default
	3	1	Bit	Reserved
	4	1	Bit	Reserved
	5	1	Bit	Reserved
	6	1	Bit	Reserved
	7	8	Bit	Reserved

Byte	Bit position	Number of bits	Format	Description
14	—	8	Unsigned char	Reserved
Total bytes: 15				

1) "1" means: The action is executed.
 "0" means: The action is not executed.

2) "1" means: Signal = 1
 "0" means: Signal = 0

3) If parameterized and available

4) Not on 7KM PAC3200

5.3.13 Current measured values, voltage measured values, and power measured values DS94

DS94

Data record DS94 contains the current measured values, the voltage measured values, and the power measured values.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 20 Structure of data record DS94 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Float	Voltage a-n
14	32	Float	Voltage b-n
18	32	Float	Voltage c-n
22	32	Float	Voltage a-b
26	32	Float	Voltage b-c
30	32	Float	Voltage c-a
34	32	Float	Current a
38	32	Float	Current b
42	32	Float	Current c
46	32	Float	Apparent power a
50	32	Float	Apparent power b
54	32	Float	Apparent power c
58	32	Float	Active power a
62	32	Float	Active power b
66	32	Float	Active power c
70	32	Float	Reactive power a
74	32	Float	Reactive power b
78	32	Float	Reactive power c
82	32	Float	Power factor a
86	32	Float	Power factor b
90	32	Float	Power factor c
94	32	Float	THD-R voltage a
98	32	Float	THD-R voltage b
102	32	Float	THD-R voltage c
106	32	Float	THD-R current a
110	32	Float	THD-R current b
114	32	Float	THD-R current c
118	32	Float	Line frequency

Byte	Number of bits	Format	Description
122	32	Float	3-phase average voltage ph-n
126	32	Float	3-phase average voltage ph-ph
130	32	Float	3-phase average current
134	32	Float	Total apparent power
138	32	Float	Total active power
142	32	Float	Total reactive power
146	32	Float	Total power factor
150	32	Float	Amplitude unbalance voltage
154	32	Float	Amplitude unbalance current
158	32	Float	Active tariff
Total bytes: 162			

5.3.14 Working hours counter and universal counter DS95

DS95

Data record DS95 contains the value of the working hours counter and the value of the configurable universal counter.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 21 Structure of data record DS95 - read access and write access

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Unsigned long	Working hours counter ¹⁾
14	32	Unsigned long	Universal counter ¹⁾
Total bytes: 18			

1) 0xFFFFFFFF means: No action.
Every other value is accepted.

5.3.15 Settings for the 7KM PAC DS131

DS131

Data record DS131 contains setting parameters for the 7KM PAC measuring device.
It applies only to 7KM9300-0AB00-0AA0.

Table 5- 22 Structure of data record DS131 - read access and write access

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Unsigned long	Connection type: <ul style="list-style-type: none"> • 0 = 3P4W • 1 = 3P3W • 2 = 3P4WB • 3 = 3P3WB • 4 = 1P2W
14	32	Unsigned long	Voltage measurement using voltage transformers Yes/No
18	32	Unsigned long	Primary voltage
22	32	Unsigned long	Secondary voltage
26	32	Unsigned long	Current measurement using current transformers ¹⁾ = Yes
30	32	Unsigned long	Primary current
34	32	Unsigned long	Secondary current
38	32	Unsigned long	Inverted current Yes/No
42	32	Unsigned long	Line frequency
46	32	Float	Zero point suppression (% rated current)
50	32	Unsigned long	Demand period
54	32	Unsigned long	Synchronization
58	32	Unsigned long	Digital input 0.0 usage type
62	32	Unsigned long	Reserved
66	32	Unsigned long	Digital input 0.0 Use of counter information
70	32	Unsigned long	Digital input 0.0 Weight of the counter information (pulses per kWh / kvarh)
74	32	Unsigned long	Digital output 0.0 Vector group assignment
78	32	Unsigned long	Digital output 0.0 usage type
82	32	Unsigned long	Digital output 0.0 vector group assignment

Byte	Number of bits	Format	Description
86	32	Unsigned long	Reserved
90	32	Unsigned long	Digital output 0.0 source of counter signal
94	32	Unsigned long	Digital output 0.0 Weight of the counter information (pulses per 1000 Wh / VARh)
98	32	Unsigned long	Digital output 0.0 pulse length
102	32	Unsigned long	Dialog language
106	32	Unsigned long	Phase labels IEC/UL
110	32	Unsigned long	Universal counter source
114	32	Unsigned long	Display refresh cycle
118	32	Unsigned long	Display contrast
122	32	Unsigned long	Display backlight level
126	32	Unsigned long	Display backlight dimmed
130	32	Unsigned long	Display time until dimmed
Total bytes: 134			

1) This parameter is read-only.

See also

Further documentation (Page 11)

5.3.16 Limit value settings DS132

DS132

Data record DS132 contains parameters for setting the limit values.
It applies only to 7KM9300-0AB00-0AA0.

Table 5- 23 Structure of data record DS132 - read access and write access

Byte	Number of bits	Format	Standard	Description	
0	8	Unsigned char	-	Header coordination	
1	8	Unsigned char	0x00	Header reserved	
2	8	Unsigned char	-	Header slot number	
3	8	Unsigned char	0x00	Header sub-slot number	
4	32	Unsigned long	0x00	Reserved	
8	16	Unsigned short	0x00	Reserved	
10	8	Unsigned char	0x01	Index of the limit value data record	
11	8	Unsigned char	0x00	Reserved	
12	32	Unsigned long	0	Limit 0	ON/OFF
16	32	Float	0		Hysteresis
20	32	Unsigned long	0		Delay
24	32	Unsigned long	0		Operation in Limit Logic
28	32	Unsigned long	0		Source
32	32	Float	0		Value
36	32	Unsigned long	0		MODE \geq / $<$
40	32	Unsigned long	0	Limit 1	ON/OFF
44	32	Float	0		Hysteresis
48	32	Unsigned long	0		Delay
52	32	Unsigned long	0		Operation in Limit Logic
56	32	Unsigned long	0		Source

Byte	Number of bits	Format	Standard	Description	
60	32	Float	0		Value
64	32	Unsigned long	0		MODE \geq / $<$
68	32	Unsigned long	0	Limit 2	ON/OFF
72	32	Float	0		Hysteresis
76	32	Unsigned long	0		Delay
80	32	Unsigned long	0		Operation in Limit Logic
84	32	Unsigned long	0		Source
88	32	Float	0		Value
92	32	Unsigned long	0		MODE \geq / $<$
96	32	Unsigned long	0	Limit 3	ON/OFF
100	32	Float	0		Hysteresis
104	32	Unsigned long	0		Delay
108	32	Unsigned long	0		Operation in Limit Logic
112	32	Unsigned long	0		Source
116	32	Float	0		Value
120	32	Unsigned long	0		MODE \geq / $<$
124	32	Unsigned long	0	Limit 4	ON/OFF
128	32	Float	0		Hysteresis
132	32	Unsigned long	0		Delay
136	32	Unsigned long	0		Operation in Limit Logic
140	32	Unsigned long	0		Source
144	32	Float	0		Value
148	32	Unsigned long	0		MODE \geq / $<$

Byte	Number of bits	Format	Standard	Description	
152	32	Unsigned long	0	Limit 5	ON/OFF
156	32	Float	0		Hysteresis
160	32	Unsigned long	0		Delay
164	32	Unsigned long	0		Operation in Limit Logic
168	32	Unsigned long	0		Source
172	32	Float	0		Value
176	32	Unsigned long	0		MODE ≥ / <
Total bytes: 180					

See also

Further documentation (Page 11)

5.3.17 Current DS202

DS202

Data record DS202 contains the current values.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 24 Structure of data record DS202 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Float	Current a
14	32	Float	Current b
18	32	Float	Current c
22	32	Float	THD-R current a
26	32	Float	THD-R current b
30	32	Float	THD-R current c
34	32	Float	3-phase average current
Total bytes: 38			

5.3.18 Voltage DS203

DS203

Data record DS203 contains the voltage values.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 25 Structure of data record DS203 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Float	Voltage a-n
14	32	Float	Voltage b-n
18	32	Float	Voltage c-n
22	32	Float	Voltage a-b
26	32	Float	Voltage b-c
30	32	Float	Voltage c-a
34	32	Float	THD-R voltage a
38	32	Float	THD-R voltage b
42	32	Float	THD-R voltage c
46	32	Float	3-phase average voltage ph-n
50	32	Float	3-phase average voltage ph-ph
Total bytes: 54			

5.3.19 Power DS204

DS204

Data record DS204 contains the power values.

It applies only to 7KM9300-0AB00-0AA0.

Table 5- 26 Structure of data record DS204 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Float	Apparent power a
14	32	Float	Apparent power b
18	32	Float	Apparent power c
22	32	Float	Active power a
26	32	Float	Active power b
30	32	Float	Active power c
34	32	Float	Reactive power a
38	32	Float	Reactive power b
42	32	Float	Reactive power c
46	32	Float	Power factor a
50	32	Float	Power factor b
54	32	Float	Power factor c
58	32	Float	Total apparent power
62	32	Float	Total active power
66	32	Float	Total reactive power
70	32	Float	Total power factor
Total bytes: 74			

5.3.20 Energy counter DS205

DS205

Via data record DS205, the master can read out and set all energy counters in Double Float format.

Table 5- 27 Structure of data record DS205 - read access and write access

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	64	Double Float	Active energy import tariff 1 ¹⁾
18	64	Double Float	Active energy import tariff 2 ¹⁾
26	64	Double Float	Active energy export tariff 1 ¹⁾
34	64	Double Float	Active energy export tariff 2 ¹⁾
42	64	Double Float	Reactive energy import tariff 1 ¹⁾
50	64	Double Float	Reactive energy import tariff 2 ¹⁾
58	64	Double Float	Reactive energy export tariff 1 ¹⁾
66	64	Double Float	Reactive energy export tariff 2 ¹⁾
74	64	Double Float	Apparent energy tariff 1 ¹⁾
82	64	Double Float	Apparent energy tariff 2 ¹⁾
Total bytes: 90			

1) 0xFFFFFFFFFFFFFFFF means: No action. Every other value is accepted.

See also

Reading data records DS51 and DS205 (Page 76)

5.3.21 Average power values over a demand period DS206

DS206

Data record DS206 contains the average power values over a demand period.

Applies only to 7KM9300-0AB00-0AA0.

Table 5- 28 Structure of data record DS206 - read access only

Byte	Number of bits	Format	Description
0	32	Struct	Header
4	32	Unsigned long	Reserved
8	16	Unsigned short	Reserved
10	32	Float	Cumulated active power import
14	32	Float	Cumulated reactive power import
18	32	Float	Cumulated active power export
22	32	Float	Cumulated reactive power export
26	32	Float	Max. active power in last period
30	32	Float	Min. active power in last period
34	32	Float	Max. reactive power in last period
38	32	Float	Min. reactive power in last period
42	32	Unsigned long	Length of last period in ms
46	32	Unsigned long	Time stamp instantaneous period in s
Total bytes: 50			

5.3.22 I&M device identification DS255

Data record DS255 contains the I&M data for the unique identification of a 7KM PAC measuring device.

Addressing the I&M data records

I&M data records for the 7KM PAC: Address slot number 1 and index 255.
I&M data records for the 7KM PAC PROFIBUS DP expansion module: Address slot number 0 and index 255.

You address slot number 0 with the diagnostics address you have defined in the properties of the DP slave in the HW Config, for example.

Table 5- 29 Structure of data record DS255, IM0 data read access only

Byte	Number of bits	Format	Standard	Description
0	8	Unsigned char	0x08	Extended function NUM
1	8	Unsigned char	0x00	Reserved
2	16	Unsigned short	65000	I&M index:= I&M 0
4	80	10 bytes	0x00	I&M header
I&M data block 0				
14	16	Unsigned short	42	IM0 manufacturer ID ¹⁾
16	160	Char 20	—	IM0 order number
36	128	Char 16	—	IM0 serial number
52	16	Unsigned short	—	IM0 hardware version
54	32	1*char 3*unsigned short	—	IM0 firmware version
58	16	Unsigned short	0x0000	IM0 counter for changes
60	16	Unsigned short	F600	IM0 profile ID
62	16	Unsigned short	0x00	IM0 profile-specific ID
64	16	Unsigned short	0x0101	IM0 version of the I&M data
66	16	Unsigned short	001E	IM0-supported I&M data
Total bytes: 68				

1) Standard: 42. "42" stands for Siemens AG.

Table 5- 30 Structure of data record DS255, IM1 data - read access and write access

Byte	Number of bits	Format	Standard	Description
0	8	Unsigned char	0x08	Extended function NUM
1	8	Unsigned char	0x00	Reserved
2	16	Unsigned short	65001	I&M index:= I&M 1
4	80	10 bytes	0x00	I&M header
I&M data block 1				
14	256	Char 32	20h	IM1 plant identifier
46	176	Char 22	20h	IM1 location identifier
Total bytes: 68				

Table 5- 31 Structure of data record DS255, IM2 data - read access and write access

Byte	Number of bits	Format	Standard	Description
0	8	Unsigned char	0x08	Extended function NUM
1	8	Unsigned char	0x00	Reserved
2	16	Unsigned short	65002	I&M index:= I&M 2
4	80	10 bytes	0x00	I&M header
I&M data block 2				
14	128	Char 16	"YYY-MM-DD"	IM2 installation date
30	304	Char 38	20h	Reserved
Total bytes: 68				

Table 5- 32 Structure of data record DS255, IM3 data - read access and write access

Byte	Number of bits	Format	Standard	Description
0	8	Unsigned char	0x08	Extended function NUM
1	8	Unsigned char	0x00	Reserved
2	16	Unsigned short	65003	I&M index:= I&M 3
4	80	10 bytes	0x00	I&M header
I&M data block 3				
14	432	Char 54	20h	IM3 comment
Total bytes: 68				

Table 5- 33 Structure of data record DS255, IM4 data - read access and write access

Byte	Number of bits	Format	Standard	Description
0	8	Unsigned char	0x08	Extended function NUM
1	8	Unsigned char	0x00	Reserved
2	16	Unsigned short	65004	I&M index:= I&M 4
4	80	10 bytes	0x00	I&M header
I&M data block 2				
14	432	Char 54	00h	IM4 signature
Total bytes: 68				

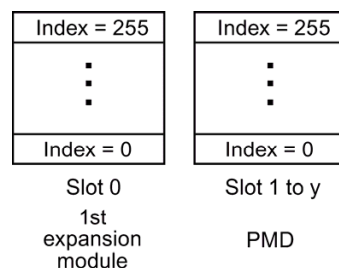
5.3.23 Addressing parameter

When addressing data, PROFIBUS assumes that the slaves have a modular physical design or that they are structured internally into function units or "modules".

Modular system design

In acyclic data traffic, all data records enabled for write or read accesses are assigned to the modules. You can address these data records with the help of the slot number and the index. The slot number addresses the module and the index addresses the data records belonging to the module. Each data record can be up to 240 bytes in size. Each slot can have its own data records.

You can address each slot individually and access special information of the slot, such as its I&M data.



Y Maximum number of slots for the relevant 7KM PAC measuring device

Figure 5-4 Measuring device: Modular concept

See also

Reading data records DS51 and DS205 (Page 76)

5.4 Reading and writing data record with SIMATIC S7

The SIMATIC S7 and other PROFIBUS DP masters offer functions for reading and writing data records.

SIMATIC S7

The SIMATIC S7 offers the following system function blocks:

- SFB 52 "RDREC" (read record): Read a data record
- SFB 53 "WRREC" (write record): Write data record
- SFB 54 "RALRM" (read alarm): Read alarm

The description, functional principle, and use of the system function blocks is contained in the manuals for the SIMATIC and the STEP 7 Online Help.

5.5 Reading and writing data record with other PROFIBUS DP masters

PROFIBUS DP master

Other PROFIBUS DP masters offer the following functions from the PROFIBUS Guideline "Communication and Proxy Function Blocks according to IEC 61131-3":

- Function block "RDREC" (read record): Read a data record
- Function block "WRREC" (write record): Write data record
- Function block "RALRM" (read alarm): Read alarms

5.6 Protocol sequence for read data record and write data record

Fundamentals

The class 1 master has send authorization and corresponds cyclically over the MS0 channel consecutively with slave 1, slave 2 etc. by means of request and response. Following this, it passes the send authorization to the class 2 master. The class 2 master can establish an acyclic connection with any slave in the remaining time of the programmed cycle, and exchange data with this slave over the MS2 channel. At the end of the current cycle time, it returns the send authorization to the class 1 master. The class 1 master can exchange acyclic data with slaves in a similar way over the MS1 channel.

Different data records have been defined for the 7KM PAC measuring device. Each data record should have a maximum length of 200 bytes. This supports the routing property of the acyclic data.

The DPV1 protocol is used for acyclic data exchange between a PROFIBUS DP class 1 master or a class 2 master and the slave. The DPV1 protocol is downward compatible. This allows you to connect PROFIBUS DP-V0 and PROFIBUS DP-V1 devices on one segment.

With a class 2 master, you can establish communication with slaves

- that have not been configured and parameterized by this master
- that still have a connection to a class 1 master.

Up to four Class 2 DP masters can simultaneously access the PAC via the PROFIBUS DP module.

Message frame formats for DPV1

Function number	Slot	Index	Length
-----------------	------	-------	--------

Figure 5-5 DPV1 message frame format read request

Function number	Slot	Index	Length	Data
-----------------	------	-------	--------	------

Figure 5-6 DPV1 message frame format read response

Function number	Slot	Index	Length	Data
-----------------	------	-------	--------	------

Figure 5-7 DPV1 message frame format write request

Function number	Slot	Index	Length
-----------------	------	-------	--------

Figure 5-8 DPV1 message frame format write response

Ensure that the length is exactly correct when writing.

Function number	Slot	Interrupt type	Specifier
-----------------	------	----------------	-----------

Figure 5-9 DPV1 message frame format interrupt response

Function number	Error Decode	Error Code 1	Error Code 2
-----------------	--------------	--------------	--------------

Function number	<ul style="list-style-type: none"> If an error occurs: Boolean OR operation of the function number from DPV1 with 0x80 = B#16#DE with read data record = B#16#DF with write data record
Error Decode	Location of error detection: 7KM PAC PROFIBUS DPV1 0x80 expansion module
Error Code 1	Error detection (see also the "Causes for sending Error Code 1" table)
Error Code 2	—

Figure 5-10 DPV1 error message frame

Note

The structures of the error message frame and the error codes comply with the PROFIBUS standard.

You can find further information in IEC 61158 and the "PROFIBUS Profile Guidelines Part 1: Identification & Maintenance Functions".

Function numbers

Table 5- 34 Meanings of the most important function numbers

Function number	Meaning
0x48	Idle
0x51	Data Transport
0x56	Resource Manager Response
0x57	Initiate
0x58	Abort
0x5C	Alarm Acknowledge (on MS1 only)
0x5E	Read
0x5F	Write

Causes

Table 5- 35 Causes for sending Error Code 1

Error Code 1	Error	Meaning
0xA0	Reading error	Occurs during read access to a DSx with "Write only" access authorization
0xA1	Write error	Occurs during write access to a DSx with "Read only" access authorization
0xA9	The function is not supported	Occurs during write access to IM0 data
0xB0	Invalid index	Occurs when DSx not implemented, e.g.: <ul style="list-style-type: none"> • If the index in the I&M header of the DS255 is invalid. • If the Extendet_Func_Num 0x08 in the I&M header of the DS255 is missing.
0xB1	"Write" length error	Occurs when length specification for Write DSx is incorrect
0xB2	Invalid slot	Occurs when invalid slot specified for Read and Write DSx
0xB5	Status conflict	Occurs in the following cases: <ul style="list-style-type: none"> • Read DS255 without previous indexing • Read DSx without previous indexing • Read DSx, if this DSx has not previously been initialized via Write DSx.¹⁾
0xC2	Temporarily not possible.	Occurs in the following cases: <ul style="list-style-type: none"> • Write DS. The PAC PROFIBUS DP expansion module is busy with another job. • Read DS. The PAC PROFIBUS DP expansion module is busy with the current job.

1) From 7KM PAC4200

See also

Addressing parameter (Page 71)

Reading data records DS51 and DS205 (Page 76)

5.7 Reading data records DS51 and DS205

In the case of 7KM PAC with 7KM9300-0AB01-0AA0, data records DS51 and DS205 are read with the CALL mechanism in the same way as the I&M data of DS255. This does not apply to the 7KM PAC3200 with 7KM9300-0AB00-0AA0.

Note

Further information

You can find further information on the CALL mechanism in IEC 61158-6, Chapter 6, and the "PROFIBUS Profile Guidelines Part 1: Identification & Maintenance Functions".

Procedure

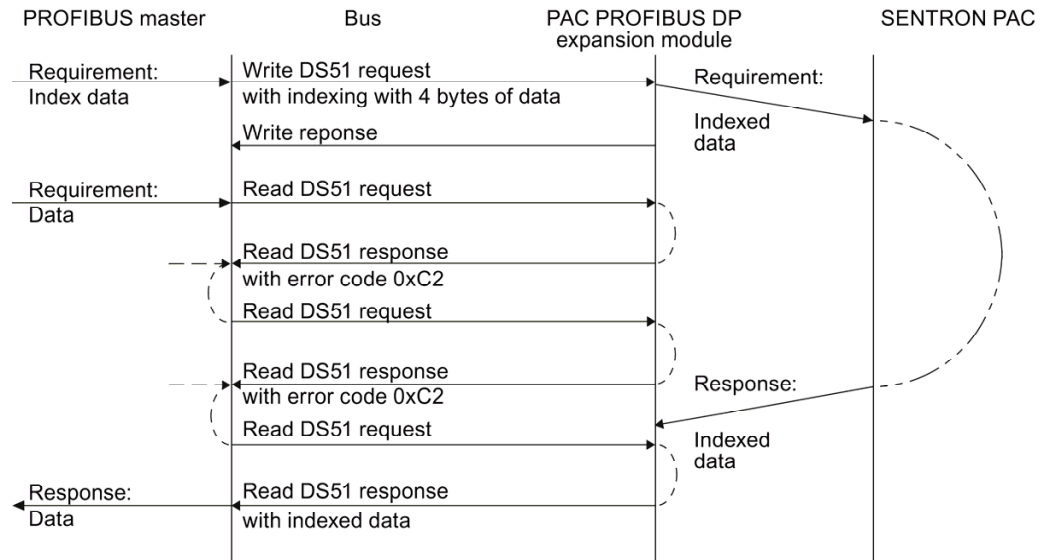


Figure 5-11 Example: Reading DS51

The DP master indexes the data with the Write DSxx request. Indexing is carried out with a 4-byte-long header whose content is irrelevant. After indexing the Read DS request, only this DP master is permitted to fetch the data. If another master attempts to fetch this data, its Read DS request will be rejected with error code 0xB5.

All subsequent Read DS requests of this DP master, and the indexing attempts of all other DP masters, will also be rejected with the error code 0xC2 until the DP master fetches the requested data.

Each indexed Read DS request has a maximum life of approximately 10 s. Following this, the 7KM PAC PROFIBUS DP expansion module is ready for indexing again.

The 7KM PAC PROFIBUS DP expansion module checks the formal correctness of the Write request for:

- Message frame length: e.g. 4 bytes at indexing
- Index

If an error occurs, the request is rejected and an error code is sent

See also

Protocol sequence for read data record and write data record (Page 73)

Addressing parameter (Page 71)

Basic type 1 and basic type 2 DS51 (Page 47)

Energy counter DS205 (Page 67)

5.8 Data formats

5.8.1 Energy counters

Energy counters in Float format

The 7KM PAC measuring devices supply the measured variables listed in the table below in Float and Double Float format via PROFIBUS/PROFINET. The values can be more easily evaluated in Float in the SIMATIC, for example. High statuses of the energy counters are resolved in Float format with up to 7 decimal places.

Table 5- 36 Energy counters available in Float format

Name	Format	Value range
Active energy import tariff 1	Float	Overflow 1.0e+12
Active energy import tariff 2	Float	Overflow 1.0e+12
Active energy export tariff 1	Float	Overflow 1.0e+12
Active energy export tariff 2	Float	Overflow 1.0e+12
Reactive energy import tariff 1	Float	Overflow 1.0e+12
Reactive energy import tariff 2	Float	Overflow 1.0e+12
Reactive energy export tariff 1	Float	Overflow 1.0e+12
Reactive energy export tariff 2	Float	Overflow 1.0e+12
Apparent energy tariff 1	Float	Overflow 1.0e+12
Apparent energy tariff 2	Float	Overflow 1.0e+12

In the GSD file, the measured variables in Double Float format are indicated by (D), and the measured variables in Float format by (F).

Note

Resetting the energy counters

If you carry out calculations with these measured variables in Float format, e.g. to calculate the daily or monthly consumption, inaccuracies arise in the case of values with more than 7 representable digits. You can ensure the accuracy of the measured values by resetting the energy counters before the counter value exceeds 7 digits.

See also

Measured variables (Page 29)

5.8.2 Limits

The 7KM PAC3200 offers limit values. These limit values are available via the PROFIBUS in the "Limit Violations" measured variable.

Limit values of the 7KM PAC3200 measuring device

Table 5- 37 Available limit values

Name	Byte	Bit	Format	Value range	Access
Limit value logic	0	0	Bit	0, 1	R
Limit 0	3	0	Bit	0, 1	R
Limit 1		1	Bit	0, 1	R
Limit 2		2	Bit	0, 1	R
Limit 3		3	Bit	0, 1	R
Limit 4		4	Bit	0, 1	R
Limit 5		5	Bit	0, 1	R

R	Read; read access
---	-------------------

Note

Limit violations can trigger diagnostic interrupts.

Limit values of other 7KM PAC measuring devices

You can find the limit values for the 7KM PAC measuring devices in the relevant manual.

5.8.3 Digital inputs status and digital outputs status

Input status and output status of the 7KM PAC measuring device

The following are available via the PROFIBUS:

- The input status of the internal input of the 7KM PAC measuring device in the "Digital inputs status" measured variable
- The output status of the internal output of the 7KM PAC measuring device in the "Digital outputs status" measured variable

Table 5- 38 Scheme: Input status and output status of the 7KM PAC measuring device

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	MSB	—	—	—	—	—	—	—
Byte 1	—	—	—	—	—	—	—	—
Byte 2	—	—	—	—	—	—	—	—
Byte 3	—	—	—	—	—	—	DI / DO 0.1 ^{1) 2)}	DI /DO 0.0 ^{1) 2)} . LSB

1) = Read access

2) "0" = OFF; "1" = ON¹⁾

Abbreviation	Meaning
LSB	Least significant byte
MSB	Most significant byte

See also

Status of the output signals DS68 (Page 48)

Status of the DS69 input signals (Page 49)

5.9 Acyclic data traffic in the case of PROFlenergy

PROFlenergy

The 7KM PAC Switched Ethernet PROFINET expansion module supports acyclic data traffic in accordance with the PROFlenergy (Query_Measurement) standard.

See also

Further documentation (Page 11)

5.9.1 I&M device identification

This data record contains the I&M data for the unique identification of a 7KM PAC measuring device.

Addressing the I&M data records

I&M data records for the 7KM PAC: Address slot "X1": slot number 0 and subslot 0x8000.

I&M data records for the 7KM PAC Switched Ethernet PROFINET expansion module Address slot "0": slot number 0 and subslot 1.

You can address the slot and the subslot with the slot's diagnostics address you have defined in the properties of the PROFINET device in the HW Config, for example.

Table 5- 39 Structure of data record 0xaff0, IM0 data read access only

Byte	Number of bits	Format	Standard	Description
0	16	Unsigned short	0x0020	Block type: IM0
2	16	Unsigned short	0x0038	Block length
4	8	Unsigned char	0x01	Block version High
5	8	Unsigned char	0x00	Block version Low
I&M data block 0				
0006	16	Unsigned short	42	IM0 manufacturer ID ¹⁾
0008	160	Char 20	—	IM0 order number
0028	128	Char 16	—	IM0 serial number
0044	16	Unsigned short	—	IM0 hardware version
0046	32	1*char 3*unsigned short	—	IM0 firmware version
0050	16	Unsigned short	0x0000	IM0 counter for changes
0052	16	Unsigned short	F600	IM0 profile ID
0054	16	Unsigned short	0x00	IM0 profile-specific ID
0056	16	Unsigned short	0x0101	IM0 version of the I&M data
0058	16	Unsigned short	001E	IM0-supported I&M data
Total bytes: 60				

1) Standard: 42. "42" stands for Siemens AG.

Table 5- 40 Structure of data record 0xaff1, IM1 data - read access and write access

Byte	Number of bits	Format	Standard	Description
0	16	Unsigned short	0x0021	Block type: IM1
2	16	Unsigned short	0x0038	Block length
4	8	Unsigned char	0x01	Block version High
5	8	Unsigned char	0x00	Block version Low
I&M data block 1				
0006	256	Char 32	20h	IM1 plant identifier
0040	176	Char 22	20h	IM1 location identifier
Total bytes: 60				

Table 5- 41 Structure of data record 0xaff2, IM2 data - read access and write access

Byte	Number of bits	Format	Standard	Description
0	16	Unsigned short	0x0022	Block type: IM2
2	16	Unsigned short	0x0038	Block length
4	8	Unsigned char	0x01	Block version High
5	8	Unsigned char	0x00	Block version Low
I&M data block 2				
0006	128	Char 16	"YYY-MM-DD"	IM2 installation date
0022	304	Char 38	20h	Reserved
Total bytes: 60				

Table 5- 42 Structure of data record 0xaff3, IM3 data - read access and write access

Byte	Number of bits	Format	Standard	Description
0	16	Unsigned short	0x0023	Block type: IM3
2	16	Unsigned short	0x0038	Block length
4	8	Unsigned char	0x01	Block version High
5	8	Unsigned char	0x00	Block version Low
I&M data block 3				
0006	432	Char 54	20h	IM3 comment
Total bytes: 60				

Table 5- 43 Structure of data record 0xaff4, IM4 data - read access and write access

Byte	Number of bits	Format	Standard	Description
0	16	Unsigned short	0x0023	Block type: IM4
2	16	Unsigned short	0x0038	Block length
4	8	Unsigned char	0x01	Block version High
5	8	Unsigned char	0x00	Block version Low
I&M data block 2				
0006	432	Char 54	00h	IM4 signature
Total bytes: 60				

Configuring

6.1 Default settings

Factory settings of the 7KM PAC PROFIBUS DP expansion module

Table 6- 1 Factory settings

Parameter	Value
Address	126
Baud rate in bit/s	Automatic recognition
Type of the connected 7KM PAC measuring device	Automatic recognition
Language	The communication parameters are displayed in the language set on the 7KM PAC measuring device. Default setting: English

Factory settings of the 7KM PAC Switched Ethernet PROFINET expansion module

Table 6- 2 Factory settings

Parameter	Value
IP address	0.0.0.0
Gateway	0.0.0.0
Subnet	0.0.0.0
NameOfStation	—
Type of the connected 7KM PAC measuring device	Automatic recognition
Language	The communication parameters are displayed in the language set on the 7KM PAC measuring device. Default setting: English

6.2 Configuration scenarios

In the SIMATIC environment, you can configure the 7KM PAC measuring device and the expansion modules in the following way:

- Integration of the 7KM PAC measuring device via PROFIBUS using STEP 7 and the device-specific GSD file
- Integration of the 7KM PAC measuring device via PROFINET using a STEP 7 GSDML file

Configuring the integration of PROFIBUS/PROFINET using STEP 7 and the GSD/GSDML file

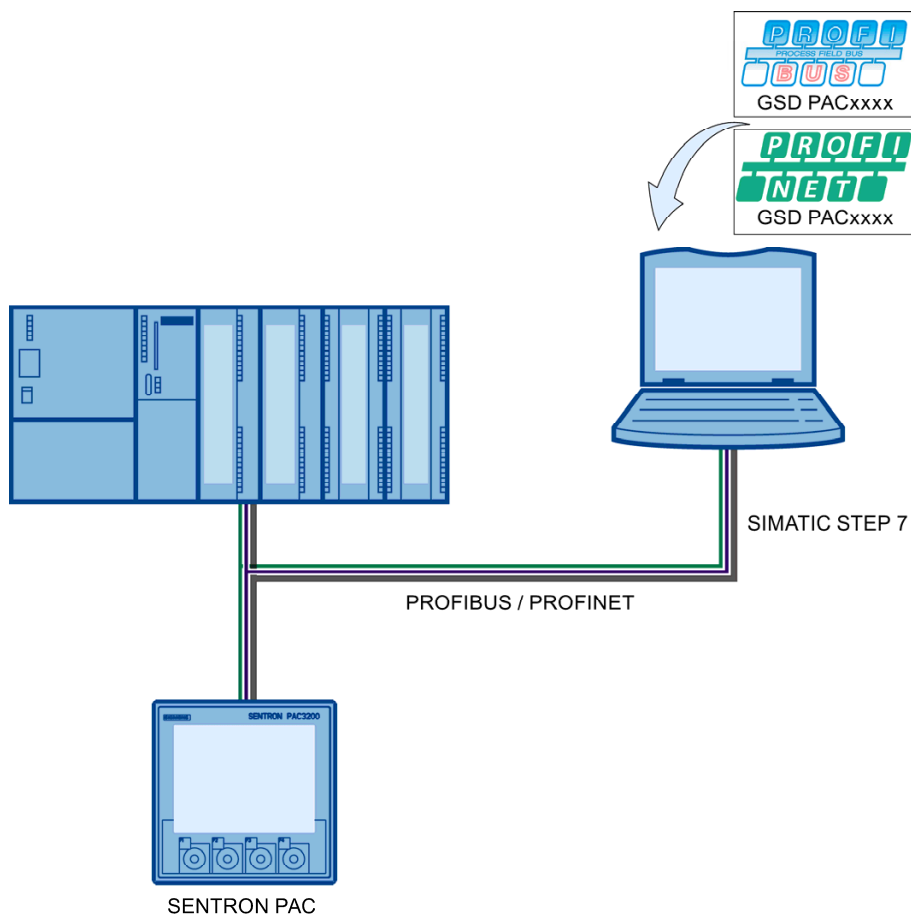


Figure 6-1 Configuring the integration of PROFIBUS/PROFINET using STEP 7 and the GSD/GSDML file

Note

Configuration with other tools

You can also use configuration tools from other manufacturers for the configuration.

6.3 Changing the address of the 7KM PAC PROFIBUS DP expansion module

Setting a unique address

Every device requires a unique address. The address is stored in the PAC PROFIBUS DP expansion module. Address 126 is used for commissioning purposes only. It must not be used for data communication.

Change the address of each device before you begin transferring data. You can change the address:

- Via the menu of the 7KM PAC measuring device
- With *powerconfig* via the Ethernet interface
- With the PROFIBUS configuring software, e.g., STEP 7
- Via the PROFIBUS interface by means of a class 2 master

NOTICE
Address change on device immediately valid
When you change the address of the PROFIBUS DP slave on the 7KM PAC, the 7KM PAC PROFIBUS DP expansion module is automatically restarted as soon as you quit the menu. The new address is then active. Reconfigure the PROFIBUS DP master with the new address. Communication is interrupted until this change takes effect.

6.4 Configuring by means of the GSD/GSDML file

Task of the GSD/GSDML file

The GSD file is:

- A text file in ASCII format in the case of PROFIBUS.
- A file in XML format in the case of PROFINET

It describes the following for the individual 7KM PAC devices:

- The measured variables
- The status information
- The control information
- The communication characteristics

The GSD file makes this data available to the class 1 master, and the GSDML file makes it available to the PROFINET IO controller. The GSD file is the basis for the configuration of a device.

PROFIBUS devices have a unique PROFIBUS ID number and a GSD file. The GSD file is matched to the 7KM PAC measuring device.

Naming convention of the PROFIBUS GSD file

The name of the GSD file contains the following information:

Table 6- 3 Composition of the file name

Places	Meaning
1 ... 2	"SI" for Siemens
3 ... 4	Version of the GSD file, e.g. "01" for the first version
5 ... 8	Identification number; this is assigned by PI.

Naming convention of the PROFINET GSDML file

The PROFINET GSDML file is language-independent. All devices and all languages are described in it. The name of the GSDML file contains the following information:

Table 6- 4 Composition of the file name

Fields	Meaning
1	"GSDML"
2	Version number of the GSD file in Vx.y format
3	Name of the manufacturer
4	Name of the device family
5	Issue data of the GSDML file in the format: YYYYMMDD
6	Optional issue time of the GSDML file in the format: hhmmss hh from 00 ... 24.
7	Extension of the filename "XML"

Language of the PROFIBUS GSD file

The GSD file is language-dependent.

Table 6- 5 GSD file extensions

Language-dependent GSD file extension	Language
GSE	English (ANSI)
GSG	German
GSF	French
GSI	Italian
GSP	Portuguese
GSS	Spanish
GSD	Language-neutral (English IEC)

Assignment of the PROFIBUS GSD file to the device and firmware version of the expansion module

Table 6- 6 Name of the GSD file, e.g.

Name of the GSD file	Meaning
SIEM8163.GSx	GSD file for the 7KM PAC3200 measuring device with a 7KM PAC PROFIBUS DP-V0 expansion module with the firmware version 1.0.1
SI018163.GSx	Version "01" of the GSD file for the 7KM PAC3200 measuring device with a PAC PROFIBUS DP-V1 expansion module with the firmware version 2.0.0
SI018173.GSx	Version "01" of the GSD file for the 7KM PAC4200 measuring device with a PAC PROFIBUS DP expansion module with the firmware version 3.0.0

Note**Latest version of the GSD file**

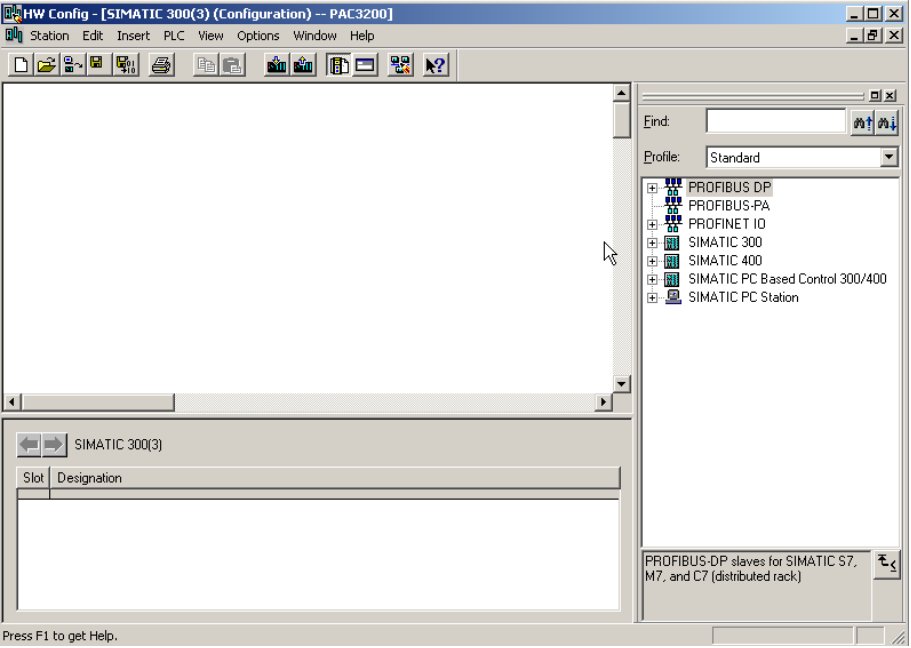
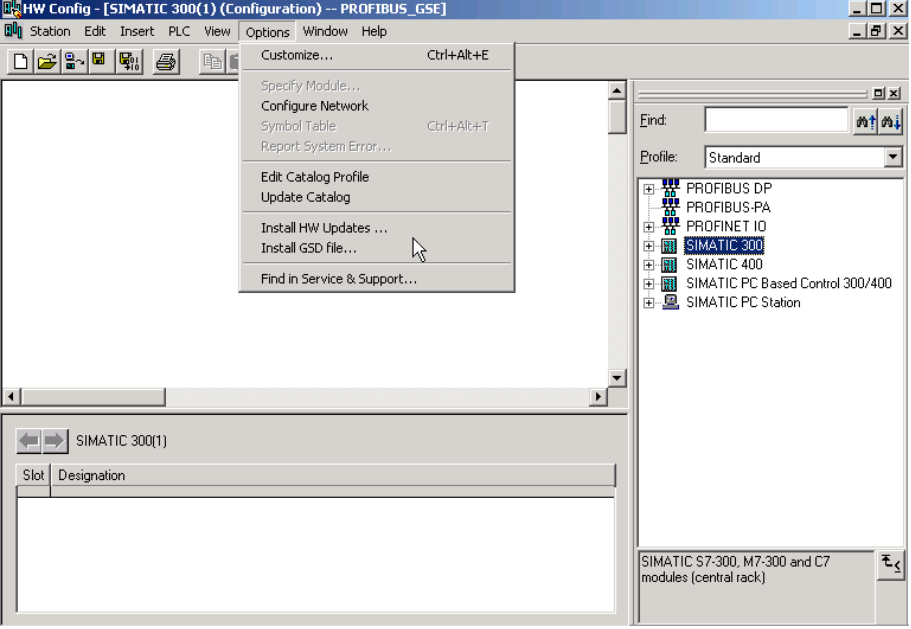
You can find the latest version of the GSD file in each case on the Internet Online service and support (<http://www.siemens.com/automation/service&support>).

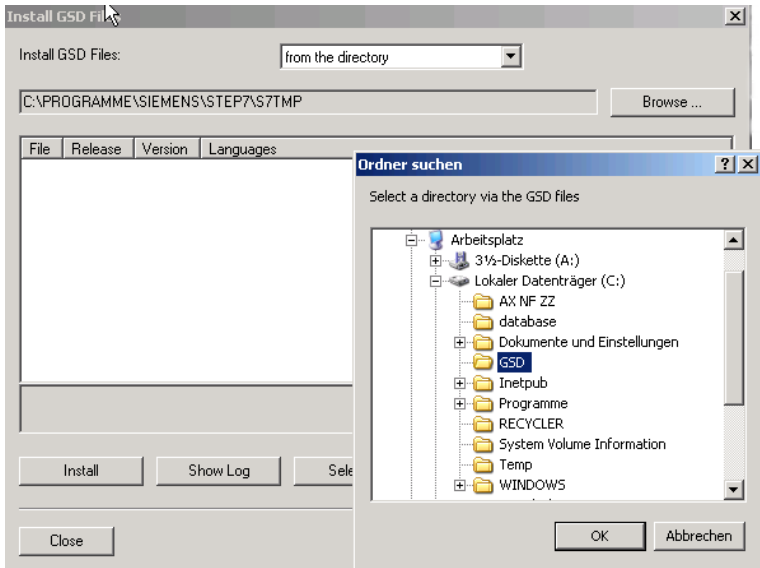
Configuring by means of the GSD file, based on STEP 7

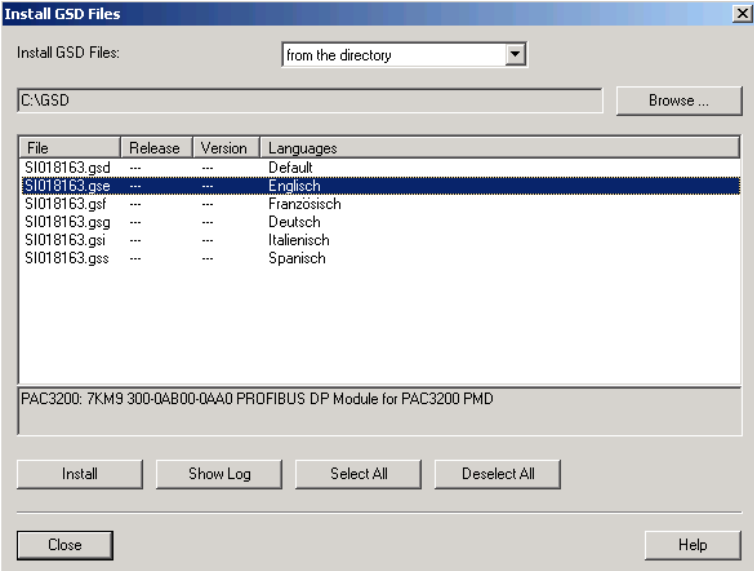
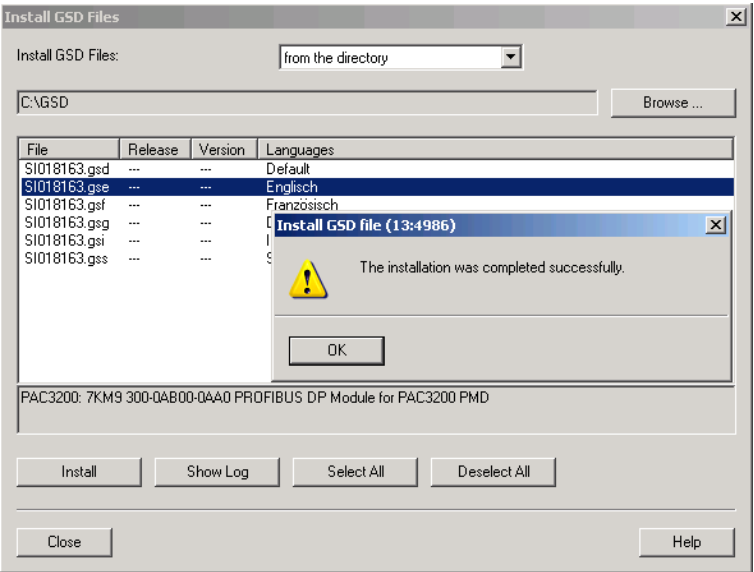
Note**7KM PAC Switched Ethernet PROFINET expansion module**

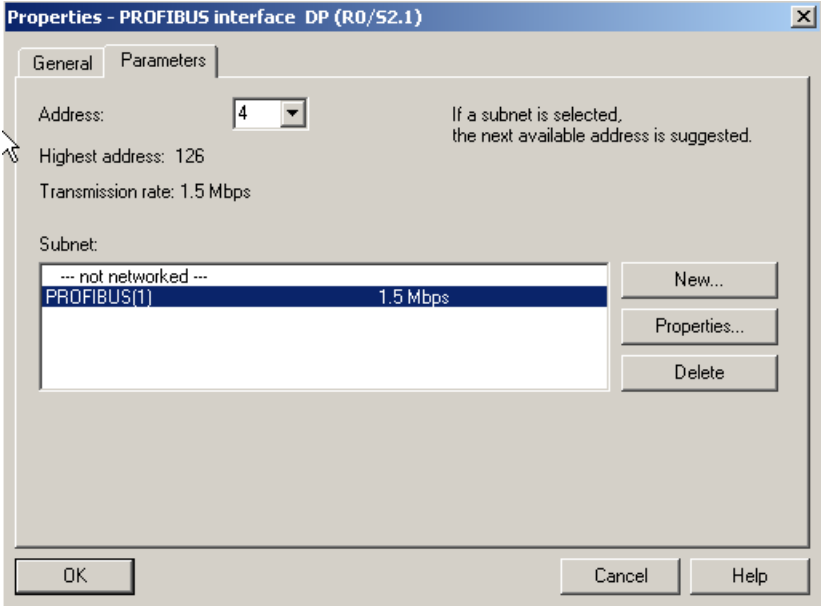
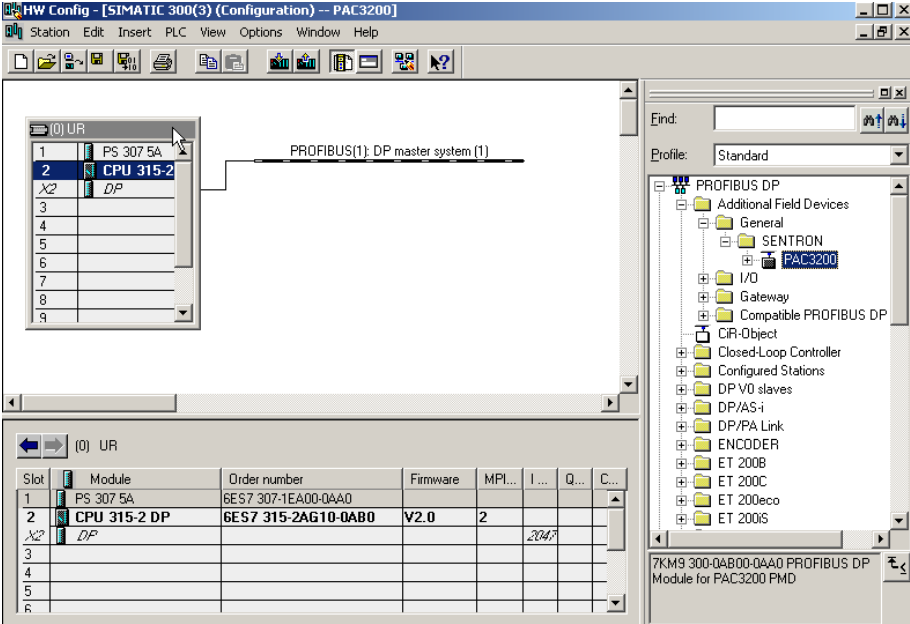
The same procedure applies when using the 7KM PAC Switched Ethernet PROFINET expansion module.

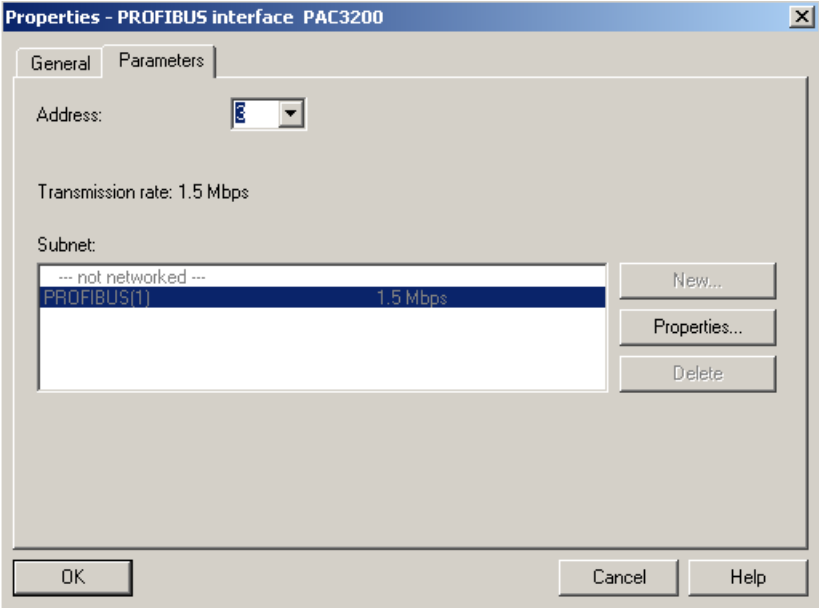
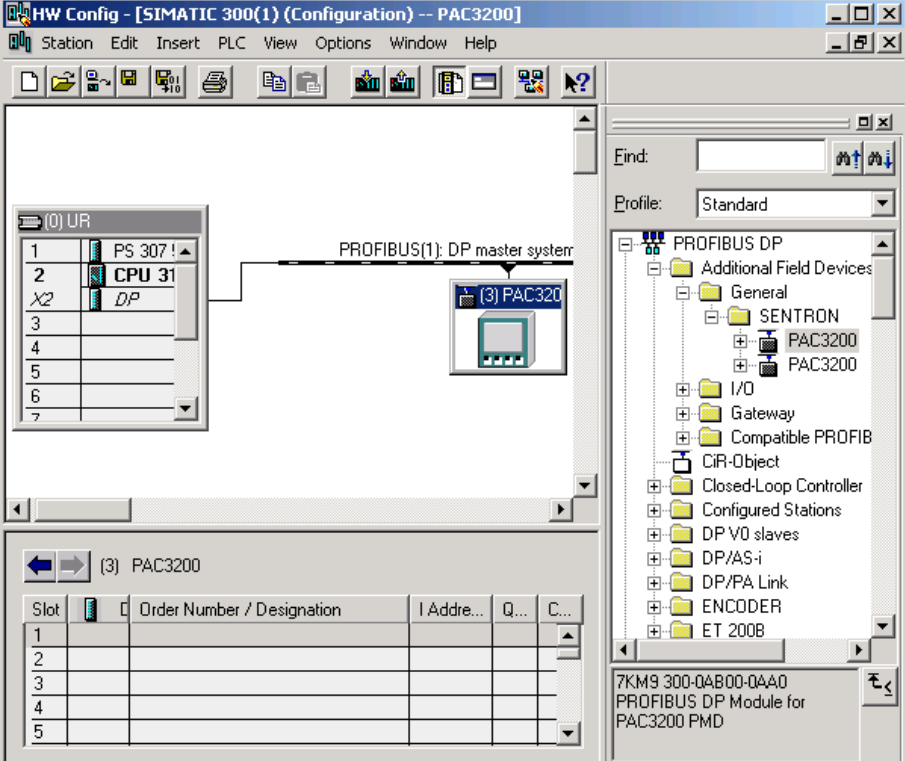
Table 6- 7 Example of how to proceed

Sequence	Screen
1 Start HW Config in the SIMATIC Manager.	 <p>HW Config after start-up</p>
2 Confirm in the "Options" > "Install GSD File" menu.	 <p>Call the "Install GSD File" function</p>

Sequence	Screen
3	<div><div>Select the directory in which the GSD file is stored.</div><div></div><div>Select the directory with the GSD file</div></div>

Sequence	Screen
4	<p>Install the GSD file.</p>  <p>Installing GSD file</p> <p>On successful completion of the installation of the GSD file, the following message is displayed:</p>  <p>Installation of the GSD file successfully completed</p>

Sequence	Screen
5	<div><div><p>Add a rack and insert in it the modules that are required, e.g., the CPU with PROFIBUS DP interface. After inserting the CPU, a window is opened. Enter the address of the PROFIBUS master here.</p></div><div></div><div>Setting the PROFIBUS address of the master</div></div>
6	<div><div><p>Select the 7KM PAC measuring device in the hardware tree: "PROFIBUS DP" > "Additional Devices" > "SENTRON" > "PAC"</p></div><div></div><div>Add the measuring device to HW Config</div></div>

Sequence	Screen
<p>7 Drag the 7KM PAC measuring device from the hardware tree to the PROFIBUS DP master system 1.</p> <p>Set the address of the 7KM PAC PROFIBUS DP expansion module.</p>	 <p>Set the address of the 7KM PAC PROFIBUS DP expansion module</p>
<p>8 Click on the icon for the 7KM PAC measuring device.</p>	 <p>HW Config with the integrated 7KM PAC PROFIBUS DP expansion module</p>

Note

Do not use the universal module

Because of the predefined data types and the available measured values, the use of the STEP 7 universal module in the configuration is not supported.

See also

Default settings (Page 85)

6.5 Information and settings for the 7KM PAC PROFIBUS DP expansion module on the 7KM PAC measuring device

When the 7KM PAC PROFIBUS DP expansion module is mounted on the 7KM PAC measuring device, you can read information about the PAC PROFIBUS DP expansion module, and set its address, on a separate screen form.

Information and settings on the 7KM PAC measuring device

Depending on the device version, you call the following in the main menu of the measuring device:

- 7KM PAC "Settings" > "PROFIBUS Module"
- 7KM PAC "Settings" > "Expansion Module" > "MODx" > "PROFIBUS Module"

You then see the following screen:

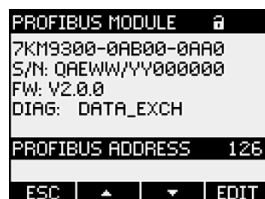


Figure 6-2 Setting the PROFIBUS address on the 7KM PAC

You will find the following information listed in the upper half of the screen form:

- The order number
- The serial number of the 7KM PAC PROFIBUS DP expansion module
- Firmware version of the 7KM PAC PROFIBUS DP expansion module
- In the "DIAG" field, you can see the communication status of the 7KM PAC PROFIBUS DP expansion module:

6.5 Information and settings for the 7KM PAC PROFIBUS DP expansion module on the 7KM PAC measuring device

Table 6- 8 Communication status with meaning

Status	Meaning
BAUD_SRCH	Searches the PROFIBUS master for the baud rate.
WAIT_PRM	The 7KM PAC PROFIBUS DP expansion module is waiting for parameterization or a request from the master.
PRM_FAULT	Incorrect parameterization; e.g. wrong GSD file
WAIT_CFG	Parameterization is OK. The PAC PROFIBUS DP expansion module is waiting for configuration.
CFG_FAULT	Incorrect configuration message frame, e.g. an incorrect measured variable has been configured.
DATA_EXCH	Configuration is OK. Data is exchanged with a class 1 master.
CON_MC2	Configuration is OK. The connection with a class 2 master has been established.

"PROFIBUS ADDRESS":

Each expansion module requires a unique address. The address 126 is the default for startup purposes. Change this address!

Valid address area: 1 ... 125

6.6 Information and settings for the 7KM Switched Ethernet PROFINET expansion module on the 7KM PAC measuring device

When the 7KM PAC Switched Ethernet PROFINET expansion module is mounted on the 7KM PAC measuring device, you can use it to read information about the 7KM PAC Switched Ethernet PROFINET expansion module on a separate screen form and to make settings for the module.

Information and settings on the 7KM PAC measuring device

Depending on the device version, you call the following in the main menu of the measuring device:

- 7KM PAC "Settings" > "Switched Ethernet"
- 7KM PAC "Settings" > "Expansion Module" > "MODx" > "Switched Ethernet"

Note

Valid firmware versions

The following is required for the 7KM PAC Switched Ethernet PROFINET expansion module:

- 7KM PAC3200 firmware version > V2.1.2 or higher
- 7KM PAC4200 firmware version > V1.3.1 or higher

In earlier versions, it is not possible to make settings in the screen form. It displays information only. You can make settings in the PROFINET software, e.g. in HW Config.

You then see the following screen:



Figure 6-3 7KM PAC Switched Ethernet PROFINET expansion module information on the 7KM PAC

You can see the following information:

- The order number
- The serial number of the 7KM PAC Switched Ethernet PROFINET expansion module
- Firmware version of the 7KM PAC Switched Ethernet PROFINET expansion module
- In the "DIAG" field, you can see the communication status of the 7KM PAC Switched Ethernet PROFINET expansion module

Table 6- 9 Communication status with meaning

Status	Meaning	Remedy
OK	The expansion module is ready for operation.	—
INIT	The expansion module is in the start phase.	—
SYS_ERR	The hardware and/or firmware of the 7KM PAC and the 7KM PAC Switched Ethernet PROFINET expansion module do not match.	Please contact Support.

- The first characters of the NameOfStation (maximum 26 characters) of the 7KM PAC Switched Ethernet PROFINET expansion module

"IP-ADDR.":

You can set the IP address of the module here. A PROFINET IO controller can change these settings using its configuration.

Call the "- ->" menu item. You then see the following screen:



Figure 6-4 7KM PAC Switched Ethernet PROFINET expansion module settings on the 7KM PAC

"SUBNET":

You can set the SUBNET address of the module here. A PROFINET IO controller can change these settings using its configuration

"GATEWAY":

You can set the gateway address of the module here. A PROFINET IO controller can change these settings using its configuration

"SNTP-IP":

You can set the address of the SNTP server here. This is for time synchronization purposes.

"MAC":

The MAC address of the 7KM PAC Switched Ethernet PROFINET expansion module is displayed here.

"MAC P1", "MAC P2":

The Ethernet addresses of the PROFINET switch ports are displayed here.

Maintenance, service and disposal

7.1 Cleaning

Description

The 7KM PAC PROFIBUS DP expansion module and the 7KM PAC Switched Ethernet PROFINET expansion module are maintenance-free.

Note

Damage due to detergents

Detergents can damage the device. Do not use detergents.

Note

Faulty connector

Be careful not to bend the pins of the connector. Bent pins can destroy the connector.

1. Use only a dry, lint-free, antistatic cloth to clean the housing.
2. Clean the pins carefully using an antistatic brush.

7.2 Repair

Procedure

Note

Loss of certification and warranty

If you open the module, the module certification will be lost and the Siemens warranty will be invalidated. Only the manufacturer is permitted to carry out repairs on the module. Return faulty or damaged modules to Siemens for repair or replacement.

If the module is faulty or damaged, proceed as follows:

1. Discharge yourself.
2. Remove the module.
3. Pack the module in a suitable manner to prevent it from being damaged during transport.
4. Return the module to Siemens. You can obtain the address from:
 - Your Siemens sales partner
 - Technical support

See also

Electrostatic sensitive devices (ESD) (Page 127)

7.3 Disposal

Disposal and recycling

Dispose of or recycle the module in accordance with the applicable laws and regulations in your country.

7.4 Firmware updates

powerconfig

Note

Performing a firmware update

Before updating the firmware, consult Technical Support to confirm that it is necessary. Update the firmware **only** if absolutely necessary.

Update the firmware with the *powerconfig* configuration software. Additional information on updating the firmware can be found in the online help for *powerconfig*.

Ethernet connection for firmware update of the 7KM PAC PROFIBUS DP expansion module

Establish a physical Ethernet connection between *powerconfig* and the Ethernet interface of the 7KM PAC measuring device.

Ethernet connection for firmware update of the 7KM PAC Switched Ethernet PROFINET expansion module

Establish a physical Ethernet connection between *7KM powerconfig* and the Ethernet interface of the 7KM Switched Ethernet PROFINET expansion module.

A firmware update of the 7KM PAC Switched Ethernet PROFINET is not possible via the Ethernet interface of the 7KM PAC measuring device.

Power failure during the firmware update

NOTICE
A power failure during a firmware update disables the functionality of the expansion module <p>The firmware update of the 7KM PAC PROFIBUS DP expansion module lasts approximately 8 to 13 minutes. The firmware update of the 7KM PAC Switched Ethernet PROFINET lasts approximately 3 minutes. To update the firmware of the module, connect the 7KM PAC and the module to a fail-safe power supply.</p> <p>If the power fails despite this security measure, try to start the firmware update of the module again in <i>powerconfig</i>.</p>

Interrupt, error, and system messages

8.1 Diagnostic and process interrupts for PROFIBUS DP

SENTRON PAC can realize

- Diagnostic functions according to PROFIBUS DPV0 and also
- Diagnostic interrupts and
- Process interrupts according to PROFIBUS DPV1.

Communication between the SENTRON PAC (= DP slave) and the PROFIBUS master, e.g. SIMATIC S7 or PC, is based on the protocol sequences defined for PROFIBUS.

The data described below is made available to users through local interfaces.

In the SIMATIC environment, interrupts are signaled via OB40 and OB82. Diagnostic data is read via SFB 54.

Note

PROFINET IO does not support process interrupts.

PROFINET diagnostic interrupts are handled as channel diagnosis. Detailed information can be read out via SFB54. Refer to the GSDML file for the assignments of error types to error text.

8.2 Diagnostic data for PROFIBUS DPV0

Structure of the slave diagnostics message

Item	Contents	Bit	Value	Contents	
Byte 0	Station status			Contents and values according to PROFIBUS Profile Guidelines Part 3	Slave diagnostics in accordance with standard
Byte 1					
Byte 2					
Byte 3	Master address				
Byte 4	Identification number (high)				
Byte 5	Identification number (low)				Device diagnostic message
Byte 6	Header		Type + length		
Byte 7	Status type		1		
Byte 8	Slot no.		0 = module 1 = PAC		
Byte 9	Specifier		1 = incoming 2 = outgoing		
Byte 10	User data 1	Bits 0 ... 6	d.c.	Reserved	
		Bit 7	1	Diagnostic data available	
Byte 11	User data 2	Bit 0	1	Communication with PAC not yet ready	
		Bit 1	1	Communication with PAC not possible	
		Bit 2	d.c.	Reserved	
		Bit 3	1	Internal fault (CRC error)	
		Bit 4	d.c.	Reserved	
		Bit 5	1	Internal fault (frame error)	
		Bit 6	1	Internal fault (timeout)	
		Bit 7	1	PAC and module firmware versions do not match → Firmware update required	
Byte 12	User data 3	Bit 0	1	Voltage out of range	
		Bit 1	1	Current out of range	
		Bit 2	1	Maximum pulse rate exceeded	
		Bit 3	1	Limit violation	
		Bits 4 ... 7	d.c.	Reserved	
Byte 13	User data 4	Bit 0	1	Digital outputs not remotely controllable	
		Bit 1	d.c.	Reserved	
		Bit 2	1	Energy counter write operation failed	
		Bit 3	1	Write operation rejected due to write protection or write protection connection changed.	

Item	Contents	Bit	Value	Contents	
		Bit 4	d.c.	Reserved	
		Bit 5	1	Internal communication error	
		Bit 6	1	Internal communication error	
		Bit 7	1	Internal communication error	

8.3 Diagnostic interrupts according to PROFIBUS DPV1

The structure of the diagnostic interrupt message is very similar to the diagnostic message for PROFIBUS DPV0

Item	Contents	Bit	Value	Contents	
Byte 0	Station status			Contents and values according to PROFIBUS Profile Guidelines Part 3	Slave diagnostics in accordance with standard
Byte 1					
Byte 2					
Byte 3	Master address				
Byte 4	Identification number (high)				
Byte 5	Identification number (low)				
Byte 6	Header		Type + length		Diagnostic interrupt
Byte 7	Interrupt type		1 = Diagnostic interrupt		
Byte 8	Slot no.		0 = module 1 = PAC		
Byte 9	Specifier		1 = incoming 2 = outgoing		
Byte 10	Alarm data 1	Bit 0	1	Communication with PAC not yet ready	
		Bit 1	1	Communication with PAC not possible	
		Bit 2	d.c.	Reserved	
		Bit 3	1	Internal fault (CRC error)	
		Bit 4	d.c.	Reserved	
		Bit 5		Internal fault (frame error)	
		Bit 6	1	Internal fault (timeout)	
		Bit 7	1	PAC and module firmware versions do not match → Firmware update required	
Byte 11	Alarm data 2		d.c.	Reserved	
Byte 12	Alarm data 3	Bit 0	1	Digital outputs not remotely controllable	
		Bit 1	d.c.	Reserved	
		Bit 2	1	Energy counter write operation failed	
		Bit 3	1	Write operation rejected due to write protection or write protection connection changed.	
		Bit 4	d.c.	Reserved	
		Bit 5	1	Internal communication error	
		Bit 6	1	Internal communication error	
		Bit 7	1	Internal communication error	

8.4 Process interrupt according to PROFIBUS DPV1

Core statement

The structure of the process interrupt message is very similar to that of the diagnostic interrupt messages

Item	Contents	Bit	Value	Contents	
Byte 0	Station status			Contents and values according to PROFIBUS Profile Guidelines Part 3	Slave diagnostics in accordance with standard
Byte 1					
Byte 2					
Byte 3	Master address				
Byte 4	Identification number (high)				
Byte 5	Identification number (low)				
Byte 6	Header		Type + length = 6 without limit violation = 10 with limit violation		Process interrupt
Byte 7	Interrupt type		2 = Process interrupt		
Byte 8	Slot no.		0 = module 1 = PAC		
Byte 9	Specifier		1 = incoming 2 = outgoing		
Byte 10	Alarm data 1	Bit 0	1	Voltage out of range	
		Bit 1	1	Current out of range	
		Bit 2	1	Maximum pulse rate exceeded	
		Bit 3	1	Limit violation combination See bytes 12 to 15 for details	
		Bits 4 ... 7	d.c.	Reserved	

8.4 Process interrupt according to PROFIBUS DPV1

Item	Contents	Bit	Value	Contents
Byte 11	Alarm data 2		d.c.	Reserved
Byte 12	Alarm data 3	Bit 0	1	Limit violation combination
		Bit 1	1	Status combination 1:
		Bit 2	1	Status combination 2:
		Bit 3	1	Status combination 3:
		Bit 4	1	Status combination 4:
		Bits 5 ... 7	d.c.	Reserved
Byte 13	Alarm data 4		d.c.	Reserved
Byte 14	Alarm data 5	Bit 0	1	Limit violation 8
		Bit 1	1	Limit violation 9
		Bit 2	1	Limit violation 10
		Bit 3	1	Limit violation 11
		Bits 4 ... 7	d.c.	Reserved
Byte 15	Alarm data 6	Bit 0	1	Limit violation 0
		Bit 1	1	Limit violation 1
		Bit 2	1	Limit violation 2
		Bit 3	1	Limit violation 3
		Bit 4	1	Limit violation 4
		Bit 5	1	Limit violation 5
		Bit 6	1	Limit violation 6
		Bit 7	1	Limit violation 7

8.5 Diagnostics LED

Description

The diagnostics LED indicates the communication status.

Table 8- 1 Status and fault display by the LED

Color	Status	Description	Measures
Green	Off	No voltage applied to the 7KM PAC PROFIBUS DP / 7KM PAC SWITCHED ETHERNET PROFINET expansion module.	<ol style="list-style-type: none"> 1. Check that the 7KM PAC PROFIBUS DP / 7KM PAC SWITCHED ETHERNET PROFINET expansion module is connected to the 7KM PAC measuring device correctly. 2. Switch on the supply voltage to the 7KM measuring device.
Green	Static ON	PROFIBUS DP communication OK. Cyclic data exchange with the class 1 master. ¹⁾ PROFINET IO communication is OK. Cyclic data exchange with the PROFINET IO controller.	—
Green	Flashing	PROFIBUS DP communication OK. Data exchange with the class 2 master. ²⁾ PROFINET IO communication is OK. Cyclic data exchange with the PROFINET IO supervisor.	—
Red	Static ON	Bus fault. Communication is not possible. No PROFIBUS DP communication with a class 1 or class 2 master.	7KM PAC PROFIBUS DP expansion module: <ul style="list-style-type: none"> • Set a valid PROFIBUS address on the 7KM PAC measuring device. • Check the bus installation. • Check that the bus connector is correctly inserted. • Check if the connecting cable to the PROFIBUS DP master has been disconnected. • Check the bus terminator.

8.5 Diagnostics LED

Color	Status	Description	Measures
		No PROFINET IO communication with a PROFINET IO controller or a PROFINET IO supervisor.	7KM PAC SWITCHED ETHERNET PROFINET expansion module: <ul style="list-style-type: none"> Set a valid NameOfStation. If necessary, correct the IP settings. Check the bus installation. Check that the bus connector is correctly inserted. Check if the connecting cable to the PROFINET IO controller has been disconnected.
Red	Flashing	Parameter assignment error <ul style="list-style-type: none"> The slave/device has not been parameterized or has been wrongly parameterized. An incorrect station address has been assigned. An incorrect GSD/GSDML file has been used. Error in configuration: <ul style="list-style-type: none"> The configuration message frame is incorrect. 	<ul style="list-style-type: none"> Check the communication and the parameter assignment. Check the PROFIBUS address, or the NameOfStation and IP settings in the case of the 7KM PAC SWITCHED ETHERNET PROFINET expansion module. Check whether the GSD/GSDML file matches the firmware version and the hardware version of the expansion module.
Orange	Static ON	Communication between the module and the 7KM PAC measuring device has been interrupted.	Check the operating capability of the 7KM PAC measuring device.
		The orange LED lights up briefly, e.g. during the initialization phase <ul style="list-style-type: none"> The LED turns green when communication has been restored. 	The usual diagnostics options on the master, e.g., error OB8x, are available for use.
		The LED lights up orange for a longer time: An internal fault has occurred.	<ul style="list-style-type: none"> Restart the device. Replace the expansion module and/or the device.
Orange	Flashing	No parameters for the expansion module are displayed on the 7KM PAC. Hardware fault on the expansion module or the 7KM PAC measuring device, e.g.: 12 V too weak or not present	Replace the module and/or the 7KM PAC measuring device.
Green, red, orange	Flashing	A firmware update is active.	Allow the firmware update to run to the end! The firmware update of the 7KM PAC PROFIBUS DP expansion module lasts approximately 8 to 13 minutes. Do not interrupt the operation!
1) A parallel connection to a class 2 master/PROFINET IO supervisor has no effect on the green status of the LED. 2) This is only the case if there is no connection to the class 1 master/PROFINET IO controller.			

Technical data

9.1 Standards

Description

Table 9- 1 The device meets the following standards

Standard	Title
IEC 60603-7	Connectors for electronic equipment - Part 7: Detail specification for 8-way, shielded, free and fixed connectors
IEC 61158-2:2004	"Digital data communications for measurement and control - Fieldbus for use in industrial control systems - Part 2: Physical layer specification and service definition"
IEC 61158-3:2003	"Digital data communications for measurement and control - Fieldbus for use in industrial control systems - Part 3: Data link service definition"
IEC 61158-4:2004	"Digital data communications for measurement and control - Fieldbus for use in industrial control systems - Part 4: Data link protocol specification"
IEC 61158-5:2004	"Digital data communications for measurement and control - Fieldbus for use in industrial control systems - Part 5: Application layer service definition"
IEC 61158-6:2004	"Digital data communications for measurement and control - Fieldbus for use in industrial control systems - Part 6: Application layer protocol specification"
IEC 61784-1:2004	PROFIBUS and PROFINET standard

Note

Other standards

In addition to the above-mentioned standards, those listed in the "SENTRON PACxxxx" manual also apply.

9.2 Technical data of the 7KM PAC PROFIBUS DP expansion module

Mechanical data

Table 9- 2 Mechanical data of the 7KM PAC PROFIBUS DP expansion module

	Values
Dimensions of housing (height x width x depth)	63 mm x 43 mm x 22 mm
Dimensions of housing with sub D socket (height x width x depth)	69 mm x 43 mm x 22 mm
Mounting position	Vertical on the 7KM PAC measuring device
Housing design	VDT 3400 structure 36
Tolerances	According to DIN 16901:1982-11
Weight	45 g
Connector to the 7KM PAC measuring device	14-pin connector
Length of cable	Dependent on baud rate. More information about cable lengths can be found in section 21.1 of the IEC 61158-2:2004 and IEC 61158-2:2003 standards
Power supply	Current is supplied by the 7KM PAC
Cooling	Passive air cooling in form of ventilation slots
Flammability class	V-0

Electrical data

Table 9- 3 Electrical data for the PAC PROFIBUS DP expansion module

	Values
ANSI TIA/EIA-485-A ¹⁾ Protective circuit for PROFIBUS interface, galvanically isolated from the device	5 V \pm 5 %
Maximum current (of 5 V on PROFIBUS DP connector)	10 mA, maximum
Electrical isolation between the 7KM PAC measuring device and the PROFIBUS DP interface	500 V
Galvanic isolation	In expansion module
Insulating voltage	Max. 500 V
1) Formerly RS 485	

Ambient and environmental conditions

Table 9- 4 Ambient and environmental conditions

Ambient and environmental conditions	Values
Degree of protection in accordance with DIN EN 60529	IP20
Permissible degree of pollution	2 in accordance with IEC 61010-1:2001
Recycling symbol	> PC / ABC <

Note

Other technical data

The other mechanical and electrical data and ambient and environmental conditions are identical to those of the 7KM PAC measuring device. You can find more information in the operating instructions and manual for the 7KM PAC measuring device.

See also

Standards (Page 115)

9.3 Technical data of the 7KM PAC Switched Ethernet PROFINET expansion module

Mechanical data

Table 9- 5 Mechanical data

	Values
Dimensions of housing (height x ¹⁾ width x depth)	63 mm x 43 mm x 22 mm
Mounting position	Vertical on the 7KM PAC measuring device
Housing design	VDT 3400 structure 36
Tolerances	According to DIN 16901:1982-11
Weight	36 g
Connector to the 7KM PAC measuring device	14-pin connector
Length of cable	At least CAT5, < 100 m You can find further information on the cable lengths on the Internet (http://www.profibus.com/nc/downloads/downloads/p-rofinet-cabling-and-interconnection-technology/display/).
Power supply	Current is supplied by the 7KM PAC
Cooling	Passive air cooling in form of ventilation slots
Flammability class	V-0

Electrical data

Table 9- 6 Electrical data

	Values
Electrical isolation between the 7KM PAC measuring device and the Ethernet interface of the 7KM PAC Switched Ethernet PROFINET expansion module	AC 1500 V
Galvanic isolation	In expansion module
Electrical isolation between the Ethernet interface and the Ethernet shield	500 V AC
Note the information in the installation instructions: Installation and connection (Page 23)	

Ambient and environmental conditions

Table 9- 7 Ambient and environmental conditions

Ambient and environmental conditions	Values
Degree of protection in accordance with DIN EN 60529	IP20
Permissible degree of pollution	2 in accordance with IEC 61131
Recycling symbol	> PC / ABC <

Note

Other technical data

The other mechanical and electrical data and ambient and environmental conditions are identical to those of the 7KM PAC measuring device. You can find more information in the operating instructions and manual for the 7KM PAC measuring device.

9.4 Communication interface of the PAC PROFIBUS DP expansion module

Technical data

Table 9- 8 Technical data for the communication interface

	Values
Connector	9-pin, sub D socket
PROFIBUS DP data transfer: supported baud rate in kbit/s	9,6 / 19,2 / 45,45 /, 93,75 / 187,5 / 500 / 1 500 / 3 000 / 6 000 / 12 000
Supported address area	1 to 126 ¹⁾
Supported communication protocols	PROFIBUS DP-V1 for: <ul style="list-style-type: none"> • Cyclic data exchange with class 1 master • Acyclic data exchange with class 1 master and class 2 master • DPV2 with clock synchronization
Measured variables to be transferred	Definable via GSD file or acyclically via data records

¹⁾ Each device on the bus must have a unique address. Address 126 is only used for commissioning purposes. It must not be used for data communication.

Pin assignment for the PROFIBUS DP connection

The 7KM PAC PROFIBUS DP expansion module uses a 9-pin sub D socket.

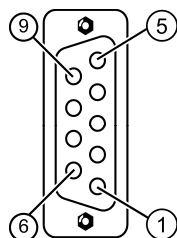


Figure 9-1 9-pin sub D socket

Table 9- 9 Pin assignment for the PROFIBUS connection

Pin	Designation	Meaning	Range
1	NC	Not assigned	—
2	NC	Not assigned	—
3	RxD/TxD-P	Receive/transmit data-P	ANSI TIA/EIA-485-A ¹⁾
4	Control-P (RTS)	Control signal	TTL
5	DGND	PROFIBUS data reference potential	GND
6	VP	Power supply output ²⁾	5 V _{EXT} / 10 mA
7	NC	Not assigned	—
8	RxD/TxD-N	Receive/transmit data-N	ANSI TIA/EIA-485-A ¹⁾
9	NC	Not assigned	—

1) Previously RS 485
2) Only for the bus terminating resistors

9.5 Communication interface of the 7KM PAC Switched Ethernet PROFINET expansion module

Technical data

Table 9- 10 Technical data for the communication interface

		Values
Industrial Ethernet:	IRT-enabled switch	<ul style="list-style-type: none"> • Auto crossover • Auto negotiation
Connector		2 shielded, 8-way, RJ 45 sockets ¹⁾
PROFINET IO data transfer: Supported data transfer rate in Mbit/s		10 / 100
NameOfStation ²⁾		Maximum 26 characters
Supported communication protocols		PROFINET infrastructure protocols, such as <ul style="list-style-type: none"> • SNTP • LLDP • SNMP • ...
Measured variables to be transferred		Definable via GSDML file or acyclically via the PROFenergy profile

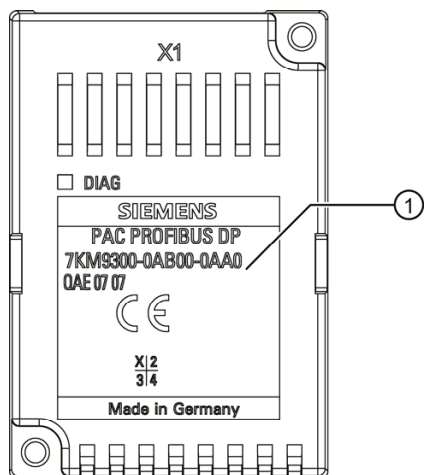
1) The connector must comply with the requirements of the PROFINET guideline for cable lengths in Section 8.1.2. - Internet (<http://www.profibus.com/nc/downloads/downloads/profinet-cabling-and-interconnection-technology/display/>)

2) Each device on the bus must have a unique NameOfStation and a corresponding IP configuration.

9.6 Labeling

7KM PAC PROFIBUS DP expansion module

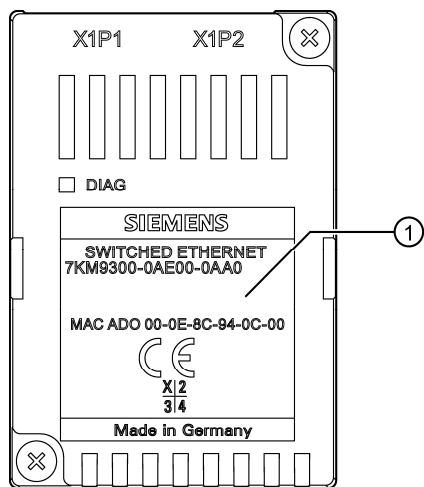
The graphic below shows the positioning of the label on the housing of the 7KM PAC PROFIBUS DP expansion module.



① Nameplate

Figure 9-2 The 7KM PAC PROFIBUS DP expansion module with label

7KM PAC Switched Ethernet PROFINET expansion module



① Nameplate

Figure 9-3 Nameplate of the 7KM PAC Switched Ethernet PROFINET expansion module

Dimension sheets

10.1 Dimension sheets

7KM PAC PROFIBUS DP expansion module

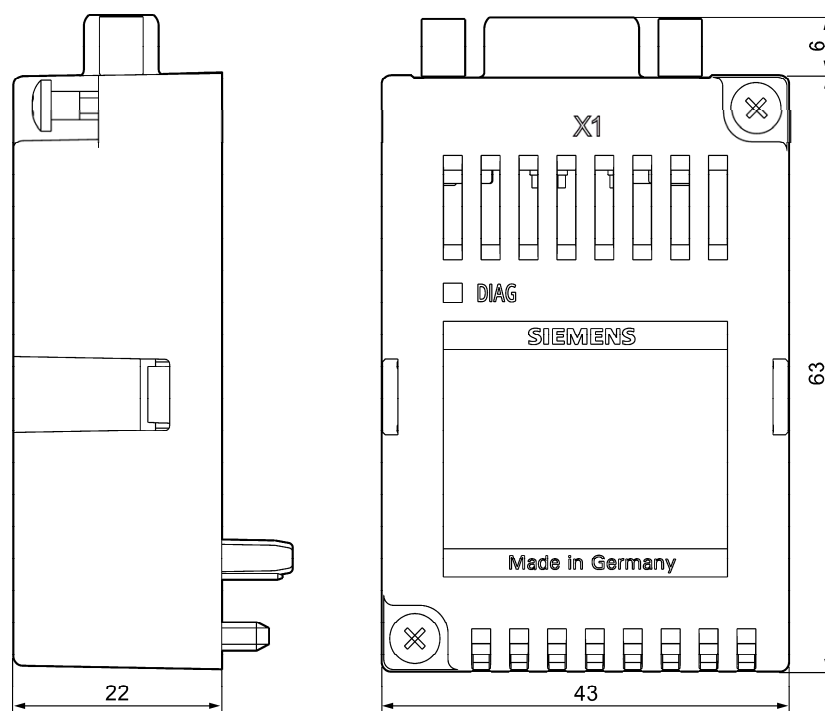


Figure 10-1 Side view and front view with sub D socket

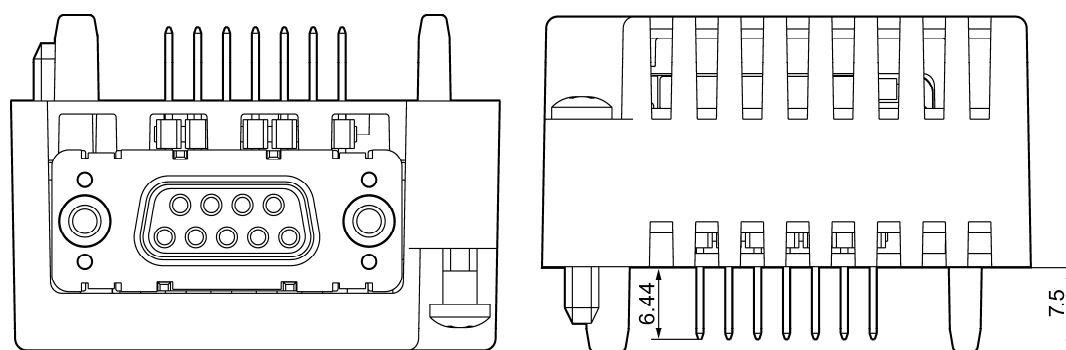


Figure 10-2 View from below and view from above with sub D socket connector and the dimensions of the plug connector between the 7KM PAC PROFIBUS DP expansion module and the 7KM PAC

All dimensions are specified in mm.

7KM PAC Switched Ethernet PROFINET expansion module

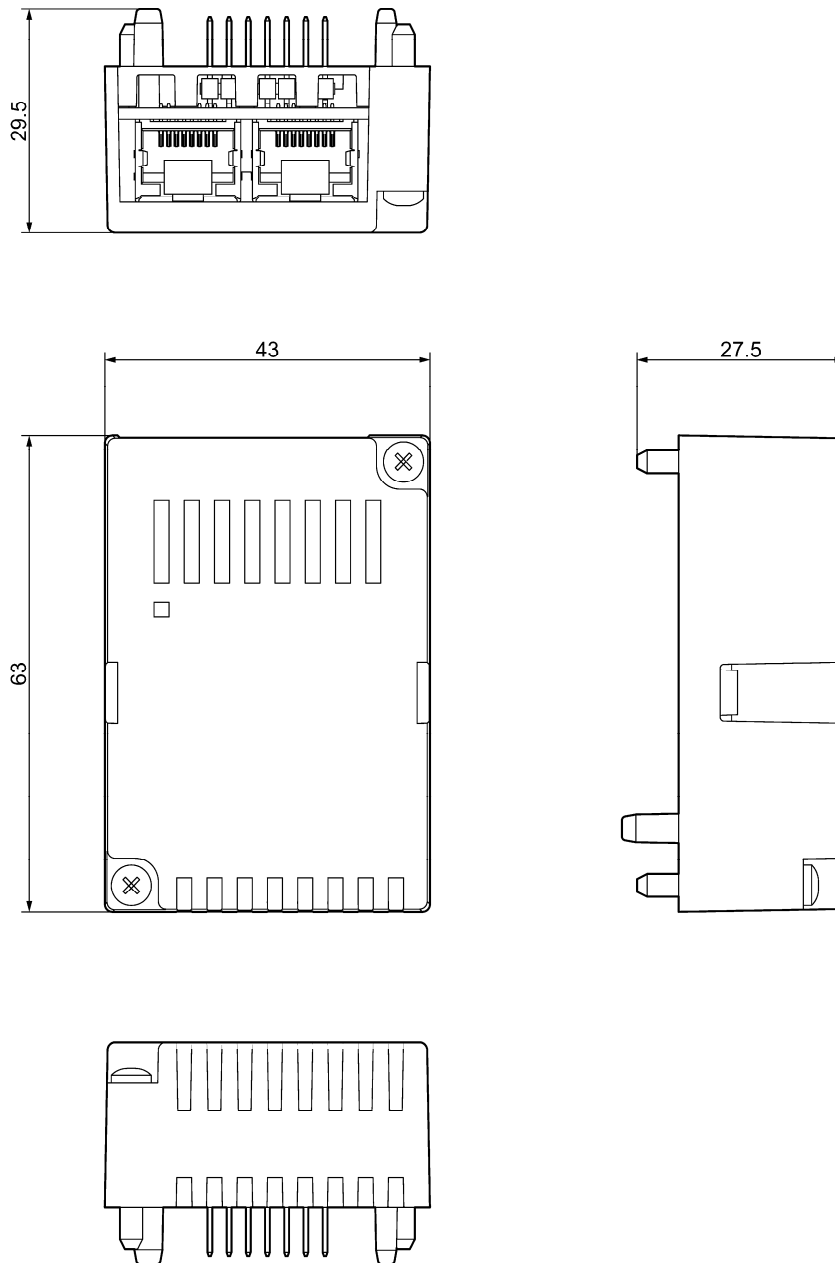


Figure 10-3 7KM PAC Switched Ethernet PROFINET expansion module - view from above with RJ 45 sockets and the dimensions of the plug connector between the 7KM PAC Switched Ethernet PROFINET expansion module and the 7KM PAC, front view, side view and view from below

All dimensions are specified in mm.

Appendix

A.1 Comprehensive support from A to Z

For more information, please see the following links:

Useful links

Table A- 1 Product information

Website	The website provides rapid and targeted information on our pioneering products and systems.	Link (http://www.siemens.com/lowvoltage)
Newsletter	Constantly updated information on the subject of low-voltage power distribution.	Link (http://www.siemens.com/lowvoltage/newsletter)

Table A- 2 Product information / product and system selection

Information and Download Center	<ul style="list-style-type: none"> • Current catalogs • Customer magazines • Brochures • Demonstration software • Promotion packages 	Link (http://www.siemens.com/lowvoltage/infomaterial)
--	---	--

Table A- 3 Product and system selection

Industry Mall	<p>Platform for e-business and product information. 24/7 access to a comprehensive information and ordering platform for our complete low-voltage controls and distribution portfolio, including:</p> <ul style="list-style-type: none"> • Selection tools • Product and system configurators • Availability check • Order tracking 	Link (http://www.siemens.com/lowvoltage/mall)
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Table A- 4 Product documentation

Service & Support Portal	<p>Comprehensive technical information from the planning phase through configuration to operation. Around the clock. 365 days a year.</p> <ul style="list-style-type: none"> • Product data sheets • Manuals / operating instructions • Certificates • Characteristic curves • Downloads • FAQs 	Link (http://www.siemens.com/lowvoltage/support)
CAX DVD	<p>Configuration-relevant CAX data on SENTRON is available on DVD:</p> <ul style="list-style-type: none"> • Commercial and technical product master data • 2D dimension drawings • Isometric illustrations • 3D models • Product data sheets • Tender specifications 	<p>Link (http://www.siemens.com/lowvoltage/mall)</p> <p>Order number: E86060-D1000-A207-A6-6300</p>
Image Database	<p>Free downloads in several different versions are available from the image database:</p> <ul style="list-style-type: none"> • All current product photos • 2D dimension drawings • Isometric illustrations • 3D models • Device circuit diagrams • Symbols 	<p>Link (http://www.siemens.com/lowvoltage/picturedb)</p>

Table A- 5 Product training

SITRAIN Portal	<p>Comprehensive training program to expand your knowledge about our products, systems, and engineering tools</p>	Link (http://www.siemens.com/lowvoltage/training)
-----------------------	---	--

ESD directives

B.1 Electrostatic sensitive devices (ESD)

ESD components are destroyed by voltage and energy far below the limits of human perception. Voltages of this kind occur as soon as a device or an assembly is touched by a person who is not electrostatically discharged. ESD components which have been subject to such voltage are usually not recognized immediately as being defective, because the malfunction does not occur until after a longer period of operation.

ESD guidelines

CAUTION

Electrostatic sensitive devices

Electronic modules contain components that can be destroyed by electrostatic discharge. These modules can be easily destroyed or damaged by improper handling.

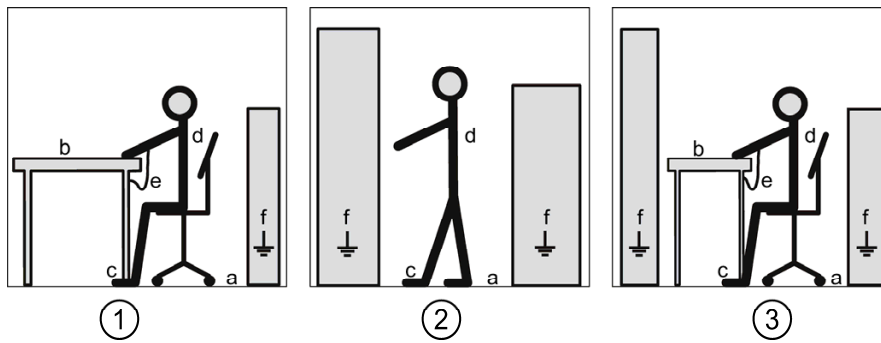
- You must discharge your body electrostatically immediately before touching an electronic component. To do this, touch a conductive, grounded object, e.g., a bare metal part of a switch cabinet or the water pipe.
- Always hold the component by the plastic enclosure.
- Electronic modules should not be brought into contact with electrically insulating materials such as plastic film, plastic parts, insulating table supports or clothing made of synthetic fibers.
- Always place electrostatic sensitive devices on conductive bases.
- Always store and transport electronic modules or components in ESD-safe conductive packaging, e.g. metallized plastic or metal containers. Leave the component in its packaging until installation.

NOTICE

Storage and transport

If you have to store or transport the component in non-conductive packaging, you must first pack the component in ESD-safe, conductive material, e.g., conductive foam rubber, ESD bag.

The diagrams below illustrate the required ESD protective measures for electrostatic sensitive devices.



- (1) ESD seat
- (2) ESD standing position
- (3) ESD seat and ESD standing position

Protective measures

- a Conductive floor
- b ESD table
- c ESD footwear
- d ESD smock
- e ESD bracelet
- f Cubicle ground connection

List of abbreviations

C.1 Abbreviations

Overview

Table C- 1 Meaning of abbreviations

Abbreviation	Meaning
ANSI	American National Standards Institute
CAN	Controller Area Network
CE	Communautés Européennes
CEI	Commission Electrotechnique Internationale
CISPR	Comité international spécial des perturbations radioélectriques
CRC	Cyclic Redundancy Check
CSA	Canadian Standards Association
DIN	Deutsches Institut für Normierung e. V.
DP	Distributed I/Os
DR	Data record
ESD	Electrostatic sensitive devices
EIA	Electronic Industries Alliance
EMC	Electromagnetic compatibility
EN	European Standard
EU	European Union
FCC	Federal Communications Commission
GSD	Device master data
GSDML	General Station Description Markup Language
HT	High Tariff
HW Config	"Hardware configuration" module in the SIMATIC Manager
I&M	Information and Maintenance
ID	Identification number
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	International Protection
IRT	Isochronous real time
ISM	Industrial, Scientific and Medical
ISO	International Organization for Standardization
LED	Light Emitting Diode
LSB	Least Significant Bit
LT	Low Tariff

Abbreviation	Meaning
MSB	Most Significant Bit
MS0	Cyclic Master Slave Communication (master class 1)
MS1	Acyclic Master Slave Communication (master class 1)
MS2	Acyclic Master Slave Communication (master class 2)
NAFTA	North American Free Trade Agreement
NEMA	National Electrical Manufacturers Association
PAC	Power Analysis & Control
PMD	Power Monitoring Device
PI	PROFIBUS user organization
PTCP	Precision Transparent Clock Protocol
RALRM	Read alarm
RDREC	Read record
RET_VAL	Return value: "Return value"
RMS	Root Mean Square RMS
RJ	Registered Jack
RS	Formerly: Radio Selector; now usually: Recommended Standard
RT	Real Time
SFB	System function block
SFC	System function
TIA	Totally Integrated Automation
THD	Total Harmonic Distortion Total Harmonic Distortion
THD-R	Relative THD
UL	Underwriters Laboratories Inc.
VDE	Association of Electrical Engineering, Electronics and Information Technology (Germany)
RLO	Result of logic operation
WRREC	Write record

Glossary

Bus

Shared transmission path over which all devices on the communication bus are connected. It has two defined ends. In the case of PROFIBUS, the bus is a twisted pair or optical fiber cable.

Bus system

All nodes physically connected to a bus cable form a bus system.

Diagnostics

The detection, localization, visualization and further evaluation of errors, disturbances and messages.

Diagnostics offers monitoring functions that automatically run while the system is in operation. This reduces startup times and standstill times. Plant availability increases.

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