Operating Instructions
ORSG45

Advanced Data Manager
Additional instructions for PROFINET device

Table of contents

1 General information

1.1 Safety symbols

⚠ DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

⚠ WARNING

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE

This symbol contains information on procedures and other circumstances that do not result in personal injury.

ℹ This functionality is only possible with a PROFINET module.

1.2 Scope of delivery

NOTICE

This manual contains an additional description for a special software option.
These additional instructions are not a substitute for the Operating Instructions pertaining to the device!
▶ Detailed information can be found in the Operating Instructions and the additional documentation.

The appropriate GSD file for the device can be found in the "Product Finder" at www.profibus.com.If necessary, contact the supplier.

1.3 Firmware history

Overview of the device software history:

Device software Version/date	Software changes	Analysis software version	Version of OPC server	Operating Instructions
V02.00.06 / 12.2015	Original software	V1.3.0 and higher	V5.00.03 and higher	BA01606O/09/EN /01.16
V02.01.03 / 07.2016	Extended functionality/bug fixes	V01.03.00.00 and higher	V5.00.03 and higher	BA01606O/09/EN /02.16
V02.04.02 / 08.2018	Extended functionality/bug fixes	V01.03.00.00 and higher	V5.00.03 and higher	BA01606O/09/EN /03.18
V2.04.06 / 10.2022	Bug fixes	V1.6.3 and higher	V5.00.07 and higher	BA01606O/09/EN /04.23-00
V2.04.07 / 07.2023	Bug fixes	V1.6.3 and higher	V5.00.07 and higher	BA01606O/09/EN /05.23

1.4   Connections

View of the PROFINET connection on the device

1	Network status LED
2	Module status LED
3	Status LED port 1
4	Status LED port 2

A0051115
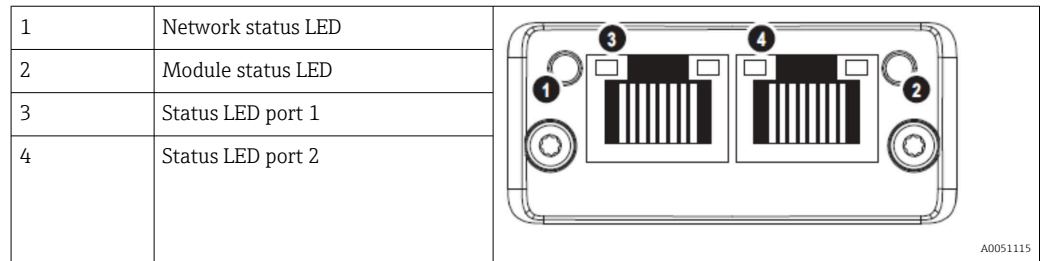
1.4.1   Network status LED

Functional description of the network status LED

Network status LED	Indicator for
Off	Not online/no voltage
Green	Online, data transfer active
Green flashing (1 x flash)	Online, data transfer stopped or transferred data is incorrect
Green flashing	Flashing test for identifying the device in the network
Red	Fatal error in the PROFINET module (module status LED also lights up red)
Red flashing (1 x flash)	Device name not assigned
Red flashing (2 x flashes)	IP address not assigned
Red flashing (3 x flashes)	Slot/subslot configuration in the module differs from the receiving slot/subslot configuration

1.4.2   Module status LED

Functional description of the module status LED

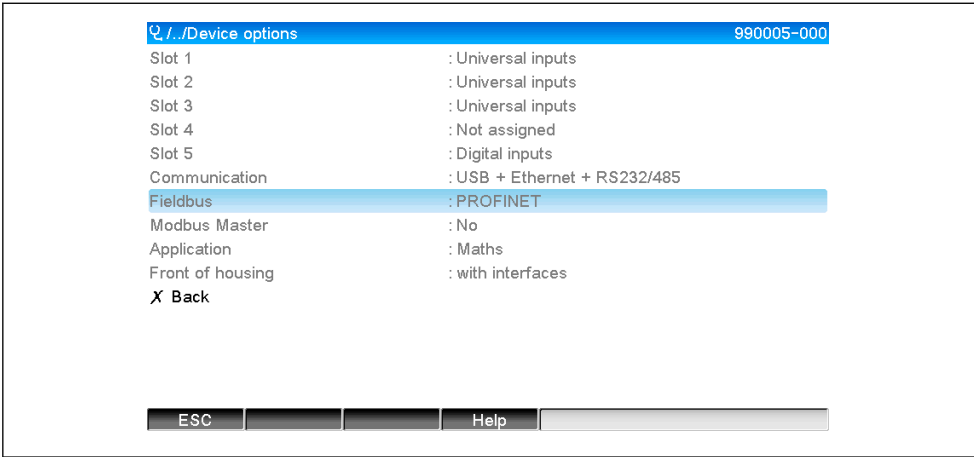| Module status LED	Indicator for
Off	No voltage or not initialized
Green	Initialized
Green flashing (1 x flash)	Initialized, diagnostics available
Red	Exception error Fatal error in the PROFINET module (network status LED also lights up red)
Red/green flashing	Firmware update to the PROFINET module → During this phase, the device must not be switched off as this can permanently damage the module.

1.4.3   Status LED port 1 and port 2

Functional description of the status LED port 1 and port 2

Status LED port 1 and port 2	Indicator for
Off	Disconnected from the network
Green	Connected to the network, communication not active
Green, flashing	Connected to the network, communication active

1.5 Checking for the presence of the PROFINET module

The following menus can be used to check whether an installed PROFINET module has been detected:

a) **Main menu → Diagnostics → Device information → Device option → Fieldbus:**
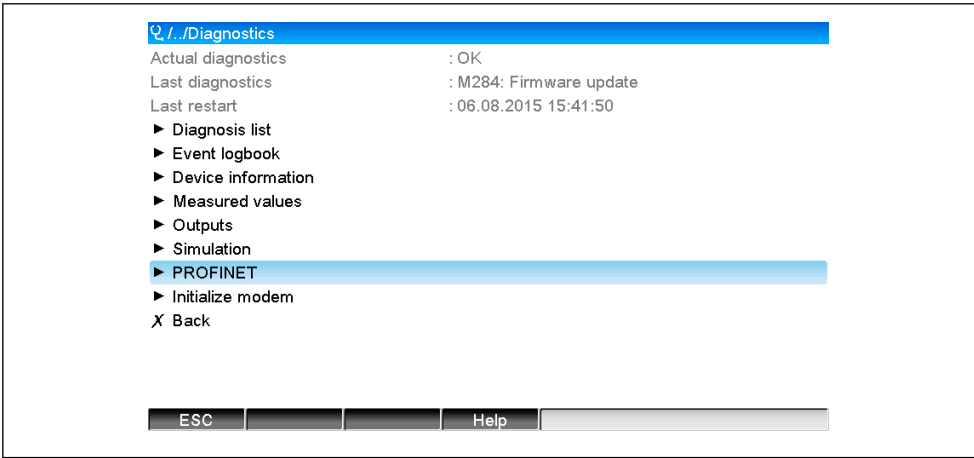


```
 Q /../Device options                                    990005-000
  Slot 1                        : Universal inputs
  Slot 2                        : Universal inputs
  Slot 3                        : Universal inputs
  Slot 4                        : Not assigned
  Slot 5                        : Digital inputs
  Communication                 : USB + Ethernet + RS232/485
  Fieldbus                      : PROFINET
  Modbus Master                 : No
  Application                   : Maths
  Front of housing              : with interfaces
  X Back



     ESC                              Help
```
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⊡ 1   Checking for the presence of the PROFINET module under "Device options"

The **Fieldbus** menu item indicates whether and which fieldbus module has been detected. If it is a PROFINET module, this is indicated as shown above.

b) **Main menu → Diagnostics → PROFINET:**


```
 q /../Diagnostics
  Actual diagnostics            : OK
  Last diagnostics              : M284: Firmware update
  Last restart                  : 06.08.2015 15:41:50
    ▶ Diagnosis list
    ▶ Event logbook
    ▶ Device information
    ▶ Measured values
    ▶ Outputs
    ▶ Simulation
    ▶ PROFINET
    ▶ Initialize modem
    X Back



     ESC                              Help
```
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⊡ 2   Checking for the presence of the PROFINET module under "Diagnostics"

In contrast to option **a)**, this menu item is only displayed if a PROFINET module has been detected. A more detailed description of this menu can be found in Section 2 "Data transmission" → 🗎 8.

If a PROFINET module has been detected, the additional information **Anybus**, **Firmware version** and the **serial number** relating to the detected module is displayed under **Main menu → Diagnostics → Device information → Hardware**.
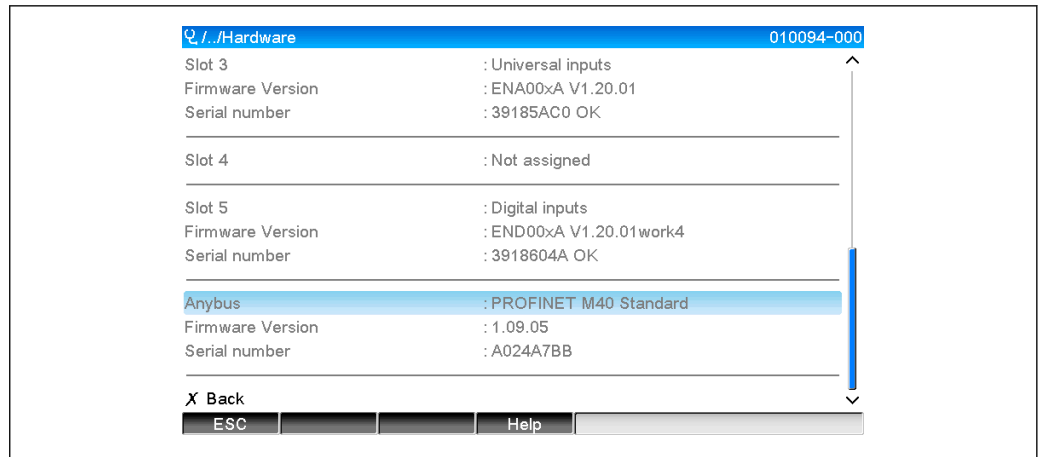
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🖻 *3   Information about the detected PROFINET module under "Hardware"*

1.6   Protocol-specific data

|	
Protocol	"Application layer protocol for decentral device periphery and distributed automation", version 2.42
Conformity class	B (additional features: Legacy, MRP, DeviceAccess)
Netload class	III
Communication type	100 Mbps
Device profile	Application interface identifier 0xF600 Generic device
Manufacturer ID	0x11
Device ID	0x86FA
Device description files (GSD)	Information and files under: www.profibus.com
Baud rates	Automatic 100 Mbps with full-duplex detection
Cycle times	From 1 ms
Polarity	Auto-polarity for automatic correction of crossed TxD and RxD pairs

Supported connections	• 1 x AR (Application Relation)
	  ▪ 1 x Input/Output CR (Communication Relation)
	  ▪ 1 x Alarm CR (Communication Relation)
	  ▪ 1 x Record Data CR (Communication Relation)
	• 2 x AR (Application Relation)
	  1 x Record Data CR (Communication Relation)

Configuration of the device name	DCP protocol

2 Data transmission

All parameters relevant to PROFINET data transmission are summarized in the main menu under **Diagnostics → PROFINET**.

This is divided into two main areas:
- Communication (see section "Communication settings" → 🖹 8)
- Configuration of the cyclic data transfer (see section "Configuration of the cyclic data transfer" → 🖹 15)

2.1 Communication settings

The settings used for PROFINET communication are displayed in this menu. In "Fig. 3 PROFINET communication settings", the parameters (**MAC address** to **Name of station**) and their current value are displayed:
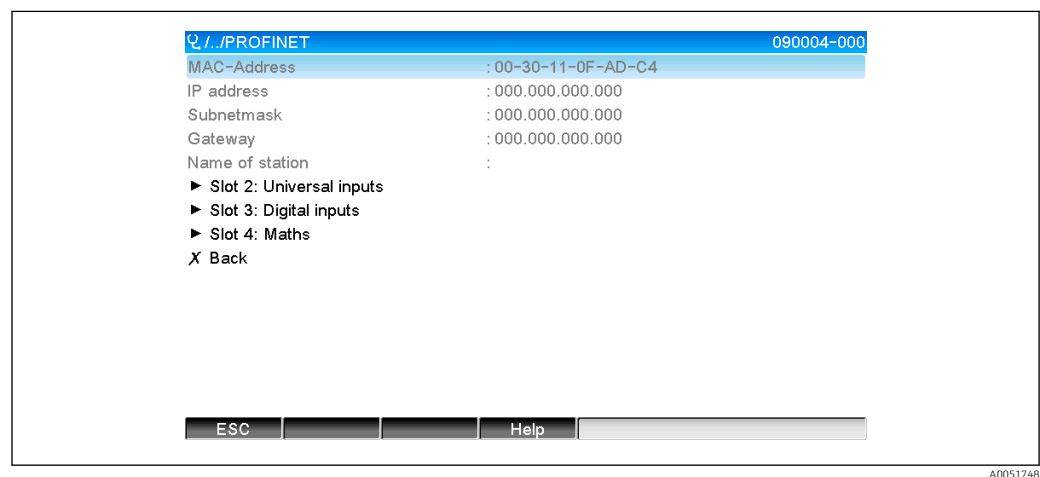

🖼 4 *PROFINET communication settings*

The MAC address is a unique hardware address that is stored in the device and cannot be changed. It is used, among other things, to identify the device in a network.With the exception of the MAC address, all other parameters are configured via the fieldbus (PROFINET Controller or a corresponding tool). This display is used to check whether and which communication settings are used.

The manner in which the parameters **IP address**, **Subnet mask**, **Gateway**, and **Name of station** are configured depends on and must be determined by referring to the tool used.

Manual configuration: (SIMATIC Manager STEP7 V5.5)

One option for manual configuration using the **SIMATIC Manager STEP7 V5.5** tool is explained below. A prerequisite for this is that the computer used (PC, laptop, etc.) is connected to the PROFINET network and that the tool is pre-configured for accessing the PROFINET network.

1.
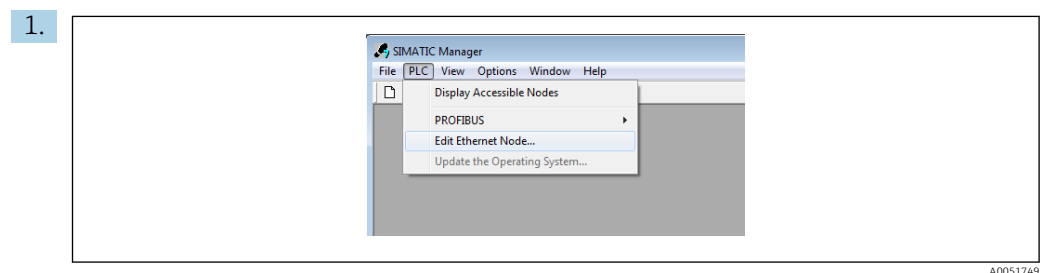
In the SIMATIC Manager main menu, select **Target system → Edit Ethernet devices**.
↳ A new window, **Edit Ethernet devices**, opens.

2. In this window, click on **Browse...**. Another window opens, which displays the devices in the PROFINET network. Select the PROFINET device to be configured and confirm with **OK**.

   ↪ The MAC address can be used to select the device as this is unique to each device.

3.
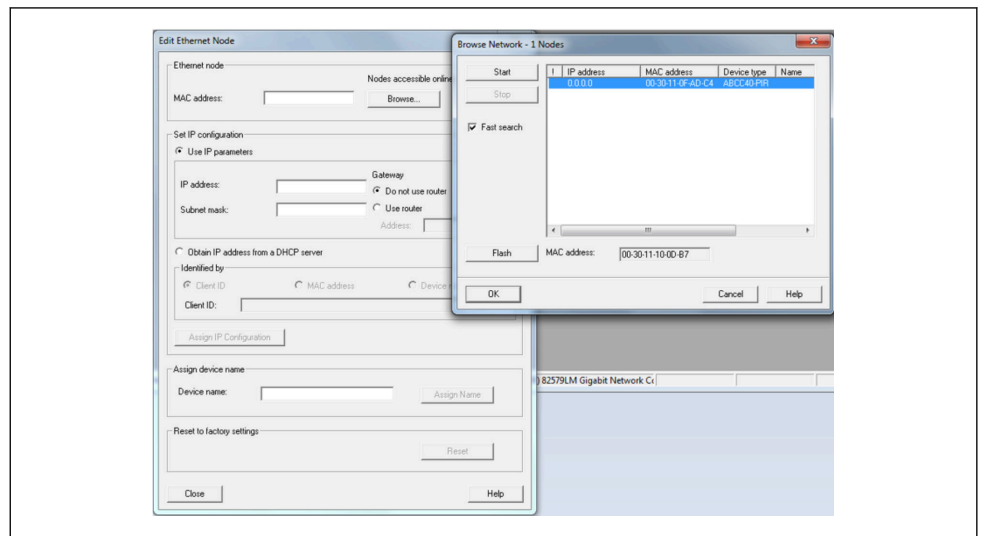
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The MAC address of the selected device is now displayed under **Ethernet devices**.The **IP address** and **Subnet mask** can now be set under **IP configuration** and the device name (= **Name of station**) can be set under **Assign device name**. In this case, the **Gateway** settings are made by the tool itself as the **Do not use a router** option has been selected.

4.

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By pressing **Assign IP configuration** and **Assign name**, the settings are sent to the device.

↳   The settings are then shown in the device's main menu under **Diagnostics →
    PROFINET**.

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Manual configuration (TIA Portal STEP7 V13):

One option for manual configuration using the **TIA Portal STEP7 V13** tool is explained below. A prerequisite for this is that the computer used (PC, laptop, etc.) is connected to the PROFINET network and that the tool is pre-configured for accessing the PROFINET network.

1.
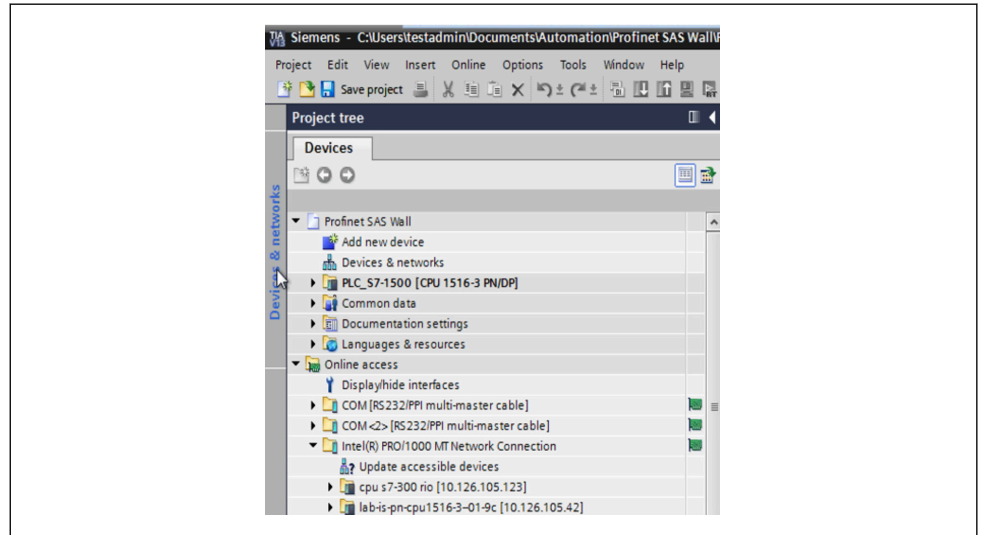
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In the TIA Portal project view, select **Project navigation → Online access** then, under the appropriate network connection, select **Update accessible devices**.

2.

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Select the PROFINET device to be configured and double-click to open the **Online & diagnostics** window.The MAC address can be used to select the device as this is unique to each device.

3.

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The MAC address of the selected device is now displayed under **Functions**. The **IP address** and **Subnet mask** can now be set under **Assign IP address** and the device name (= **Name of station**) can be set under **Assign name**. In this case, the **Gateway** settings are made by the tool itself as the **Do not use a router** option has been selected.

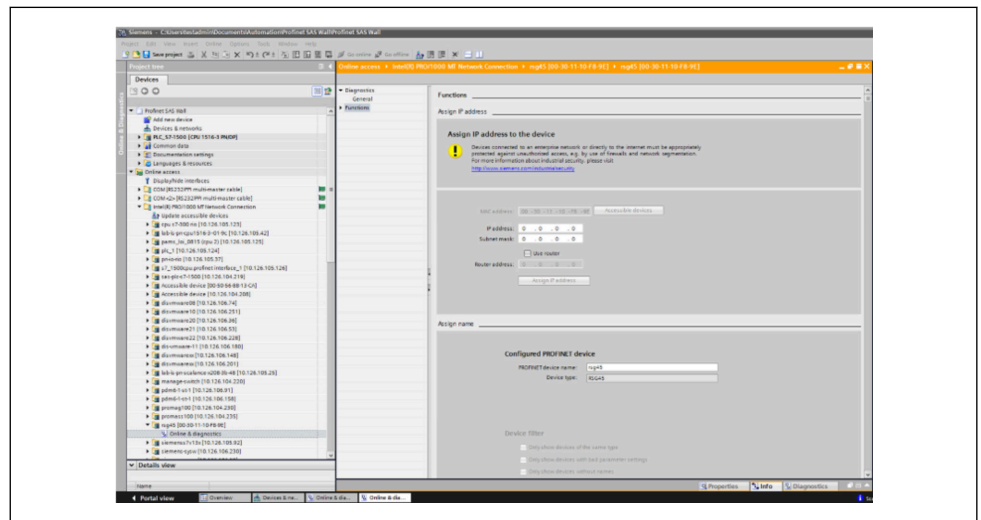4. By pressing **Assign IP configuration** and **Assign name**, the settings are sent to the device.

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The settings are then shown in the device's main menu under **Diagnostics →PROFINET** as well as in the web server.

2.2   Cyclic data transfer

PROFINET can be used to cyclically transfer the values of universal inputs 1-40, digital inputs 1-20, and maths channels 1-12.

The cyclic data transfer is configured exclusively via the PROFINET Controller, which sends the configuration to the device once the connection for cyclic data transfer has been established. The device receives the configuration, checks its validity, and adapts to the new configuration, provided this is valid. No settings are made in the device itself. A more

detailed description of the process can be found in section "Configuration of the cyclic data transfer".

Explanation of the data types used:
- Uint8: 1 byte, integer
- Uint16: 2 bytes, integer
- Float32: 4 bytes, floating point number (IEEE-754, short precision)
- Float64: 8 bytes, floating point number (IEEE-754, long precision)

Every value is always transferred with a status byte, which describes its usability and follows the actual value directly.

Example: Instantaneous value (Float32+Uint8)
- Value: Float32 → 4 bytes
- Status: Uint8 → 1 byte (see section "Coding of the status byte" → 🗎 14)
- Transferred data (5 bytes): Byte 0-3: Float32; Byte 4: Status

2.2.1   Input data: Data transmission, Device → PROFINET Controller

Input data consists of values that are sent from a device to the PROFINET Controller during the cyclic data transfer.

The following values can be sent from the device to the PROFINET Controller:

Transferable input data

Value	Data structure	Data size (bytes)	Written to
Instantaneous value	Value: Float32 Status: Uint8	5	Universal inputs, maths channels
Digital state	Value: Uint16 Status: Uint8	3	Digital inputs, maths channels
Totalizer (Float32)	Value: Float32 Status: Uint8	5	Universal inputs, digital inputs, maths channels
Totalizer (Float64)	Value: Float64 Status: Uint8	9	Universal inputs, digital inputs, maths channels

The interpretation of the read value depends on the configuration of the input/channel. The instantaneous value of a universal input, for example, can be the result of a thermocouple measurement or a current measurement, among other things.

For a detailed description of how to configure the inputs/channels see the standard Operating Instructions.

2.2.2   Output data: Data transmission, PROFINET Controller → Device

Output data consists of values that are sent from a PROFINET Controller to the device during the cyclic data transfer.
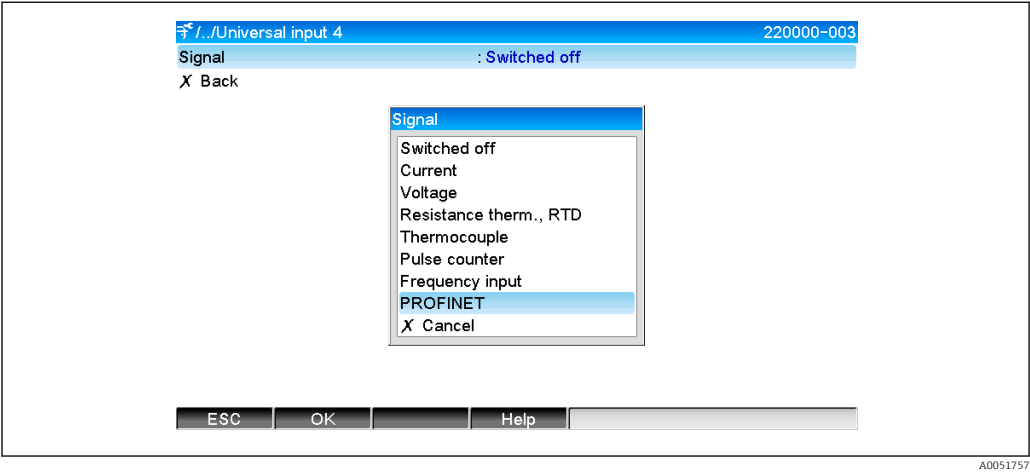
The following values can be sent from the PROFINET Controller to the device:

Receivable output data

Value	Data structure	Data size (bytes)	Read from
Instantaneous value	Value: Float32 Status: Uint8	5	Universal inputs
Digital state	Value: Uint16 Status: Uint8	3	Digital inputs

In order for a value received by the PROFINET Controller to be used, the input (universal/digital) must be configured accordingly. To do this, **PROFINET** must be selected as the signal in the input. If this is not the case, the received value incl. status byte is only buffered; it is not further processed or saved in the device.

Example for universal input 4:

🖻 5   *Configuring PROFINET as the input signal*

2.2.3   Coding of the status byte

Input data

The status byte of an input/channel, which is sent to the PROFINET Controller, can contain the following values:

Coding of the status byte for input data

Value (in hex format)	Meaning	Possible causes
0x24	Transferred value cannot be used	• Open circuit • Short-circuit • Sensor/input error • Calculated value invalid
0x28	Transferred value cannot be used	• Value falls below the measuring range of the sensor • Value exceeds the measuring range of the sensor
0x4B	Value uncertain	Input/channel returns equivalent value instead of the calculated value
0x80	Value OK	

Output data

The status byte of an input, which is received by the PROFINET Controller, interprets the device as follows:

Interpretation of the status byte in the case of output data

Value (in hex format)	Meaning
0x00 – 0x3F	Value cannot be used
0x40 – 0x7F	Value uncertain → value is used but with error display
0x80 – 0xFF	Value OK

2.2.4 Configuration of the cyclic data transfer

The cyclic data transfer is configured exclusively in the PROFINET Controller. The input/channel or its input and/or output data is selected via the slot/subslot configuration with which a PROFINET Controller is configured (see section "Slot/subslot configuration").

The currently used (cyclic data transfer active) or most recently saved (cyclic data transfer not active) configuration is displayed in the device (see section "Display of the slot/subslot configuration in the device").

Slot/subslot configuration

The slot configuration defines whether and which channel type is used.

The configuration of the subslots of a slot defines which input and/or output data is used. The subslot number determines the channel number in the device.

The table below shows the allocation of inputs/channels to the slots/subslots:

Figure: Slot/subslot ↔ Inputs/channels

Slot	ModulIdentNumber	Channel type	Subslot	Input/channel
2	0x02000028	Universal inputs	1	Universal input 1
			2	Universal input 2
			...	...
			39	Universal input 39
			40	Universal input 40
3	0x03000014	Digital inputs	1	Digital input 1
			2	Digital input 2
			...	...
			19	Digital input 19
			20	Digital input 20
4	0x0400000C	Maths channels	1	Maths channel 1
			2	Maths channel 2
			...	...
			11	Maths channel 11
			12	Maths channel 12

In order to distinguish which value or value combination is sent and/or received, the subslots are configured via SubmodulIdentNumbers. The table below provides an overview of the available SubmodulIdentNumbers as well as their assignment to the inputs/channels:

Figure: SubmodulIdentNumber ↔ Input/output data

SubmodulIdentNumber	Data source	Data direction	Length (bytes)	Available in
0x01000001	In: Instantaneous value	Input data only	In: 5	Universal inputs, maths channels
0x01000002	In: Digital state	Input data only	In: 3	Universal inputs, maths channels
0x01000003	In: Totalizer (Float32)	Input data only	In: 5	Universal inputs, digital inputs, maths channels
0x01000004	In: Totalizer (Float64)	Input data only	In: 9	Universal inputs, digital inputs, maths channels

SubmodulIdentNumber	Data source	Data direction	Length (bytes)	Available in
0x01000005	In: Instantaneous value + totalizer (Float32)	Input data only	In: 10 (=5+5)	Universal inputs, maths channels
0x01000006	In: Instantaneous value + totalizer (Float64)	Input data only	In: 14 (=5+9)	Universal inputs, maths channels
0x01000007	In: Digital state + totalizer (Float32)	Input data only	In: 8 (=3+5)	Digital inputs
0x01000008	In: Digital state + totalizer (Float64)	Input data only	In: 12 (3+9)	Digital inputs
0x02000001	Out: Instantaneous value	Output data only	Out: 5	Universal inputs
0x02000002	Out: Digital state	Output data only	Out: 3	Digital inputs
0x03000001	In: Totalizer (Float32) Out: Instantaneous value	Input/output data	In: 5 Out: 5	Universal inputs
0x03000002	In: Totalizer (Float64) Out: Instantaneous value	Input/output data	In: 9 Out: 5	Universal inputs
0x03000003	In: Totalizer (Float32) Out: Digital state	Input/output data	In: 5 Out: 3	Digital inputs
0x03000004	In: Totalizer (Float64) Out: Digital state	Input/output data	In: 9 Out: 3	Digital inputs

In the case of value combinations that return several values in one data direction (xx + yy), the order in the list determines the order of transfer.Example: "0x01000005":

In: Instantaneous value + totalizer (Float32)

Data length: 10 bytes

Byte 0-4: Instantaneous value incl. status byte

Byte 5-9: Totalizer (Float32) incl. status byte

Configuration of a PROFINET Controller

In order to configure a PROFINET Controller for the cyclic data transfer, the device description file **GSDML-Vu.uu-vvvv-wwww-xxxxyyzz.xml** must be used. The final digits (**xxxxyyzz**) in the file name describe the output time:

- xxxx = Year
- yy = Month
- zz = Day

The first released file has the designation **GSDML-V2.32-EH-RSG45-xxxxyyzz.xml** and is only available in English.

This file contains all the information required for operation and is imported into the tool used to configure the PROFINET Controller. The configuration process depends on and must be determined by referring to the tool used.

GSDML file	Compatible firmware
GSDML-V2.32-EH-RSG45-xxxxyyzz.xml	V2.00.06 - V2.01.03
GSDML-V2.34-EH-RSG45-xxxxyyzz.xml	From V2.04.02
GSDML-V2.42-EH-RSG45-xxxxyyzz.xml	From V2.04.07

Configuration based on a Siemens controller (S7 315-2 PN/DP) using the **SIMATIC STEP 7 V5.5** tool as well as the **TIA Portal STEP 7 V13** is explained below. Some experience with the tool is required (creating a project, importing a GSD file) as these steps are not explained in any more detail here.
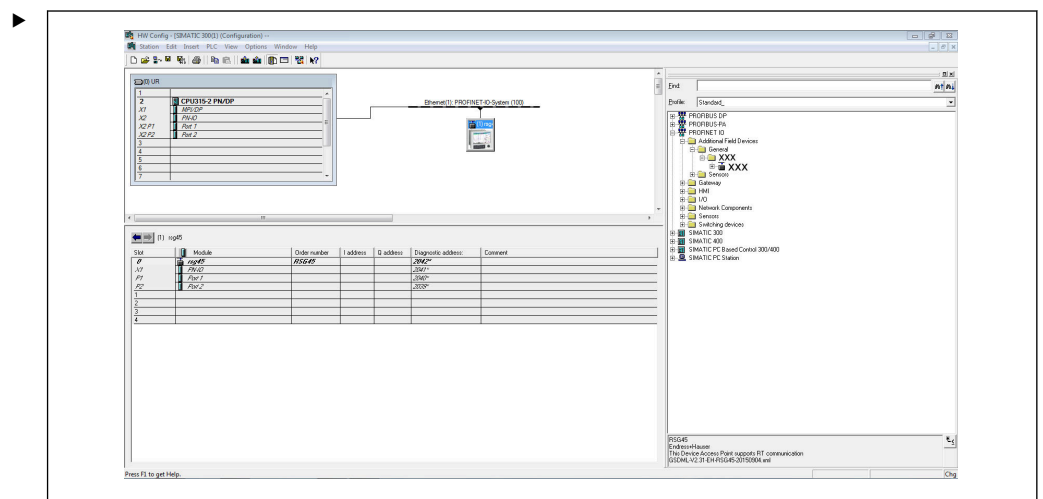
Selecting the device in HW-Config (SIMATIC STEP 7 V5.5)

After importing the GSD file, the device can be found in the catalog under **PROFINET IO →**
Additional field devices → General → ...:
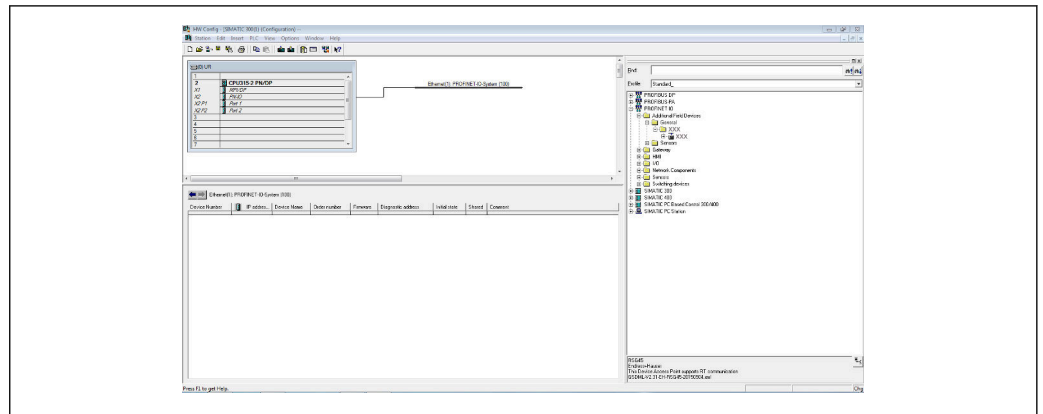
 6   Display of the device in the HW-Config catalog

▶

 7   Device connected to PROFINET network

Left-click on the device and, keeping the mouse button held down, connect the device
to the PROFINET network.

In the standard configuration, all slots, with the exception of slot 0 (corresponds to slot 0
in the above figure), are empty. In slot 0, the **Device Access Point** is permanently
configured with the following structure:

Slot 0: DAP
- 0: Device name
  Description/configuration of the device: The name assigned in this configuration
  (=Name of station) is displayed here. The name assigned in the configuration must
  match the name set in the device, as the device is identified for the cyclic data exchange
 based on its name.
- X1: PN-IO
  Description/configuration of the PROFINET interface: Update times, monitoring times,
 media redundancy, etc.
- P1: Port 1 / P2: Port2
  Description/configuration of the physical ports: Topology, available options, etc.

Slot 1 is not currently used and cannot currently be configured.Any configuration of this
slot will be rejected by the device.

Selecting the device in the TIA Portal STEP 7 V13 hardware catalog

After importing the GSD file, the device can be found in the catalog:
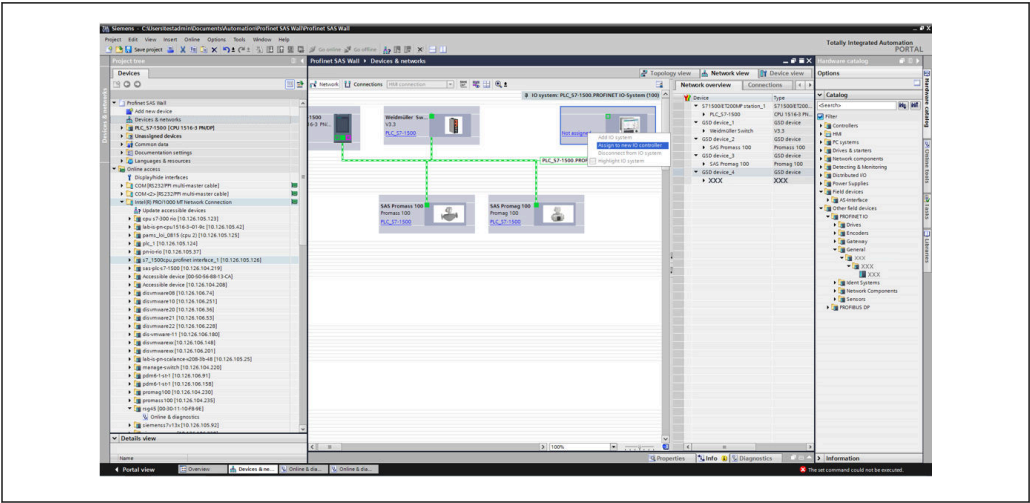
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▶
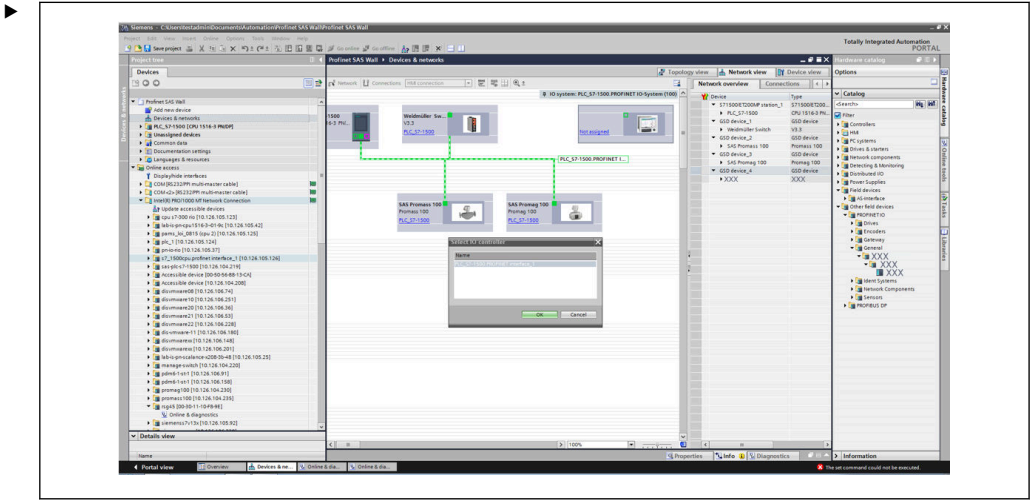
A0051761
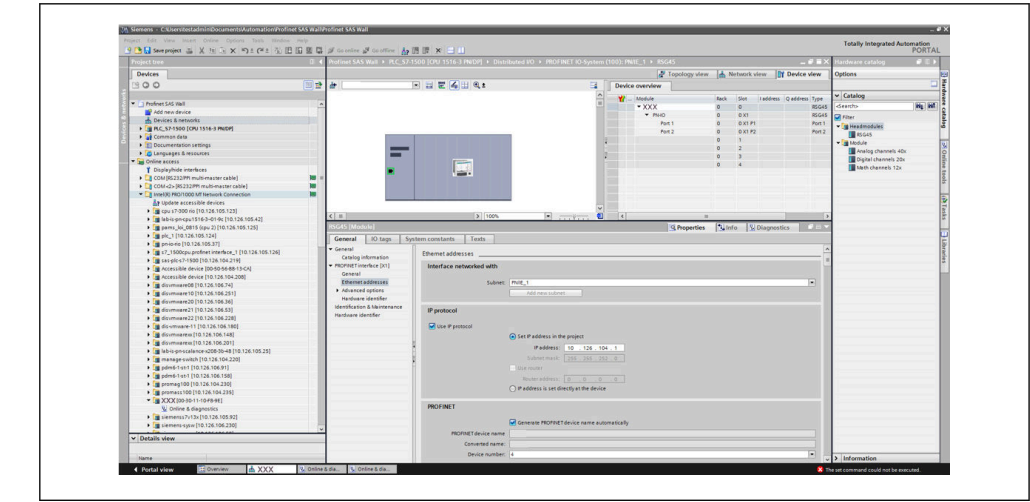
A0051762

Left-click on the device and, keeping the mouse button held down, drag the device into the network view and then assign it to a PROFINET network (IO controller).

In the standard configuration, all slots, with the exception of slot 0 (corresponds to slot 0 in the above figure), are empty. In slot 0, the **Device Access Point** is permanently configured with the following structure:

Slot 0: DAP
- 0: Device name
  Description/configuration of the device: The name assigned in this configuration (=Name of station) is displayed here. The name assigned in the configuration must match the name set in the device, as the device is identified for the cyclic data exchange based on its name.
- X1: PN-IO
  Description/configuration of the PROFINET interface: Update times, monitoring times, media redundancy, etc.
- P1: Port 1 / P2: Port2
  Description/configuration of the physical ports: Topology, available options, etc.

Slot 1 is not currently used and cannot currently be configured.Any configuration of this slot will be rejected by the device.

Selecting data to be transmitted (SIMATIC STEP 7 V5.5 and TIA Portal V13)

The cyclic data is configured in two steps:

In the first step, the type and number of available inputs/channels is selected via the configuration of the slot with a module.

In the second step, the input/channel and the data to be transferred are determined via the configuration of the subslot with a submodule.

The figure below provides an overview of available modules and submodules based on the specifications from **Table Slot/subslot ↔ Input/channels** and **Table SubmoduleNumber ↔ Input/output data**:
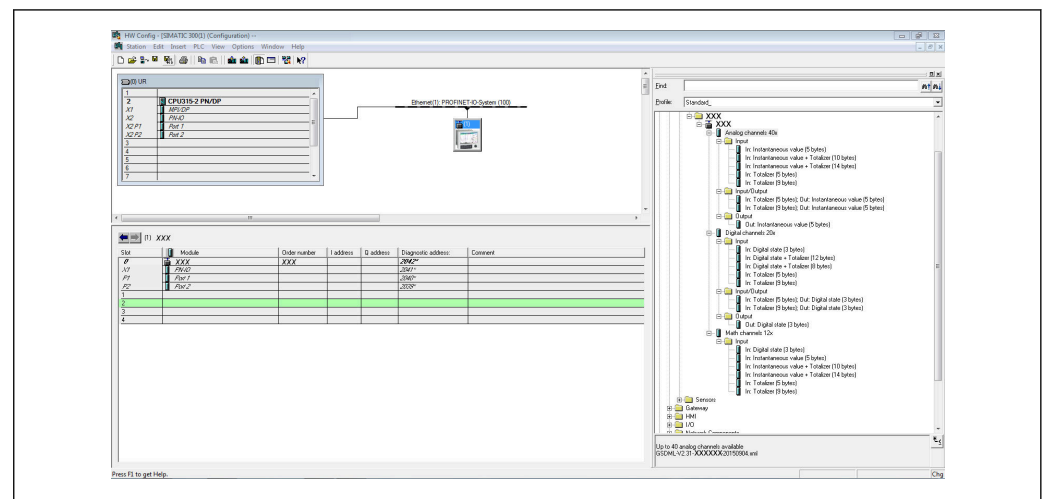
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⊞ *8   Slot/subslot configuration in the TIA Portal*

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 9   Slot/subslot configuration in the TIA Portal

In order to provide a clearer overview, the selectable submodules of a module are divided into three categories:
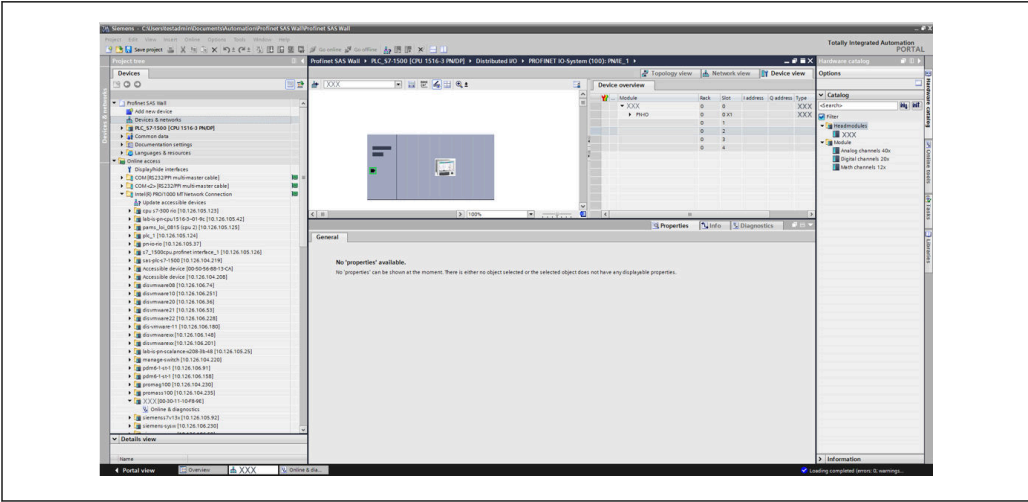
1.   Input:
      All submodules available for selection that only return input data are summarized here.
2.   Input/output:
      All submodules available for selection that both return input data and receive output data are summarized here.
3.   Output:
      All submodules available for selection that only receive output data are summarized here.

Depending on the tool used, either the ModulIdentNumber/SubmodulIdentNumber and/or the text for the ModulIdentNumber/SubmodulIdentNumber stored in the GSD file is displayed. In this case, the stored text is displayed instead of the ModulIdentNumber/SubmodulIdentNumber:

Figure: Module/submodule text in the GSD file ↔ ModulIdentNumber/SubmodulIdentNumber

Displayed text		ModulIdentNumber	SubmodulIdentNumber
Module	Analog channels 40x	0x02000028	
	Digital channels 20x	0x03000014	
	Maths channels 12x	0x0400000C	
Submodule	In: Instantaneous value (5 bytes)		0x01000001
	In: Digital state (3 bytes)		0x01000002
	In: Totalizer (5 bytes)		0x01000003
	In: Totalizer (9 bytes)		0x01000004
	In: Instantaneous value + Totalizer (10 bytes)		0x01000005
	In: Instantaneous value + Totalizer (14 bytes)		0x01000006
	In: Digital state + Totalizer (8 bytes)		0x01000007
	In: Digital state + Totalizer (12 bytes)		0x01000008
	Out: Instantaneous value (5 bytes)		0x02000001
	Out: Digital state (3 bytes)		0x02000002

Displayed text	ModulIdentNumber	SubmodulIdentNumber
In: Totalizer (5 bytes); Out: Instantaneous value (5 bytes)		0x03000001
In: Totalizer (9 bytes); Out: Instantaneous value (5 bytes)		0x03000002
In: Totalizer (5 bytes); Out: Digital state (3 bytes)		0x03000003
In: Totalizer (9 bytes); Out: Digital state (3 bytes)		0x03000004

A configuration is shown below based on the digital inputs; this is identical, however, for all other inputs/channels.

First, slot 3 must be configured with the **Digital channels 20x** module. Once this is complete, the display expands by the number of configurable subslots:
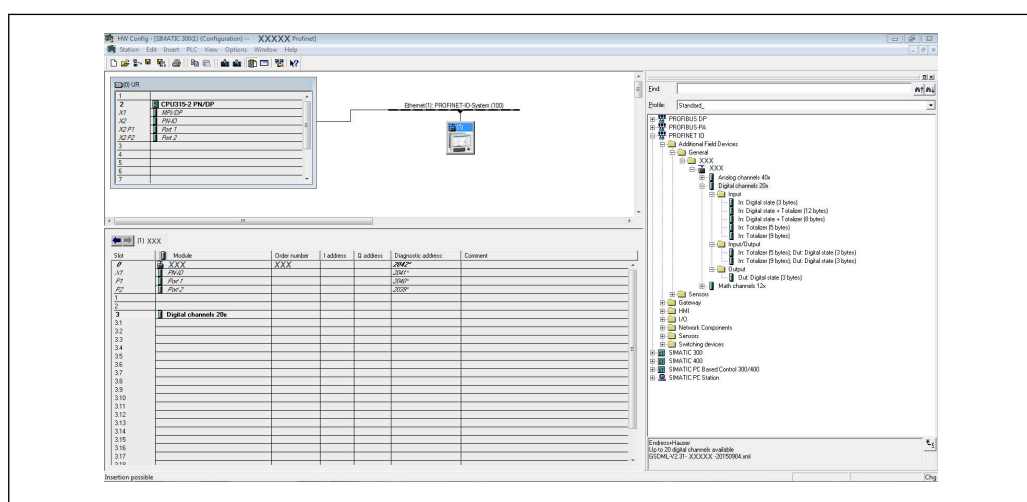
🖾 *10   Display of configurable subslots in HW-Config*
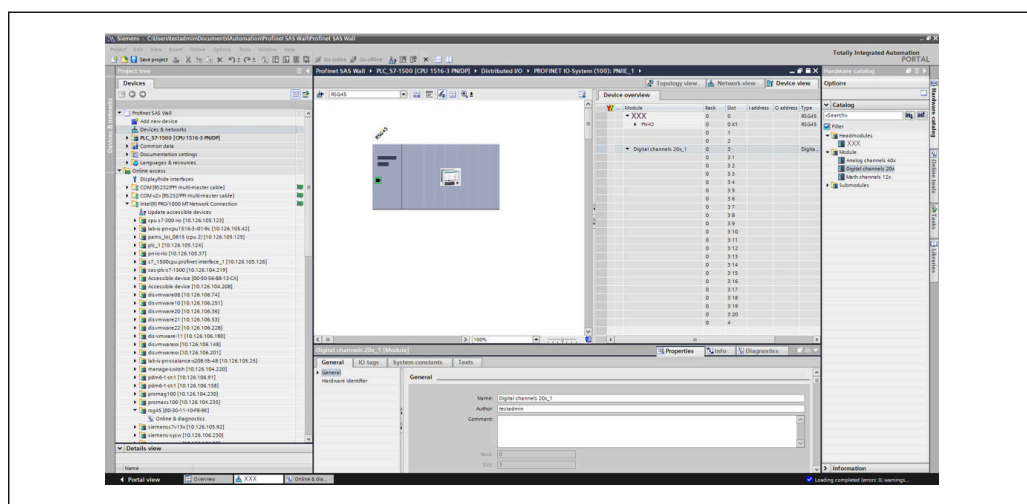
🖾 *11   Display of configurable subslots in the TIA Portal*

The subslots can now be configured with the corresponding submodules. In this example, all available submodules are distributed between subslots 1-8 (corresponds to digital inputs 1-8) so that each subslot is configured with another submodule:

12   Configuration of digital inputs in HW-Config

13   Configuration of digital inputs in the TIA Portal

During the configuration, the total number of bytes transferred in each data direction must not exceed 280 bytes. These limit values (input: max. 280 bytes; output: max. 280 bytes) are stored in the GSD file and are generally also verified by the tool used.
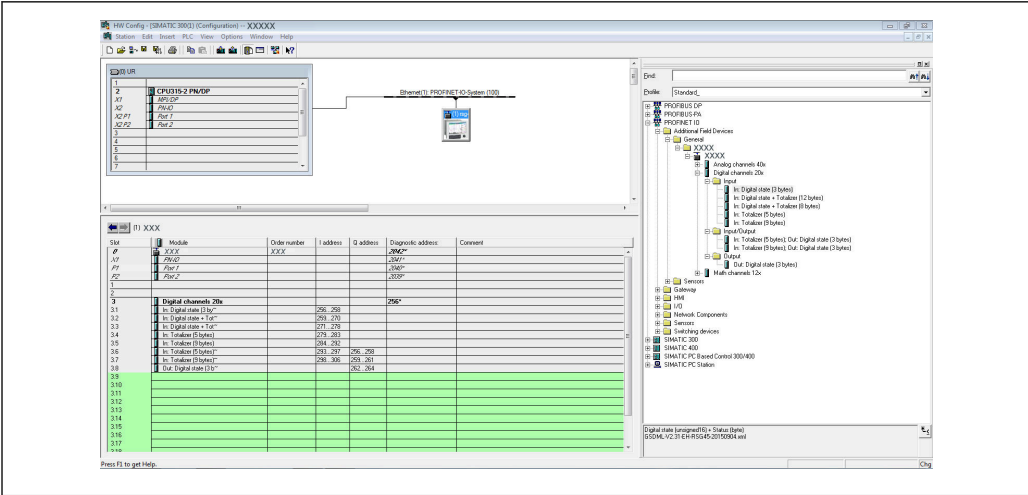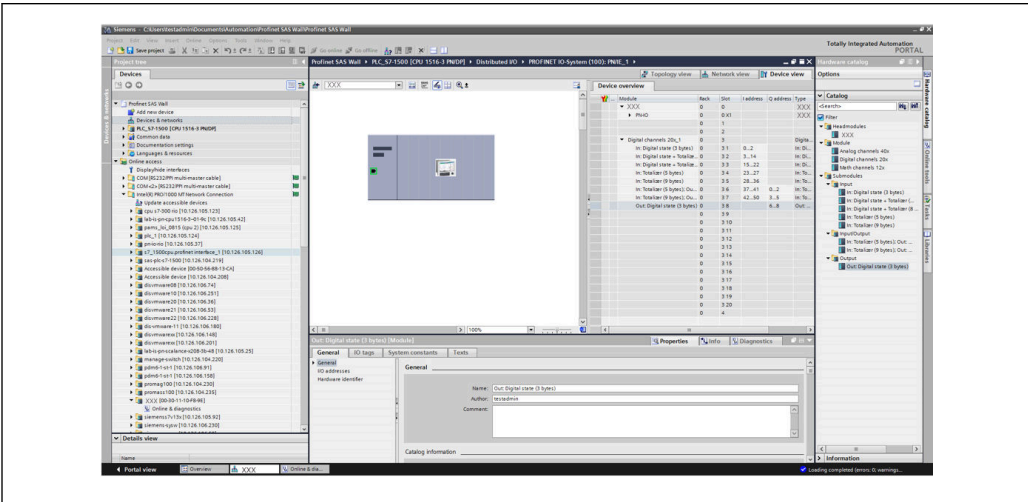
Once the slot/subslot configuration is complete, this is transferred to the controller.

Once it has received the slot/subslot configuration, the controller attempts to start the cyclic data transfer. When the connection is established, the slot/subslot configuration is sent to the device. During the adaptation phase, the device may disappear briefly from the PROFINET network. This happens if the device has received a configuration that requires the PROFINET interface to be restarted.

Adapting the device to the received configuration

While establishing a connection, the PROFINET Controller sends the slot/subslot configuration to the device, where it is checked for validity. In the event of an invalid configuration, the device ignores the received configuration and retains the current configuration. If the configuration is valid, the device adapts accordingly. If the configuration is identical to the current configuration, the device starts the cyclic data transfer immediately.

If, on the other hand, the received configuration differs from the set configuration, the device disconnects briefly from the PROFINET network in order to restart the PROFINET interface with the new configuration.

The restart can be monitored/checked as follows:

1. **Main menu** → **Diagnostics** → **PROFINET**:
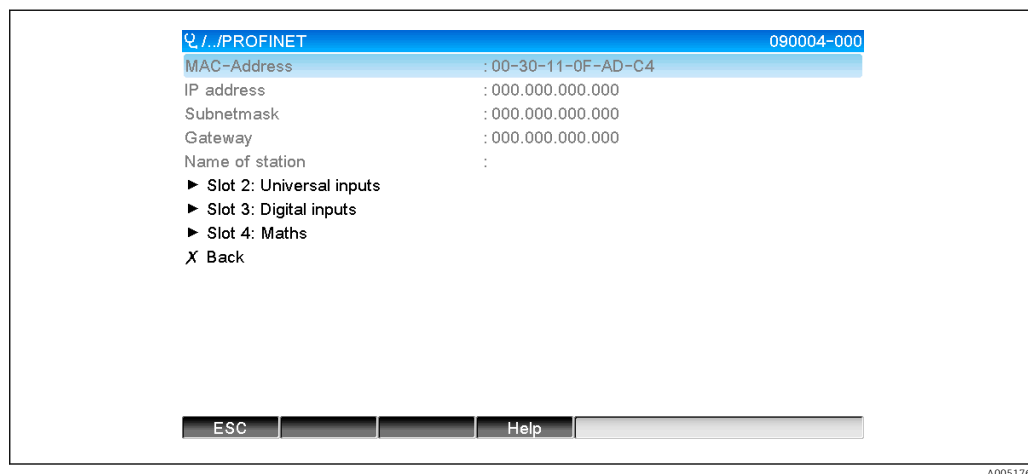
▣ *14   Display of the restart in the PROFINET menu*

While the PROFINET interface is restarting, the **IP address**, **Subnet mask** and **Gateway** connection settings are set to 0 and the name configured under **Name of station** is set to ------. After the restart, this information reappears according to the configured data.

This procedure is carried out every time the PROFINET interface is restarted. A restart can be triggered by the following actions:

    a)   Adaptation to new slot/subslot configuration

    b)   Command to restart the interface received

    c)   Command to reset the interface to the factory settings received

2) Event logbook:
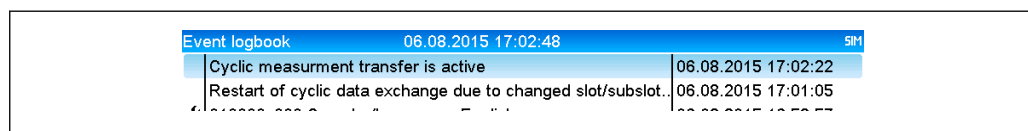
▣ *15   Display of the restart in the event logbook*

An entry is only made in the event logbook if the restart was carried out due to an adaptation to a new slot/subslot configuration.

Display of the slot/subslot configuration in the device

In the main menu under **Diagnostics** → **PROFINET**, the **Slot2: Universal inputs**, **Slot3: Digital inputs** and **Slot4: Maths** submenus are displayed:

A0051771

⊠ *16   PROFINET configuration of the cyclic data transfer*

These submenus show the currently used (cyclic data transfer active) or most recently saved (cyclic data transfer not active) configuration. The structure of the submenus is always the same and only differs in the number of subslots displayed, which corresponds to the number of inputs/channels.

- **Slot 2: Universal inputs** submenu
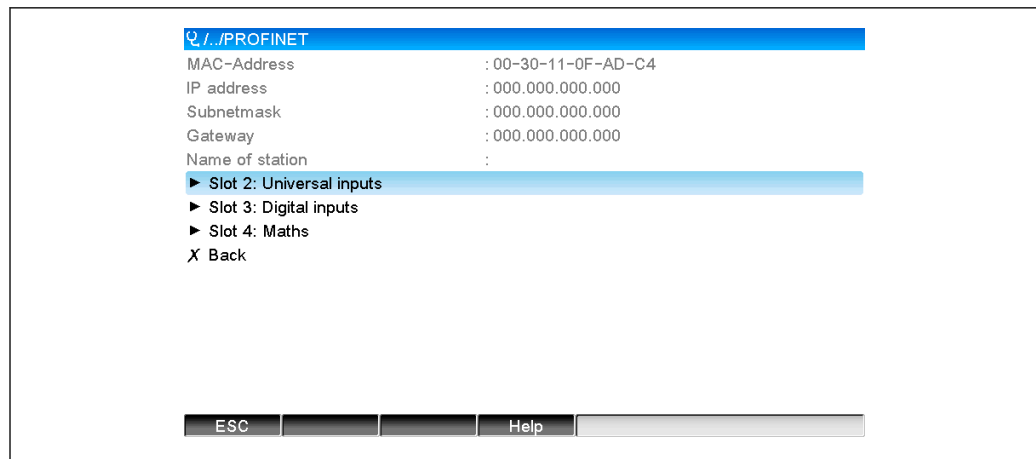 Available universal inputs: 1-40
  Displayed subslots: 1-40
- **Slot 3: Digital inputs** submenu
  Available digital inputs: 1-20
  Displayed subslots: 1-20
- **Slot 4: Maths** submenu
  Available maths channels: 1-12
  Displayed subslots: 1-12

The display is explained below on the basis of the maths channels:
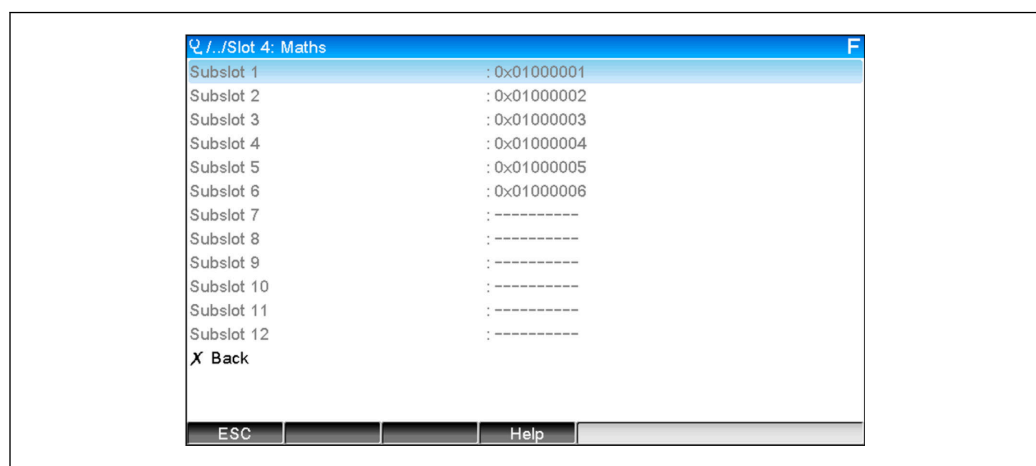
A0051772

⊠ *17   Display of the configuration of maths channels*

As shown in the figure, the submenu is divided into two areas:
- Left: Specification of the subslot = number of the channel (in this case the maths channel)
- Right: Specification of the configured SubmodulIdentNumber. If ------- is displayed instead of the SubmodulIdentNumber, this means that the subslot or the input/channel is not involved in the cyclic data transfer. During the cyclic data transfer, only values from the subslots or inputs/channels that have been configured with a corresponding SubmodulIdentNumber are received/sent.

2.2.5   Checking whether cyclic data transfer is active

You can check whether the device is performing a cyclic data exchange in the main menu under **Diagnostics → Event logbook**:

Event logbook	06.08.2015 17:30:54	SIM
Cyclic measurement transfer is active	06.08.2015 17:30:40	
No cyclic measurment transfer	06.08.2015 17:30:34	
🔧 220000-003 Signal: Switched off	06.08.2015 17:30:24	

A0051773

🖾 *18   Device performing cyclic data exchange*

The message **Cyclic measurement transfer is active** is entered here when the device begins a cyclic data transfer with a PROFINET Controller. If the cyclic data transfer is ended, the message **No cyclic measurement transfer** appears.

2.3   Acyclic data transfer

2.3.1   Transferring texts

Texts can be saved in the device's events list. The maximum length is 40 characters. If the text is longer than 40 characters, write access is blocked with an error message.The texts must be written via **Slot 0 → SubSlot 1 → Index 1**.

Once the text has been successfully written, it is entered into the event logbook:

Event logbook	06.08.2015 17:05:24	SIM
🖾 ABCD: Fieldbus (Remote)	06.08.2015 17:04:55	
Cyclic measurment transfer is active	06.08.2015 17:04:48	

A0051774

🖾 *19   Entry of a text into the event logbook*

The above figure shows that the text **ABCD** has been successfully written.

2.3.2   Batch data

Batches can be started and stopped. The batch name, batch designation, batch number and preset counter can also be configured for stopping the batch. The texts (ASCII) can have a maximum length of 30 characters. If the text is longer than 30 characters, write access is blocked with an error message.

The functions and parameters must be written via **Slot 0 → SubSlot1 → Index 2**:

Function	Description	Data
0x01	Start batch	Batch 1…4, ID, name
0x02	Stop batch	Batch 1…4, ID, name
0x03	Batch designation	Batch 1…4, text (max. 30 characters)
0x04	Batch name	Batch 1…4, text (max. 30 characters)
0x05	Batch number	Batch 1…4, text (max. 30 characters)
0x06	Preset counter	Batch 1…4, text (max. 8 characters)

Starting a batch

If the user administration function is enabled, an ID (max. 8 characters) and a name (max. 20 characters) must be transmitted, separated by a ';'.

Example: Start batch 2

Byte	0	1
	func	nr
	1	2

The entry **Batch 2 started** is saved in the event list. This message also appears on the screen for a few seconds.

Ending a batch

If the user administration function is enabled, an ID (max. 8 characters) and a name (max. 20 characters) must be transmitted, separated by a ';'.

Example: End batch 2, user administration function enabled (ID: "IDSPS", Name "RemoteX")

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	func	nr	49	44	53	50	53	3B	52	65	6D	6F	74	65	58
	2	2	'I'	'D'	'S'	'P'	'S'	';'	'R'	'e'	'm'	'o'	't'	'e'	'X'

The entry **Batch 2 terminated** and **Remote (IDSPS)** is saved in the event list. This message also appears on the screen for a few seconds.

Setting the batch designation

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device settings (Direct access 490005).

Example: Batch designation "Identifier" for batch 2

Byte	0	1	2	3	4	5	6	7	8	9	10	11
	func	nr	49	64	65	6E	74	69	66	69	65	72
	3	2	'I'	'd'	'e'	'n'	't'	'i'	'f'	'i'	'e'	'r'

Setting the batch name

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device settings (Direct access 490006).

Example: Batch name "Name" for batch 2

Byte	0	1	2	3	4	5
	func	nr	4E	61	6D	65
	4	2	'N'	'a'	'm'	'e'

Setting the batch number

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device settings (Direct access 490007).

Example: Batch number "Num" for batch 2

Byte	0	1	2	3	4
	func	nr	4E	75	6D
	4	2	'N'	'u'	'm'

Set preset counter

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device settings (Direct access 490008).

- Maximum 8 characters (including '.', 'E', '-')
- Exponential function permitted, whereby the permitted value range must not be exceeded, e.g. **1.23E-2** = 0.0123 decimal
- Only positive numbers
- Maximum value range: 0 - 99999999

Example: Preset counter to 12.345 for batch 2

Byte	0	1	2	3	4	5	6	7	8	9
	func	nr	31	32	2E	33	34	35	36	37
	6	2	'1'	'2'	'.'	'3'	'4'	'5'	'6'	'7'

Reading out the batch status

This can be used to read out the status of every batch and the last communication status.6 bytes must be read out via **Slot 0 → SubSlot 1 → Index 2**.

Example: Batch 2 started, communication status "OK"

Byte	0	1	2	3	4	5
		Comm. status	Status batch 1	Status batch 2	Status batch 3	Status batch 4
	0	0	0	1	0	0

If, for example, a batch number is set even though the batch is already running, byte 1 would have the value 0x03.

Communication status:

0:	OK
1:	Not all of the necessary data was transmitted (mandatory entries)
2:	No responsible user logged in
3:	Batch already running
4:	Batch not configured
5:	Batch controlled via control input
7:	Automatic batch number active
9:	Error, text contained characters that cannot be displayed, text too long, incorrect batch number, function number out of range

2.3.3   Relays

Relays can be set if they were set to **Remote** in the device settings. Parameters must be written via **Slot 0 → SubSlot 1 → Index 3**.

Setting relays

Example: Setting relay 6 to the active state

Byte	0	1
	RelNo	Status
	6	1

Reading out the relay status

This reads out the status of every relay. Bit 0 corresponds to relay 1. 2 bytes must be read out via **Slot 0 → SubSlot 1 → Index 3**.

Example: Relay 1 and relay 6 in the active state

Byte	0	1
	Relays 12-9 (hex)	Relays 1-8 (hex)
	0	0x21

2.3.4   Changing limit values

Limit values can be changed. The functions and parameters must be written via **Slot 0 → SubSlot1 → Index 4**.

Function	Description	Data
1	Initialization	
2	Accept limit values	
3	Change limit value	Limit value number, value [;dt]
5	Specify reason	Text specifying the reason

The following procedure must be followed to change limit values:

1. Initialize a change to limit values.

2. Change limit values.

3. Specify a reason for the change.

4. Accept limit values.

The changes since the last initialization can be discarded with a new initialization.

Initializing a change to limit values

This prepares the device for changes to the limit values.

Byte	0	1
	Func	Fill byte
	1	2A

Changing limit values

Here, a limit value in the device is changed but is not yet accepted.

Examples:

Func	Limit value	Data	Meaning
3	1	5.22;;60	Limit value 1 to 5.22, no span, 60 s delay
3	2	5.34	Limit value 2 to 5.34
3	3	;;10	Limit value 3, delay to 10 seconds
3	4	20;;;50	Limit value 4, in/outband lower limit value 20, upper limit value 50

Example: Changing limit value 1 (upper limit value for universal input) to 90.5

Byte	0	1	2	3	4	5
	Func	Limit value	39	30	2E	35
	3	1	'9'	'0'	'.'	'5'

Example: Changing limit value 3 (gradient for universal input) to 5.7 within 10 seconds

Byte	0	1	2	3	4	5	6	7	8
	Func F	Limit value	35	2E	37	3B	3B	31	30
	3	3	'5'	'.'	'7'	';'	';'	'1'	'0'

Specifying a reason for changing the limit values

Before saving the change to limit values, a reason can be specified and saved in the events list. If no reason is specified, the entry "Limit values have been changed" is made in the events list.

Texts (as per ASCII table) can be transferred. The maximum length is 30 characters. If the text is longer than 30 characters, write access is blocked with an error message.

Byte	0	1	2..n
	Func	Fill byte	Text
	5	2A	

Accept limit values

Here, the modified limit values are accepted in the device and stored in the device settings.

Byte	0	1
	Func	Fill byte
	2	2A

Reading out the execution status

This can be used to read out the status of the last limit value function performed.1 byte must be read out via **Slot 0 → SubSlot 1 → Index 4**.

Example: Incorrect function addressed

Byte	0
	Comm. status
	1

Communication status:

0:	OK
1:	Incorrect function number or limit value number
2:	Data missing
3:	Limit value not active
4:	Gradient → two values
5:	Function not currently possible
9:	Error

3 Troubleshooting

- Is a PROFINET module installed?
- Is the Ethernet connection between the device and controller OK?
- Is the right GSD file being used?
- Are the **Slots** and **Subslots** configured correctly?

4 List of abbreviations/definition of terms

PROFINET module: The PROFINET plug-in module that is plugged into the front of the device.

PROFINET controller: All instruments such as a PLC, PC plug-in cards etc. that perform a PROFINET controller function.