

# WCS-PNG210

## WCS PROFINET IO interface module

Manual



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# 1 Introduction

## 1.1 Content of this Document

This document contains information required to use the product in the relevant phases of the product life cycle. This may include information on the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Commissioning and operation
- Maintenance and repair
- Troubleshooting
- Dismounting
- Disposal



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**Note**

For full information on the product, refer to the further documentation on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

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**Note**

For specific device information such as the year of construction, scan the QR code on the device. As an alternative, enter the serial number in the serial number search at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

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The documentation comprises the following parts:

- This document
- Datasheet

In addition, the documentation may comprise the following parts, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Instruction manual
- Functional safety manual
- Other documents

## 1.2 Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismantling lies with the plant operator.

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismantling of the product. The personnel must have read and understood the instruction manual and the further documentation.

Prior to using the product make yourself familiar with it. Read the document carefully.

## 1.3 Symbols Used

This document contains symbols for the identification of warning messages and of informative messages.

### Warning Messages

You will find warning messages, whenever dangers may arise from your actions. It is mandatory that you observe these warning messages for your personal safety and in order to avoid property damage.

Depending on the risk level, the warning messages are displayed in descending order as follows:



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#### **Danger!**

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

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#### **Warning!**

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

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#### **Caution!**

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

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### Informative Symbols



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#### **Note**

This symbol brings important information to your attention.

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#### **Action**

1. This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

## 2 Product description

### 2.1 Use and application

The WCS-PNG210 interface module acts as an interface between the WCS reader and the PROFINET IO controller. The device has two PROFINET ports. The second port can be used, for example, as an outgoing PROFINET port. The data between the WCS reader and WCS-PNG210 is transmitted via an RS-485 interface. The data from the WCS-PNG210 to the controller is transmitted via the PROFINET protocol.

You can connect a maximum of four WCS readers of type LS221 (and/or LS121) to one WCS-PNG210 interface module. If you connect several WCS readers, they must have different addresses. The number of connected WCS readers is configured in the hardware project settings.

### 2.2 Dimensions

The interface module housing has the following dimensions.

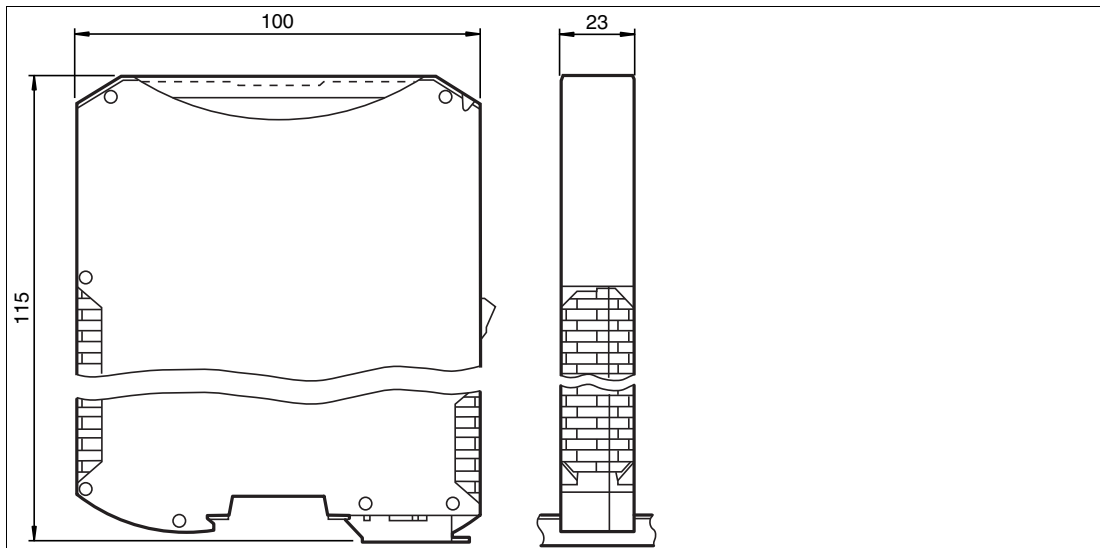


Figure 2.1 Dimensions

## 2.3 Design of the device

### Device components

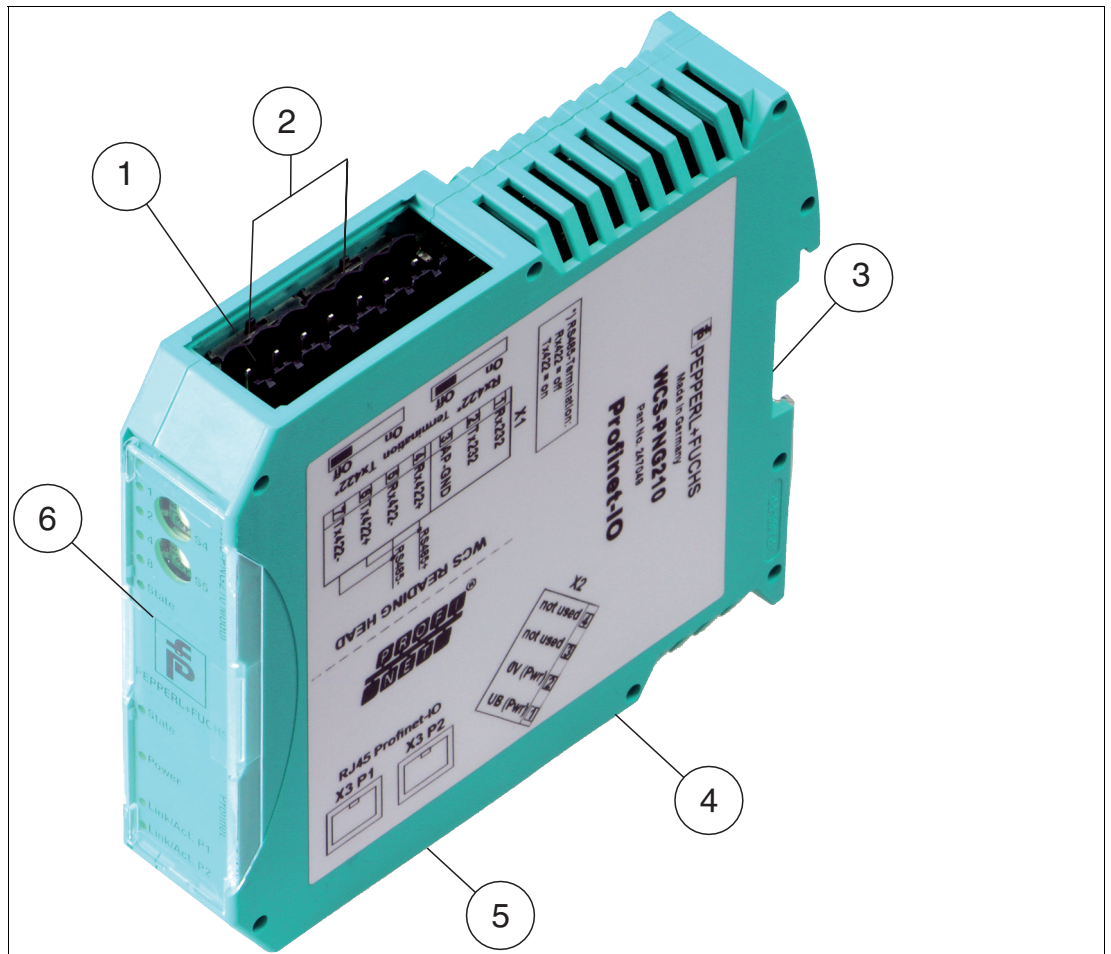


Figure 2.2 Interface module overview

- 1 X1: RS-485 interface
- 2 RS-485 bus termination slide switch
- 3 Mounting bracket
- 4 X2: Connection for power supply
- 5 X3: PROFINET IO communication interface
- 6 Front panel with rotary coding switches and indicator lights

## Front panel

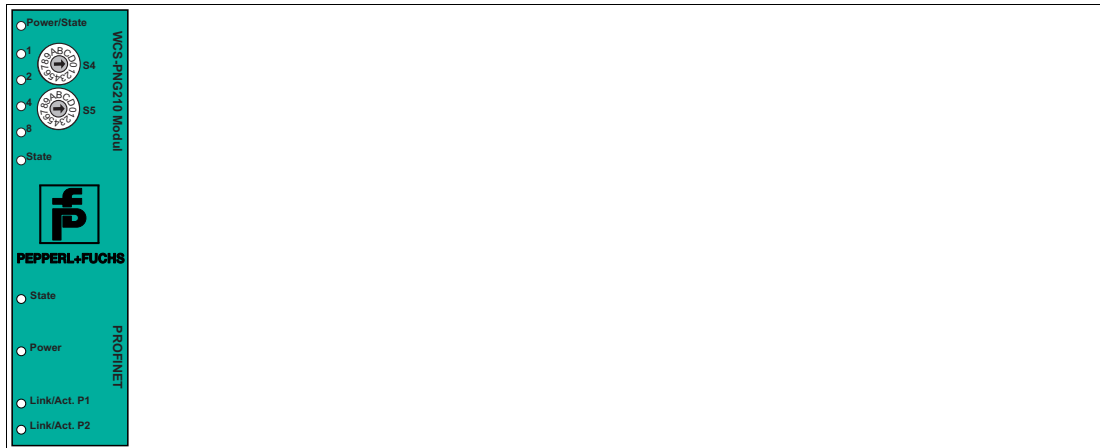


Figure 2.3 Front panel overview

### Power:

The "Power" LED is green: The WCS-PNG210 interface module is correctly connected to the power supply.

### State:

The "State" LED is green: Data exchange is taking place with the WCS readers. Using the four "Error No/Select ID" LEDs, the number of the currently polled WCS reader is displayed.

ErrorNo/Select ID				Reader address
8	4	2	1	
0	0	0	1	0
0	0	1	0	1
0	1	0	0	2
1	0	0	0	3

Table 2.1 Display of the four LEDs "Error No/Select ID" when the "State" LED lights up green

The "State" LED is red: The interface module has detected an error or a warning. The interface module displays the binary coded error and/or warning number via the "Error No/Select ID" LEDs.

Error (No. 1...5): Switch the interface module off and back on. If the error occurs again, the module must be replaced.

Warning (No. 6...15): The warning provides information. The interface module displays the warning for one minute and then resets automatically.

ErrorNo/Select ID LED				Error number	Error description
LED8	LED4	LED2	LED1		
0	0	0	0	0	Reserved
0	0	0	1	1	Hardware error
0	0	1	0	2	EEPROM error
0	0	1	1	3	Internal memory error
0	1	0	0	4	Fieldbus hardware error or incorrect fieldbus ID
0	1	0	1	5	Script error

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ErrorNo/Select ID LED				Error number	Error description
LED8	LED4	LED2	LED1		
0	1	1	0	6	Reserved
0	1	1	1	7	Communication WCS reader, RS send buffer overflow
1	0	0	0	8	Communication WCS reader, RS receive buffer overflow
1	0	0	1	9	Communication WCS reader, RS timeout
1	0	1	0	10	General fieldbus error
1	0	1	1	11	Parity or frame check error
1	1	0	0	12	Reserved
1	1	0	1	13	Fieldbus configuration error
1	1	1	0	14	Fieldbus data buffer overflow
1	1	1	1	15	Reserved

Table 2.2 Meaning of the error codes (four LEDs display "Error No/Select ID", if the "State" is illuminated red and thus indicates an error or a warning)

### Rotary coding switches S4 and S5

The two switches control the operating modes. Ensure that the two switches are at **position 0** to enable the data exchange mode.

### PROFINET State:

LED "PROFINET State"	PROFINET interface state
Lights up green	Data exchange in progress
Flashes green	PROFINET is initialized, waiting for connection with IO controller
Lights up red	Error with PROFINET hardware
Flashes red	Error during PROFINET initialization

Table 2.3 "PROFINET State" LED display

### PROFINET Power:

The "PROFINET Power" LED is green: The LED is connected directly to the electrically isolated supply voltage of the PROFINET side.

### PROFINET Link/Activity P1:

The "Link/Activity" LED on port 1 is controlled directly by the PROFINET processor and is green if the Ethernet link pulses are found. When there is data traffic on the network, the LED flashes green at the same speed as the sent/received data.

### PROFINET Link/Activity P2:

The "Link/Activity" LED on port 2 is controlled directly by the PROFINET processor and is green if the Ethernet link pulses are found. When there is data traffic on the network, the LED flashes green at the same speed as the sent/received data.

## 3 Installation

### 3.1 Mounting



#### Mounting the Modules

The module is fastened to a DIN mounting rail with a width of 35 mm using a snap-on fixing method.

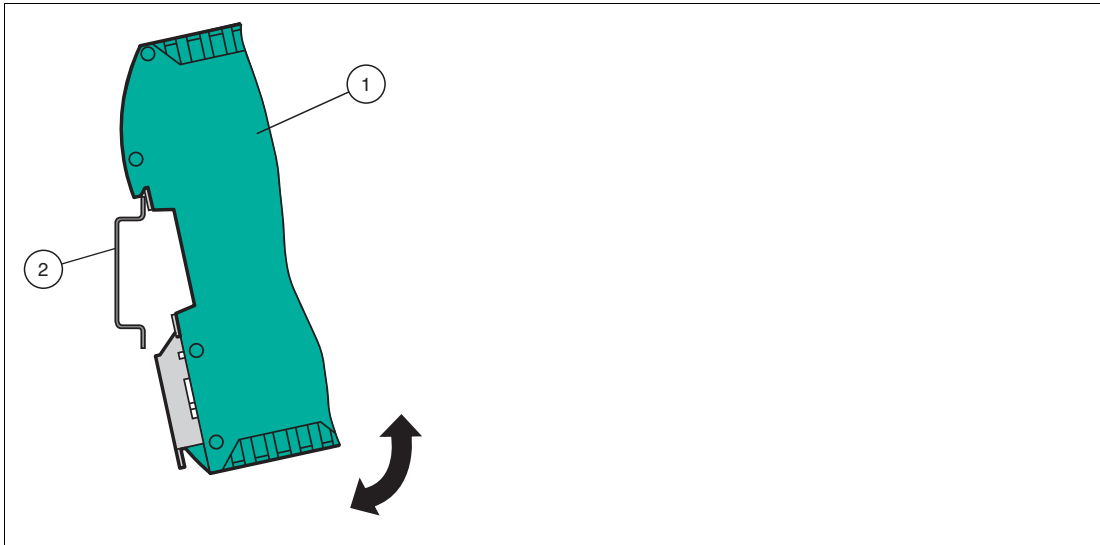


Figure 3.1 Mounting

1. Hook the module (1) onto the DIN mounting rail (2) from above and press it down until it snaps into place.

↳ The module is mounted.



#### Note

##### Heat Dissipation

You may place other modules to the left and right of the module. Above and below the modules, there must be at least 5 cm of free space for heat dissipation.

2. You must connect the DIN mounting rail to the switch cabinet's equipotential busbar. The connection wire must have a cross section of at least 10 mm<sup>2</sup>.



#### Note

##### Vertical Installation

You can also install the DIN mounting rail vertically, so that the modules can be rotated by 90° for mounting.

## 3.2 Electrical connection



### Danger!

Device damage due to incorrect installation

A faulty installation of cables and connection lines can endanger the function and the electrical safety of the device.

- Note the permissible core cross section of the conductor.
- If you are using stranded conductors, make sure that these stranded conductors are crimped with wire end ferrules.
- Make sure that conductors are insulated all the way up to the terminal.
- Observe the tightening torque for the screws on the terminal. The tightening torque is 0.5 Nm.
- Using an inappropriate tool may damage the screw heads. Use a slot-head screwdriver of size 3.5 x 0.5.
- Connecting an alternating current can damage the device or cause the device to malfunction. Connect the device to direct current (DC).

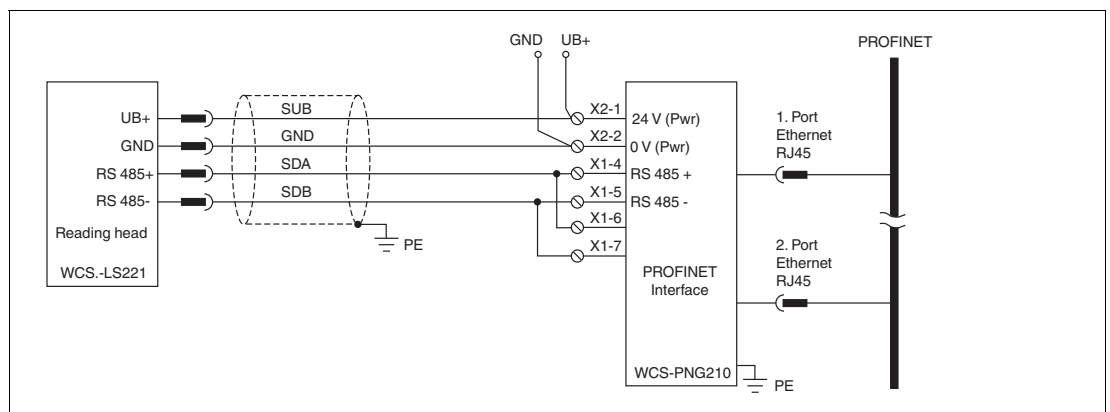


Figure 3.2 Electrical connection

Plug X1 is located on the top side of the interface module, plug X2 on the underside.

### Connection technology

You must/may use the following connection technology when wiring the assembly:

- Standard screw/plug connection (supply + RS)
- 8-pin RJ45 connector (PROFINET IO connection)

In the case of the standard screw terminals, one line per connection point can be clamped. To tighten the screws, use a screwdriver with a blade width of 3.5 mm.

Permissible cable cross section:

- Flexible cable with wire end ferrule: 1 x 0.25 ... 1.5 mm<sup>2</sup>
- Solid cable: 1 x 0.25 ... 1.5 mm<sup>2</sup>

The plug-in terminal strip represents a combination of standard screw connections and plug connectors. The plug connector is coded and can therefore not be plugged in incorrectly.



## Connecting the power supply

1. Connect the operating voltage (10 VDC...30 VDC) to terminals 1 and 2 of the 4-pin plug X2 on the interface module. In addition, note the label on the module.

↳ The "Power" LED lights up green.

Terminal		Description
1	UB (Pwr)	Operating voltage interface module/ operating voltage WCS reader
2	0 V (Pwr)	Ground interface module/ground WCS reader
3	Not used	Not used
4	Not used	Not used

Table 3.1 Terminal X2

## Equipotential bonding connection

The connection to equipotential bonding occurs automatically when attaching to the DIN mounting rail.



## PROFINET IO communication interface

This interface can be found on the module in the form of two 8-pin RJ45 sockets on the bottom of the housing.

1. Insert the PROFINET connector into the RJ45 socket(s) with the label "RJ45 PROFINET IO".



### Note

Ensure that the cable length to the neighboring Ethernet nodes is at least 0.6 m.



### Preparing to use the RS-485 interface

For operation on an RS-485 interface, the terminal on connector X1 must be connected as follows:

1. Connect terminal 4 "Rx 422+" to terminal 6 "Tx 422+".
2. Connect terminal 5 "Rx 422-" to terminal 7 "Tx 422-".

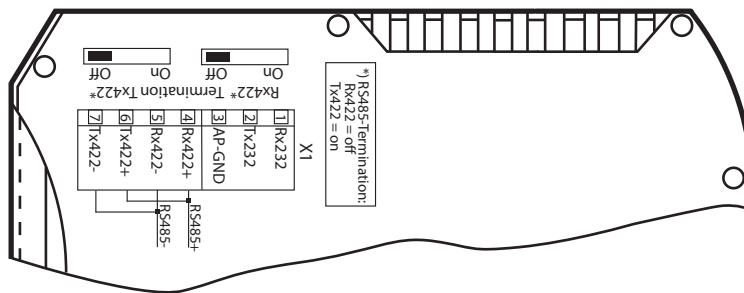
Terminal		Description
4	Rx 422+	RS-485+ data line to WCS reader
5	Rx 422-	RS-485- data line to WCS reader
6	Tx 422+	Connect terminal 6 "Tx 422+" to terminal 4 "Rx 422+"
7	Tx 422-	Connect terminal 7 "Tx 422-" to terminal 5 "Rx 422-"

Table 3.2 Terminal X1



#### Note

#### RS-485 bus termination



If the interface module is operated as the first or last physical device in an RS-485 bus, there must be a bus termination on this module. To do this, set the slide switch "Rx 422 Termination" to "Off" and the slide switch "Tx 422 Termination" to "On". This activates the RS-485 terminator (150 Ω) built into the interface module.

If you only connect one WCS reader to the interface module, you must always activate the RS-485 terminator, see also Cable routing in the RS-485 bus.

Flow chart

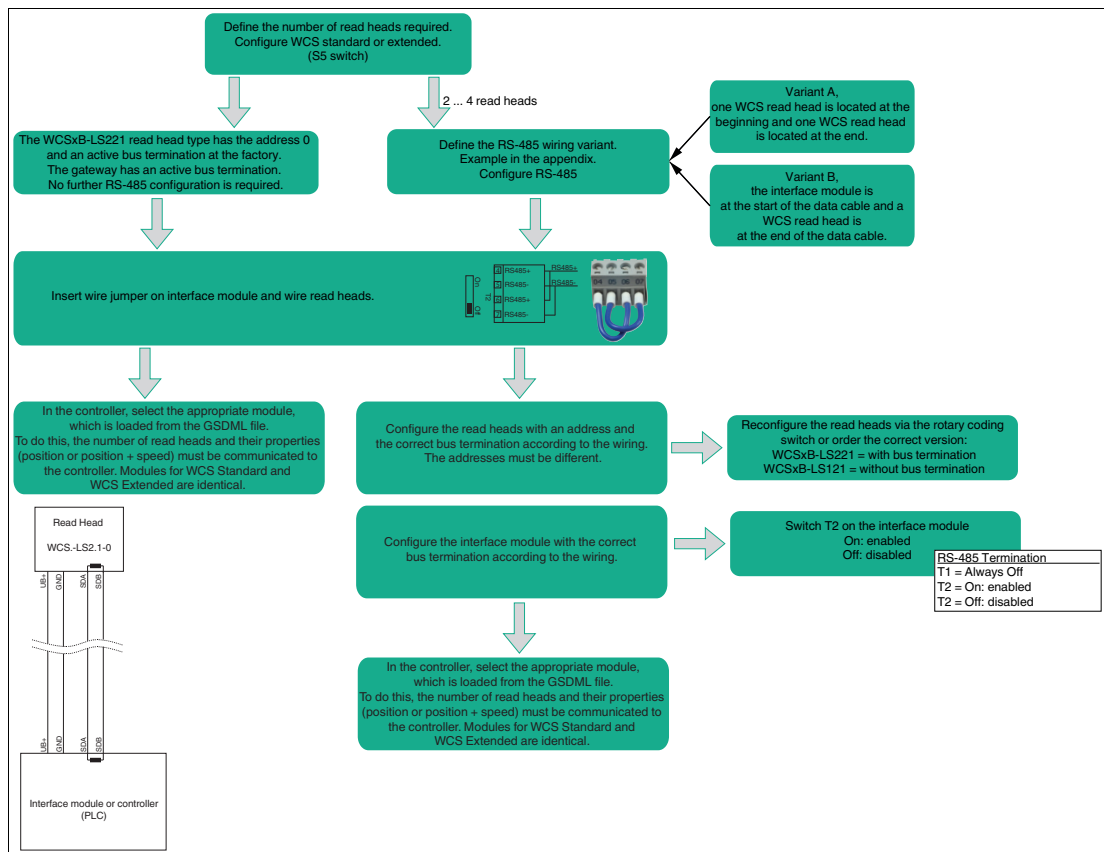


Figure 3.3 Flow chart

### 3.3 Dismounting



#### Dismounting the modules

Use a suitable slot-head screwdriver for dismounting the module.

1. Disconnect all the supply and signal lines.

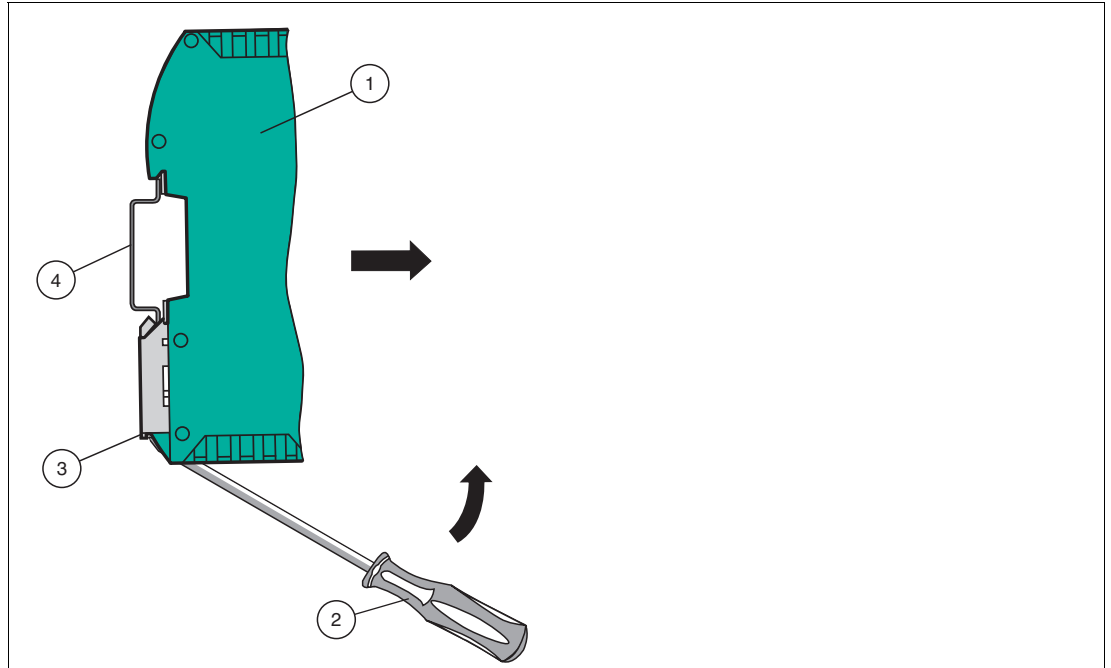


Figure 3.4 Dismounting

2. Insert the screwdriver (2) into the groove of the mounting bracket (3).
3. Press the screwdriver (2) in the specified direction until the lock on the DIN mounting rail (4) opens, see figure.
4. Then press the module (1) upwards and lift it out of the DIN mounting rail.

## 4 Commissioning

### 4.1 Introduction



#### Warning!

Danger to life due to defective work

Errors during installation and commissioning can cause life-threatening injuries and significant property damage.

- Installation and commissioning must be carried out only by trained personnel in accordance with safety regulations.

#### Components

To commission the module, you will require the following components:

- WCS-PNG410 interface module
- Cordset from the interface module to the read head
- Connector for the PROFINET connection to the interface module
- Ethernet cable
- 10 V DC .... 30 V DC voltage supply
- GSDML file (the GSDML file can be downloaded free of charge from our website [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)).



#### Connecting the Interface Module

To ensure that the assembly functions correctly, you must carry out the following steps during commissioning:

1. Assign a PROFINET address.



#### Note

On delivery, the module does not yet have an IP address. In normal operation, the IP address is usually assigned to the module by the PROFINET IO controller (PLC).

2. Assign a PROFINET device name.



#### Note

On delivery, the interface module does not yet have a device name. The device name is assigned to the interface module via the configuration software.

3. Connect the module to PROFINET using the interface labeled "RJ45 PROFINET IO."
4. For information on commissioning the process device (read head), please refer to its manual.
5. Ground the DIN mounting rail onto which the assembly is clipped.
6. Connect the direct current to the terminals provided.
7. Use any programming tool for project planning. The GSDML file can be downloaded from our website: [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com). Simply enter the product name or item number in the product/keyword field and click "Search."



#### Note

A more detailed description of the individual steps is provided on the following pages.



## 4.2 Connecting WCS readers

If you connect several WCS readers to one interface module, the WCS readers must have different addresses. This will allow the programmable logic controller to allocate the data to the correct WCS readers. If you only connect one WCS reader to an interface module, this WCS reader always receives the address 0. You can connect up to four WCS readers to an interface module via an RS-485 cable. On delivery, the default address of each WCS reader is 0. Refer to the configuration instructions for the WCS reader if you need to change the address of the WCS reader.

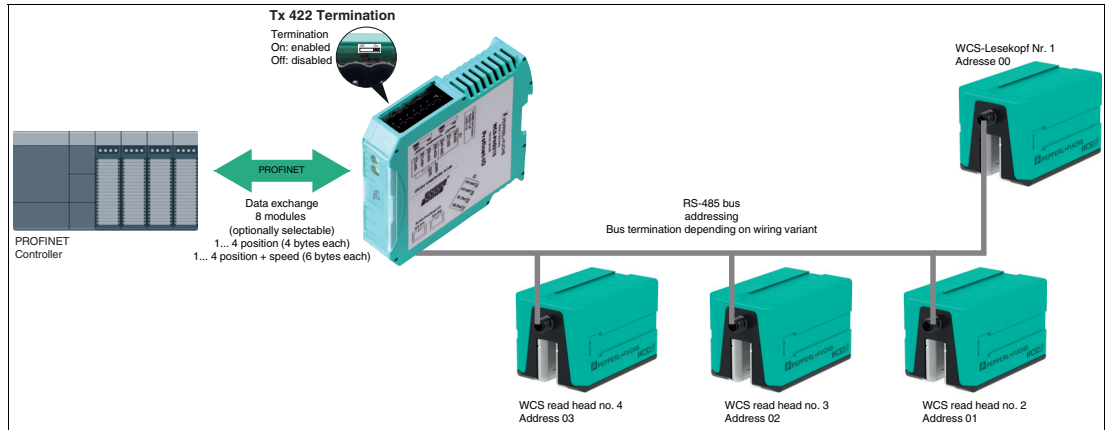


Figure 4.1 Communication structure

WCS reader terminal pin				Interface module terminal
WCS2A	WCS2B	WCS3A	WCS3B	
2	2	1	1	X2-1
4	4	2	2	X1-4
1	1	3	4	X1-5
3	3	5	3	X2-2

Table 4.1 Connecting the WCS reader(s)

### Setting the number of connected WCS readers

Set the number of connected WCS readers in the hardware project settings, see chapter 4.4.

### 4.3 Connecting the WCS-PNG210 to the network

The connection to the PROFINET IO is made via the two "RJ45 PROFINET IO" sockets on the underside of the interface module. The front socket is labeled "X3 P1", and the rear socket is labeled "X3 P2".

#### Pin assignment X3 P1 & X3 P2

Terminal		Designation
1	TD+	Transmission line +
2	TD-	Transmission line -
3	RD+	Receive line +
4	n.c.	Not connected
5	n.c.	Not connected
6	RD-	Receive line -
7	n.c.	Not connected
8	n.c.	Not connected

Table 4.2 Terminals of the 8-pin "RJ45 PROFINET IO" sockets



#### Note

The cable to the surrounding modules on the Ethernet line must be at least 0.6 m long.



#### Connecting the device to the controller

1. Plug the PROFINET connector into the RJ45 socket. Use a Cat. 5 data cable.



#### Setting data exchange mode

1. Set the "S4" and "S5" rotary switches to position 0.

## 4.4 Integrating the Interface Module into the Network



### Warning!

Risk of injury due to incorrect configuration

An error during the configuration of the device can override the fail-safe function, causing a danger to people and machinery.

- Ensure that the device is programmed exclusively by qualified personnel.
- Only put devices into operation after they have been configured correctly.

### Device name

In the PROFINET system, each device is addressed via a unique device name (symbolic name). You can change the PROFINET device name in the TIA Portal under "Devices and networks" > "Device view" > "Properties" (1) > "General" (2) > "Ethernet addresses" (3). To do this, first remove the checkmark next to "Generate PROFINET device name automatically" (4). Then enter the device name.

If the 'Generate PROFINET device name automatically' field is activated, the device name is automatically assigned with the device name from the GSDML file and a running number.

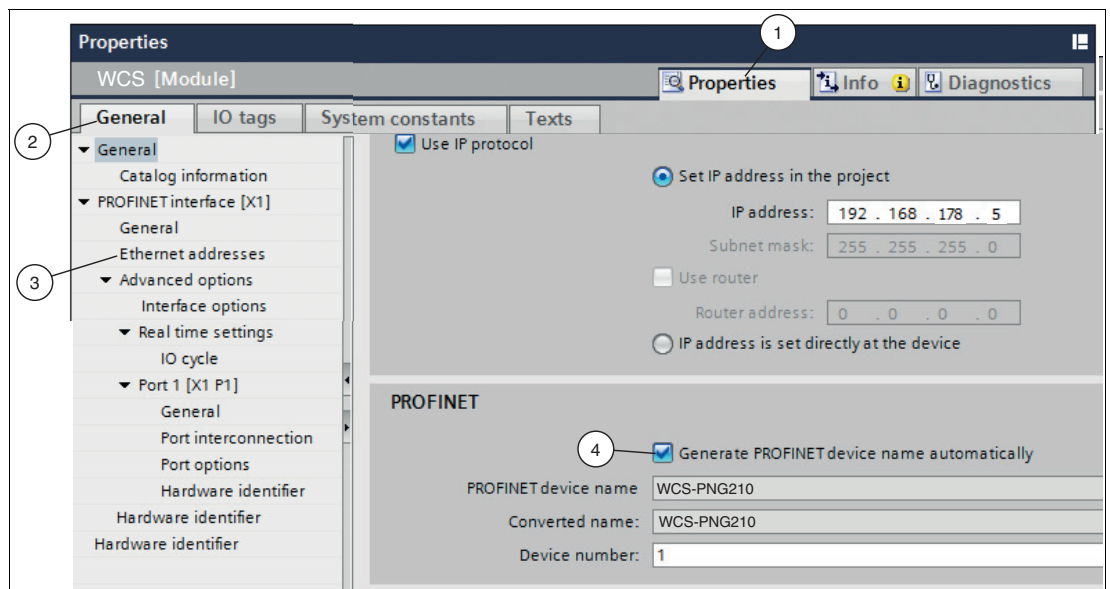


Figure 4.2

### IP Address

In normal operation (data exchange mode), the IP address is usually assigned to the module by the PROFINET controller (PLC). For this purpose, the module has a device name that is used to address it.



#### Note

Various configuration tools are available for configuring the interface module. In this manual, the configuration is described as an example for a Siemens controller using the TIA Portal. If you are using a programmable logic controller (PLC) from another manufacturer, the procedure is similar, but may differ in detail.



#### Note

The figures are provided to aid basic understanding and may deviate from the actual design.



## Creating a Project

To create a project, proceed as follows:

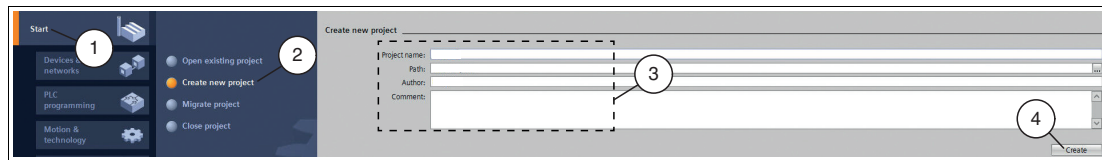


Figure 4.3 Creating a project

1. Launch the TIA Portal.
2. In the portal view, select **Start** (1) > **Create new project** (2).
3. Define fields for the project (3), e.g., by entering a name for the project in the **Project name** field.
4. Use the **Create** button (4) to confirm your entry.



## Integrating the Control Panel

To integrate the control panel, proceed as follows:

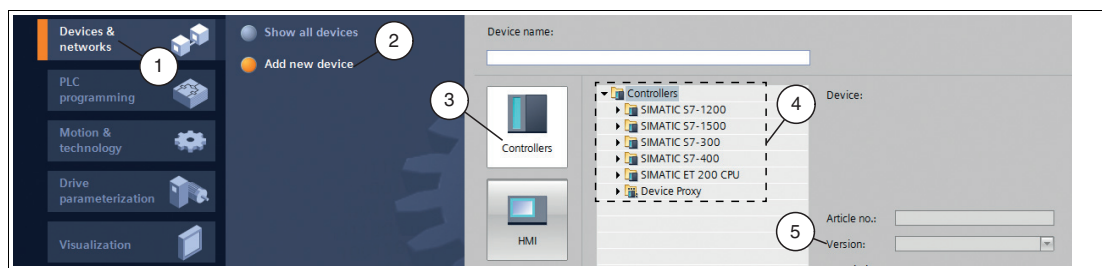


Figure 4.4 Integrating the Control Panel

1. In the portal view, select **Device & networks** (1) > **Add new device** (2). Alternatively, you can also go to **Add new device** via the project tree in your project.
2. Click the **Controllers** button (3).
3. Select your control panel from the hardware catalog (4). Make sure that you select the right firmware version of the control panel in the **Version** field (5).
4. Double-click on **Add** to add the control panel to the project.

↳ The project view opens.



### Note

Now configure the control panel as required. For example, define settings for the PROFINET interface or startup/cycle behavior. Additional information can be found in the Siemens AG user documentation.



## Download GSDML file

To operate the interface module, you need a device description file (GSDML file). The GSDML file can be downloaded from our website <http://www.pepperl-fuchs.com>.

1. Enter the product name or part number in the product/keyword search box and click the search button.
2. Select your product from the search results list and click the Software tab in the product information list.
3. Here is a list of all available downloads.



## Installing the GSDML File

You require a GSDML file to operate the interface module. The GSDML file can be downloaded from our website: [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com). Enter the product name or item number in the Product/Keyword search box and click on Search. Select your product from the list of search results and click on the Software tab in the product information list. A list of all available downloads is displayed. To install the GSDML file, proceed as follows:

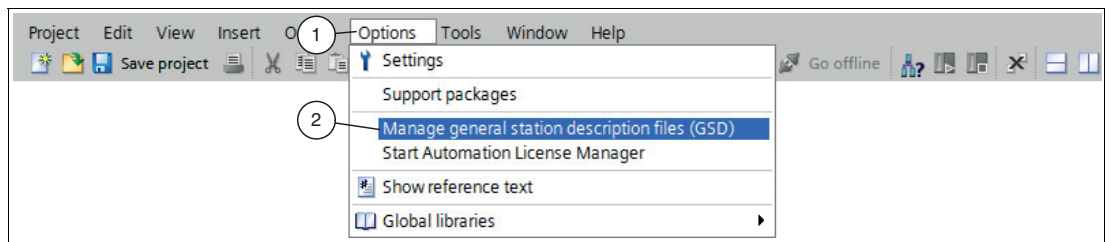


Figure 4.5 GSDML file

1. Select **Options (1) > Manage general station description files (GSD) (2)**.

↳ The **Manage general station description files** window opens.

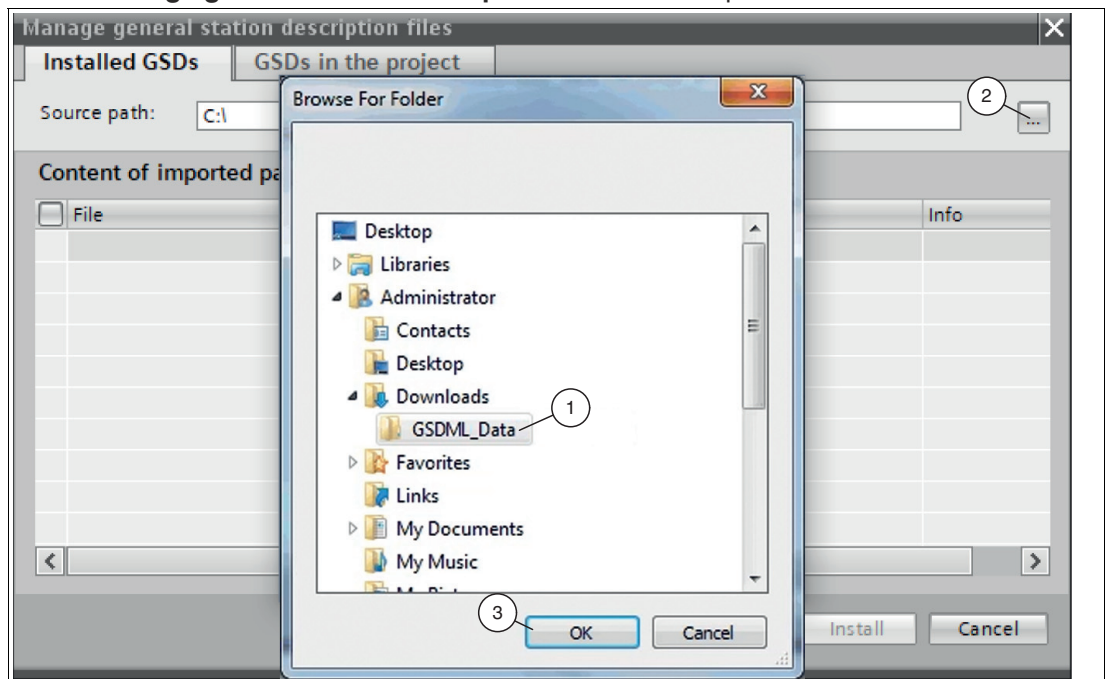


Figure 4.6 Searching for a GSDML file

2. Click the **Browse** button (2) to search for the GSDML file on your computer.
3. Select the folder containing the GSDML file (1).
4. Click **OK** (3) to confirm your selection.
  - ↳ All the GSDML files in the selected folder are displayed in the list.
5. Select the relevant GSDML file by checking the box to the left of the file name.
6. Click **Install**.
  - ↳ The installation process starts automatically.
    - Once the file is installed successfully, the system issues a notification that installation was successful. Close this window. The device data is added to the hardware catalog.



## Integrating the Interface Module

To integrate the interface module and connect it to the control panel, proceed as follows:

1. In the project tree, right-click on the control panel and select **Go to network view**.

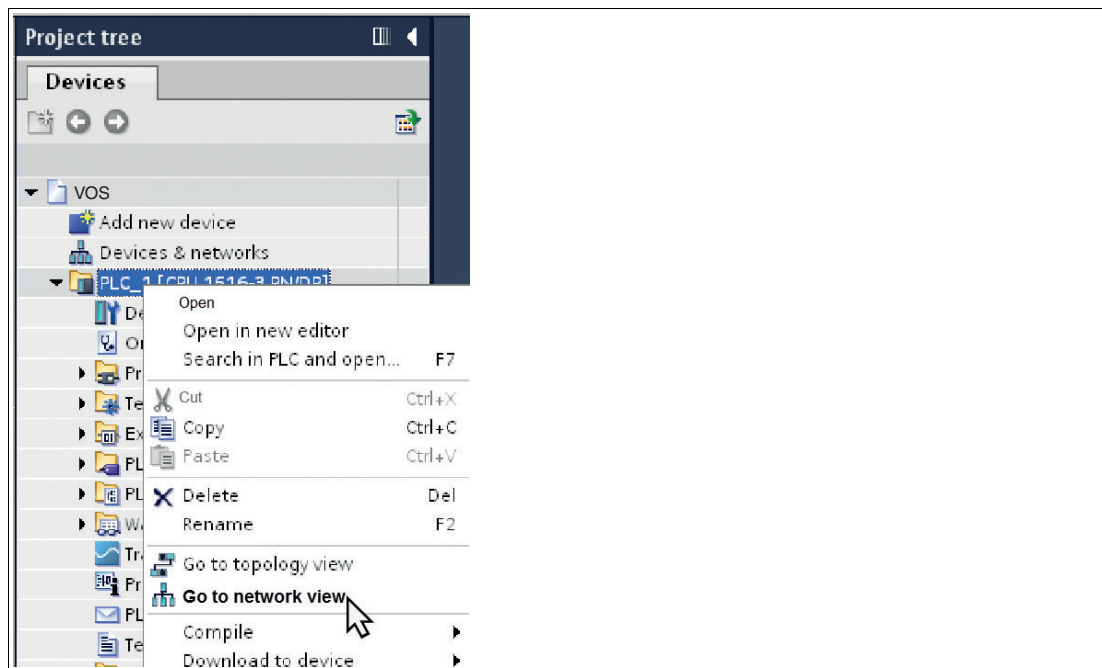


Figure 4.7 Selecting the network view

↳ The **Network view** opens in the work area.

2. Open the hardware catalog and navigate through the tree structure (1) to your interface module.



### Note

Alternatively, you can search for the interface module using the search function. If you uncheck the "Filter" box, you can search for "Pepperl+Fuchs" in the search bar. Following the folder structure will take you directly to the correct module.

3. Select your interface module from the hardware catalog (1) and drag and drop it into the network view (4).

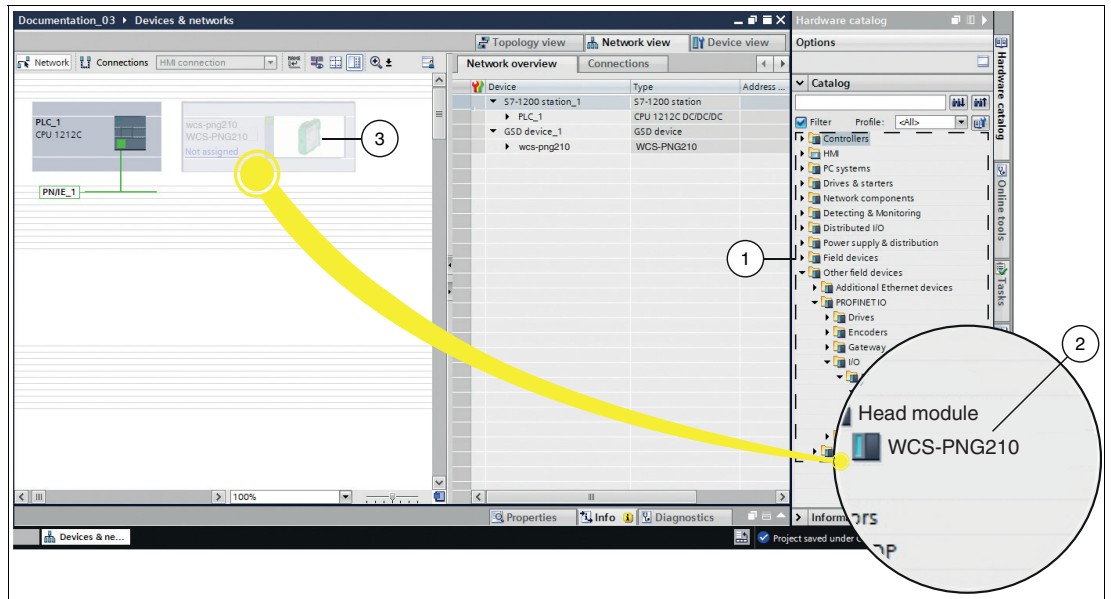


Figure 4.8 Integrating the interface module

↳ The interface module is displayed in the network view window (4).



Figure 4.9 Connecting the interface module to the control panel

4. To connect the interface module to the control panel, proceed as follows:
  1. Click the green PROFINET interface (1) for the control panel and do not let go of the mouse button.
  2. Drag the line to the PROFINET interface (2) on the gateway.
  3. Release the mouse button.

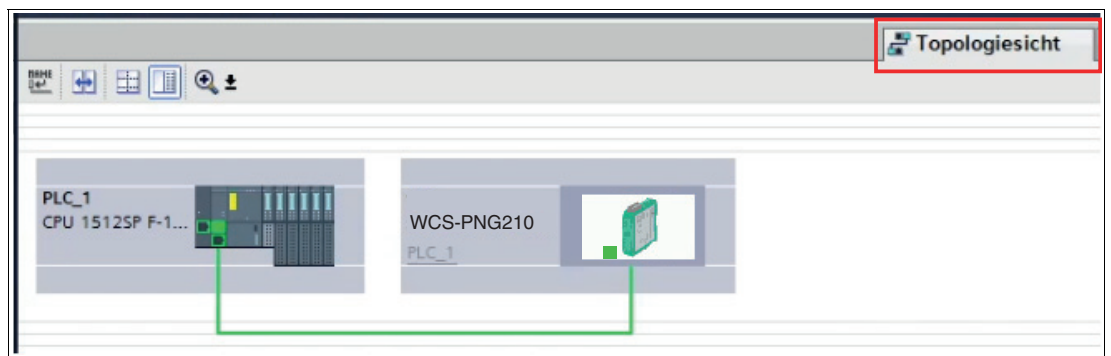


Figure 4.10

4. Switch to the "Topology view". This is the tab directly next to the network view. Connect the interface module to the control unit as described in the previous step.

**Note**

Ensure that the correct port is connected to the controller. If Ethernet is connected to port 2 on the physical controller, port 2 must also be connected to the interface module in the TIA portal. If the ports are not respected, an error message will appear and the interface module will not be controllable. If you move the mouse over the controller port, its name/number will appear and you can check that it is the correct port.

↳ The interface module is now connected to the control panel.

**Integrate additional modules into the project**

Up to 4 WCS read heads can be connected to the interface module. The controller must be informed of the number of read heads and their characteristics. The modules can be found in the hardware catalogue.

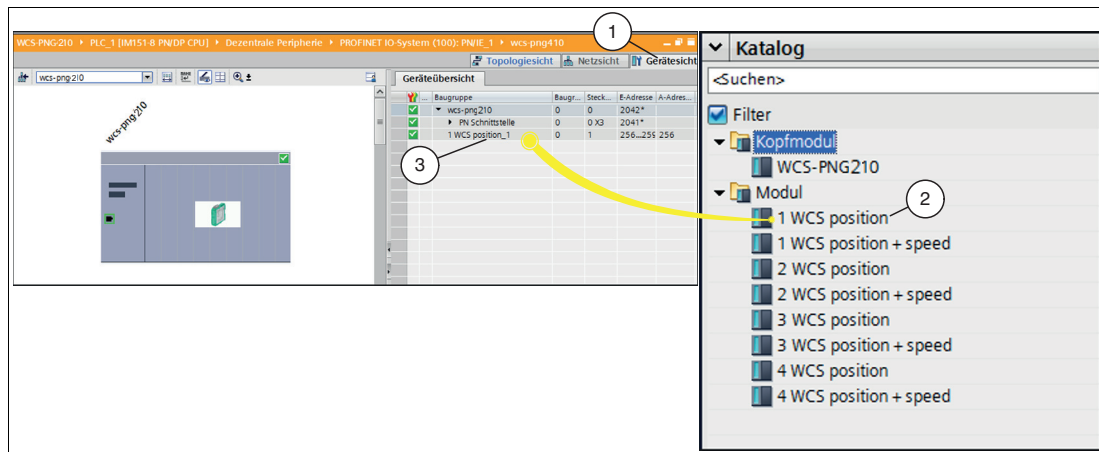


Figure 4.11 Integrate modules

1. Switch to the **"Device View"** (1) tab in the **"Devices and networks"** window.
2. Open the Hardware Catalogue. Select the module (2) with the appropriate number of read heads and operating mode and drag it into the **"Device View"** (1).

↳ A range of I/Q addresses is automatically assigned to the modules.

**Note**

In the "only position" mode, the WCS read heads output their respective position. In the "position and speed" mode, the WCS read heads output their position and the speed at which they are moving.

Irrespective of the number of WCS read heads, 1 byte is reserved for querying the diagnostics of the WCS read heads. For the response data, 4 bytes are reserved per WCS read head in position only operating mode. In "position and speed" mode, 6 bytes are reserved per WCS read head.





## Transfer hardware configuration

After you have configured the hardware, you can transfer it to the controller.

1. Right-click on the controller in the project tree.
2. Select "Download to Device" and then "Hardware Configuration" from the context menu that appears.
  - ↳ The "Advanced charging" window opens.
3. Select your controller and load the hardware configuration by clicking the "Load" button (1).

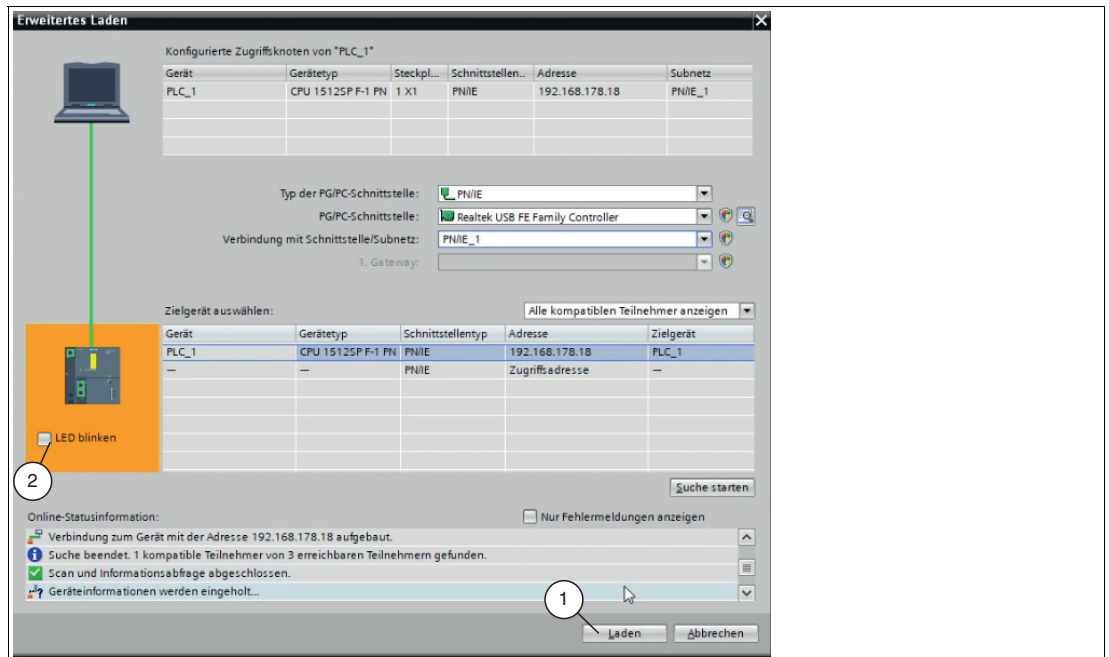


Figure 4.12



### Tip

You can perform an LED flash test (2) on the selected interface module or controller in the PROFINET network. This function is useful, for example, if several interface modules or controllers are connected in the PROFINET network. In this way you can make sure that you have selected the correct interface module or controller.

The "State" LED flashes on the interface module mentioned.

## 4.5 Data format for modules

In "only Position" operating mode, 4 bytes are reserved for each WCS reader.

Bit	7	6	5	4	3	2	1	0
Byte 0	0	0	0	0	0	P18	P17	P16
Byte 1	P15	P14	P13	P12	P11	P10	P09	P08
Byte 2	P07	P06	P05	P04	P03	P02	P01	P00
Byte 3	0	0	SST	DB	ERR	OUT	0	0

Table 4.3 Data format for each connected WCS reader in "only Position" operating mode, reader address = 0...3

In "Position and Speed" operating mode, 6 bytes are reserved for each WCS reader.

Bit	7	6	5	4	3	2	1	0
Byte 0	0	0	0	0	0	P18	P17	P16
Byte 1	P15	P14	P13	P12	P11	P10	P09	P08
Byte 2	P07	P06	P05	P04	P03	P02	P01	P00
Byte 3	0	0	SST	DB	ERR	OUT	0	0
Byte 4	0	0	0	0	0	0	0	0
Byte 5	0	S06	S05	S04	S03	S02	S01	S00

Table 4.4 Data format for each connected WCS reader in "Position and Speed" operating mode, reader address = 0...3

### Description of the protocol data

<b>DB</b>	0	By default, the diagnostic bit is not set
	1	Diagnostic bit, read head dirty Cleaning necessary
<b>OUT</b>	0	Read head in code rail
	1	Read head partially outside the code rail No valid position available
<b>ERR</b>	0	Error display, error code (LEDs)
<b>P00 ... P18</b>		Current position value P00 = LSB
<b>S00 ... S06</b>		Current speed in 0.1 m/s For example: Byte 5 = 00011011 = 27, corresponds to 2.7 m/s
<b>SST</b>	0	Speed valid
	1	Current speed unknown. Last valid speed in S00 ... S06 saved

## Data from read head

ERR	DB	OUT	SST	Description	State of the read head lens
0	0	0	x	Current position value in P00 ... P18, binary coded	Good
0	0	1	x	Read head outside the code rail, no position value	Good
				P00 ... P18 = 0: WCS read head partially outside the code rail	
				P00 = 1, P02 ... P18 = 0: WCS read head completely outside the code rail	
0	1	0	x	Current position value in P00 ... P18, binary coded	Poor
0	1	1	x	No position value, read head outside the code rail (see OUT message)	Poor
1	x	x	x	No position value, error message from read head, error number in P00 ... P04, binary coded	-
x	x	x	1	Current speed unknown, last speed in S00 ... S06	-
x	x	x	0	Current speed in S00 ... S06	-

## 5 Appendix

### 5.1 Cable routing in the RS-485 bus

The data cables must always form an in-line connection between the first and the last node. This in-line connection must end with a terminator.

The RS-485 terminators are integrated in the WCS readers and can be switched on and off with the interface module.

If only **one WCS reader** is connected, one device is connected at the beginning and one device is connected at the end of the data line.

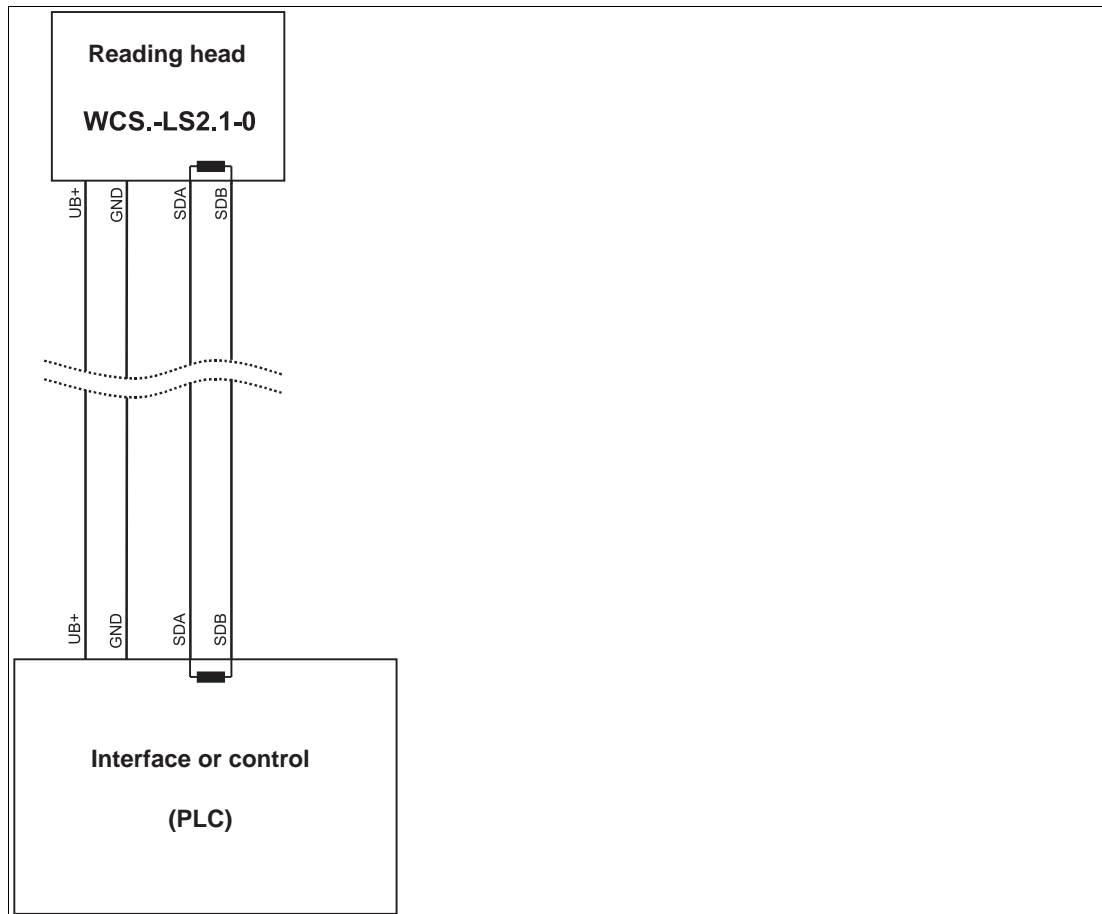


Figure 5.1 Connection of **one** reading head

If **two WCS readers** are connected to one interface module, there are two wiring versions:

- **Version A:**

One WCS reader is located at the beginning and one WCS reader at the end of the data line. For both WCS readers, the RS-485 terminator is activated. The interface module is located between these two readers and does not have an RS-485 terminator. Each WCS reader is connected to the interface module by a separate data cable.

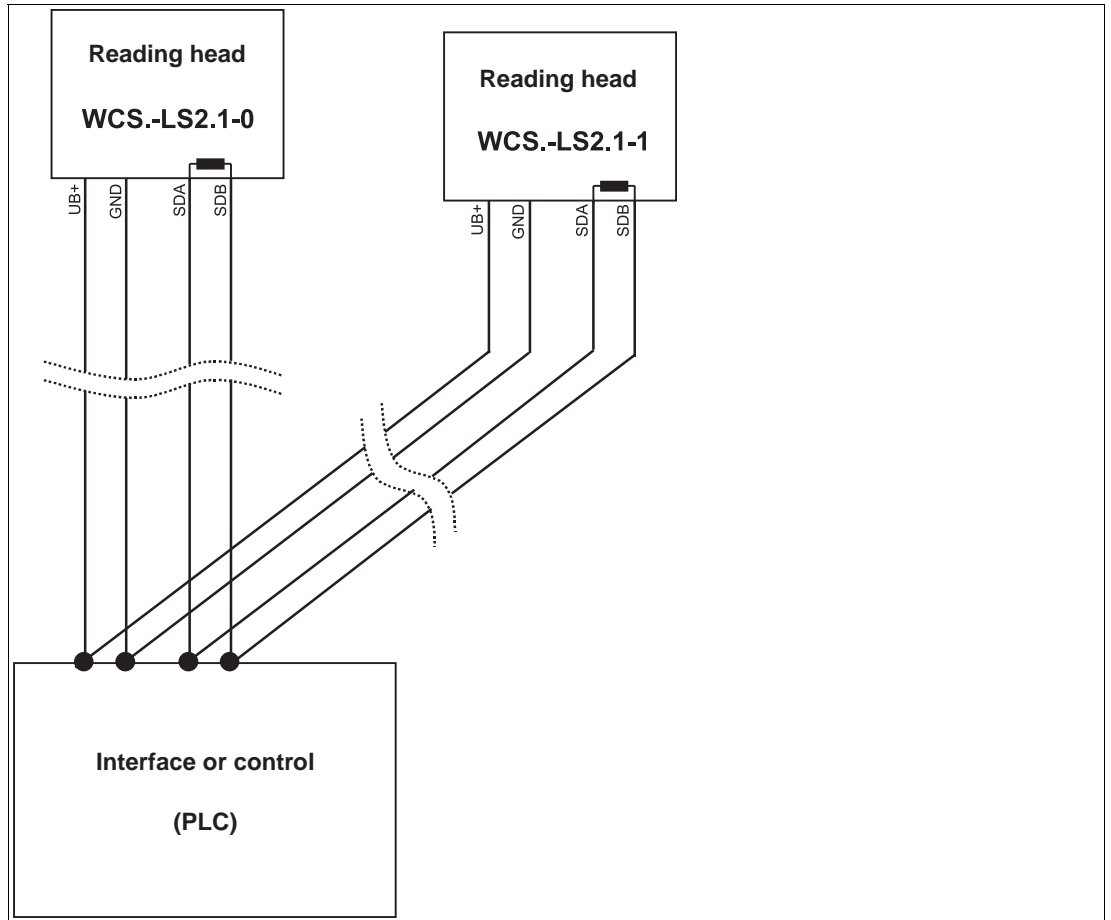


Figure 5.2 Connection of **two** reading heads, Version A

- **Version B:**

The interface module is located at the beginning of the data line; one WCS reader is located at the end of the data line. Both need the RS-485 terminator. The second WCS reader is connected to the line connection between the interface module and the first WCS reader through a short spur (length <1 m). Use a bus terminal to connect the spur.

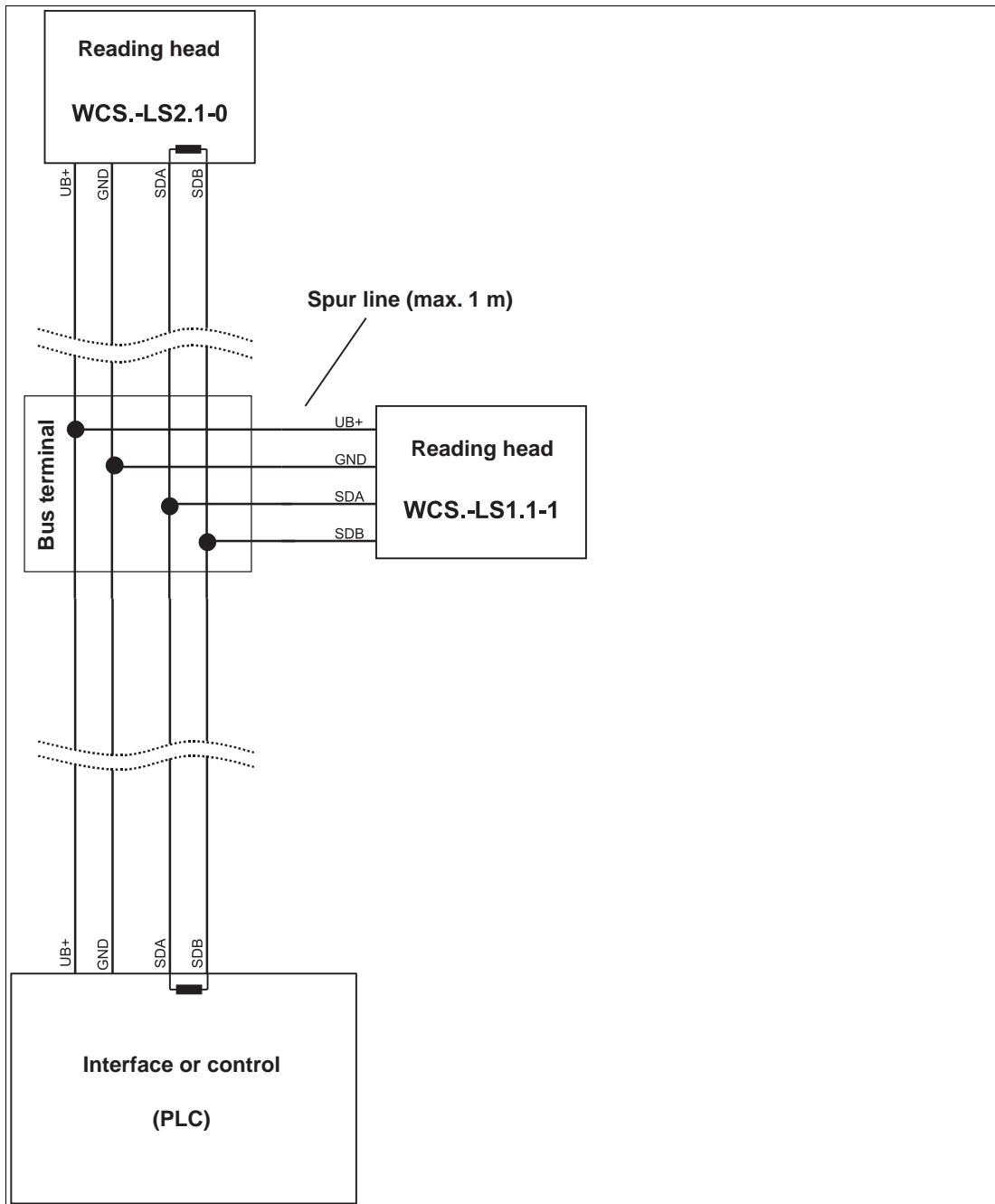


Figure 5.3 Connection of **two** reading heads, Version B

The wiring version used depends on which is best suited for the application. If **three** or **four WCS readers** are used on the same interface module, connect these using spurs as shown in variant B.

## 5.2 Data cables and accessories

### RS-485 data cable

For the RS-485 data transfer path, a four-wire, shielded, twisted pair data cable must be used. One wire pair is used for the supply voltage, and one pair for the RS-485 data connection. The maximum length of the cable depends on the data transfer capacity of the data cable—core-core—and on the cross section of the cables for power supply of the WCS readers. For data transfer, a small core cross section, and thus small cable capacitance is an advantage, whereas for the power supply the largest possible cross section is required. The table below shows the possible cable lengths depending on the cable cross section.

In the calculations, the worst-case scenario was assumed: All WCS readers are located at the end of the data line. In the case of large cable lengths, and when connecting multiple WCS2 readers with heating, six-wire data cable (3 x 2) can be used. These data cables use two pairs for the power supply (doubling the cable cross section), and one pair for the RS-485 data line.

Capacitance (core-core)	RS-485 interface		
	19.2 KB (LS246)	62.5 KB (LS221)	187.5 KB (LS211)
60 pF	500 m	500 m	300 m
90 pF	500 m	450 m	275 m
120 pF	500 m	400 m	250 m

The table shows the possible cable lengths depending on the cable capacitance (core-core). The number of connected WCS readers is of no significance.

### Data cables

There are 2 types of data cable available:

- CBL-PVC-GY-3x2x014-100M (Item number: 70178419) for stationary cable routing
- CBL-PUR-GY-3x2x025-100M (Item number: 70179127) for trailing cable and drag chain installations.

The cables are available in rolls of 100 metres each for free assembly.

### Single-ended female cordsets and adapter cables

#### Field-attachable female connectors M12 x 1

	Number of poles	Cable diameter	Order designation
straight	4	6 mm – 8 mm	V1-G-PG9
angled	4	6 mm – 8 mm	V1-W-PG9
straight	5	6 mm – 8 mm	V15-G-PG9
angled	5	6 mm – 8 mm	V15-W-PG9
straight	6	6 mm – 8 mm	V17-G-PG9
angled	6	6 mm – 8 mm	V17-W-PG9 *)

Table 5.1 \*) Cable outlet on top, not variable

**Shielded connection cable with molded single-ended female cordset**

	<b>Number of poles</b>	<b>Cable length</b>	<b>Order designation</b>
straight	4	2 m	V1-G-2M-PUR-ABG
straight	4	5 m	V1-G-5M-PUR-ABG
angled	4	2 m	V1-W-2M-PUR-ABG
angled	4	5 m	V1-W-5M-PUR-ABG
straight	5	5 m	V15-G-5M-PU R-ABG
angled	5	5 m	V15-W-5M-PUR-ABG
straight	8	2 m	V19-G-2M-PU R-ABG
straight	8	5 m	V19-G-5M-PU R-ABG



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