

MANUAL

VLX-F231-B6 VLX PROFIBUS DP Interface Module



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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



Note!

For full information on the product, refer to the further documentation on the Internet at www.pepperl-fuchs.com.

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
- Other documents

1.2 Target Group, Personnel

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

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismounting 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:



Danger!

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.



Warning!

This symbol indicates a possible fault or danger.

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



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.

Informative Symbols



Note!

This symbol brings important information to your attention.



Action

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 VLX-F231-B6 interface module serves as an interface between SmartRunner (from now on referred to as the sensor) and the PROFIBUS DP input card of the control panel. Data is transferred between the sensor or sensors and the VLX-F231-B6 interface module via the RS-485 interface and from the VLX-F231-B6 interface module to the control panel via the PROFIBUS DP protocol.

You can connect up to four sensors. If you connect several sensors, they must have different addresses. The VLX-F231-B6 interface module constantly queries the position values of the sensors and always has the current sensor data.

The VLX-F231-B6 interface module has the following configuration:

Baud rate: Max. 230 MBaud

2.2 Dimensions

The interface module housing has the following dimensions.

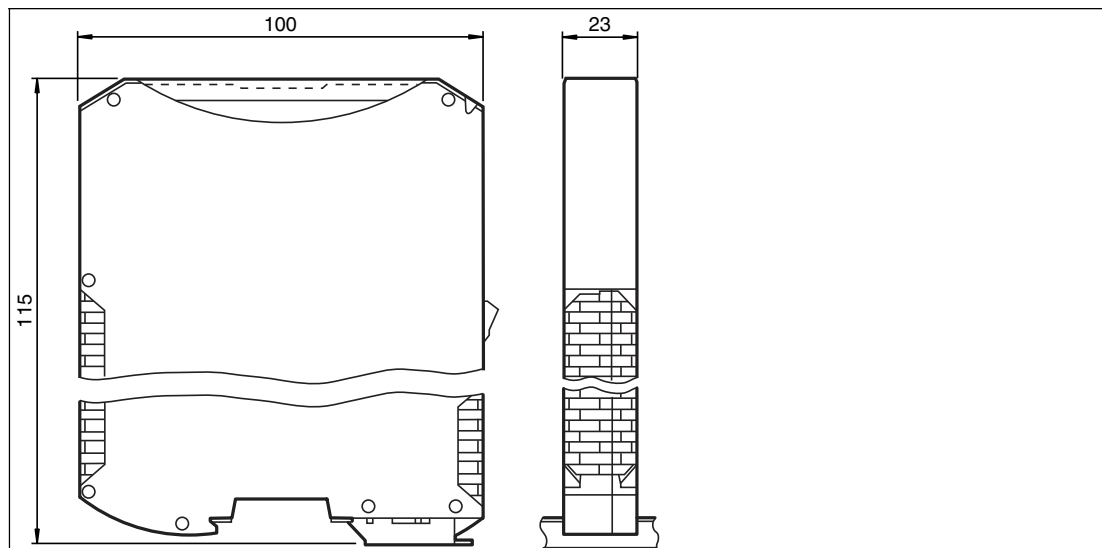


Figure 2.1 Dimensions

2.3 Design of the Device
Device Components

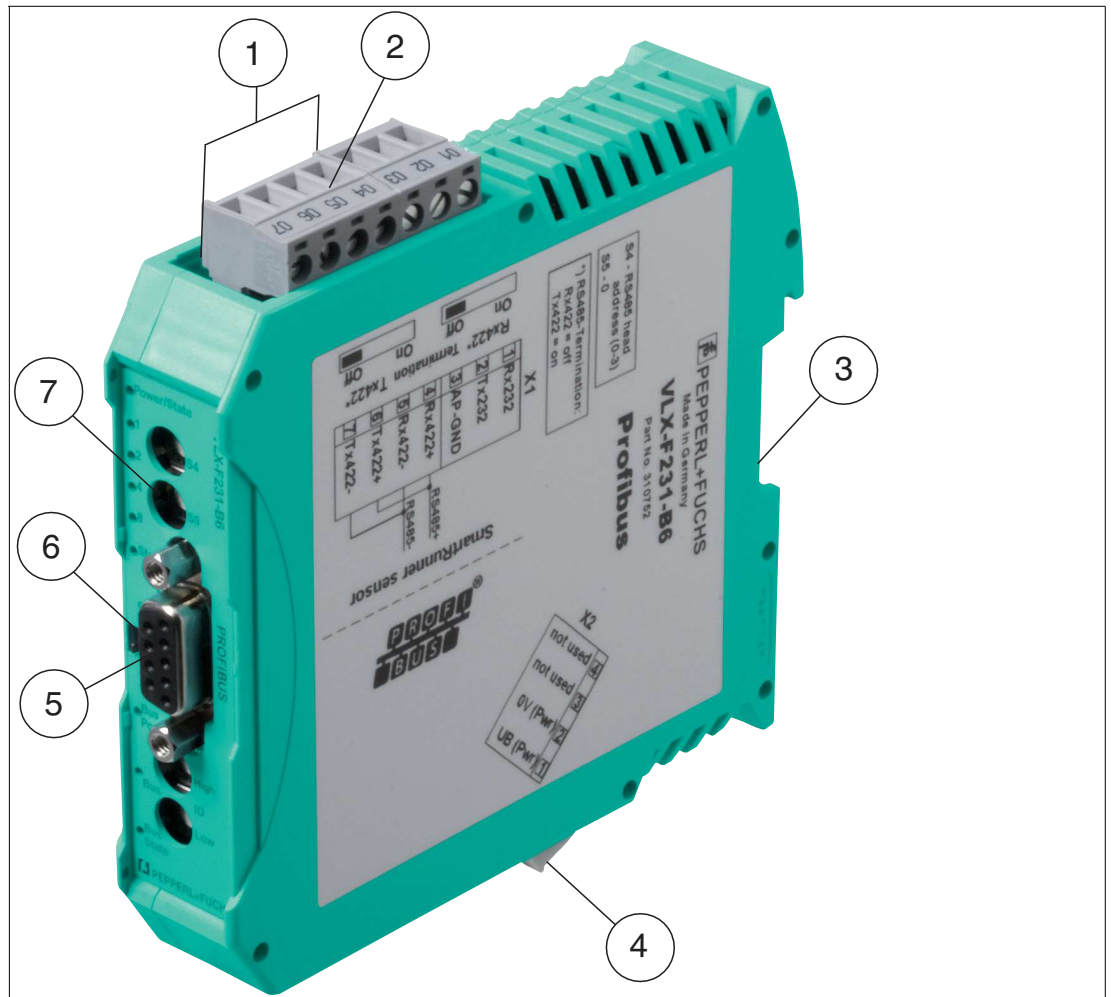


Figure 2.2 Interface module overview

- 1 RS-485 terminator sliding switch (behind the terminal block)
- 2 X1: RS-485 interface
- 3 Mounting bracket
- 4 X2: Connection for power supply
- 5 PROFIBUS communication interface
- 6 Slide switch for PROFIBUS DP terminator
- 7 Front panel with rotary coding switches and indicator lights

Front Panel

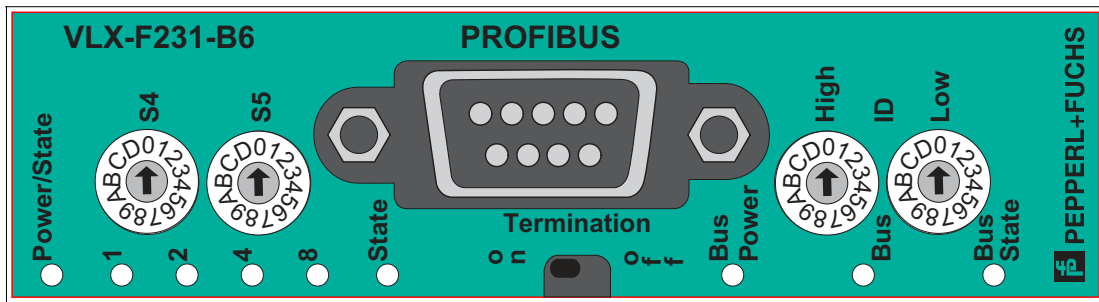


Figure 2.3 Front panel overview

Sensor (VLX-F231-B6)

Power

The "Power" LED is green: The VLX-F231-B6 interface module is correctly connected to the power supply.

State

The "State" LED is green: Data is being exchanged with the sensor(s). The four "Error No/Select ID" LEDs are used to display the number of the currently polled sensor.

Error No/Select ID				Sensor 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 via the four "ErrorNo/Select ID" LEDs when the "State" LED lights up green

The "State" LED lights up red: The interface module has detected an error or a warning. The interface module uses the "ErrorNo/Select ID" LEDs to display the binary coded error number or warning number, and sends the number to the PROFIBUS master via the external diagnostic byte.

- 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.

LED ErrorNo/Select ID				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
0	1	1	0	6	Reserved
0	1	1	1	7	Sensor communication, RS send buffer overflow
1	0	0	0	8	Sensor communication, RS receive buffer overflow
1	0	0	1	9	Sensor communication, RS timeout
1	0	1	0	10	General fieldbus error
1	0	1	1	11	Parity error 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 Significance of the error codes (display via the four "Error No/Select ID" LEDs when the "State" LED lights up red and thus indicates an error or a warning)

Rotary switches S4 and S5

Rotary switches S4 and S5 have no function. Ensure that the two switches are at **position 0** to enable the data exchange mode.

PROFIBUS

Bus Power

The "BusPower" LED lights up green: The LED is connected directly to the electrically isolated supply voltage for the PROFIBUS side.

Bus

The "Bus" LED lights up red: The interface module cannot exchange any data on the PROFIBUS.

Bus State

"BusState" LED	PROFIBUS DP interface state
Lights up green	Data exchange on the PROFIBUS
Flashes red/green	Interface module is waiting for PROFIBUS parameter data
Lights up red	Error on the PROFIBUS
Flashes green	Interface module is waiting for configuration data

ID High and ID Low rotary switches

You can set the PROFIBUS address with the two ID High and ID Low rotary switches. The digits selected using the two rotary switches together form the PROFIBUS address in hexadecimal format.

Example: To set address 19 (=13h), set the ID High rotary switch to position "1," and the ID Low rotary switch to position "3."



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.

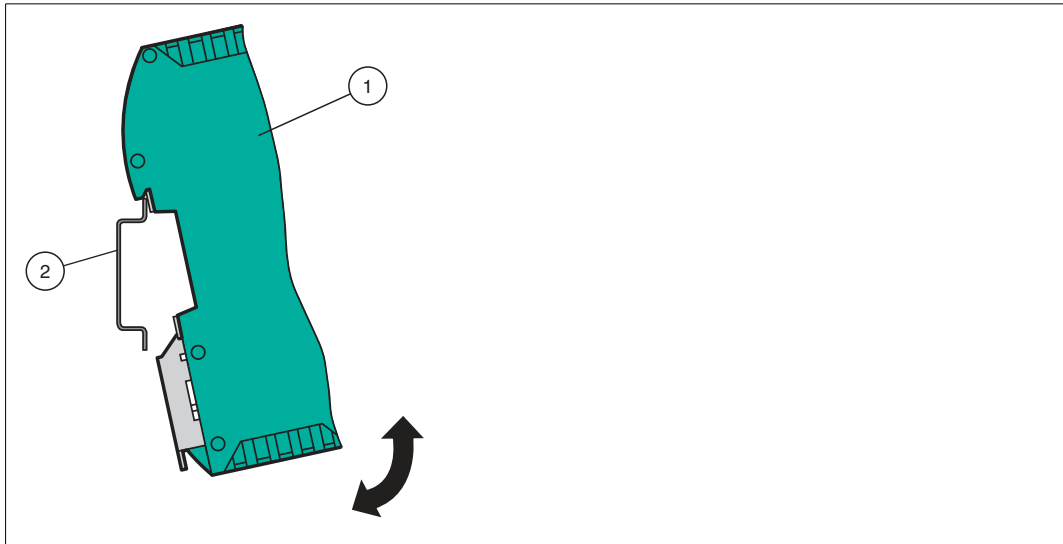


Figure 3.1 Mounting

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 mm².



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

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

- Observe the permissible core cross section of the conductor.
- If you are using stranded conductors, crimp the stranded conductors with wire end ferrules.
- Make sure that the insulation on the conductors extends all the way 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 sized 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).

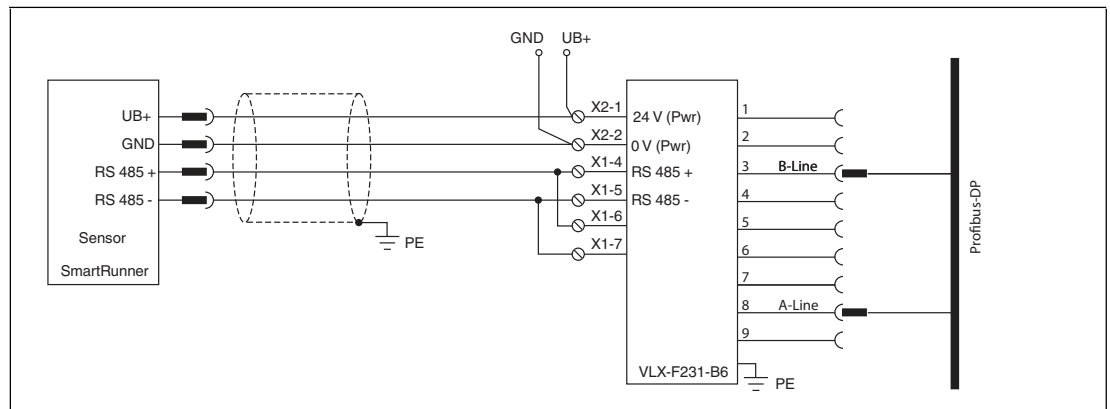


Figure 3.2 Electrical connection

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

Connection Technology

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

- Standard screw/plug connection (supply + RS)
- 9-pin, D-SUB connector (PROFIBUS DP connection)

When using standard screw terminals, one cable 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 mm²
- Solid cable: 1 x 0.25 ... 1.5 mm²

The plug-in terminal strip combines a standard screw connection and a plug connector. The plug connector is coded and therefore cannot be plugged in incorrectly.

The 9-pin D-SUB connector is secured with two screws with a "4-40 UNC" thread. To tighten the screws, use a screwdriver with a blade width of 3.5 mm. Observe the maximum tightening torque of 0.4 Nm.



Connecting the Power Supply

Connect the operating voltage (10 VDC...33 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 sensor
2	0 V (Pwr)	Ground interface module/ground sensor
3	not used	is not used
4	not used	is not used

Table 3.1 Terminal X2

Equipotential Bonding Connection

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



PROFIBUS DP Communication Interface

This interface can be found on the front of the housing in the form of a 9-pin D-SUB socket.

1. Connect the PROFIBUS connector to the D-SUB socket labeled "PROFIBUS."
2. Tighten the lock screws on the connector using a screwdriver.
3. If the assembly is at the beginning or at the end of the PROFIBUS cable, you must connect the terminator that is integrated in the interface module. To do this, slide the sliding switch to the "on" position or to the upper end position.
4. If the module is not at the beginning or at the end, you must slide the sliding switch to the "off" position or to the lower end position.



Preparing for Operation on RS-485 Interface

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

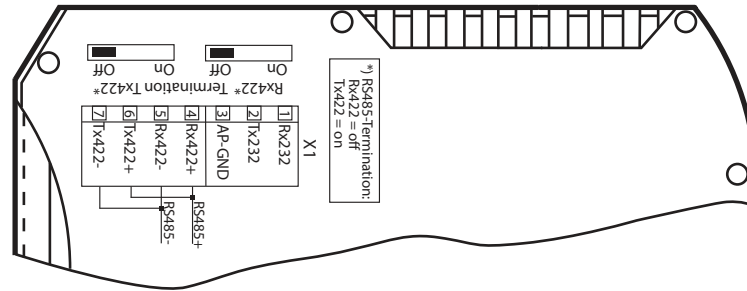
1. Connect Terminal 4 "Rx 422+" to terminal 6 "Tx 422+."
2. Connect Terminal 5 "Rx 422-" to terminal 7 "Tx 422-."

Terminal	Description	
4	Rx 422+	Data line RS-485+ to sensor
5	Rx 422-	Data line RS-485- to sensor
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

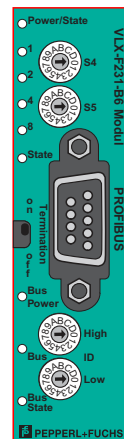


If the interface module is operated as the first or last physical device in an RS-485 bus, there must be a bus termination on this module. To do this, set the "Rx 422 Termination" slide switch to "Off" and the "Tx 422 Termination" slide switch to "On." This activates the RS-485 terminator (150 Ω) built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

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



Note!
PROFIBUS Termination



If the interface module is located at the beginning or end of the data cable to the control panel, there must be a bus termination at this interface module. To do this, set the "Termination" (PROFIBUS) slide switch to "On." This activates the PROFIBUS terminator built into the interface module.

More information about bus termination can be found in the general fieldbus literature.



3.3

Dismounting



Dismounting the modules

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

1. Disconnect all the supply and signal lines.

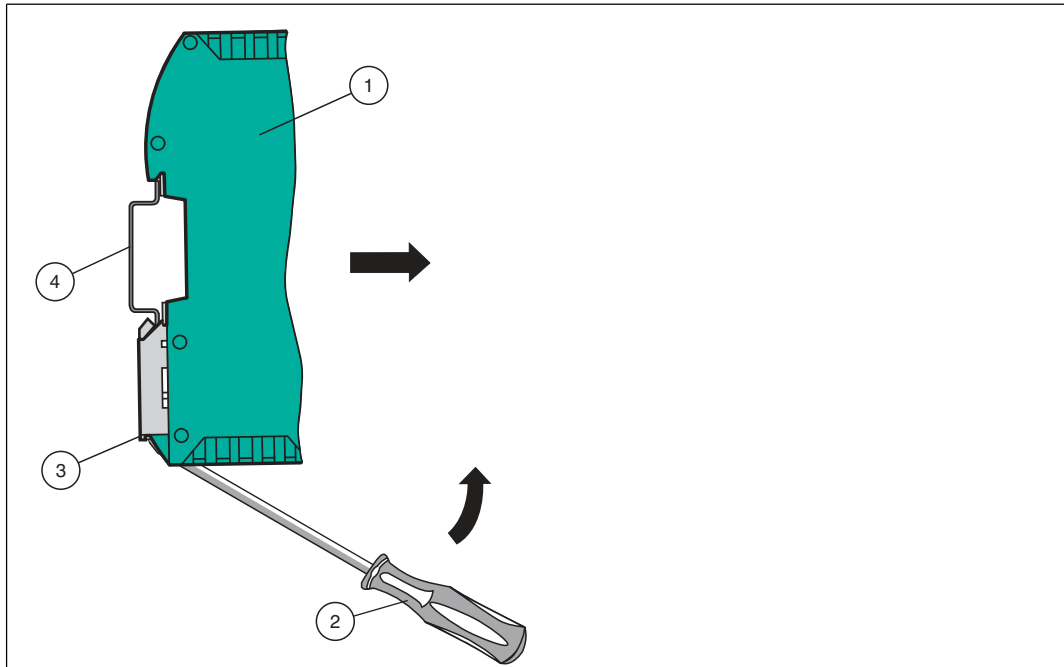


Figure 3.3 Dismounting

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 only be carried out by trained personnel in accordance with safety regulations.

Components

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

- VLX-F231-B6 interface module
- Cord set from the interface module to the sensor
- Connector for the PROFIBUS connection to the interface module
- PROFIBUS cable (this cable is usually already installed on site)
- 10 VDC...33 VDC power supply
- GSD file (the GSD file can be obtained free of charge from our website 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. Set the PROFIBUS address on the front side of the module, using the two rotary switches labeled "PROFIBUS ID High" and "PROFIBUS ID Low."



Note!

The PROFIBUS address that is set must match the configured address. It is only read in when the module is switched on.

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



Note!

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

4.2 Connecting the Sensor

If you connect several sensors to one interface module, the sensors must have different addresses. The different addresses will allow the programmable logic controller to allocate the data to the right sensors. If you connect only one sensor to an interface module, this sensor always receives the address 0. You can connect up to four sensors to an interface module via an RS-485 cable. Each sensor is supplied with the default address of 0. Details of how to change the address of the sensor can be found in the instruction manual for the sensor.

Sensor connection pin	Interface module terminal
1	X2-1
2	X1-4
4	X1-5
3	X2-2

Table 4.1 Connecting the sensor/sensors

Setting the Number of Connected Sensors

Set the number of connected sensors in the hardware project settings.

4.3 Connecting the Interface Module to the Network

A 9-pin connector is used to connect to the PROFIBUS DP, in accordance with the PROFIBUS standard. You therefore need a 9-pin D-sub connector that you can plug into the 9-pin D-sub socket on the device. This plug is not included with the interface module.

Pin	Designation
1	Protective earth
2	Not assigned
3	B line
4	Control signal/repeater
5	Weight
6	5 V _{DC}
7	Not assigned
8	A line
9	Weight

Table 4.2 Pin assignment for the 9-pin connector



1. Connect the PROFIBUS connector to the D-SUB socket labeled "PROFIBUS."
2. Tighten the lock screws on the connector using a screwdriver.
3. If the assembly is at the beginning or at the end of the PROFIBUS cable, you must connect the terminator that is integrated in the gateway. To do this, slide the slide switch to the "on" position.
4. If the assembly is not at the beginning or at the end, you must slide the slide switch to the "off" position.
5. Set the PROFIBUS address on the fieldbus side of the assembly, using the two rotary switches labeled "PROFIBUS ID High" and "PROFIBUS ID Low." This setting uses hexadecimal format.



Example!

The PROFIBUS ID is 26 decimal = 1A hexadecimal. The "PROFIBUS ID High" switch must be set to 1 and the "PROFIBUS ID Low" switch must be set to A.

6. If the rotary switch on the PROFIBUS side (PROFIBUS ID) is set to "7E" (= 126), the gateway uses a PROFIBUS address that is stored in the EEPROM. This address is 126 by default and can only be changed by a PROFIBUS master via the PROFIBUS itself. The address 126 is reserved for this purpose in the PROFIBUS, i.e., a slave with this address can never exchange data, but can only be configured with a new ID.
7. If the rotary switch is set to a value between 0 and 125, the gateway uses this PROFIBUS ID and it is not possible to change the setting via a master.

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.



Note!

Various configuration tools are available to allow you to configure the interface module. As an example, this manual describes the configuration of a Siemens control panel with the VLX-F231-B6 interface module using the TIA Portal V14. If you are using a programmable logic controller (PLC) from a different manufacturer, the process will be similar to the one described here.



Installing the GSD File

A **GSD file** is required to operate the device. The GSD file can be downloaded from our website: www.pepperl-fuchs.com. Simply enter the product name or item number in the Product/Keyword field and click "Search." Select your product from the list of search results. Click on the information you require in the product information list, for example, Software. A list of all available downloads is displayed.

1. Start "TIA Portal V14."

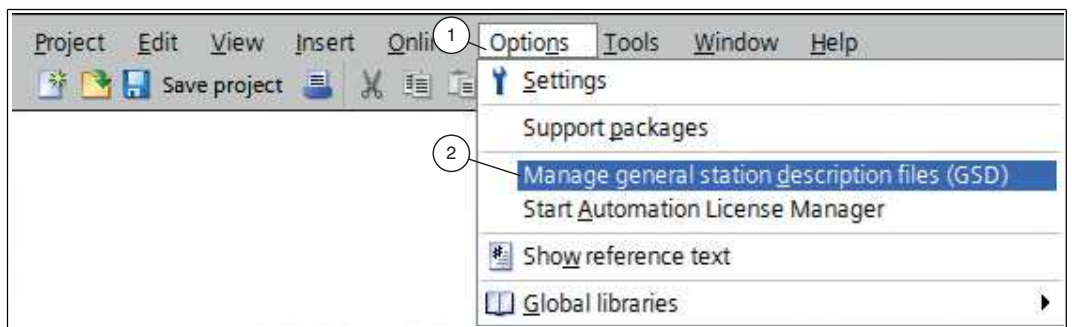


Figure 4.1 GSD file

2. Under "Options" (1) in the menu bar, select the command "Manage general station description files (GSD)" (2).

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

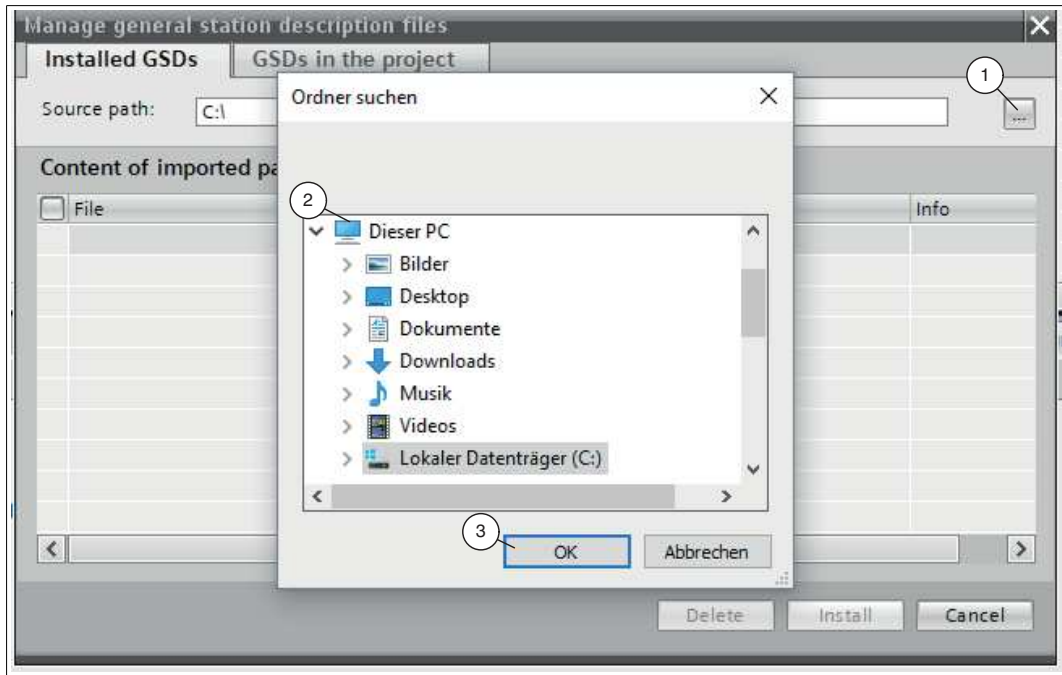


Figure 4.2 Searching for a GSD file

3. Click the "Button with the three dots" (1), which allows you to search for your GSD file on the storage medium.
4. Select your GSD file (2) and click "OK" (3) to confirm your selection.

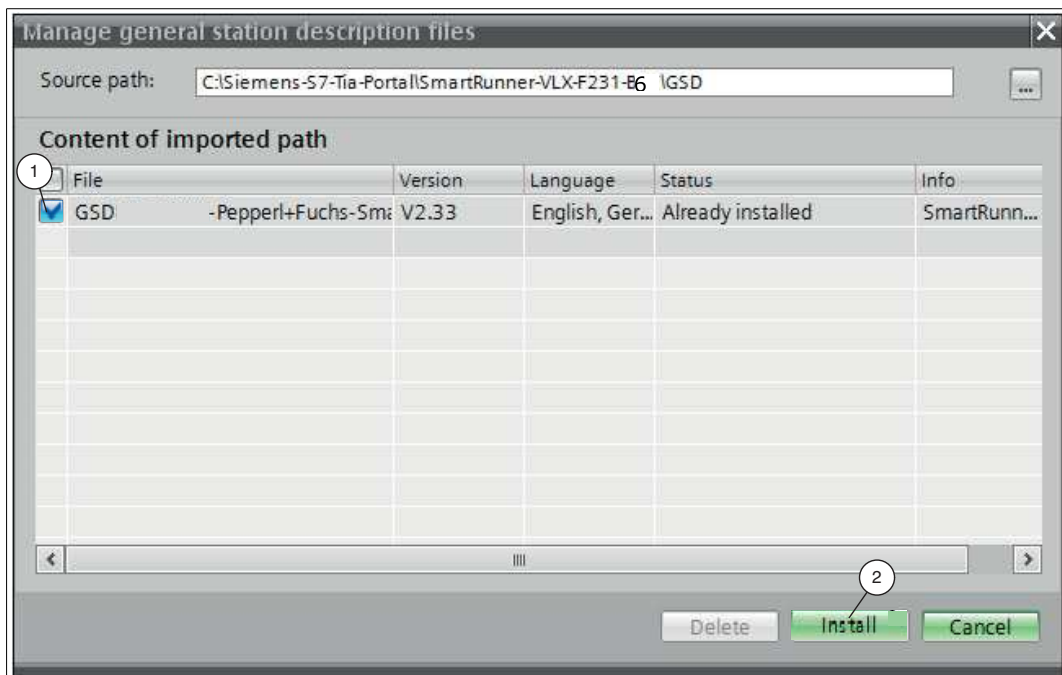


Figure 4.3 Installing the GSD file

5. Select the GSD file to install by checking the box (1) to the left of the filename.
6. Click the "Install" button (2). The installation process may take a few minutes.

↳ 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. The project view opens in the work area without a selection being made.



Integrating a Device into the Project

1. On the left-hand side of the project navigation, double click on the "Device and networks" using the left mouse button. Network view is displayed in the work area.

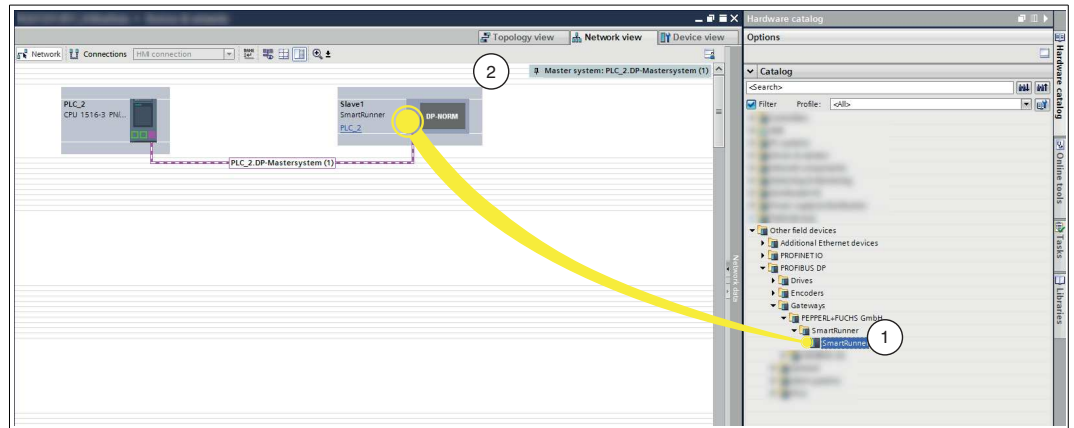


Figure 4.4 Hardware catalog

2. Open the hardware catalog and browse through the tree structure until you see your device (1).



Note!

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

3. Select your device (1) from the hardware catalog and drag this module into the network view (2).

↳ The device is displayed in the network view window (2).

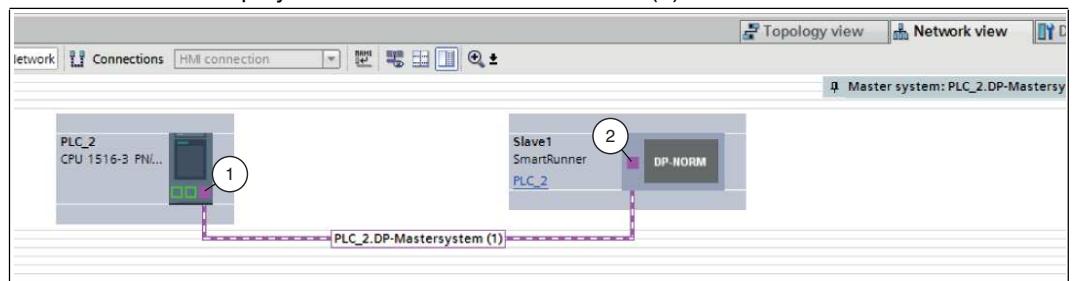


Figure 4.5 Connecting the PROFIBUS interfaces

4. Connect the device to the control panel. To do this, move the mouse cursor over the PROFIBUS interface that is highlighted in purple on the control panel (1). Click the left mouse button and drag the line shown to the PROFIBUS interface on the device (2). Once there, release the left mouse button again.

↳ The device is now connected to the control panel. A PROFIBUS subsystem is created.

Integrating Modules into the Project

You have the option of connecting up to four sensors to the interface module. To do this, you must specify the number of modules and their properties in the control panel. The modules are available in the hardware catalog.

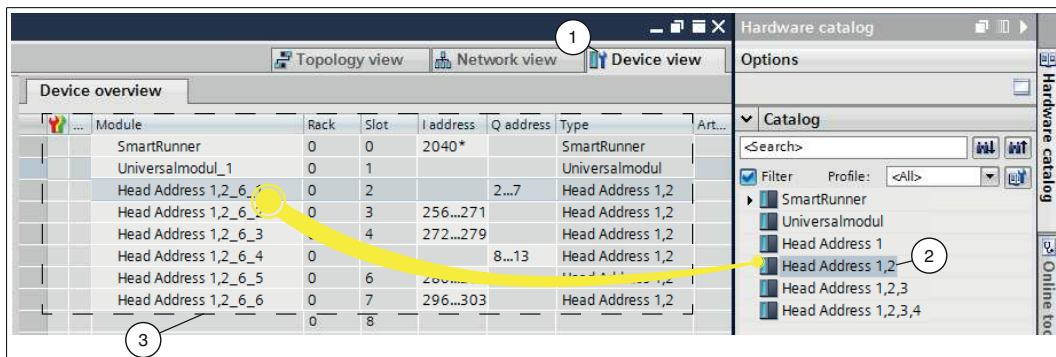


Figure 4.6 Integrating modules

1. Switch to the "Device view" tab (1) in the "Device and networks" window.
2. Open the hardware catalog. Select your module (2) from the hardware catalog and drag it into the device view (3).

↳ The modules are automatically assigned an address range.

Creating Tag Tables

A tag table must be created to be able to watch or control measured values. In the tag table, you can assign tags to input addresses or output addresses and allocate tag names. The names are valid throughout the control panel. To create a tag table, proceed as follows:

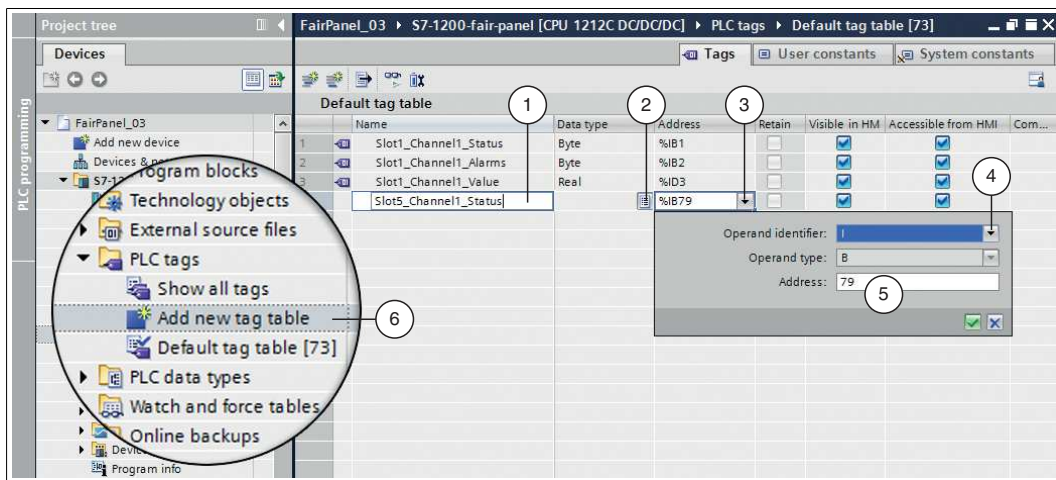


Figure 4.7 Creating a tag table

1. In the project tree, click on **PLC tags** and double-click on **Add new tag table** (6).
2. Enter a tag name in the field in the **Name** column (1).
3. Select the appropriate data type from the drop-down list in the **Data type** column (2).
4. Click on the drop-down list (3) in the field in the **Address** column.

↳ A dialog box opens in which you can define the properties and the address range for the tag.



Note!

Information about the address range can be found in the next chapter (see chapter 4.5).

5. From the drop-down list in the **Operand identifier** field (4), select whether it is an input channel, an output channel, or a marker:
 - I: input channel
 - Q: output channel
 - M: marker
6. From the drop-down list in the **Operand type** field, select the data type for address assignment:
 - X: 1 bit
 - B: 1 byte (8 bits)
 - W: 1 word (16 bits)
 - D: 1 double word (32 bits)
7. Select an address range for the tag by entering a value in the **Address** field (5).



Note!

Address Range

Module	Rack..	Slot...	I address	Q address	Type	Artikel-Nr.	Firmware	Kom...
SmartRunner	0	0	2040*		SmartRunner		V6.0	
Universalmodul_1	0	1			Universalmodul			
Head Address 1,2_6_1	0	2		2...7	Head Address 1,2			
Head Address 1,2_6_2	0	3	256...271		Head Address 1,2			
Head Address 1,2_6_3	0	4	272...279		Head Address 1,2			
Head Address 1,2_6_4	0	5		8...13	Head Address 1,2			
Head Address 1,2_6_5	0	6	280...295		Head Address 1,2			
Head Address 1,2_6_6	0	7	296...303		Head Address 1,2			

The address designations in this example are project-dependent and may differ from your actual address assignment. The memory range is automatically assigned by the TIA Portal when the modules are integrated into the project. This memory range determines the address range in the tag table.

Switch to the device configuration then to the module (**Device view** (1)) to copy the address range of the module (2) to the address range (**Address**) field of the tag table.



Creating an Observation Table and Monitoring Tags



Note!

To use observation tables, activate online mode.

To create an observation table and monitor measured values, proceed as follows:

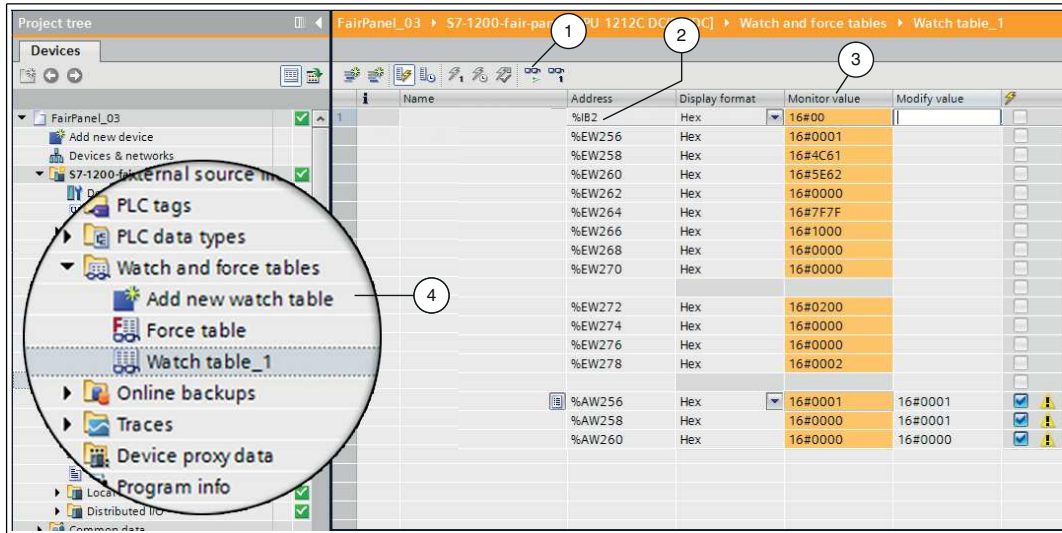


Figure 4.8 Create observation table

1. In the project tree, click on **Watch and force tables** and double-click on **Add new watch table** (4).
2. Click the field in the **Address** column.
↳ A list of addresses that you have defined in the tag table is displayed.
3. From the list, select the address that you want to watch.
4. Click on the watch icon (1) to watch the values.
↳ The current measured value is displayed in the field in the **Monitor value** column (3).



Note!
Output and Input Parameters in the Observation Table

Watch and force tables ▶ Watch table_1					
	Name	Address	Display format	Monitor value	Modify value
1		%IB2	Hex	16#00	
		%EW256	Hex	16#0001	
		%EW258	Hex	16#4C61	
		%EW260	Hex	16#5E62	
		%EW262	Hex	16#0000	
		%EW264	Hex	16#7F7F	
		%EW266	Hex	16#1000	
		%EW268	Hex	16#0000	
		%EW270	Hex	16#0000	
		%EW272	Hex	16#0200	
		%EW274	Hex	16#0000	
		%EW276	Hex	16#0000	
		%EW278	Hex	16#0002	
		%AW256	Hex	16#0001	
		%AW258	Hex	16#0000	
		%AW260	Hex	16#0000	

Figure 4.9 Observation table

1. Result protocol
2. Teach result protocol
3. Output parameters

Information about input/output parameters can be found in the next chapter (see chapter 4.5).



Controlling Variables

Implementing a trigger command is one example of how to use the observation table. To do so, proceed as follows:

#	Name	Address	Display format	Monitor value	Modify value	Comment
1		%EW256	Hex	16#0001		
2		%EW258	Hex	16#0860		
3		%EW260	Hex	16#5E61		
4		%EW262	Hex	16#0000		
5		%EW264	Hex	16#7F7F		
6		%EW266	Hex	16#5600		
7		%EW268	Hex	16#0000		
8		%EW270	Hex	16#0000		
9						
10		%EW272	Hex	16#0200		
11		%EW274	Hex	16#0000		
12		%EW276	Hex	16#0000		
13		%EW278	Hex	16#0002		
14						
15	%AW256		Hex	16#0001	16#0001	
16	%AW258		Hex	16#0000	16#0	
17	%AW260		Hex	16#0000	16#0	
18						
19						
20						
21						
22						
23						
24						
25						

1. Enter an output parameter "AW256" from 0 to 1 in the observation window. Right click in the **Modify value** selection field (1) to do this.
2. In the context menu, select **Modify** (2) > **Modify to 0** (3) > **Modify to 1** (4).
↳ A trigger is activated. This means that the sensor triggers an image capture process.

4.5 Data Format for Modules

Output Parameters

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0 - Reserved	0	0	0	0	0	0	0	0
Byte 1 - Trigger	0	0	0	0	0	0	0	1
Byte 2 - Reserved	0	0	0	0	0	0	0	0
Byte 3 - Teach	0	0	0	0	0	0	0	1
Byte 4 - Reserved	0	0	0	0	0	0	0	0
Byte 5 - Choose profile ¹	0	0	x	x	x	x	x	x

1. Only for VLM350-F280-R4-1001, VLM350-F280-R4-1002, and VLM350-F280-R4-1101

Legend

	1 ... 32	Profile number
X	0	Not defined
	> 32	Not defined

Trigger

After changing *Bit 0* from **0 to 1**, a "**Trigger**" is activated. This means that the sensor triggers an image capture process. In order to run an additional "**Trigger**," **Bit 0** must be reset.

Teach

After changing *Bit 0* from **0 to 1**, a "**Teach-In**" is triggered. This means that the sensor initiates the teach-in process. A trigger must then be transmitted. In order to run the "**Teach**" process again, **Bit 0** must be reset.

Input Parameters



Note!

The two protocols "Result Protocol" and "Teach Result Protocol" are connected. The two protocols cannot be run at the same time. Only one of the two protocols can be run at a time.

Result Protocol

Result data provides the measurement status and result as a response.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 1 - Status	0	-	Addr 1	Addr 0	Event	WRN	No Match	ERR
Byte 2 - Result	0	R6	R5	R4	R3	R2	R1	R0
Byte 3 - Counter	0	C06	C05	C04	C03	C02	C01	C00
Byte 4 - Quality	0	Q06	Q05	Q04	Q03	Q02	Q01	Q00
Byte 5 - Quality	0	Q16	Q15	Q14	Q13	Q12	Q11	Q10
Byte 6 - Quality	0	Q26	Q25	Q24	Q23	Q22	Q21	Q20
Byte 7 - PosX	0	PosX13	PosX12	PosX11	PosX10	PosX09	PosX08	PosX07
Byte 8 - PosX	0	PosX06	PosX05	PosX04	PosX03	PosX02	PosX01	PosX00
Byte 9 - PosZ	0	PosZ13	PosZ12	PosZ11	PosZ10	PosZ09	PosZ08	PosZ07
Byte 10 - PosZ	0	PosZ06	PosZ05	PosZ04	PosZ03	PosZ02	PosZ01	PosZ00
Byte 11 - Checksum	0	xor	xor	xor	xor	xor	xor	xor
Byte 12	0	0	0	0	0	0	0	0
Byte 13	0	0	0	0	0	0	0	0
Byte 14	0	0	0	0	0	0	0	0
Byte 15	0	0	0	0	0	0	0	0
Byte 16	0	0	0	0	0	0	0	0

Legend

Status	Addr	Device address
	Event	Event occurred (future) Currently read as 0
	WRN	Unused
	No Match	Profile does not match the saved profile
	ERR	System error or evaluation error
Result	R0 ... R6	Profile number 1 ... 32 0x00 = no object found
Quality	Q00 ... Q26	Quality of the current profile (0 = no profile found, 100 = perfect match) Quality: Quality Good Quality2: Quality Variation Quality3: Quality Outliers
Counter		Increments for each evaluation, is restarted at 0x3F
Position Data ¹	PosX16 ... PosX00	X-deviation of current profile from saved profile
	PosZ16 ... PosZ00	Z-deviation of current profile from saved profile

1. Only for VLM350-F280-R4-1001, VLM350-F280-R4-1002, and VLM350-F280-R4-1101

Teach Result Protocol

Teach Result Data returns the status and result of the teach-in process as a response.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 17 - Status	0	-	Addr 1	Addr 0	Event	WRN	0	ERR
Byte 18 - Result	0	0	0	0	0	0	0	0
Byte 19 - Counter	0	C06	C05	C04	C03	C02	C01	C00
Byte 20 - Quality A	0	QA6	QA5	QA4	QA3	QA2	QA1	QA0
Byte 21 - Quality B	0	QB6	QB5	QB4	QB3	QB2	QB1	QB0
Byte 22 - Quality C	0	QC6	QC5	QC4	QC3	QC2	QC1	QC0
Byte 23 - Quality D	0	QD6	QD5	QD4	QD3	QD2	QD1	QD0
Byte 24 - Checksum	0	xor	xor	xor	xor	xor	xor	xor

Legend

Status	Addr	Device address
	Event	Event has occurred - for future use, currently read as 0
	WRN	Unused
	ERR	System error or evaluation error
Result	R0	For extended protocol Always 0
Counter	C00 ... C06	Increments with each teach-in
Quality A		The quality of the current teach-in 0 = teach-in not possible 100 = perfect teach-in
Quality B-D		Unused

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