ICE1-8IOL-S2-G60L-V1D

Fieldbus Module with Multiprotocol Technology and I/O-Link

Manual





EtherNet/IP^{*}



Your automation, our passion.

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Pepperl+Fuchs Group Lilienthalstr. 200 68307 Mannheim Germany Phone: +49 621 776 - 0 E-mail: info@de.pepperl-fuchs.com **North American Headquarters** Pepperl+Fuchs Inc. 1600 Enterprise Parkway Twinsburg, Ohio 44087 USA Phone: +1 330 425-3555 E-mail: sales@us.pepperl-fuchs.com **Asia Headquarters** Pepperl+Fuchs Pte. Ltd. P+F Building 18 Ayer Rajah Crescent Singapore 139942 Phone: +65 6779-9091 E-mail: sales@sg.pepperl-fuchs.com https://www.pepperl-fuchs.com

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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 Manufacturer

Pepperl+Fuchs Group Lilienthalstraße 200, 68307 Mannheim, Germany

Internet: www.pepperl-fuchs.com

1.3 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.



1.4 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 ICE1-8IOL-* modules function as an interface in an industrial fieldbus system. They enable communication between a central controller at the control level and the decentralized sensors and actuators at the field level. The resulting potential line or ring topologies that can be achieved enable reliable data communication and a significant reduction in the amount of wiring required, and therefore in the costs for installation and maintenance. Simple and quick extension is also possible.

The ICE1-8IOL-* series modules have a rugged metal housing made of die-cast zinc. Due to the fully encapsulated device housing, the module electronics are protected against environmental influences and can be used in a wide range of temperatures. Despite the rugged design, the modules have compact dimensions and a low weight. They are especially suitable for use in machines and plants with a moderate I/O concentration on distributed assemblies.

Multiprotocol (EtherNet/IP, PROFINET)

The multiprotocol modules allow you to select different protocols for communication within a fieldbus system. As a result, multiprotocol modules can be integrated into different networks without the need to obtain specific modules for each protocol. Thanks to this technology, you can also use one module in different environments.

Using rotary coding switches in the lower area of the modules, you can conveniently and easily set both the protocol and the address of the module, provided that the protocol to be used supports this. If you have chosen a protocol and started the cyclic communication once, the module remembers this setting and uses the selected protocol from this point on. To use another supported protocol with this module, perform a factory reset.

Input/Output Channels for the Field Level

For the field level, the modules have the following input/output channels

- 8 IO-Link master ports
 - 4 IO-Link master ports, class A
 - 4 IO-Link master ports, class B

If one or more of the IO-Link ports are not required, these can also be freely configured as digital inputs or outputs (SIO mode).

- 4 hardwired digital inputs
- 4 configurable digital outputs (instead of the voltage outputs of class B master ports on pin 2)

IO-Link Characteristics of the Modules

The modules support IO-Link Standard V1.1.

 Parametrization of IO-Link devices in PROFINET using Siemens IO_LINK_DEVICE function blocks for Step 7 and the TIA Portal

8 x IO-Link master ports

- 4 class A connections with an additional hardwired digital input at pin 2 of the I/O port.
 - 4 class B connections with a galvanically isolated auxiliary power supply for up to 2 A per port at pins 2 and 5 with a total current of 8 A.
 - The auxiliary power supply can be configured as a digital output.

IO-Link connections

• 5-pin M12 connector

Parameter storage

• The Parameter Storage function stores and monitors the parameters of the IO-Link device and the IO-Link master.



 This function makes it possible for you to easily replace the IO-Link device or the IO-Link master.

This is possible from IO-Link specification V1.1 onward and only if the IO-Link device and the IO-Link master support the function.

IO-Link device parameterization

• The IO-Link devices can be parameterized in the PROFINET protocol using the Siemens IO_LINK_DEVICE function block for STEP 7 and the TIA Portal.

Special Product Features

• Rugged design:

Connectivity options for the module series include the widespread M12 connector with A coding for I/O signals and D coding for the network. In addition, the connectors are color-coded to prevent users from using the wrong ports. The output circuits are galvanically isolated from the rest of the network and the sensor electronics. Controllers are therefore reliably protected against noise.

Integrated web server:

Network parameters such as IP address, subnet mask, and gateway can be adjusted via the integrated web server. The modules support the communication protocols BOOTP and DHCP for automated assignment of network parameters via the corresponding servers.

You can read the parameters of the IO-Link device via the integrated web server and write new parameters to the modules in single-write mode. Single-write mode does not activate the automatic parameter storage mechanism.

Force Mode

In Force Mode, the module ports can be temporarily configured as digital inputs/outputs or IO-Link ports. The configuration applies until the module is next switched off.

"Force Mode" allows the simulation of process data at the digital inputs/outputs without the need to connect sensors and actuators. This means that you can test an application in advance without a full physical application. It is possible to simulate input switching states or to switch outputs even without a controller. This feature makes machine commissioning simpler and quicker and can be used to test new production plants.

Integrated network switch:

The integrated two-port Ethernet switch of the modules allows you to set up a line topology or a ring topology for the EtherNet/IP network or PROFINET network. The additional DLR or MRP protocol allows you to design a highly available network infrastructure.

Redundancy function:

The module firmware supports the redundancy function DLR (Device Level Ring) or MRP (Media Redundancy Protocol) for ring topologies. This means that if the connection is interrupted, the modules switch immediately to an alternative ring segment and thus ensure interruption-free operation. The supported DLR class is "beacon-based" in accordance with the EtherNet/IP specification.

• Fail-safe function:

The modules provide a fail-safe function. You can therefore choose the behavior of each individual output channel in the event of an interruption or a loss of communication.

QuickConnect:

QuickConnect allows the modules to record the communication in an EtherNet/IP network especially quickly through an accelerated boot-up process. This allows you to switch tools faster, for example.

• S2 system redundancy:

S = single network access point

2 = switching between two application relationships is possible

The S2 system redundancy uses a system from a PROFINET device that is connected to two redundant PROFINET controllers. This arrangement allows the additional controller to take over the IO data exchange connection if the connection to the primary controller fails.

Normally, a connection failure to the main controller triggers the switch to an additional controller. A manual switch can be forced via the additional controller.



2.2 Indicators and Operating Elements

ICE1-8IOL-S2-G60L-V1D



- (1) Channel indicator LED
- Status indicator LED

3 Rotary switch

Note

F

The LEDs in the lower area of the Ethernet IO module have different names and functions depending on the selected protocol. The following LED descriptions are therefore divided into a general part (1), which is valid for all protocol settings, and LED descriptions for a specific protocol setting (2).



Figure 2.1

Indicators—General Part

Description for LED A, B, DIA, U_S , U_{Aux}

LED	Function
DIA LED A (for each of X1 - X8 A)	Red: peripheral error (sensor/actuator overload or short circuit) SIO mode Yellow: channel A status (pin 4) is "on" Off: no error, not connected IO-Link mode Green: IO-Link communication present Flashing green: no IO-Link device connected Off: not configured for IO-Link
DIA LED B (for each of X1 – X8 B)	Red: peripheral fault (sensor and actuator overload or short circuit at line L+ (pin 1)) SIO mode White: channel B status (pin 2) is "on" Red: overload or short circuit at C/Q (pin 4) line Off: no error, not connected IO-Link mode Red: IO-Link COM mode: IO-Link communication error or overload or short circuit at C/Q (pin 4) line Flashing green: no IO-Link device connected Off: not configured for IO-Link
LED U _S	Green: voltage 19 V \leq U_S \leq 30 V Red: voltage U_S $<$ 19 V or U_S $>$ 30 V
LED U _{Aux}	Green: voltage 19 V $\leq U_{Aux} \leq 30$ V Red: voltage $U_{Aux} < 19$ V or $U_L > 30$ V Red alert is only possible if, for EtherNet/IP, the option "Report U_{Aux} supply voltage fault" is enabled in "General Diagnostic Settings" or, for PROFINET, the option " U_{Aux} supply diagnosis" is enabled in "Global Diagnostic Parameters."

Table 2.1

EtherNet/IP indicators

E/IP areas: relevant LEDs Lnk/Act X01, Lnk/Act X02, MS, NS

LED	Function
LED Lnk/Act X01 LED Lnk/Act X02	Green: connected to an Ethernet node Flashing yellow: data exchange with an IO device Off: no connection
LED MS	Green: module ready for operation Flashing green: missing configuration Flashing red/green: self-test Red: non-recoverable, serious error Flashing red: minor recoverable error (e.g., incorrect configuration) Off: module switched off
LED NS	Green: module has at least one connection Flashing green: module has no connections. IP address is available Red/green: module is performing a self-test Red: module has determined that the assigned IP address already exists Flashing red: the connection has timed out or been interrupted Off: module is turned off or does not have an IP address

Table 2.2

2022-02



PROFINET Indicators

P area: relevant LEDs Lnk/Act X01, Lnk/Act X02, BF, DIA

LED	Function
LED Lnk/Act X01 LED Lnk/Act X02	Green: connected to an Ethernet node Flashing yellow: data exchange with an IO device Off: no connection
LED BF	Red: no configuration, slow or no physical connection Flashing red: link exists but no communication link to the PROFINET controller is available Off: no error
LED DIA	Red: PROFINET diagnostic alarm active Flashing red (1 Hz): time-out or fail-safe mode is active Flashing red (2 Hz) for 3 sec: DCP signal service triggered via the bus Red double flashing: firmware update Off: no error

Table 2.3

Operating Elements

Switch	Function
Rotary switch X100	Setting the fieldbus protocol Setting the IP address ¹
Rotary switch X10	Setting the IP address ²
Rotary switch X1	Setting the IP address ³

1. Only EtherNET/IP

2. Only EtherNET/IP

3. Only EtherNET/IP

2.3 Interfaces and Connections

The contact arrangements below show the front view of the plug-in area of the connectors.

Fieldbus Connection X01, X02

Risk of destruction!

Caution!

Never route the power supply to the data cable.

- Connection: M12 socket, 4 pin, D-coded
- Color coding: green



Figure 2.2

Schematic drawing of port X01, X02

Port	Pin	Signal	Function
Ports X01, X02	1	TD+	Transmit data +
	2	RD+	Receive data +
	3	TD-	Transmit data -
	4	RD-	Receive Data -

Table 2.4Assignment of port X01, X02

Connection for IO-Link, digital inputs/outputs X1 - X8

- Connection: M12 socket, 5 pin, A-coded
- Color coding: black



Caution!

Risk of destruction with external sensor supply!

The module infeed for the sensor supply U_S may only be provided over the specified power connection (Power X03/X04 >> U_S +24 V/GND_ U_S) for the module. It is not permitted to supply external power via the IO-Port (port X1 - X8 >> pin 1/pin 3) and this may destroy the module electronics through power feedback.



Caution!

Do not compromise galvanic isolation through incorrect cabling!

The sensor supply (port X5 - X8 >> pin 1/pin 3) and extended sensor supply (port X5 - X8 >> pin 2/pin 5) are galvanically isolated from each other. If the reference potentials (GND_{US} – pin 3) and (GND_{UX} – pin 5) are connected, excessive equalization currents may flow. In this case, it is not permitted for a sensor to be connected to (port X5 - X8 >> pin 2)!

Eliminating the galvanic isolation is not recommended.



Caution!

Risk of destruction!

Never route the power supply to the data cable.

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Figure 2.3

Schematic drawing of inputs/outputs 1 - 8

Port	Pin	Signal	Function
IO-Link Class A, inputs/out- puts	1	L+	IO-Link sensor power supply +24 V
X1X4	2	IN-x	Channel B: digital input (type 1)
	3	L-	IO-Link sensor power supply GND_U _S
	4	C/Q	Channel A: IO-Link data exchange
	5	n.c.	Not used

Port	Pin	Signal	Function
IO-Link Class B, inputs/out- puts	1	L+	IO-Link sensor power supply +24 V
A5 A6	2	U _{AUX} (+24 V)	Channel B: auxiliary voltage, galvanically isolated from the IO-Link/module power supply
	3	L-	IO-Link sensor power supply GND_U _S
	4	C/Q	Channel A: IO-Link data exchange
	5	GND_U _{AUX}	Protective earth, reference potential U _{AUX}

Connection for Power Supply X03, X04

- Power supply with M12 power L-coded
- · Color coding: gray

Note

For the system/sensor and actuator supply, use only power supplies that comply with PELV (protective extra-low voltage) or SELV (safety extra-low voltage). Power supplies according to EN 61558-2-6 (transformer) or EN 60950-1 (switching power supplies) fulfill these requirements.



Caution!

Loss of function when the system supply voltage is too low.

Ensure in all cases that the supply voltage measured at the most remote participants (sensor/actuator) does not drop below 18 V DC in terms of system supply voltage.



Note

Power supply connection

When connecting the power supply, ensure a separate power supply to the sensor and system via U_s and auxiliary voltage via U_{Aux} for e.g., actuators. Where the plant has a separate power supply concept for system current and load current, this means the sensor and system area of the Ethernet IO module can continue working even if there is a failure of the load power supply.

Where several Ethernet IO modules are connected in series, ensure the separate power supplies are connected properly $U_s . U_{Aux}$.





Schematic drawing of M12 L-encoding (plug); port X03 (IN)



Figure 2.5 Schematic drawing of M12 L-encoding (socket); port X04 (OUT)

Port	Pin	Signal	Function
Power supply	1	U _S (+24 V)	Sensor/system supply
700,704	2	GND U _{Aux}	Ground/reference potential U _{Aux}
	3	GND U _S	Ground/reference potential U _s
	4 U _{Aux} (+24 V)	Auxiliary voltage (galv. insulated)	
	FE (5)	FE (FE)	Functional ground



2.4 Dimensions

ICE1-8IOL-S2-G60L-V1D







3 Installation

3.1 General Information

Install the module with two M6x25/30 size screws on a level surface. The required torque is 1 Nm. Use washers according to DIN 125. For the installation holes, use a spacing of 237.3 mm to 239.7 mm.



Note

Power supply connection

When connecting the power supply, ensure a separate power supply to the sensor and system via U_s and auxiliary supply via U_{Aux} for e.g., actuators. Where the plant has a separate power supply concept for system current and load current, this means the sensor and system area of the Ethernet IO module can continue working even if there is a failure of the load power supply.

Where several Ethernet IO modules are connected in series, ensure the separate power supplies are connected properly U_s . U_{Aux} .



Note

To dissipate interference currents and the EMC resistance, the modules use a short circuit to ground with an M4 thread. This is marked with the symbol for grounding and the label "XE."

Note

Connect the module using a low-impedance connection with the reference ground. In the case of a grounded mounting surface, you can connect the module directly via the fixing screws.



Note

For non-grounded mounting surfaces, use a ground strap or a suitable FE conductor. Connect the ground strap or FE conductor to the grounding point using an M4 screw and place a washer and a serrated washer under the fixing screw if possible.

-		

Note

Use a suitable UL-certified cable (CYJV or PVVA). To program the controller, please consult the manufacturer information and use only the appropriate accessories.



Note

For UL application:

Approved only for indoor use. Please observe the maximum altitude of 2000 meters. Approved up to a maximum of pollution degree 2.



Warning!

Terminals, the housing of field-wired terminal boxes or components may exceed a temperature of 60 $^\circ\text{C}.$



Warning!

Use temperature-resistant cables with the following properties: Heat resistant up to at least 96 $^\circ\text{C}.$

4 Commissioning, Protocol Setting

4.1 Protocol Setting

Multiprotocol

You can use the multiprotocol modules to select various protocols for communication within a fieldbus system. This allows you to integrate the multiprotocol modules into different networks without having to obtain a specific module for each protocol. This technology also allows you to use the same module in different environments. Using the rotary switches on the front of the modules, you can easily and conveniently set the protocol and address of the module, provided that the protocol to be used supports this. Once you have selected a protocol and started the cyclical communication, the module recognizes these settings and uses the selected protocol from this point on. To use another supported protocol with this module, perform a factory reset.

Setting a Protocol

Multiprotocol modules have a total of three rotary switches. Move the first rotary switch X100 to the relevant switch position to set the protocol. If you use EtherNet/IP, set the last octet of the IP address using the rotary switches (X100, X10, X1).





Assigning the Protocol Using the Rotary Switches

Protocol	X100	X10	X1
EtherNet/IP	0 – 2	0 – 9	0 - 9
PROFINET	Р	-	-

In its delivered state, the module does not contain any protocol settings. In this case, simply select the desired protocol. To use a modified rotary switch setting (protocol setting), you must perform a power cycle or a "Reset" via the web interface. Once you have set the protocol using the rotary switches, the module saves these settings as soon as it starts a cyclical communication. You can no longer change the protocol using the rotary switch from this point on. To change the protocol, perform a factory reset first.

If you set the rotary coding switch to an invalid position, the device signals this with a flash code: the BF/MS/ERR LED flashes red three times.

The IP address can be changed depending on the selected protocol.



EtherNet/IP

If you use EtherNet/IP as the protocol, use rotary switch X100 to set the value 100 as the last octet of the IP address for the module. You can use rotary switch X100 to set a value of 0 to 2 for the IP address. You can use rotary switches X10 and X1 to select values between 0 and 9. You can use rotary switch X10 to configure position 10 of the last octet of the IP address. You can use rotary switch X1 to configure position 1 of the last octet of the IP address.

The default setting for the first three octets of the IP address is 192.168.1.

Example: Rotary switch settings 2 (X100), 1 (X10), and 0 (X1) result in an IP address of 192.168.1.210 for EtherNet/IP.

PROFINET

If you use PROFINET as the protocol, only set rotary switch X100 to the value "P."

Factory Settings

A factory reset erases any changes you have made to settings, etc. and restores the factory settings. The saved protocol selection is also reset.

To perform a factory reset, set rotary switch X100 to 9, rotary switch X10 to 7, and rotary switch X1 to 9. Then switch the module off and on again. The factory settings are restored after 10 seconds.

To select a new protocol, follow the instructions in this chapter.







Caution!

Destruction of the Operating System

When restoring the factory settings, ensure that the module is connected to the voltage supply and switched on for **at least** 10 seconds. If it has been on for less than 10 seconds, the operating system may be destroyed. The module would then need to be sent to Pepperl+Fuchs for repair.

5 Commissioning for PROFINET

5.1 Preparation

The configuration and commissioning process for the modules described over the following pages was performed using TIA Portal V15 project planning software from SIEMENS. When using a control system from a different controller provider, please refer to the corresponding documentation.

GSDML File

To configure the modules in the control system, you need a GSD file in XML format. You can download this file from our website at https://www.pepperl-fuchs.com.

The file for the PROFINET modules is named GSDML-V2.3*-Pepperl-Fuchs-ICE1-S2-yyyymmdd.xml. In this case, **yyyymmdd** is the issue date of the file.

Integrate the GSDML file into the TIA Portal using the GSD manager via the main menu "Options > Manage general station description files (GSD)." The modules with a PROFINET interface are then available in the hardware catalog.

₩ Siemens - C:\Users\jkrato\Docum	ents\Software\IO-Module\ICE1-8IOL-G60L-V1D\PROF
Project Edit View Insert Online	Options Tools
📑 📑 🔚 Save project 📕 🐰 💷	Y Settings
Project tree	Support packages
Devices	Manage general station description files (GSD) Start Automation License Manager
	Show reference text
▼ 7 S7-1200_ICE1-8IOL	[] Global libraries

Figure 5.1

MAC IDs

The modules have three assigned MAC IDs when they are delivered. These are unique and cannot be changed by the user.

The first assigned MAC ID is printed on the module.

SNMP

The modules support the SNMP Ethernet network protocol (Simple Network Management Protocol). The information from the network management system is displayed in accordance with MIB-II (Management Information Base), which is defined in RFC 1213.

Passwords:

Read community: public

Write community: private

5.2 Configuration Example

The configuration and commissioning process for the modules described over the following pages was performed using TIA Portal V15 project planning software from SIEMENS. The configuration is based on the example of an ICE1-8IOL-S2-G60L-V1D module. For other module versions, configuration is carried out with a few minor changes.

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Commissioning for PROFINET



Note

To configure a module in the control system, you need a GSDML file.

5.2.1 Integration of PROFINET IO Modules in the TIA Portal

As an example, the following is an explanation of how to configure an Ethernet IO module as a PROFINET type in the TIA portal, based on the ICE1-8IOL-S2-G60L-V1D module.



- 1. Install the GSDML file for the desired module in the TIA Portal.
 - → Once the GSDML file for the PROFINET modules has been installed, the modules are available in the TIA portal hardware catalog.

Hardware catalog	11	
Options		
	1	
✓ Catalog		
<search></search>	141 D	hit
Filter Profile: <all></all>		Y
Controllers		
▶ 🛅 HMI		
PC systems		
Drives & starters		
Network components		
Detecting & Monitoring		
Distributed I/O		
Power supply & distribution		
Field devices		
 Other field devices 		
Additional Ethernet devices		
PROFINET IO		
Drives		
Encoders		
Balluff GmbH		
Belden Deutschland GmbH - Lur	mberg	
Murrelektronik	noerg	
Pepperl+Fuchs GmbH		
✓ Pepperl+Fuchs ICE1		
ICE1-16DI-G60L-V1D		
ICE1-16DIO-G60L-C1-V1D		
ICE1-16DIO-G60L-V1D		
ICE1-8DI8DO-G60L-C1-V1D)	
ICE1-8DI8DO-G60L-V1D		
ICE1-8IOL-G30L-V1D		
ICE1-8IOL-G60L-V1D		
ICE1-8IOL-52-G60L-V1D		
🕨 🧃 Ident Systems		
Sensors		
Values		
F La Valves		



2. Double-click on the desired module and select the corresponding PROFINET interface.

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Figure 5.3

→ Slot 1 is automatically occupied with the status/control module, which cannot be deleted. The remaining subslots are configured as "inactive" by default and can be changed.

Module	Fail-safe	Rack	Slot	I address	Q address	Туре	Article number
 ICE1-8IOL-S2-G60L-V1D 		0	0: PROFINET Interface			ICE1-8IOL-52-G60L	70103603
PN-IO		0	0: PROFINET Interface X1			ICE1-8IOL-52-G60L	
 IO-Link Master_1 		0	1: IO System			IO-Link Master	
Status/Control Module		0	1: IO System 1			Status/Control Mod	
Inactive (A/B)		0	1: IO System 1.2: Port X1			Inactive (A/B)	
Inactive (A/B)_1		0	1: IO System 1.3: Port X2			Inactive (A/B)	
Inactive (A/B)_2		0	1: IO System 1.4: Port X3			Inactive (A/B)	
Inactive (A/B)_3		0	1: IO System 1.5: Port X4			Inactive (A/B)	
Inactive (A/B)_4		0	1: 10 System 1.6: Port X5			Inactive (A/B)	
Inactive (A/B)_5		0	1: IO System 1.7: Port X6			Inactive (A/B)	
Inactive (A/B)_6		0	1: IO System 1.8: Port X7			Inactive (A/B)	
Inactive (A/B)_7		0	1: IO System 1.9: Port X8			Inactive (A/B)	

Figure 5.4

→ The following submodule profiles are available for configuration of an 8IOL module:



ICE1-8IOL-S2-G60L-V1D Commissioning for PROFINET





5.2.2 Assigning a Unique Device Name in the Control System



PROFINET IO devices are addressed in the PROFINET network via a unique device name. This can be freely assigned by the user but must appear only once in the network.

1. Select slot 0 in the module device view and assign an appropriate module name. In this example, the product identifier is "ICE1-8IOL-S2-G60L-V1D."

PEPPERL+FUCHS

ICE1-8IOL-S2-G60L-V1D [ICE1-	8IOL-S2-G60L-V1D]	🔍 Properties 🚺 Info 👔 🗓 Diagnostics	18
General IO tags Sys	stem constants Texts		
General Catalog information PROSINGT interface [V1]	General		
General Ethernet addresses	Name:	ICE1-8IOL-52-G60L-V1D	
Advanced options	Author: Comment:	FA-CTSS_SYS	
Shared Device			
•	Rack:	0	~
	Slot:	0	

Figure 5.6

- Check the automatically assigned IP address in "PROFINET interface [x1] -> Ethernet addresses."
- 3. Check whether the control system and module are on the same Ethernet subsystem. If necessary, change the setting.

ICE1-8IOL-S2-G60L-V1D [ICE1	I-8IOL-S2-G60L-V1D]	💁 Properties 🚺 Info 👔 😨 Diagnostics 💿 🗆 🤜
General IO tags S	ystem constants Texts	
 General Catalog information 	Ethernet addresses	
✓ PROFINET interface [X1] General	Interface networked with	
Advanced options Identification & Maintenance	Subnet:	Add new subnet
Shared Device	IP protocol	
	IP address:	172.24.55.187
	Subnet mask:	255 . 255 . 255 . 192
		Synchronize router settings with IO controller
		Use router
	Router address:	0.0.0
	, PROFINET	
		Generate PROFINET device name automatically
	PROFINET device name:	ice1-8iol-s2-g60l-v1d
	Converted name:	ice1-8iol-s2-g60l-v1d
	Device number:	1

Figure 5.7

4. To use the previously assigned device name, enable the "Generate PROFINET device name automatically" option.

Note

For clarity, we recommend that you do not use a different device name.

5.2.3 Assigning the Device Name to a PROFINET IO Module

Each module must have a device name so that each node in the PROFINET network can be assigned an IP address. A node search displays all PROFINET devices that have been found.

The Ethernet IO modules have three assigned MAC IDs when they are delivered. These are unique and cannot be changed by the user. The first MAC ID is shown on the housing of the Ethernet IO module. (See between X2 and X3). Using this ID, each device can be found in the list of available nodes and assigned a device name.

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- 1. Connect the module to the PROFINET network.
- 2. In "Device View," select the module "Slot 0."
- 3. Open the dialog "Accessible devices" via the main menu "Online -> Accessible devices"



Figure 5.8

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Accessible devices	Accessible nodes of the	Type of the PG/PC interfa PG/PC interfa e selected interface:	ce: 🖳 PN/IE ce: 🔝 Intel(R)	Ethernet Connection (7) I2	₹19-LM ▼ 👻
	Device	Device type	Interface type	Address	MAC address
Flash LED	Accessible device	ICE1-8IOL-52-G6	150	00-0D-81-04-17-AB	00-0D-81-04-17-AB
Online status information Concern to the status of the st	n: levices found. n retrieval completed. ormation			🗌 Display only erro	Start search r messages
				<u>S</u> h	ow <u>C</u> ancel

Figure 5.9

- 4. Select a module from those found.
 - → If the desired module is not displayed in the list of available nodes on the network, you can change the device filter and refresh the list. If the device still does not appear, check your firewall settings.



5. Assign the selected PROFINET device name to the module.

/ Diagnostics	Assign PROFINET dev	/ice name								
Functions										
Assign IP address										
Assign PROFINET device name	Configured PROFINET device									
Reset to factory settings		poor urr de	110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110 - 110	line 1 Riel an a COLutel						
		PROFINE I de	vice name:	10e1-8101-52-9601-V10						
		U	evice type:	ICE1-8IOL-52-G60L-V						
		Device filter								
•		Only sho	w devices of	the same type						
		Only she	w devices wit	th bad parameter settings						
-		Onlyshe	w devices wi	thout names						
	Accessible de	vices in the network:								
	IP address	MAC address	Device	PROFINET device name	Status					

Figure 5.10

 \mapsto If the device name was set successfully, this will be indicated by the status.

6. To complete the process, click the "Assign name" button.

5.2.4 Configuring the IO-Link Channels

A preconfiguration of the I/O function is automatically used for slot 1 of the rack.

By default, all channels are preconfigured as "inactive." The configurations for the IO-Link channels (C/Q or channel A/pin 4 of the IO port) in subslots 2 ... 9 (port 1 of the device corresponds to subslot 2, etc.; port 8 of the device corresponds to subslot 9) can be defined as required. The input and output addresses defined by the hardware manager can be changed.



Deleting an IO-Link Channel Configuration

1. To delete an IO-Link channel, select the desired IO-Link channel in "Device View."

		F Topolo	gy view	h Ne	twork view	Devic	e view
F ICE 1-8IOL-52-G60L-V1D [ICE 1 🐨 🔠 🗰 🌃 🖽 🛄 🔍 ± 🔤	Device	overview		- nr			
(Brit	<u>^</u> <u>ү</u> м	odule	Fail-safe	Rack	Slot		I address
260		ICE1-8IOL-52-G60L-V1D		0	0: PROFINET Inte	erface	
AL SOL		PN-IO		0	0: PROFINET Inte	erface X1	
	-	IO-Link Master_1		0	1: IO System		
W		Status/Control Module		0	1: IO System 1		23
	1	Inactive (A/B)		0	1: IO System 1.	2: Port X1	4
	-	Inactive (A/B)_1		0	1: IO System 1.	3: Port X2	5
	•	Inactive (A/B)_2		0	1: IO System 1.4	4: Port X3	6
NAMES OF TAXABLE PARTY OF TAXABLE PARTY OF TAXABLE PARTY OF TAXABLE PARTY.		Inactive (A/B)_3		0	1: IO System 1.	5: Port X4	7
		Inactive (A/B)_4		0	1: IO System 1.	6: Port X5	8
		Inactive (A/B)_5		0	1: IO System 1.	7: Port X6	9
		Inactive (A/B)_6		0	1: IO System 1.	8: Port X7	10
		Inactive (A/B) 7		0	1:10 System 1.9	9. Port X8	11

Figure 5.11



2. Right-click on this entry.

 \rightarrow The following menu appears:



Figure 5.12

3. Select the "Delete" option. To confirm the following dialog, click "Yes."



Figure 5.13



Creating an IO-Link Channel Configuration

1. Different IO-Link communication channels (input channel, output channel or input/output channel) are available in addition to the digital input and output channels. To display a selection of options, click the appropriate folder in the hardware catalog:

Hardware	catalog 🛛	4 🗉 F
Options		
✓ Catalor	g	
		il int
Filter	Profile: All>	
Head	module	
- Subm	nodules	
) 🖬 Dir	gital	
- 10	Link In/Out	
1	IO-Link I/O 1/1 Byte, PQI	
	IO-Link I/O 1/4 Bytes, PQI	1
1	IO-Link I/O 16/16 Bytes, F	PQI
1	IO-Link I/O 2/2 Bytes, PQI	l
1	IO-Link I/O 2/8 Bytes, PQI	l .
I	10-Link I/O 24/24 Bytes, F	PQI
1	IO-Link I/O 3/3 Bytes, PQI	1
1	IO-Link I/O 32/32 Bytes, F	PQI
	IO-Link I/O 32/4 Bytes, PO	2I
	IO-Link I/O 4/1 Bytes, PQI	I
-	IO-Link I/O 4/32 Bytes, PC	21
-	IO-Link I/O 4/4 Bytes, PQI	
	IO-LINK I/O 8/2 Bytes, PQI	1
	link Input	
	-Link Output	
	ther	
	ilei	

2. Select the required option. To drag the configuration to a free IO-Link subslot, click and hold the left mouse button.

The following options are available for the IO-Link C/Q channel (channel A/pin 4):

Digital Input: In this mode the channel works as a digital input. The IO-Link master does not attempt to independently establish communication with the connected IO-Link device.

Note

Π

In case of optional COM operations, the status of the digital input signal is not updated.

Digital Output:	In this mode the channel works as a digital output. It is not possible to communicate with the connected device.
Inactive:	This mode should be selected when the channel is not used. In this case, the power supply L+ to pin 1 of the connection is disabled.
IO-Link :	In this mode (COM mode), process data is exchanged from or to the device via a communication connection. The IO-Link master automatically starts communication with the connected IO-Link device, taking into account the baud rate. In this mode, all IO-Link functions can be used without limitation (parameter- ization, diagnosis, etc.). Configuration modules with data lengths of 1 32 input and/or output bytes are available. If the IO-Link device does not have a suitable configuration module, the next largest data length must be selected.

5.2.5 Parameterization of the IO-Link Channels

By double-clicking the relevant IO-Link subslot in the hardware configuration and selecting the "Module parameters" tab, you can set the following parameters:

IO-Link I/O 4/1 Bytes, PC			Q Properties	tics 🗍 —
General IO tags	System constants Text	s		
 General Catalog information 	Module parameters			
Hardware interrupts Module parameters	Ch. A (Pin 4) Mode			
I/O addresses	Ch. A (Pin 4) Mo	de: [IO-Link		
	Failsafe Configuration (I	D-Link COM Mode)		
	Failsafe Value	(s): Set Low		
	Replacement Va	ue: 0		
	Port Parameters in IO-Lin	k Mode		
	Enable Port Diagnosis (Pin4) IOL-Device, Validation/Back	cQ.		
	Enable Process Alarm (Dev Notification	ice m): Enabled		
	Configuration Sou	ce: PROFINETIO Controller		
	Enable Input Fract	on: Disabled		
	Enable Pull/P	ug: Enabled		
	Port Mo	de: 10-Link - autostart (below options excluded)		
	Validation and Back	up: No device check		•
	Port Cycle Ti	ne: As fast as possible		
	Vendor ID (ioddfinder.io-link.co	m): 0		
	Device ID (ioddfinder.io-link.co	m): 0		

Figure 5.14

5.2.5.1 Fail-Safe Configuration (Outputs Only)

This option only applies to IO-Link channels in COM mode in which output data is used. In COM mode, IO data is exchanged between the IO-Link master and the IO-Link device via serial communication.



Fail-Safe Value (COM mode)

The following values can be selected:

Failsafe Configuration (IO-Lir	nk COM Mode)	
Failsafe Value(s):	Set Low	
Replacement Value:	Set Low Set High	
Port Parameters in IO-Link Mc	Replacement Value IO-Link Master Command	

Figure 5.15

• Set Low:

All bits of the output data with a value of 0 are transferred to the IO-Link device. (Default setting)

• Set High:

All bits of output data with a value of 1 are transferred to the IO-Link device.

• Hold Last:

The last valid output value received by the control unit is continuously and cyclically transferred to the IO-Link device.

Replacement Value:

If this option is selected, you can enter a substitute value in the following input fields, which will be continuously and cyclically transmitted to the IO-Link device.

IO-Link master command:

The "IO-Link master command" option enables the use of IO-Link-specific mechanisms for valid/invalid output process data.

In this way, the behavior is determined by the device itself.

5.2.5.2 Port Parameters in IO-Link Mode

Enable Port Diagnosis

Enable or disable the IO-Link master port diagnosis and the IO-Link device alarms using the "Enable Port Diagnosis" option. This affects the diagnosis only in relation to the IO-Link channel (pin 4) of the IO port.

Default: Enabled

Enable Process Alarm (Device Notifications)

Enable or disable the IO-Link device alarm notifications using the "Enable Process Alarm" option. When this option is disabled, all "Notification" IO-Link device alarms are suppressed in the IO-Link master.

Default: Enabled

Configuration Source

PROFINET IO controller

The PROFINET IO controller assigns the IO-Link master port configuration.

Port and device configuration tool (not yet supported)

An external IO-Link port and IO-Link device configuration tool assigns the IO-Link master port configuration.

Default: PROFINET IO controller

Enable Input Fraction

If the user configures a subslot module with less than the actual input data of the device, the IO-Link master sends as many IO-Link device input bytes as possible to the PLC, including the PQI byte of the subslot module. Consequently, only "0" up to (device input length - 1) octets of the input data of the device are mapped to the PROFINET process input data of the IO-Link master

If this option is disabled and the input data length does not match, a data length mismatch alarm is enabled. If a mismatch is detected in the output data, a diagnosis of the process data "mismatches" is generated regardless of the selected "Enable Input Fraction" setting.

Enable Pull/Plug

Enable or disable the pull/plug alarms of an IOL device (add/remove submodules) using the "Enable Pull/Plug" option. The failure or return of an IO-Link device is mapped via PROFINET pull/plug alarms. This assignment is independent of the switch-on and shutdown phases.

- Plug alarms
 - **Ready to operate**: IOL device is ready
 - COM fault: wrong device or other problems
 - IOL device started but not ready for operation due to a fault
- Pull alarms

COM fault: no IOL device

If the option is set to "Disabled," a channel diagnosis is generated when an IO-Link device is lost.

Default: Enabled

Port Mode

Disabled

Configure an IO-Link port for later use using the "Disabled" option. If the IO-Link device is not connected, no diagnosis is generated.

- IO-Link Autostart No explicit port configuration is required with the "Plug&Play" option. Basic assignments are not required. Examples:
 - Validation and backup (test level)
 - Port cycle time
 - Manufacturer identifier
 - Device ID
- IO-Link Manual

An explicit port configuration is possible for specific assignments.

- Validation and backup (test level)
- Port cycle time
- Manufacturer identifier
- Device ID

These parameters are GSD-based and can be configured via the PROFINET engineering system.

Default: IO-Link Autostart



Feature	IO-Link Autostart	IO-Link Manual (GSD)
Access on process data (PD)	Yes	Yes
Diagnostics of port & device	Yes	Yes
I&M data (IM0) access	Yes	Yes
Device check (consolidated/real)	No	Yes
Backup & Restore	No	Yes
Device parameterization (PDCT)	No	No
TMG TE GmbH Device Tool V5	Yes	Yes
Commissioning (online)	No	No

Overview of Dependencies for the "Port Mode" Configuration Type

Table 5.1Port mode configuration types

Validation and Backup

The "IO-Link Manual" port mode is required for the "Validation and Backup" option.

• No IOL device check

The connected "Manufacturer identifier" and "Device ID" are not checked. No "Backup and Restore" of the IOL master parameter server is supported.

- **Type-compatible IOL device (V1.0)** Type-compatible according to IO-Link specification V1.0
- Type-compatible IOL device (V1.1)
 Type-compatible according to IO-Link specification V1.1; "Manufacturer identifier" and "Device ID" are checked by the IOL master
- Type-compatible IOL device (V1.1) with "Backup and Restore" Type-compatible according to IO-Link specification V1.1; "Manufacturer identifier" and "Device ID" are checked by the IOL master with "Backup and Restore." The connected IOL device must be type compatible for the "Backup and Restore" function.
- Backup (device to master)

A backup (upload / from IOL device to IOL master) is performed if an IO-Link device is connected and the master has no valid data. The parameter data that is read is permanently stored on the master. If parameter data is changed on the device during runtime, the device parameter stored on the master can be updated using the ParamDownload-Store command (index 0x0002, subindex 0x00, value 0x05). This command sets the flag **DS_UPLOAD_REQ** on the device so that the IOL master performs an upload from the IOL device. For each new connection to an IO-Link device, the master compares the stored parameter data with the device data. If the function is not active on the device (parameter storage "locked"), the master will download the stored data onto the device where there are discrepancies. The IO-Link master can be replaced using the "Backup" function.

Restore (master to device)

Parameter data can be transferred to an IO-Link device only if parameter data is available on the IOL master parameter server and can be used for the device. When an IOL device is connected, the master compares the stored parameter data with the IOL device data. If the function is not active on the device (parameter storage "locked"), the master will download the stored data onto the device where there are discrepancies. If the master has not stored a device parameter set, nothing happens.

The IO-Link device can be replaced using the "Restore" function.

Default: no IOL device check

Action	IO-Link master status	IO-Link device status
Backup	Valid data (or deleted)	Upload flag active (valid data)
Backup	Invalid data (or deleted)	Upload flag not active & valid data
Backup	Valid data	Upload flag active & valid data
Restore	Valid data	Upload flag not active (data is the same)

Table 5.2

Note

If the parameters were written to the IO-Link device in block mode, an IO-Link device sets the "Upload" flag independently.

Port Cycle Time

The "IO-Link Manual" port mode is required for the "Port Cycle Time" option.

As fast as possible

For the cyclic IO data update between the IOL master and IOL device, the IO-Link master uses the maximum supported IOL device update cycle time, which is limited by the maximum supported IOL master cycle time.

• 1.6 ms, 3.2 ms, 4.8 ms, 8 ms, 20.8 ms, 40 ms, 80 ms, 120 ms You can manually set the cycle time to the options provided. This option can be used for IOL device modules that are connected via inductive couplers. Inductive couplers are usually the bottleneck in the update cycle time between IOL master and IOL device. In this case, refer to the datasheet of the inductive coupler.

Default: As fast as possible

Vendor ID

The "IO-Link Manual" port mode is required for the "Vendor ID" option.

The manufacturer identifier of the connected IOL device can be entered as a decimal value [0 ... 65535] and is used for validating type compatibility depending on the "Validation and Backup" settings.

Default: 0

Device ID

The "IO-Link Manual" port mode is required for the "Device ID" option.

The device ID of the connected IOL device can be entered as a decimal value [0 ... 65535] and is used for validating type compatibility depending on the "Validation and Backup" settings.

Default: 0

5.2.6 Parameterization of the Status/Control Module

The status/control module in slot 1/subslot 1 is permanently preconfigured for each module. It contains 2 bytes of input data and 2 bytes of output data for the digital IO data plus status and control bits of the IO-Link master.

The bit assignments are described in the main chapter "Commissioning for PROFINET" in the "Bit Assignment" chapter (See chapter 5.3).

Using the status/control module, it is also possible to carry out all of the global module-specific parameterization that is not related to ports in the IO-Link COM mode.





- 1. Select "Device View" (1) and the desired module (2) (in this example, slot 1 with an 8IOL module).
- 2. Then, in the "General" tab, select the "Module parameters" (3) area.



Figure 5.16

 \rightarrow You can now carry out the desired parameter settings in the dialog (4).

The following is a brief description of the individual areas for parameter setting.

5.2.6.1 General Device Settings

Digital-IO Bit Mapping Mode (BMM)

Select the mapping of IO bits using the "Digital-IO Bit Mapping Mode" parameter.

BMM1: standard mapping

In "port-based" bit mapping mode 1 (BMM1), the channel A bits (C/Q, channel A/pin 4) and the channel B bits are transferred alternately in ascending order for all ports.

Mapping for BMM1 + BOM1

Status/control	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Bit	X4B	X4A	X3B	ХЗА	X2B	X2A	X1B	X1A
UINT16 Low Bit	X8B	X8A	X7B	X7A	X6B	X6A	X5B	X5A

Table 5.3

Mapping for BMM1 + BOM2

Status/control	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Bit	X8B	X8A	X7B	X7A	X6B	X6A	X5B	X5A
UINT16 Low Bit	X4B	X4A	X3B	ХЗА	X2B	X2A	X1B	X1A

Table 5.4

• BMM2: retrofit mapping

In "pin-based" bit mapping mode 2 (BMM2), all ascending channel A bits (C/Q, channel A/pin 4) and all ascending channel B bits (channel B/pin 2) are transferred one after the other.

Mapping for BMM2 + BOM1

Status/control	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Bit	X8A	X7A	X6A	X5A	X4A	ХЗА	X2A	X1A
UINT16 Low Bit	X8B	X7B	X6B	X5B	X4B	X3B	X2B	X1B

Table 5.5

Mapping for BMM2 + BOM2

Status/control	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Bit	X8B	X7B	X6B	X5B	X4B	X3B	X2B	X1B
UINT16 Low Bit	X8A	X7A	X6A	X5A	X4A	ХЗА	X2A	X1A

Table 5.6

Digital-IO Byte Order Mode (BOM)

Select the byte order of the status/control bytes using the "Digital-IO Byte Order Mode" parameter.

• BOM1: retrofit, standard mapping

For BMM1, the ports X4 bit ... X1 bit are mapped to the status/control high byte. For BMM2, the A channel bits of the ports X8 bits ... X1 bits are mapped to the status/control high byte.

Mapping for BOM1 + BMM1

Status/control	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Bit	X4B	X4A	X3B	ХЗА	X2B	X2A	X1B	X1A
UINT16 Low Bit	X8B	X8A	X7B	X7A	X6B	X6A	X5B	X5A

Table 5.7

Mapping for BOM1 + BMM2

Status/control	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Bit	X8A	X7A	X6A	X5A	X4A	ХЗА	X2A	X1A
UINT16 Low Bit	X8B	X7B	X6B	X5B	X4B	X3B	X2B	X1B

Table 5.8

BOM2: new standard

For BMM1, the ports X8 bit ... X5 bit are mapped to the status/control high byte. For BMM2, the B channel bits of the ports X8 bits ... X1 bits are mapped to the status/control high byte.

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Mapping for BOM2 + BMM1

Status/control	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Bit	X8B	X8A	X7B	X7A	X6B	X6A	X5B	X5A
UINT16 Low Bit	X4B	X4A	X3B	ХЗА	X2B	X2A	X1B	X1A

Table 5.9

Mapping for BOM2 + BMM2

Status/control	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Bit	X8B	X7B	X6B	X5B	X4B	X3B	X2B	X1B
UINT16 Low Bit	X8A	X7A	X6A	X5A	X4A	ХЗА	X2A	X1A

Table 5.10

Web Interface

Allow/disallow the use of the web server using the "Web Interface" parameter. If the parameter is set to "Disabled," the web pages are not accessible.

Default: Enabled

Digital-Out Ch. B Restart Mode

Automatic Restart after Failure

If the parameter is set to "Automatic Restart after Failure," you can configure the restart behavior of the channel B outputs of ports 5 ... 8 (60 mm versions only). If an output short circuit or overload is detected, the output is switched off by the IO-Link master. However, to check whether the overload or short-circuit state is active, the output is automatically switched on again after a time delay.

Restart after Output Reset

If an output short circuit or overload is detected, the output is switched off by the IO-Link master. The output is not automatically reset. Before the output can be switched on again, it must be logically reset by the PLC.

Default: Automatic Restart after Failure

Digital-Out Ch. A Controlled by

Port Submodule

Use the output byte 1/bit 0 of the corresponding subslot module to control the digital A channels.

Status/Control Module

If the parameter is set to "Status/Control Module," you can control the digital A channel outputs using the output bits of the status/control module. The digital outputs can be controlled only from one source of data.

Default: Port Submodule

5.2.6.2 General Diagnostic Settings

General Diagnosis Settings		
General Diagnosis Settings		
Report UAux supply voltage fault alarms:	Disabled	
Report Ch.B/Pin2 DO fault without UAux:	Enabled	×

Figure 5.17



Report UAux Supply Voltage Fault Alarms

Enable or disable the fault alarm of the U_{Aux} supply voltage using the "Report U_{Aux} supply voltage fault alarms" parameter.

Default: disabled



Note

To prevent diagnostic messages when the supply voltage is next switched on or off, the "Report UAux supply voltage fault" option is disabled by default.

Report Ch.B/Pin2 DO Fault without UAux

The diagnosis of the digital outputs of channel B/pin 2 can be configured depending on the $U_{Aux}\xspace$ status.

Default: Enabled

5.2.6.3 Fail-Safe Configuration

The device supports a fail-safe function for channels that are used as digital outputs. During configuration of the devices, the status of the outputs after an interruption or loss of communication in the PROFINET IO network can be defined.

The following options can be selected:

- Set Low the output channel is disabled and/or the output bit is set to 0.
- Set High the output channel is enabled and/or the output bit is set to 1.
- Hold Last the last output status is retained.

Fail Safe Value Port1 Ch.A:	Set Low	
Fail Safe Value Port2 Ch.A:	Set Low	
Fail Safe Value Port3 Ch.A:	Hold Last	
Fail Safe Value Port4 Ch.A:	Set Low	
Fail Safe Value Port5 Ch.A:	Set Low	
Fail Safe Value Port6 Ch.A:	Set Low	5
Fail Safe Value Port7 Ch.A:	Set Low	
Fail Safe Value Port8 Ch.A:	Set Low	
Fail Safe Value Port5 Ch.B:	Set Low	
Fail Safe Value Port6 Ch.B:	Set Low	
Fail Safe Value Port7 Ch.B:	Set Low	

Figure 5.18

5.2.6.4 Surveillance Timeout Configuration

You can also configure the separate auxiliary voltage U_{Aux} , which is available on type B IO-Link channels (channel B/pin 2) of ports 5 ... 8, as an additional digital output ("Digital-IO mode for Ch. B" area). This enables you to switch the power supply like a digital output.

The firmware of the module allows you to configure a delay time before output current monitoring is enabled for this particular application. The delay time is referred to as the "Surveillance timeout" and can be configured for each output channel. The delay time starts after the status of the output channel changes i.e., if it is enabled after a rising edge or disabled after a falling edge. Once this time has elapsed, the output is monitored and fault states are reported by the diagnostics.



The "Surveillance Timeout" parameter can be set from 0 ... 255 ms. The default value for this parameter is 80 ms.

If an output channel is in a static state i.e., if the channel is permanently switched on or switched off, the typical value is 5 ms.

Surveillance Timeout Configu	uration / ms	
Surv. Timeout Port5 Ch.B:	80	
Surv. Timeout Port6 Ch.B:	80	
Surv. Timeout Port7 Ch.B:	80	
Surv. Timeout Port8 Ch.B:	80	

Figure 5.19

5.2.6.5 Digital Input Logic

This parameter can be used to configure the logic of channels that are used as digital inputs.

Default setting:

NO (normally open) for all channels

NO (normally open):

In this case, an undamped sensor has an open switching output (low signal). The device input detects a low level and returns a 0 to the control unit.

• NC (normally closed):

In this case, an undamped sensor has a closed switching output (high signal). The device input detects a high level, inverts the signal, and returns a 0 to the control unit.

Digital-Input Logic		
DI-Logic for Port1 Ch.A:	NO (Normally Open)	-
DI-Logic for Port2 Ch.A:	NO (Normally Open) NC (Normally Closed)	
DI-Logic for Port3 Ch.A:	NO (Normally Open)	
DI-Logic for Port4 Ch.A:	NO (Normally Open)	
DI-Logic for Port5 Ch.A:	NO (Normally Open)	•
DI-Logic for Port6 Ch.A:	NO (Normally Open)	
DI-Logic for Port7 Ch.A:	NO (Normally Open)	
DI-Logic for Port8 Ch.A:	NO (Normally Open)	
DI-Logic for Port1 Ch.B:	NO (Normally Open)	
DI-Logic for Port2 Ch.B:	NO (Normally Open)	
DI-Logic for Port3 Ch.B:	NO (Normally Open)	
DI-Logic for Port4 Ch.B:	NO (Normally Open)	•

Figure 5.20

5.2.6.6 Digital-IO-mode for Ch. B/Pin 2

In this area, you can parameterize the IO-Link connections of ports 5 ... 8, class B, as follows:

Digital I/O mode for Ch. B		
Digital I/O mode for Ch. B		
DI Mode for Port 1 Ch. B:	Digital Input	
DI Mode for Port 2 Ch. B:	Digital Input	-
DI Mode for Port 3 Ch. B:	Digital Input	
DI Mode for Port 4 Ch. B:	Digital Input	
DO Mode for Port 5 Ch. B:	Inactive	
DO Mode for Port 6 Ch. B:	Inactive	-
DO Mode for Port 7 Ch. B:	Inactive	
DO Mode for Port 8 Ch. B:	Inactive	

Figure 5.21

Default setting:

Port 1 ... 4: digital input

Port 5 ... 8: inactive

Auxiliary Power (IO-Link Type B):

In this mode, pin 2 and pin 5 of the IO-Link connections of class B ports 5 \dots 8 serve as an auxiliary voltage output.

The auxiliary voltage is provided via the U_{AUX} supply input.

The auxiliary voltage output cannot be controlled.

Digital Output (DO):

In this mode, pin 2 of the IO-Link connections of class B ports 5 ... 8 can be used as a digital output.

The control bits are transferred to the device by the control unit within the status/control module.

A "Surveillance Timeout" can be parameterized for the outputs ("Surveillance Timeout Configuration" area).

5.2.7 Siemens IO-Link Library

IO-Link Device Parameterization

SIEMENS IO-Link Library

With the Siemens TIA Portal "IO_LINK_DEVICE" functional module, device parameters can be written to an IO-Link device and parameters, measured values, and diagnostic data can be read acyclically. For STEP7 Classic V5.5, the original version "IO_LINK_CALL" is to be used for acyclic communication with IO-Link devices.

In a revised version of this library, "IO_LINK_CALL" was replaced by the "IO_LINK_DEVICE" functional module for acyclic communication with IO-Link devices.

%FB	50001
"IO_LIN	K_DEVICE"
- EN	ENO
REQ	DONE_VALID
- ID	BUSY
CAP	ERROR
RD_WR	STATUS
PORT	IOL_STATUS
IOL_INDEX	RD_LEN
LEN	
RECORD_IOL_	
RECORD_IOL_ DATA	

Figure 5.22

TIA Portal IO_LINK_DEVICE

EN	ENO
REQ	DONE
	VALID
-ID	
030	BUSY
CAP	FPDOD
-RD WR	ERROR
-	STATUS
PORT	
	IOL_
-IOL_INDE	X STATUS
TOT	DD TEN
SUBINDEX	KD_LEN
1920-51 0287-34	
- LEN	
CERCE	
RECORD	
TOP DATA	

Figure 5.23 STEP 7 V5.5 IO_LINK_CALL

The service data is clearly addressed via the index and sub-index. Using the hardware identifier of the status/control module (ID), you can read and write the Client Access Point (CAP = 255) and the corresponding IO-Link port (PORT: 1 - 8 for IO-Link ports).



Note

If the logical input address for the IO_LINK_CALL module is used, it may be necessary for the input address to be less than or equal to the output address.

You may need to change this value manually in the engineering tool.

5.2.8 Replacing Devices Without a Removable Medium/Programming Unit





The replacement device that will be used for a replacement without a removable medium/programming unit must still have its factory settings applied. If necessary, the factory settings must be restored.

PROFINET IO devices that support the "Device replacement without removable medium or programming unit" function can be replaced by identical devices in an existing PROFINET network. In such cases, the IO controller assigns the device name. To do so, it uses the configured topology and the neighborhoods determined by the IO devices. The Ethernet IO modules support the device replacement function without a removable medium/programming unit.

- 1. Click on the PLC in slot 1 (1).
- 2. In the "Profinet interface_1 [Module]" area, click on "Advanced options" (2).
- 3. Change to the "Properties" tab (3) and click on the option to replace a device without a removable medium (4).

						a Top	ology view	A Network view	Device vie	w
PLC_1 (CPU	1215C]	💽 , 🖻	Devi	ce overview				LIDY C	1.0	
01	1	2	8	Module	Slot	I address	Q address	Туре	Article no.	
-	_			HSC_3	1 18	100810		HSC		1
(Dickline)		Ni-m		HSC_4	1 19	101210		HSC		
1000				HSC_5	1 20	101610		HSC		
222			*	HSC_6	1 21	102010		HSC		1
10		Universit ALDER:0	-	Pulse_1	1 32		100010	Pulse generator (PTO/P		1
-			-	Pulse_2	1 33		100210	Pulse generator (PTO/P		1
1000				Pulse_3	1 34		100410	Pulse generator (PTO/P		
				Pulse_4	1 35		100610	Pulse generator (PTO/P		
				PROFINET interface_1	1 X1			PROFINET interface		
					2					
	>		1							>
NEINET Selv	dimension 1	[Modulo]						the second process	-	North Party
· · · · · · · · · · · · · · · · · · ·		(module)				sr	operues \	Tauno D Diag	inostics	0
ALL DE LE				Table				\sim		
ieneral	IO tags	System con:	tants	Texts			(
General	IO tags	System con:	itants	Texts			(3)		
Seneral Seneral Sthernet addre	IO tags	System con Advanced o	ptions	Texts			(3		_
General General Sthernet addre Ime synchroni	IO tags	System con Advanced o	ptions	Texts			(3		-
General Seneral Sthernet addre Time synchroni Operating mod	10 tags	System con Advanced o	itants ptions	16X13			(3		_
General General Ethernet addre Time synchroni Operating moo	10 tags	System con Advanced o	itants				(3		-
Seneral Seneral Ethernet addre Time synchroni Operating moo Advanced optio Interface op	IO tags	System con Advanced o Interface opt	tants ptions ions device repl	acement without exchangeable m	edium		(3)		_
General Seneral Ethernet addre fime synchroni Operating moo dvanced opti Interface op Media redui	IO tags sses zat 2 le 2 ons tions ndancy	System cont Advanced o Interface opt	tants ptions lons device repl t overwriting	acement without exchangeable m	edium D devices		(3)		_
General General Ethernet addre Time synchroni Operating moo Advanced opti Interface op Media redur • Real time se	IO tags isses zat 2 itions indancy etting 4	System cont Advanced o Interface opt	otants	acement without exchangeable min	edium O devices		(3)		-
General General Ethernet addre Time synchroni Operating moo Advanced opti Interface op Media redur > Real time se > Port [X1 P1]	IO tags isses zat 2 iss tions indancy etting 4	System cons Advanced o Interface opt Support Permi Use IEC	tants ptions lons device repl t overwriting V2.2 LLDP m	acement without exchangeable m g of device names of all assigned to node	edium O devices		(3)		
General General Ethernet addre Time synchroni Operating moo Advanced opti Interface op Media redur > Real time se > Port [X1 P1] > Port [X1 P2]	IO tags	System cons Advanced o Interface opt Suppor Use IEC Keep-Nive	tants ptions lons device repl t overwriting V2.2 LLDP m connection	acement without exchangeable minode	edium O devices		(3)		_

Note

A network topology is configured based on the connections between PROFINET ports on the individual devices. This can be reached via slot 0 of the PROFINET devices in use. Displaying all non-linked ports allows you to specify a suitable partner port in each case.

- 4. Define the network topology for the device replacement. To do so, select "Devices & networks" and "Topology view."
- 5. Use the mouse to drag a connection between the module and the PLC.

Devices					P Topology view	A Network view	Device view	
8		@±				and the second s		
		1000					~	
57-1200_ICE1-8IOL								Top
Add new device	PLC 1	-	ICE1-8IOL-G60L	1	_			5010
Devices & networks	CPU 1215C		ICE1-SIOL-G60L.		44			-0
Grouped devices		_	NC-1	- 17				1
Security settings							-	
Germon data Documentation settings	< 11				> 100	%	···· ··· · · ·	
Languages & resources	Port_2 [Module	1			Reporties	🗓 Info 🚯 🖞 Diag	nostics	
Online access	General	IO tags	System constants	Texts	1			
Card Reader/USB memory	General	[^
	Port interconnee	tion	Port interconnectio	n				
	Port options		Local port:					
				Local port:	PLC_1\PROFINET interface_1	[X1]\Port_2 [X2 P2 R]		
					Medium:	Copper		
					Cable name:		-	
						-		
					1	<u> </u>		
		-						
		- 1						
			(
	-		Partner port:					
Details view					Monitoring of partner port	is not possible		
	-			Partner port:	Any partner			
100000					Medium:			
The definition of the second					Cable length:	<100 m		
(North C								

Figure 5.25



Project tree 🛛 🕅	\$7-1200_ICE1-8IOL • D	evices & networks			_ 2 =
Devices	_		🚝 Topology view	Network view	Device view
8	₩ ₩ ₩ 11 Q.±			-	
S7-1200_ICE1-BIOL Add new device Devices & networks Device_St networks Ungrouped devices Scurity settings	PLC_1 CPU 1215C	ICE1-8IOL-G60L ICE1-8IOL-G60L ICE1-8IOL-G60L			
Common data Documentation settings			Lation prototi		~
Languages & resources Online access	<		> 100	16 (m)	····· 8 ···· •
Card Reader/USB memory	Port X01 10/100 M8/t/s [Port X01 10/100 MB(8)	Properties	Linfo 🚺 💆 Diag	gnostics
	General 10 tags	System constants Texts			
	General Port interconnection	Port interconnection			
	Port options	Local port:			
		Local port:	ICE1-BIOL-G60L-V1D_1IPN-	O [X1]Port X01 10/100 N	/Bit/s [X1 P1 R]
			Medium:	Copper	
			Cable name:		
✓ Details view		Partner port:			
			Monitoring of partner port	is executed	
Name			Alternative partners		
- Inventor	_	Partner port:	PLC_1\PROFINET interface_1	[X1]\Port_2 [X1 P2 R]	

Figure 5.26

→ The port interconnection was successful if the link is shown in the "Topology View" and on the "Partner Port."

5.2.9 Identification and Maintenance Functions (I&M)

The PROFINET module is capable of uniquely identifying devices installed in the system by means of an electronic nameplate. This device-specific data can be read acyclically at any time by the user. In addition, the installation date, location code, and other descriptions can be defined in the module on creation of the system.

Supported I&M Functions

Module-specific I&M functions
 The module-specific I&M features 0 to 4 can be read or written via slot 0. The specified index is used for the mapping of data records.

I&M 0

Data object	Length [byte]	Access	Default value/description
MANUFACTURER_ID	2	Read	0x005D
ORDER_ID	20	Read	Order number of the module in ASCII
SERIAL_NUMBER	16	Read	Defined in the production process, in ASCII
HARDWARE_REVISION	2	Read	Hardware revision of the device
SOFTWARE_REVISION	4	Read	Software revision of the device
REVISION_COUNTER	2	Read	Counts each statically stored param- eter change on the IO-Link master (e.g., device name or IP address)
PROFILE_ID	2	Read	0xF600 (generic device)
PROFILE_SPECIFIC_TYPE	2	Read	0x0003 (IO module)

Data object	Length [byte]	Access	Default value/description
IM_VERSION	2	Read	0x0101 (I&M version 1.1)
IM_SUPPORTED	2	Read	0x001E (I&M 1 4 supported)

Table 5.11 I&M 0 (slot 0, index 0xAFF0)

I&M 1

Data object	Length [byte]	Access	Default value/description
TAG_FUNCTION	32	Read/w rite	0x20 et seq. (empty)
TAG_LOCATION	22	Read/w rite	0x20 et seq. (empty)

Table 5.12 I&M 1 (slot 0, index 0xAFF1)

I&M 2

Data object	Length [byte]	Access	Default value/description
INSTALLATION_DATE	16	Read/w rite	0x20 et seq. (empty) The supported data format is a visi- ble character string with a fixed length of 16 bytes; "YYYY-MM-DD hh:mm" or "YYYY- MM-DD" filled with spaces

Table 5.13

I&M 2 (slot 0, index 0xAFF2)

I&M 3

Data object	Length [byte]	Access	Default value/description
DESCRIPTOR	54	Read/w rite	0x20 et seq. (empty)

Table 5.14 I&M 3 (slot 0, index 0xAFF3)

I&M 4

Data object	Length [byte]	Access	Default value/description
SIGNATURE	54	Read/w rite	0x20 et seq. (empty)

Table 5.15 I&M 4 (slot 0, index 0xAFF4)

I&M Functions of the IO-Link Master

The IO-Link master-specific I&M functions 0 and 99 can be read via slot 1. The specified index is used for the mapping of data records.

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I&M 0

Data object	Length [byte]	Access	Default value/description
MANUFACTURER_ID	2	Read	0x005D
ORDER_ID	20	Read	Order number of the module in ASCII
SERIAL_NUMBER	16	Read	Defined in the production process, in ASCII
HARDWARE_REVISION	2	Read	Hardware revision of the device
SOFTWARE_REVISION	4	Read	Software revision of the device
REVISION_COUNTER	2	Read	Counts each statically stored param- eter change on the IO-Link master (e.g., device name or IP address)
PROFILE_ID	2	Read	0xF600 (generic device)
PROFILE_SPECIFIC_TYPE	2	Read	0x0003 (IO module)
IM_VERSION	2	Read	0x0101 (I&M version 1.1)
IM_SUPPORTED	2	Read	0x001E (I&M 1 4 supported)

Table 5.16 I&M 0 (slot 0, index 0xAFF0)

I&M 99

Data object	Length [byte]	Access	Default value/description
IOL_VERSION	1	Read	0x11 (IO-Link version 1.1)
IOL_PROFILE_VERSION	1	Read	0x10 (IO-Link profile version 1.0)
IOL_FEATURE_SUPPORT	4	Read	0x0000000
NUMBER_OF_PORTS	1	Read	0x08 (number of supported IO-Link connections)
REF_PORT_CONFIG	1	Read	0x00 (no connection configuration data supported)
REF_IO_MAPPING	1	Read	0x00 (no I/O mapping data sup- ported)
REF_IPAR_DIRECTORY	1	Read	0x00 (no IPar directory supported)
REF_IOL_M	1	Read	0x00 (no IOL-M parameters sup- ported)
NUMBER_OF_CAPS	1	Read	0x01 (number of client access points)
INDEX_CAP1	1	Read	0xFF (client access point for IOL CALL)

Table 5.17 I&M 99 (slot 1, index 0xB063)

I&M Functions of the IO-Link Device

The IO-Link device-specific I&M functions 16 and 23 can be read via slot 1, sub-slot 1. The specified index is used for the mapping of data records.

Only data that is not equal to zero is received when a connection to an IO-Link device can be established.



I	&	М	1	6	 23
-	~			-	

Data object	Length [byte]	Access	Default value/description
VENDOR_ID	2	Read	0x0000 (IO-Link device vendor ID)
DEVICE_ID	4	Read	0x00000000 (IO-Link device ID)
FUNCTION_ID	2	Read	0x0000 (IO-Link device function ID)
RESERVED	10	Read	0x00 et seq.

Table 5.18 I&M 16 ... 23 (slot 1, sub-slot 1, index 0xB000...0xB007)

Reading and Writing I&M Data

In its standard library, SIEMENS offers system functions with which I&M data can be read and written. A data record contains a 6 byte block header and the current I&M data record. The data requested when reading or the data to be written only begins after the existing block header. When writing, the block header must also be taken into account.

The following table shows the structure of a data record.

Data object	Length [byte]	Data Type	Coding	Description
BlockType	2	Word	I&M 0: 0x0020 I&M 1: 0x0021 I&M 2: 0x0022 I&M 3: 0x0023 I&M 4: 0x0024 I&M 1623: 0x0F00 I&M 99: 0x0F00	BlockHeader
BlockLength	2	Word	I&M 0: 0x0038 I&M 1: 0x0038 I&M 2: 0x0012 I&M 3: 0x0038 I&M 4: 0x0038 I&M 1623: 0x0014 I&M 99: 0x000F	
BlockVersionHigh	1	Byte	0x01	•
BlockVersionLow	1	Byte	0x00	•
I&M data	I&M 0: 54 I&M 1: 54 I&M 2: 16 I&M 3: 54 I&M 4: 54 I&M 1623: 18 I&M 99: 13	Byte		I&M record

Table 5.19

Data record with BlockHeader and I&M record

Reading I&M Records

I&M data can be read using the standard RDREC (SFB52) command block in the TIA portal. First, the hardware identifier of the CPU is read out under "PLC Variables > System Constants." The CPU should be displayed there as <Local> with the data type "Hw_SubModule." You specify the hardware identifier via the corresponding input parameter (ID). The I&M index (INDEX) must also be transmitted. The return parameters indicate the length of the received I&M data and contain a corresponding status or error message.

Writing I&M Records

I&M data can be written using the standard WDREC (SFB53) function block in the TIA portal. First, the hardware identifier of the CPU is read out under "PLC Variables > System Constants." The CPU should be displayed there as <Local> with the data type "Hw_SubModule." You specify the hardware identifier via the corresponding input parameter (ID). The I&M index (INDEX) and the data length (LEN) to be written must also be transmitted. The return parameters contain a status or an error message.

5.2.10 Prioritized Start-Up/Fast Start-Up (FSU)

The modules with Fast Start-Up (FSU) support optimized system power-up. This ensures a quick restart after a power supply is restored after an interruption.





Figure 5.27

- 1. Select "Device View" (1) and the desired module (in this example, slot 1 for ICE1-8IOL-G60L-V1D_1).
- 2. Then, in the "General" tab, select the "Advanced Options" area (2).
- 3. Click on the "Prioritized Start-Up" option (3) to enable prioritized startup.

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5.3 Bit Assignment

The IO-Link master uses a modular device model. Slot 1/subslot 1 contains the status/control module. This module provides 2 bytes of input data and 2 bytes of output data for IO-Link masters with S2 system redundancy. When an IO-Link master is selected from the GSD file, the module is integrated automatically and cannot be changed. The IO-Link ports use the following subslots 2 ... 9 in slot 1. Depending on the configuration, they may have a different operating mode and data length.

5.3.1 Process Data Status / Control Module, Slot 1 / Subslot 1

The status/control module has an UINT16 for digital input data and an UINT16 for digital output data.

Status Data (Input)

The input UINT16 contains the status of the digital inputs. For the digital A channel inputs, the data is available in the input byte of the corresponding sub-slot module.

Control Data (Output)

The output UINT16 contains the control bits for the digital B channel outputs. The byte 1 / bit 0 output for the corresponding sub-slot module must be used to control the digital A channels. The General Device Settings parameter Digital Out Ch. A Controlled By: Status/Control Module can be used to switch to control bits. In this instance, the outputs cannot be controlled via the byte 1 / bit 0 sub-slot output.

The digital output can be controlled only from one source of data.

Parameter Dependencies of the Digital I/O Data Mapping

Select the settings for Bit Mapping Mode (BMM) and Byte Order Mode (BOM) for the digital I/O mapping of status/control module data. See chapter 5.2.6.1

Status/Control Module [Status/Control Module]	Properties Linfo 🔒 💆 Diagnostics	11 -
General IO tags System constants Texts		
General Catalog information Module parameters		
Module parameters General Device Settings		
General Diagnosis Settings General Device Settings		
Failsafe Configuration (DO		
Surveillance Timeout Con Digital I/O Bit Mapping Mor	e	
Digital Input Logic	E Investigation of the sector of the sect	1.1
Digital I/O mode for Ch. B Digital I/O Byte Order Mor	ROMI Devente: [RABM] High-Rese(VIR)2 V1R(2) Low-Rese(VR)2 V5R(2) [R18(2] High-Rese(VR2 V12) Low-Rese(VR2 V12)]	-
Module failure	 Down warden: Towner Law and L Law and Law and Law	
I/O addresses Web Interfac	Enabled	+
Digital Out Ch. B Restart Mod	Automatic Restart after Failure (Pcrt 58)	-
Digital Out Ch. A Controlled b	Port Submodule (default)	-

Figure 5.28

5.3.1.1 Digital I/O Mapping Mode 1 (Default Mapping)

If mapping mode 1 has been selected in the device configuration, the data of the status/control module is transferred as follows.

"Digital Input" Status with BMM1 and BOM1

Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Byte	DI X4B	DI X4A	DI X3B	DI X3A	DI X2B	DI X2A	DI X1B	DI X1A
UINT16 Low Byte	DO X8B	DI X8A	DO X7B	DI X7A	DO X6B	DI X6A	DO X5B	DI X5A

Table 5.20 Bold: "Auxiliary Power" or "Digital Output" mode

In the "Digital Output" and "Auxiliary Power" modes, the digital output statuses are reflected as the status in the digital inputs.

- DI 1A = digital input connection 1, channel A (pin 4)
- DO 7B = output status connection 7B



"Digital Input" Status with BMM1 and BOM2

Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Byte	DO X8B	DI X8A	DO X7B	DI X7A	DO X6B	DI X6A	DO X5B	DI X5A
UINT16 Low Byte	DI X4B	DI X4A	DI X3B	DI X3A	DI X2B	DI X2A	DI X1B	DI X1A

Table 5.21 Bold: "Auxiliary Power" or "Digital Output" mode

In the "Digital Output" and "Auxiliary Power" modes, the digital output statuses are reflected as the status in the digital inputs.

- DI 1A = digital input connection 1, channel A (pin 4)
- DO 7B = output status connection 7B

"Digital Output" Check with BMM1 and BOM1

Output	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Byte	n/a	DO X4A optional	n/a	DO X3A optional	n/a	DO X2A optional	n/a	DO X1A optional
UINT16 Low Byte	DO X8B	DO X8A optional	DO X7B	DO X7A optional	DO X6B	DO X6A optional	DO X5B	DO X5A optional

Table 5.22

- n/a = not available
- DO 5B = digital output connection 1, channel B (pin 2)
- DO 1A optional = Optional if configured as DO and the General device parameter Digital Out Channel A Controlled by is set to Status/Control Module. (Otherwise, the control data is displayed in bit 0 of the corresponding subslot byte.)

"Digital Output" Check with BMM1 and BOM2

Output	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Byte	DO X8B	DO X8A optional	DO X7B	DO X7A optional	DO X6B	DO X6A optional	DO X5B	DO X5A optional
UINT16 Low Byte	n/a	DO X4A optional	n/a	DO X3A optional	n/a	DO X2A optional	n/a	DO X1A optional

Table 5.23

- n/a = not available
- DO 5B = digital output connection 1, channel B (pin 2)
- DO 1A optional = Optional if configured as DO and the **General device** parameter **Digital Out Channel A Controlled by** is set to Status/Control Module. (Otherwise, the control data is displayed in bit 0 of the corresponding subslot byte.)

5.3.1.2 Digital I/O Mapping Mode 2 (Alternative Mapping)

If mapping mode 2 has been selected in the device configuration, the data of the status/control module is transferred as follows.

"Digital Input" Status with BMM2 and BOM1

Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Byte	DI X8A	DI X7A	DI X6A	DI X5A	DI X4A	DI X3A	DI X2A	DI X1A
UINT16 Low Byte	DO X8B	DO X7B	DO X6B	DO X5B	DI X4B	DI X3B	DI X2B	DI X1B

Table 5.24

- The status of the digital outputs is returned in the digital input data.
- DI 1A = digital input connection 1, channel A (pin 4)



DO 7B = output status connection 7B

"Digital Input" Status with BMM2 and BOM2

Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Byte	DO X8B	DO X7B	DO X6B	DO X5B	DI X4B	DI X3B	DI X2B	DI X1B
UINT16 Low Byte	DI X8A	DI X7A	DI X6A	DI X5A	DI X4A	DI X3A	DI X2A	DI X1A

Table 5.25

- The status of the digital outputs is returned in the digital input data.
- DI 1A = digital input connection 1, channel A (pin 4)
- DO 7B = output status connection 7B

"Digital Output" Check with BMM2 and BOM1

Output	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Byte	DO X8A optional	DO X7A optional	DO X6A optional	DO X5A optional	DO X4A optional	DO X3A optional	DO X2A optional	DO X1A optional
UINT16 Low Byte	DO X8B	DO X7B	DO X6B	DO X5B	n/a	n/a	n/a	n/a

Table 5.26

- DO 5B = digital output connection 1, channel B (pin 2)
- DO 1A optional = Optional if configured as DO and the General device parameter Digital Out Channel A Controlled by is set to Status/Control Module.

Mapping the I/O Channel to the PROFINET Channel Diagnostics

Connection	X8	X7	X6	X5	X4	Х3	X2	X1
Pin	2/4	2/4	2/4	2/4	2/4	2/4	2/4	2/4
Channel	B/A							
PROFINET chan- nel diagnostics	8	7	6	5	4	3	2	1

Table 5.27

"Digital Output" Check with BMM2 and BOM2

Output	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
UINT16 High Byte	DO X8B	DO X7B	DO X6B	DO X5B	n/a	n/a	n/a	n/a
UINT16 Low Byte	DO X8A optional	DO X7A optional	DO X6A optional	DO X5A optional	DO X4A optional	DO X3A optional	DO X2A optional	DO X1A optional

Table 5.28

- DO 5B = digital output connection 1, channel B (pin 2)
- DO 1A optional = Optional if configured as DO and the General device parameter Digital Out Channel A Controlled by is set to Status/Control Module.





Connection	X8	X7	X6	X5	X4	Х3	X2	X1
Pin	2/4	2/4	2/4	2/4	2/4	2/4	2/4	2/4
Channel	B/A							
PROFINET chan- nel diagnostics	8	7	6	5	4	3	2	1

Mapping the I/O Channel to the PROFINET Channel Diagnostics

Table 5.29

5.3.2 IO-Link Connections Process Data, Slot 1/Subslot 2 ... Subslot 9

The process data lengths of the IO-Link connections in COM mode depend on the configurations of IO-Link connections X1 ... X8. Data lengths between 1 ... 33 bytes of input data and/or 1 ... 32 bytes of output data can be configured.

The data content can be taken from the descriptions of the IO-Link devices.

If no precise data length exists for the IO-Link device configuration, always select the next largest data length.

The last byte of the port input data contains the PQI byte (Port Qualifier Information). This byte is added to the input data for the IOL device by the IOL master.

Ch. A Configuration as Digital Input

Note

If the port is configured as a digital input, the port data length is one byte and the status of the digital input is set to bit 0.

The mapping mode selected for the status/control module has no influence on the process data of the IO-Link connections.

INPUT	Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Slot 1.2	X1 Byte 1 33	• If t	he IO-Lir	ik port is	in "Digit	al-In" mo	de, the	status is	set to
Slot 1.3	X2 Byte 1 33	DI PG	I-C/Q" (c I bvte is	hannel A available	., pin 4) i e.	n bit 0 / I	oyte 1. In	this cas	se, no
Slot 1.4	X3 Byte 1 33	• Th	e last bvi	e contai	ns the P	QI (Port	Qualifier	Informat	tion).
Slot 1.5	X4 Byte 1 33		· ··· · ,						- /
Slot 1.6	X5 Byte 1 33								
Slot 1.7	X6 Byte 1 33	ĺ							
Slot 1.8	X7 Byte 1 33								
Slot 1.9	X8 Byte 1 33	1							
Table 5 30	1	1							

Input Data: Sub-Slots 1.2 ... 1.9

Table 5.30

PQI Description

Bit	Acronym	Short Description	Value	Description
0	-	Reserved	0	Reserved
			-	-
1	-	Reserved	0	Reserved
			-	-

Bit	Acronym	Short Description	Value	Description
2	New- Param	New parameter	0	no update of IOL device parame- ter detected
			1	update of IOL device parameter detected: master performed a parameter storage upload (Mas- ter to Device) and a new IOL-D Backup object (0xB904) is avail- able
3	SubstDev	Substitute device detection	0	Not supported, do not evaluate this bit!
			1	Not supported, do not evaluate this bit!
4	PortActive	Port activation	0	port deactivated via port function
			1	port activated (default)
5	DevCom	Device communica-	0	no IOL device available
		tion	1	IOL device detected and is in PREOPERATE or OPERATE state
6	DevErr	Port/device error indi-	0	no error / warning occurred
		cation	1	error/warning assigned to IOL device or IOL master port occurred
7	PQ	Device process data validity	0	invalid I/O process data from IOL device
			1	valid I/O process data from device

Table 5.31

Output Data: Sub-Slots 1.2 ... 1.9

INPUT	Input	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Slot 1.2	X1 Byte 1 32	• Op	tional / i	f the IO-	Link po	rt is in "E	Digital-O	ut" mod	e, the
Slot 1.3	X2 Byte 1 32	sta	ite is set	to "DO-	C/Q" (c	hannel A	A, pin 4)	in bit 0 /	byte 1.
Slot 1.4	X3 Byte 1 32								
Slot 1.5	X4 Byte 1 32								
Slot 1.6	X5 Byte 1 32								
Slot 1.7	X6 Byte 1 32								
Slot 1.8	X7 Byte 1 32								
Slot 1.9	X8 Byte 1 32								

Table 5.32

Ch. A Configuration as Digital Output



Note

If the port is configured as a digital output, the port data length is one byte (one byte for digital output control bit 0). If the General Device parameter Digital Out Ch. A Controlled by is set to Status/Control Module, the output cannot be controlled by bit 0 in the port output byte.

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6

The Integrated Web Server

The module has an integrated web server that provides functions for configuring modules, and displaying status and diagnostic information.

The web interface offers an overview of the module configuration and status. It can also be used to adjust specific settings, perform a restart, reset to factory settings, and update firmware.

Status Page

Enter http:// in the address bar of the web browser, followed by the IP address, e.g., http://192.168.1.1.

If the module home page does not open, please check your browser and firewall settings.

								ICE	1 Wel
Ports Sys	ilem	User	G	ontact					
RW	Devi	ce Information							
	Nan	10		ICE1-8IOL-S2-G	50L-V1D				
	Bus			ON					
	Dev IQ-I	ice Diagnosis ink Master Dia	anosis						
2200			-						
	Port	Information							
	Por	t Type	Pin / Channel	Function	State	Dia	Details		
		IO4 ink	4/A	Digital Input	ON				
•••	X1	Class A + DI	2/B	Digital Input	OFF		Û		
			4/A	Digital Output					
	X2	IO-Link Class A + DI	210	1 Bit Out Digital Input			O		
			278	1 Bit In / NO Digital Insuit	CAFF				
	X3	IO-Link	4/A	1 Bit In / NO	OFF		Œ		
		Class A + DI	2/B	1 Bit In / NO	OFF		-		
• • •		10-Link	4/A	Digital Input	OFF				
	X4	Class A + DI	2/B	Digital Input	OFF	DIA	Û		
			410	Digital Output					
	X5	IO-Link Class B + DO	47.4	1 Bit Out Digital Cultout	OFF.		(i)		
			2/B	1 Bit Out	OFF				
	X6	IO-Link Class B + DO	4/A 2/B	Inactive			0		
) (63)		IO-Link	4/A	Inactive					
	X	Class B + DO	2/B	AUX Power			ω		
المحيوسا الأمي	YS	IO-Link	4/A	IO-Link (COM3) 4 Bytes In 4 Bytes Dur	Operate		0		
		Class D + DO					•		

Figure 6.1

This page serves as a starting point for access to the integrated web server.

Device Overview

The left side shows a graphical representation of the module with all LEDs and the positions of the rotary coding switches

Device Information

The "Device Information" table contains some basic data on the module, e.g., the version, the state of the cyclic communication, and a diagnostic indicator. The diagnostic indicator shows whether a diagnosis is present in the module.

Port Information

The "Port Information" table indicates the configuration and status of all I/O ports of the module.

Ports (Connection Side)

Click the "Ports" tab in the menu bar of the start window. A new window opens with the details of the individual ports:

Statuti Ports Oydem User Contact Port Details Show details for port *X1 *X2 *X3 *X4 *X5 *X6 *X7 *X8 Port Details *X1 *X2 *X3 *X4 *X5 *X6 *X7 *X8 Port Information *Port *X8 *Yendor ID D0/27(de: 2) *Dexis # -D0 *Dexis # -D0 Dexis # -D0 Dexis # -D0 *Dexis # -D0 *Dexis # -D0 *Yendor ID D0/21/20 *Product ID *Dexis # -D0 Dexis # -D0 Product ID *Product ID *Disc # D D/21/20 Product ID *Product ID *D/21/20 Yendor Toxt Output *Product ID *D/21/20 Product ID D/21/20 *Product ID *D/21/20 *Product ID Output *Product ID *D/21/20 Output Output *Product ID *D/21/20 *Product ID Output *Product ID *Product ID Output Output *Product ID *Product ID *Product ID *Product ID *Product ID *Product ID *Product ID *Product ID <	Statur Parts Cyclinit User Contact	Status Ports System User Contact Cont Details Interview details for port PX1 X2 X3 X4 X5 X6 X7 •X8 Not interview details for port PX1 X3 X4 X5 ×X6 X7 •X8 Interview details for port Not interview details for port Not interview details for port Interview details for port Interview details for port Interview details for port Not interview details for port Not interview details Product Text Vendor Text Ve	Statuti Ports Oydem User Contact	B PEF	PPEF	RL+FU	CHS					
Statut Ports Cyntim User Contact	Statut Puts Cyptim User Contact	Status Peds Stydem Uber Contact	Statur Pote Oputint User Contact				_					ICE1 Webserve
Port Details Show statist for port X1 X2 X3 X4 X5 X6 X7 XX Port Monte 10 20 10 10 10 10 10 10 10 10 10 10 10 10 10	Port Details show details for port X1 X2 X3 X4 X5 X6 X7 X8 Port information Port Diagnosis Delank Delank <th>Port Details viru viru<th>Port Details store store stor</th><th>Status</th><th>Ports</th><th>System</th><th>Us</th><th>er Contact</th><th></th><th></th><th></th><th></th></th>	Port Details viru viru <th>Port Details store store stor</th> <th>Status</th> <th>Ports</th> <th>System</th> <th>Us</th> <th>er Contact</th> <th></th> <th></th> <th></th> <th></th>	Port Details store store stor	Status	Ports	System	Us	er Contact				
Show details for port 1 1 2 2 3 3 4 5 5 6 7 4 5 5 Prof. 10 7 4 10 7 10 7 10 7 10 7 10 7 10 7 10	Show details for port. N1 X2 X3 X4 X5 X6 X7 • X8 Port information X9 X1 X8 • X6 X7 • X8 Port information X9 X1 X8 • X6 X7 • X8 Port information X9 X1 X8 • X8 • X8 • X8 Port information X8 Y24 Y24 Y24 Y24 Y24 Y24 <	have detailed for port. Image: Contract of the	Show details for port. N1 X2 X3 X4 X5 X6 X7 X8 Prof. Line To The To Th	Port Deta	ails							
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Figure 6.2

Detailed port information is displayed.

- Port Diagnosis shows incoming and outgoing diagnoses in plain text.
- Pin 2 and pin 4 contain information about the configuration and status of the port.
- Additional information about the connected sensor and its process data is shown under IO-Link.

System Page

Click the "System" tab in the menu bar of the start window. A new window opens with information on the system of the module:





			ICE1 Webserver
Ports System User Co	ontact		
tion	IP Settings		
	Parameter	Settings	
Pepperi+Fuchs PROFINET S2	IP-Address	192 168 1 12	
1.0.0.15-S2 (App) / V1.0.0.0 (RT Protocol) / (B10001-V15t)	Subnat Mask		
	oublies mask	200 , 255 , 255 , 0	
ICE1-8IOL-S2-G60L-V1D	Gateway	192 . 168 . 1 . 12	
70103603	Remanent config (Only P	ROFINET)	
V1.0			
40000100	Submit		
week 51, 2016	Popult		
00.00.01.02.05.10	Neoun.		
DO DO 81 US FF AD			
Foundation duplex			
LINK ODWI			
192 169 1 12			
255 255 255 0			
100 168 1 10			
102.100.112			
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Figure 6.3

This page contains information about the following values and parameters:

- The firmware name and version is displayed under "Firmware".
- The "Device" section contains all the information about the module itself.
- Restart device
- The module initializes a software reset.
- Reset configuration to factory defaults
 - The module restores the default factory settings.



F

During a factory reset, the "BF/MS/RUN" LED will light up red three times. Once reset to the factory settings, the "BF/MS/RUN" LED will light up green three times. Once the LED has lit up green three times, restart the device and wait ten seconds.

Firmware update

The module initializes a firmware update. Select the provided *.ZIP container to update firmware. For firmware updates, please contact our support team. Follow the instructions that appear on the screen.

Figure 6.4

User Administration

Click on the "User" tab in the menu bar of the start window. A new window opens with the user administration settings for the module:

 A Nicht sicher 192268.1.12/user.htm CE1 Webserver Status Ports System User Contact 	- → C ▲ Nicht sicher 192168.1.12/user/htm FPEPPERL+FUCHS ICE1 Webserver Status Parts System User Contact Users
EPEPPERL+FUCHS ICE1 Webserver Status Porto System User Contact Users Users Users Vername Permissions Edit Del admin Aumin Pi a User T Write permissions Edit Del admin Aumin Pi a Xdd new user	E PEPPERL+FUCHS ICE1 Webserver Status Parts Cystem User Contact Users
Seperfect Function Status Purts System User Users User Edit Del arman User1 Write permissions Edit Del arman Add new user Add new user Add new user	PEPPERL+FUCHS ICE1 Webserver Status Ports System Liser Contact
ICE1 Webserver Status Ports System User Users Usermanne Permissions Edit User1 Write permissions Image: Contact	ICE1 Webserver Status Ports System User Contact Users
Status Ports System User Contact Users Users User Del admin Admin Image: Contact Image: Contact User1 Wrife parmissions Image: Contact Image: Contact Add new user Image: Contact Image: Contact Image: Contact	Status Ports System User Contact Users
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User1 Write permissions 🖉 🕱 Add new user	admin Admin 🖌 🚨
Add new user	User1 Write permissions
Add new user	
	Add new user

Figure 6.5

This page contains the settings relevant to managing the users of the module. New users can be added with **Admin** or **Write** access permissions.



Тір

For security reasons, change the default admin password once the device has been configured.

Default user login data:

- User: admin
- Password: private



Contact Page

Click on the "Contact" tab in the menu bar of the start window. A new window with the contact data of Pepperl+Fuchs opens:



Figure 6.6

The address of the contact page is:

http://[IP address]/contact.htm

This page provides information about Pepperl+Fuchs Group contact details.

7 Troubleshooting

7.1 Diagnostics Indicator in the Integrated Web Server

The module shows the error diagnostics on the connection page of the integrated web server. For information on how to call up the connection page, see chapter 6.

🕫 PE	PPE	RL+FU	CHS	5				
i								ICE1 Webserver
Status	Ports	System	U	ser Contact				
Port D	etails							
Show details	for port							
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Port Informa	tion			IO-Link				
Port		X6		Vendor ID				
Type		IO-Link		Device ID				
		Class B + DO		Vendor Name				
Dia		DIA		Vendor Text				
Port Diagnos	IS			Product Name				
 IO-Lin 	k device broke	n wire		Product ID:				
				Product Text				
Pin 4 / Chan	nel A			Serial No.				
Function		IO-Link		HW Revision				
State		Scan		FVV Revision				
Pin 2 / Chan	nel B			Application Name (Tag)			Set	
Function		AUX Power			-		Jec	
State				Input Data				
				Output Data				
				Parameter Read/Write	Index Rea	Subinde	x: 0	

Figure 7.1

Diagnostic data is displayed in the "Port Diagnosis" area of the connection page, according to the connection.



Alarm Signals and Error Messages from Modules via PROFINET

Note

Alarm signals and error messages are only transmitted via PROFINET if the parameter for diagnosis is activated in the controller when the modules are configured.

If the modules detect a fault state, they trigger an alarm signal. The modules support diagnostic alarms. Diagnostic alarms are triggered by periphery faults, such as overloads, short circuits, and low voltage.

An alarm is triggered both by incoming events (e.g., sensor short circuits) and outgoing events.

The alarms are evaluated dependent on the PROFINET IO controller used.



Evaluating Alarms in the TIA portal

If a diagnostics alarm is triggered, the user program in the TIA portal is interrupted and a diagnostics block is called. The following blocks are used:

Cause	OB call
Diagnostics alarm (short circuit, overload, wire break, low voltage on an I/O module)	OB82
Failure of a station or a rack	OB86

The initial information regarding the cause and type of fault is provided by the OB called and its start information. More detailed information regarding the error event can be obtained in the error OB by calling RALRM_SFB [SFB54] (read supplementary alarm information). For this purpose, SFB 54 must called in every error OB.

If the error OB called does not exist in the CPU, the CPU switches into the STOP operating state.

The Structure of the Diagnostics Data Records

Block version 0x0101 and the format identifier (USI, User Structure Identifier) 0x8000 are used to display the diagnostics data records.

The data values "ChannelNumber" and "ChannelError" contain the following values, depending on the error that has occurred:

Type of error	Source of fault	Channel number	Error code
Undervoltage/overvoltage of sensor/system power supply	Module	0x8000 (diagnosis not channel-specific)	0x0002
Auxiliary voltage/actuator voltage too low	Auxiliary voltage	0x8000 (diagnosis not channel-specific)	0x0103
Overload/short circuit of the sensor supply	IO port (pin 1)	0x01 to 0x08	0x01
Port driver temperature excess	IO port (pin 1)	0x01 to 0x08	0x0113
Overload/short circuit of the digital 500 mA outputs	IO port (pin 4)	0x01 to 0x08	0x010A
Overload/short circuit of the digital 2 A outputs	IO port (pin 2)	0x05 - 0x08	0x0109
Overload/short circuit of auxiliary power supply (U _{Aux}) at Class B port	IO port (pin 2)	0x05 - 0x08	0x0108
IO-Link C/Q Error	IO port (pin 4)	0x01 - 0x08	0x0006
IO-Link device diagnosis	IO-Link device	0x01 - 0x08	Dependent on the IO- Link device diagnosis Extended diagnosis: 0x9000

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Display of diagnosis in the TIA Portal

- 1. Select the faulty I/O module in the hardware manager and navigate to its device view.
- 2. Select the affected channel/the submodule.
- 3. Open the online diagnostics by right-clicking with the mouse and select the menu item "Online & diagnostics > Channel diagnostics."

Diagnostics	Channel di	agnostics			
Diagnostic status Channel diagnostics					
Functions		Channel type	Channel no	Fron	
		Outout	2	Wire break	
	Help C Possi - A cr - Fau - Def - Incr - Incr - Mer	on selected dia ible causes for able to the encu- lt in external ci fective encoder orrect encoder orrect encoder ut channel is no asuring resistor ible causes for	gnostics row encoders: oder is broken. rcuit type set in param tused (open) is too high sctuators:	eters	

Figure 7.2



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