

Documentation | EN

EPI2xxx, ERI2xxx

IO-Link box modules with digital outputs



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1 Foreword

1.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.

It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Trademarks

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Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 with corresponding applications or registrations in various other countries.



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1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

⚠ DANGER

Hazard with high risk of death or serious injury.

⚠ WARNING

Hazard with medium risk of death or serious injury.

⚠ CAUTION

There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE

The environment, equipment, or data may be damaged.

Information on handling the product



This information includes, for example:
recommendations for action, assistance or further information on the product.

1.3 Documentation issue status

Version	Comment
1.9	<ul style="list-style-type: none"> • Technical data updated • Signal interface updated
1.8	<ul style="list-style-type: none"> • Product images updated • Technical data updated • Structure update
1.7	<ul style="list-style-type: none"> • Dimensions updated • UL requirements updated
1.6	<ul style="list-style-type: none"> • Figures in the chapters "Introduction" updated
1.5	<ul style="list-style-type: none"> • Front page updated
1.4	<ul style="list-style-type: none"> • EPI2338-000x, ERI2338-000x: Imprint updated
1.3	<ul style="list-style-type: none"> • Chapter "Process data" added
1.2	<ul style="list-style-type: none"> • ERI2xxx added • Introduction updated • Technical Data updated • Connection IO-Link Master updated • Cabling updated • Update chapter "IO-Link Master" and "IO-Link Device" • Update structure • Corrections
1.1.2	<ul style="list-style-type: none"> • EPI2008 - Technical Data updated • EPI2809 - Technical Data updated • EPI2338 - Technical Data updated • EPI2339 - Technical Data updated
1.1.1	<ul style="list-style-type: none"> • Firmware update of the IO-Link device updated
1.1.0	<ul style="list-style-type: none"> • EPI2008-000x - Object description and parameterization updated • EPI2809-002x - Object description and parameterization updated • EPI2338-000x - Object description and parameterization updated • EPI2339-002x - Object description and parameterization updated
1.0.0	<ul style="list-style-type: none"> • First publication
0.6	<ul style="list-style-type: none"> • Corrections
0.5	<ul style="list-style-type: none"> • First preliminary version

Firm and hardware version

The documentation refers to the firm and hardware status that was valid at the time it was prepared.

The properties of the modules are subject to continuous development and improvement. Modules having earlier production statuses cannot have the same properties as modules with the latest status. Existing properties, however, are always retained and are not changed, so that these modules can always be replaced by new ones.

The firmware and hardware version (delivery state) can be found in the batch number (D number) printed at the side of the IO-Link box module.

Syntax of the batch number (D number)

D: WW YY FF HH

WW - week of production (calendar week)

YY - year of production

FF - firmware version

HH - hardware version

Example with D No. 29 10 02 01:

29 - week of production 29

10 - year of production 2010

02 - firmware version 02

01 - hardware version 01

2 Product overview

Digital output modules

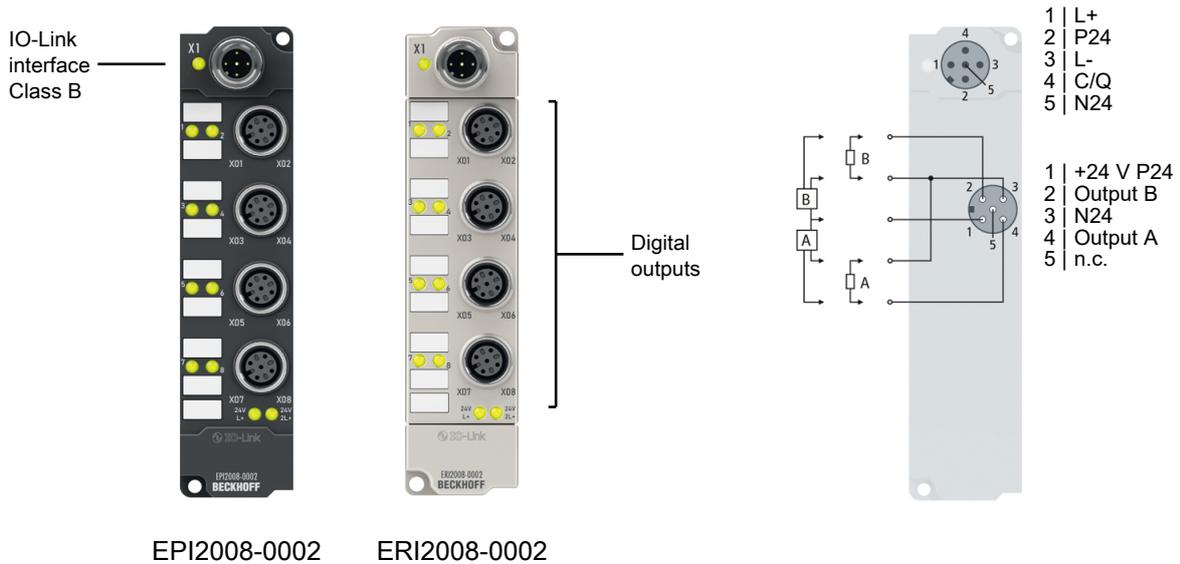
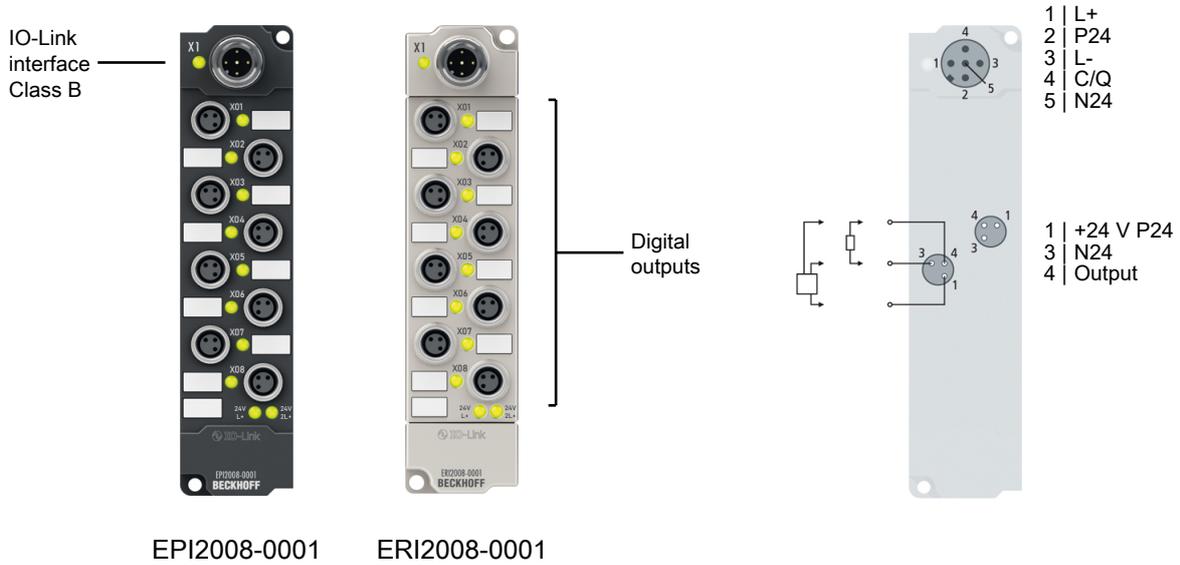
Module	Signal connection	Number of outputs	Current	Comment	Housing
EPI2008-0001 [▶ 10]	8 x M8	8	0,5 A (Σ 4 A)	Maximum of the total of all outputs 4 A	Industrial housing
ERI2008-0001 [▶ 10]	8 x M8	8	0,5 A (Σ 4 A)	Maximum of the total of all outputs 4 A	Zinc die-cast housing
EPI2008-0002 [▶ 10]	4 x M12	8	0,5 A (Σ 4 A)	Maximum of the total of all outputs 4 A	Industrial housing
ERI2008-0002 [▶ 10]	4 x M12	8	0,5 A (Σ 4 A)	Maximum of the total of all outputs 4 A	Zinc die-cast housing
EPI2809-0021 [▶ 13]	16 x M8	16	0,5 A (Σ 4 A)		Industrial housing, wide body
ERI2809-0021 [▶ 13]	16 x M8	16	0,5 A (Σ 4 A)		Zinc die-cast housing, wide body
EPI2809-0022 [▶ 13]	8 x M12	16	0,5 A (Σ 4 A)		Industrial housing, wide body
ERI2809-0022 [▶ 13]	8 x M12	16	0,5 A (Σ 4 A)		Zinc die-cast housing, wide body

Digital combination modules

Module	Signal connection	Number of outputs	Current	Number of inputs	Filter (Default adjustment)	Housing
EPI2338-0001 [▶ 17]	8 x M8	0 bis 8	0,5 A (Σ 4 A)	8 bis 0	3,0 ms	Industrial housing
ERI2338-0001 [▶ 17]	8 x M8	0 bis 8	0,5 A (Σ 4 A)	8 bis 0	3,0 ms	Zinc die-cast housing
EPI2338-0002 [▶ 17]	4 x M12	0 bis 8	0,5 A (Σ 4 A)	8 bis 0	3,0 ms	Industrial housing
ERI2338-0002 [▶ 17]	4 x M12	0 bis 8	0,5 A (Σ 4 A)	8 bis 0	3,0 ms	Zinc die-cast housing
EPI2339-0021 [▶ 22]	16 x M8	0 bis 16	0,5 A (Σ 4 A)	16 bis 0	3,0 ms	Industrial housing, wide body
ERI2339-0021 [▶ 22]	16 x M8	0 bis 16	0,5 A (Σ 4 A)	16 bis 0	3,0 ms	Zinc die-cast housing, wide body
EPI2339-0022 [▶ 22]	8 x M12	0 bis 16	0,5 A (Σ 4 A)	16 bis 0	3,0 ms	Industrial housing, wide body
ERI2339-0022 [▶ 22]	8 x M12	0 bis 16	0,5 A (Σ 4 A)	16 bis 0	3,0 ms	Zinc die-cast housing, wide body

2.1 EPI2008-000x, ERI2008-000x

2.1.1 Introduction



8 digital outputs 24 V_{DC}, I_{max} 0.5 A

The EPI2008-000x and ERI2008-000x IO-Link box modules with digital outputs switch binary control signals from the controller to the process level to the actuators. The eight outputs process load currents up to 0.5 A and indicate their signal state via LEDs.

The signal connection is made optionally via M8 (EPI2008-0001, ERI2008-0001) or M12 connectors (EPI2008-0002, ERI2008-0002). The outputs are short-circuit proof and protected against polarity reversal.

The IO-Link box modules with zinc die-cast housing (ERIx_{xxx}) are ready for use in harsh industrial and process environments. With the fully sealed design and metal surfaces the ERI series is ideal for applications requiring enhanced load capacity and protection against weld spatter, for example.

Quick links

[Mounting and connection \[▶ 30\]](#)

2.1.2 Technical Data

All values are typical values over the entire temperature range, unless stated otherwise.

IO-Link	
Connection	1 x M12 plug, 5-pin, A-coded
Data transfer rate	230.4 kbaud (COM 3)
Specification version	IO-Link V1.1, Class B
Requirements for IO-Link master	V1.1
Current consumption from L+	100 mA
Current consumption from P24	20 mA + load
Electrical isolation L+ / P24	yes

Digital outputs	EPI2008-0001	ERI2008-0001	EPI2008-0002	ERI2008-0002
Number	8			
Connection	8 x M8 socket		4 x M12 socket	
Cable length	max. 30 m			
Load type	ohmic, inductive, lamp load			
Nominal output voltage	24 V _{DC} from P24			
Output current	max. 0.5 A per channel			
Short circuit current	typically 1.5 A			

Housing data	EPI2008-0001	ERI2008-0001	EPI2008-0002	ERI2008-0001
Dimensions W x H x D	30 mm x 126 mm x 26.5 mm (without plug connectors)			
Weight	approx. 165 g			
Installation position	variable			
Material	PA6 (polyamide)	Zinc die-cast	PA6 (polyamide)	Zinc die-cast

Environmental conditions	
Ambient temperature during operation	-25 ... +60 °C -25 ... +55 °C according to cURus
Ambient temperature during storage	-40 ... +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, cURus [► 43]

*) Real applicable approvals/markings see type plate on the side (product marking).

2.1.3 Process image

Output 0 to Output 7

The IO-Link device is connected to IO-Link Port1 of the IO-Link master (EP6224-3022).

You will find the 8 digital outputs to the module (here using the EPI2008-0001 as an example) under **Output 0 to Output 7**.

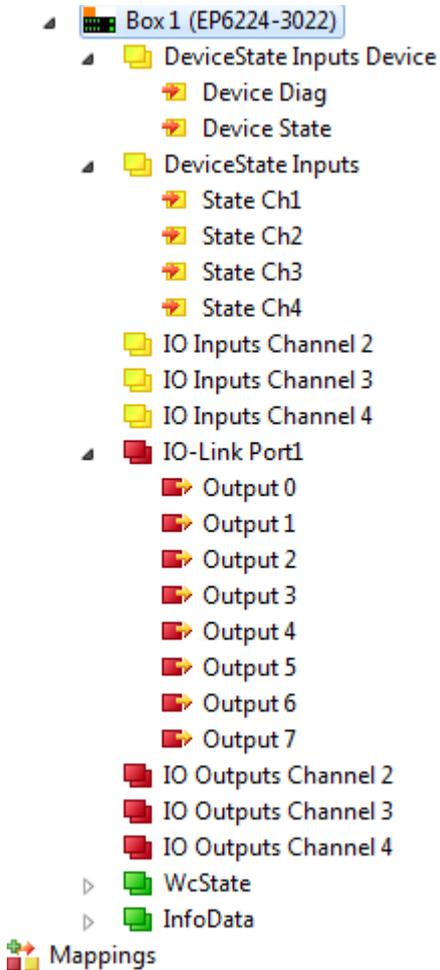
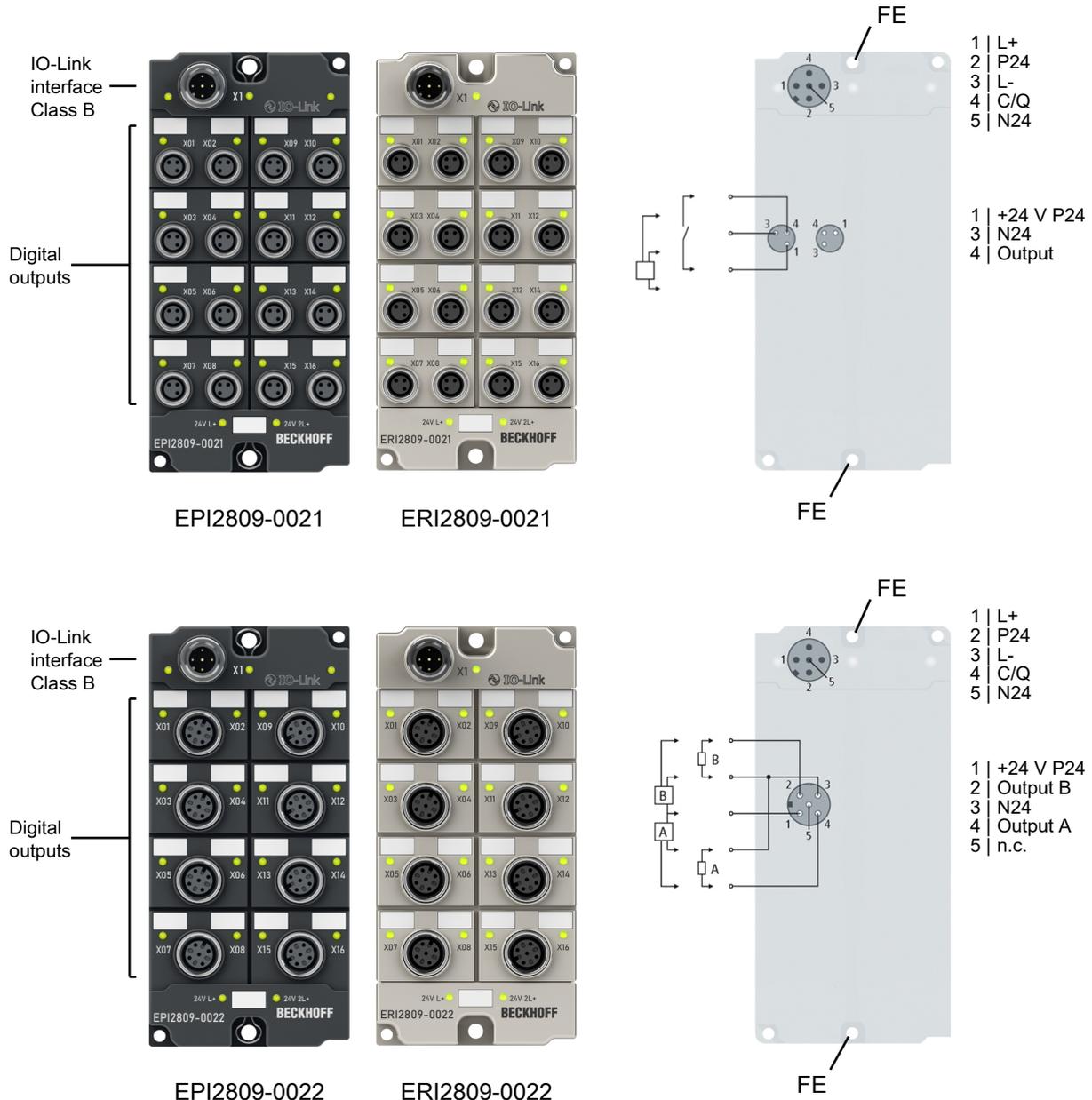


Fig. 1: EPI2008-000x, Process image

2.2 EPI2809-002x, ERI2809-002x

2.2.1 Introduction



16 digital outputs, 24 V_{DC}, I_{max} 0.5 A (Σ 4 A)

The EPI2809-002x and ERI2809-002x IO-Link box modules with digital outputs switch binary control signals from the controller to the process level to the actuators.

The 16 outputs process load currents up to 0.5 A each, although the total current is limited to 4 A. This makes these modules particularly suitable for applications in which not all of the outputs are active at the same time, or in which not all actuators require signal currents of 0.5 A.

The signal state is indicated by means of LEDs. The signals are connected via M8 connectors (EPI2809-0021, ERI2809-0021) or M12 connectors (EPI2809-0022, ERI2809-0022). All outputs are short-circuit proof and protected against polarity reversal.

The IO-Link box modules with zinc die-cast housing (ERIx_{xxx}) are ready for use in harsh industrial and process environments. With the fully sealed design and metal surfaces the ERI series is ideal for applications requiring enhanced load capacity and protection against weld spatter, for example.

Quick links

[Mounting and connection \[► 30\]](#)

2.2.2 Technical data

All values are typical values over the entire temperature range, unless stated otherwise.

IO-Link	
Connection	1 x M12 plug, 5-pin, A-coded
Data transfer rate	230.4 kbaud (COM 3)
Specification version	IO-Link V1.1, Class B
Requirements for IO-Link master	V1.1
Current consumption from L+	100 mA
Current consumption from P24	20 mA + load
Electrical isolation L+ / P24	yes

Digital outputs	EPI2809-0021	ERI2809-0021	EPI2809-0022	ERI2809-0022
Number	16			
Connection	16 x M8 socket		8 x M12 socket	
Cable length	max. 30 m			
Load type	ohmic, inductive, lamp load			
Nominal output voltage	24 V _{DC} from P24			
Output current	max. 0.5 A per channel, sum current of all outputs max. 4 A			

Housing data	EPI2809-0021	ERI2809-0021	EPI2809-0022	ERI2809-0022
Dimensions W x H x D	60 mm x 126 mm x 26.5 mm (without plug connectors)			
Weight	approx. 250 g			
Installation position	variable			
Material	PA6 (polyamide)	Zinc die-cast	PA6 (polyamide)	Zinc die-cast

Environmental conditions	
Ambient temperature during operation	-25 ... +60 °C -25 ... +55 °C according to cURus
Ambient temperature during storage	-40 ... +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, cURus [▶ 43]

*) Real applicable approvals/markings see type plate on the side (product marking).

2.2.3 Process image

Output 0 to Output 15

The IO-Link device is connected to **IO-Link Port1** of the IO-Link master (EP6224-3022).

You will find the 16 digital outputs to the module (here using the EPI2809-0021 as an example) under **Output 0 to Output 15**.

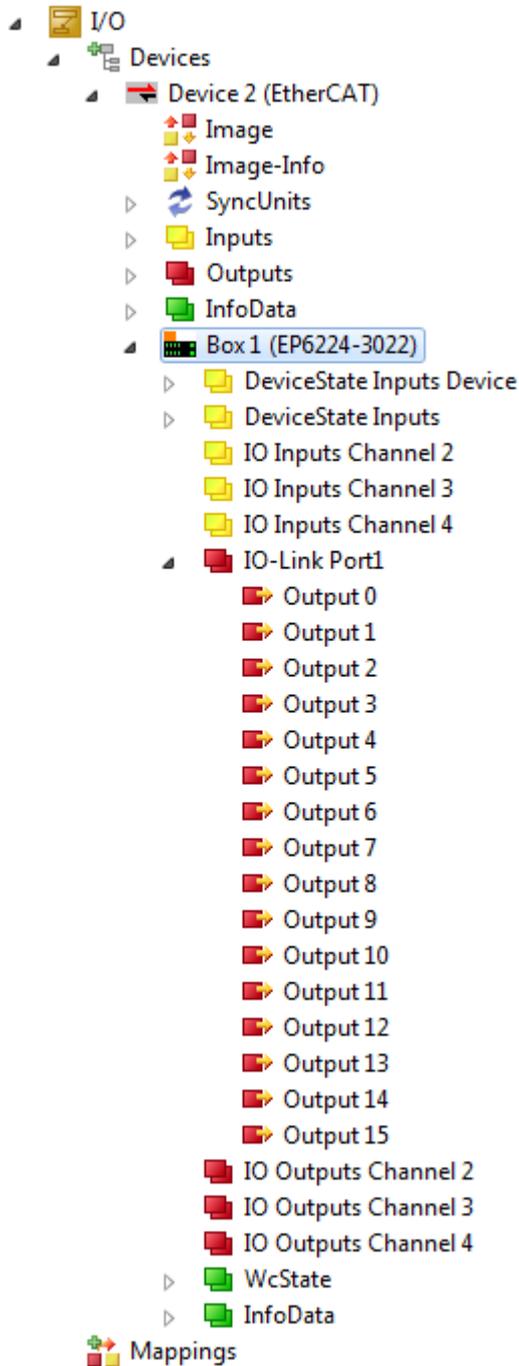
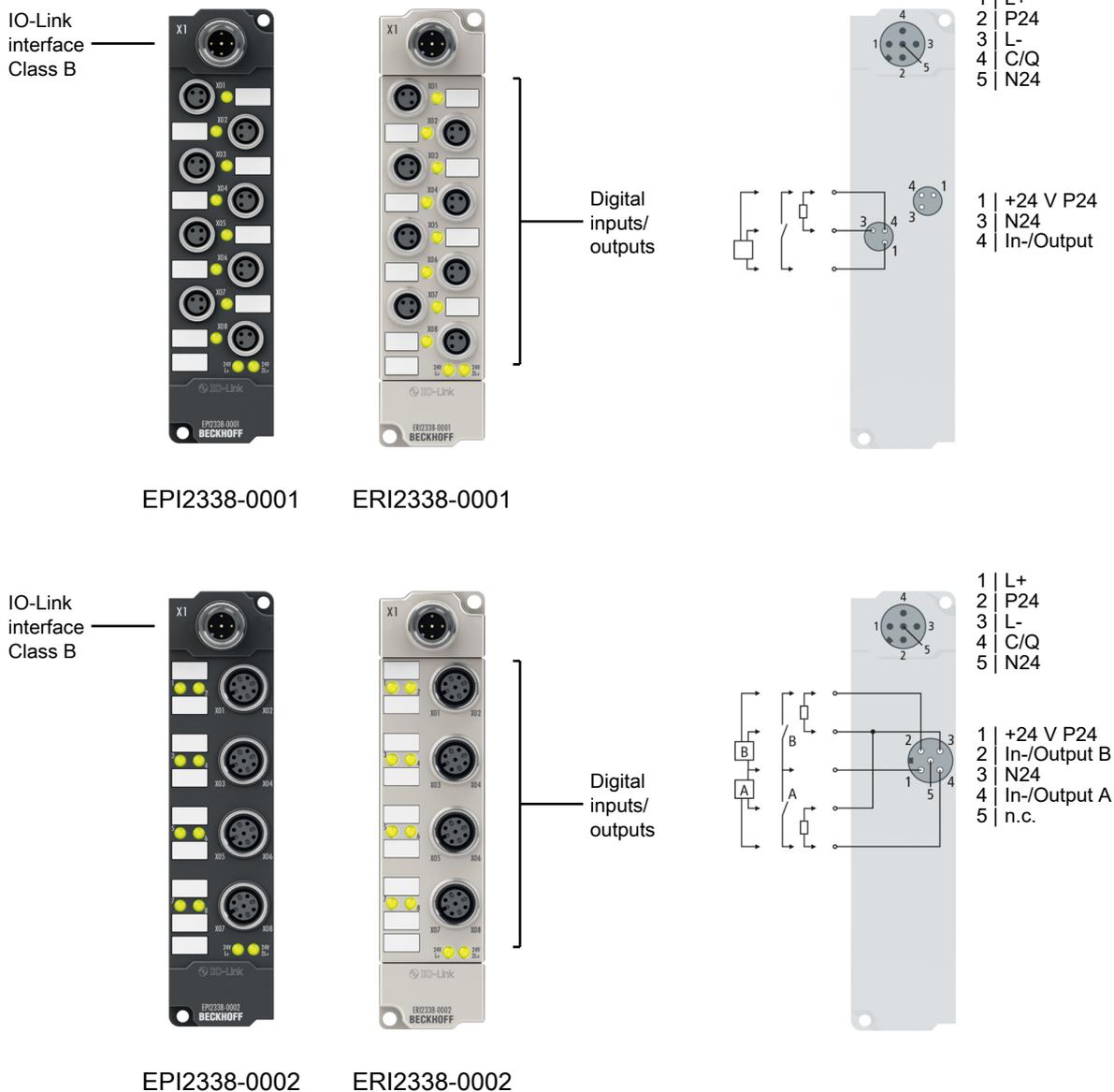


Fig. 2: EPI2809-002x, Process image

2.3 EPI2338-000x, ERI2338-000x

2.3.1 Introduction



8 digital inputs or outputs, 24 V_{DC}

The EPI2338-000x and ERI2338-000x IO-Link box modules have 8 digital channels, each of which can be operated as inputs or outputs. A configuration whether a channel is to be used as input or output is not required; the input circuit is internally connected to the output driver so that a set output is automatically displayed in the input process image.

The outputs process load currents up to 0.5 A, are short-circuit proof and protected against polarity reversal.

The filter constant of the inputs is 3.0 ms (EPI2338-000x, ERI2338-000x). The state of each signal is indicated by means of light emitting diodes. The signals are optionally connected via M8 connectors (EPI2338-0001, ERI2338-0001) or M12 connectors (EPI2338-0002, ERI2338-0002).

i **Supply of the connected sensors from P24, not from L+**

Unlike many other modules, the EPI2338 and ERI2338 IO-Link box modules supply digital sensors from the additional supply voltage P24 and not from the voltage L+! This is because the connections can be used either as input or output. Nevertheless, an overload of the sensor supply (current > 0.5 A) is also indicated here by the illuminated red "24 V" LED.

NOTICE**For shutdown in the event of a fault, do not supply sensors externally**

If the design of your installation is such that the additional supply voltage P24 is switched off in the event of a fault, you must not power the connected sensors externally, but only through the EPI23x8, ERI23x8! Otherwise, when the P24 energy is switched off, the EPI23x8, ERI23x8 can continue to draw energy from the external sensor supply, and the outputs will not be switched off.

The IO-Link box modules with zinc die-cast housing (ERIxxxx) are ready for use in harsh industrial and process environments. With the fully sealed design and metal surfaces the ERI series is ideal for applications requiring enhanced load capacity and protection against weld spatter, for example.

Quick links

[Mounting and connection \[► 30\]](#)

2.3.2 Technical Data

All values are typical values over the entire temperature range, unless stated otherwise.

IO-Link	
Connection	1 x M12 plug, 5-pin, A-coded
Data transfer rate	230.4 kbaud (COM 3)
Specification version	IO-Link V1.1, Class B
Requirements for IO-Link master	V1.1
Current consumption from L+	100 mA
Current consumption from P24	20 mA + load + sensor power supply
Electrical isolation L+ / P24	yes

Digital outputs	EPI2338-0001	ERI2338-0001	EPI2338-0002	ERI2338-0002
Number	0 to 8 Each digital output can alternatively be used as a digital input.			
Connection	8 x M8 socket		4 x M12 socket	
Cable length	max. 30 m			
Load type	ohmic, inductive, lamp load			
Nominal output voltage	24 V _{DC} from P24			
Output current	max. 0.5 A per channel			
Short circuit current	max. 1.5 A			

Digital inputs	EPI2338-0001	ERI2338-0001	EPI2338-0002	ERI2338-0002
Number	0 to 8 Each digital input can alternatively be used as a digital output.			
Connection	8 x M8 socket		4 x M12 socket	
Cable length	max. 30 m			
Characteristics	Type 3 according to EN 61131-2, compatible with type 1			
Nominal input voltage	24 V _{DC} (-15 % / +20 %)			
Input filter	3.0 ms (default), adjustable between 0 ms and 20 ms			
Pulse extension	0 ms (default), adjustable between 0 ms and 100 ms			
Signal voltage "0"	-3 ... +5 V			
Signal voltage "1"	+11 ... +30 V			
Input current	3 mA			
Sensor power supply	24 V _{DC} from P24			

Housing data	EPI2338-0001	ERI2338-0001	EPI2338-0002	ERI2338-0001
Dimensions W x H x D	30 mm x 126 mm x 26.5 mm (without plug connectors)			
Weight	approx. 165 g			
Installation position	variable			
Material	PA6 (polyamide)	Zinc die-cast	PA6 (polyamide)	Zinc die-cast

Environmental conditions	
Ambient temperature during operation	-25 ... +60 °C -25 ... +55 °C according to cURus
Ambient temperature during storage	-40 ... +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, <u>cURus</u> [► 43]

*) Real applicable approvals/markings see type plate on the side (product marking).

2.3.3 Process image

Inputs and Outputs

The IO-Link device is connected to **IO-Link Port1** of the IO-Link master (EP6224-3022).

You will find the 8 digital inputs to the module (here using the EPI2338-0001 as an example) under **Input 0 to Input 7** and the 8 digital outputs under **Output 0 to Output 7**.

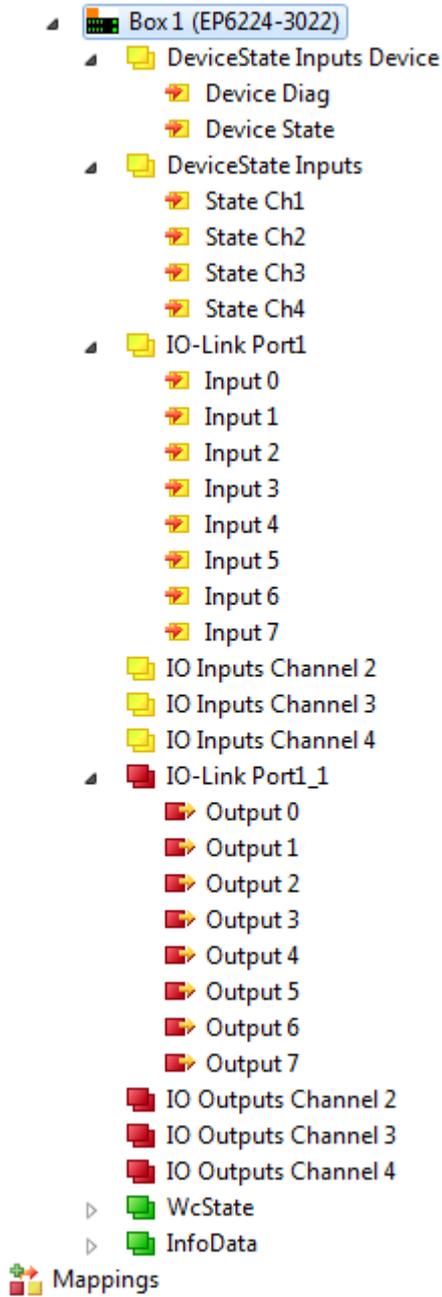
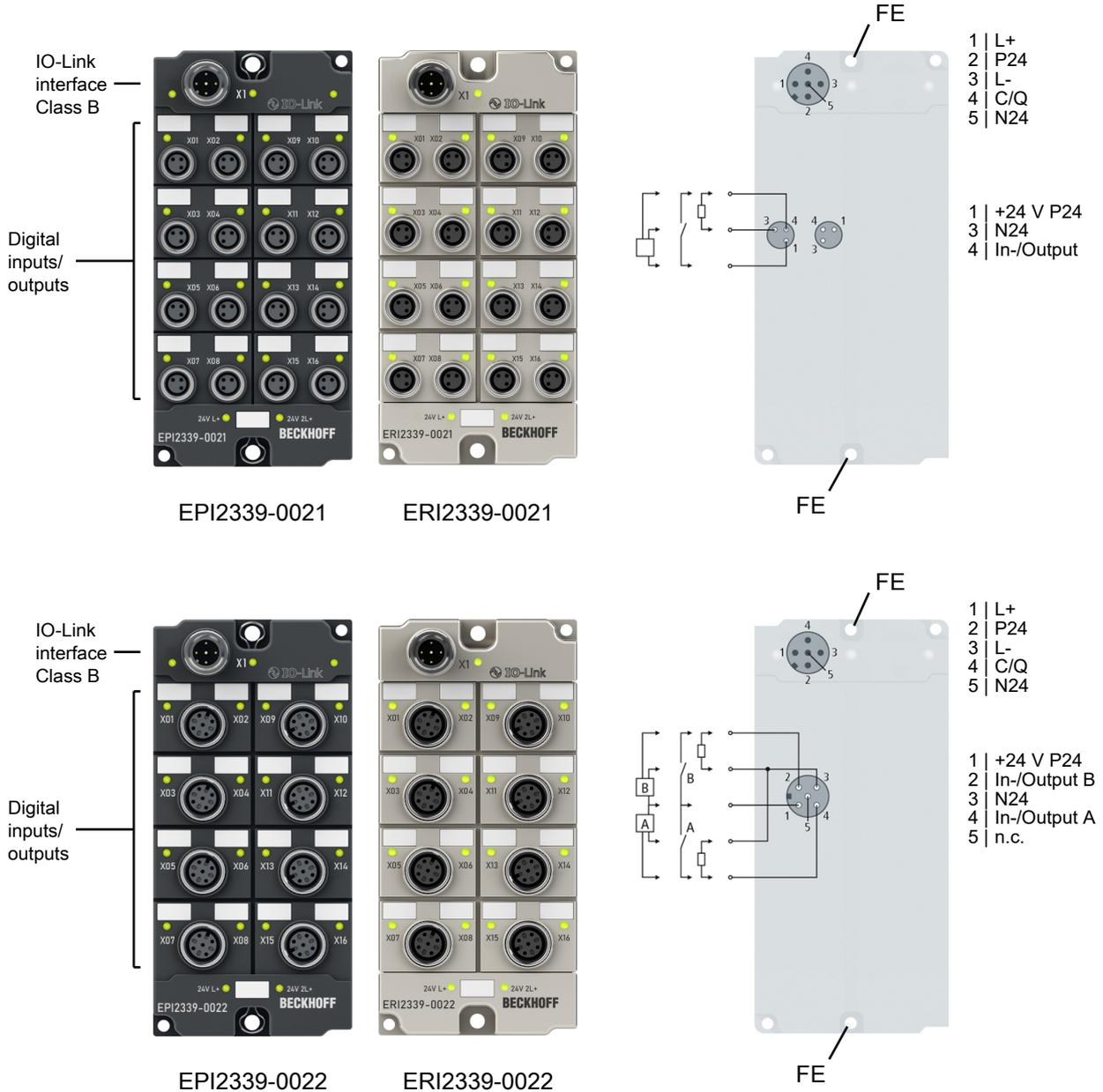


Fig. 3: EPI2338-000x, Process image

2.4 EPI2339-002x, ERI2339-002x

2.4.1 Introduction



16 digital inputs or outputs, 24 V_{DC}

The EPI2339-002x and ERI2339-002x IO-Link box modules have 16 digital channels, each of which can be operated as inputs or outputs. A configuration whether a channel is to be used as input or output is not required; the input circuit is internally connected to the output driver so that a set output is automatically displayed in the input process image.

The outputs process load currents up to 0.5 A, are short-circuit proof and protected against polarity reversal.

The filter constant of the inputs is 3 ms.

The state of each signal is indicated by means of light emitting diodes. The signals are connected via M8 connectors (EPI2339-0021, ERI2339-0021) or M12 connectors (EPI2339-0022, ERI2339-0022).

i **Supply of the connected sensors from P24, not from L+**

Unlike many other modules, the EPI2339-002x and ERI2339-002x IO-Link box modules supply digital sensors from the additional supply voltage P24 and not from the voltage L+. This is because the connections can be used either as input or output. Nevertheless, an overload of the sensor supply (current > 0.5 A) is also indicated here by the illuminated red "24 V" LED.

NOTICE**For shutdown in the event of a fault, do not supply sensors externally**

If the design of your installation is such that the additional supply voltage P24 is switched off in the event of a fault, you must not power the connected sensors externally, but only through the EPI23x9, ERI23x9! Otherwise, when the P24 energy is switched off, the EPI23x9, ERI23x9 can continue to draw energy from the external sensor supply, and the outputs will not be switched off.

The IO-Link box modules with zinc die-cast housing (ERIxxxx) are ready for use in harsh industrial and process environments. With the fully sealed design and metal surfaces the ERI series is ideal for applications requiring enhanced load capacity and protection against weld spatter, for example.

Quick links

[Mounting and connection \[► 30\]](#)

2.4.2 Technical data

All values are typical values over the entire temperature range, unless stated otherwise.

IO-Link	
Connection	1 x M12 plug, 5-pin, A-coded
Data transfer rate	230.4 kbaud (COM 3)
Specification version	IO-Link V1.1, Class B
Requirements for IO-Link master	V1.1
Current consumption from L+	100 mA
Current consumption from P24	20 mA + load + sensor power supply
Electrical isolation L+ / P24	yes

Digital outputs	EPI2339-0021	ERI2339-0021	EPI2339-0022	ERI2339-0022
Number	0 to 16 Each digital output can alternatively be used as a digital input.			
Output connections	16 x M8 socket		8 x M12 socket	
Cable length	max. 30 m			
Load type	ohmic, inductive, lamp load			
Nominal output voltage	24 V _{DC} from P24			
Output current	max. 0.5 A per channel			
Short circuit current	maximum 1.5 A			

Digital inputs	EPI2339-0021	ERI2339-0021	EPI2339-0022	ERI2339-0022
Number	0 to 16 Each digital input can alternatively be used as a digital output.			
Connection	16 x M8 socket		8 x M12 socket	
Cable length	max. 30 m			
Characteristics	Type 3 according to EN 61131-2, compatible with type 1			
Nominal input voltage	24 V _{DC} (-15 %/+20 %)			
Input filter	3 ms (default), adjustable between 0 ms and 20 ms			
Pulse extension	0 ms (default), adjustable between 0 ms and 100 ms			
Signal voltage "0"	-3 ... +5 V			
Signal voltage "1"	+11 ... +30 V			
Input current	3 mA			
Sensor power supply	24 V _{DC} from P24			

Housing data	EPI2339-0021	ERI2339-0021	EPI2339-0022	ERI2339-0022
Dimensions W x H x D	60 mm x 126 mm x 26.5 mm (without plug connectors)			
Weight	approx. 250 g			
Installation position	variable			
Material	PA6 (polyamide)	Zinc die-cast	PA6 (polyamide)	Zinc die-cast

Environmental conditions	
Ambient temperature during operation	-25 ... +60 °C -25 ... +55 °C according to cURus
Ambient temperature during storage	-40 ... +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, <u>cURus</u> [► 43]

*) Real applicable approvals/markings see type plate on the side (product marking).

2.4.3 Process image

Inputs and Outputs

The IO-Link device is connected to IO-Link Port1 of the IO-Link master (EP6224-3022).

You will find the 16 digital inputs to the module under **Input 0 to Input 15** and the 16 digital outputs under **Output 0 to Output 15** (here using the EPI2339-0021 as an example).

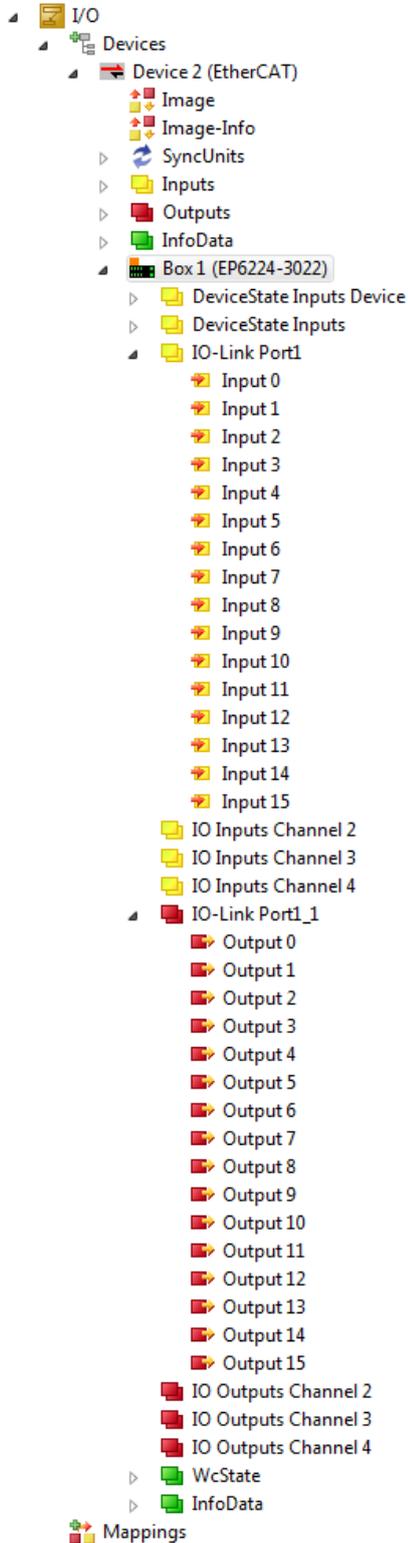


Fig. 4: EPI2339-002x Process image, digital inputs and digital outputs

3 IO-Link basics

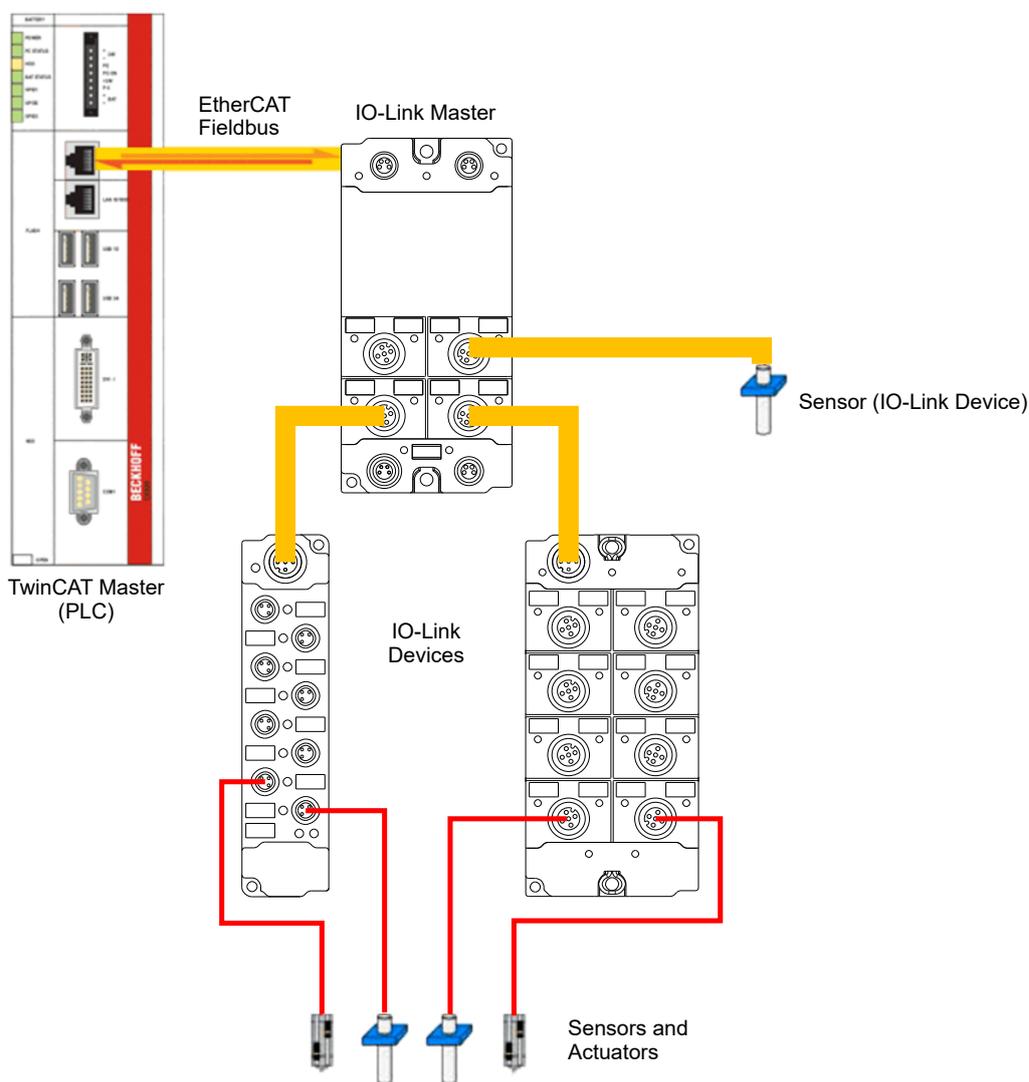
IO-Link is a communication system for connecting intelligent sensors and actuators to an automation system. The IEC 61131-9 standard specifies IO-Link under the designation "Single-drop digital communication interface for small sensors and actuators" (SDCI).

Both the electrical connection data and the communication protocol are standardized and summarized in the IO-Link Spec.

3.1 IO-Link system layout

An IO-Link system consists of an IO-Link master and one or more IO-Link devices, i.e. sensors or actuators. The IO-Link master provides the interface to the higher-level controller and controls communication with the connected IO-Link devices.

The IO-Link masters from Beckhoff have several IO-Link ports, to each of which one IO-Link device can be connected. IO-Link is not a fieldbus, but rather a point-to-point connection.



⚠ CAUTION

Risk of device damage

The IO-Link devices must be supplied from the 24 V power supply of the IO-Link master provided for this purpose. Otherwise, damage to the IO-Link port is possible.

3.2 Establishment of IO Link communication

The establishment of the IO-Link communication is illustrated in Fig. *Establishment of IO-Link communication*. This illustrates in particular the sequence when automatically scanning [▶ 51] the IO-Link port.

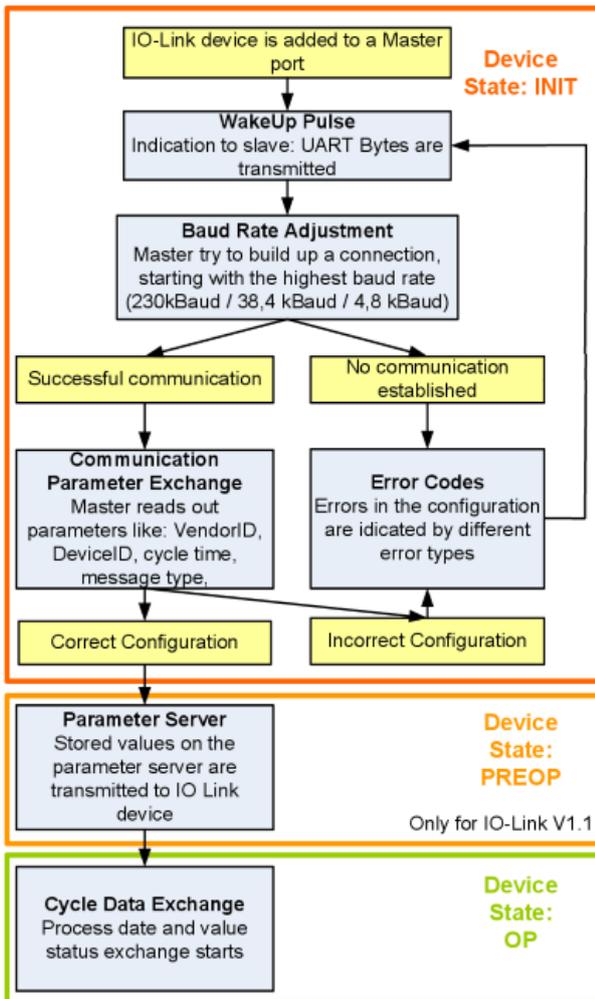


Fig. 5: Establishment of IO Link communication

- If an IO-Link device is connected to a master port, the master attempts to establish communication. A defined signal level, the **wake-up pulse**, signals to the device that UART bytes are to be sent from now on. From this point on, all data will be interpreted by the IO-Link device as UART bytes.
- The master runs through all baud rates [▶ 29], starting with the fastest baud rate (COM3 = 230 kbaud). A successful connection has been established when the slave responds to the wake-up pulse.
- First of all the master reads the **basic parameters** (Vendor ID, Device ID, process data length, telegram type and cycle time) and compares them with the existing configuration.
- If no connection could be established to the device, or if the saved parameters differ from those read, the corresponding error is output.
- If the saved parameters differ from those read, the IO-Link device changes to the PREOP state. If the IO-Link device specification is V1.1, the parameter server [▶ 29] is now executed. If the IO-Link device specification is V1.0, this step is omitted and the device changes directly to OP.
- Finally the cycle time is written and the device changes to OP. After that the master cyclically exchanges data with the device.

3.3 Device description IODD

IO-Link devices possess individual system information in the form of an IO device description (IODD), which contains:

- Communication features
- Device parameters with value range and default values
- Identification, process and diagnostic data
- Device data
- Text description
- Picture of the device
- Vendor's logo

If the IODD is imported, then the device data are automatically detected during [automatic scanning \[► 51\]](#) with TwinCAT and adopted in the System Manager.

3.4 Parameter server

In order to be able to use the functionality of the parameter server, both the IO-Link master and the IO-Link device must be specified to V1.1. The IO-Link revision of the device can be read for the individual port under [Settings \[► 58\]](#). All IO-Link masters from Beckhoff with current firmware support the IO-Link specification V1.1.

- The parameter server in the IO-Link master contains parameter data that are saved in the IO-Link device. The memory capacity is max. 2 kbyte (including header).
If the IO-Link device is exchanged, then the data are loaded from the parameter server into the new device. The requirement for this is that the device is of the same type (VendorID and DeviceID must be the same).
- If a new IO-Link device is configured, then the IO-Link master loads the parameters from the IO-Link device into the parameter server when starting for the first time.
Data from other IO-Link devices that are already configured (VendorID and DeviceID do not correspond to the configured device) are overwritten.
- At each further start the IO-Link master uses a checksum to check whether the data in the parameter server correspond to those on the IO-Link device and if necessary downloads them to the device.
- If the parameters change during the device runtime, this can be reported to the Master via the [store button \[► 66\]](#) ([ParamDownloadStore \[► 67\]](#)). The master then starts the parameter server with an upload.
- By default the event is not set each time the parameters are written, therefore the end of the parameterization procedure has to be reported to the IO-Link device via the [store button \[► 66\]](#) ([ParamDownloadStore \[► 67\]](#)).
The IO-Link device then sends the corresponding event to the master. The data are loaded into the parameter server.
- In the case of a pre-programmed IO-Link device, no download takes place from the parameter server to the device.

3.5 Data transfer rate

An IO-Link master according to specification V1.1 supports all three transmission methods and automatically adjusts the baud rate to that of the IO-Link device.

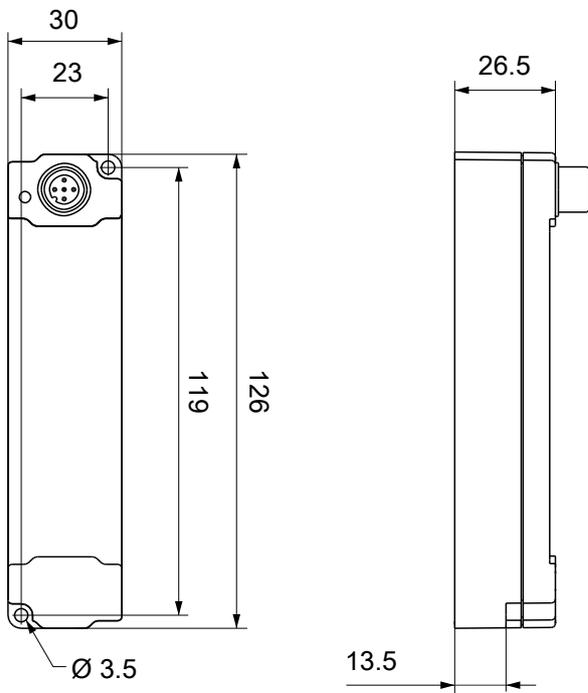
An IO-Link device usually supports only one baud rate. IO-Link devices with different baud rates can be connected to the various ports of the master.

- COM1 = 4.8 kbaud
- COM2 = 38.4 kbaud
- COM3 = 230.4 kbaud

4 Mounting and connection

4.1 Mounting

4.1.1 Dimensions EPIxxxx-xx0x and ERIxxxx-xx0x

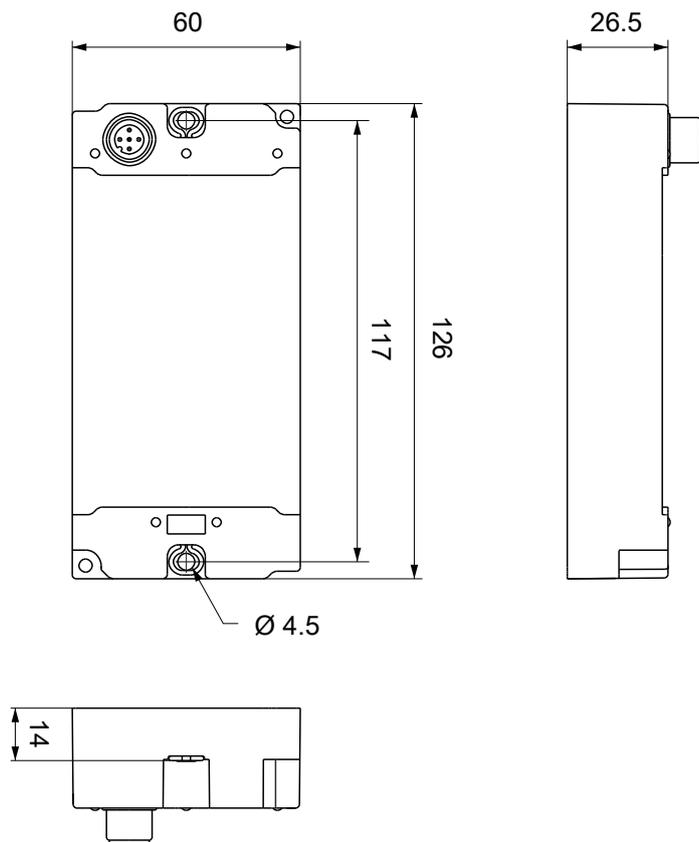


All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

Housing material	PA6 (polyamide)
Sealing compound	polyurethane
Mounting	two mounting holes Ø 3.5 mm for M3
Metal parts	brass, nickel-plated
Contacts	CuZn, gold-plated
Installation position	variable
Protection class	IP65, IP66, IP67 (conforms to EN 60529) when screwed together
Dimensions (H x W x D)	approx. 126 x 30 x 26.5 mm (without connectors)

4.1.2 Dimensions EPIxxxx-xx2x and ERIxxxx-xx2x



All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

Housing material	PA6 (polyamide)
Sealing compound	polyurethane
Mounting	two mounting holes Ø 4.5 mm for M4
Metal parts	brass, nickel-plated
Contacts	CuZn, gold-plated
Installation position	variable
Protection class	IP65, IP66, IP67 (conforms to EN 60529) when screwed together
Dimensions (H x W x D)	approx. 126 x 60 x 26.5 mm (without connectors)

4.1.3 Fixing

● **Protect connectors against soiling**

i Protect all connections from contamination during module installation! Protection class IP65 can only be guaranteed if all cables and connectors are connected! Unused connections must be protected with the appropriate connectors! Connector sets see catalog.

Modules with narrow housing are installed with two M3 screws.

Modules with wide housing are installed with two M3 screws in the mounting holes in the corners or two M4 screws in the central fastening holes.

The bolts must be longer than 15 mm. The fastening holes in the modules have no thread.

Note when mounting that the overall height is increased further by the fieldbus connections. See the Accessories section.

Mounting Rail ZS5300-0001

The mounting rail ZS5300-0001 (500 mm x 129 mm) allows the time saving assembly of modules.

The rail is made of stainless steel, 1.5 mm thick, with already pre-made M3 threads for the modules. The rail has got 5.3 mm slots to mount it via M5 screws to the machine.

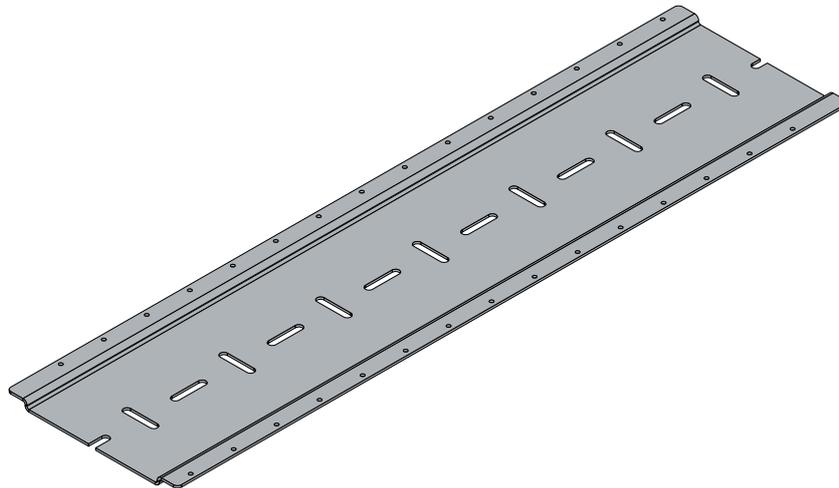


Fig. 6: Mounting Rail ZS5300-000

The mounting rail is 500 mm long, that way 15 narrow modules can be mounted with a distance of 2 mm between two modules. The rail can be cut to length for the application.

Mounting Rail ZS5300-0011

The mounting rail ZS5300-0011 (500 mm x 129 mm) has in addition to the M3 threads also pre-made M4 threads to fix 60 mm wide modules via their middle holes.

Up to 14 narrow or 7 wide modules may be mixed mounted.

4.1.4 Tightening torques for plug connectors

Screw connectors tight with a torque wrench. (e.g. ZB8801 from Beckhoff)

Connector diameter	Tightening torque
M8	0.4 Nm
M12	0.6 Nm

4.2 IO-Link connection

4.2.1 IO-Link master connection

IO-Link interface

The IO-Link specification defines various IO-Link pin assignment, which are described in the following section.

The switching and communication line is marked with (C/Q).

Port Class A (type A): The function of pin 2 and pin 5 is not preset. The vendor can assign an additional digital channel to pin 2. Port Class B (type B): pin 2 and pin 5 are used for an additional power supply. The information regarding the pin assignment of your module can be found in the chapter "Introduction".

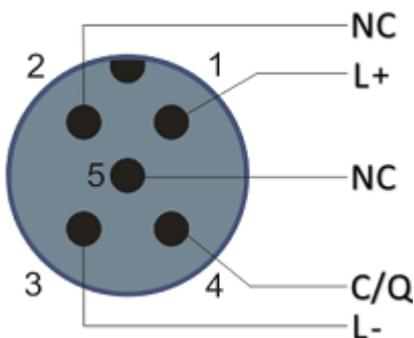


Fig. 7: Pin assignment Port Class A, Pin 2 not connected

In the case of Class A modules an additional digital input or output (I/Q) can be connected to Pin 2.

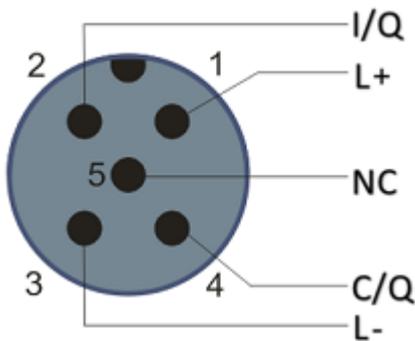


Fig. 8: Pin assignment Port Class A, Pin 2 connected

Port Class B (type B): For devices with higher current demand, an additional power supply is provided via pin 2 and pin 5.

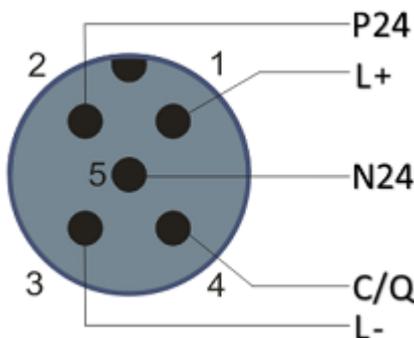


Fig. 9: Pin assignment Port Class B

The IO-Link master (EP622x-xxxx) has an A-coded M12 socket for the outgoing IO-Link connection.



Fig. 10: IO-Link connection, master

Wire colors

The wire colors of the IO-Link cable with corresponding pin assignment of the IO-Link connector:

Pin	Wire color
1	brown
2	white
3	blue
4	black
5	grey

IO-Link cable



Fig. 11: Example IO-Link cable: male to female

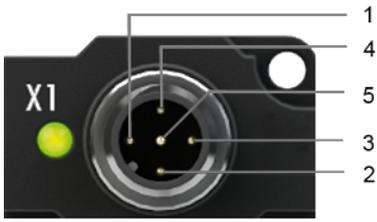
The cables available from Beckhoff for the IO-Link system can be found in the chapter .

i IO-Link cable

A 3-core IO-Link cable may be sufficient for Class A masters/devices from Beckhoff. A Class B master/device requires a 5-wire IO-Link cable.

4.2.2 Connection IO-Link Device

The IO-Link box (EPIxxxx,ERIxxxx) has an A-coded M12 connector for the incoming IO-Link connection.



IO-Link connection, Device (narrow housing)



IO-Link connection, Device (wide housing)

4.2.3 IO-Link status LED



IO-Link Device status LED (narrow housing)



IO-Link Device status LED (wide housing)

LED display

LED	Display	Meaning
IO-Link status LED (X1)	off	IO-Link communication inactive
	flashes green (1Hz)	IO-Link communication active
	red illuminated	Short circuit on C/Q line or overheating

4.3 Status LEDs for power supply

The IO-Link module contains 2 diagnostic LEDs for the power supply and a Diagnostic object (0x0A00) for more accurate diagnosis. The description of the diagnostic parameters (Index 0x0A00) is described in the section Object description and parameterization.



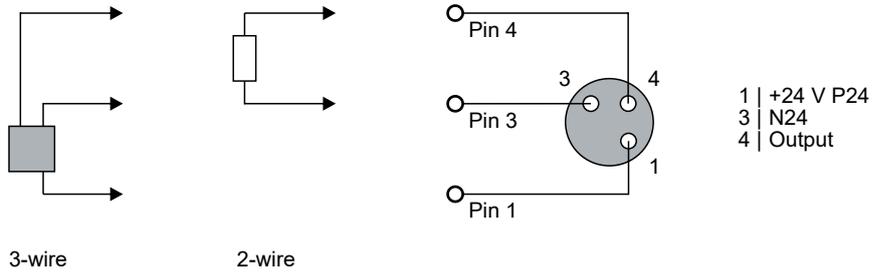
Fig. 12: Status LEDs for power supply

LED display

LED	Display	Meaning
24 V	off	Voltage L+ non-existent
	green	voltage L+ ok
	red	Voltage L+ too low
right LED	green	Voltage P24 ok, digital outputs ok
	off	Voltage P24 too low, overvoltage detected at one of the digital outputs, short-circuit

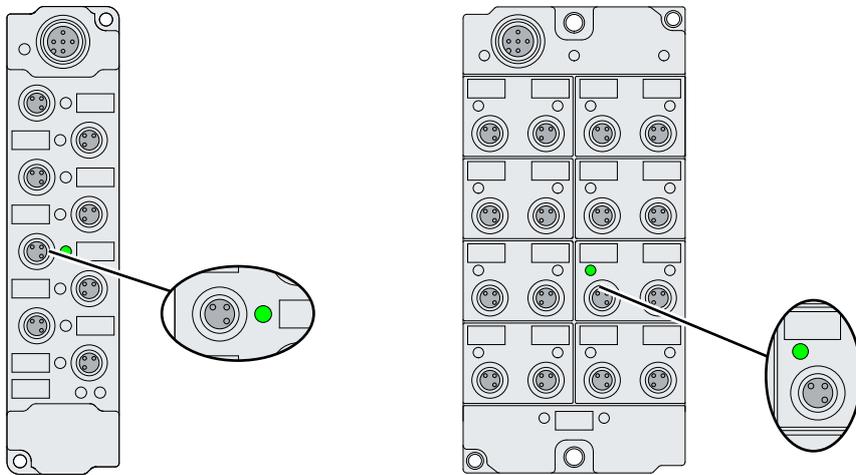
4.4 Signal connection

4.4.1 Digital outputs M8



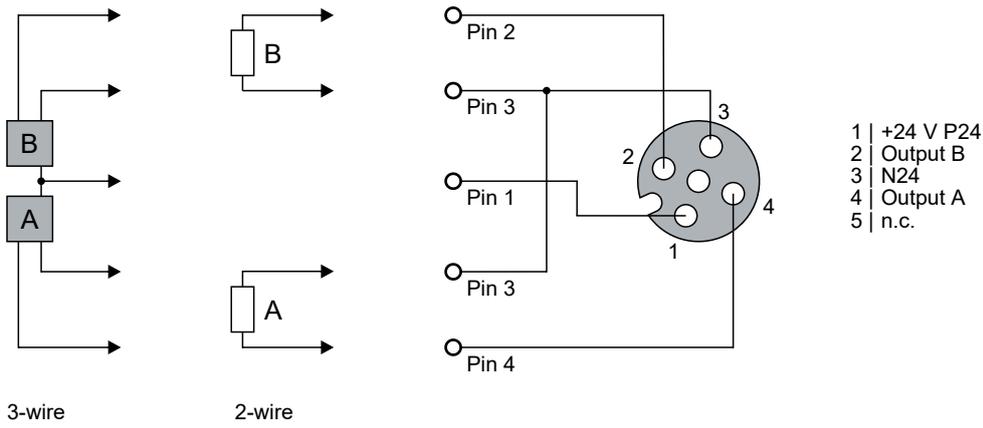
Status LEDs

There is a green LED next to each M8 socket.



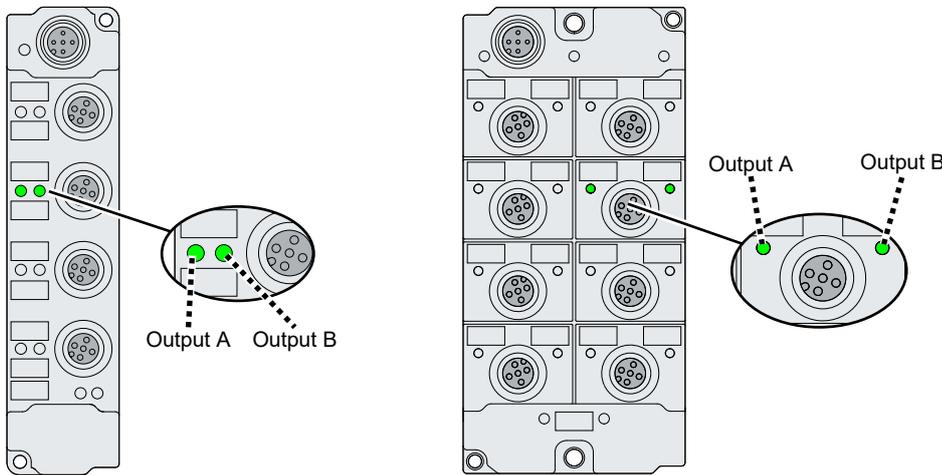
Display	Meaning
Off	The digital output is switched off
Lit	The digital output is switched on

4.4.2 Digital outputs M12



Status LEDs

There are two green LEDs next to each M12 socket.

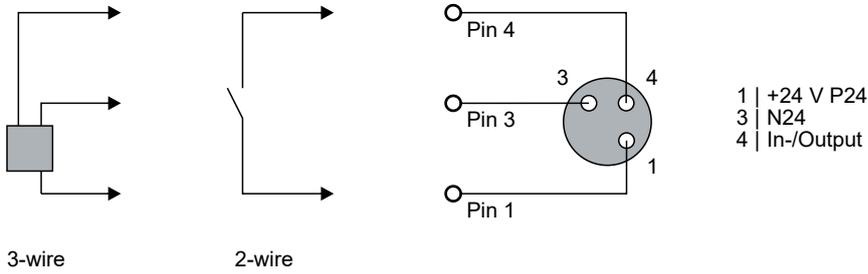


Display	Meaning
Off	The digital output is switched off
Lit	The digital output is switched on

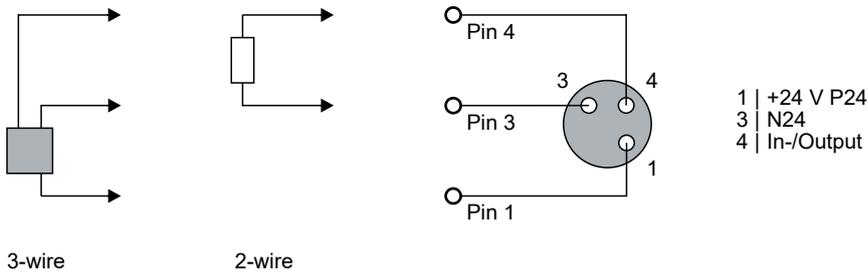
4.4.3 Digital inputs/outputs M8

Each channel can be operated either as a digital input or as a digital output.

Operation as digital input

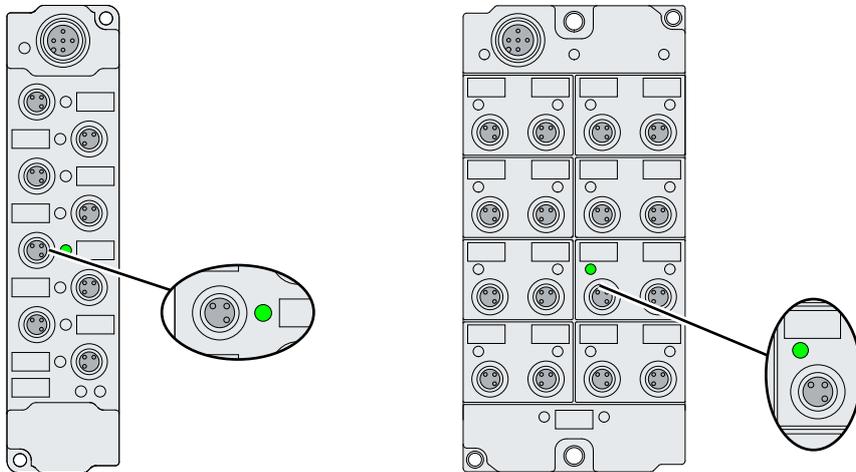


Operation as digital output



Status LEDs

There is a green LED next to each M8 socket.

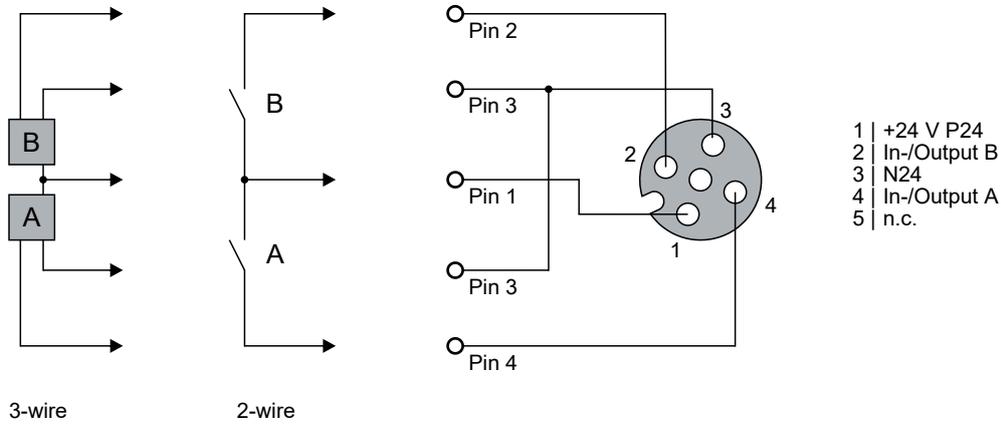


Display	Meaning when operating as digital input	Meaning when operating as digital output
Off	Low level detected.	The digital output is switched off.
Lit	High level detected.	The digital output is switched on.

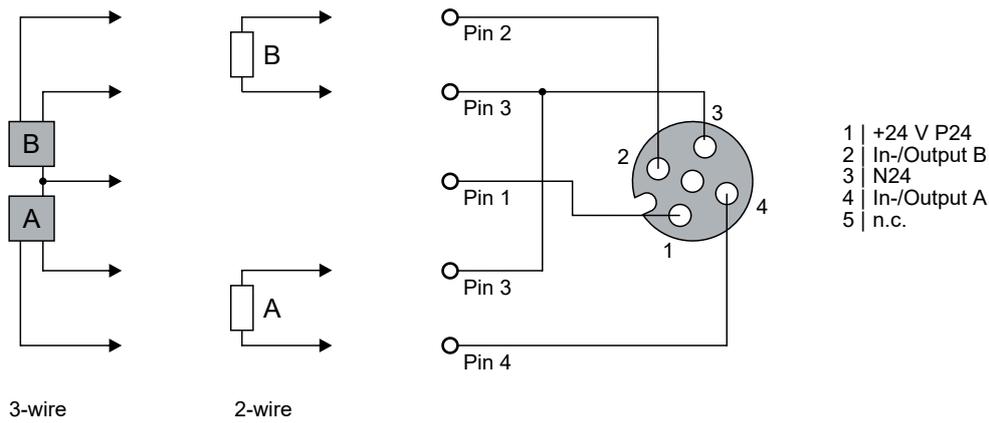
4.4.4 Digital inputs/outputs M12

Each channel can be operated either as a digital input or as a digital output.

Operation as digital input

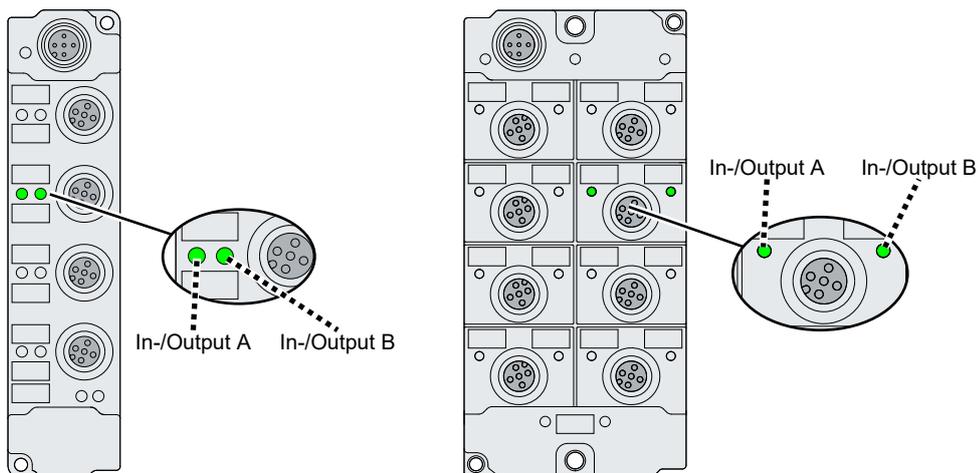


Operation as digital output



Status LEDs

There are two green LEDs next to each M12 socket.



Display	Meaning when operating as digital input	Meaning when operating as digital output
Off	Low level detected.	The digital output is switched off.
Lit	High level detected.	The digital output is switched on.

4.5 UL Requirements

The installation of the EtherCAT Box Modules certified by UL has to meet the following requirements.

Supply voltage

⚠ CAUTION

CAUTION!

This UL requirements are valid for all supply voltages of all marked EtherCAT Box Modules!
For the compliance of the UL requirements the EtherCAT Box Modules should only be supplied

- by a 24 V_{DC} supply voltage, supplied by an isolating source and protected by means of a fuse (in accordance with UL248), rated maximum 4 Amp, or
- by a 24 V_{DC} power source, that has to satisfy *NEC class 2*.
A *NEC class 2* power supply shall not be connected in series or parallel with another (class 2) power source!

⚠ CAUTION

CAUTION!

To meet the UL requirements, the EtherCAT Box Modules must not be connected to unlimited power sources!

Networks

⚠ CAUTION

CAUTION!

To meet the UL requirements, EtherCAT Box Modules must not be connected to telecommunication networks!

Ambient temperature range

⚠ CAUTION

CAUTION!

To meet the UL requirements, EtherCAT Box Modules has to be operated only at an ambient temperature range of -25 °C to +55 °C!

Marking for UL

All EtherCAT Box Modules certified by UL (Underwriters Laboratories) are marked with the following label.



Fig. 13: UL label

4.6 Cabling

A list of EtherCAT cables, power cables, sensor cables, IO-Link cables, Ethernet/EtherCAT connectors and field-configurable connectors can be found in the chapter .

IO-Link cable

The IO-Link master is connected to the IO-Link device by an unshielded 3, 4 or 5-core (type A) or 5-core (type B) cable with a maximum length of 20 m. The IO-Link cables are available as straight and angled versions. Further information about the IO-Link connection can be found under: [IO-Link master connection](#) [► 34]



Fig. 14: Example IO-Link cable: male to female

Sensor cable



Fig. 15: Selection of sensor cables available from Beckhoff

5 Commissioning and configuration

5.1 Configuration of the IO link master

i EtherCAT XML device description and configuration files

The display matches that of the CoE objects from the EtherCAT XML Device Description. We recommend downloading the latest XML file from the download area of the [Beckhoff website](#) and installing it according to installation instructions.

When adding the IO-Link master (see chapter Integrating into a TwinCAT project) in the TwinCAT System Manager, an additional tab called "IO-Link" is created (fig. *IO-Link tab*). A detailed description can be found in chapter [Configuration of the IO-Link devices](#) [▶ 46]

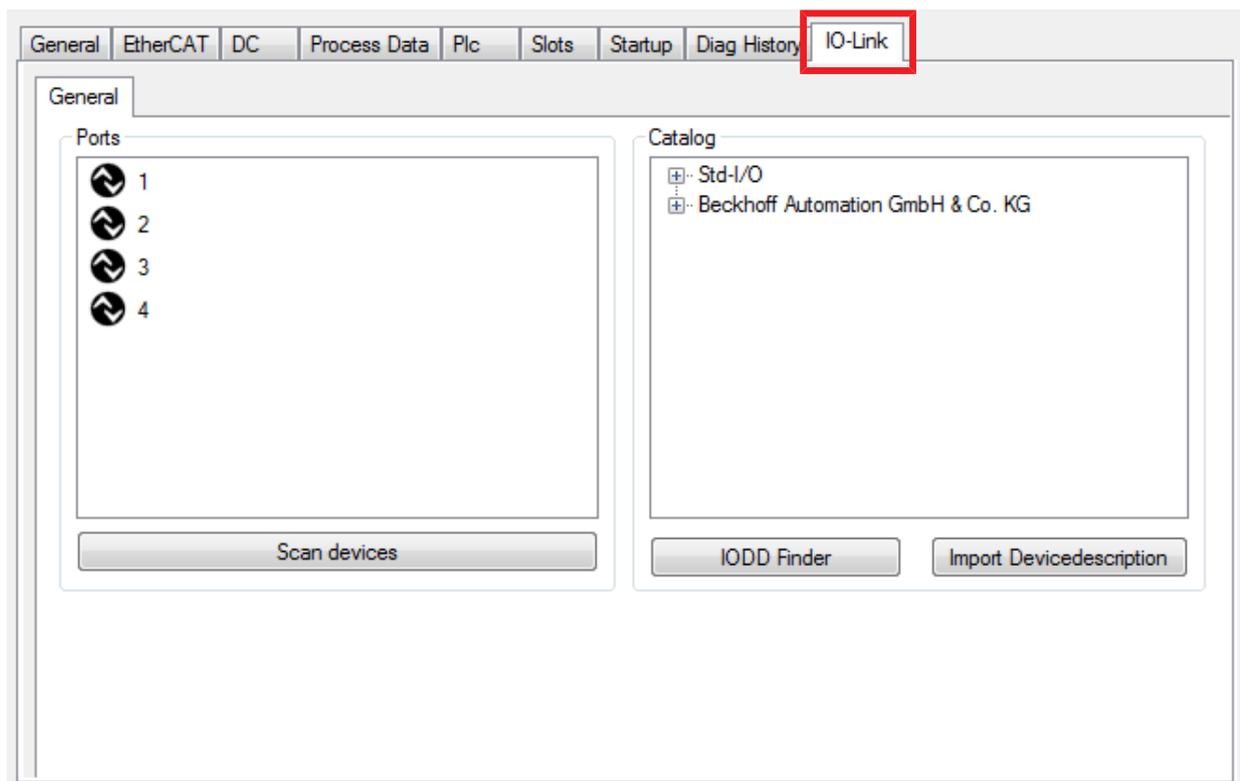


Fig. 16: "IO Link" tab

i IO-Link Extension

If the tab "IO-Link" is not displayed, the associated System Manager extension is missing. The System Manager extension is required for TwinCAT version 2.10, build 1325 to 1330.

- If your System Manager version or TwinCAT 3 does not yet provide this support, it can be installed later if necessary. Please contact our [Support](#) [▶ 95].

5.2 Configuration of the IO-Link devices

The configuration of the IO link devices is carried out in the IO link configuration tool. Configure the IO link device as described below.

- ✓ Requirement: an IO-Link master has been added in the Solution Explorer under the "I/O" entry.
- 1. [Open the IO link configuration tool \[► 46\]](#).
- 2. [Import the IODD file of the IO link device \[► 50\]](#).
- 3. Assign devices to ports.
 - ⇒ [Assign a device to a port \[► 47\]](#).
 - ⇒ [Configure a port as digital in- or output \[► 50\]](#).
- 4. [Remove a device from a port \[► 56\]](#).
- 5. [Activate the IO link configuration \[► 57\]](#), so that changes become effective.

5.2.1 Open the IO link configuration tool

- ✓ Requirement: an IO-Link master has been added in the Solution Explorer under the "I/O" entry.
- 1. Double-click on the IO-Link master.
 - ⇒ A device editor for the IO-Link master opens.
- 2. Click on the "IO-Link" tab.
 - ⇒ The IO-Link configuration tool opens. The configuration tool contains two fields:
 - „Ports“
The left-hand field "Ports" shows a list of the ports of the IO-Link master. If a device has been assigned to a port, the device designation is shown next to the port.
 - „Catalog“
The right-hand field "Catalog" shows the device catalog.
The device catalog contains an alphabetically sorted list of the IO-Link devices for which a device description (IODD) exists in the local TwinCAT installation.
The IODDs for the EPIxxxx, ERIxxxx IO-Link Box modules from Beckhoff can be downloaded via the [Download finder](#). The downloaded zip file contains the IODD device description files for the Beckhoff EPIxxxx, ERIxxxx IO-Link Box modules.

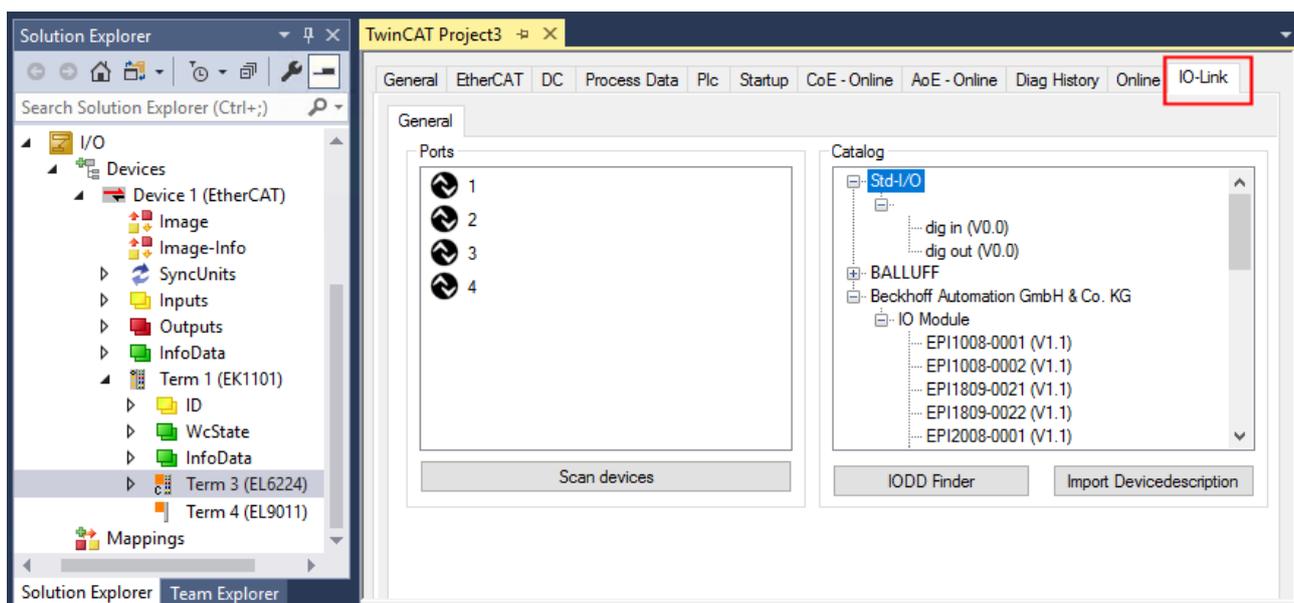


Fig. 17: IO-Link configuration tool

5.2.2 Integrating IO-Link devices

The integration of the IODD file should always be the first step, since this enables the breakdown of the individual process data of the IO-Link devices as well as the display of the parameters.

There are several ways of integrating an IO-Link device:

1. Importing the IODD file (offline and online) via
 - ⇒ button Import Devicedescription [▶ 48] (A) or
 - ⇒ button IODD Finder [▶ 48] (B)
2. Select the device in the "Catalog" field and assign it to a port [▶ 50].
3. Automatic scanning of the IO-Link ports (online) via
 - ⇒ button Scan devices [▶ 51] (C)
4. Manual insertion (offline and online) via
 - ⇒ menu Create Device [▶ 55] (D)

i Application note

- If the IODD is not available, the IO-Link device should be integrated online by scanning.
- Manual integration of the IO-Link devices via "Create Device" should only be carried out if the IODD of the vendor and the IO-Link device are not available at the time of project creation.

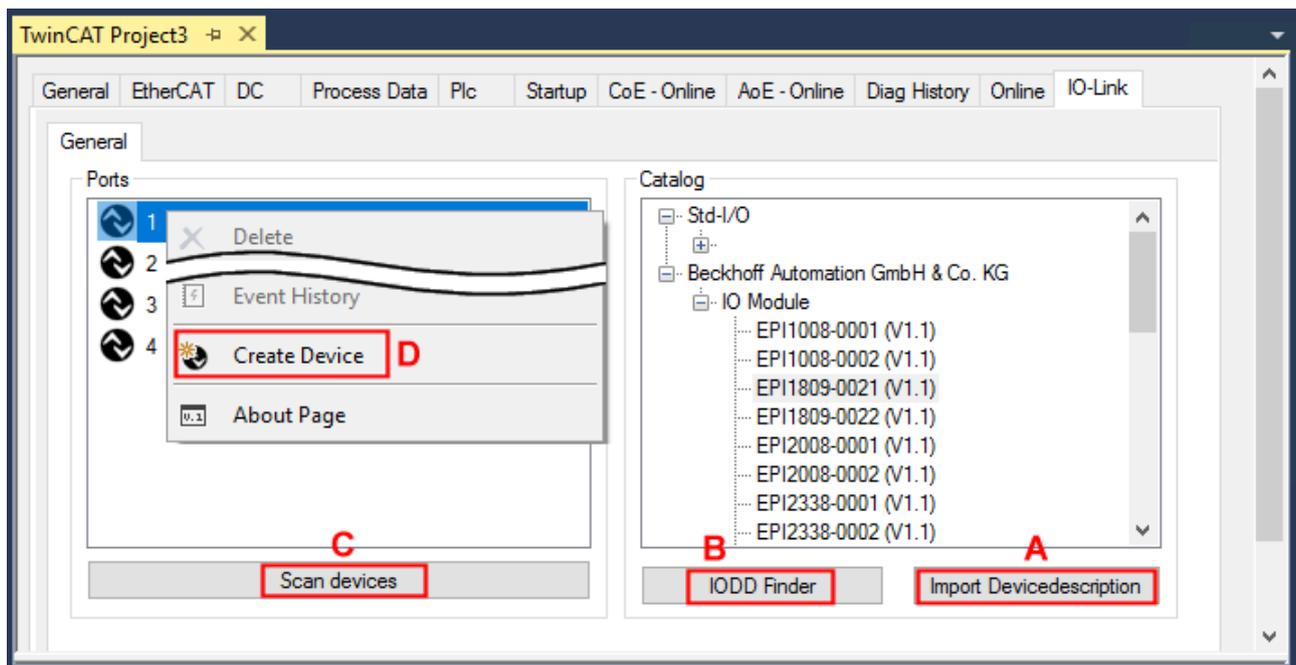


Fig. 18: Creating IO-Link devices

5.2.2.1 1. Importing the device description IODD

Importing the device description simplifies the integration of the IO-Link devices. The individual process data are broken down, enabling simple parameterization of the sensor. The IODD only needs to be imported during the initial commissioning of a new IO-Link device. The import is port-independent. Proceed as follows to import the IODD:

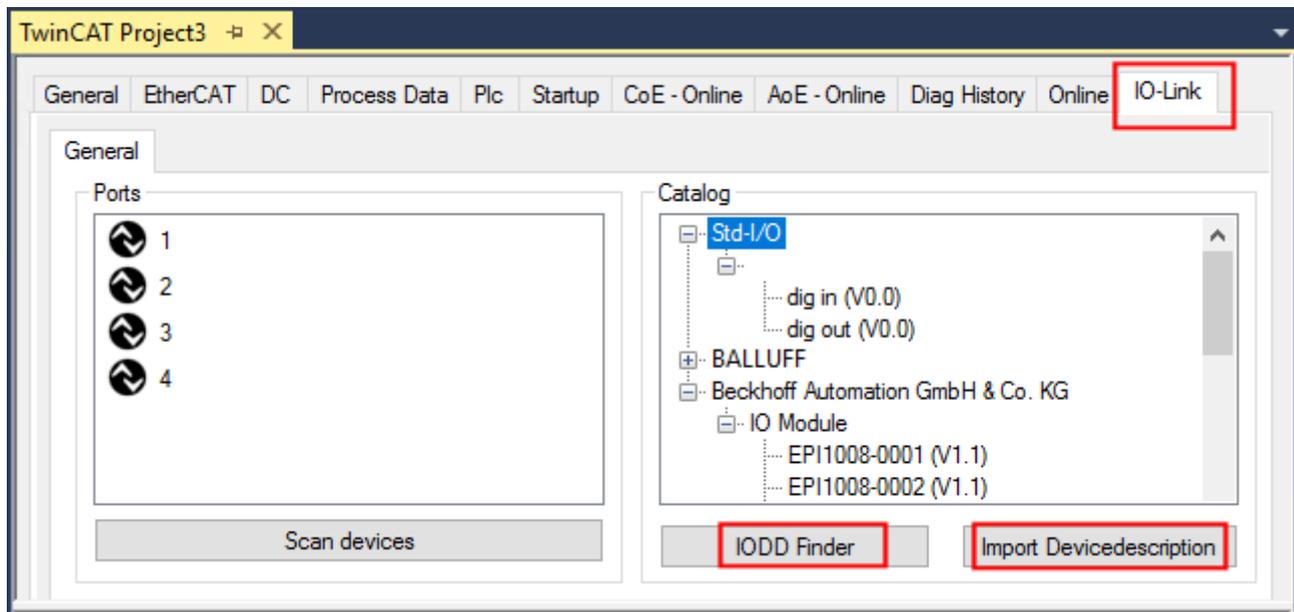


Fig. 19: Import of the IODD device description via “IODD Finder” or “Import Devicedescription”

Button “Import Devicedescription”

1. Press the “Import Devicedescription” button in the “IO-Link” tab
 2. Select the .xml file of the desired sensor.
 3. After pressing the Open button, the imported files are stored in the following folder:
 - for TwinCAT 2.x: \TwinCAT\IO\IOLink
 - for TwinCAT 3.x: \TwinCAT\3.X\Config\IO\IOLink.
- ⇒ The imported device descriptions are listed in a tree structure in the “Catalog” field, sorted by vendor.

i No manual copying of the XML files

Do not copy the files directly into the folder; read them in via *Import Devicedescription* instead! Important checks will otherwise be bypassed!

Button “IODD Finder”

1. Press the “IODD Finder” button in the “IO-Link” tab
2. Searching for the desired IO-Link sensor/device by entering them in the search mask; see the figure below (1)
3. Selecting the desired IO-Link sensor/device. Move the mouse pointer over the figure of the desired IO-Link sensor/device. A blue download icon appears, see the following figure (2).

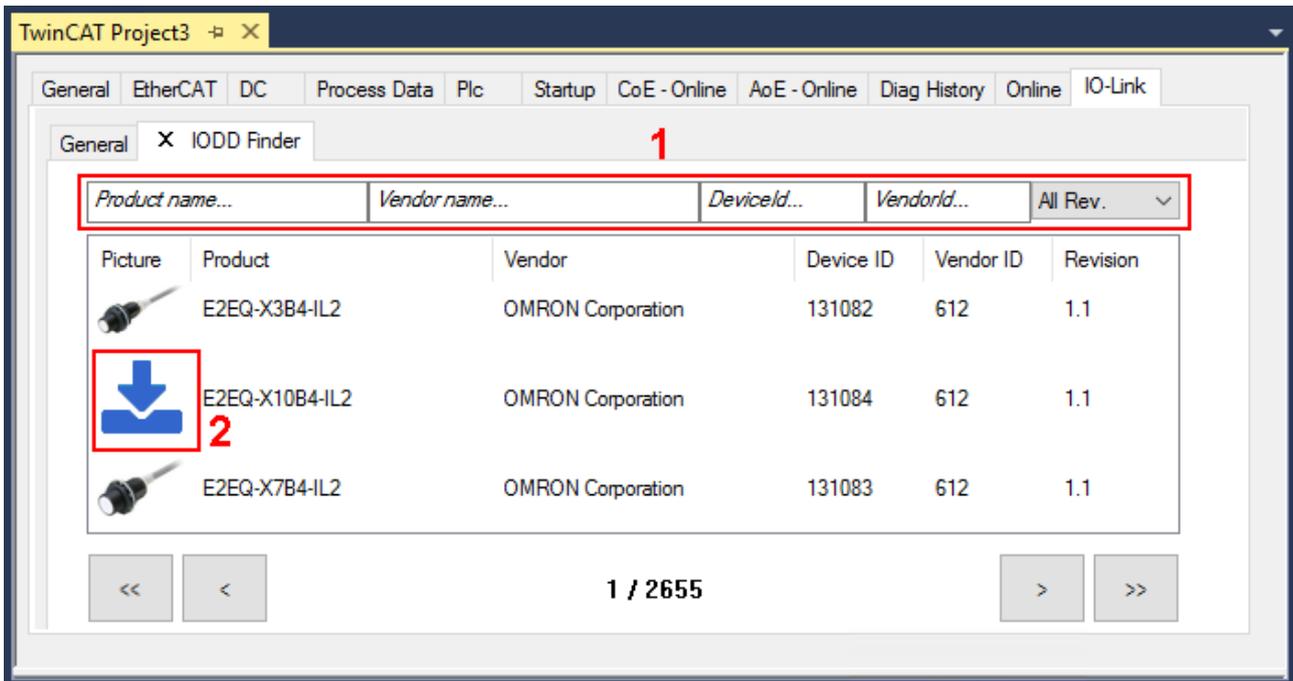


Fig. 20: IODD Finder, selection and import of the .xml-file

4. After clicking the download symbol, the .xml file of the selected IO-Link sensor/device is imported and stored in the following folder:
 - for TwinCAT 2.x: \TwinCAT\IO\IOLink
 - for TwinCAT 3.x: \TwinCAT\3.X\Config\IO\IOLink
5. When moving the mouse pointer over the IO-Link sensor/device, a green icon now indicates (see the following figure (3)) that the .xml file already exists.

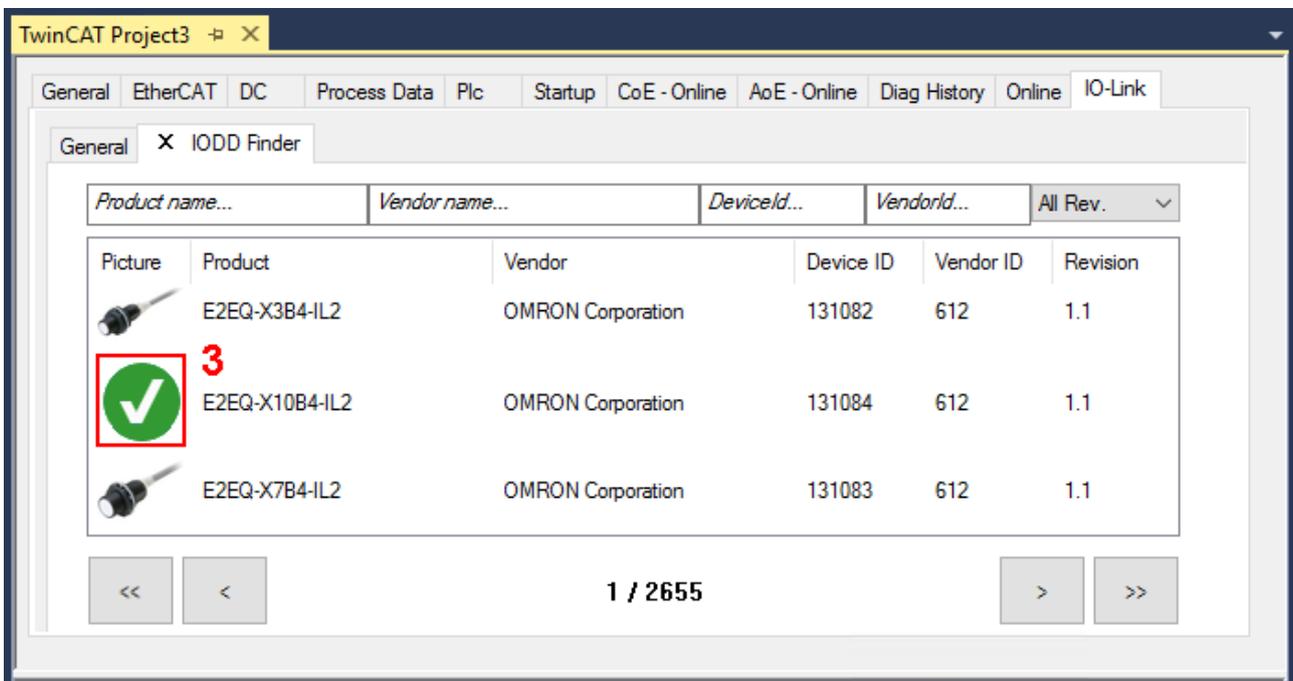


Fig. 21: IODD Finder, display of an already imported device description

- ⇒ The imported device descriptions are listed in a tree structure in the “Catalog” field of the IO-Link tab, sorted by vendor.

5.2.2.2 2. Assigning IO-Link device to port n

Online configuration

✓ Requirement: The IO-Link device is connected.

1. Press the button Scan devices (see chapter [Automatic scanning](#) [▶ 51])

⇒ The device is automatically detected and created with the corresponding parameters. If several devices are stored in the IODD file, the first entry is always selected here. Grouping in the IODD is usually carried out by the vendor if the process data are the same and there are only mechanical differences (e.g. other material).

Offline configuration

The *Catalog* field shows the IO-Link device catalog, which lists the already imported device descriptions in a tree structure, sorted by vendor.

1. Select the desired IO-Link device from the *Catalog* field
 - via drag and drop or
 - by right-clicking on the product with "Add to Port n".

Activating the configuration

2. [Activate the IO link configuration](#) [▶ 57], so that changes become effective.

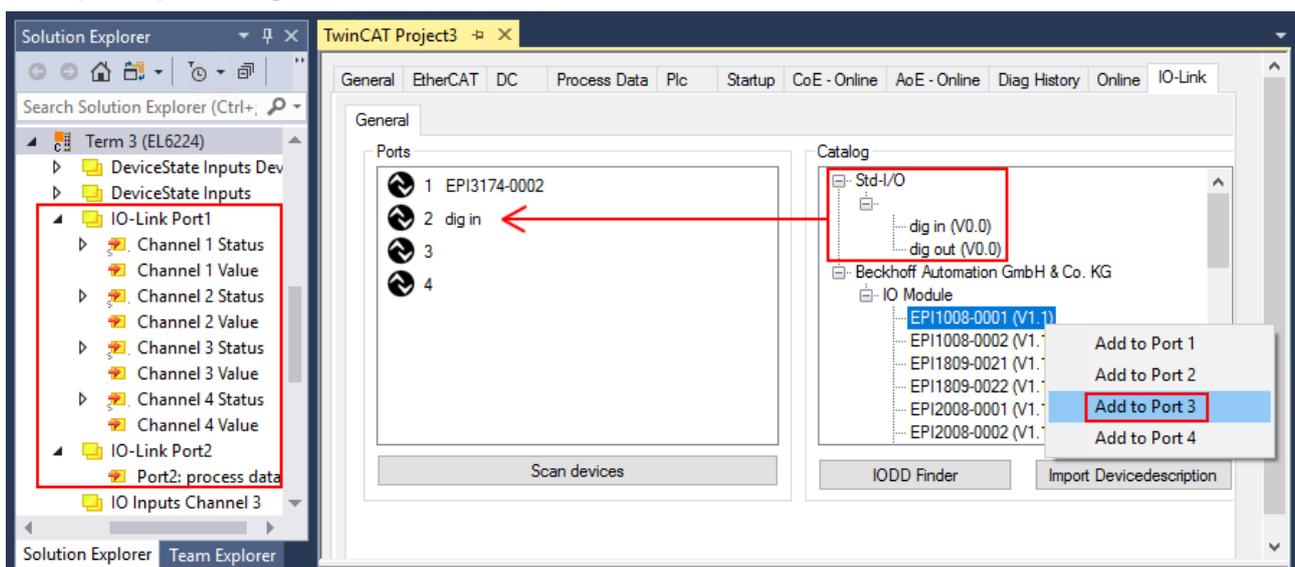
⇒ The IO-Link devices are displayed, and the process data are created. If an error is found when integrating the IO-Link device, e.g. wrong VendorID or no device connected, then this is indicated via the status of the port (object state Ch.n 0xF100:0n).

Configuration of the IO-Link ports as digital in- or output

IO-Link ports can also be configured as digital inputs or digital outputs. This allows digital sensors and actuators having no IO-Link functionality to be connected to IO-Link ports.

1. Expand the "Std-I/O" tree node in the "Catalog" field.
 - ⇒ The operating modes "dig in" and "dig out" appear.
2. Configure the desired port. There are two ways to do this:
 - Drag-and-drop: pull "dig in" or "dig out" onto the port in the "Ports" field or
 - Right-click on "dig in" or "dig out" and click on "Add to Port n".

Example of port assignment on the IO link master EL6224



Port1:
EPI3174-0002 is assigned
Process data of Port1 and Port2 are displayed in the Solution Explorer.

Port2:
is configured as digital input

Port3:
EPI1008-0001 will be assigned

5.2.2.3 3. Automatic scanning of the IO-Link ports

This part of the documentation describes the configuration of the physically available IO-Link devices in TwinCAT.

During automatic scanning of the IO-Link ports, the steps “WakeUp pulse”, “Baud rate setting”, “Reading of the communication parameters”, plus “Parameter server” and “Cyclic data exchange”, if applicable, are performed, see [Establishing the IO-Link communication \[▶ 28\]](#). The corresponding IO-Link device must be connected to the IO-Link port for this.

The connected devices are automatically detected, configured and a search is performed for the associated IODD.

Finding connected IO-Link devices

✓ Requirement: the master and the devices are cabled and supplied with voltage.

1. Click on the “Scan devices” button (see the following figure).

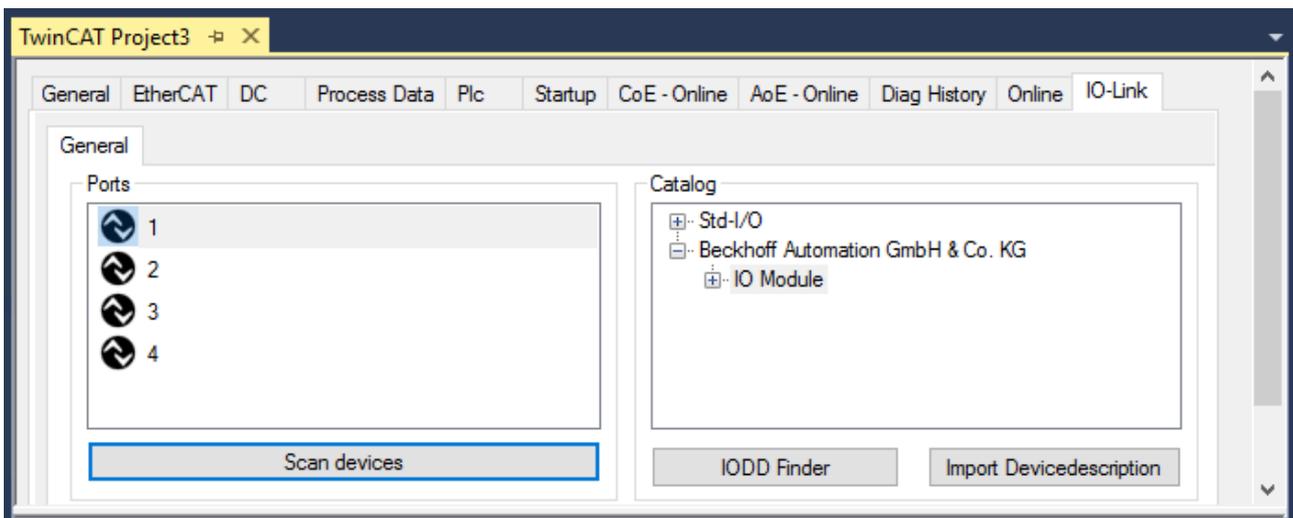


Fig. 22: Scan devices

- ⇒ The connected IO-Link devices can be found.
- ⇒ The information window lists the connected device for each of the four ports. Only port2 of the master is assigned an IO-Link device.
- ⇒ Confirm with the OK button.

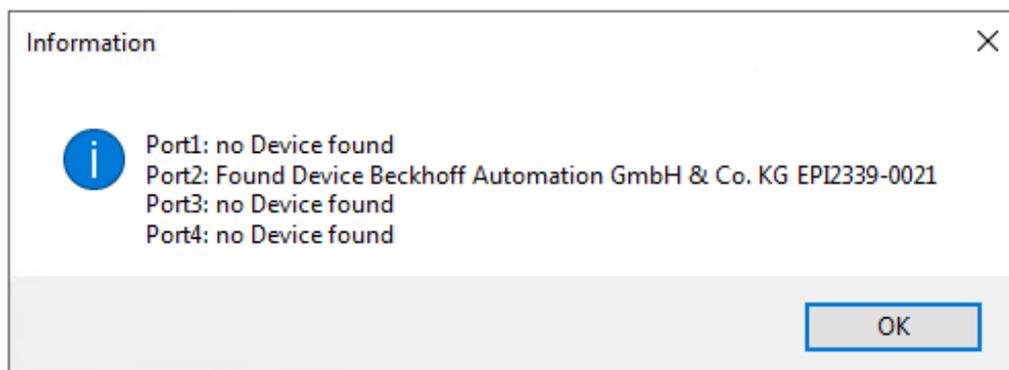


Fig. 23: Information “Scan devices”

1. To be able to work with the devices, the button “Reload Devices” must be clicked. 

The IO-Link devices are now entered in the *General* display. The Port2 “Details” field displays information about the connected device. Additionally the tabs [Settings](#) [► 53] and [Parameter](#) [► 54] can be opened.

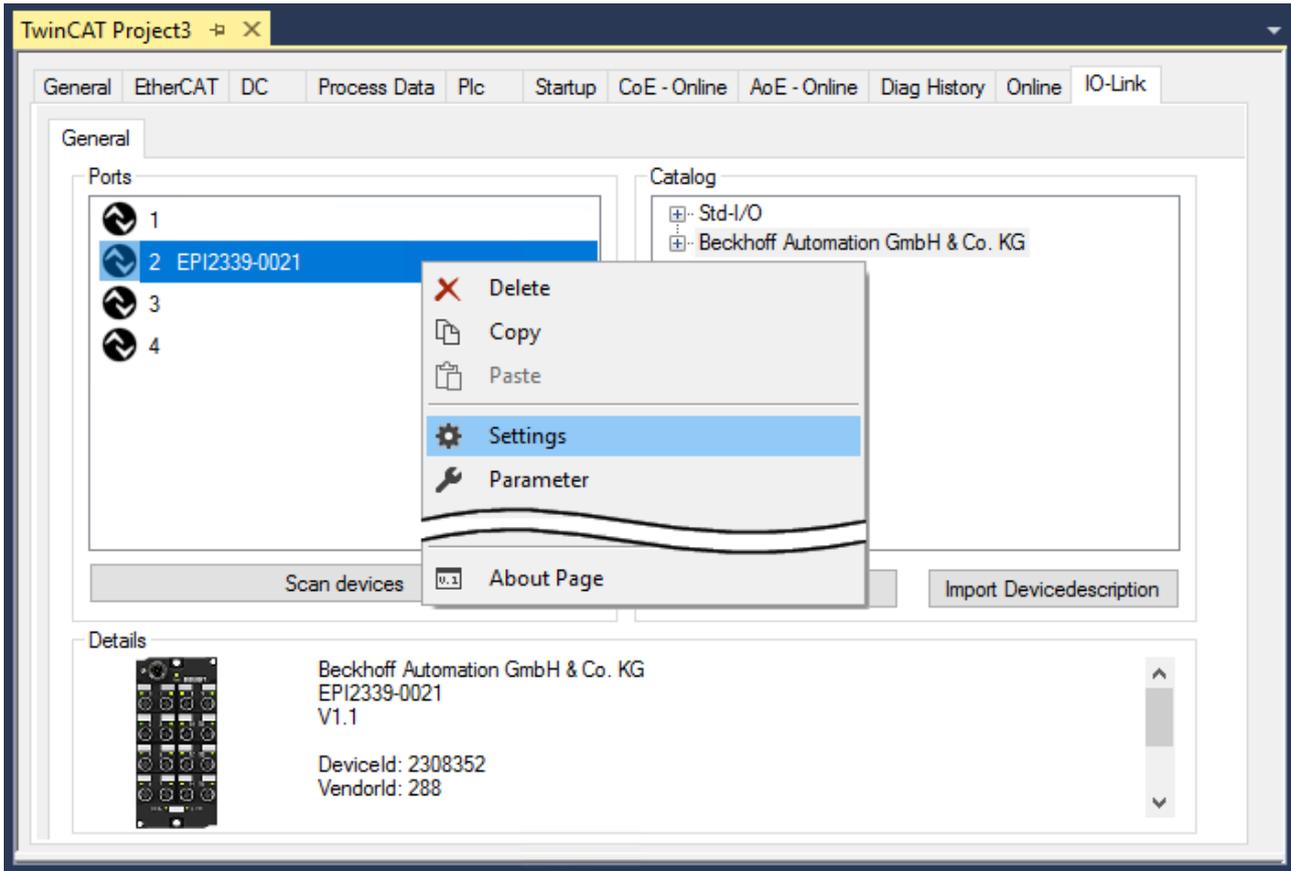


Fig. 24: Device at Port2, Display “Details”, open tabs “Settings” and “Parameter”

Show settings of the device

1. Right-click on port2, to display more details in dialog “Settings”.
2. If necessary, change the settings as described in chapter [Settings of the IO-Link devices \[► 58\]](#).

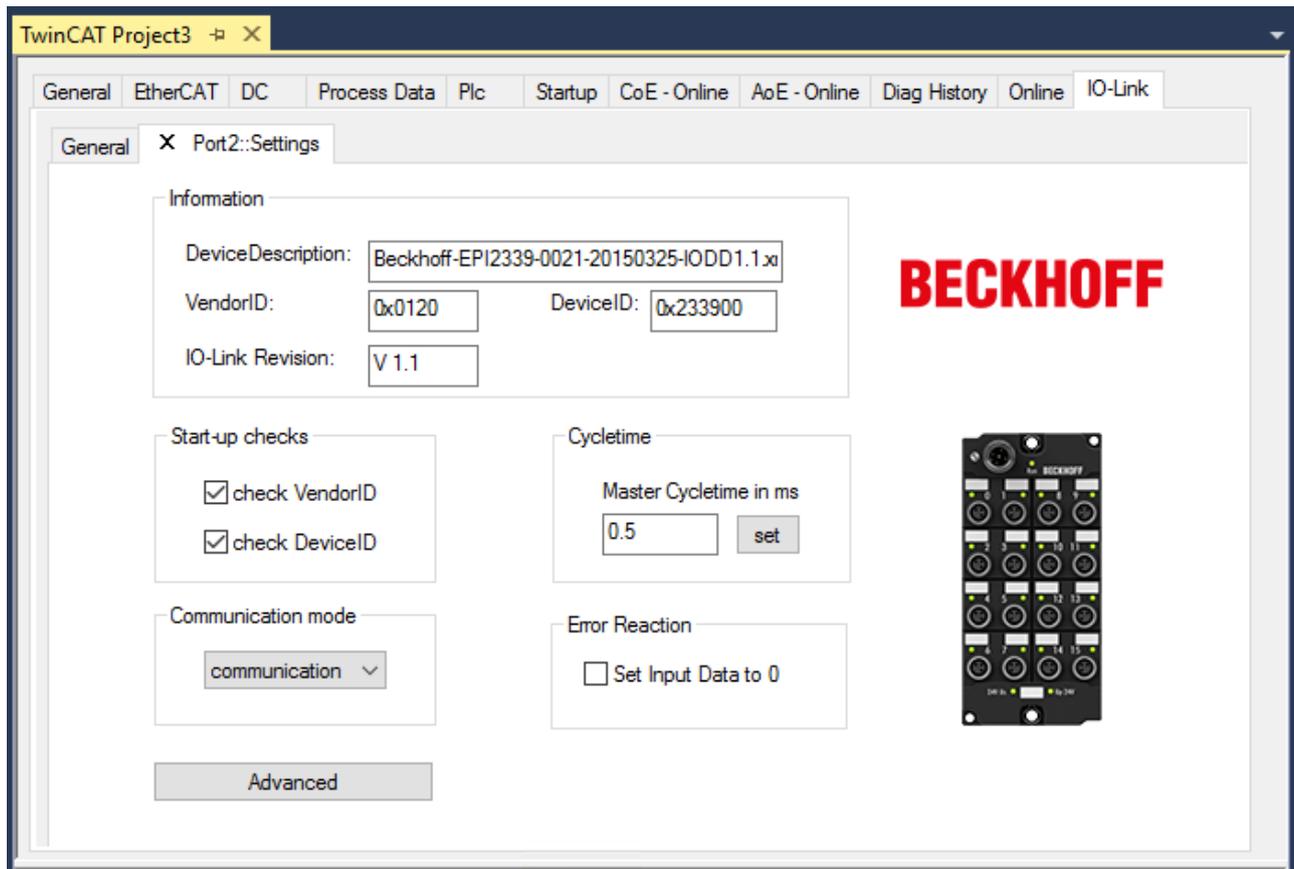


Fig. 25: Settings of the device assigned to port2

Show parameters of the device

1. Open the Parameter tab via
 - double-click on Port2 or
 - right-click on Port2 and select "Parameter" in the menu.
 ⇒ The Parameters of of the respective IO link device are listed.
2. Parameterize the device as described in chapter [EPIxxxx, ERIxxxx - Setting of the IO-Link device parameters \[▶ 60\]](#).

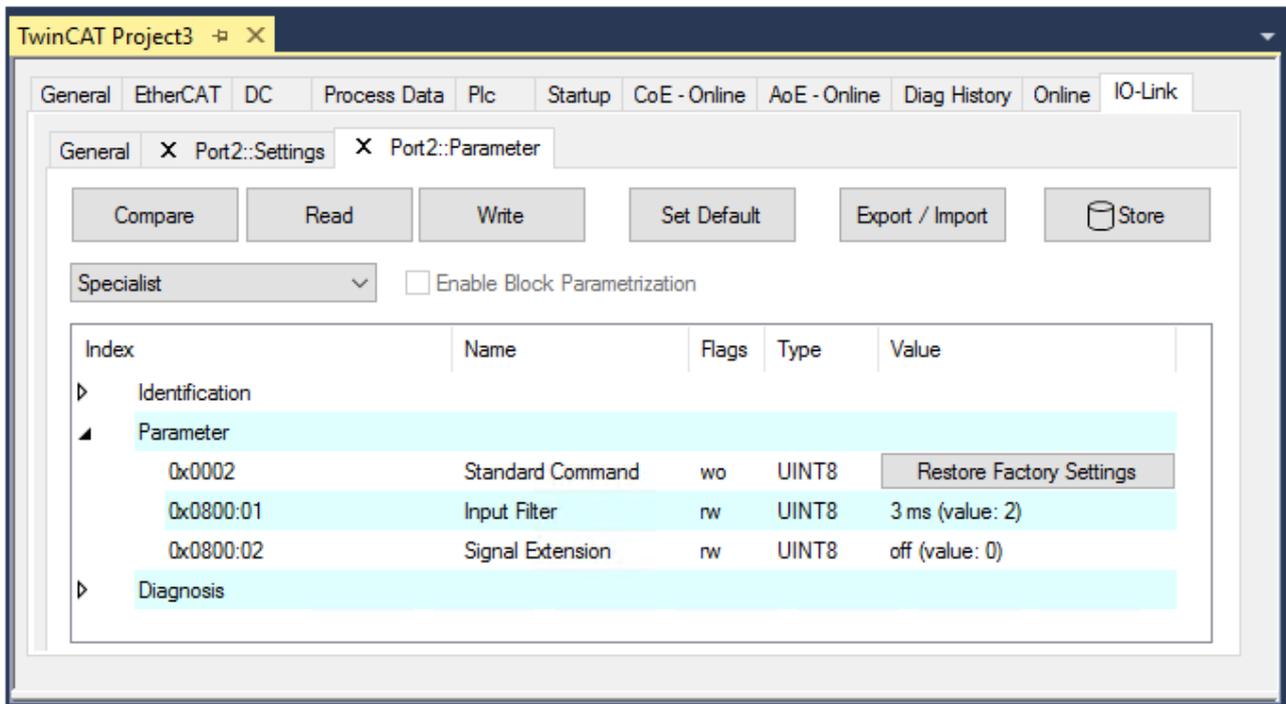


Fig. 26: Parameter of the device assigned to port2

5.2.2.4 4. Manual insertion via Create Device

This part of the documentation describes the manual configuration of the IO-Link devices in TwinCAT.

The manual insertion of the IO-Link device should only be carried out if the IODD from the vendor and the IO-Link device are not available. By saving the project, the settings for the individual ports are saved. The devices that were created are **not** stored in the "Catalog" (see the figure below (A)). To insert the IO-Link devices manually via "Create Device", proceed as follows:

1. The IODD of the IO link device is already available:
Select the respective device from the "Catalog" field sorted by manufacturer (see following figure (A)).
2. No IODD is available:
Add the device can be manually via "Create Device". These data are **not** saved in the "Catalog" field and must be manually entered for each port.
3. Right-click on the port to open the context menu (see the figure below (B)) and select "Create Device".
4. In the "Create Device" dialog an IO-Link device with the basic communication parameters can be created. The mandatory fields here are: For Vendor ID, Device ID and process data length see the figure below (C). The values VendorID and DeviceID can be entered both in hexadecimal notation (input format: 0xnnnn) and as decimal numbers (nnnn).
The communication parameters to be entered can be found in the information provided by the device vendor.
5. If the IO-Link device version is 1.1, then the parameter server is activated by the selection of the check box "Revision V1.1" (see following figure (D)).
6. Activate the IO link configuration [▶ 57], so that changes become effective.

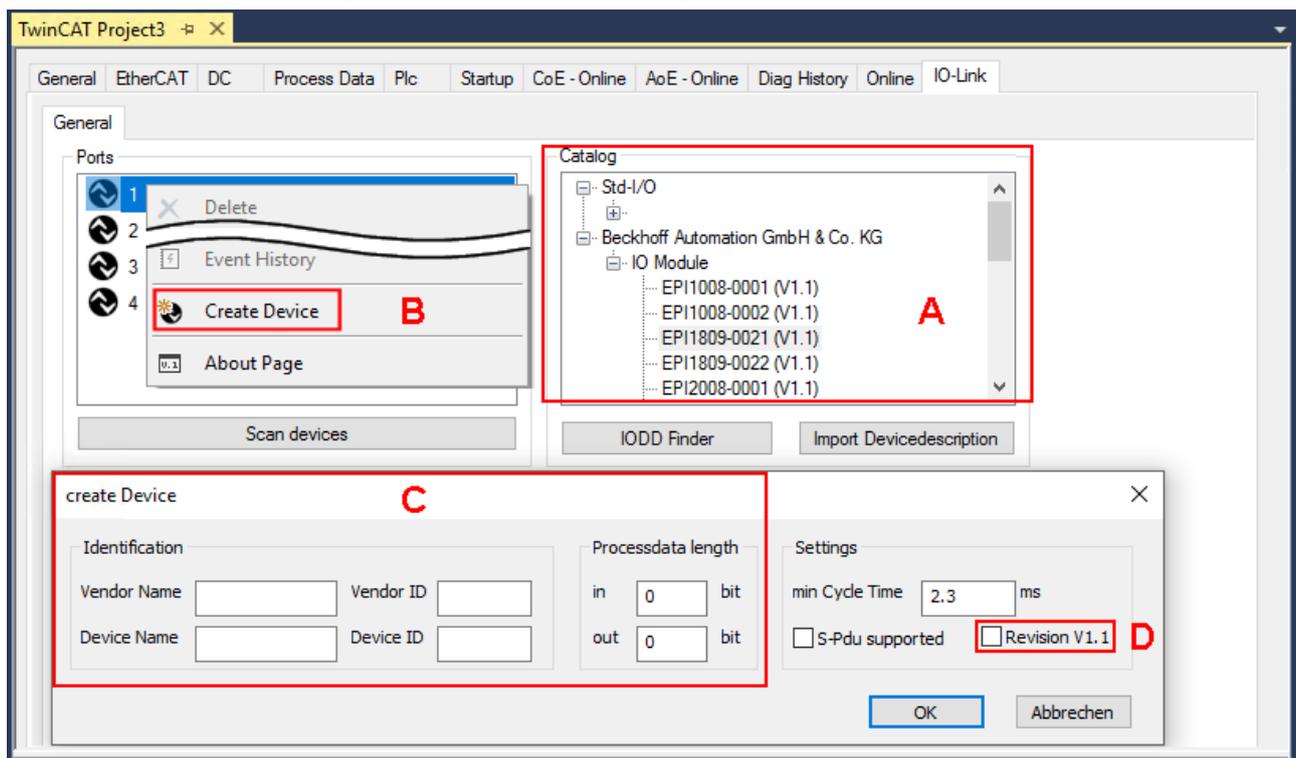


Fig. 27: Manual creation of an IO-Link device via the "Create Device" dialog (C)



Reading the IODD

Even when manually creating and scanning, the IODD should always be read in as well in order to display further sensor-specific information.

7. In the "Settings" tab of the IO link devices further settings can be made as described in chapter Settings of the IO-Link devices [▶ 58].

5.2.3 Removal of IO-Link devices

To remove a device that has already been inserted, proceed as follows.

1. Right-click on the port to open the context menu and select "Delete".

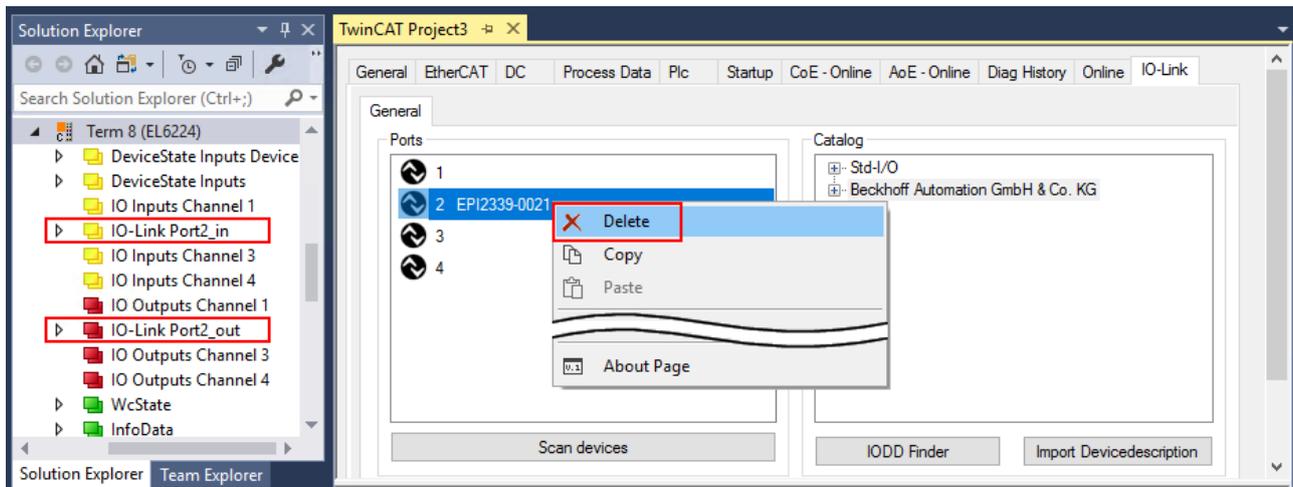


Fig. 28: Remove the device from port2

2. [Activate the IO link configuration \[▶ 57\]](#), so that changes become effective.
⇒ The already create process data are removed.

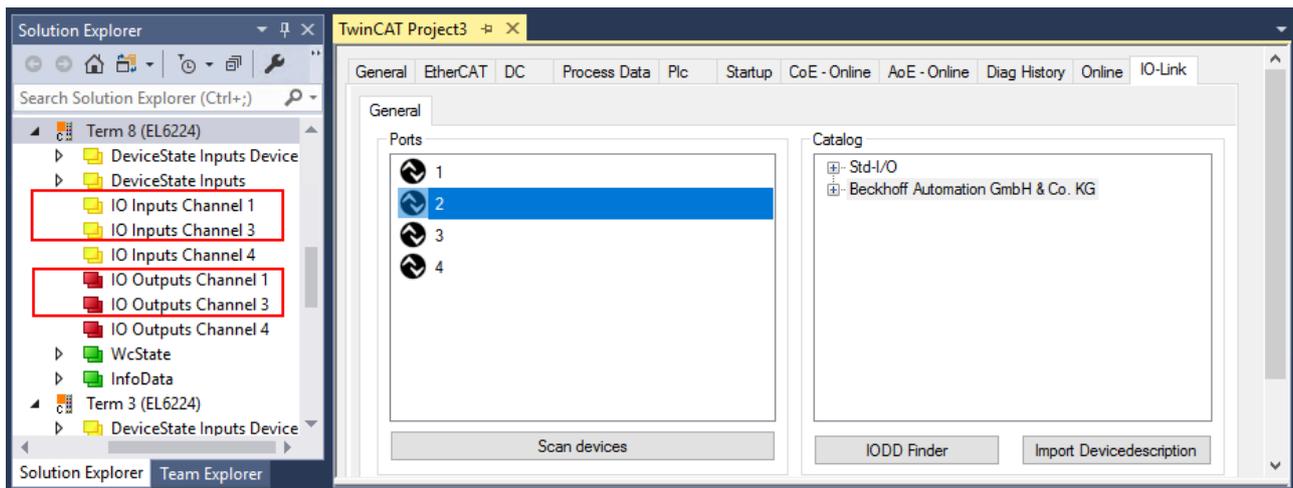


Fig. 29: The device was removed from the port2, the process data no longer displayed in the tree.

5.2.4 Activating the configuration

Changes in the IO-Link configuration tool only become effective when you activate the IO-Link configuration.

There are two ways to activate the IO-Link configuration:

- Click on the "Reload Devices" button



- Activate the TwinCAT configuration:
Click on the "Activate Configuration" button



5.3 Settings of the IO-Link devices

To find the basic settings of the devices for each port, proceed as follows.

1. right-click on the port to open the context menu and select "Settings".
- ⇒ A new tab "Portx:: Settings" opens where the settings described below can be made.

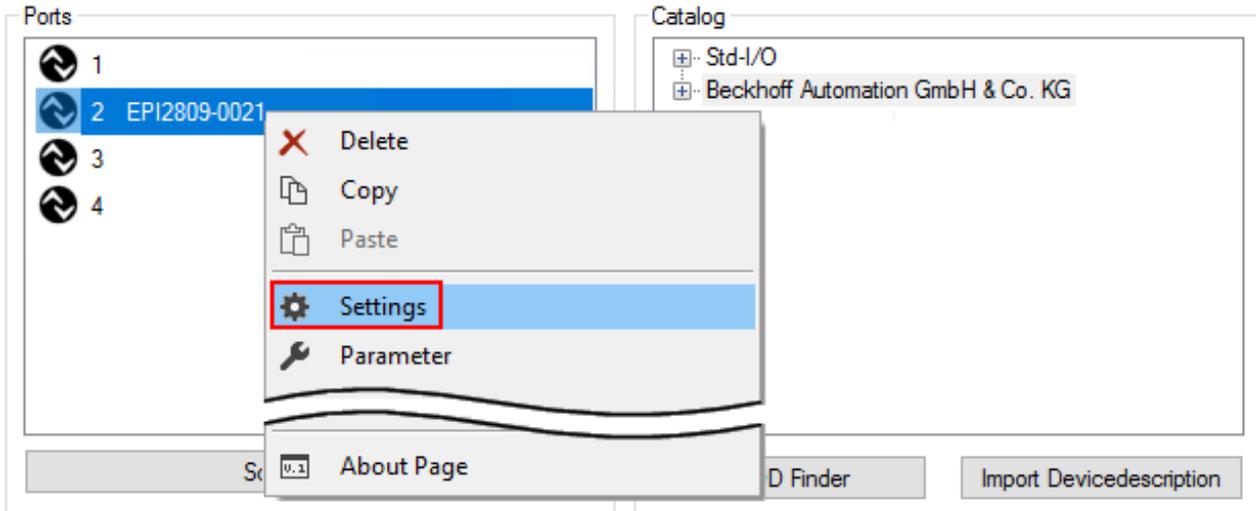


Fig. 30: Context menu - Settings

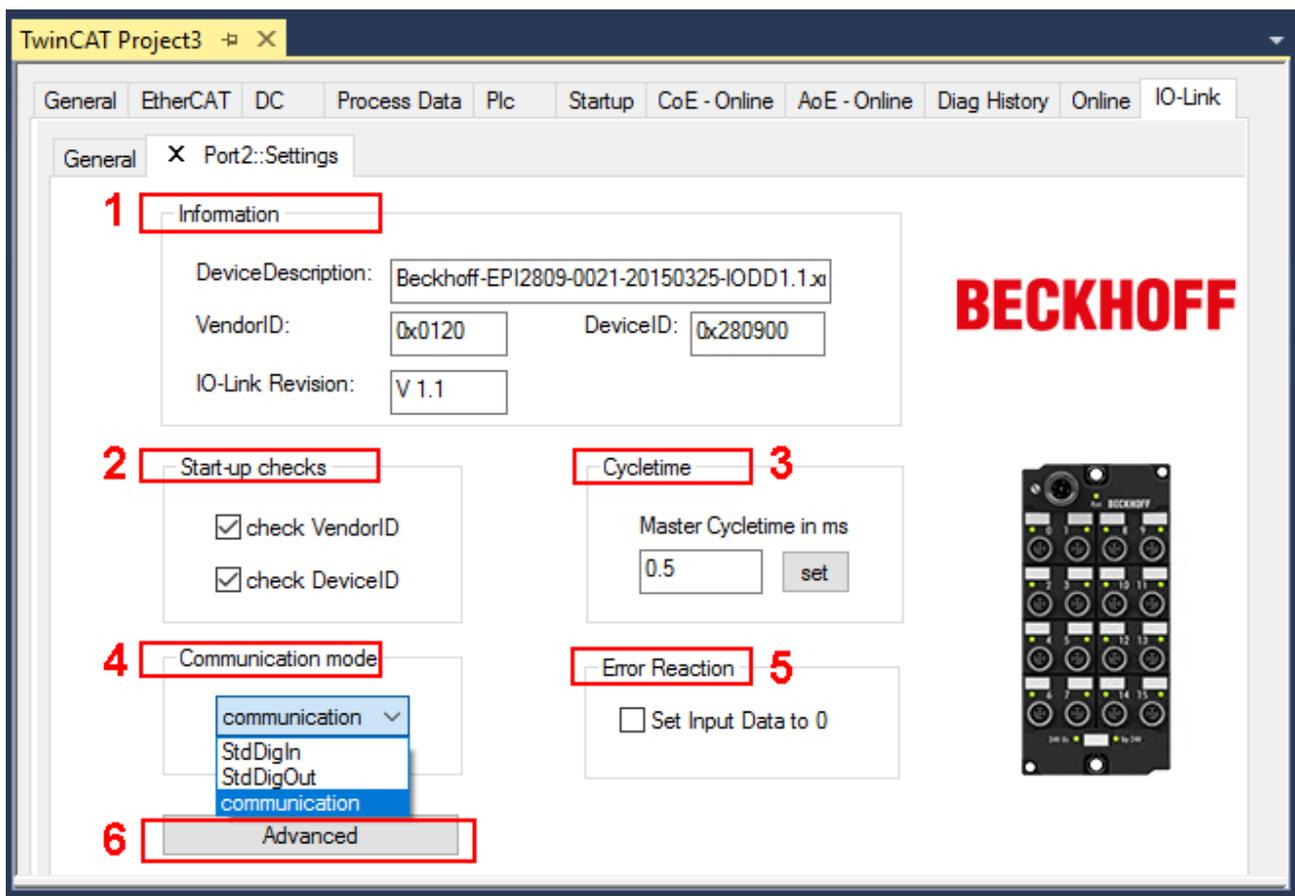


Fig. 31: Settings of the IO-Link devices

1. Information

This field is for information only; the IODD that was read in is displayed under Device Description. Furthermore, the VendorID, DeviceID and the IO-Link revision (V1.0 or V1.1) of the IO-Link devices are displayed. If the device is an IO-Link device V1.1, then the parameter server [[▶ 29](#)] function is supported.

The following settings can be made in the settings for the IO-Link devices (see figure above):

2. Start-up checks

This parameter can be used to specify that the Vendor ID and Device ID should be checked when the IO-Link device starts up.

⇒ This avoids errors when exchanging IO-Link devices.

3. CycleTime

Specifies the cycle time for the IO-Link master

4. Communication mode

Selection of the mode in which the IO-Link port is to be operated.

⇒ "Communication": Default mode for IO-Link devices

⇒ "StdDigIn / StdDigOut": Mode for non-IO-Link devices, automatically selected if the port is configured as a digital input or output [[▶ 50](#)].

5. Error Reaction

If the "Set Input Data to 0" field is activated:

⇒ input data are set to 0 in case of error

⇒ Status display: "Error"

6. Button "Advanced"

7. Data Storage

Pay attention to the sensor version:

⇒ V1.0 -> data storage is not supported

⇒ V1.1 -> data are stored in the parameter server (preset)

8. Process Data Format

Adaptation of the process data format

If Field "Use Octet String" is selected

⇒ complex data types (process data) are created as octet strings.

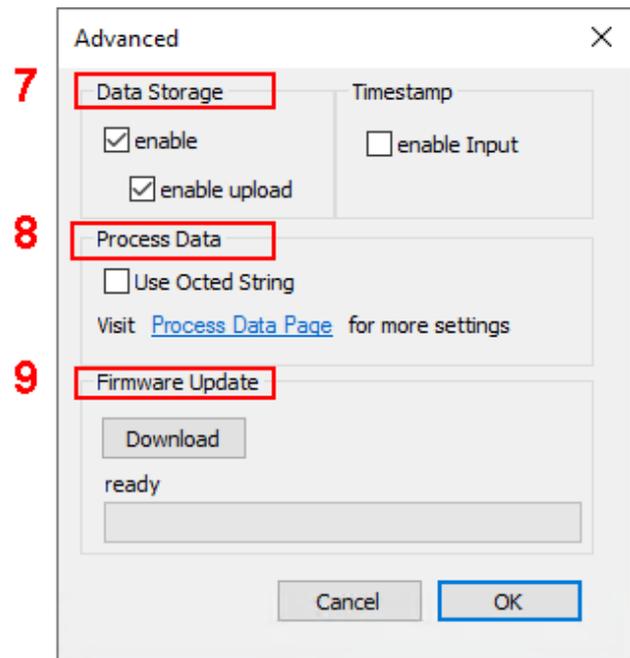
Advantage: simple further processing in the PLC

9. Firmware Update of the Beckhoff IO-Link devices

For a firmware update use the "Download" button.

Observe the description in the documentation of EPIxxx boxes in chapter Firmware Update des

IO-Link Devices.



5.4 EPIxxxx, ERIxxxx - Setting of the IO-Link device parameters

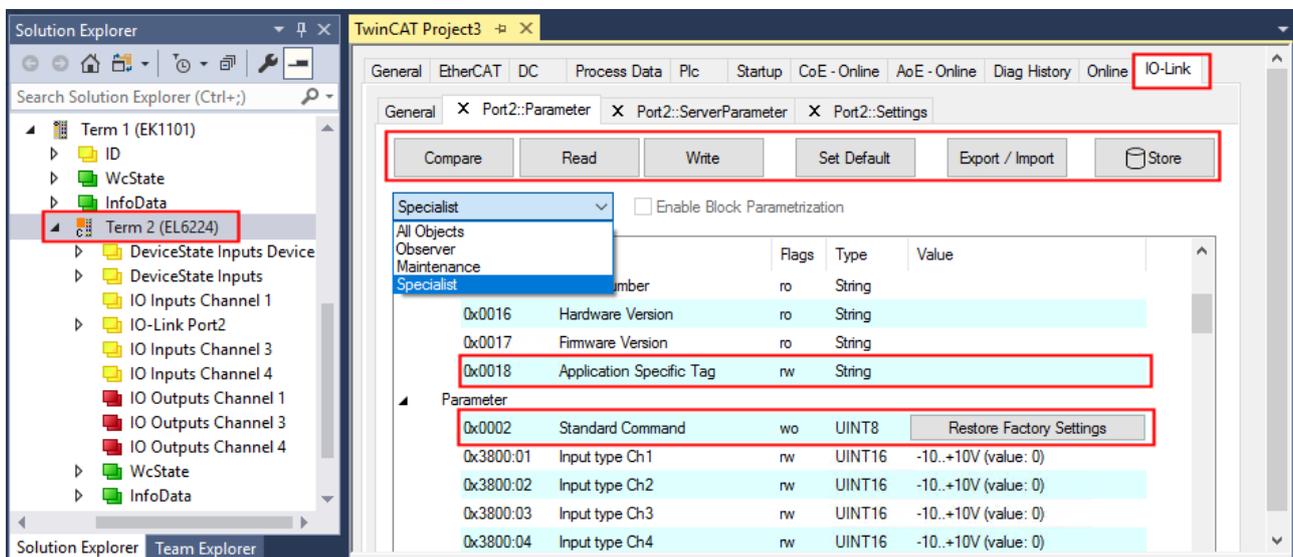
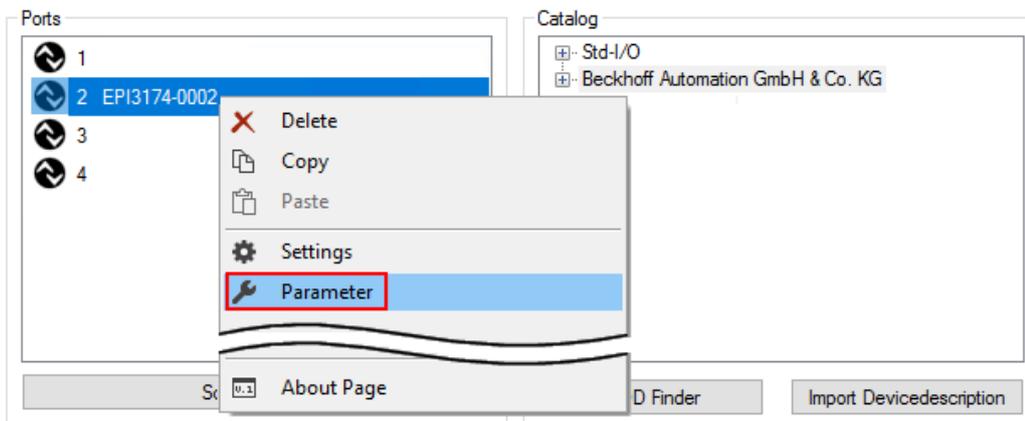
This chapter explains how to read out and set the IO-Link device parameters.

The number and type of the objects shown on the “Parameters” tab vary according to the type of sensor. The default settings as stored in the IODD can initially be seen.

To open the “Parameter” tab

1. Click the IO-Link master in the TwinCAT tree structure.
2. Click the “IO-Link” tab.
3. Select the port to which the IO-Link device is connected,
4. Double-click or by right-click to the port and select “Parameter”.

⇒ The “Parameter” tab is opened.



The device parameters are listed in the tab. The buttons [Compare](#) [▶ 61], [Read](#), [Write](#) [▶ 63], [Set Default](#) [▶ 64], [Export/Import](#) [▶ 65] and [Store](#) [▶ 66] are located at the top of the tab. The “Read”, “Write” and “Store” buttons are used to read out the parameters stored in the IO-Link device, load them and store them in the parameter server of the master.

Different user roles can be selected from the drop-down menu. The default user role is “Specialist”. The parameters are displayed in different representations and scopes.

Restarting the IO link device or restoring of the application parameters is possible via the parameter [Standard Command](#) [▶ 69].

Application specific information can be specified in parameter (0x0018) [Application Specific Tag](#) [▶ 70].

“Compare” button

1. Press the “Compare” button.
 - ⇒ the parameter data of the configuration are compared with the parameter sets in the sensor.
 - ⇒ The result is displayed in the “Parameter” tab see following figures.

Conformity of configuration and sensor data

The match is confirmed by a green tick in front of the index. Matching values are displayed in the “Value” field (see index 0x0018 “Application Specific Tag”).

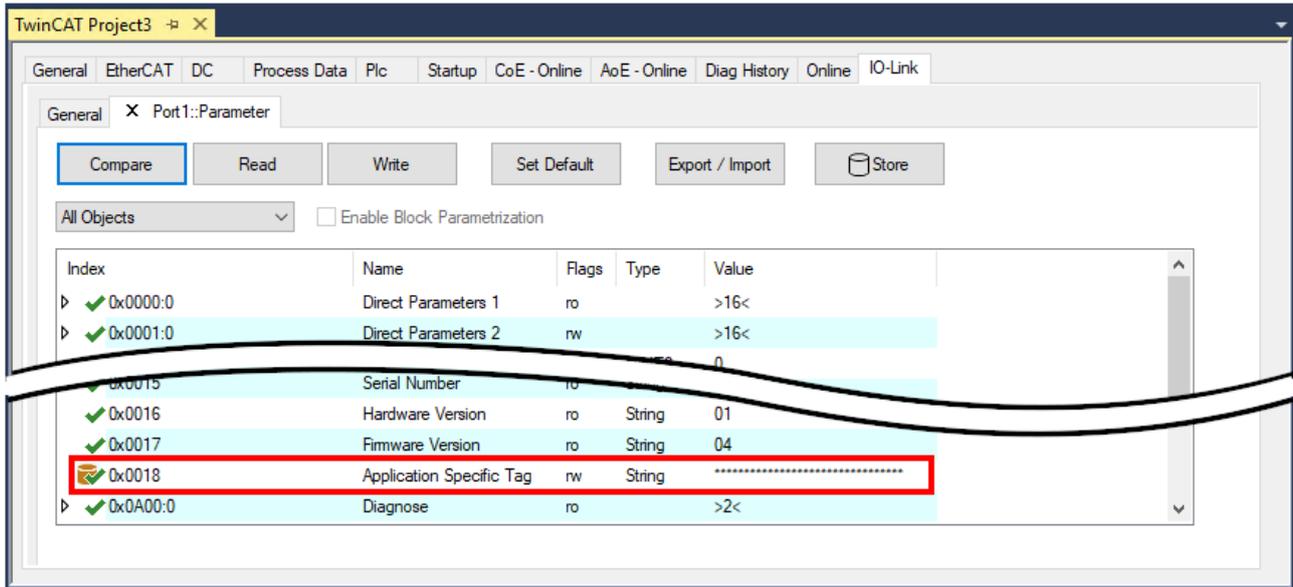


Fig. 32: Display of matching data in the “Parameter” tab

Deviations between configuration and sensor data

Deviations are indicated by a pen-symbol in front of the index. If there are different values in the “Value” field, the value “Compare” is displayed (see Index 0x0018 “Application Specific Tag”).

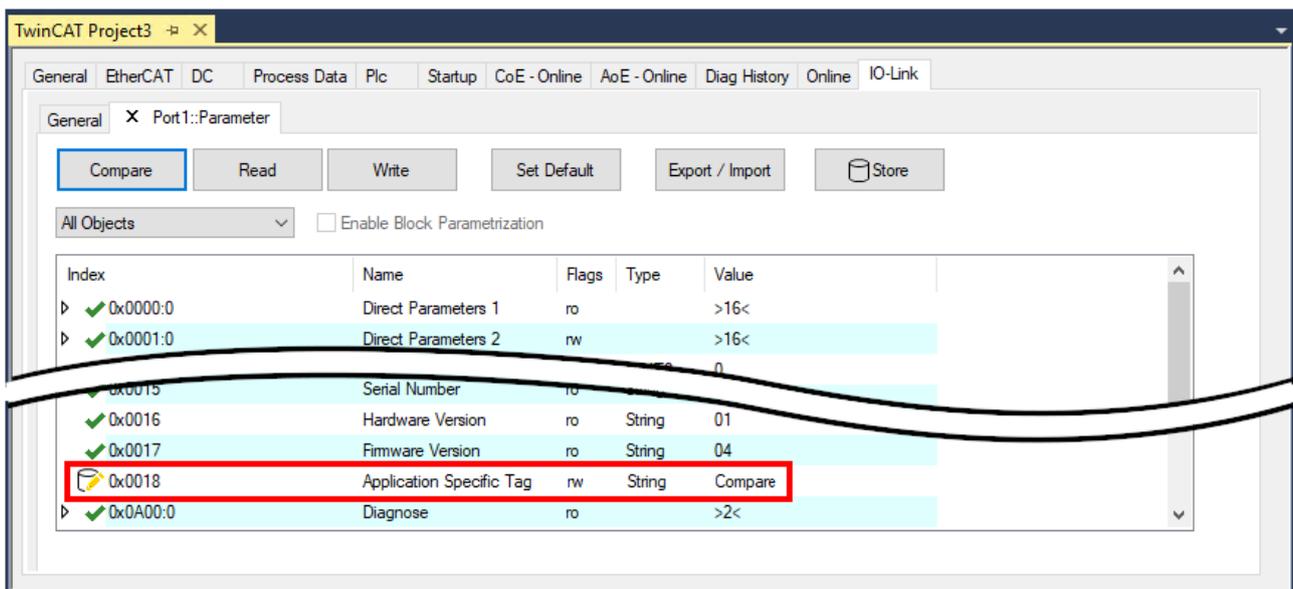


Fig. 33: Display of deviating data in the “Parameter” tab

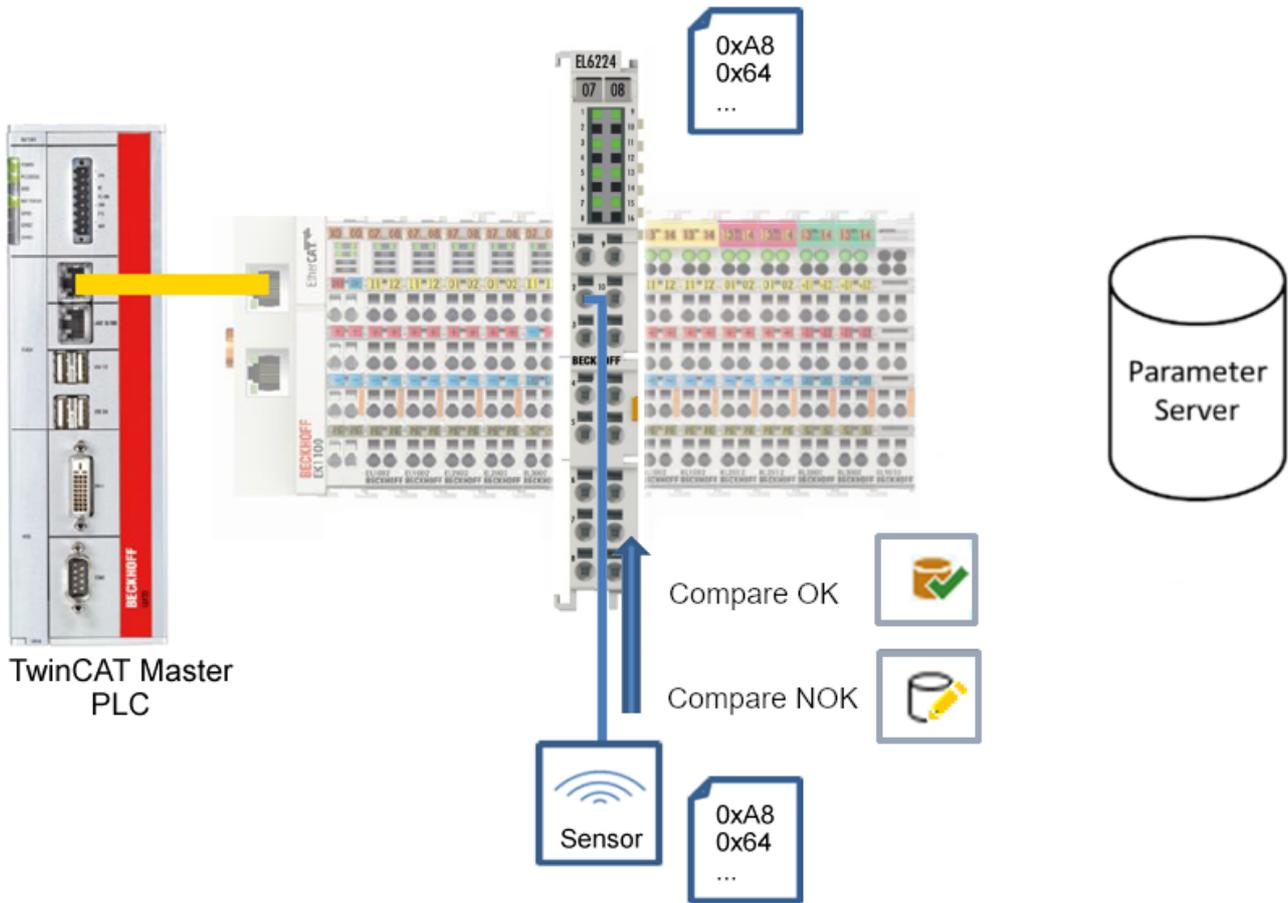


Fig. 34: Compare configuration and sensor data

“Read” button

The default values from the IODD file are always preset

1. Press the “Read” button
- ⇒ The current parameter values of the sensor are read. The successful reading of the data is confirmed with a green tick in front of the index.

“Write” button

The default values from the IODD file are always preset

1. Enter the desired value under “Value”.
 2. Press the Enter key.
 - ⇒ The values are accepted.
 3. Press the “Write” button.
- ⇒ The data is written to the device (offline configuration is possible). The successful writing process is confirmed via a storing symbol in front of the index.

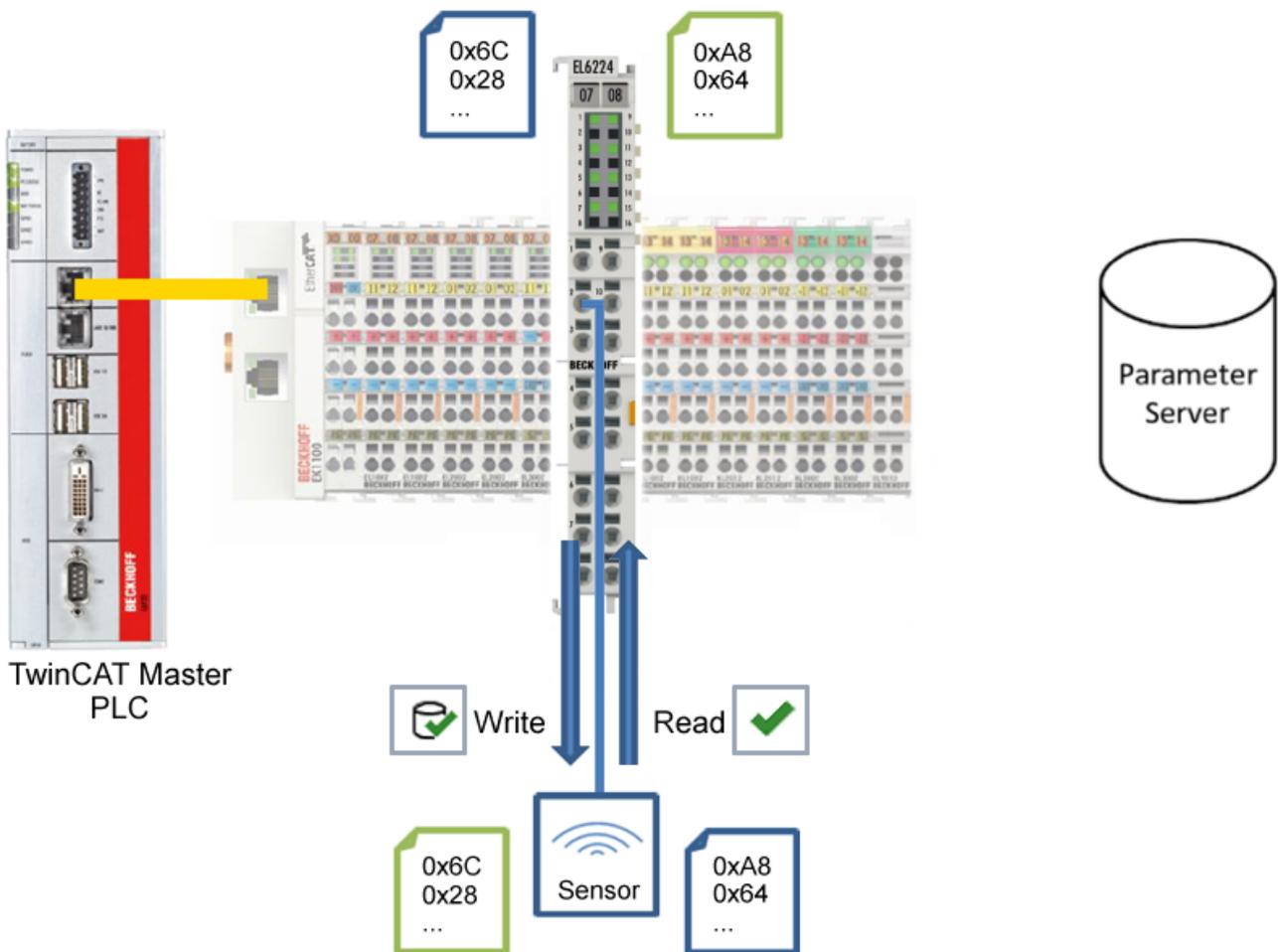


Fig. 35: Write parameter data to the sensor, read parameter data from the sensor.

“Set Default” button

1. Press the “Set Default” button.
- ⇒ All parameter values are set to the default settings.

● Write default-values to the sensor

i Note that the default-values must also be written to the device via the “Write” button.

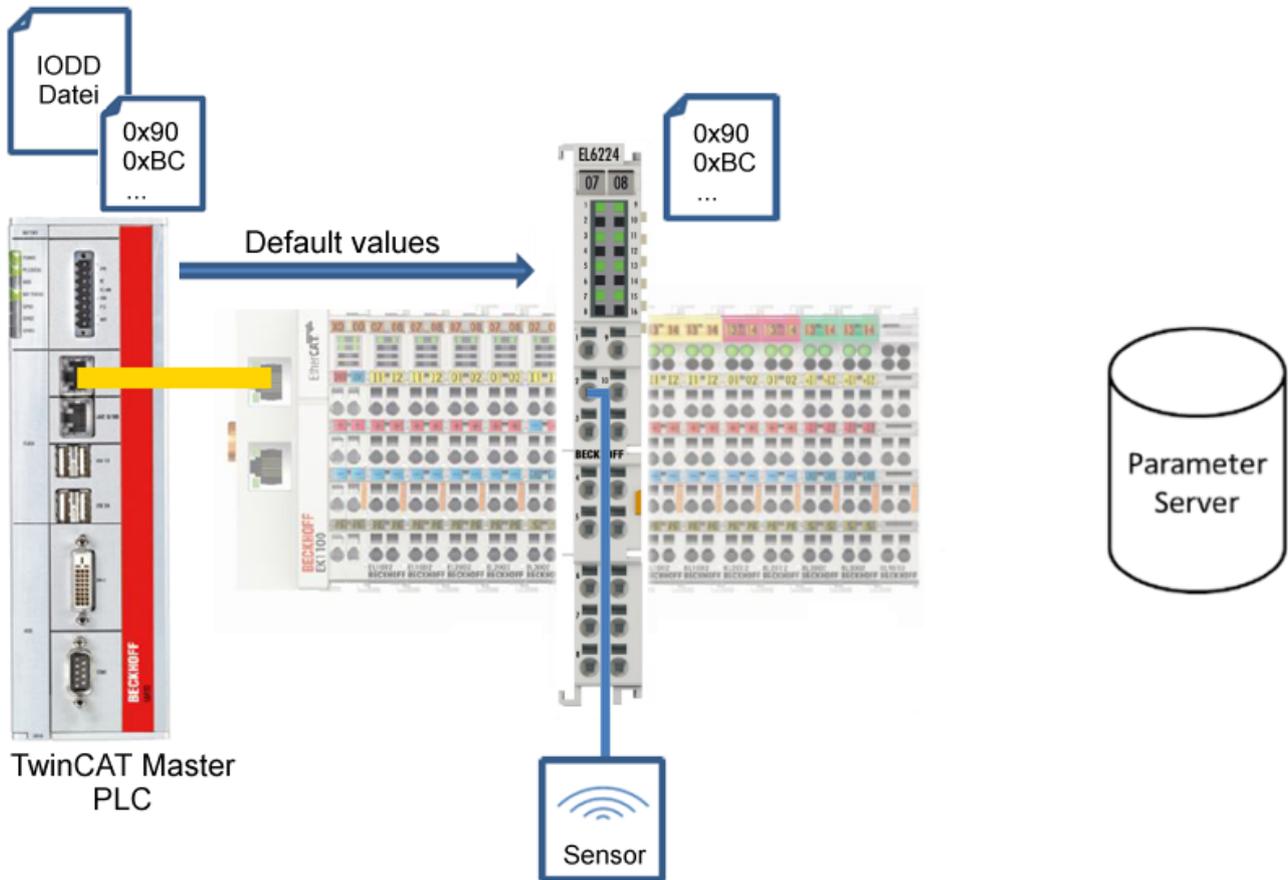


Fig. 36: Reset parameter values to default

“Export / Import” button

The set parameter values can be exported as a .vbs file and restored later via Import.

1. Press the “Export / Import” button (see the diagram below (1)).
 - ⇒ The Import / Export dialog is opened
2. Specify the path under which you want to export or import the .vbs file, see fig. (2) below and confirm with the “Open” button, see fig. (4) below.
3. In addition, the export options “Attach Store Command” and “Enable Block Parametrization” can be selected as shown in fig. (3) below.
 - ⇒ “Attach Store Command”: The parameters are loaded into the parameter server after the script has written all values.
 - ⇒ “Enable Block Parametrization”: Block parameterization is enabled. For some sensors, writing is only possible when block parameterization is enabled.
4. Press the “Export” or “Import” button
 - ⇒ The parameters are adopted from the imported file. The change of parameters is marked with a pencil symbol.
5. Write the new parameter values to the sensor via “Write” button.
 - ⇒ The data is written to the device (offline configuration is possible). The successful writing process is confirmed via a storing symbol in front of the index.

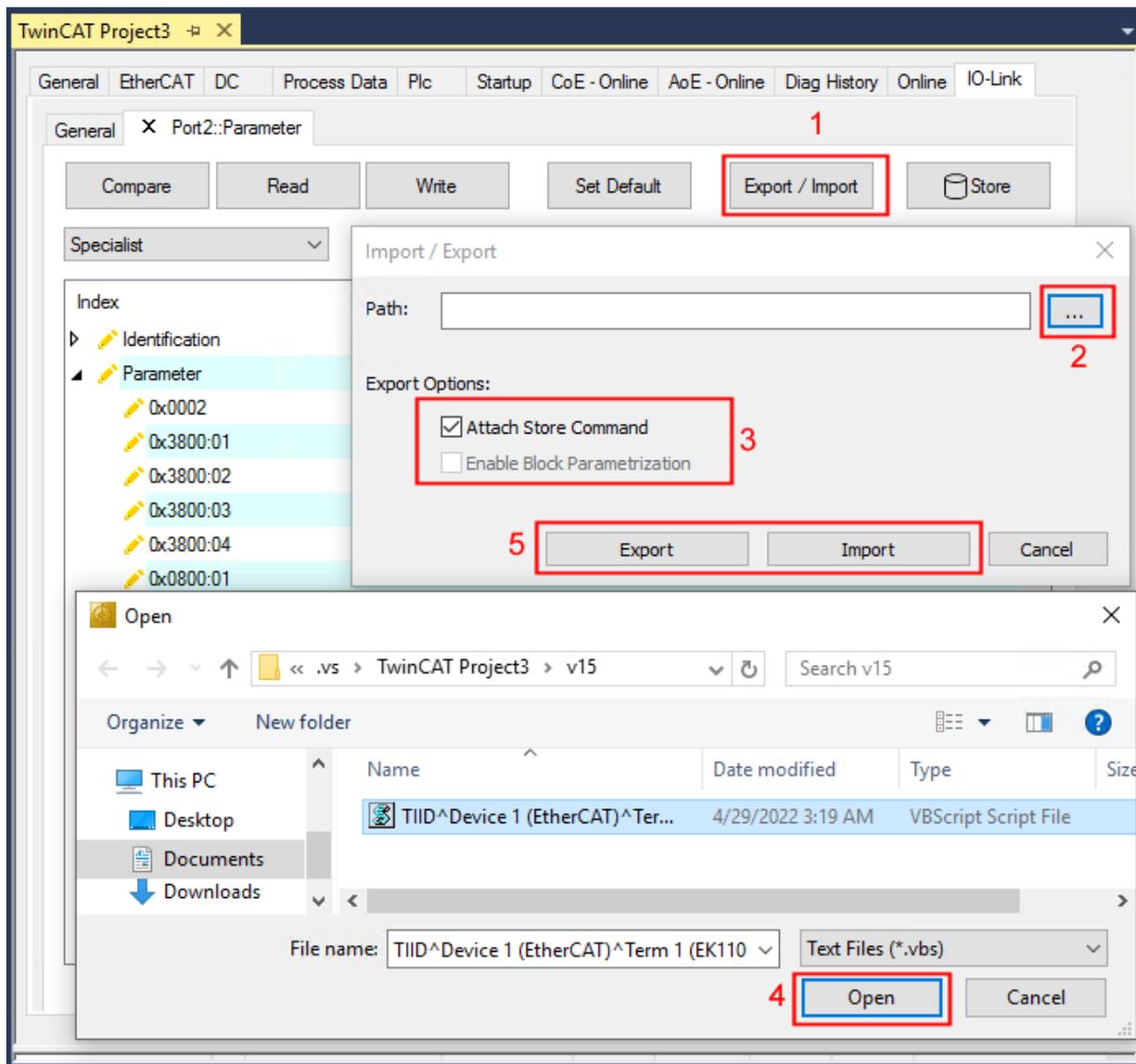


Fig. 37: Parameterization IO-Link device - Export / Import

“Store” button

1. Click “Store” (data storage):
 - ⇒ The Beckhoff IO-Link master stores sensor-dependent-data, e. g. the following parameters (0x0018) “Application-Specific Tag”, (0x08n0) “Settings” and 0x3800 “Range Settings”.
The success of storing process is marked with the storing symbol.
 - ⇒ If the IO-Link device is exchanged for a similar module, the device can be restored.

The stored values are displayed in the “ServerParameter” tab

1. Right-click on the device and select “Parameter Server” from the menu.
 - ⇒ The stored values are displayed.

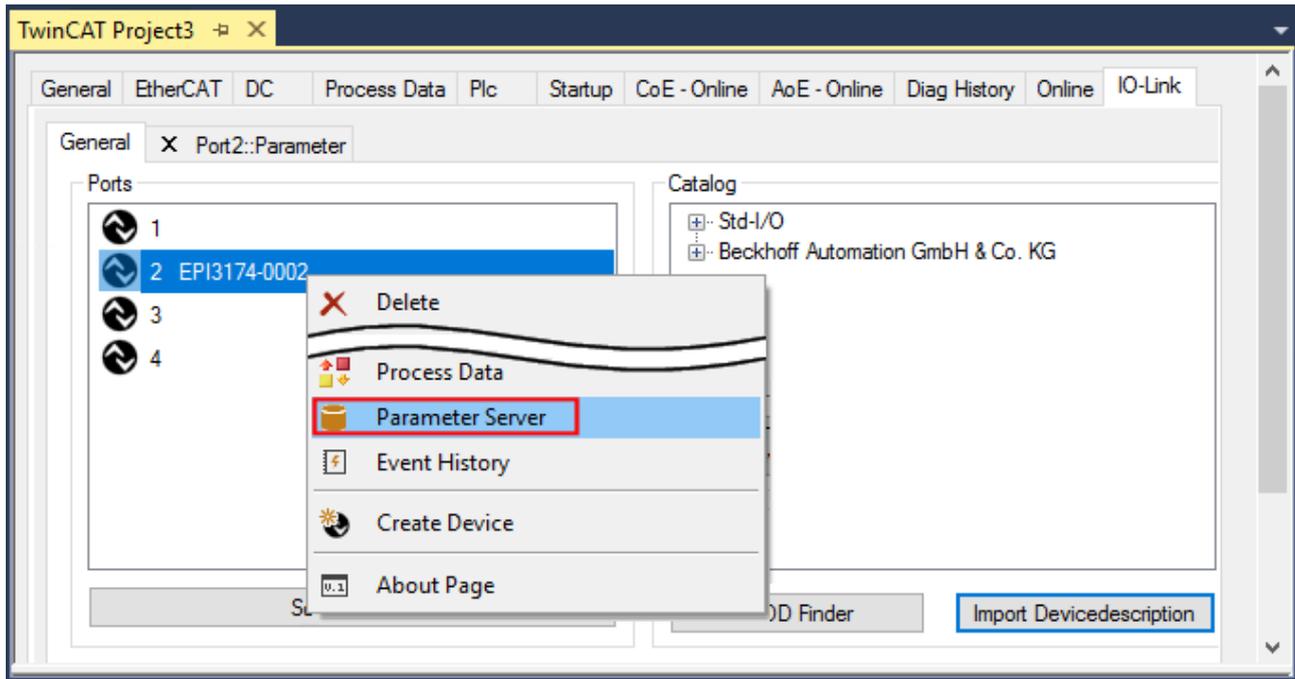


Fig. 38: Open the “ServerParameter” tab

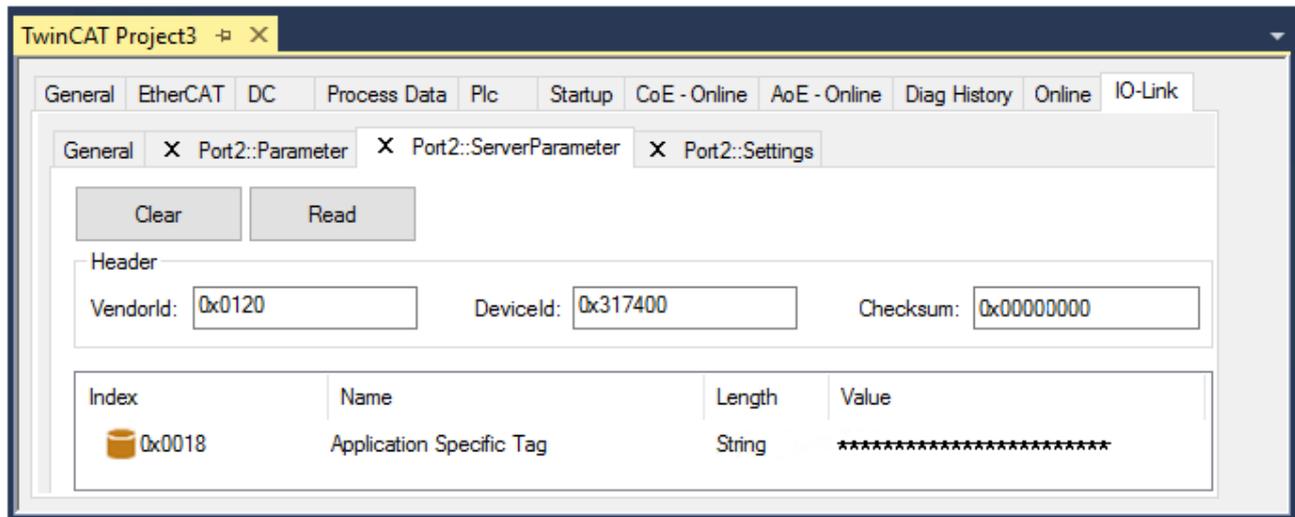


Fig. 39: „ServerParameter“ tab

Activate store button via PLC

As for CoE, the Indexgroup of an ADS command is specified as **0xF302** for the IO link data channel.

According to the IO-Link specification devices with ISDU support shall use index **0x0002** to receive the SystemCommand. The following list displays coding examples for system commands (ISDU), the complete table “Coding of SystemCommand (ISDU)” can be found in the [IO-Link specification](#).

Command (hex)	Command (dec)	Name of the command	Definition
....			
0x01	1	ParamUploadStart	Start Parameter Upload
0x02	2	ParamUploadEnd	Stop Parameter Upload
0x03	3	ParamDownloadStart	Start Parameter Download
0x04	4	ParamDownloadEnd	Stop Parameter Download
0x05	5	ParamDownloadStore	Finalize parameterization and start Data Storage
0x06	6	ParamBreak	Cancel all Param commands
....			

Use an ADS Write function block for activating the store-function via the plc. The following figure shows a sample code for activation of the store-Button (command 0x05 “ParamDownloadStore”)

```

Case_Write:
  AdsWrite_EL6224( WRITE := FALSE );
  AdsWrite_EL6224.IDXGRP   := EL6224_Ch_iGrp;
  AdsWrite_EL6224.IDXOFFS := EL6224_Ch_iOffWri;
  AdsWrite_EL6224.LEN     := SIZEOF(EL6224_bywrite);
  AdsWrite_EL6224.SRCADDR := ADR(EL6224_bywrite);
  AdsWrite_EL6224( Write := TRUE);
  eSwitch1 := Case_WriBu;

EL6224_AoePortCh : UINT := 16#1001;
EL6224_Ch_iGrp   : UDINT := 16#F302;
EL6224_Ch_iOffManu : UDINT := 16#00100000;
EL6224_Ch_iOffPro  : UDINT := 16#00140000;
EL6224_Ch_iOffWri  : UDINT := 16#00020000;
EL6224_sManu       : STRING;
EL6224_sPro        : STRING;
EL6224_bywrite     : BYTE := 16#5;
  
```

Fig. 40: Sample code for activation of the store-function via the plc

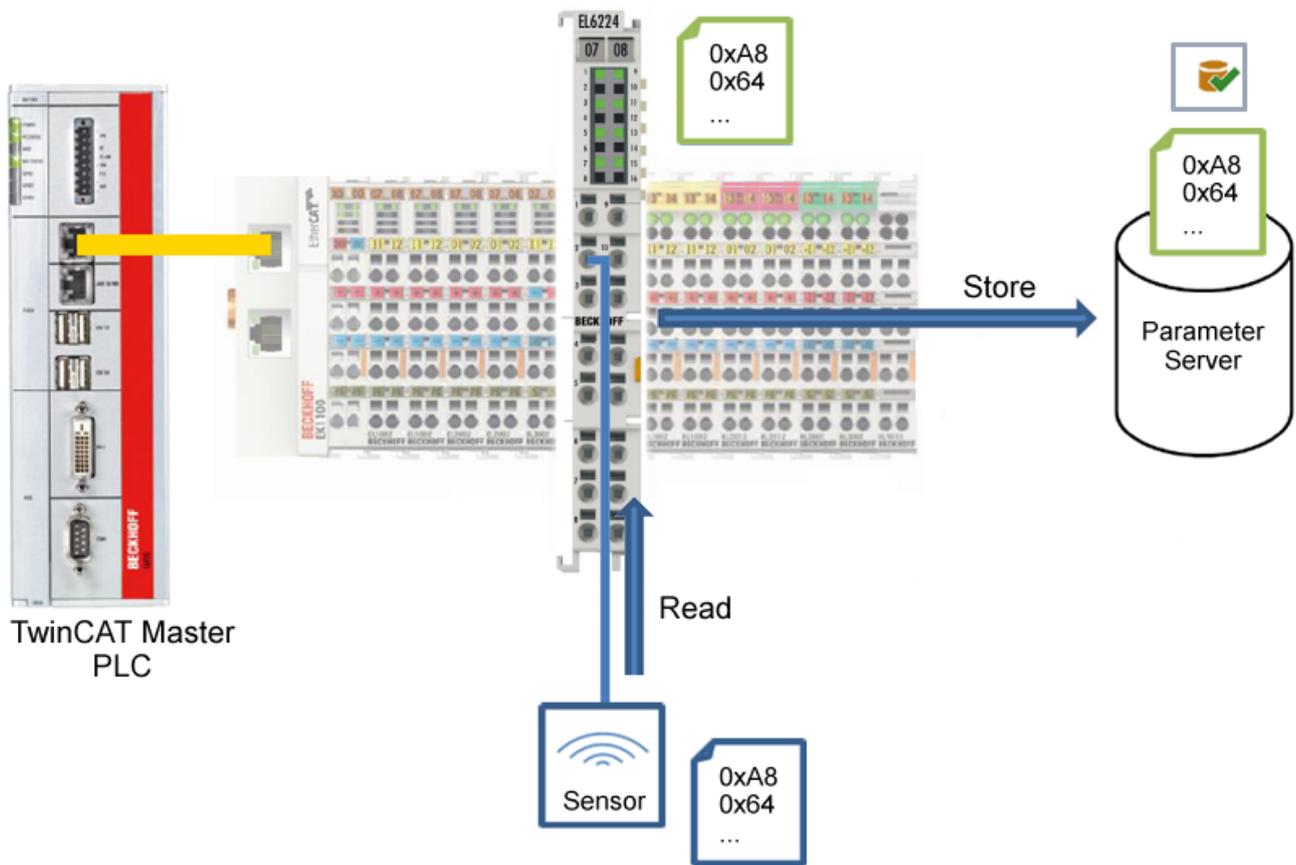


Fig. 41: Store parameters

Standard Command (Index 0x0002)

The IO-Link master writes various IO-Link-specific commands to the “Standard Command” during startup. Some of these commands are available in the TwinCAT interface (see figure below).

1. Click “Standard Command” in the parameter list of the “All Objects” user role, then double-click “Standard Command” in the right-hand field.
 2. Select the desired value from the list of different options and
 - “Device Reset”: Restarts the IO-Link device.
 - “Application Reset”: No function.
 - “Restore Factory Settings”: Restoring the application parameters, i.e. the Settings parameter (0x0800).
 3. Use the “Write” button (as described above [▶ 63]).
- ⇒ The data is written to the device (offline configuration is possible). The successful writing process is confirmed via a storing symbol in front of the index.

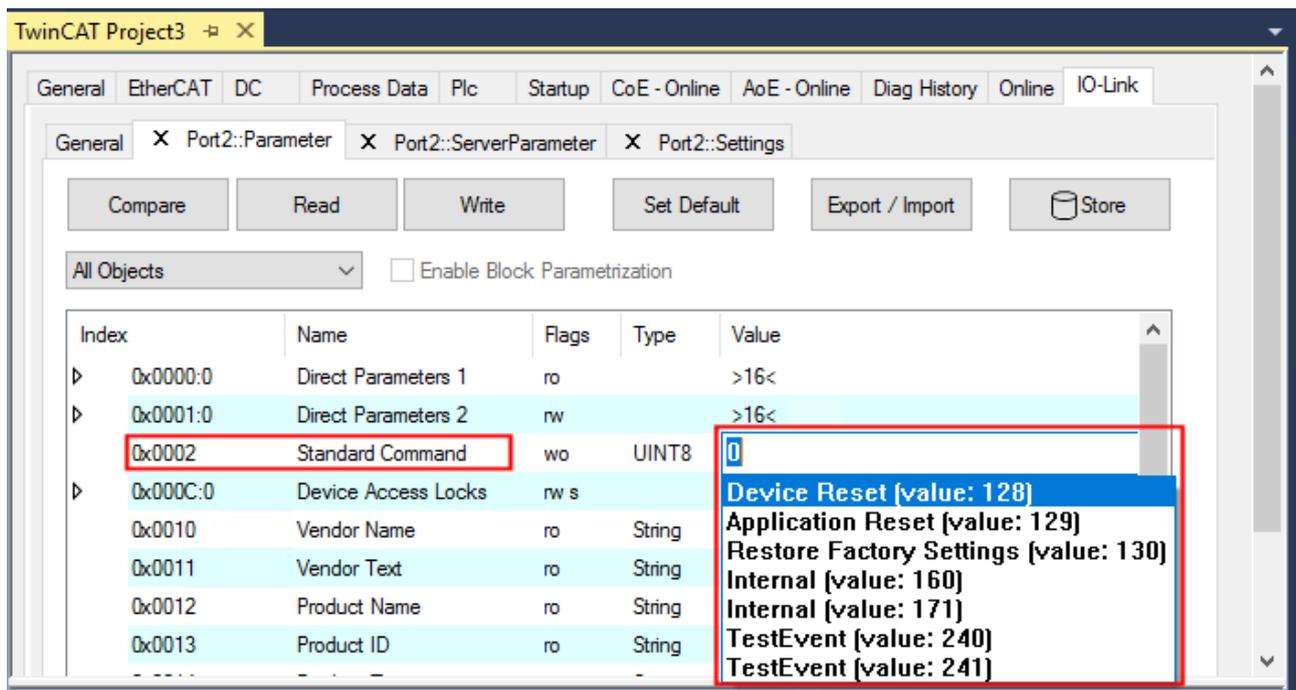


Fig. 42: Parameters IO-Link device “Standard Command”

“Application Specific Tag” (Index 0x0018)

Application-specific information can be entered and stored here.

1. Click “Application-Specific Tag” in the parameter list, then double-click “Application-Specific Tag” in the right-hand field.
2. Enter application-specific information and confirm with the Enter key.
3. Use the [Write \[▶ 63\]](#) button and the [Store \[▶ 66\]](#) button, if required (as described above).

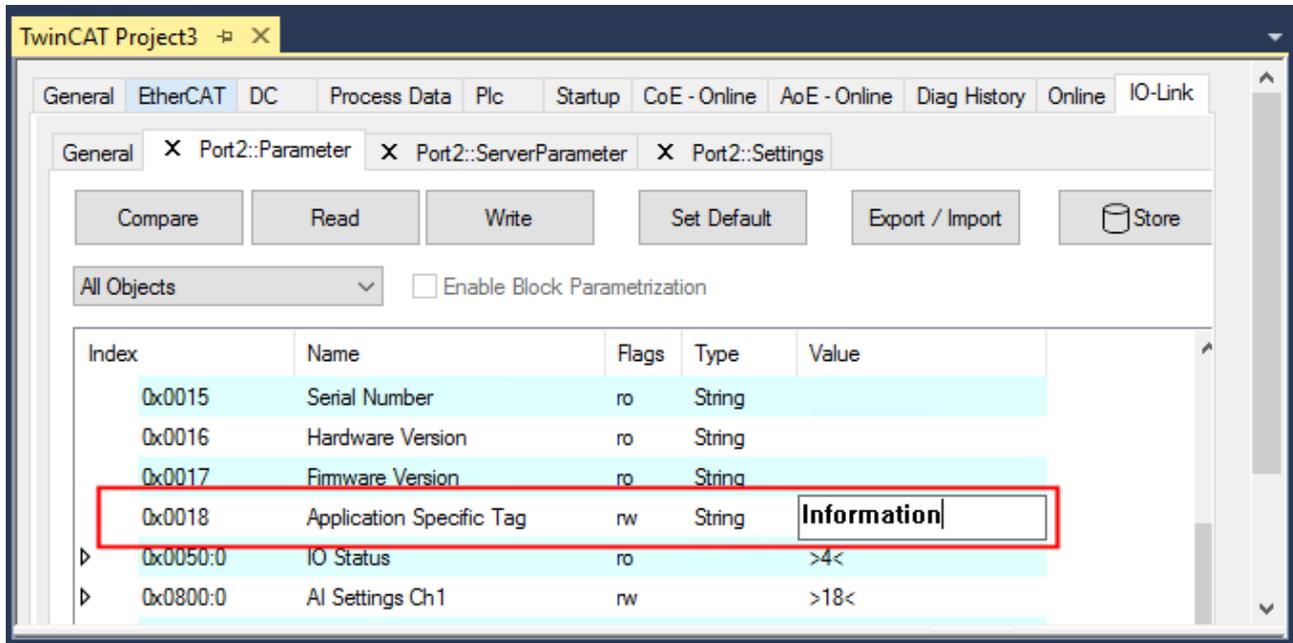


Fig. 43: Parameters IO-Link device: “Application Specific Tag”

5.5 ADS access to device parameters

The exchange of the acyclic data takes place via a specified index and subindex range that is device-specific and can be read about in the corresponding vendor documentation.

Parameter data exchange

An intelligent IO-Link sensor/actuator (in the previous figure marked "Sensor (IO-Link Device)") can support parameterization by SPDU (Service Protocol Data Units). The PLC must explicitly query or, when marked as such, send these acyclic service data.

● SPDU access

i TwinCAT supports access via ADS and via the EP6224-xxxxxx CoE directory.

The respective parameter is addressed via the so-called SPDU index. The following ranges are available:

Name	Index range
System	0x00 ... 0x0F
Identification	0x10 ... 0x1F
Diagnostic	0x20 ... 0x2F
Communication	0x30 ... 0x3F
Preferred Index	0x40 ... 0xFE
Extended Index	0x0100 ... 0x3FFF
	the range 0x4000 ... 0xFFFF is reserved

The use of the implementation of these ranges is the responsibility of the sensor/actuator vendor. In the interest of clarity, only a few possible indices with names are listed here. Please refer to the corresponding chapter "Object description and parameterization".

Index	Name
0010	Vendor Name
0011	Vendor Text
0012	Product Name
0013	Product ID
0015	Serial Number
0016	Hardware Revision
0017	Firmware Revision
...	...

ADS

Communication relating to IO-Link demand data is initiated via an ADS command. An ADS address always consists of a NetID and PortNo. TwinCAT forwards an ADS command to the EP6224 Box module via AoE (ADS over EtherCAT). From where the command is relayed to the IO-Link master section and therefore to the data channel.

AoE-NetID

The EP6224 is assigned a dedicated AoE-NetID for communication with the IO-Link master section. This is assigned by the configuration tool (see the figure below).

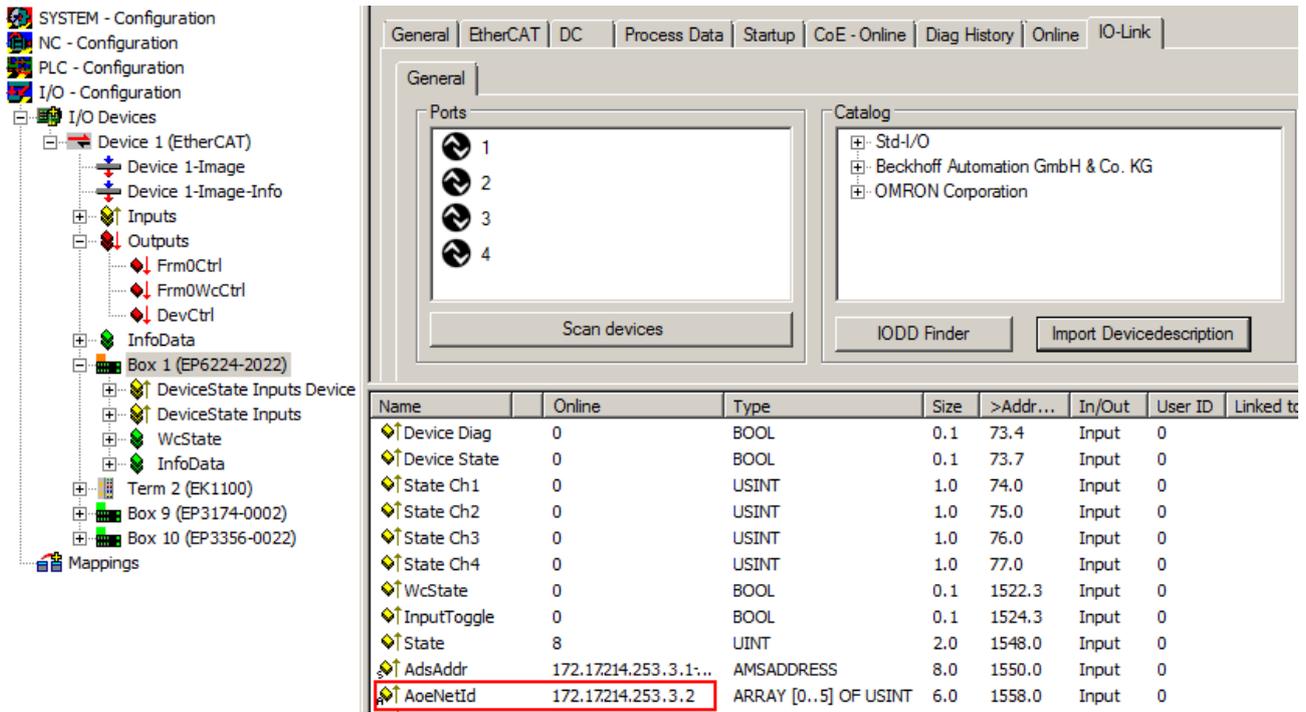


Fig. 44: AoE-NetID allocation

PortNo

The individual IO-Link ports for the master are allocated via the port number. The port numbers are allocated in ascending order from 0x1000. I.e. IO-Link Port1 === PortNo 0x1000 and IO-Link Portn === PortNo 0x1000 + n-1.

The following specification applies for the EP6224 (4-port IO-Link master):

- IO-Link Port1 === PortNo 0x1000
- IO-Link Port2 === PortNo 0x1001
- IO-Link Port3 === PortNo 0x1002
- IO-Link Port4 === PortNo 0x1003

ADS Indexgroup

As for CoE, the Indexgroup of an ADS command is specified as 0xF302 for the IO link data channel.

ADS Indexoffset

The IO link addressing with index and subindex is coded in the Indexoffset. The Indexoffset has a size of 4 bytes and is subdivided as follows: 2-byte index, 1-byte reserve, 1-byte subindex.

- Example: Indexoffset 0x12340056 corresponds to index 0x1234 and subindex 56

Example with ADS monitor

Reading of the Application-Specific Name, index 0x0018 subindex 0x00 (see figure below).

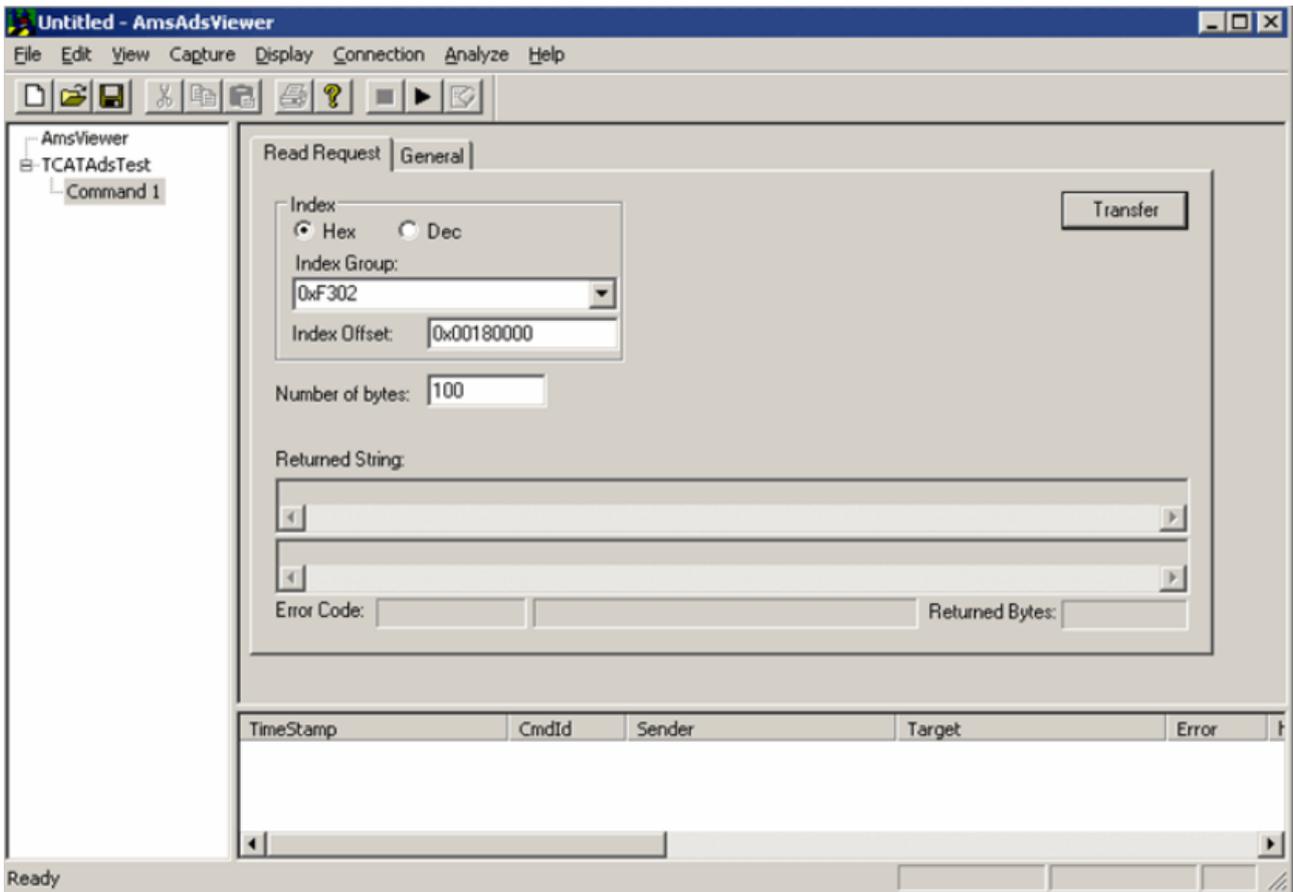


Fig. 45: Reading of the Application-Specific Name

Example showing the principle in the code

Reading of Application-Specific Name, index 0x0018 subindex 0x00 at IO-Link Port2.

```
AmsAddr adsAdr;
adsAdr.netId.b[0] = 0x0A; //AoE-NetID of EP6224
adsAdr.netId.b[1] = 0x03; //AoE-NetID of EP6224
adsAdr.netId.b[2] = 0x02; //AoE-NetID of EP6224
adsAdr.netId.b[3] = 0x16; //AoE-NetID of EP6224
adsAdr.netId.b[4] = 0x02; //AoE-NetID of EP6224
adsAdr.netId.b[5] = 0x03; //AoE-NetID of EP6224
adsAdr.port = 0x1001; //IO-Link Port2
errCode = AdsSyncReadReq(&adsAdr, 0xF302, 0x00180000, 100, &pReadBuffer);
```

5.6 EPI2xxx, ERI2xxx - Set up the parameters of the IO-Link device

5.6.1 Input filter (Index 0x0800:01)

The function of the Input filter is explained in the section [EPI23xx-xxxx, ERI23xx-xxxx - Input debouncing and input signal extension](#) [► 77]. For parameterization of the input filter proceed as follows:

1. Select *Specialist* in the tab *Parameter*.
2. Open the *Parameter list* and double click on *Input Filter*.
3. Select the desired value from the list of different options.
4. Use the *Write* and as necessary the *Store* button (as described above).

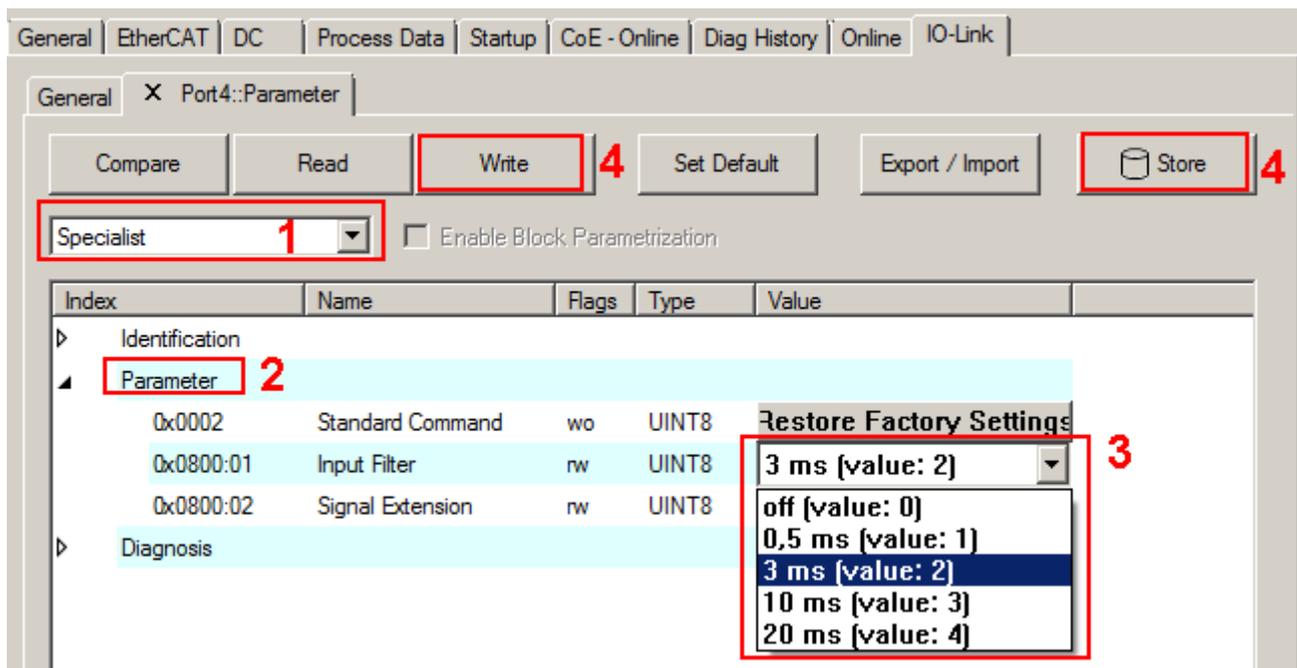


Fig. 46: Parameterization of input filter (Index 0x0800:01)

5.6.2 Signal Extension (Index 0x0800:02)

The function of the *Signal Extension* is explained in the section [EPI23xx-xxxx, ERI23xx-xxxx - Input debouncing and input signal extension](#). [► 77] For parameterization of the input filter proceed as follows:

1. Select *Specialist* in the tab *Parameter*
2. Open the *Parameter list* and double click on *Signal Extension*
3. Select the desired value from the list of different options
4. Use the *Write* and as necessary the *Store* button (as described above).

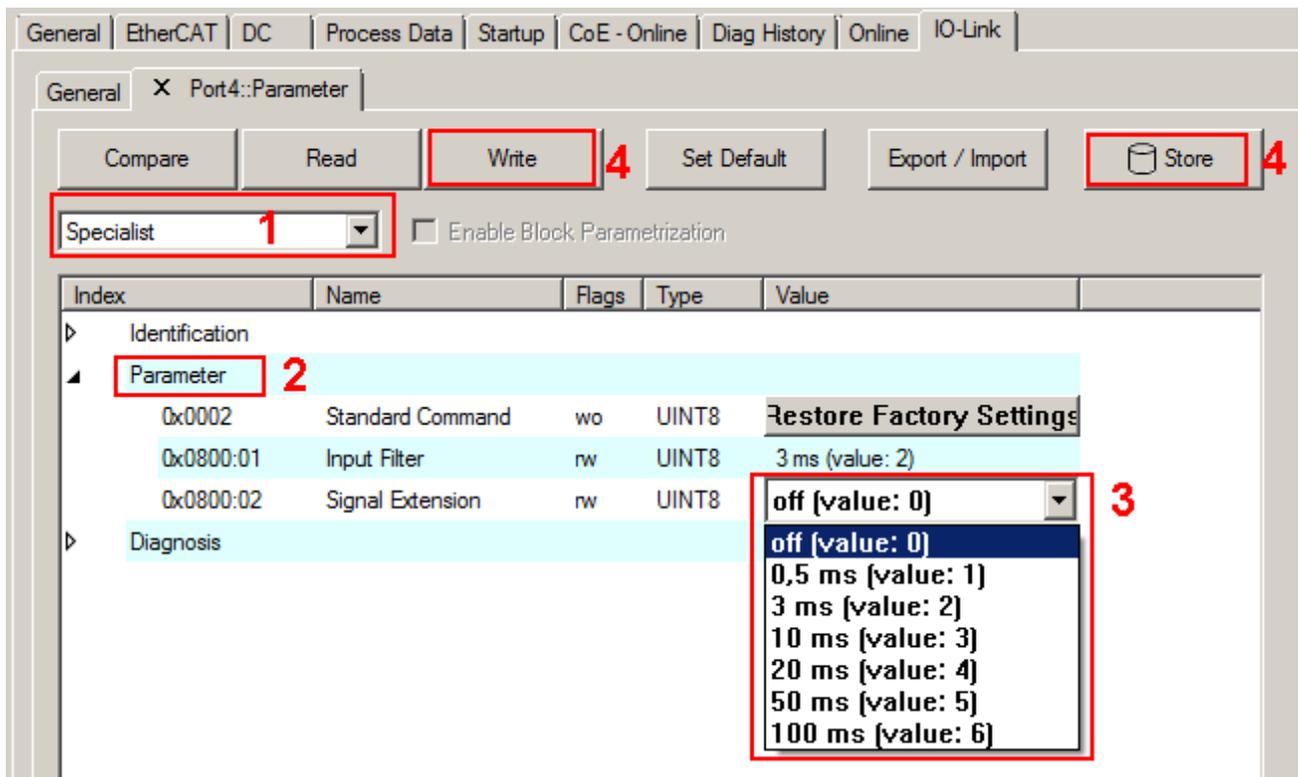


Fig. 47: Parameterization of Signal Extension (Index 0x0800:02)

5.6.3 Diagnosis (Index 0x0A00)

The *Diagnosis* parameters vary between the different devices. The meaning of *Diagnosis* parameters (Index 0x0A00) can be read in the respective chapter *Object description and parameterization*.

(EPI2008-000x, ERI2008-000x [▶ 83] / EPI2809-002x, ERI2809-002x [▶ 86] / EPI2338-000x, ERI2338-000x [▶ 88] / EPI2339-002x, ERI2339-002x [▶ 92])

As an example, the *Diagnosis* parameters of the EPI2339-0021 are presented in the figure below.

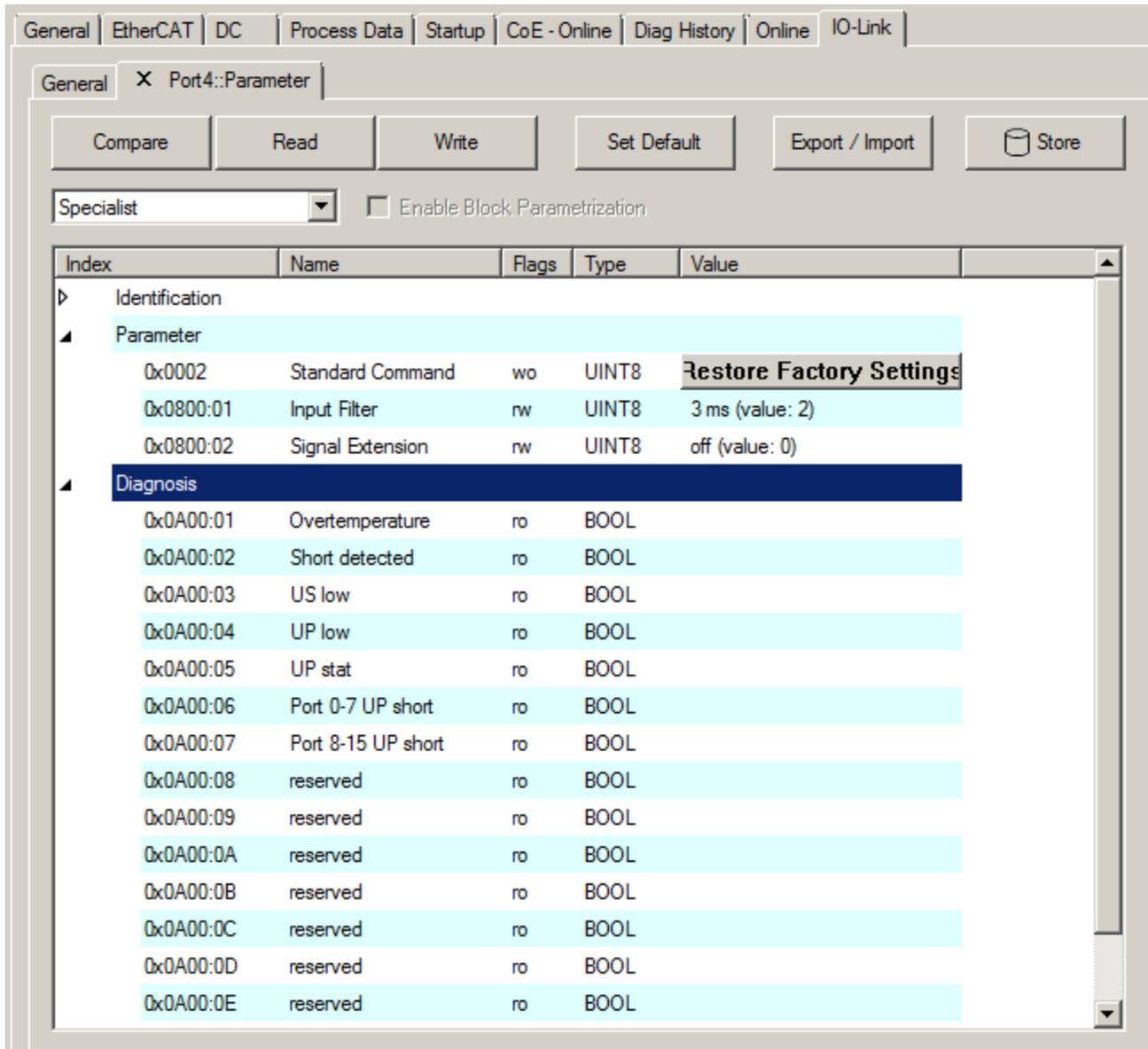


Fig. 48: IO-Link Device Parameter: showing Diagnosis EPI2339-0021 as example

5.7 EPI23xx-xxxx, ERI23xx-xxxx - Input debouncing and input signal extension

The digital IO-Link box modules EPI23xx and ERI23xx support a configurable input debouncing and a variable input signal extension for all digital inputs. This can be set via Device Parameter Object 0x0800. The set value applies for all digital inputs. How to set the parameters of the IO-Link Device will be explained in the section [EPI2xxx, ERI2xxx - set up the parameters of IO-Link Device \[► 74\]](#).

Input filter: variable adjustable over Device Parameter (Object 0x0800 Subindex 1).

Value	Filtertime [ms]
0	0
1	0.5
2	3
3	10
4	20

The value decides the delay with which the input value is transferred to the higher-level control. Impulses that are smaller than the filter time will be ignored. In the figure below function examples are presented with a filter time of 10 ms.

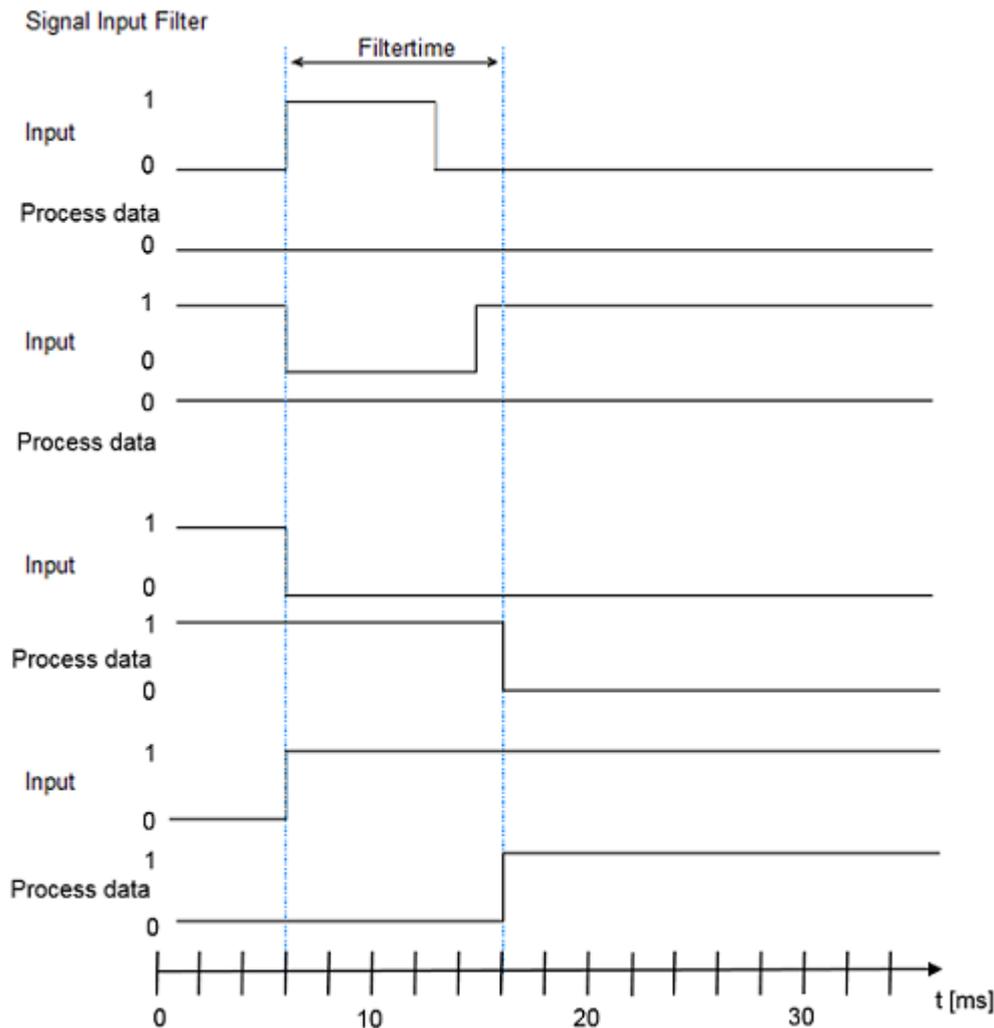


Fig. 49: Signal Input Filter

Input signal extension time: variable adjustable over Device Parameter (Object 0x0800 Subindex 2).

Value	Input signal extension time [ms]
0	0
1	0.5
2	3
3	10
4	20
5	50
6	100

The parameter specifies the time for which an input impulse is extended with additional momentum change. Short change of the input impulse during the signal extension will be ignored.

Signal Extension

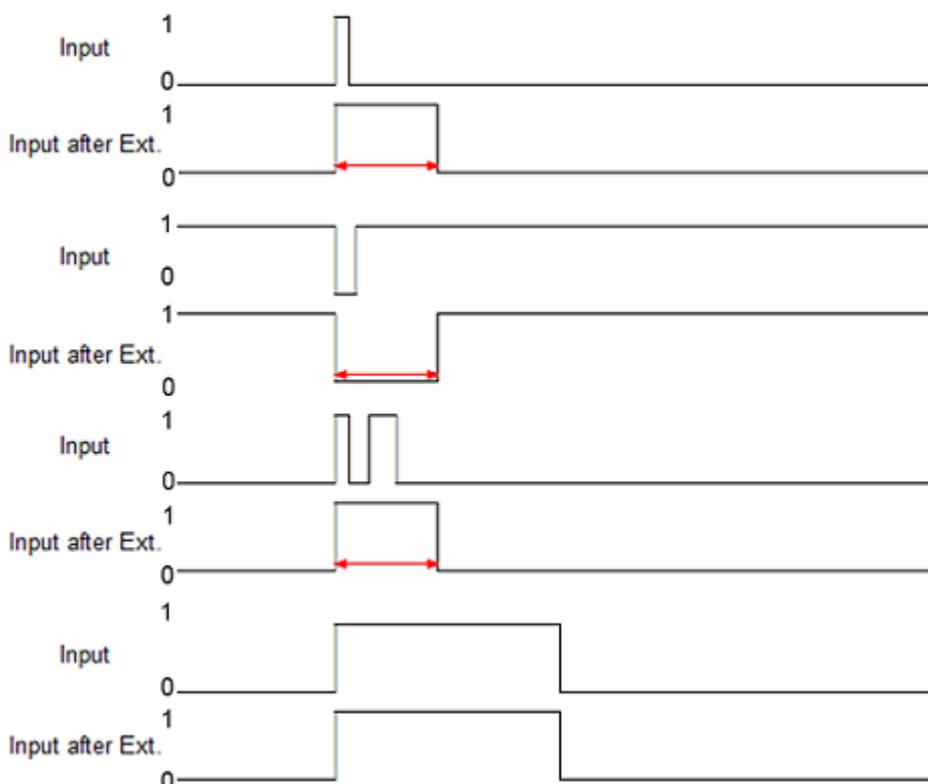


Fig. 50: Signal Extension

If the input debouncing and the input signal extension is active, the input impulse is always filtered first and then extend the result.

6 Device parameters

6.1 Object Overview - EPI2338-0001

i IO-Link IODD Device Description

The display corresponds to the display of the IO-Link device parameters. It is advisable to download the latest IO-Link IODD device description files from the [Download section](#) of the Beckhoff website and install them according to the installation instructions.

The object overview of EPI2338-0001 is listed below as an example.

Subindex	Name	Flags	Default value
0x0000:00	Direct Parameters 1		
0x0000:01	Reserved	RO	0
0x0000:02	Master Cycle Time	RO	5
0x0000:03	Min Cycle Time	RO	5
0x0000:04	M-Sequence Capability	RO	1
0x0000:05	IO-Link Version ID	RO	17
0x0000:06	Process Data Input Length	RO	16
0x0000:07	Process Data Output Length	RO	16
0x0000:08	Vendor ID 1	RO	0x0120
0x0000:09	Vendor ID 2	RO	0x0120
0x0000:0A	Device ID 1	RO	0x233900
0x0000:0B	Device ID 2	RO	0x233900
0x0000:0C	Device ID 3	RO	0x233900
0x0000:0D	Reserved	RO	255
0x0000:0E	Reserved	RO	255
0x0000:0F	Reserved	RO	255
0x0000:10	System Command	RO	255

Subindex	Name	Flags	Default value
0x0001:00	Direct Parameters 2		
0x0001:01	Device Specific Parameter 1	RW	0
0x0001:02	Device Specific Parameter 2	RW	0
0x0001:03	Device Specific Parameter 3	RW	0
0x0001:04	Device Specific Parameter 4	RW	0
0x0001:05	Device Specific Parameter 5	RW	0
0x0001:06	Device Specific Parameter 6	RW	0
0x0001:07	Device Specific Parameter 7	RW	0
0x0001:08	Device Specific Parameter 8	RW	0
0x0001:09	Device Specific Parameter 9	RW	0
0x0001:0A	Device Specific Parameter 10	RW	0
0x0001:0B	Device Specific Parameter 11	RW	0
0x0001:0C	Device Specific Parameter 12	RW	0
0x0001:0D	Device Specific Parameter 13	RW	0
0x0001:0E	Device Specific Parameter 14	RW	0
0x0001:0F	Device Specific Parameter 15	RW	0
0x0001:10	Device Specific Parameter 16	RW	0

Subindex	Name	Flags	Default value
0x0002	Standard Command	RW	0

Subindex	Name	Flags	Default value
0x000C:00	Device Access Locks		
0x000C:01	Parameter (write) Access Lock	RW	0
0x000C:02	Data Storage Lock	RW	0
0x000C:03	Local Parameterization Lock	RW	0
0x000C:04	Local User Interface Lock	RW	0

Subindex	Name	Flags	Default value
0x0010	Vendor Name	RO	Beckhoff Automation GmbH & Co. KG
0x0011	Vendor Text	RO	www.beckhoff.com
0x0012	Product Name	RO	EPI2338-0001
0x0013	Product ID	RO	EPI2338-0001
0x0014	Product Text	RO	8 DIO Module
0x0015	Serial Number	RO	00000000
0x0016	Hardware Version	RO	01
0x0017	Firmware Version	RO	01
0x0018	Application Specific Tag	RW	*****

Subindex	Name	Flags	Default value
0x0800:00	Settings		
0x0800:01	Input Filter	RW	3 ms
0x0800:02	Signal Extension	RW	off

Subindex	Name	Flags	Default value
0x0A00:00	Diagnose		
0x0A00:01	Overtemperature	RO	0
0x0A00:02	Short detected	RO	0
0x0A00:03	US low	RO	0
0x0A00:04	UP low	RO	0
0x0A00:05	UP stat	RO	0
0x0A00:06	Reserved	RO	0
0x0A00:07	Reserved	RO	0
0x0A00:08	Reserved	RO	0
0x0A00:09	Reserved	RO	0
0x0A00:0A	Reserved	RO	0
0x0A00:0B	Reserved	RO	0
0x0A00:0C	Reserved	RO	0
0x0A00:0D	Reserved	RO	0
0x0A00:0E	Reserved	RO	0
0x0A00:0F	Reserved	RO	0
0x0A00:10	Reserved	RO	0

Key

Flags:

RO (Read Only) this object can be read only

RW (READ/Write) this object can be read and written

6.2 EPI2008-000x, ERI2008-000x - Object description and parameterization

i IO-Link IODD Device Description

The display corresponds to the display of the IO-Link device parameters. It is advisable to download the latest IO-Link IODD device description files from the [Download section](#) of the Beckhoff website and install them according to the installation instructions.

Parameter server (data storage)

The IO-Link box modules support the data storage functionality according to protocol revision 1.1. The parameters 0x0018 (application-specific tag) and 0x08n0 (settings) are secured with the IO-Link master. In order to use this functionality, the IO-Link master must also support it. (e.g. with the Beckhoff EP6224-xxxx IO-Link master from firmware 10) Changes to these parameters are saved by the IO-Link master and restored when the box is replaced with an identical IO-Link box. How to use the data storage functionality is explained in chapter Setting of the IO-Link device parameters.

Index 0000 Direct Parameters 1

Index (hex)	Name	Meaning	Data type	Flags	Default
0000:01	Reserved	-	UINT8	RO	0
0000:02	Master Cycle Time	IO-Link specific	UINT8	RO	5
0000:03	Min Cycle Time	IO-Link specific	UINT8	RO	5
0000:04	M-Sequence Capability	IO-Link specific	UINT8	RO	1
0000:05	IO-Link Version ID	IO-Link specific	UINT8	RO	17
0000:06	Process Data Input Length	IO-Link specific	UINT8	RO	16
0000:07	Process Data Output Length	IO-Link specific	UINT8	RO	16
0000:08 - 0000:09	Vendor ID	manufacturer ID	UINT8	RO	0x0120
0000:0A - 0000:0C	Device ID	device ID	UINT8	RO	0x233900
0000:0D - 0000:0F	Reserved	-	UINT8	RO	255
0000:10	System Command	IO-Link specific		RO	255

Direct Parameter Page 2

Index (hex)	Name	Meaning	Data type	Flags	Default
0001:01 - 0001:10	Device Specific Parameter	IO-Link specific	UINT8	RW	0

Index 0002 Standard Command

Index (hex)	Name	Meaning	Data type	Flags	Default
0002	Standard Command	IO-Link specific	UINT8	W	0

Index 000C Device Access Locks

Index (hex)	Name	Meaning	Data type	Flags	Default
000C:01	Parameter (write) Access Lock	unassisted	BOOL	RW	FALSE
000C:02	Data Storage Lock	unassisted	BOOL	RW	FALSE
000C:03	Local Parameterization Lock	unassisted	BOOL	RW	FALSE
000C:04	Local User Interface Lock	unassisted	BOOL	RW	FALSE

Index 0010 Vendor Name

Index (hex)	Name	Meaning	Data type	Flags	Default
0010	Vendor Name	manufacturer designation	String	R	Beckhoff Automation GmbH & Co. KG

Index 0011 Vendor Text

Index (hex)	Name	Meaning	Data type	Flags	Default
0011	Vendor Text	manufacturer specific text	String	R	www.beckhoff.com

Index 0012 Product Name a

Index (hex)	Name	Meaning	Data type	Flags	Default
0012	Product Name	product designation	String	R	EPI2008-000x, ERI2008-000x

Index 0013 Product ID

Index (hex)	Name	Meaning	Data type	Flags	Default
0013	Product ID	product designation	String	R	EPI2008-000x, ERI2008-000x

Index 0014 Product Text

Index (hex)	Name	Meaning	Data type	Flags	Default
0014	Product Text	product description	String	R	8 DO Module

Index 0015 Serial Number

Index (hex)	Name	Meaning	Data type	Flags	Default
0015	Serial Number	serial number (Individual serial number. Independent of the lasered serial number)	String	R	00000000

Index 0016 Hardware Version

Index (hex)	Name	Meaning	Data type	Flags	Default
0016	Hardware Version	Hardware revision	String	R	01

Index 0017 Firmware Version

Index (hex)	Name	Meaning	Data type	Flags	Default
0017	Firmware Version	Firmware version	String	R	01

Index 0018 Application Specific Tag

Index (hex)	Name	Meaning	Data type	Flags	Default
0018	Application Specific Tag	application specific description	String	RW	***** *****

Index 0A00 Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
0A00:01	Overtemperature	overheating of the IO-Link modules	BOOL	RO	FALSE
0A00:02	Short detected	short circuit on the IO-Link C/Q data line	BOOL	RO	FALSE
0A00:03	US low	supply voltage too low (< 18V)	BOOL	RO	FALSE
0A00:04	UP low	Additional power supply too low (<18V)	BOOL	RO	FALSE
0A00:05	UP stat	Additional power supply non-existent (<8V)	BOOL	RO	FALSE
0A00:06 - 0A00:10	Reserved	-	BOOL	RO	FALSE

6.3 EPI2809-002x, ERI2809-002x - Object description and parameterization

i IO-Link IODD Device Description

The display corresponds to the display of the IO-Link device parameters. It is advisable to download the latest IO-Link IODD device description files from the [Download section](#) of the Beckhoff website and install them according to the installation instructions.

Parameter server (data storage)

The IO-Link box modules support the data storage functionality according to protocol revision 1.1. The parameters 0x0018 (application-specific tag) and 0x08n0 (settings) are secured with the IO-Link master. In order to use this functionality, the IO-Link master must also support it. (e.g. with the Beckhoff EP6224-xxxx IO-Link master from firmware 10) Changes to these parameters are saved by the IO-Link master and restored when the box is replaced with an identical IO-Link box. How to use the data storage functionality is explained in chapter Setting of the IO-Link device parameters.

Index 0000 Direct Parameters 1

Index (hex)	Name	Meaning	Data type	Flags	Default
0000:01	Reserved	-	UINT8	RO	0
0000:02	Master Cycle Time	IO-Link specific	UINT8	RO	5
0000:03	Min Cycle Time	IO-Link specific	UINT8	RO	5
0000:04	M-Sequence Capability	IO-Link specific	UINT8	RO	1
0000:05	IO-Link Version ID	IO-Link specific	UINT8	RO	17
0000:06	Process Data Input Length	IO-Link specific	UINT8	RO	16
0000:07	Process Data Output Length	IO-Link specific	UINT8	RO	16
0000:08 - 0000:09	Vendor ID	manufacturer ID	UINT8	RO	0x0120
0000:0A - 0000:0C	Device ID	device ID	UINT8	RO	0x233900
0000:0D - 0000:0F	Reserved	-	UINT8	RO	255
0000:10	System Command	IO-Link specific		RO	255

Direct Parameter Page 2

Index (hex)	Name	Meaning	Data type	Flags	Default
0001:01 - 0001:10	Device Specific Parameter	IO-Link specific	UINT8	RW	0

Index 0002 Standard Command

Index (hex)	Name	Meaning	Data type	Flags	Default
0002	Standard Command	IO-Link specific	UINT8	W	0

Index 000C Device Access Locks

Index (hex)	Name	Meaning	Data type	Flags	Default
000C:01	Parameter (write) Access Lock	unassisted	BOOL	RW	FALSE
000C:02	Data Storage Lock	unassisted	BOOL	RW	FALSE
000C:03	Local Parameterization Lock	unassisted	BOOL	RW	FALSE
000C:04	Local User Interface Lock	unassisted	BOOL	RW	FALSE

Index 0010 Vendor Name

Index (hex)	Name	Meaning	Data type	Flags	Default
0010	Vendor Name	manufacturer designation	String	R	Beckhoff Automation GmbH & Co. KG

Index 0011 Vendor Text

Index (hex)	Name	Meaning	Data type	Flags	Default
0011	Vendor Text	manufacturer specific text	String	R	www.beckhoff.com

Index 0012 Product Name

Index (hex)	Name	Meaning	Data type	Flags	Default
0012	Product Name	product designation	String	R	EPI2809-002x, ERI2809-002x

Index 0013 Product ID

Index (hex)	Name	Meaning	Data type	Flags	Default
0013	Product ID	product designation	String	R	EPI2809-002x, ERI2809-002x

Index 0014 Product Text

Index (hex)	Name	Meaning	Data type	Flags	Default
0014	Product Text	product description	String	R	16 DO Module

Index 0015 Serial Number

Index (hex)	Name	Meaning	Data type	Flags	Default
0015	Serial Number	serial number (Individual serial number. Independent of the lasered serial number)	String	R	00000000

Index 0016 Hardware Version

Index (hex)	Name	Meaning	Data type	Flags	Default
0016	Hardware Version	Hardware revision	String	R	01

Index 0017 Firmware Version

Index (hex)	Name	Meaning	Data type	Flags	Default
0017	Firmware Version	Firmware version	String	R	01

Index 0018 Application Specific Tag

Index (hex)	Name	Meaning	Data type	Flags	Default
0018	Application Specific Tag	application specific description	String	RW	***** *****

Index 0A00 Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
0A00:01	Overtemperature	overheating of the IO-Link modules	BOOL	RO	FALSE
0A00:02	Short detected	short circuit on the IO-Link C/Q data line	BOOL	RO	FALSE
0A00:03	US low	supply voltage too low (< 18V)	BOOL	RO	FALSE
0A00:04	UP low	Additional power supply too low (<18V)	BOOL	RO	FALSE
0A00:05	UP stat	Additional power supply non-existent (<8V)	BOOL	RO	FALSE
0A00:06 - 0A00:07	Reserved	-	BOOL	RO	FALSE
0A00:08	Port 0-7 output overcurrent	Overcurrent detected on one of the digital outputs port 0-7	BOOL	RO	FALSE
0A00:09	Port 8-15 output overcurrent	Overcurrent detected on one of the digital outputs port 8-15	BOOL	RO	FALSE
0A00:0A - 0A00:10	Reserved	-	BOOL	RO	FALSE

6.4 EPI2338-000x, ERI2338-000x - Object description and parameterization

i IO-Link IODD Device Description

The display corresponds to the display of the IO-Link device parameters. It is advisable to download the latest IO-Link IODD device description files from the [Download section](#) of the Beckhoff website and install them according to the installation instructions.

Parameter server (data storage)

The IO-Link box modules support the data storage functionality according to protocol revision 1.1. The parameters 0x0018 (application-specific tag) and 0x08n0 (settings) are secured with the IO-Link master. In order to use this functionality, the IO-Link master must also support it. (e.g. with the Beckhoff EP6224-xxxx IO-Link master from firmware 10) Changes to these parameters are saved by the IO-Link master and restored when the box is replaced with an identical IO-Link box. How to use the data storage functionality is explained in chapter Setting of the IO-Link device parameters.

Index 0000 Direct Parameters 1

Index (hex)	Name	Meaning	Data type	Flags	Default
0000:01	Reserved	-	UINT8	RO	0
0000:02	Master Cycle Time	IO-Link specific	UINT8	RO	5
0000:03	Min Cycle Time	IO-Link specific	UINT8	RO	5
0000:04	M-Sequence Capability	IO-Link specific	UINT8	RO	1
0000:05	IO-Link Version ID	IO-Link specific	UINT8	RO	17
0000:06	Process Data Input Length	IO-Link specific	UINT8	RO	16
0000:07	Process Data Output Length	IO-Link specific	UINT8	RO	16
0000:08 - 0000:09	Vendor ID	manufacturer ID	UINT8	RO	0x0120
0000:0A - 0000:0C	Device ID	device ID	UINT8	RO	0x233900
0000:0D - 0000:0F	Reserved	-	UINT8	RO	255
0000:10	System Command	IO-Link specific		RO	255

Direct Parameter Page 2

Index (hex)	Name	Meaning	Data type	Flags	Default
0001:01 - 0001:10	Device Specific Parameter	IO-Link specific	UINT8	RW	0

Index 0002 Standard Command

Index (hex)	Name	Meaning	Data type	Flags	Default
0002	Standard Command	IO-Link specific	UINT8	W	0

Index 000C Device Access Locks

Index (hex)	Name	Meaning	Data type	Flags	Default
000C:01	Parameter (write) Access Lock	unassisted	BOOL	RW	FALSE
000C:02	Data Storage Lock	unassisted	BOOL	RW	FALSE
000C:03	Local Parameterization Lock	unassisted	BOOL	RW	FALSE
000C:04	Local User Interface Lock	unassisted	BOOL	RW	FALSE

Index 0010 Vendor Name

Index (hex)	Name	Meaning	Data type	Flags	Default
0010	Vendor Name	manufacturer designation	String	R	Beckhoff Automation GmbH & Co. KG

Index 0011 Vendor Text

Index (hex)	Name	Meaning	Data type	Flags	Default
0011	Vendor Text	manufacturer specific text	String	R	www.beckhoff.com

Index 0012 Product Name

Index (hex)	Name	Meaning	Data type	Flags	Default
0012	Product Name	product designation	String	R	EPI2338-000x, ERI2338-000x

Index 0013 Product ID

Index (hex)	Name	Meaning	Data type	Flags	Default
0013	Product ID	product designation	String	R	EPI2338-000x, ERI2338-000x

Index 0014 Product Text

Index (hex)	Name	Meaning	Data type	Flags	Default
0014	Product Text	product description	String	R	8 DIO Module

Index 0015 Serial Number

Index (hex)	Name	Meaning	Data type	Flags	Default
0015	Serial Number	serial number (Individual serial number. Independent of the lasered serial number)	String	R	00000000

Index 0016 Hardware Version

Index (hex)	Name	Meaning	Data type	Flags	Default
0016	Hardware Version	Hardware revision	String	R	01

Index 0017 Firmware Version

Index (hex)	Name	Meaning	Data type	Flags	Default
0017	Firmware Version	Firmware version	String	R	01

Index 0018 Application Specific Tag

Index (hex)	Name	Meaning	Data type	Flags	Default
0018	Application Specific Tag	application specific description	String	RW	***** *****

Index 0800 Settings

Index (hex)	Name	Meaning	Data type	Flags	Default
0800:01	Input Filter	Input debouncing for digital inputs	UINT8	RW	3 ms
0800:02	Signal Extension	Pulse extension for digital inputs	UINT8	RW	off

Index 0A00 Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
0A00:01	Overtemperature	overheating of the IO-Link modules	BOOL	RO	FALSE
0A00:02	Short detected	short circuit on the IO-Link C/Q data line	BOOL	RO	FALSE
0A00:03	US low	supply voltage too low (< 18V)	BOOL	RO	FALSE
0A00:04	UP low	Additional power supply too low (<18V)	BOOL	RO	FALSE
0A00:05	UP stat	Additional power supply non-existent (<8V)	BOOL	RO	FALSE
0A00:06 - 0A00:10	Reserved	-	BOOL	RO	FALSE

6.5 EPI2339-002x, ERI2339-002x - Object description and parameterization

i IO-Link IODD Device Description

The display corresponds to the display of the IO-Link device parameters. It is advisable to download the latest IO-Link IODD device description files from the [Download section](#) of the Beckhoff website and install them according to the installation instructions.

Parameter server (data storage)

The IO-Link box modules support the data storage functionality according to protocol revision 1.1. The parameters 0x0018 (application-specific tag) and 0x08n0 (settings) are secured with the IO-Link master. In order to use this functionality, the IO-Link master must also support it. (e.g. with the Beckhoff EP6224-xxxx IO-Link master from firmware 10) Changes to these parameters are saved by the IO-Link master and restored when the box is replaced with an identical IO-Link box. How to use the data storage functionality is explained in chapter Setting of the IO-Link device parameters.

Index 0000 Direct Parameters 1

Index (hex)	Name	Meaning	Data type	Flags	Default
0000:01	Reserved	-	UINT8	RO	0
0000:02	Master Cycle Time	IO-Link specific	UINT8	RO	5
0000:03	Min Cycle Time	IO-Link specific	UINT8	RO	5
0000:04	M-Sequence Capability	IO-Link specific	UINT8	RO	1
0000:05	IO-Link Version ID	IO-Link specific	UINT8	RO	17
0000:06	Process Data Input Length	IO-Link specific	UINT8	RO	16
0000:07	Process Data Output Length	IO-Link specific	UINT8	RO	16
0000:08 - 0000:09	Vendor ID	manufacturer ID	UINT8	RO	0x0120
0000:0A - 0000:0C	Device ID	device ID	UINT8	RO	0x233900
0000:0D - 0000:0F	Reserved	-	UINT8	RO	255
0000:10	System Command	IO-Link specific		RO	255

Direct Parameter Page 2

Index (hex)	Name	Meaning	Data type	Flags	Default
0001:01 - 0001:10	Device Specific Parameter	IO-Link specific	UINT8	RW	0

Index 0002 Standard Command

Index (hex)	Name	Meaning	Data type	Flags	Default
0002	Standard Command	IO-Link specific	UINT8	W	0

Index 000C Device Access Locks

Index (hex)	Name	Meaning	Data type	Flags	Default
000C:01	Parameter (write) Access Lock	unassisted	BOOL	RW	FALSE
000C:02	Data Storage Lock	unassisted	BOOL	RW	FALSE
000C:03	Local Parameterization Lock	unassisted	BOOL	RW	FALSE
000C:04	Local User Interface Lock	unassisted	BOOL	RW	FALSE

Index 0010 Vendor Name

Index (hex)	Name	Meaning	Data type	Flags	Default
0010	Vendor Name	manufacturer designation	String	R	Beckhoff Automation GmbH & Co. KG

Index 0011 Vendor Text

Index (hex)	Name	Meaning	Data type	Flags	Default
0011	Vendor Text	manufacturer specific text	String	R	www.beckhoff.com

Index 0012 Product Name

Index (hex)	Name	Meaning	Data type	Flags	Default
0012	Product Name	product designation	String	R	EPI2339-002x, ER2339-002x

Index 0013 Product ID

Index (hex)	Name	Meaning	Data type	Flags	Default
0013	Product ID	product designation	String	R	EPI2339-002x, ER2339-002x

Index 0014 Product Text

Index (hex)	Name	Meaning	Data type	Flags	Default
0014	Product Text	product description	String	R	16 DIO Module

Index 0015 Serial Number

Index (hex)	Name	Meaning	Data type	Flags	Default
0015	Serial Number	serial number (Individual serial number. Independent of the lasered serial number)	String	R	00000000

Index 0016 Hardware Version

Index (hex)	Name	Meaning	Data type	Flags	Default
0016	Hardware Version	Hardware revision	String	R	01

Index 0017 Firmware Version

Index (hex)	Name	Meaning	Data type	Flags	Default
0017	Firmware Version	Firmware version	String	R	01

Index 0018 Application Specific Tag

Index (hex)	Name	Meaning	Data type	Flags	Default
0018	Application Specific Tag	application specific description	String	RW	***** *****

Index 0800 Settings

Index (hex)	Name	Meaning	Data type	Flags	Default
0800:01	Input Filter	Input debouncing for digital inputs	UINT8	RW	3 ms
0800:02	Signal Extension	Pulse extension for digital inputs	UINT8	RW	off

Index 0A00 Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
0A00:01	Overtemperature	overheating of the IO-Link modules	BOOL	RO	FALSE
0A00:02	Short detected	short circuit on the IO-Link C/Q data line	BOOL	RO	FALSE
0A00:03	US low	supply voltage too low (< 18V)	BOOL	RO	FALSE
0A00:04	UP low	Additional power supply too low (<18V)	BOOL	RO	FALSE
0A00:05	UP stat	Additional power supply non-existent (<8V)	BOOL	RO	FALSE
0A00:06	Port 0-7 UP short	short circuit detected on one of the digital ports 0-7	BOOL	RO	FALSE
0A00:07	Port 8-15 UP short	short circuit detected on one of the digital ports 8-15	BOOL	RO	FALSE
0A00:08	Port 0-7 output overcurrent	Overcurrent detected on one of the digital outputs port 0-7	BOOL	RO	FALSE
0A00:09	Port 8-15 output overcurrent	Overcurrent detected on one of the digital outputs port 8-15	BOOL	RO	FALSE
0A00:0A - 00A00:10	Reserved	-	BOOL	RO	FALSE

7 Appendix

7.1 General operating conditions

Protection rating according to IP code

The degrees of protection are defined and divided into different classes in the IEC 60529 standard (EN 60529). Degrees of protection are designated by the letters "IP" and two numerals: **IPxy**

- Numeral x: Dust protection and contact protection
- Numeral y: Protection against water

x	Meaning
0	Not protected
1	Protected against access to dangerous parts with the back of the hand. Protected against solid foreign objects of 50 mm Ø
2	Protected against access to dangerous parts with a finger. Protected against solid foreign objects of 12.5 mm Ø
3	Protected against access to dangerous parts with a tool. Protected against solid foreign objects of 2.5 mm Ø
4	Protected against access to dangerous parts with a wire. Protected against solid foreign objects of 1 mm Ø
5	Protection against access to dangerous parts with a wire. Dust-protected. Ingress of dust is not prevented completely, although the quantity of dust able to penetrate is limited to such an extent that the proper function of the device and safety are not impaired
6	Protection against access to dangerous parts with a wire. Dust-tight. No ingress of dust

y	Meaning
0	Not protected
1	Protection against vertically falling water drops
2	Protection against vertically falling water drops when enclosure tilted up to 15°
3	Protection against spraying water. Water sprayed at an angle of up to 60° on either side of the vertical shall have no harmful effects
4	Protection against splashing water. Water splashed against the enclosure from any direction shall have no harmful effects
5	Protection against water jets.
6	Protection against powerful water jets.
7	Protected against the effects of temporary immersion in water. Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is immersed in water at a depth of 1 m for 30 minutes

Chemical resistance

The resistance refers to the housing of the IP67 modules and the metal parts used. In the table below you will find some typical resistances.

Type	Resistance
Water vapor	unstable at temperatures > 100 °C
Sodium hydroxide solution (ph value > 12)	stable at room temperature unstable > 40 °C
Acetic acid	unstable
Argon (technically pure)	stable

Key

- resistant: Lifetime several months
- non inherently resistant: Lifetime several weeks
- not resistant: Lifetime several hours resp. early decomposition

7.2 Accessories

Mounting

Ordering information	Description	Link
ZS5300-0011	Mounting rail	Website

Cables

A complete overview of pre-assembled cables for fieldbus components can be found [here](#).

Ordering information	Description	Link
ZK2000-2xxx-xxxx	Sensor cable M8, 3-pin	Website
ZK2000-5xxx-xxxx	Sensor cable M12, 5-pin	Website
ZK2000-6xxx-xxxx	Sensor cable M12, 4-pin	Website
ZK2000-7xxx-0xxx	Sensor cable M12, 4-pin + shield	Website

Labeling material, protective caps

Ordering information	Description
ZS5000-0010	Protective cap for M8 sockets, IP67 (50 pieces)
ZS5000-0020	Protective cap for M12 sockets, IP67 (50 pcs.)
ZS5100-0000	Inscription labels, unprinted, 4 strips of 10
ZS5000-xxxx	Printed inscription labels on enquiry



Further accessories

Further accessories can be found in the price list for fieldbus components from Beckhoff and online at <https://www.beckhoff.com>.

Tools

Ordering information	Description
ZB8801-0000	Torque wrench for plugs, 0.4...1.0 Nm
ZB8801-0001	Torque cable key for M8 / wrench size 9 for ZB8801-0000
ZB8801-0002	Torque cable key for M12 / wrench size 13 for ZB8801-0000
ZB8801-0003	Torque cable key for M12 field assembly / wrench size 18 for ZB8801-0000

7.3 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for local support and service on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on her internet pages: www.beckhoff.com

You will also find further documentation for Beckhoff components there.

Support

The Beckhoff Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline: +49 5246 963 157
e-mail: support@beckhoff.com
web: www.beckhoff.com/support

Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

Hotline: +49 5246 963 460
e-mail: service@beckhoff.com
web: www.beckhoff.com/service

Headquarters Germany

Beckhoff Automation GmbH & Co. KG

Hülshorstweg 20
33415 Verl
Germany

Phone: +49 5246 963 0
e-mail: info@beckhoff.com
web: www.beckhoff.com

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com