

System CPX-E

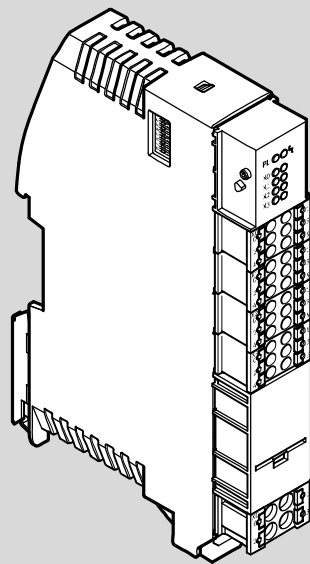
IO-Link master module CPX-E-4IOL-...

FESTO

Description

Protocol
IO-Link

Function
Parameterisation



8071107
2017-07
[8071109]

IO-Link master module
CPX-E-4IOL-...

Original instructions
CPX-E-4IOL-...-EN

IO-Link® is a registered trademark of its respective trademark holder in certain countries.

Symbols used:



Note

Material damage or loss of function



Recommendations, tips, references to other documentation

Table of Contents

1	About this document	4
1.1	Further applicable documents	4
1.2	Target group	4
1.3	Product version	4
1.4	Product label	5
1.5	Specified standards	5
2	Function	6
2.1	General remarks	6
2.1.1	Product design	6
2.1.2	Display components	6
2.1.3	Control elements	7
2.1.4	Connecting components	7
2.1.5	Functional example	8
2.2	IO-Link	8
2.3	Diagnostics	9
2.3.1	Diagnostic and error messages	10
2.3.2	Priorities of the diagnostic/error messages	10
2.3.3	Diagnostic/error messages according to error numbers	11
2.3.4	Event codes	12
3	Parameterisation	13
3.1	Overview of parameters	13
3.2	Parameter	14
3.2.1	Monitoring ULoad	14
3.2.2	Behaviour after SCS	14
3.2.3	Behaviour after SCO	14
3.2.4	PS supply	15
3.2.5	Cycle time (Port 1 ... 4)	15
3.2.6	PL supply (Port 1 ... 4)	16
3.2.7	Operating mode (Port 1 ... 4)	17
3.2.8	LineState (Port 1 ... 4)	18
3.2.9	Device error code (Port 1 ... 4)	19
A	Technical Data	20
B	Terminology	22
Index		23


1 About this document

This document describes the function and parameterisation of the product stated in the title. Safe use of the product is described in a separate document → 1.1 Further applicable documents.

1.1 Further applicable documents

Document	Contents
Description of system CPX-E (CPX-E-SYS)	Detailed description of system CPX-E
Instructions for use of system CPX-E (CPX-E-SYS)	Instructions and important notes on mounting, electrical installation and maintenance tasks for system CPX-E
Instructions for use of the IO-Link master module CPX-E-4IOL-... (CPX-E-4IOL-...)	Instructions and important information on use and safe application
Documentation of the components in system CPX-E and the periphery connected to it	Information on use of the components
Documentation of the connected devices with the IO-Link interface	Information on commissioning and parameterisation of the components
Documentation for the higher-order controller and the additional participants in the network	Information on commissioning and parameterisation of the components

Tab. 1.1

 For all available product documentation → www.festo.com/pk.

1.2 Target group

This document is intended for qualified specialised personnel. Experience in an IO-Link® system is required in order to understand this documentation.

1.3 Product version


This document refers to the following product versions:


Product	Version number
CPX-E-4IOL	IO-Link master module CPX-E-4IOL as of Revision 1
CPX-E-4IOL-P ¹⁾	IO-Link master module CPX-E-4IOL-P as of Revision 1

1) Use in an industrial environment and process automation according to NE 21

Tab. 1.2

The product version can be identified from the product label or with the help of appropriate software from Festo.

 Appropriate software for identifying the product version can be found in the Festo Support Portal → www.festo.com/sp. Information on using the software can be found in the integrated Help function.

 There may be an updated version of this document for these or later product versions.

- Check whether a corresponding version of this document is available → www.festo.com/sp.

1.4 Product label

The product label is located on the left-hand side of the module. Scanning the printed Data Matrix Code with an appropriate device calls up the Festo Support Portal, with information appropriate for the product. Alternatively, the product key (11-digit alphanumeric code or product label) can be entered in the search field of the Support Portal.

- 1 Designation
- 2 Part number/serial number
- 3 Revision status
- 4 Data Matrix Code
- 5 Product Key
- 6 Approvals/warning symbols
- 7 Pin assignment

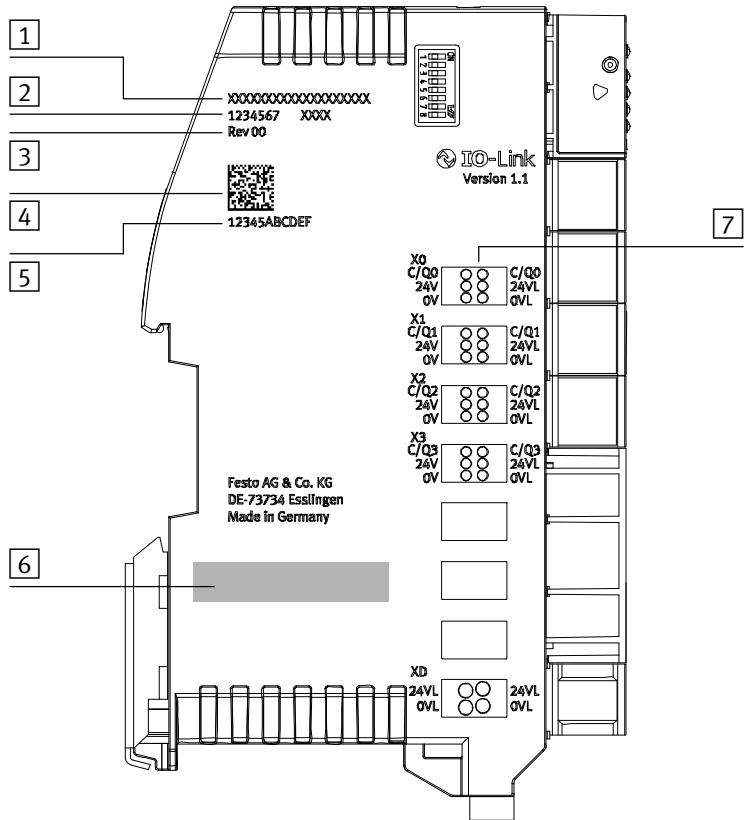


Fig. 1.1

1.5 Specified standards

Version status	
EN 60529:2013-10	IEC 60204-1:2014-10
EN 61000-6-2:2009-04	NE 21:2012-05
EN 61000-6-4:2011-09	

Tab. 1.3

2 Function

2.1 General remarks

The module provides 4 IO-Link interfaces (ports) for integration into system CPX-E. The operating and load voltage supply are implemented separately. LED indicators are available to display the operating status of the module and connected devices. The address space provided to the IO-Link interfaces (ports) by the module is defined by DIL switches.

i Detailed information on the DIL switches can be found in the Detailed information on the DIL switches can be found in the “Instructions for use of CPX-E-4IOL-...” → 1.1 Further applicable documents.

2.1.1 Product design

- 1 LED displays
- 2 Terminal strips of the IO-Link interface (Ports 1 ... 4) [X0 ... X3]
- 3 Terminal strip of load voltage supply U_{OUT} [XD]
- 4 Terminal strip interlock
- 5 Linking
- 6 DIL switch

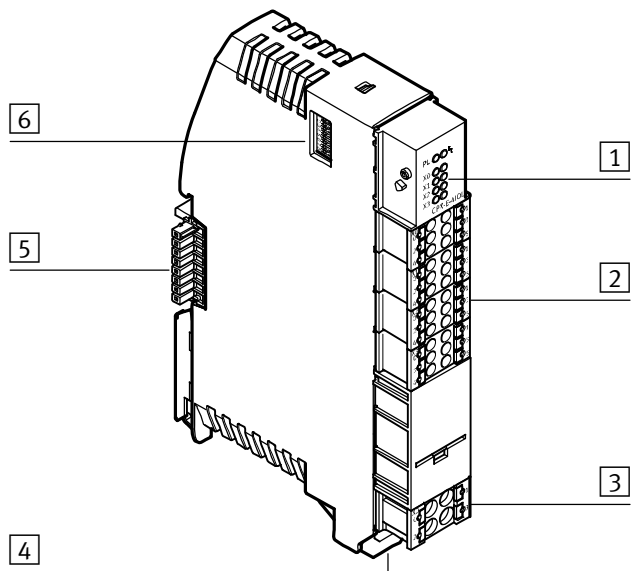


Fig. 2.1

2.1.2 Display components

- 1 Module error [4] (red)
- 2 Standard IO mode (SIO) [X0 ... X3] (yellow)
- 3 IO-Link mode (IOL) [X0 ... X3] (green)
- 4 Load voltage supply U_{OUT} [PL] (green)

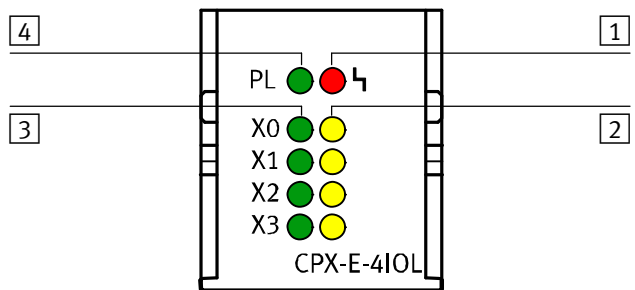

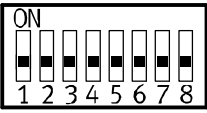


Fig. 2.2

2.1.3 Control elements

The address space (inputs/outputs) provided by the module is set using DIL switches → Tab. 2.1.

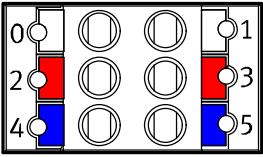
 Switch position combinations that are not listed lead to an error (error number 204).

DIL switch	1	2	3	4	5	6 ... 8	Address space [byte]	
							Per port	Module
	OFF	Off	Off	Off	Off	OFF	2 I/2 O ¹⁾	8 I/8 O ¹⁾
	ON	Off	Off	Off	Off	OFF	4 I/4 O	16 I/16 O
	OFF	ON	Off	Off	Off	OFF	8 I/8 O	32 I/32 O
	ON	ON	OFF	ON	Off	OFF	16 I/16 O ²⁾	
	OFF	Off	ON	OFF	ON	OFF	32 I/32 O ³⁾	

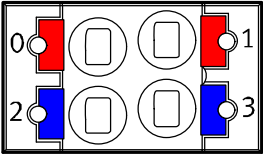
- 1) Factory setting
- 2) Only Port 1 [X0] and Port 2 [X1] active
- 3) Only Port 1 [X0] active

Tab. 2.1

2.1.4 Connecting components

Port [X0] ... [X3]	Signal	Description	
	0/1	C/Q Standard IO (in SIO mode) or IO-Link communication (in IOL mode)	
	2	L+	+24 V DC operating voltage supply U _{EL/SEN}
	3	P24	+24 V DC load voltage supply U _{OUT}
	4	L-	0 V DC operating voltage supply U _{EL/SEN}
	5	N24	0 V DC load voltage supply U _{OUT}

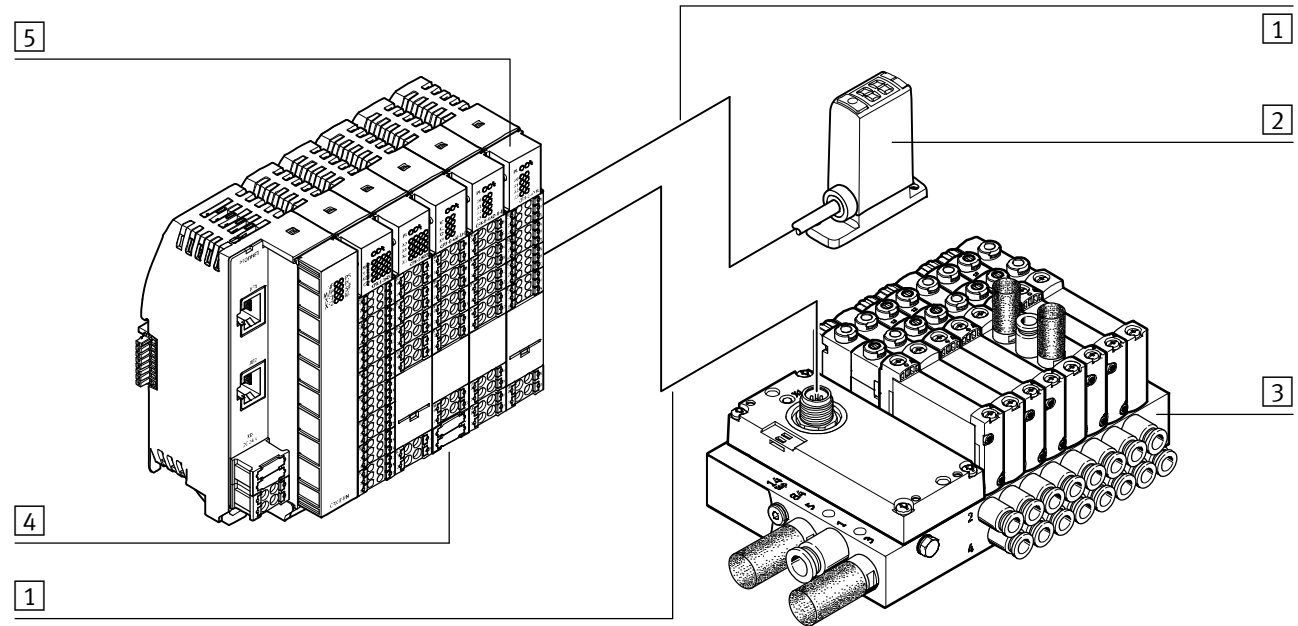
Tab. 2.2

Connection [XD] ¹⁾	Signal	
	0	+24 V DC load voltage supply U _{OUT}
	1	
	2	0 V DC load voltage supply U _{OUT}
	3	

1) The connections XD.0 and XD.1 and also XD.2 and XD.3 are interconnected in the terminal strip.

Tab. 2.3

2.1.5 Functional example



- 1 Connecting cable
- 2 Pressure sensor with IO-Link
- 3 Valve terminal with IO-Link

- 4 System CPX-E
- 5 IO-Link master module CPX-E-4IOL

Fig. 2.3

2.2 IO-Link

The IO-Link communication system is used for the exchange of serial data from decentralised devices on the field level. The connection type corresponds with a point-to-point connection, which means it can be connected to only one device at every IO-Link interface.

The IO-Link interfaces (ports) can be operated in the following operating modes:

- Inactive (for unused ports)
- DI (the port acts like a digital input)
- IO-Link (IO-Link communication takes place at the port)

i The module described in this document has IO-Link interfaces (ports) of Class B (Type B) that provides an additional load voltage supply.
The devices description by IODD (IO Device Description) is not supported.

2.3 Diagnostics

For the diagnostics of errors, various possibilities are available:

- Internal system diagnostics
- LED indicators on the product



The internal system diagnostics is described in the “Description of the CPX-E system”
→ 1.1 Further applicable documents.

The LED indicators on the product are described in the following tables.

Module error [4] ¹⁾		
LED (red)	Significance	Remedy
 Lights up	General error/module error	<ul style="list-style-type: none"> • Check the devices, voltage supplies and installation. • Check parameterisation and adjust.
	Channel error/error between module and device	<ul style="list-style-type: none"> • Check the line and connections. • Check and adapt the address space. • Check device.
 Off	System-internal communication OK, no module error	–

1) Flashes once briefly at the initialisation of the CPX-E system




Tab. 2.4

IO-Link mode (IOL) [X0] ... [X3]		
LED (green)	Significance	Remedy
 Lights up	IO-Link communication exists without channel error	–
 Flashes	IO-Link channel diagnosis Device indicates an event or connection to device interrupted	<ul style="list-style-type: none"> • Read out the event code (→ Tab. 2.10) through the “Device error code” (→ Tab. 3.10) and perform the corresponding remedial measures.
 Off	No IO-Link communication exists	–

Tab. 2.5

Standard IO mode (SIO) [X0] ... [X3]		
LED (yellow)	Meaning	Remedy
 Lights up	Process signal = 1	–
 Off	Process signal = 0	–

Tab. 2.6

Load voltage supply U_{OUT} [PL]		
LED (green)	Significance	Remedy
 Lights up	Load voltage supply U_{OUT} exists	–
 Flashes	Undervoltage of the load voltage supply U_{OUT} on at least one device	<ul style="list-style-type: none"> • Check the load voltage supply U_{OUT}.
 Off	Load voltage supply U_{OUT} not present or undervoltage	<ul style="list-style-type: none"> • Check the load voltage supply U_{OUT}.

Tab. 2.7

2.3.1 Diagnostic and error messages

Malfunctions or errors are sent to the bus module as an error number and can be evaluated by the network or suitable software of Festo.



The prerequisite for sending diagnostic/error messages (if supported by the respective network) is an existing connection to the host system and a corresponding parameterisation of the module
 → 3 Parameterisation.

2.3.2 Priorities of the diagnostic/error messages

The module differentiates various instances that can cause diagnostic/error messages. These instances have various priorities in system CPX-E.

If several diagnostic/error messages cannot be sent in parallel on the network side, the error message with the highest priority is displayed.

Priority	Error instance	Description
Highest	System	Error in the module
...	Port 1	Error in the module at port 1
	Port 2	Error in the module at port 2
	Port 3	Error in the module at port 3
Lowest	Port 4	Error in the module at port 4

Tab. 2.8



- The error instances of the ports are allocated to the outputs by default.
- The prioritisation of the individual modules in system CPX-E runs to the right in descending order from the bus module (position always a the far left).
- Diagnostic/error messages from inputs have priority over diagnostic/error messages from outputs.

2.3.3 Diagnostic/error messages according to error numbers

Error no.	Meaning/possible causes	Error handling
0	Device OK	–
1	General error	<ul style="list-style-type: none"> • Check device, remedy error.
	Device NOK, general diagnostics	
	Hardware error – device replacement	
	Component error – repair or replacement	
	General error in power supply	
	Fuse triggered	<ul style="list-style-type: none"> • Check installation.
	Device software error	
	Mass error	
	Temperature overload	
	Technology-specific application error	
Measuring range exceeded	<ul style="list-style-type: none"> • Return device. • Check application. 	
2	Short circuit	<ul style="list-style-type: none"> • Check installation.
3	Wire break	<ul style="list-style-type: none"> • Check installation.
5	Error in the power supply	<ul style="list-style-type: none"> • Check power supply.
	Primary voltage/main power supply too low	
	Undervoltage PL device supply ¹⁾	
9	Below minimum value	<ul style="list-style-type: none"> • Check installation. • Check battery.
	Device temperature limit fallen below	
	Error in memory buffering	
	Low battery level	
10	Above maximum level	<ul style="list-style-type: none"> • Check installation. • Check power supply.
	Device has exceeded temperature limit	
	Primary voltage/main power supply too low	
24	Process variable range underflow	<ul style="list-style-type: none"> • Check process data.
25	Process variable range overflow	<ul style="list-style-type: none"> • Check process data.
29	Parameter error	<ul style="list-style-type: none"> • Check parameterisation. • Check the data sheet and values. • Check the data sheet. • Check the configuration.
	Invalid parameters received from the host	
	Parameter error	
	Missing parameters	
39	Maintenance required	<ul style="list-style-type: none"> • Check process data.
57	Device missing/failed	<ul style="list-style-type: none"> • Check the configuration.
88	Short circuit at port ²⁾	<ul style="list-style-type: none"> • Check installation.
89	Port configuration error	<ul style="list-style-type: none"> • Check the configuration.
204	Invalid switch setting	<ul style="list-style-type: none"> • Check the DIL switch setting.

1) Only relevant if the PL monitoring is active in a device.

2) L+, P24

Tab. 2.9



When accessing the module through the software, the respectively current error can be determined more precisely for each port using an event code insofar as the error is returned to the connected device
 → 2.3.4 Event codes.

2.3.4 Event codes

Within the communication between module and device, so-called events are used for status diagnostics, which include an error code (event code), each with a constant length of 2 bytes.

Event code ¹⁾	Error instance	Description	Error no.
–	Internal	Short circuit at port ²⁾	88
		Configuration fault	89
		Device missing/failed	57
		Invalid parameters received from the host (parameterisation error)	29
0x...	Device	All event codes not specified in this list	1
0x0000		Device OK	0
0x1000		Device NOK, general diagnostics	1
0x4000		Temperature overload	1
0x4210		Device has exceeded temperature limit	10
0x4220		Device has fallen below temperature limit	9
0x5000		Hardware error – device replacement	1
0x5010		Component error – repair or replacement	1
0x5011		Error in memory buffering – check batteries	9
0x5012		Low battery level – check batteries	9
0x5100		General error in power supply	1
0x5101		Fuse triggered	1
0x5110		Primary voltage/main power supply too low	10
0x5111		Primary voltage/main power supply too low	5
0x5112		Undervoltage PL device ³⁾	5
0x6000		Device software error	1
0x6320		Parameter error – check data sheet and values	29
0x6321		Missing parameter – check data sheet	29
0x6350		Changed parameter – check configuration	29
0x7700		Wire break at device peripherals – check installation	3
0x7701 ... 0x770F		Wire break at Device 1 ... Device 15 periphery – check installation	3
0x7710		Short circuit – check installation	2
0x7711		Mass error – check installation	1
0x8C00		Technology-specific application error – device reset	1
0x8C10		Process variable range overflow – process data inconsistent	25
0x8C20		Measuring range exceeded – check application	1
0x8C30		Process variable range underflow – process data inconsistent	24
0x8C40		Maintenance required – cleaning	39
0x8C41		Maintenance required – refill	39
0x8C42		Maintenance required – replace wearing parts	39

1) Representation of MSB left, LSB right

2) L+, P24

3) Only relevant if the PL monitoring is active in a device.

Tab. 2.10

3 Parameterisation

3.1 Overview of parameters

Parameter	F no. ¹⁾	Detailed information
	4828 + 64m	
Monitoring U _{Load}	+ 0	→ Tab. 3.2
Behaviour after SCS	+ 1	→ Tab. 3.3
Behaviour after SCO		→ Tab. 3.4
Reserved	+ 2 ... 5	–
PS supply	+ 6	→ Tab. 3.5
Reserved	+ 7	–
Settings of Port 1		
Cycle time (low)	+ 8	→ Tab. 3.6
Cycle time (high)	+ 9	
PL supply	+ 10	→ Tab. 3.7
Operating mode	+ 11	→ Tab. 3.8
Settings of Port 2		
Cycle time (low)	+ 12	→ Tab. 3.6
Cycle time (high)	+ 13	
PL supply	+ 14	→ Tab. 3.7
Operating mode	+ 15	→ Tab. 3.8
Settings of Port 3		
Cycle time (low)	+ 16	→ Tab. 3.6
Cycle time (high)	+ 17	
PL supply	+ 18	→ Tab. 3.7
Operating mode	+ 19	→ Tab. 3.8
Settings of Port 4		
Cycle time (low)	+ 20	→ Tab. 3.6
Cycle time (high)	+ 21	
PL supply	+ 22	→ Tab. 3.7
Operating mode	+ 23	→ Tab. 3.8
Status of port 1 ²⁾		
LineState	+ 24	→ Tab. 3.9
Device error code (low)	+ 25	
Device error code (high)	+ 26	
Status of port 2 ²⁾		
LineState	+ 27	→ Tab. 3.9
Device error code (low)	+ 28	
Device error code (high)	+ 29	
Status of port 3 ²⁾		
LineState	+ 30	→ Tab. 3.9
Device error code (low)	+ 31	
Device error code (high)	+ 32	
Status of port 4 ²⁾		
LineState	+ 33	→ Tab. 3.9
Device error code (low)	+ 34	
Device error code (high)	+ 35	

1) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

2) Only read access possible

Tab. 3.1

3.2 Parameter

3.2.1 Monitoring U_{Load}

The “Monitoring U_{Load} ” parameter defines whether the monitoring of the load voltage supply shall be activated or deactivated in regard to undervoltage.

When the monitoring is activated, the error is sent to the bus module and indicated by the error LED on the module.

Monitoring U_{Load}										
Settings	Selection via software	Selection via parameter								
		F no. ¹⁾	Bit							
		4828 + 64m	7	6	5	4	3	2	1	0
Deactivate monitoring	Inactive	+ 0							0	
Activate monitoring	Active (default)							1		

1) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

Tab. 3.2

3.2.2 Behaviour after SCS

The “Behaviour after SCS” parameter defines whether the voltage remains deactivated or reactivates automatically after a short circuit or overload at the IO-Link interfaces (ports).

In case of the “Leave deactivated” setting, the voltage can be reactivated by deactivating and then reactivating the “PS supply” parameter (→ Tab. 3.5). Otherwise the activation and deactivation of system CPX-E is required for the return of voltage.

Behaviour after SCS										
Settings	Selection via software	Selection via parameter								
		F no. ¹⁾	Bit							
		4828 + 64m	7	6	5	4	3	2	1	0
Leave voltage deactivated	Leave deactivated	+ 1								0
Reactivate voltage automatically again	Reactivate (preset)									1

1) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

Tab. 3.3

3.2.3 Behaviour after SCO

The “Behaviour after SCO” parameter defines whether the voltage remains deactivated or reactivates automatically after a short circuit or overload at the IO-Link interfaces (ports). In case of the “Leave deactivated” setting, the voltage can be reactivated by deactivating and then reactivating the “PS supply” parameter (→ Tab. 3.5). Otherwise the activation and deactivation of system CPX-E is required for the return of voltage.

Behaviour after SCO										
Settings	Selection via software	Selection via parameter								
		F no. ¹⁾	Bit							
		4828 + 64m	7	6	5	4	3	2	1	0
Leave load voltage deactivated	Leave deactivated	+ 1							0	
Reactivate load voltage automatically	Reactivate (preset)								1	

1) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

Tab. 3.4

3.2.4 PS supply

The “PS supply” parameter defines whether the operating voltage supply (signal L+ → Tab. 2.2) shall be deactivated or activated. The setting applies for all IO-Link interfaces (ports).

PS supply										
Settings	Selection via software	Selection via parameter								
		F no. ¹⁾	Bit							
		4828 + 64m	7	6	5	4	3	2	1	0
Deactivate operating voltage	Inactive	+ 6								0
Activate operating voltage	Active (default)									1

1) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

Tab. 3.5

3.2.5 Cycle time (Port 1 ... 4)

The “Cycle time” parameter defines the cycle time (low/high) set by the IO-Link master. The setting can be made separately for each IO-Link interface (port).

The value becomes effective at the start of the IO-Link connection by setting the “Operating mode” parameter to “IO-Link” (→ Tab. 3.8). Changes during IO-Link operation are not make until the connection has been deactivated and then reactivated again.

Cycle time (Port 1 ... 4)										
Settings	Comments	Selection via parameter								
		F no. ¹⁾	Bit							
		4828 + 64m	7	6	5	4	3	2	1	0
Cycle time of Port 1										
Low	16 Bit (in 100 µs unit)	+ 8	½	½	½	½	½	½	½	½
High	Presetting = 0	+ 9	½	½	½	½	½	½	½	½
Cycle time of Port 2										
Low	16 Bit (in 100 µs unit)	+ 12	½	½	½	½	½	½	½	½
High	Presetting = 0	+ 13	½	½	½	½	½	½	½	½
Cycle time of Port 3										
Low	16 Bit (in 100 µs unit)	+ 16	½	½	½	½	½	½	½	½
High	Presetting = 0	+ 17	½	½	½	½	½	½	½	½
Cycle time of Port 4										
Low	16 Bit (in 100 µs unit)	+ 20	½	½	½	½	½	½	½	½
High	Presetting = 0	+ 21	½	½	½	½	½	½	½	½

1) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

2) In case of a setting of 0, the minimum supported cycle time of the IO-Link® device is used.

Tab. 3.6

3.2.6 PL supply (Port 1 ... 4)

The “PL supply” parameter defines whether the load voltage supply (signal P24 → Tab. 2.2) shall be deactivated or activated. The setting can be made separately for each IO-Link interface (port).

PL supply (Port 1 ... 4)										
Settings	Selection via software	Selection via parameter								
		F no. ¹⁾ 4828 + 64m	Bit							
			7	6	5	4	3	2	1	0
Port 1	Port 1	+ 10								
Deactivate load voltage	Inactive								0	
Switch on the load voltage	Active (default)								1	
Port 2	Port 2	+ 14								
Deactivate load voltage	Inactive								0	
Switch on the load voltage	Active (default)								1	
Port 3	Port 3	+ 18								
Deactivate load voltage	Inactive								0	
Switch on the load voltage	Active (default)								1	
Port 4	Port 4	+ 22								
Deactivate load voltage	Inactive								0	
Switch on the load voltage	Active (default)								1	

1) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

Tab. 3.7

3.2.7 Operating mode (Port 1 ... 4)

The “Operating mode” parameter defines the operating mode of the IO-Link interface (port). The setting can be made separately for each IO-Link interface (port).

Operating mode (Port 1 ... 4)		Selection via parameter								
Settings	Comments	F no.¹⁾ 4828 + 64m	Bit							
			7	6	5	4	3	2	1	0
Operating mode of Port 1		+ 11								
Inactive	Port is not in use (presetting)								0	0
DI	Port acts like a digital input								0	1
DO	Reserved ²⁾								1	0
IO-Link	IO-Link communication								1	1
Operating mode of Port 2		+ 15								
Inactive	Port is not in use (presetting)								0	0
DI	Port acts like a digital input								0	1
DO	Reserved ²⁾								1	0
IO-Link	IO-Link communication								1	1
Operating mode of Port 3		+ 19								
Inactive	Port is not in use (presetting)								0	0
DI	Port acts like a digital input								0	1
DO	Reserved ²⁾								1	0
IO-Link	IO-Link communication								1	1
Operating mode of Port 4		+ 23								
Inactive	Port is not in use (presetting)								0	0
DI	Port acts like a digital input								0	1
DO	Reserved ²⁾								1	0
IO-Link	IO-Link communication								1	1

1) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

2) The parameter setting leads to a parameter error (error number 29) and the parameter setting of the port switches to “Inactive.”

Tab. 3.8

3.2.8 LineState (Port 1 ... 4)

LineState (Port 1 ... 4) ¹⁾		Selection via parameter										
Settings	Comments	F no. ²⁾	Bit									
		4828 + 64m	7	6	5	4	3	2	1	0		
LineState of Port 1		+ 24										
Inactive	Port is deactivate								0	0	0	
DI	Port is a digital input								0	0	1	
CheckFault	Configuration error ³⁾								0	1	1	
Preoperate	Port is in IO-Link status PREOPERATE ³⁾								1	0	0	
Operate	Port is in IO-Link status OPERATE ⁴⁾								1	0	1	
Scanning	IO-Link communication started, still no IO-Link device found								1	1	0	
DeviceLost	Communication to IO-Link device interrupted								1	1	1	
LineState of Port 2		+ 27										
Inactive	Port is deactivate								0	0	0	
DI	Port is a digital input								0	0	1	
CheckFault	Configuration error ³⁾								0	1	1	
Preoperate	Port is in IO-Link status PREOPERATE ³⁾								1	0	0	
Operate	Port is in IO-Link status OPERATE ⁴⁾								1	0	1	
Scanning	IO-Link communication started, still no IO-Link device found								1	1	0	
DeviceLost	Communication to IO-Link device interrupted								1	1	1	
LineState of Port 3		+ 30										
Inactive	Port is deactivate								0	0	0	
DI	Port is a digital input								0	0	1	
CheckFault	Configuration error ³⁾								0	1	1	
Preoperate	Port is in IO-Link status PREOPERATE ³⁾								1	0	0	
Operate	Port is in IO-Link status OPERATE ⁴⁾								1	0	1	
Scanning	IO-Link communication started, still no IO-Link device found								1	1	0	
DeviceLost	Communication to IO-Link device interrupted								1	1	1	
LineState of Port 4		+ 33										
Inactive	Port is deactivate								0	0	0	
DI	Port is a digital input								0	0	1	
CheckFault	Configuration error ³⁾								0	1	1	
Preoperate	Port is in IO-Link status PREOPERATE ³⁾								1	0	0	
Operate	Port is in IO-Link status OPERATE ⁴⁾								1	0	1	
Scanning	IO-Link communication started, still no IO-Link device found								1	1	0	
DeviceLost	Communication to IO-Link device interrupted								1	1	1	

1) Only read access possible

2) Function number (➔ Description of system CPX-E; m = module number (counted from left to right, starting with 0)

3) IO-Link communication set up

4) IO-Link communication set up, process data transferred

Tab. 3.9

3.2.9 Device error code (Port 1 ... 4)

The “Device error code” parameter displays the current lowest-value error code (event code) of the connected IO-Link device. If no event is reported, the parameter has a value of 0.

Device error code (Port 1 ... 4)¹⁾										
Settings	Comments	Selection via parameter								
		F no.²⁾	Bit							
			7	6	5	4	3	2	1	0
Device error code of Port 1										
Low	16 Bit (hexadecimal)	+ 25	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁
High		+ 26	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁
Device error code of Port 2										
Low	16 Bit (hexadecimal)	+ 28	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁
High		+ 29	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁
Device error code of Port 3										
Low	16 Bit (hexadecimal)	+ 31	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁
High		+ 32	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁
Device error code of Port 4										
Low	16 Bit (hexadecimal)	+ 34	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁
High		+ 35	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁	% ₁

1) Only read access possible

2) Function number (→ Description of system CPX-E); m = module number (counted from left to right, starting with 0)

Tab. 3.10

A Technical Data

General remarks		
Key feature	Specification/value	
	CPX-E-4IOL	CPX-E-4IOL-P
General technical data, system CPX-E	Description of system CPX-E ➔ 1.1 Further applicable documents	
Dimensions (Length x Width x Height)	[mm]	124.3 x 18.9 x 76.6
Product weight ¹⁾	[g]	96
Mounting position	Vertical/horizontal	
Ambient temperature	[°C]	-5 ... +60 (-5 ... +50) ²⁾
Storage temperature	[°C]	-20 ... +70
Air humidity (non-condensing)	[%]	0 ... 95
Assigned address space (inputs/outputs) ³⁾	[byte]	32/32 (max.)
Module code (CPX-E-specific)	174	
Submodule code (CPX-E-specific)		
If all Ports 1 ... 4 are activated by DIL switches ➔ Tab. 2.1	4	104
If only Ports 1 and 2 are activated by DIL switches ➔ Tab. 2.1	2	102
If only Port 1 is activated by DIL switches ➔ Tab. 2.1	1	101
Module identification		
If all Ports 1 ... 4 are activated by DIL switches ➔ Tab. 2.1	E-4IOL	E-4IOL-P
If only Ports 1 and 2 are activated by DIL switches ➔ Tab. 2.1	E-2IOL	E-2IOL-P
If only Port 1 is activated by DIL switches ➔ Tab. 2.1	E-1IOL	E-1IOL-P
Degree of protection in accordance with EN 60529	IP20	
Protection against electric shock (protection against direct and indirect contact to IEC 60204-1)	Through the use of PELV circuits (Protected Extra-Low Voltage)	
Electromagnetic compatibility	To EN 61000-6-2/-4	To EN 61000-6-2/-4 and NE 21

1) Including linking

2) With horizontal mounting position

3) Depending on the setting of the DIL switches

Tab. A.1

Power supply			
Key feature		Specification/value	
		CPX-E-4IOL	CPX-E-4IOL-P
Operating voltage supply $U_{EL/SEN}$	[V DC]	24 ± 25 %	
Intrinsic current consumption at nominal operating voltage 24 V from $U_{EL/SEN1}$	[mA]	50	
Mains buffering time $U_{EL/SEN}$	[ms]	10	20
Load voltage supply U_{OUT}	[V DC]	24 ± 25 %	
Capacitive load	[nF]	363	
Undervoltage identification U_{OUT}			
Trigger level	[V DC]	17	
Hysteresis	[V DC]	0.5	

1) Without connected devices

Tab. A.2

IO-Link ports¹⁾			
Key feature		Specification/value	
Number of ports		4	
Max. number of devices (per port)		1	
Max. line length (per port)	[m]	20 (unscreened)	
Max. process data length (per port)			
If all Ports 1 ... 4 are activated by DIL switches	[byte]	8 l/8 0	
→ Tab. 2.1			
If only Ports 1 and 2 are activated by DIL switches	[byte]	16 l/16 0	
→ Tab. 2.1			
If only Port 1 is activated by DIL switches	[byte]	32 l/32 0	
→ Tab. 2.1			
Transmission rate (per port)	[kbps]	230.4 (corresponds with IO-Link COM3)	
		38.4 (corresponds with IO-Link COM2)	
		4.8 (corresponds with IO-Link COM1)	
Cycle time		Minimum supported cycle time of the connected IO-Link devices ²⁾	
Max. current $U_{EL/SEN}$ (per module)	[A]	1.8	
Max. current U_{OUT} (per port)	[A]	1.6	
Short-circuit protection			
Operating voltage supply $U_{EL/SEN}$			
Electronic (per module)	[A]	1.8	
Thermal (per port)	[A]	3.0	
Load voltage supply U_{OUT}			
Electronic (per port)	[A]	1.6	
Thermal (per port)	[A]	3.0	
Behaviour after end of overload		Can be parameterised	
Electrical isolation			
Between the ports		None	
Between $U_{EL/SEN}$ and U_{OUT}	[V]	Yes, DC 75/AC 60	
Reverse polarity protection ³⁾		Yes, for system and load voltage supply respectively	

1) According to IO-Link specification V1.1

2) The cycle time used can be permanently set using the "Cycle time" parameter (→ Tab. 3.6).

3) Without feedback protection

Tab. A.3

B Terminology

Term/abbreviation	Description
Bus module	Connects system CPX-E to the network; transmits control signals to the connected modules CPX-E and monitors their functionality.
DIL switch	Switches consisting of several switch elements with which settings can be made (dual in-line).
I/O	Input and output
IO-Link	Communication system for exchanging the serial data of decentralised devices.
In/out (I/O) module	Collective term for modules that provide analogue or digital inputs and/or outputs.
Modules CPX-E	Collective term for modules that can be integrated in system CPX-E.
System CPX-E	Complete system consisting of modules CPX-E.

Tab. B.1

Index

A

Abbreviations, 22

B

Behaviour after SCO, 14

Behaviour after SCS, 14

C

Cycle time , 15

D

Device error code, 19

Diagnostic and error messages, 10

– According to error numbers, 11

– Priorities, 10

Diagnostics, 9

F

Further applicable documents, 4

I

IO-Link, 8

IO-Link mode (IOL), 9

L

LED indicators, 9

– IO-Link mode (IOL), 9

– Load voltage supply, 10

– Module error, 9

– Standard IO mode (SIO), 9

LineState, 18

Load voltage supply, 10

M

Module error, 9

Monitoring ULoad, 14

O

Operating mode, 17

P

Parameter, 14

– Behaviour after SCO, 14

– Behaviour after SCS, 14

– Cycle time, 15

– Device error code, 19

– LineState, 18

– Monitoring ULoad, 14

– Operating mode, 17

– Overview, 13

– PL supply, 16

– PS supply, 15

PL supply, 16

Product label, 5

Product version, 4

PS supply, 15

S

Standard IO mode (SIO), 9

T

Target group, 4

Technical data, 20

Terminology, 22

Reproduction, distribution or sale of this document or communication of its contents to others without express authorization is prohibited. Offenders will be liable for damages. All rights reserved in the event that a patent, utility model or design patent is registered.

Copyright:
Festo SE & Co. KG
Ruiter Straße 82
73734 Esslingen
Germany

Phone:
+49 711 347-0

Fax:
+49 711 347-2144

e-mail:
service_international@festo.com

Internet:
www.festo.com