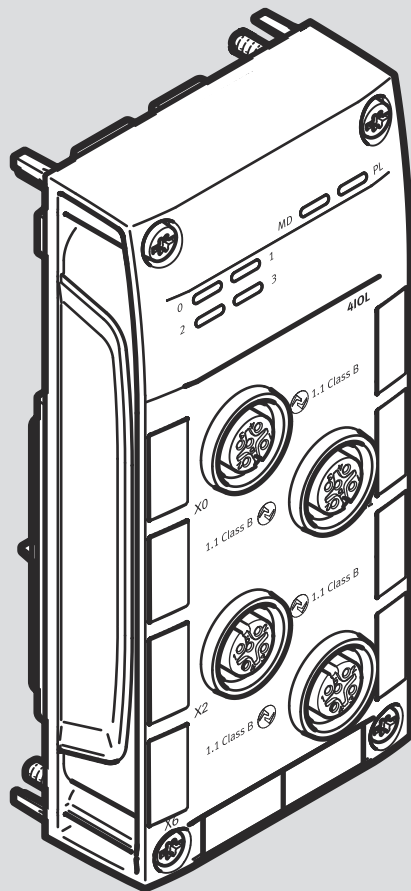


CPX-AP-A-4IOL-M12

IO-Link Master

FESTO

Operating instruction



8235687

8235687
2025-05c
[8235689]

Original instructions

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Table of contents

1	About this document.....	5
1.1	Applicable documents.....	5
1.2	Product version.....	5
1.3	Product labelling.....	5
1.4	Specified standards.....	5
2	Safety.....	5
2.1	Safety instructions.....	5
2.2	Intended use.....	5
2.3	Training of qualified personnel.....	6
3	Additional information.....	6
4	Product overview.....	6
4.1	Product design.....	6
4.2	LED indicators.....	6
4.3	Connecting elements.....	7
5	Function.....	7
6	Mounting.....	7
7	Installation.....	7
7.1	Connecting cables.....	7
8	Commissioning.....	8
8.1	Address space (data length of inputs/outputs).....	9
8.2	IO-Link device description file (IO-Link Device Description).....	9
9	Parameterisation.....	9
10	Diagnostics.....	12
10.1	LED indicators.....	12
10.2	Diagnostic messages.....	14
10.3	Event codes.....	17
10.3.1	Master event codes.....	17
10.3.2	Device event codes.....	19
11	Technical data.....	22
11.1	Technical data, general.....	22
11.2	Technical data, electrical.....	22

1 About this document

1.1 Applicable documents



All available documents for the product → www.festo.com/sp.

Document	Content
Operating instructions remote I/O system CPX-AP-A	Instruction manual and important information on the assembly, electrical installation and maintenance tasks and also description of the remote I/O system CPX-AP-A

Tab. 1: Applicable documents

1.2 Product version

This document refers to the following product versions:

Product	Version
CPX-AP-A-4IOL-M12	IO-Link master CPX-AP-A-4IOL-M12 from revision 1

Tab. 2: Product version

The product version can be determined from the product labelling.



There may be an updated version of this document for this or later product versions → www.festo.com/sp.

1.3 Product labelling

The product labelling and the Data Matrix Code are printed on the housings of the modules. Scanning the Data Matrix Code with an appropriate device opens the Festo Internet page with documents appropriate for the product. Alternatively, the Product Key (11-digit alphanumeric code on the product labelling) can be entered in the search field → www.festo.com/sp.

1.4 Specified standards

Version
IEC 60204-1:2016-10
IEC 60364-4-41:2005-12

Tab. 3: Standards specified in the document

2 Safety

2.1 Safety instructions

- Only use the product if it is in perfect technical condition.
- Observe the identifications on the product.
- Store the product in a cool, dry environment protected from UV and corrosion. Keep storage times short.
- Before working on the product, switch off the power supply and secure it against being switched on again.

2.2 Intended use

The IO-Link master is intended for use as an interface between a remote I/O system CPX-AP-A and devices with IO-Link Port.
Use the product as follows:

- Use only in an industrial environment. Outside industrial environments, e.g. in commercial and residential/mixed-use areas, it may be necessary to take measures to suppress radio interference.
- Use only in combination with modules and components that are approved for the applicable product variant → www.festo.com/catalogue.

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with electrical (open-loop) control technology.

3 Additional information

- Contact the regional Festo contact if you have technical problems
→ www.festo.com.
- Accessories and spare parts → www.festo.com/catalogue.

4 Product overview

4.1 Product design

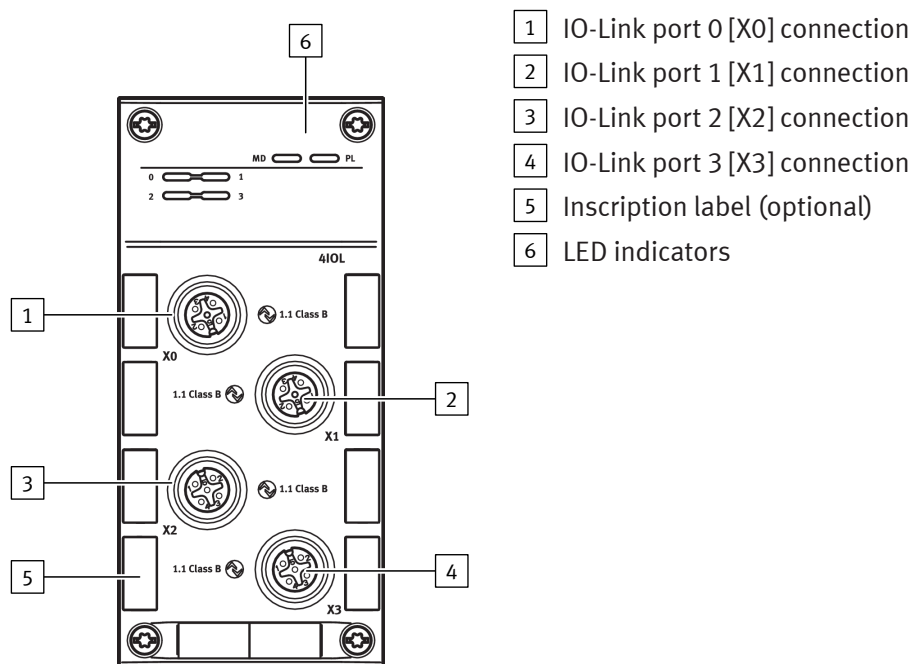


Fig. 1: Product design

4.2 LED indicators

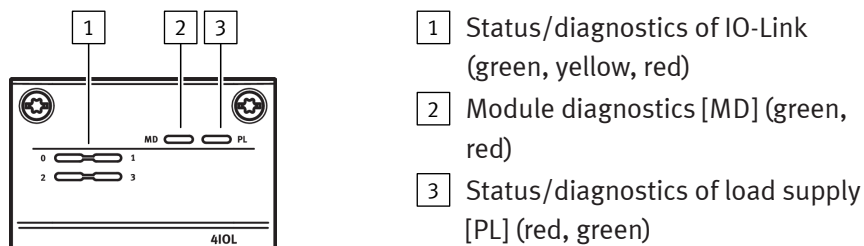
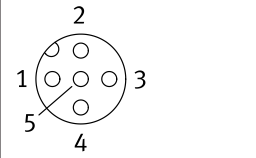


Fig. 2: LED indicators

4.3 Connecting elements

IO-Link Ports [X0] ... [X3] connection			
M12 socket, 5-pin, A-coded		Signal	
	1	L+	+24 V DC sensor supply
	2	P24	+24 V DC load voltage supply
	3	L–	0 V DC sensor supply
	4	C/Q	IO-Link communication (in IOL mode) or standard IO (in DI mode)
	5	N24	0 V DC load voltage supply

Tab. 4: IO-Link connection Ports



If there is a connection to other circuits at one of the connections for inputs or outputs, the circuits must also comply with SELV/PELV.

Digital and IO-Link signal lines	
Max. cable length	20 m

Tab. 5: Requirements for the connecting cable

5 Function

The module response can be parameterised → 9 Parameterisation.
Status and error messages are indicated by LED displays on the module and reported to the interface by the system communication.

6 Mounting

- Carry out assembly in accordance with the "Operating Instructions remote I/O system CPX-AP-A" → 1.1 Applicable documents.

7 Installation

- Carry out installation in accordance with the "Operating Instructions remote I/O system CPX-AP-A" → 1.1 Applicable documents.
- When connecting Devices Class A with 4 or 5-pin cables, do not connect pins 2 and 5.

7.1 Connecting cables

⚠ WARNING

Risk of injury due to electric shock.

- For the electric power supply, use SELV or PELV circuits that guarantee a reliable electric disconnection from the mains network.
- Observe IEC 60204-1/EN 60204-1.

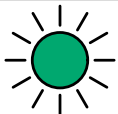
- Switch off the power supply.

- 2. Use a suitable torque screwdriver with socket to tighten union nuts.
 - For example, use PHOENIX CONTACT SAC BIT M8-D10 with a tightening torque of 0.4 Nm ± 15% for M8. Different from the information for connecting cables.
 - For example, use PHOENIX CONTACT SAC BIT M12-D15 with a tightening torque of 0.6 Nm ± 10% for M12. Different from the information for connecting cables.
- 3. Close the unused connections with cover caps.

8 Commissioning

Response of the display components of the module after error-free commissioning

- Carry out commissioning in accordance with the "Instruction manual remote I/O system CPX-AP-A" → 1.1 Applicable documents.

[MD]	[PL]
 Green light	 Green light

Tab. 6: Response of the LED displays of the module after error-free commissioning



Information on troubleshooting in the event of different response:
→ 1.1 Applicable documents
→ 10 Diagnostics

8.1 Address space (data length of inputs/outputs)

The address space (data length of inputs/outputs) provided by the module can be set using software.

The following variants for setting the address space (data length of inputs/outputs) are available:

Variant	Module code (hex/dec)	Supported network ¹⁾	Module [byte]		per port [byte]	
			Inputs ²⁾	Outputs	Inputs	Outputs
2	0x300E/12302	PB, EP, EC	12	8	2	2
2_OE	0x300F/12303	PN, EP				
4	0x3010/12304	PB, EP, EC	20	16	4	4
4_OE	0x3011/12305	PN, EP				
8 ³⁾	0x300C/12300	PB, EP, EC	36	32	8	8
8_OE	0x300D/12301	PN, EP				
16	0x3012/12306	PB, EP, EC	68	64	16	16
16_OE	0x3013/12307	PN, EP				
32	0x3014/12308	EP, EC	132	128	32	32
32_OE	0x3015/12309	PN, EP				

1) PB = PROFIBUS; PN = PROFINET; EP = EtherNet/IP; EC = EtherCAT

2) The last 4 input bytes contain the IO-Link port qualifier information bytes for port 0 ... 3.

3) Factory setting

Tab. 7: Variants for setting the address space



The "Festo IO-Link Tool" software can be used to set the address space (data length inputs/outputs) → www.festo.com/sp.

The setting is saved permanently in the module. Changes only become effective after restarting the remote I/O system CPX-AP-A.

8.2 IO-Link device description file (IO-Link Device Description)



The "Festo IO-Link Tool" software can be used to configure a IO-Link device → www.festo.com/sp.

9 Parameterisation

Various parameters are available for reading out information about the modules in a remote I/O system CPX-AP-A and for configuring the modules to the application.

Standard parameters

ID	Parameters	Number of instances ¹⁾	Data type	Access ²⁾	Array size
246	Fieldbus serial number	1	UINT32	ro	—
791	Product key	1	CHAR	ro	12
960	Firmware version	1	CHAR	ro	30
20000	Module code	1	UINT32	ro	—
20085	Measured value of temperature AP-ASIC	1	INT16	ro	—
20087	Current measured value of logic supply (PS)	1	UINT16	ro	—
20088	Current measured value of load supply (PL)	1	UINT16	ro	—
20093	Hardware version	1	UINT8	ro	—

ID	Parameters	Number of instances ¹⁾	Data type	Access ²⁾	Array size
20118	Application-specific identification	1	CHAR	rw	32
11295004	I&M 2 Date of installation	1	CHAR	rw	17

1) Counting starting at 0.

2) ro = read only; rw = read write

Tab. 8: Standard parameters

Module parameters

ID	Parameters	Number of instances ¹⁾	Data type	Access ²⁾	Array size
20022	Configuration for load supply (PL) voltage monitoring – 0: load supply monitoring inactive – 1: load supply monitoring active, under-voltage diagnosis suppressed in case of switch-off – 2: load supply monitoring active	1	ENUM_ID	rw	–
20086	Activation of the load supply	4	BOOL	rw	–
20090	Variant switching	1	UINT32	rw	–
20097	Activation of the sensor supply	1	BOOL	rw	–
11295002	I&M 1 System identification	1	CHAR	rw	33
11295005	I&M 3 Additional designation	1	CHAR	rw	55

1) Counting starting at 0.

2) ro = read only; rw = read write

Tab. 9: Module parameters

General channel parameters

ID	Parameters	Number of instances ¹⁾	Data type	Access ²⁾	Array size
20049	Setpoint cycle time ³⁾ – 0: as fast as possible – 16: 1.6 ms – 32: 3.2 ms – 48: 4.8 ms – 68: 8.0 ms – 73: 10.0 ms – 78: 12.0 ms – 88: 16.0 ms – 98: 20.0 ms – 133: 40.0 ms – 158: 80.0 ms – 183: 120.0 ms	4	ENUM_ID	rw	–
20050	Activation of diagnostics for IO-Link device lost	4	BOOL	rw	–
20071	Port mode – 0: DEACTIVATED – 1: IOL_MANUAL – 2: IOL_AUTOSTART – 3: DI_CQ – 97: PREOPERATE	4	ENUM_ID	rw	–
20072	Validation and backup	4	ENUM_ID	rw	–
20073	Target vendor ID	4	UINT16	rw	–

ID	Parameters	Number of instances ¹⁾	Data type	Access ²⁾	Array size
20074	Port status information – 0: NO_DEVICE – 1: DEACTIVATED – 2: PORT_DIAG – 3: PREOPERATE – 4: OPERATE – 5: DI_C/Q – 6: DO_C/Q – 254: PORT_POWER_OFF 255: NOT_AVAILABLE	4	ENUM_ID	ro	–
20075	Revision ID	4	UINT8	ro	–
20076	Transmission rate – 0: NOT_DETECTED – 1: COM1 – 2: COM2 – 3: COM3	4	ENUM_ID	ro	–
20077	Actual cycle time	4	UINT16	ro	–
20078	Actual vendor ID	4	UINT16	ro	–
20079	Actual device ID	4	UINT32	ro	–
20080	Target device ID	4	UINT32	rw	–

1) Counting starting at 0.

2) ro = read only; rw = read write

3) Changes only become effective when the port mode is changed (ID 20071).

Tab. 10: General channel parameters

Channel parameter inputs

ID	Parameters	Number of instances ¹⁾	Data type	Access ²⁾	Array size
20108	Input data length	4	UINT8	ro	–

1) Counting starting at 0.

2) ro = read only; rw = read write

Tab. 11: Channel parameter inputs

Channel parameter outputs

ID	Parameters	Number of instances ¹⁾	Data type	Access ²⁾	Array size
20109	Output data length	4	UINT8	ro	–

1) Counting starting at 0.

2) ro = read only; rw = read write

Tab. 12: Channel parameter outputs

10 Diagnostics

10.1 LED indicators

Module diagnostics [MD]		
LED	Meaning	Remedy
 Off	Logic supply PS not available.	– Check connection of logic supply PS.
 Green light	Module diagnostics not active	–
 Flashing green 0.5 Hz	Module diagnostics active "Information" degree of severity e.g. switching off load supply PL	–
 Flashing red 0.5 Hz	Module diagnostics active "Warning" degree of severity e.g. parameterisation error	– Carry out appropriate remedial measures, e.g. check parameterisation.
 Red light	Module diagnostics active "Error" degree of severity e.g. undervoltage in logic supply PS	– Carry out appropriate remedial measures, e.g. check logic supply PS.
 Fast flashing red 2 Hz	Module ramp-up not yet completed. System communication not yet initialised.	–
 Fast flashing green 2 Hz	Module identification (service function)	–

Tab. 13: Module diagnostics LED [MD]

Load supply [PL]		
LED	Meaning	Remedy
 Green light	Load supply PL available.	–
 Flashing green 0.5 Hz	Load supply PL not available.	Check load supply PL.
 Flashing red 0.5 Hz	Load supply PL outside the tolerance range.	Check load supply PL.

Tab. 14: Load supply LED [PL]

Diagnostics input		
LED	Meaning	Remedy
 Red light	Dependent on the status of the LED [MD]: – Channel error (if LED [MD] is red) – Parameterisation error (if LED [MD] flashes red)	Check connected sensors or parameter setting.
 Flashing red 0.5 Hz	Limit value exceeded/fallen below	Check connected sensors or parameter setting.
 Off	No diagnostics at the input	–

Tab. 15: LED diagnostics input

IO-Link Port 0 ... 3		
LED	Meaning	Remedy
IO-Link mode – IOL (green)		
 Green light	Device connected. Communication OK.	–
 Flashing green	IO-Link Port activated. No connection to a Device.	Check connection between module and Device.
 Off	IO-Link Port deactivated.	–
Standard IO mode (yellow)		
 Yellow light	Digital input set (process signal = 1)	–
 Off	Digital input not set (process signal = 0)	–
Channel error (red)		
 Red light	Error pending at Port Possible causes:	
	– Incorrect device connected	Check Device and setpoint configuration (→ parameter 20072, 20073, 20080).
	– Configured process data length insufficient	Adjust process data length.
	– Data memory error	Check data memory.
	– Invalid cycle time	Adjust cycle time (→ parameter 20049).
	– Incorrect protocol revision	Device not compatible with set configuration (→ parameter 20072).
 Flashing red	Pending error of the Device	Read out diagnostic messages and carry out corresponding remedial measures → 10.2 Diagnostic messages.

Tab. 16: LED IO-Link Port 0... 3

10.2 Diagnostic messages

Diagnostic messages of an IO-Link device are sent to the IO-Link Master via event codes. The event code is mapped in the IO-Link master to a diagnostics ID ➔ 10.3 Event codes.

For all diagnostics messages of the remote I/O system and for information on grouping and displaying the diagnostic messages see the operating instructions remote I/O system CPX-AP-A ➔ 1.1 Applicable documents.

The table below contains the diagnostic messages of the IO-Link master.

The table below contains the diagnostic messages of the IO-Link master.

ID hex (dec)	Message	Description	Remedy	Diagnostic status
01 01 010B (16843019)	Short circuit/overload in sensor supply	A short-circuit/overload of the sensor supply was detected	– Check sensor for correct function, in particular for current consumption. – Check sensor wiring.	Error
01 01 0161 (16843105)	Short circuit – check installation	Short circuit – check installation	– Check installation	Error
01 01 0162 (16843106)	Earth fault - check installation	Earth fault - check installation	– Check installation	Error
01 01 017A (16843130)	Short circuit on I/Q	Short circuit on I/Q (IO-Link)	– Check wiring	Error
01 01 017B (16843131)	Short circuit on C/Q (if digital output)	Short circuit on C/Q (if digital output)	– Check wiring	Error
01 01 017C (16843132)	Overload on I/Q	Overload on I/Q	– Check load	Error
01 01 017D (16843133)	Overload on C/Q (if digital output)	Overload on C/Q (if digital output)	– Check load	Error
02 01 0016 (33619990)	Undervoltage in logic supply (PS) 24 V DC	Undervoltage of the logic supply (PS) 24 V DC was detected.	– Check the power supply (logic)	Error
02 01 0017 (33619991)	Overvoltage in logic supply (PS) 24 V DC	Overvoltage of the logic supply (PS) 24 V DC was detected.	– Check the power supply (logic)	Error
02 01 0105 (33620229)	Undervoltage in load supply (PL) 24 V DC	Undervoltage in the load supply (PL) 24 V DC was detected.	– Check power supply (load) – Check for short circuit	Error
02 01 0106 (33620230)	Shutdown of load supply (PL) 24 V DC	A shutdown of the load voltage supply PL was detected. The cause can be a deliberate shutdown by emergency stop.	– Check whether emergency stop was activated – Check the load voltage supply	Information
02 01 013F (33620287)	Overvoltage in load supply (PL) 24 V DC	Overvoltage in load supply (PL) 24 V DC	– Check power supply	Error
02 01 0149 (33620297)	General power supply error	General power supply error	– Check power supply	Error
02 05 0147 (33882439)	Memory error	Data loss in remanent memory	– Check batteries	Error
02 05 0148 (33882440)	Batteries weak	Batteries weak	– Check batteries	Warning
03 01 002D 50397229	Device undertemperature	Device undertemperature	– Check ambient conditions	Error

ID hex (dec)	Message	Description	Remedy	Diagnostic status
03 01 002F (50397231)	Device overtemperature	Device overtemperature	– Check warning threshold parameterisation – Device fan defective? – Device overloaded? – Check installation conditions; control cabinet fan filter dirty? – Check drive layout (possible overloading during continuous operation)	Error
03 01 0142 (50397506)	Temperature error - overload	Temperature error - overload	– Device-specific	Error
03 01 0181 (50397569)	PHY overtemperature	PHY overtemperature	– Eliminate heat source	Error
06 00 0109 (100663561)	Startup parameter rejected by device	The startup parameter specified in the AP device description does not exist in the device or deviates from the specification.	– Check firmware version	Error
06 00 014F (100663631)	Parameter error	Parameter was written with invalid value.	– Check datasheet and parameter values	Error
06 00 0150 100663632	Parameter missing in the device	Parameter missing in the device	– Check datasheet and parameter values	Error
07 05 0166 (117768550)	Measuring range exceeded	Measuring range exceeded	– Check application – Check input signal – Check parameters and configuration	Error
07 07 0165 (117899621)	Process variable range overflow	Overflow of the process variable range - process data uncertain	– Check input signal – Check parameters and configuration	Warning
07 07 0167 (117899623)	Underflow of the process variable range	Underflow of the process variable range - process data uncertain	– Check input signal – Check parameters and configuration	Warning
08 00 0135 (134218037)	Wire break detected	A wire break was detected for the channel.	– Check wiring	Error
08 01 0130 (134283568)	Output process data watchdog of the AP module expired	Output process data watchdog of the AP module expired	– Restart AP system. – Check cable.	Error
0801 01A2 (134283682)	System state emergency operation mode	System initialisation (module detection) has failed. The system is in maintenance mode. I/O function is not available.	– Restart system – Update firmware to the latest version – Contact Festo Service	Error
08 0A 0108 (134873352)	IO-Link event	An IO-Link diagnostic event (note, warning or error) has occurred. IO-Link event-specific details are attached to this message.	– See documentation of the IO-Link master or device	Error
08 0A 014C (134873420)	Invalid cycle time	Invalid cycle time of IO-Link communication	– Adjust cycle time to the permissible value	Error
08 0A 014D (134873421)	Version error - incompatible protocol version	Version error - incompatible IO-Link protocol version	– Device not compatible	Error
08 0A 014E (134873422)	ISDU batch failed	ISDU batch failed - parameter inconsistency?	– Check parameters	Error
08 0A 016B (134873451)	Wrong VendorID - deviation of the inspection level	The recognised IO-Link device does not match the configured VendorID.	– Check that the correct IO-Link device is connected.	Error
08 0A 0177 (134873463)	Backup inconsistency - upload error	IO-Link backup/restore failed. Error uploading	– Device-specific	Error

ID hex (dec)	Message	Description	Remedy	Diagnostic status
08 0A 0178 (134873464)	Parameter inconsistency - download error	IO-Link backup/restore failed. Download error	– Device-specific	Error
08 0A 017F (134873471)	Process data configuration error	Reserved process data length for the IO-Link device too small	– Set the module variant to a larger process data length	Error
08 0A 0180 (134873472)	Short circuit C/Q	Short circuit C/Q signal (IO-Link)	– Check wiring	Error
08 0A 0182 (134873474)	IO-Link events overflow	IO-Link events overflow. Data loss of the events possible.	– Device-specific	Error
08 0A 0183 (134873475)	Backup inconsistency - memory out of range (2048 octets)	IO-Link backup/restore failed. Memory out of range (2048 octets)	– Device-specific	Error
08 0A 0184 (134873476)	Backup inconsistency - DataStorageIndex not available	IO-Link backup/restore failed. DataStorageIndex not available	– Device-specific	Error
08 0A 0185 (134873477)	Backup inconsistency - non-specific error during data storage	IO-Link backup/restore failed. Non-specific error in data memory	– Device-specific	Error
08 0A 01A8 (134873512)	Incorrect DeviceID - deviation of the inspection level	The detected IO-Link device does not match the configured DeviceID.	– Check that the correct IO-Link device is connected.	Error
08 0A 01A9 (134873513)	No device connected	No IO-Link device connected	– Check that the correct IO-Link device is connected.	Error
0A 00 014A (167772490)	Fuse blown/opened	Fuse blown/opened	– Replace fuse – Eliminate cause of defective fuse	Error
0B 00 010E (184549646)	General software error	An error has occurred that could not be assigned to any other specific diagnosis.	– Check that you are using the latest firmware version. – Please contact Festo Support	Error
0C 00 0169 (201326953)	Maintenance required - refill	Maintenance required - refill	– Refill	Warning
0C 01 0168 (201392488)	Maintenance required - cleaning	Maintenance required - cleaning	– Cleaning the device	Warning
0C 01 016A (201392490)	Maintenance required - replacement of wearing parts	Maintenance required - replacement of wearing parts	– Check wearing parts and replace if necessary	Warning
0D 00 0141 (218104129)	General malfunction of IO-Link device	General malfunction - unknown error of the IO-Link device. Corresponds to IO-Link EventCode 0x1000.	– Check IO-Link device	Information
0D 00 0164 (218104164)	Simulation active	Simulation active	– Check operating mode	Warning
10 02 0145 (268566853)	Device hardware error	Hardware error of the IO-Link device	– Repair or replace IO-Link device	Error
10 02 0146 (268566854)	Malfunction of a device component	Malfunction of a component of the IO-Link device	– Repair or replace IO-Link device	Error
(10020152) 268566866	Wire break at lower-level device 1	Wire break at lower-level IO-Link device 1	– Check wiring	Error
(10020153) 268566867	Wire break at lower-level device 2	Wire break at lower-level IO-Link device 2	– Check wiring	Error
10 02 0154 (268566868)	Wire break at lower-level device 3	Wire break at lower-level IO-Link device 3	– Check wiring	Error
10 02 0155 268566869	Wire break at lower-level device 4	Wire break at lower-level IO-Link device 4	– Check wiring	Error
10 02 0156 (268566870)	Wire break at lower-level device 5	Wire break at lower-level IO-Link device 5	– Check wiring	Error

ID hex (dec)	Message	Description	Remedy	Diagnostic status
10 02 0157 (268566871)	Wire break at lower-level device 6	Wire break at lower-level IO-Link device 6	– Check wiring	Error
10 02 0158 (268566872)	Wire break at lower-level device 7	Wire break at lower-level IO-Link device 7	– Check wiring	Error
10 02 0159 (268566873)	Wire break at lower-level device 8	Wire break at lower-level IO-Link device 8	– Check wiring	Error
10 02 015A (268566874)	Wire break at lower-level device 9	Wire break at lower-level IO-Link device 9	– Check wiring	Error
10 02 015B (268566875)	Wire break at lower-level device 10	Wire break at lower-level IO-Link device 10	– Check wiring	Error
10 02 015C (268566876)	Wire break at lower-level device 11	Wire break at lower-level IO-Link device 11	– Check wiring	Error
10 02 015D (268566877)	Wire break at lower-level device 12	Wire break at lower-level IO-Link device 12	– Check wiring	Error
10 02 015E (268566878)	Wire break at lower-level device 13	Wire break at lower-level IO-Link device 13	– Check wiring	Error
10 02 015F (268566879)	Wire break at lower-level device 14	Wire break at lower-level IO-Link device 14	– Check wiring	Error
10 02 0160 (268566880)	Wire break at lower-level device 15	Wire break at lower-level IO-Link device 15	– Check wiring	Error

Tab. 17: Diagnostic messages

10.3 Event codes

Diagnostic messages of an IO-Link device are sent to the IO-Link Master via event codes. The event code is mapped in the IO-Link master to a diagnostic ID.

IO-Link		CPX-AP	
Attribute	Value	Attribute	Value
Port	0 ... 3	Channel	0 ... 3
Instance		–	–
Source	0: Device	Channel type	4: input channel
	1: Master		3: submodule
Type	0: reserved	Severity	Information
	1: Notification		Information
	2: Warning		Warning
	3: Error		Error
Mode	0: reserved	Type	–
	1: Event single shot		0: Inform
	2: Event disappears		2: Resolve
	3: Event appears		1: Raise

Tab. 18: Mapping to the attributes of the diagnostic message

10.3.1 Master event codes

The following table contains the event codes of the IO-Link Master.

IO-Link event code hex	Diagnostics ID hex	Message	Description
1800h	08 0A 01A9 (134873513)	No device connected	No IO-Link device connected
			Remedy – Check that the correct IO-Link device is connected.
			Diagnostic status Error

IO-Link event code hex	Diagnostics ID hex	Message	Description
1801h	06 00 0109 (100663561)	Startup parameter rejected by device	The startup parameter specified in the AP device description does not exist in the device or deviates from the specification.
			Remedy – Check firmware version
			Diagnostic status Error
1802h	08 0A 016B (134873451)	Wrong VendorID - deviation of the inspection level	The recognized IO-Link device does not match the configured VendorID.
			Remedy – Check that the correct IO-Link device is connected.
			Diagnostic status Error
1803h	08 0A 01A8 (134873512)	Wrong DeviceID - deviation of the inspection level	The detected IO-Link device does not match the configured DeviceID.
			Remedy – Check that the correct IO-Link device is connected.
			Diagnostic status Error
1808h	08 0A 0182 (134873474)	IO-Link events overflow	IO-Link events overflow. Data loss of the events possible.
			Remedy – Device-specific
			Diagnostic status Error
1809h	08 0A 0183 (134873475)	Backup inconsistency - memory out of range (2048 octets)	IO-Link backup/restore failed. Memory out of range (2048 octets)
			Remedy – Device-specific
			Diagnostic status Error
180Ah	08 0A 0184 (134873476)	Backup inconsistency - DataStorageIndex not available	IO-Link backup/restore failed. DataStorageIndex not available
			Remedy – Device-specific
			Diagnostic status Error
180Bh	08 0A 0185 (134873477)	Backup inconsistency - non-specific error during data storage	IO-Link backup/restore failed. Non-specific error in data memory
			Remedy – Device-specific
			Diagnostic status Error
180Ch	08 0A 0177 (134873463)	Backup inconsistency - upload error	IO-Link backup/restore failed. Error uploading
			Remedy – Device-specific
			Diagnostic status Error
180Dh	08 0A 0178 (134873464)	Parameter inconsistency - download error	IO-Link backup/restore failed. Download error
			Remedy – Device-specific
			Diagnostic status Error
1810h	01 01 017A (16843130)	Short circuit on I/Q	Short circuit on I/Q (IO-Link)
			Remedy – Check wiring
			Diagnostic status Error
1811h	01 01 017B (16843131)	Short circuit on C/Q (if digital output)	Short circuit on C/Q (if digital output)
			Remedy – Check wiring
			Diagnostic status Error
1812h	01 01 017C (16843132)	Overload on I/Q	Overload on I/Q
			Remedy – Check load
			Diagnostic status Error
1813h	01 01 017D (16843133)	Overload on C/Q (if digital output)	Overload on C/Q (if digital output)
			Remedy – Check load
			Diagnostic status Error
1F00h	08 0A 017F (134873471)	Process data configuration error	Reserved process data length for the IO-Link device too small
			Remedy – Set the module variant to a larger process data length

IO-Link event code hex	Diagnostics ID hex	Message	Description	
1F00h	08 0A 017F (134873471)	Process data configuration error	Diagnostic status	Error
6000h	08 0A 014C (134873420)	Invalid cycle time	Invalid cycle time of IO-Link communication	
			Remedy	– Adjust cycle time to the permissible value
			Diagnostic status	Error
6001h	08 0A 014D (134873421)	Version error - incompatible protocol version	Version error - incompatible IO-Link protocol version	
			Remedy	– Device not compatible
			Diagnostic status	Error
6002h	08 0A 014E (134873422)	ISDU batch failed - parameter inconsistency?	ISDU batch failed - parameter inconsistency?	
			Remedy	– Check parameters
			Diagnostic status	Error
7700h	08 00 0135 (134218037)	Wire break detected	A wire break was detected for the channel.	
			Remedy	– Check wiring
			Diagnostic status	Error
All other event codes	08 0A 0108 (134873352)	IO-Link event	An IO-Link diagnostic event (note, warning or error) has occurred. IO-Link event-specific details are attached to this message.	
			Remedy	– See documentation of the IO-Link master or device
			Diagnostic status	Information, Warning, Error

Tab. 19: IO-Link master event codes

10.3.2 Device event codes

The following table contains the event codes of the IO-Link devices.

IO-Link event code hex	Diagnostics ID hex	Message	Description	
1000h	0D 00 0141 (218104129)	General malfunction of IO-Link device	General malfunction - unknown error of the IO-Link device. Corresponds to IO-Link EventCode 0x1000.	
			Remedy	– Check IO-Link device
			Diagnostic status	Information
1805h	03 01 0181 (50397569)	PHY overtemperature	PHY overtemperature	
			Remedy	– Eliminate heat source
			Diagnostic status	Error
1806h, 1807h	01 01 010B (16843019)	Short circuit/overload in sensor supply	A short-circuit/overload of the sensor supply was detected	
			Remedy	– Check sensor for correct function, in particular for current consumption. – Check sensor wiring.
			Diagnostic status	Error
180Eh, 5112h	02 01 0105 (33620229)	Undervoltage in load supply (PL) 24 V DC	Undervoltage in the load supply (PL) 24 V DC was detected.	
			Remedy	– Check power supply (load) – Check for short circuit
			Diagnostic status	Error
4000h	03 01 0142 (50397506)	Temperature error - overload	Temperature error - overload	
			Remedy	– Device-specific
			Diagnostic status	Error
4210h	03 01 002F (50397231)	Device overtemperature	Device overtemperature	

IO-Link event code hex	Diagnostics ID hex	Message	Description	
4210h	03 01 002F (50397231)	Device overtemperature	Remedy	– Check warning threshold parameterisation – Device fan defective? – Device overloaded? – Check installation conditions; control cabinet fan filter dirty? – Check drive layout (possible overloading during continuous operation)
			Diagnostic status	Error
4220h	03 01 002D (50397229)	Temperature in device too low	Temperature in device too low	
			Remedy	– Check ambient conditions
5000h	10 02 0145 (268566853)	Device hardware error	Hardware error of the IO-Link device	
			Remedy	– Repair or replace IO-Link device
5010h	10 02 0146 (268566854)	Malfunction of a device component	Malfunction of a component of the IO-Link device	
			Remedy	– Repair or replace IO-Link device
5011h	02 05 0147 (33882439)	Memory error	Data loss in remanent memory	
			Remedy	– Check batteries
5012h	02 05 0148 (33882440)	Batteries weak	Batteries weak	
			Remedy	– Check batteries
5100h	02 01 0149 (33620297)	General power supply error	General power supply error	
			Remedy	– Check power supply
5101h	0A 00 014A (167772490)	Fuse blown/opened	Fuse blown/opened	
			Remedy	– Replace fuse – Eliminate cause of defective fuse
5110h	02 01 0017 (33619991)	Overvoltage in logic supply (PS) 24 V DC	Overvoltage of the logic supply (PS) 24 V DC was detected.	
			Remedy	– Check the power supply (logic)
5111h	02 01 0016 (33619990)	Undervoltage in logic supply (PS) 24 V DC	Undervoltage of the logic supply (PS) 24 V DC was detected.	
			Remedy	– Check the power supply (logic)
6000h	0B 00 010E (184549646)	General software error	An error has occurred that could not be assigned to any other specific diagnosis.	
			Remedy	– Check that you are using the latest firmware version. – Please contact Festo Support
6320h	06 00 014F (100663631)	Parameter error	Parameter was written with invalid value.	
			Remedy	– Check datasheet and parameter values
6321h	06 00 0150 (100663632)	Parameter missing in the device	Parameter missing in the device	
			Remedy	– Check datasheet and parameter values
			Diagnostic status	Error

IO-Link event code hex	Diagnostics ID hex	Message	Description
7701h ... 770Fh	10 02 0152 (268566866)	Wire break at lower-level device 1 ... 15	Wire break at lower-level IO-Link device 1 ... 15
			Remedy – Check wiring
			Diagnostic status Error
7710h	01 01 0161 (16843105)	Short circuit – check installation	Short circuit – check installation
			Remedy – Check installation
			Diagnostic status Error
7711h	01 01 0162 (16843106)	Earth fault - check installation	Earth fault - check installation
			Remedy – Check installation
			Diagnostic status Error
8C01h	0D 00 0164 (218104164)	Simulation active	Simulation active
			Remedy – Check operating mode
			Diagnostic status Warning
8C10h	07 07 0165 (117899621)	Overflow of the process variable range - process data uncertain	Overflow of the process variable range - process data uncertain
			Remedy – Check input signal – Check parameters and configuration
			Diagnostic status Warning
8C20h	07 05 0166 (117768550)	Measuring range exceeded	Measuring range exceeded
			Remedy – Check application – Check input signal – Check parameters and configuration
			Diagnostic status Error
8C30h	07 07 0167 (117899623)	Underflow of the process variable range - process data uncertain	Underflow of the process variable range - process data uncertain
			Remedy – Check input signal – Check parameters and configuration
			Diagnostic status Warning
8C40h	0C 01 0168 (201392488)	Maintenance requirement - cleaning	Maintenance requirement - cleaning
			Remedy – Cleaning the device
			Diagnostic status Warning
8C42h	0C 01 016A (201392490)	Maintenance required - replacement of wearing parts	Maintenance required - replacement of wearing parts
			Remedy – Check wearing parts and replace if necessary
			Diagnostic status Warning

Tab. 20: IO-Link device event codes

11 Technical data

11.1 Technical data, general

CPX-AP-A-4IOL-M12		
Certificates, declaration of conformity		➔ www.festo.com/sp
Mounting position		Any
Dimensions (width × length × height)	[mm]	50.1 × 107.3 × 57.5 (including interlinking module)
Product weight	[g]	90
Ambient temperature	[°C]	−20 ... +50
Storage temperature	[°C]	−20 ... +70
Humidity (non-condensing)	[%]	5 ... 95
Max. assigned address space (max. inputs/outputs)	[Byte]	32/32 per port 132/132 module
Maximum number of IO-Link Masters in AP		See manual of the various bus interfaces.
Module code (hex/dec)		Dependent on the set data length ➔ 8.1 Address space (data length of inputs/outputs) 0x300C/12300d (factory setting)
Module identification		CPX-AP-A-4IOL-M12
Protection against electric shock (protection against direct and indirect contact)		By the use of SELV/PELV circuits (Safe extra-low voltage/Protected extra-low voltage)
Electromagnetic compatibility		See declaration of conformity ➔ www.festo.com

Tab. 21: General technical data

11.2 Technical data, electrical

Power supply		
Logic supply PS	[V DC]	24 ± 25 %
Intrinsic current consumption at nominal operating voltage 24 V from PS	[mA]	Typically 55 (without connected Devices)
Mains buffering time, logic supply PS	[ms]	10
Load supply PL	[V DC]	24 ± 25 % The permissible PL voltage range must be checked with the connected IO-Link device.
Intrinsic current consumption at nominal operating voltage 24 V from PL	[mA]	Typically 5 (without connected Devices)
Capacitive load at load supply PL		
24 V PL to 0 V PL	[nF]	Typically 35
24 V PL to FE	[nF]	Typically 35
0 V PL to FE	[nF]	Typically 20
Undervoltage detection in logic supply PS		
Trigger level	[V DC]	17
Hysteresis	[V DC]	0.5

Tab. 22: Power supply

IO-Link Ports (in accordance with IO-Link specification V1.1)		
Number Ports		4
Port type		Port Class B (type B)
Max. number Devices (per Port)		1
Max. cable length (per Port)	[m]	20 unshielded
Transmission rate (per Port)	[kbps]	230.4 (corresponds to IO-Link COM3)
	[kbps]	38.4 (corresponds to IO-Link COM2)
	[kbps]	4.8 (corresponds to IO-Link COM1)
Cycle time	[ms]	Dependent on the minimum supported cycle time of the connected Device (a fixed value can be set → parameter 20049).
Max. process data length (per Port)	[Byte]	32 I/32 O
PS supply		
Internal voltage drop	[V]	≤ 1
Max. current PS (per module/Port)	[A]	2/0.5
Short circuit protection PS electronic (per module)	[A]	2
Response after PS overload		Automatic recovery
PS reverse polarity protection		Yes (internal only)
PL supply		
Internal voltage drop	[V]	≤ 1
Max. current PL (per module/Port)	[A]	4/1.5 not simultaneously at all ports
PL short-circuit protection		No External fuse protection via circuit breaker required.
PL reverse polarity protection		Yes (internal only)
Electrical isolation		
Between the ports		No
Between PS and PL		Yes

Tab. 23: IO-Link Ports

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