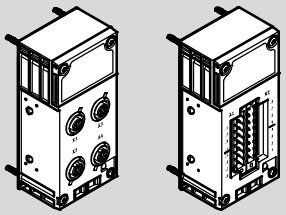
Analogue Module CPX-4AE-4AA-H



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Brief Description
(Translation of the original instructions)

8083241
2017-12
[8083243]

Analogue Module CPX-4AE-4AA-H ..... English

HART® and Torx® are registered trademarks of the respective trademark owners in certain countries.

1 About this document

This document describes the function, mounting and installation of the product. Certain aspects of use are described in other documents and must be observed ➔ Further applicable documents.

1.1 Further applicable documents

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

The following documents contain extensive information:
- Description of the analogue module ➔ CPX-4AE-4AA-H.
- Description of system CPX ➔ P.BE-PX-SYS-....

2 Safety

2.1 General safety information

- Only use the product if it is in perfect technical condition.
- Observe product labelling.
- Take into consideration the ambient conditions at the location of use.
- Prior to mounting, installation and maintenance work: switch off the power supply.
- Observe the handling specifications for electrostatically sensitive devices.
- Seal unused connections with cover caps to achieve the required degree of protection.
- Use connection hardware with the required degree of protection.
- Store the product in a cool, dry, UV-protected and corrosion-protected environment. Ensure that storage times are kept to a minimum.

2.2 Intended use

The analogue module is determined only for use in terminal CPX and terminal CPX-P of Festo.

- Operate the product only at suitable bus nodes CPX ➔ Fig. 1.
  Connect a maximum of 5 analogue modules with HART functionality to the bus nodes CPX-FB13 (PROFIBUS).
- Use only permissible combinations of module components ➔ Fig. 2.
- The product may only be used in its original status without unauthorised modifications. Only the conversions or modifications described in this and further applicable documents are permitted.
- Use the product only in an industrial environment. Outside of industrial environments, e.g. in commercial and mixed-residential areas, actions to suppress interference may have to be taken.

Bus node	Required revision
CPX-FB13 (PROFIBUS)	From Rev 34
CPX-FB33 (PROFINET IO)	From Rev 33
CPX-M-FB34	From Rev 33
CPX-M-FB35	From Rev 33

Fig. 1

Interlinking block	Connection block CPX-P-AB-4XM12-4POL	Connection block CPX-P-AB-2XKL-8POL
Metal version	Permissible	Permissible
Plastic version	Not permissible	Permissible

Fig. 2

2.3 Training of specialized personnel

This document is intended for qualified personnel. Experience with electrical control systems is required in order to understand this documentation.

3 Additional information

- Accessories ➔ www.festo.com/catalogue
- Spare parts ➔ www.festo.com/spareparts

4 Service

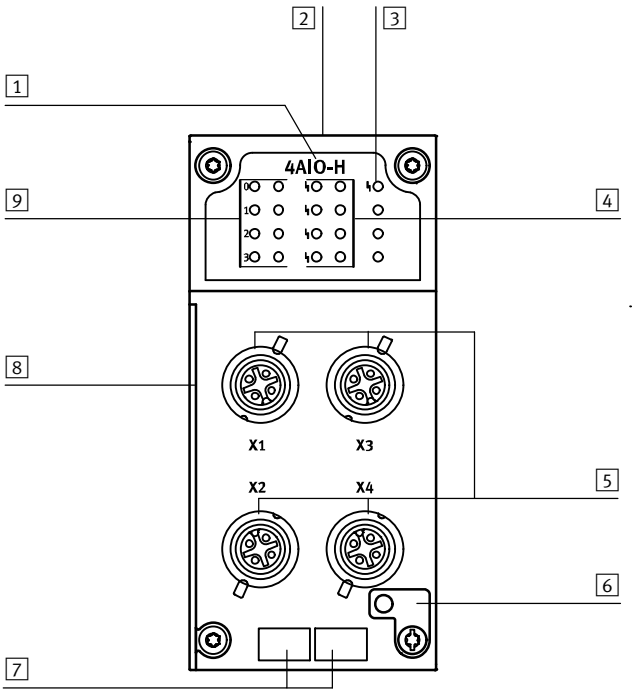
Contact your regional Festo contact person if you have technical questions ➔ www.festo.com

5 Product overview

5.1 Function

The analogue module with HART functionality provides analogue current inputs and current outputs and enables the recording and further processing of analogue current signals.

5.2 Connection and display components



1 Module identifier
2 Product labelling, connection block (on the top side of the fibre-optic cable)
3 Module error indicator (red LED)
4 Channel error indicator (red LED)
5 Electrical connections (here: M12)
6 Earth terminal
7 Inscription labels
8 Slot for insulating plate
9 Channel status indicator (1 LED per channel)
LED 0 ... 3 (green): input
LED 0 ... 3 (yellow): output

Fig. 3

Pin allocation on connection block CPX-P-AB-4XM12-4POL

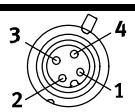
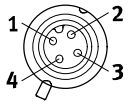
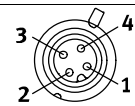
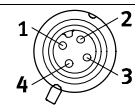
Socket contact M12	Pin	Function	Signal
X_1 	X1.1	24 V_{SEN} / IO_0	$AOUT_0$
	X1.2	0 V_{SEN}	XGND
	X1.3	II_0	AIN_0
	X1.4	0 V_{SEN}	XGND
X_2 	X2.1	24 V_{SEN} / IO_1	$AOUT_1$
	X2.2	0 V_{SEN}	XGND
	X2.3	II_1	AIN_1
	X2.4	0 V_{SEN}	XGND
X_3 	X3.1	24 V_{SEN} / IO_2	$AOUT_2$
	X3.2	0 V_{SEN}	XGND
	X3.3	II_2	AIN_2
	X3.4	0 V_{SEN}	XGND
X_4 	X4.1	24 V_{SEN} / IO_3	$AOUT_3$
	X4.2	0 V_{SEN}	XGND
	X4.3	II_3	AIN_3
	X4.4	0 V_{SEN}	XGND

Fig. 4

Pin allocation on connection block CPX-P-AB-2XKL-8POL

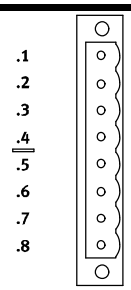
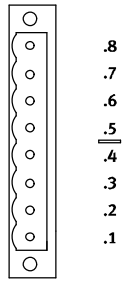
Connection block	Pin	Function	Signal
X_1 	X1.1	24 V_{SEN} / IO_0	$AOUT_0$
	X1.2	0 V_{SEN}	XGND
	X1.3	II_0	AIN_0
	X1.4	0 V_{SEN}	XGND
	X1.5	24 V_{SEN} / IO_1	$AOUT_1$
	X1.6	0 V_{SEN}	XGND
	X1.7	II_1	AIN_1
	X1.8	0 V_{SEN}	XGND
X_2 	X2.1	24 V_{SEN} / IO_2	$AOUT_2$
	X2.2	0 V_{SEN}	XGND
	X2.3	II_2	AIN_2
	X2.4	0 V_{SEN}	XGND
	X2.5	24 V_{SEN} / IO_3	$AOUT_3$
	X2.6	0 V_{SEN}	XGND
	X2.7	II_3	AIN_3
	X2.8	0 V_{SEN}	XGND

Fig. 5

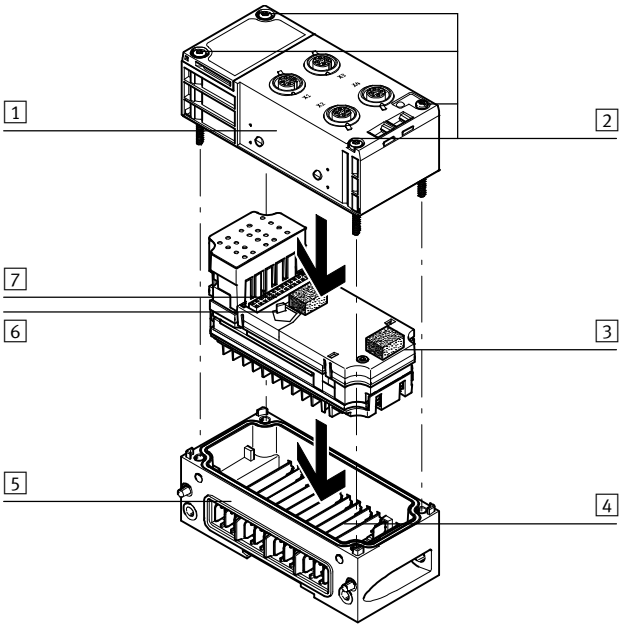
LED indicators – normal operating status

Behaviour of the LED indicators in normal operating status:
- The green LEDs of the active inputs light up or flash.
- The yellow LEDs of the active outputs light up or flash.

6 Mounting

6.1 Mounting the electronic module and connection block

Requirements
- Supply voltage is switched off.
- The interlinking block is clean and free of foreign matter.
- The DIL switches are set ➔ Chap. 6.2.



1 Connection block
2 Screws (Torx T10)
3 Electronics module
4 Contact rails
5 Interlinking block
6 Coding pin
7 Plug connectors

Fig. 6

Mounting the electronic module and connection block

➔ **Note**

If threads are damaged or seals are defective, the device cannot achieve its specified IP degree of protection.
- Before mounting, check the seals and thread. Replace damaged parts.

1. Check seal and seal surfaces. Replace damaged parts.
2. Place the electronics module in the interlinking block without tilting.
3. Press on the electronic module to the limit stop.
4. Align the connection block on the interlinking block with the electronics module.
5. Push the connection block onto the interlinking block without tilting.
6. Insert the screws and tighten them crosswise.
   - Plastic interlinking block: thread-cutting screws
   - Metal interlinking block: screws with metric thread
   - Tightening torque 0.9 ... 1.1 Nm

6.2 Dismounting the electronic module and connection block

1. Switch off the power supply of the entire terminal CPX:
   - Compressed air
   - Operating voltage for electronics and sensors
   - Load voltage of valves
2. Loosen the screws of the connection block.
3. Pull the connection block out of the plug connector of the electronic module without tilting.
4. Pull the electronic module out of the contact rails of the interlinking block without tilting.

7 Installation

The connection of field devices on the analogue module depends on the type of connection block and setting of the DIL switches on the electronic module. Information on installation ➔ Description of analogue module.

7.1 Power supply

The operating and load voltage supply is fed through interlinking blocks or end plates (Protective Extra-Low Voltage, PELV) ➔ Description of system CPX.

7.2 Changing the configuration of the analogue current channels (DIL switches)

Description of the switch positions

Using the DIL switches, the following analogue current channel functions can be configured:

- Input or output channel
- Expansion of the process image by HART variables (+16 bytes)

If the configuration of the analogue current channels is changed, observe the maximum address range of the terminal CPX (e.g. if the process image is expanded by HART variables).

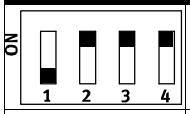
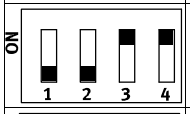
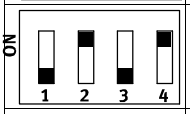
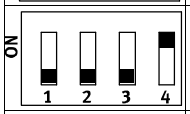
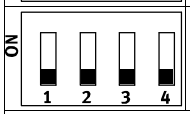
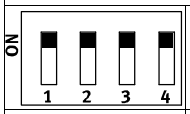
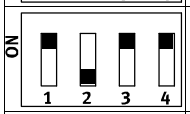
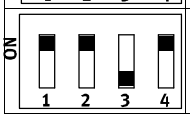
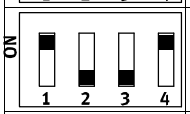
Switch setting	Variant	PII	PIO	Description
Without HART variables				
	4AE-H	8 bytes	0 bytes	Channel 0: input Channel 1: input Channel 2: input Channel 3: input
	3AE1AA-H	6 bytes	2 bytes	Channel 0: input Channel 1: input Channel 2: input Channel 3: output
	2AE2AA-H	4 bytes	4 bytes	Channel 0: input Channel 1: input Channel 2: output Channel 3: output
	1AE3AA-H	2 bytes	6 bytes	Channel 0: input Channel 1: output Channel 2: output Channel 3: output
	4AA-H	0 bytes	8 bytes	Channel 0: output Channel 1: output Channel 2: output Channel 3: output
	Reserved for test mode	–	–	–
With HART variables				
	4AE-H + 4HV	24 bytes	0 bytes	Channel 0: input Channel 1: input Channel 2: input Channel 3: input
	3AE1AA-H + 4HV	22 bytes	2 bytes	Channel 0: input Channel 1: input Channel 2: input Channel 3: output
	2AE2AA-H + 4HV	20 bytes	4 bytes	Channel 0: input Channel 1: input Channel 2: output Channel 3: output
	1AE3AA-H + 4HV	18 bytes	6 bytes	Channel 0: input Channel 1: output Channel 2: output Channel 3: output
	4AA-H + 4HV	16 bytes	8 bytes	Channel 0: output Channel 1: output Channel 2: output Channel 3: output

Fig. 7

Setting the DIL switches

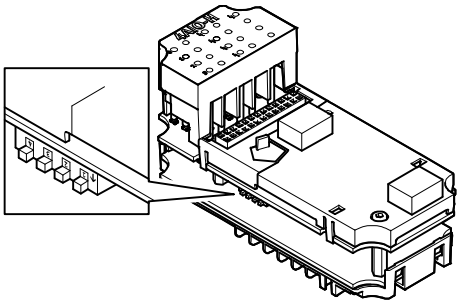


Fig. 8

1. Switch off the power supply of the entire terminal CPX:
   - Compressed air
   - Operating voltage for electronics and sensors
   - Load voltage of valves
2. Loosen the screws of the connection block.
3. Pull the connection block out of the plug connector of the electronic module without tilting.
4. Set the DIL switches on the electronic module.
5. Mount the connection block ➔ Chap. 6.1.

   ➔ The process image becomes effective after switching on the power supply.

8 Commissioning

Detailed information on commissioning ➔ Description of the analogue module.

8.1 Parameterisation

The terminal CPX and the module described here can be parameterised with the operator unit (CPX-MMI), the Festo Maintenance Tool (CPX-FMT) software or the higher-level system.

9 Diagnostics

Detailed information on diagnostics ➔ Description of the analogue module.

9.1 LED indicators

The display of errors can be suppressed during parameterisation.

LED	Description
Module error indicator	
	Error-free operation
	Module error – All channel-specific errors – Parameterisation errors of hysteresis – The DIL switch is incorrectly set.
Channel error indicator	
	Error-free operation
	Channel-specific errors
Channel status indicator of inputs	
	Channel inactive or active as output
	Channel active as input: – Signal range 4 … 20 mA with HART – HART communication error-free
	Channel active as input
Channel status indicator of outputs	
	Channel inactive or active as input
	Channel active as output: – Signal range 4 … 20 mA with HART – HART communication error-free
	Channel active as output

Fig. 9

10 Technical data

Technical data of terminal CPX ➔ Description of system CPX.

Feature		Specification/value
Dimensions (Length x Width x Height)	[mm]	107 x 50 x 70, including interlinking block and connection block
Product weight, including interlinking	[g]	78
Type of mounting		On interlinking block
Ambient temperature	[°C]	-5 ... 50
Storage temperature	[°C]	-20 ... 70
Air humidity (non-condensing)	[%]	95
Degree of protection to EN 60529		Depending on connection block
Electromagnetic compatibility		To EN 61000-6-2/-4
CE marking (Declaration of conformity ➔ www.festo.com/sp)		To EU Explosion Protection Directive (ATEX) In accordance with EU EMC Directive
Note on materials		RoHS compliant
Information on materials -		
– Housing		PA reinforced PC
Power supply		
Nominal operating voltage	[V DC]	24
Operating voltage range	[V DC]	18 ... 30
Intrinsic current consumption at nominal operating voltage	[mA]	Typically 170, max. 200
Electrical connection		– M12 4-pin – Spring-loaded terminal – Screw terminal
Reverse polarity protection		– For operating voltage – Per channel for inputs and outputs
Analogue current channels		
Quantity		4, selectable as inputs or outputs
Signal range	[mA]	– 0 ... 20 without HART – 4 ... 20 without HART – 4 ... 20 with HART
Repetition accuracy at 25 °C	[%]	0.05
Operating error limit related to the ambient temperature range	[%]	± 0.3
Basic error limit at 25 °C	[%]	± 0.1
Analogue inputs		
Input resistance	[Ω]	300
Open circuit voltage	[V DC]	Max. 28.8
Short circuit current	[mA]	Max. 22
Available sensor voltage	[V]	Min. 20.7 at 20 mA
Sensor cable length	[m]	Max. 500 (screened)
Electrical isolation between channels		None
Electrical isolation between channel and internal bus		Yes
Fuse protection (short circuit)		Per channel
Analogue outputs		
Load resistance	[Ω]	Max. 750

Fig. 10