

ifm electronic



Operating instructions  
ClassicLine module

**AS interface**

**AC5230**

UK

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# 1 Safety instructions

- Please read the product description prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- The unit conforms to the relevant regulations and EC directives.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application.

That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.

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## 2 Functions and features

The slave converts digital and analogue input signals and transfers them to the AS-i master via the AS-interface. In addition the slave receives data via the AS-interface and converts them to analogue output data. The AS-i module operates as a slave with bidirectional data transfer in the AS-i network.

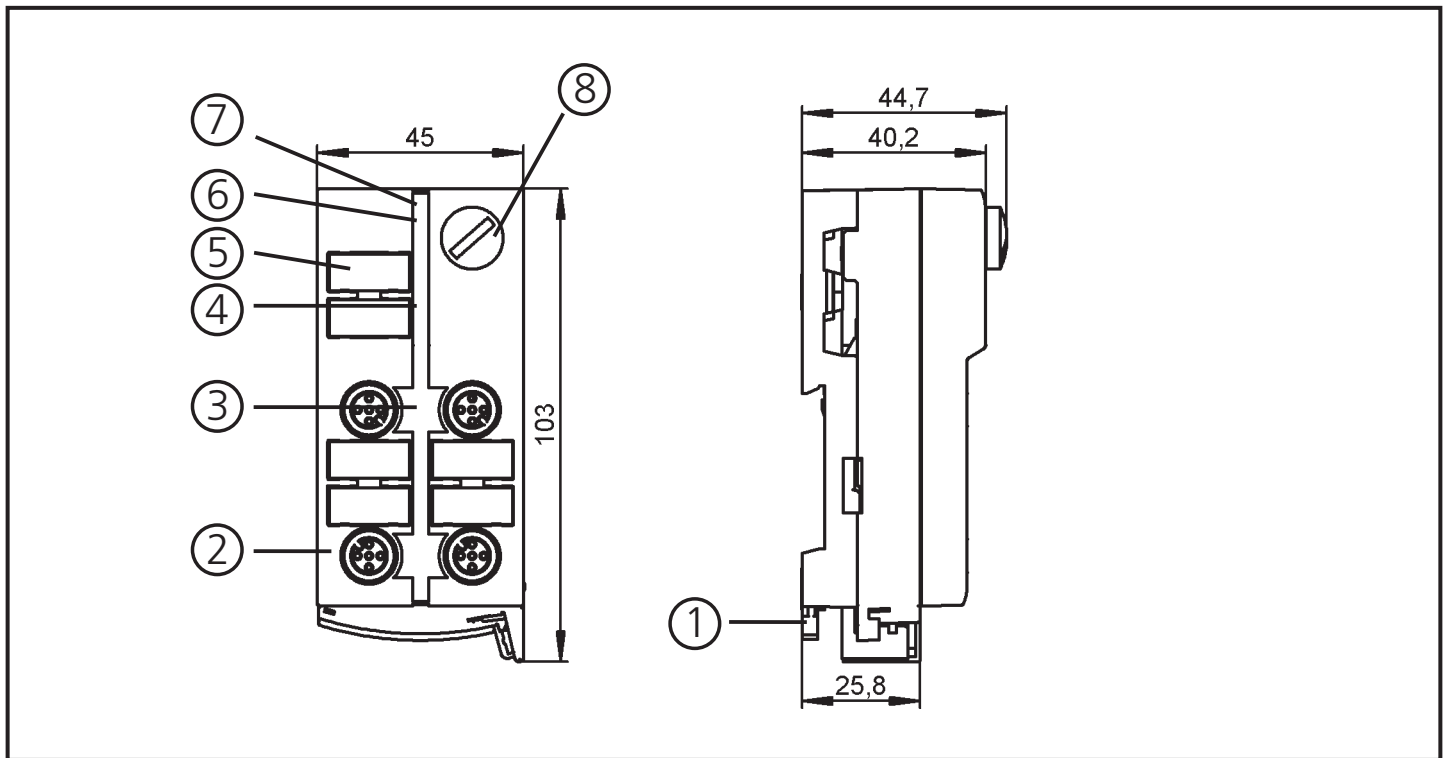
The data transfer to the host is asynchronous according to the AS-i profile S-7.5.5 and the AS-i specification 3.0.

The slave can only be operated in conjunction with a version 3.0 master (master profile M4).

- Maximum number of modules per master: 31
- Current measurement 4...20 mA
- Current output 4...20 mA
- Two digital inputs

There are electrical separations between the analogue input, analogue output and AS-i. These separations are only effective in case of external supply. If an analogue sensor/actuator is supplied from AS-i, the electrical separation is linked for this connection. The digital inputs are always electrically connected with AS-i. The load must not exceed a maximum of 200 mA.

### 3 Operating and display elements



- 1: Earthing lead
- 2: 4 M12 sockets
- 3: LED
- 4: LED 1
- 5: Labels
- 6: LED FAULT
- 7: LED PWR
- 8: Addressing interface

## 4 Installation



### Alignment of the flat cable on delivery

Carefully place the yellow flat cable into the profile slot.

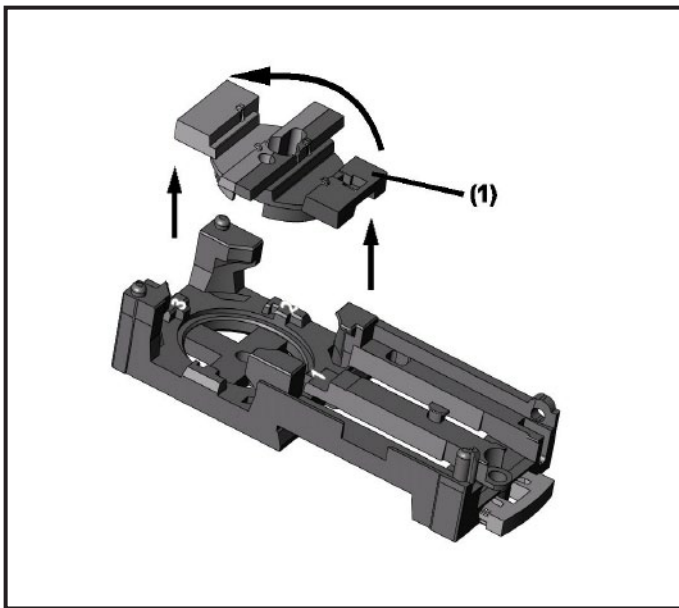
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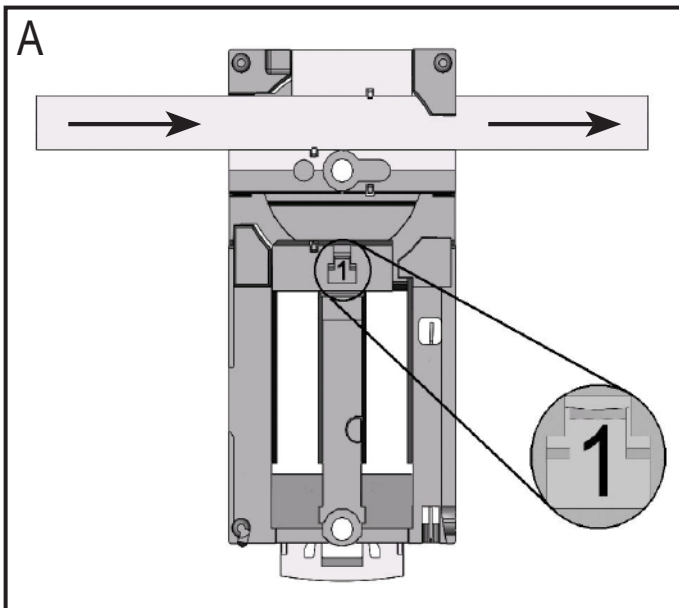
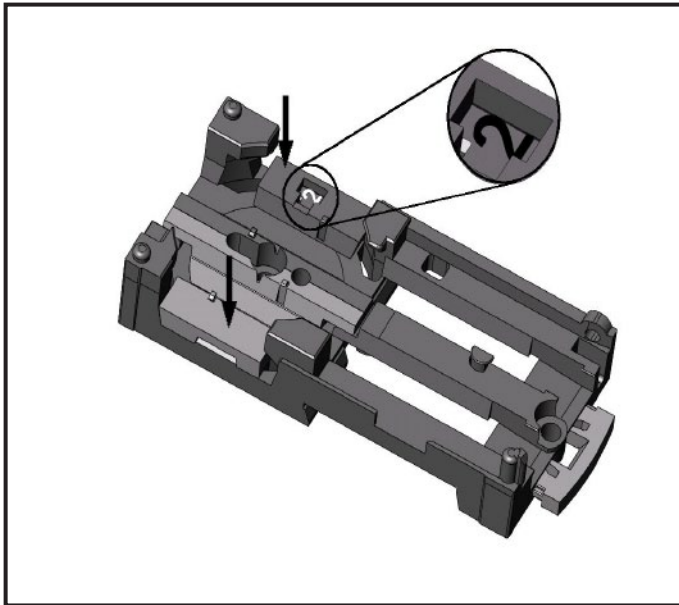
Mount the upper part.



Lock the unit.



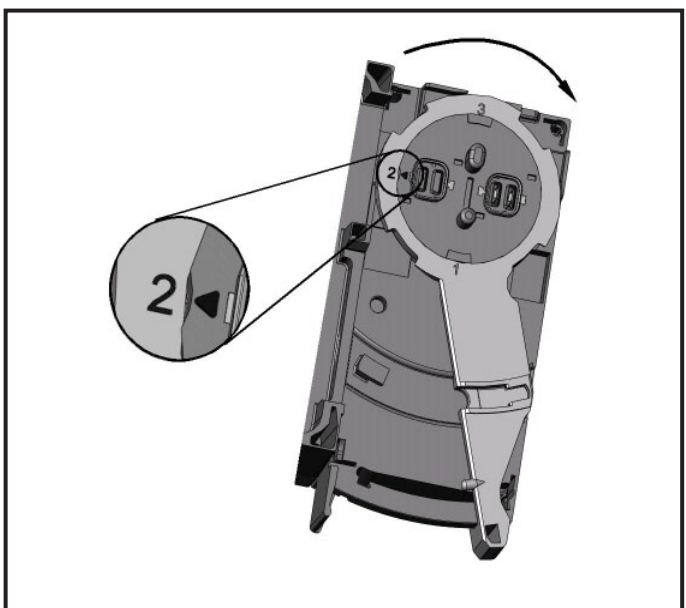
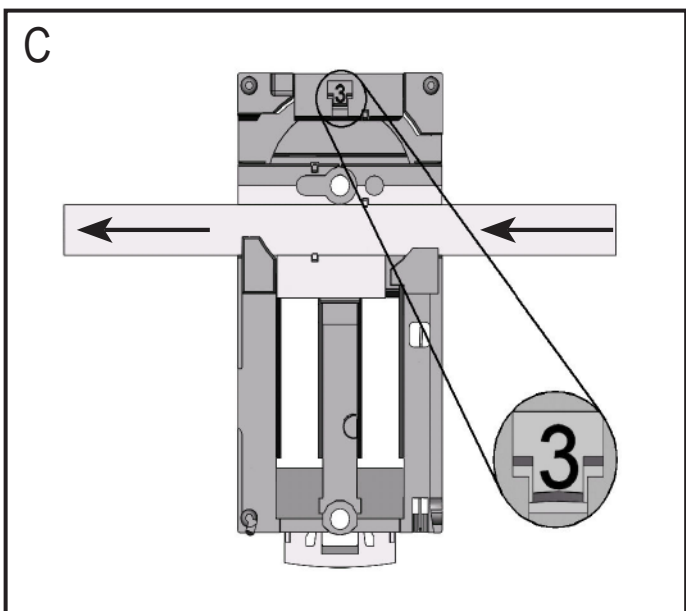
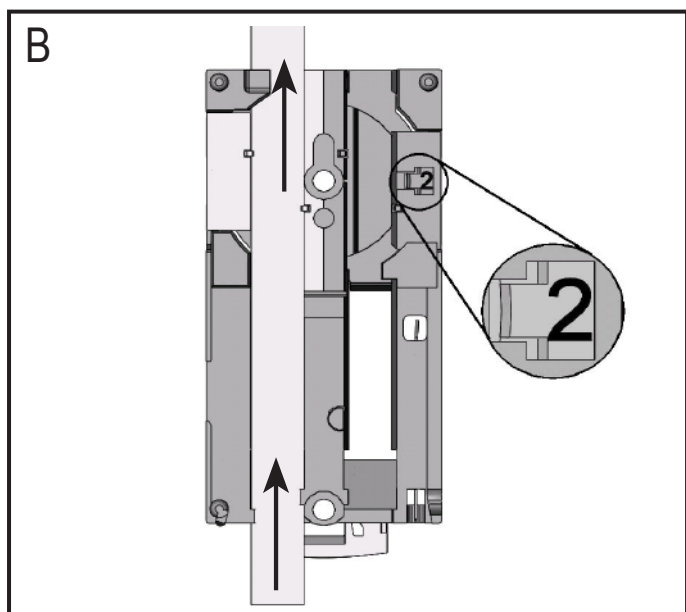
The supplied lower part the flat cable can be aligned in three directions.  
For the requested direction place the flat cable guide (1) accordingly.



### Settings at the lower part

Select the position 1, 2 or 3 depending on the requested flat cable alignment (→).

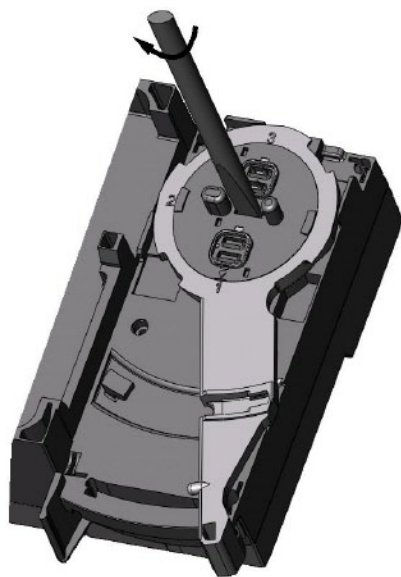
A = factory setting



### Settings at the upper part

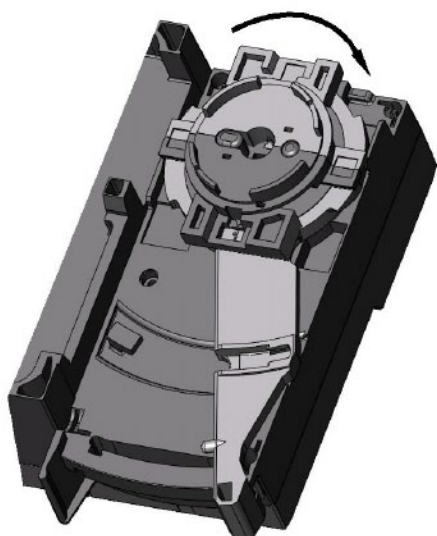
Then set the selected position at the upper part. To do so, turn the triangle to the corresponding number (fig. D1 and D2).

D1



Use a tool, e.g. a screwdriver (figure D1) or the yellow / black flat cable guide (figure D2).

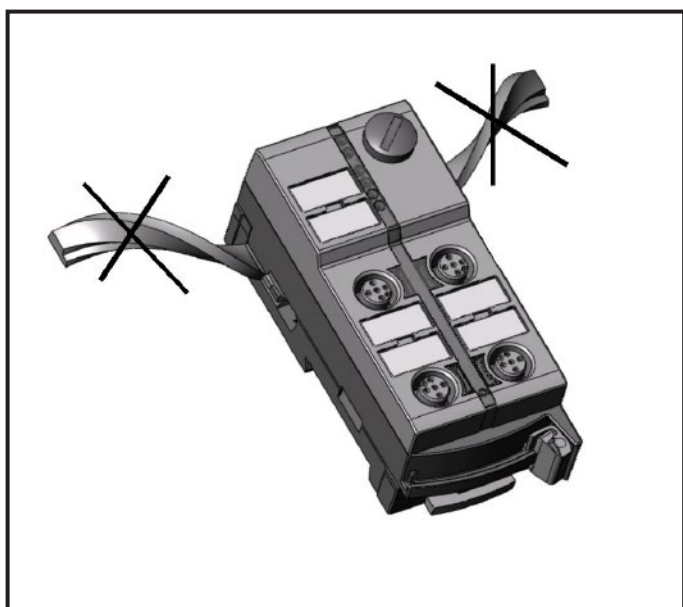
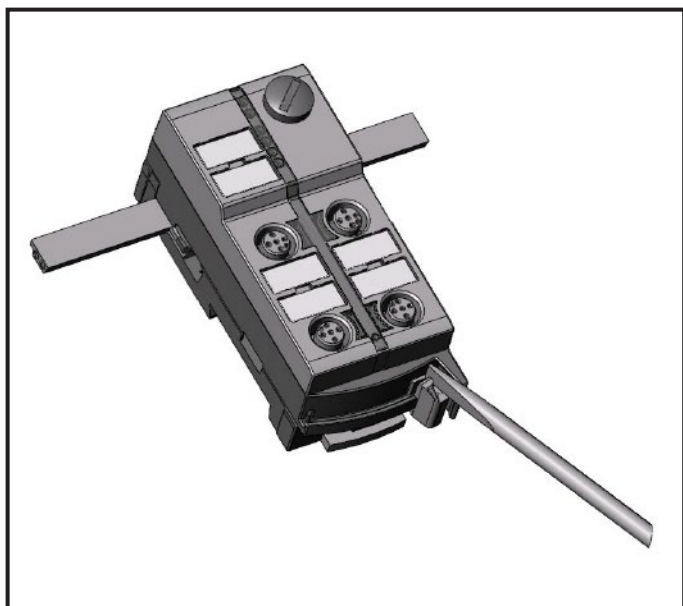
D2



## Open the unit



Open the unit using a tool as shown (e.g. screwdriver).



Take care in laying the AS-i flat cable, the flat cable should be laid straight for about 15 cm.

## 5 Addressing

The address is set to 0 at the factory.

### 5.1 Addressing with the AC1154 addressing unit

When mounted and wired the module can be addressed with the addressing cable (E70213) via the integrated addressing interface.

## 6 Electrical connection

Connect the plugs of the sensors / actuators to the M12 sockets.

To guarantee protection rating IP 67

- cover the unused sockets with protective caps (E73004)\*, tightening torque 0.6...0.8 Nm.

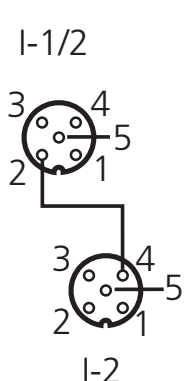
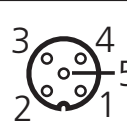
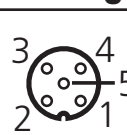
- the flat cable end seal (E70413)\* must be used if the module is at the end of the cable line.

\* to be ordered separately.

The earthing lead (2.8 x 0.5 mm) on the supplied lower part is connected to pin 5, functional earth of the M12 sockets.

## 6.1 Wiring

The connection of sensors with digital outputs is made via the M12 sockets I-1/2 und I-2.

| Digital inputs I-1/2                                                              |     | Analogue input                                                                      |     |
|-----------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------|-----|
|  |     |    |     |
|                                                                                   |     | M12 socket                                                                          | Pin |
|                                                                                   |     | sensor supply +24 V                                                                 | 1   |
|                                                                                   |     | analogue input AI +                                                                 | 2   |
|                                                                                   |     | sensor supply 0 V                                                                   | 3   |
|                                                                                   |     | analogue input AI -                                                                 | 4   |
|                                                                                   |     | functional earth                                                                    | 5   |
|                                                                                   |     | Analogue output                                                                     |     |
|                                                                                   |     |  |     |
| M12 socket                                                                        | Pin | M12 socket                                                                          | Pin |
| sensor supply +24 V                                                               | 1   | actuator supply +24 V                                                               | 1   |
| input                                                                             | 2   | analogue output AO +                                                                | 2   |
| sensor supply 0 V                                                                 | 3   | actuator supply 0 V                                                                 | 3   |
| input                                                                             | 4   | analogue output AO -                                                                | 4   |
| functional earth                                                                  | 5   | functional earth                                                                    | 5   |

## 7 Current measurement

In all the following wiring diagrams the indicated pin connection refers to the module. The current measurement input (socket A) ensures connection of 2, 3 and 4-wire sensors. This leads to four possible connections.



When connecting a 2-wire or 3-wire sensor without own supply there has to be an external link between pin 3 and pin 4. Then the electrical separation to AS-i is, however, removed.

### Connection of a 2-wire sensor without own supply

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|                                                                                                                                                                                                                                   |                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: sensor supply +24 V</li> <li>• Pin 2: analogue input AI +</li> <li>• Pin 3: sensor supply 0 V</li> <li>• Pin 4: analogue input AI -</li> <li>• Pin 5: functional earth</li> </ul> |                                                            |
|                                                                                                                                                                                                                                   | <p>1: analogue +</p> <p>2: analogue -</p> <p>3: sensor</p> |

### Connection of a 2-wire sensor with own (grounded) supply

|                                                                                                                                                                                                                                   |                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: sensor supply +24 V</li> <li>• Pin 2: analogue input AI +</li> <li>• Pin 3: sensor supply 0 V</li> <li>• Pin 4: analogue input AI -</li> <li>• Pin 5: functional earth</li> </ul> |                                                            |
|                                                                                                                                                                                                                                   | <p>1: analogue +</p> <p>2: analogue -</p> <p>3: sensor</p> |

## Connection of a 3-wire sensor without own supply

|                                                                                                                                                                                                                                   |                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: sensor supply +24 V</li> <li>• Pin 2: analogue input AI +</li> <li>• Pin 3: sensor supply 0 V</li> <li>• Pin 4: analogue input AI -</li> <li>• Pin 5: functional earth</li> </ul> |                                                            |
|                                                                                                                                                                                                                                   | <p>1: analogue +</p> <p>2: analogue -</p> <p>3: sensor</p> |

## Connection of a 4-wire sensor without own supply

|                                                                                                                                                                                                                                   |                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: sensor supply +24 V</li> <li>• Pin 2: analogue input AI +</li> <li>• Pin 3: sensor supply 0 V</li> <li>• Pin 4: analogue input AI -</li> <li>• Pin 5: functional earth</li> </ul> |                                                            |
|                                                                                                                                                                                                                                   | <p>1: analogue +</p> <p>2: analogue -</p> <p>3: sensor</p> |

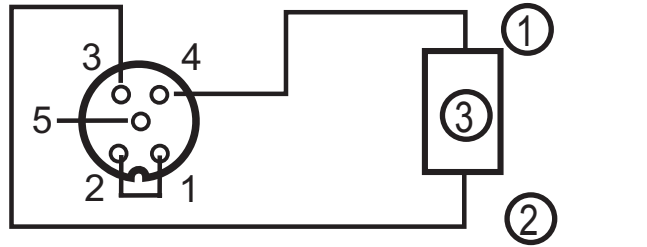
## 8 Current output

The current output is implemented as passive current controller which is effective between pins 2 and 4. The current controller is electrically separated from AS-i and does not have its own supply. Therefore an appropriate PELV voltage source has to be looped in the circuit of the current output and the actuator.

If there is no PELV voltage source, the actuator supply on pins 1 and 3 can be used for the supply. The electrical separation to AS-i is then removed. Make sure that this actuator circuit is not connected with the external potential or grounded.

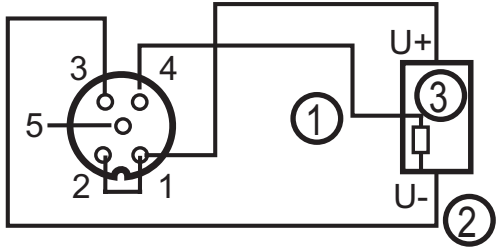
In all the following wiring diagrams the indicated pin connection refers to the module. The current output (socket AO) ensures connection of 2, 3 and 4-wire sensors. There are the following possible connections.

|                                                                                                                                                                                                                                         |                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: actuator supply +24 V</li> <li>• Pin 2: analogue output AO +</li> <li>• Pin 3: actuator supply 0 V</li> <li>• Pin 4: analogue output AO -</li> <li>• Pin 5: functional earth</li> </ul> |  <p>1: analogue +<br/>2: analogue -<br/>3: actuator</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|

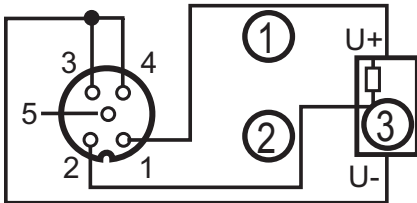
|                                                                                                                                                                                                                                         |                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: actuator supply +24 V</li> <li>• Pin 2: analogue output AO +</li> <li>• Pin 3: actuator supply 0 V</li> <li>• Pin 4: analogue output AO -</li> <li>• Pin 5: functional earth</li> </ul> |  <p>1: analogue +<br/>2: analogue -<br/>3: actuator</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                                                                                         |                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: actuator supply +24 V</li> <li>• Pin 2: analogue output AO +</li> <li>• Pin 3: actuator supply 0 V</li> <li>• Pin 4: analogue output AO -</li> <li>• Pin 5: functional earth</li> </ul> | <p>1: analogue +<br/>2: analogue -<br/>3: actuator</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|

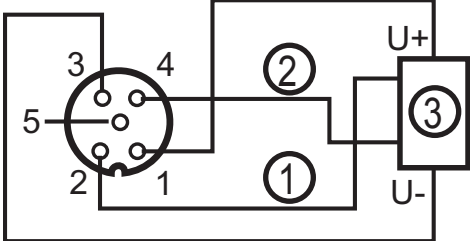
Wiring diagram of a 3-wire actuator without own supply, actuator load connected to U-

|                                                                                                                                                                                                                                         |                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: actuator supply +24 V</li> <li>• Pin 2: analogue output AO +</li> <li>• Pin 3: actuator supply 0 V</li> <li>• Pin 4: analogue output AO -</li> <li>• Pin 5: functional earth</li> </ul> |  |
|                                                                                                                                                                                                                                         | <p>1: analogue +</p> <p>2: analogue -</p> <p>3: actuator</p>                       |

Wiring diagram of a 3-wire actuator without own supply, actuator load connected to U+.

|                                                                                                                                                                                                                                         |                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: actuator supply +24 V</li> <li>• Pin 2: analogue output AO +</li> <li>• Pin 3: actuator supply 0 V</li> <li>• Pin 4: analogue output AO -</li> <li>• Pin 5: functional earth</li> </ul> |  |
|                                                                                                                                                                                                                                         | <p>1: analogue +</p> <p>2: analogue -</p> <p>3: actuator</p>                        |

Connection of a 4-wire actuator without own supply

|                                                                                                                                                                                                                                         |                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Pin 1: actuator supply +24 V</li> <li>• Pin 2: analogue output AO +</li> <li>• Pin 3: actuator supply 0 V</li> <li>• Pin 4: analogue output AO -</li> <li>• Pin 5: functional earth</li> </ul> |  |
|                                                                                                                                                                                                                                         | <p>1: analogue +</p> <p>2: analogue -</p> <p>3: actuator</p>                         |

## 9 Parameter setting of the analogue channels

| Parameter bit                             | Description                                                                                             | Remarks                                                                                                                                                                                                   |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P0<br>Watchdog<br>Analogue output         | 1* watchdog output active<br>0 watchdog output inactive                                                 | output performance when the AS-i communication is aborted<br>1: analogue output switches on the no load value (< 3.9 mA)<br><br>0: analogue output retains the current value                              |
| P1<br>Peripheral fault<br>Analogue input  | 1* peripheral fault on the analogue input active<br>0 peripheral fault on the analogue input inactive   | message of a peripheral fault of the analogue input on AS-i<br>1: peripheral fault of the analogue input is signalled to AS-i<br><br>0: peripheral fault of the analogue input is not signalled to AS-i   |
| P2<br>Peripheral fault<br>Analogue output | 1* peripheral fault on the analogue output active<br>0 peripheral fault on the analogue output inactive | message of a peripheral fault of the analogue input on AS-i<br>1: peripheral fault of the analogue output is signalled to AS-i<br><br>0: peripheral fault of the analogue output is not signalled to AS-i |
| P3                                        | 1* normal operation<br>0 reserved                                                                       | for normal operation P3 has to be = 1.                                                                                                                                                                    |
| * default setting                         |                                                                                                         |                                                                                                                                                                                                           |

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## 10 Measuring range of the module

For the measuring range and its significance please refer to the following tables.



The accuracy is only achieved in the nominal range (4...20 mA), it is not guaranteed in the extended nominal range.

### Analogue input 4...20 mA

| Range [mA] | Units dec.    | Units hex.  | LED1    | Peripheral fault | Description         |
|------------|---------------|-------------|---------|------------------|---------------------|
| < 3.6      | 32767*        | 7FFF*       | flashes | on (P1)          | wire break          |
| 3.6...4    | 3600...3999   | 0E10...0F9F | flashes | off              | below nominal range |
| 4...20     | 4000...20000  | FA0...4E20  | on      | off              | nominal range       |
| 20...22    | 20001...22000 | 4E21...55F0 | flashes | off              | above nominal range |
| > 22       | 32767*        | 7FFF*       | flashes | on (P1)          | overflow            |

\* The default value 7FFFh (32767) is transmitted if the value is above or below the nominal range, in the event of wire break or overflow.

### analogue output 4...20 mA

| Range [mA] | Units dec.    | Units hex.  | LED1    | Peripheral fault | Description         |
|------------|---------------|-------------|---------|------------------|---------------------|
| 3.5...3.9* | < 3900        | < 0F3C      | flashes | on (P2)          | below nominal range |
| 3.9...4    | 3900...3999   | 0F3C...0F9F | flashes | off              | extended range      |
| 4...20     | 4000...20000  | 0FA0...4E20 | on      | off              | nominal range       |
| 20...22    | 20001...22000 | 4E21...55F0 | flashes | off              | extended range      |
| 22*        | > 22000       | > 55F0      | flashes | on (P2)          | overcontrol         |

\* Below nominal range (output value < 3900 dec.) the current output is reset to the no load value (3.5...3.9 mA). Above nominal range (output value > 22000 dec.) the current output is limited to 22 mA.

# 11 Operation



Avoid build-up of dirt and dust on the upper and lower parts so that the locking mechanism is not affected.

Check whether the unit operates correctly. Display by LEDs:

|                          |                                                                             |
|--------------------------|-----------------------------------------------------------------------------|
| • LED1 yellow on:        | analogue signal in the measurement and control range (normal operation)     |
| • LED 1 yellow flashes:  | analogue signal outside the measuring range or no sensor/actuator connected |
| • LED green PWR on:      | AS-i voltage is applied                                                     |
| • LED red FAULT on:      | AS-i communication error                                                    |
| • LED red FAULT flashes: | peripheral fault*                                                           |

\* A peripheral fault is displayed:

- with overload or short circuit of the sensor/actuator supply.
- if an analogue signal is outside the value range and the peripheral fault indication for this channel is activated via the parameter (P1, P2).
- if nothing is connected to an analogue channel and the peripheral fault indication for this channel is activated via the parameters (P1, P2).

## 12 Technical data

Technical data and further information at  
[www.ifm.com](http://www.ifm.com)

## 13 Annex

Slave Profile S-7.5.5 manufacturer specific assignments according to AS-i Spec. V3.0

| Index 0<br>Acyclic Read service response: Read ID object |                                                                     |         |         |         |                       |         |        |        |     |
|----------------------------------------------------------|---------------------------------------------------------------------|---------|---------|---------|-----------------------|---------|--------|--------|-----|
| Byte                                                     | Bits: (0...7) for byte constructions; 0...15 for word constructions |         |         |         |                       |         |        |        |     |
|                                                          | 15<br>7                                                             | 14<br>6 | 13<br>5 | 12<br>4 | 11<br>3               | 10<br>2 | 9<br>1 | 8<br>0 | dec |
| 0                                                        | vendor ID (high)<br>0                                               |         |         |         |                       |         |        |        | hex |
| 1                                                        | vendor ID (high)<br>4                                               |         |         |         |                       |         |        |        | hex |
| 2                                                        | device ID (high)<br>0                                               |         |         |         |                       |         |        |        | hex |
| 3                                                        | device ID (low)<br>6                                                |         |         |         |                       |         |        |        | hex |
| 4                                                        | I/O Configuration<br>22                                             |         |         |         |                       |         |        |        | hex |
|                                                          | 1 word output analogue                                              |         |         |         | 1 word input analogue |         |        |        |     |
|                                                          | 0                                                                   | 0       | 1       | 0       | 0                     | 0       | 1      | 0      | bin |
| 5                                                        | hardware revision                                                   |         |         |         |                       |         |        |        | hex |
| 6                                                        | firmware revision communication controller                          |         |         |         |                       |         |        |        | hex |
| 7                                                        | firmware revision analogue input controller                         |         |         |         |                       |         |        |        | hex |
| 8                                                        | firmware revision analogue output controller                        |         |         |         |                       |         |        |        | hex |

| <b>Index 1</b><br><b>Acyclic Read service response: Read DIAGNOSIS object</b> |                                                                     |         |         |         |         |         |        |        |     |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------|---------|---------|---------|---------|---------|--------|--------|-----|
| Byte                                                                          | Bits: (0...7) for byte constructions; 0...15 for word constructions |         |         |         |         |         |        |        |     |
|                                                                               | 15<br>7                                                             | 14<br>6 | 13<br>5 | 12<br>4 | 11<br>3 | 10<br>2 | 9<br>1 | 8<br>0 | dec |
| 0                                                                             | Standard Diagnostic Code*<br>0 / FF                                 |         |         |         |         |         |        |        | hex |
| 1                                                                             | Diagnostic Code Channel 1 (Analogue Input 1)**                      |         |         |         |         |         |        |        | bin |
|                                                                               | CHDIS                                                               | res     | res     | PFOER   | PFONR   | PFOVL   | PFCOM  | PFGEN  |     |
| 2                                                                             | Diagnostic Code Channel 2 (Analogue Output 1)**                     |         |         |         |         |         |        |        | bin |
|                                                                               | CHDIS                                                               | res     | res     | PFOER   | PFONR   | PFOVL   | PFCOM  | PFGEN  |     |
| 3                                                                             | Diagnostic Code Channel 3 (not used with AC5230)**                  |         |         |         |         |         |        |        | bin |
|                                                                               | CHDIS                                                               | res     | res     | PFOER   | PFONR   | PFOVL   | PFCOM  | PFGEN  |     |
| 4                                                                             | Diagnostic Code Channel 4 (not used with AC5230)**                  |         |         |         |         |         |        |        | bin |
|                                                                               | CHDIS                                                               | res     | res     | PFOER   | PFONR   | PFOVL   | PFCOM  | PFGEN  |     |

\* Standard diagnostic code values:

0: no error

FF: general error

\*\* The respective bits of the diagnostic code are set to 1 in the following cases:

CHDIS: channel not enabled

res: reserved for future use

PFOER: analogue value outside extended range

PFONR: analogue value outside nominal 4...20 mA-range

PFOVL: general channel overload (e.g. overtemperature, overcurrent)

PFCOM: internal communication loss (e.g. wire break in analogue loop)

PFGEN: general peripheral fault (e.g. overload of sensor supply)