$C \epsilon$

Operating instructions
AS-i SmartLine module

UK

AC3210
AC3216
AC3217

Contents

1 Preliminary note

Technical data, approvals, accessories and further information at
www.ifm.com.

1.1 Explanation of symbols

▶   Instructions

>   Reaction, result

→   Cross-reference

⚠ Important note
Non-compliance may result in malfunction or interference.

ℹ️ Information
Supplementary note.

2 Safety instructions

• The device described is a subcomponent for integration into a system.

  - The manufacturer of the system is responsible for the safety of the system.

  - The system manufacturer undertakes to perform a risk assessment and to
    create a documentation in accordance with legal and normative requirements
    to be provided to the operator and user of the system. This documentation
    must contain all necessary information and safety instructions for the operator,
    the user and, if applicable, for any service personnel authorised by the
    manufacturer of the system.

• Read this document before setting up the product and keep it during the entire
  service life.

• The product must be suitable for the corresponding applications and
  environmental conditions without any restrictions.

• Only use the product for its intended purpose (→ Functions and features).

• If the operating instructions or the technical data are not adhered to, personal
  injury and/or damage to property may occur.

• The manufacturer assumes no liability or warranty for any consequences
  caused by tampering with the product or incorrect use by the operator.

• Installation, electrical connection, set-up, operation and maintenance of the unit
  must be carried out by qualified personnel authorised by the machine operator.

- Protect units and cables against damage.

3 Functions and features

The slave converts analogue input signals and transfers them to the AS-i master via the AS-Interface. The AS-i module operates as a slave with bidirectional data transfer in the AS-i network.

The data transfer from the host to the slave is asynchronous according to the AS-i profile S-7.3 and the AS-i specification V2.11.

- The slave can be operated in conjunction with a version 2.11 master or higher (master profile M3 or M4).
- Current measurement 4...20 mA (AC3210/AC3216)
  or voltage measurement 0...10 V (AC3217)
- R_i current measurement < 50 Ω (AC3210/AC3216)
  R_i voltage measurement > 100 kΩ (AC3217)
- AS-i profile S-7.3.E
- Maximum number of modules per AS-i system: 31
- Conversion time (digital - analogue) in the slave
  - for one channel: 20 ms
  - for two channels: 120 ms
  - for three channels: 180 ms
  - for four channels: 240 ms
- Sensor supply from AS-i (max. 100 mA) or external 24 V PELV voltage source (the external supply voltage is selected automatically as soon as an external 24 V voltage is applied)
- Resolution: 16 bits / 1 µA (AC3210/AC3216) or 16 bits/1 mV (AC3217)
- Value range: 4000...20000 dec. (AC3210/AC3216) or 0...10000 dec. (AC3217)
- The sensors are connected via COMBICON terminals

4 Addressing

▶ Assign a free address between 1 and 31.

The address is set to 0 at the factory.

4.1 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.

! No addressing via the addressing socket while live.

5 Installation

5.1 Installation of the device

▶ Install the device on a 35 mm DIN rail.
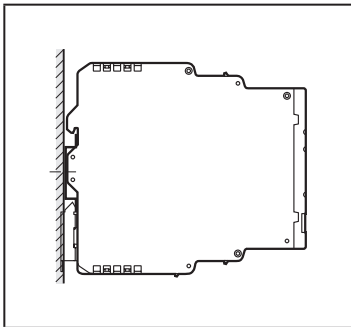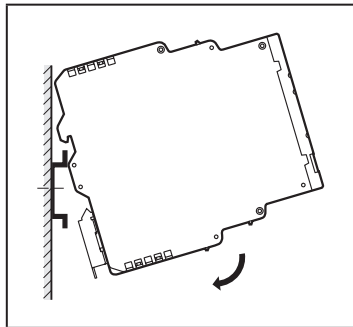
▶ Leave enough space between the unit and the top and bottom of the control cabinet to enable air circulation and to avoid excessive heating.

▶ Take into account the internal heating of all devices when mounting several devices side by side and observe the environmental conditions for every device.

5.2 Removal of the device
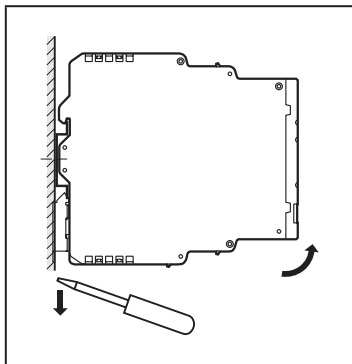
6 Electrical connection

> ⚠️ The unit must be connected by a qualified electrician.
>
> The national and international regulations for the installation of electrical equipment must be adhered to.

▶ Disconnect power.

▶ Connect the unit.

6.1 Wiring

I+	sensor supply +24 V
C1...C4	analogue input current (AC3210/AC3216)
V1...V4	analogue input voltage (AC3217)
I-	sensor supply 0 V
0 V	analogue input 0V
A+	AS-i +
A-	AS-i -
E+	external sensor supply +24 V
E-	external sensor supply 0 V

AC3210
AC3216

I+	C1	I-	0V
I+	C2	I-	0V
I+	C3	I-	0V

AC3217

I+	V1	I-	0V
I+	V2	I-	0V
I+	V3	I-	0V

| 0V | I- | C4 | I+ |
| A+ | A- | E+ | E- |

| 0V | I- | V4 | I+ |
| A+ | A- | E+ | E- |

6.1.1 Connection of a 2-wire sensor

A 2-wire sensor is connected via the terminals I+ and C1...4 (AC3210/AC3216) or V1...2 (AC3217).
The terminals I- and 0V must be connected to each other via a link.

1: Analogue module
2: 2-wire sensor

6.1.2 Connection of a 3-wire sensor

A 3-wire sensor is connected via the terminals I+, I- and C1...4 (AC3210/AC3216) or V1...4 (AC3217).
The terminals I- and 0V must be connected to each other via a link.

1: Analogue module
2: 3-wire sensor
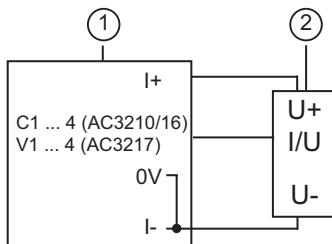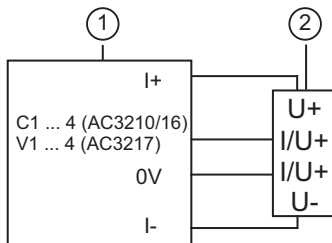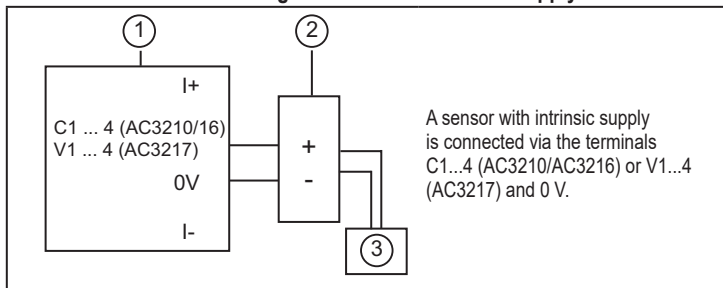
6.1.3 Connection of a 4-wire sensor

A 4-wire sensor is connected via the terminals I+, I-, C1...4 (AC3210/AC3216) or V1...4 (AC3217) and 0 V.

1: Analogue module
2: 4-wire sensor

6.1.4 Connection of an analogue sensor with intrinsic supply

A sensor with intrinsic supply is connected via the terminals C1...4 (AC3210/AC3216) or V1...4 (AC3217) and 0 V.

1: Analogue module
2: Sensor with intrinsic supply
3: Supply PELV ungrounded

7 Parameter setting

Parameter bit / Designation	Description		Comments			
P0 Filter	1* 50 Hz filter active in the A/D converter		The 50 Hz filter applies to the whole of Europe			
	0* 60 Hz filter active in the A/D converter					
P1, P2 Channel activation	parameter bit		analogue channel			
	P1	P2	1	2	3	4
	0	0	on	off	off	off
	0	1	on	on	off	off
	1	0	on	on	on	off
	1	1	on	on	on	on
P3 Peripheral fault	1* peripheral fault active		* default setting			
	0 peripheral fault not active					

8 Measuring range

▶ The measuring ranges, the states of the LEDs and their meaning are indicated in the following tables.

8.1 Analogue module AC3210/AC3216

Range 4...20 mA	Units dec.	Units hex.	LED analogue	Meaning
< 1 mA	32767	7FFF	flashing	wire break
1 mA...3.999 mA	1000...3999	03E8...0F9F	on	below nominal range
4 mA...20 mA	4000 ... 20000	0FA0...4E20	on	nominal range
20.001 mA...23 mA	20001...23000	4E21...59D8	on	above nominal range
> 23 mA	32767	7FFF	flashing	overflow

8.2 Analogue module AC3217

Range 0...10 V	Units dec.	Units hex.	LED analogue	Meaning
< 0 V	0000	0000	on	outside range
0 ...10 V	0000...10000	0000...2710	on	nominal range
10.001...11.5 V	10001...11500	2711...2CEC	on	above nominal range
> 11.5 V	32767	7FFF	flashing	overflow

8.3 Transmission time of the analogue values

The transmission time of the analogue values depends on the conversion time of the analogue signals into digital signals in the AS-i module and on the transmission time via the AS-Interface.

The conversion time per analogue input signal is 60 ms. But if only channel 1 is used, i.e. all other channels are deactivated via the parameter bits P1 and P2, the conversion time for this channel is only 20 ms.

The transmission time of the 4 16-bit values via the AS-interface ideally is 7 AS-i cycles per value. For a cycle time of 5 ms per AS-i cycle this results in a transmission time of 4 x 7 x 5 ms = 140 ms via the AS-Interface.

If the channels 2 to 4 are deactivated, the transmission via the AS-Interface for one channel requires 7 AS-i cycles. For a cycle time of 5 ms per AS-i cycle this results in a transmission time of 1 x 7 x 5 ms = 35 ms via the AS-Interface.

Thus the total transmission time for 4 analogue values ideally is 240 ms (conversion time) + 140 ms (transmission time) = 380 ms. If channels 2 to 4 are deactivated, the transmission time ideally is 20 ms + 35 ms = 55 ms.

9 Operation

▶ Check the safe functioning of the unit.

9.1 LED display AC3210/AC3216

LED AS-i green lights	AS-i voltage supply OK
LED AUX green lights	external voltage supply 24 V OK
LEDs I1...I4 yellow light	analogue signal in the measuring range
LEDs I1...I4 yellow flash	analogue signal outside the measuring range, no sensor connected or wire break
LEDs I2...I4 yellow off	no sensor connected (at least one LED flashes, because not all channels can be deactivated via the parameter bit P1/P2) (channel activation) (channel 1 is always activated)
LED FAULT red lights	AS-i communication error, e. g. slave address 0
LED FAULT red flashes	Peripheral fault A peripheral fault is displayed, if - at least one of the analogue signals is outside the value range - nothing is connected to at least one analogue channel although the respective channel is enabled - if a wire break occurred
LED yellow DIAG - DIAG lights - DIAG flashes - DIAG off	internal diagnostics - no fault - internal fault (replace module) - internal fault (replace module)

11

9.2 LED display AC3217

LED AS-i green lights	AS-i voltage supply OK
LED AUX green lights	External voltage supply 24 V OK
LEDs I1...I4 yellow light	The respective channel is activated Analogue signal in the measuring range or no sensor connected (it cannot be differentiated whether the 0 V signal is applied or whether no sensor is connected) (channel 1 is always enabled)
LEDs I1...I4 yellow flash	Analogue signal outside the measuring range (overflow)
LEDs I2...I4 yellow off	The respective channel is not activated
LED FAULT red lights	AS-i communication error, e. g. slave address 0
LED FAULT red flashes	Peripheral fault A peripheral fault is indicated if at least one of the analogue signals is outside the value range

LED yellow DIAG	Internal diagnostics
- DIAG lights	- no fault
- DIAG flashes	- internal fault (replace module)
- DIAG off	- internal fault (replace module)

10 Maintenance, repair, disposal

10.1 Maintenance

The unit is maintenance-free.

10.2 Cleaning of the housing surface

▶ Disconnect the device.
▶ Clean the device from dirt using a soft, chemically untreated and dry cloth.

> 🛈 Micro-fibre cloths without chemical additives are recommended.

10.3 Repair

▶ The device must only be repaired by the manufacturer.

10.4 Disposal

▶ Dispose of the device in accordance with the national environmental regulations.

11 Scale drawing