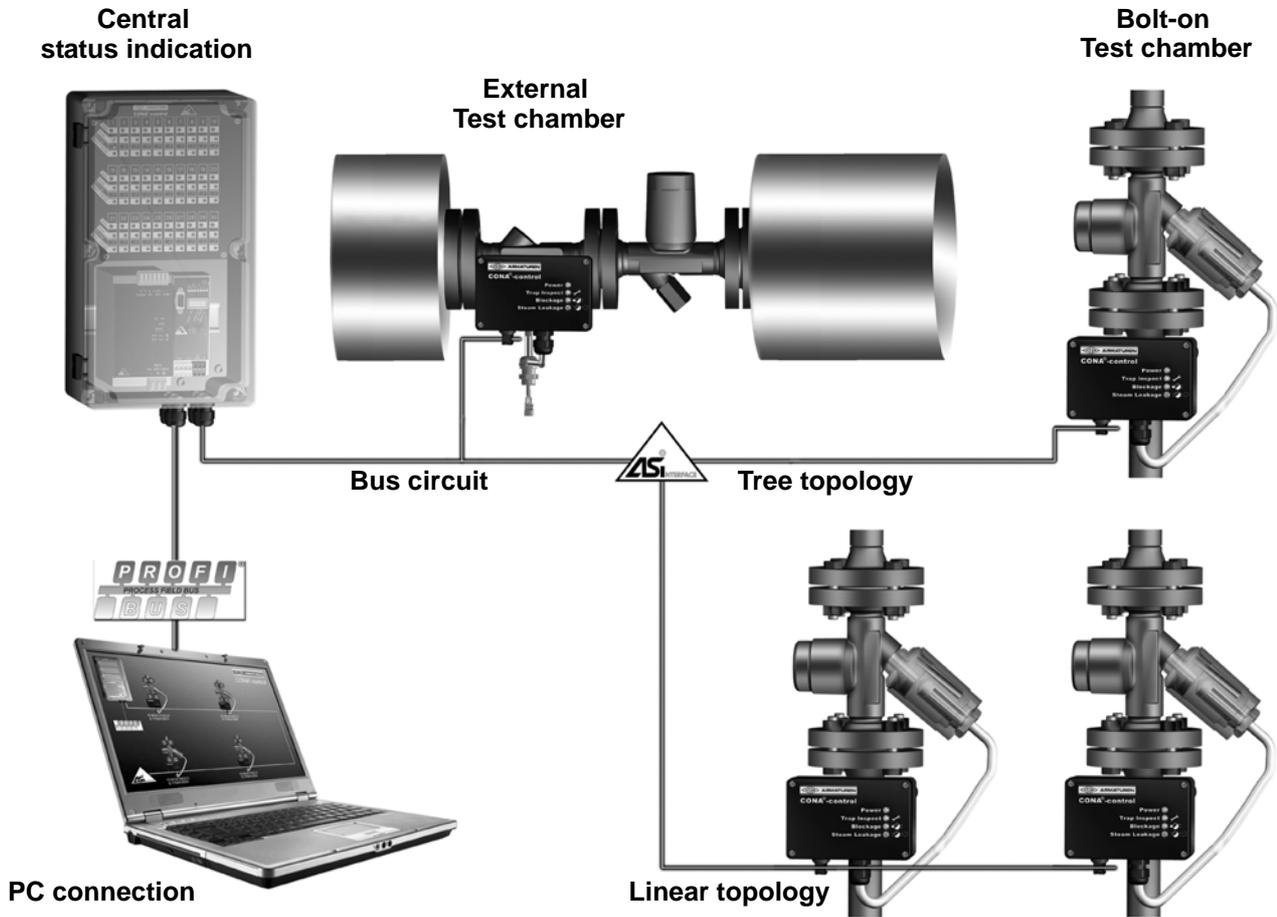


# Operating and Installation Instructions

## Monitoring system for steam traps

### CONA<sup>®</sup>-control



## Contents

<b>1.0 General information on Operating Instructions</b> .....	<b>2-3</b>
<b>2.0 Notes on possible dangers</b> .....	<b>2-3</b>
2.1 Significance of symbols .....	2-3
2.2 Explanatory notes on safety information .....	2-3
<b>3.0 Storage and transport</b> .....	<b>2-4</b>
<b>4.0 Description</b> .....	<b>2-4</b>
4.1 Applications.....	2-4
4.2 Operating principle .....	2-5
4.3 Indications on the CONA <sup>®</sup> -control system.....	2-7
4.4 Measuring amplifier .....	2-8
4.5 Central status indication .....	2-9
4.5.1 AS-i / PROFIBUS gateway .....	2-10
4.6 Power supply.....	2-11
4.7 Technical data .....	2-12
4.7.1 Test chamber .....	2-12
4.7.2 Measuring amplifier .....	2-12
4.7.3 Central status indication .....	2-12
4.7.4 Power supply .....	2-12

<b>5.0 Installation</b> .....	<b>2-13</b>
5.1 General notes on installation .....	2-13
5.2 External test chamber .....	2-14
5.2.1 Installation instructions for welding.....	2-14
5.3 Bolt-on test chamber.....	2-15
5.4 Connecting and laying the AS-Interface circuit .....	2-15
5.5 Measuring amplifier.....	2-17
5.5.1 Notes on installation .....	2-17
5.5.2 Installation procedure .....	2-17
5.5.3 Drilling pattern for wall mounting .....	2-17
5.5.4 Circuit diagram .....	2-18
5.5.5 Connection .....	2-19
5.6 Central status indication.....	2-20
5.6.1 Notes on installation .....	2-20
5.6.2 Installation procedure .....	2-20
5.6.3 Circuit diagram .....	2-21
5.6.4 Connection .....	2-21
<b>6.0 Putting the system into operation</b> .....	<b>2-23</b>
6.1 Measuring amplifiers without a central status indication .....	2-23
6.2 Measuring amplifiers with a central status indication .....	2-24
6.2.1 Setting the PROFIBUS-DP address.....	2-25
6.2.2 Addresses.....	2-25
6.2.3 Process data for higher-level bus systems.....	2-26
6.3 Operating instructions .....	2-31
6.3.1 Restart after a power failure .....	2-31
6.3.2 Shutting down the plant .....	2-32
6.3.3 Recommendation .....	2-32
<b>7.0 Care and maintenance</b> .....	<b>2-32</b>
<b>8.0 Troubleshooting</b> .....	<b>2-33</b>
<b>9.0 Troubleshooting table</b> .....	<b>2-33</b>
9.1 Fault indications on the measuring amplifier .....	2-33
9.2 Fault indications on the AS-i gateway .....	2-34
9.3 Fault indications on the power supply .....	2-35
<b>10.0 Dismantling the valve and the housing</b> .....	<b>2-35</b>
<b>11.0 Warranty / Guarantee</b> .....	<b>2-36</b>

## 1.0 General information on Operating Instructions

These Operating Instructions provide information on mounting, operating and maintaining the valves and electronics. Please contact the supplier or the manufacturer in case of problems which cannot be solved by reference to the Operating Instructions.

They are binding for transport, storage, installation, start-up, operation, maintenance and repair.

The notes and warnings must be observed and adhered to at all times.

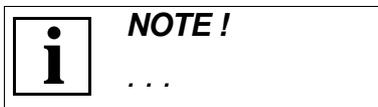
- Handling and all work must be carried out by expert personnel or all activities supervised and checked by a suitably trained person.

The manufacturer reserves the right to introduce technical modifications at any time.

These Operating Instructions comply with the requirements of the relevant EU Directives.

## 2.0 Notes on possible dangers

### 2.1 Significance of symbols



Important or useful information.



Warning regarding a general danger.



Warning regarding dangerous voltage.

### 2.2 Explanatory notes on safety information

Dangers, risks and safety information are highlighted in these Operating and Installation Instructions to attract the reader's attention.

Information marked with the above symbol and "**ATTENTION !**" describes behaviour or procedures which - if ignored - can result in serious or fatal injury to users or third parties or in material damage to the plant or the environment. The behaviour and procedures referred to must be complied with and suitable measures implemented to monitor such compliance.

All other information not specifically emphasised, such as transport, installation, operating and maintenance instructions as well as technical data (in these Operating Instructions, in the product documentation or on the device itself), must likewise be complied with in order to avoid faults which could directly or indirectly cause serious injury to persons or damage to property.

### 3.0 Storage and transport



#### **ATTENTION !**

- Protect against external shocks (impact, vibration, etc.).
- Valves must not be used to absorb external forces, e.g. they are not designed to be used as climbing aids or as attachment points for lifting gear.
- Suitable handling and lifting equipment must always be used.  
Refer to the data sheet for weights.

- Store the device in a dry, dirt-free location (temperature range: -40°C to +85°C).
- Don't remove the electronics, valve or measuring amplifiers from the packaging until they are actually ready to be installed.
- The paint is a base coat to protect against corrosion during transport and storage. Be careful not to damage the paint protection.
- Don't soil or damage the rating plate or the circuit diagram.

### 4.0 Description

#### 4.1 Applications

The CONA<sup>®</sup>-control monitoring system is a test device for steam traps. A test chamber is installed either directly in front of or on the steam trap. Steam leakage or blockage of the steam trap can be detected by means of a sensor.

Detected faults can optionally be grouped together and indicated centrally, for example in the control room. Relay outputs or an AS-Interface are provided for data communication. The AS-i master has an interface for higher-level bus systems, so that fault indications can also be directly evaluated by the plant controls.



#### **ATTENTION !**

- Refer to the data sheet for applications, limits of use and operating options.
- Certain media require or preclude the use of special materials for the test chambers.
- The valves are designed for standard operating conditions. If the actual conditions exceed these requirements, e.g. aggressive or abrasive media, all non-standard requirements should be indicated in the order.

All information provided here conforms to the Pressure Equipment Directive 2014/68/EU. It is the responsibility of the plant planner to ensure compliance. Special markings on the valve must be taken into account.

Refer to the data sheet to see which materials are used in standard versions.

Please contact the supplier or the manufacturer if you have any questions.

### 4.2 Operating principle

The test chambers, which resemble a syphon, are installed either directly in front of or on the steam trap. If the steam trap is leaking steam, the condensate level on the input side is forced downwards by the steam pressure.

If the steam trap is blocked, condensate collects upstream of it. The accumulated condensate and the condensate in the test chamber cool down.

The level and temperature in the test chamber are measured by a calorimetric sensor and evaluated by a measuring amplifier. The measuring amplifier must be mounted a maximum of 2 m away from the sensor / test chamber to prevent disturbances from falsifying the measurement result. In the standard version the cable of the measuring amplifier is 1 m long.

If a fault is detected, it is indicated by means of LEDs on the measuring amplifier and the central status indication (optional):

- "Steam Leakage" is indicated if the sensor is surrounded by steam.
- "Blockage" is indicated if the temperature in the test chamber is below the specified value.



#### **NOTE !**

- *When the plant or part of the plant is started up or shut down, "Blockage" is indicated at least. The condensate or steam in the test chamber cools down so that the temperature falls below the specified value.*
- *Depending on the plant operating conditions or the type of steam trap, it is possible that the test chamber may no longer contain any condensate after the plant has been shut down (due to evaporation, for example, or because the steam trap has opened). In this case, "Steam Leakage" is also indicated.*
- *Status indications are triggered as a result!*
- *If the central status indication is used, all indicated faults should be reset after the plant or part of the plant has been shut down!*

#### **Tip:**

*We recommend connecting the CONA<sup>®</sup>-control system to the plant control, so that the plant control evaluates all fault indications and sets the "Trap Inspect" LEDs. This permits faults that are indicated when parts of the plant are started up or shut down to be reliably suppressed. The PLC software in the AS-i master / gateway must be stopped for this purpose.*

The measuring amplifier can optionally be equipped with an relay card. so the data can be evaluated and processed over the existing relay outputs e.g. in a SPS.

Also optionally, the measuring amplifier can be equipped with an AS-i bus card. A two-wire cable can then be used to exchange data and supply the required power to the amplifier.

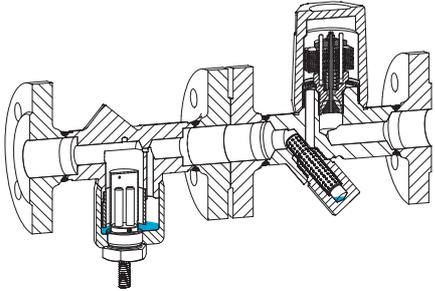
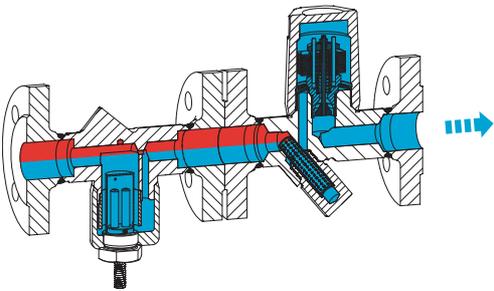
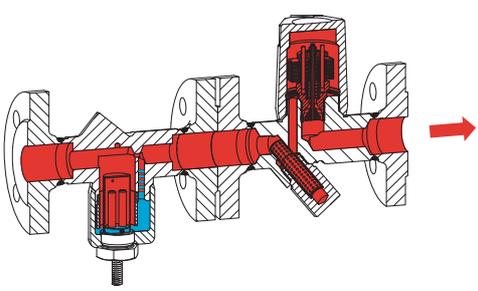
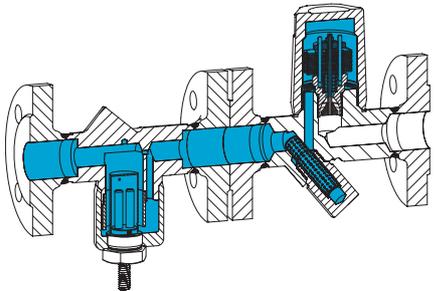
The central status indication integrates an AS-i power supply and an AS-i master / gateway. It allows up to 30 steam traps to be centrally monitored. The AS-i master / gateway has a PROFIBUS interface as standard to enable all status indications to be evaluated by a higher-level control. Faults that are indicated when the plant or part of the plant is started up or shut down can thus be reliably suppressed.

If the status indications are separately evaluated by the "central status indication", the PLC software in the AS-i master is required. The LEDs on the "central status indication" light up continuously to indicate the current status of each device. If a fault is detected, it is stored and a "Trap Inspect" signal is sent to the corresponding measuring amplifier over the AS-i bus. As soon as the steam trap functions correctly again after a fault has been cleared, the LED on the central status indication blinks to show that the fault is no longer present. By pressing the Reset button on the central status indication, you can reset the stored fault.

"Trap Inspect" is indicated on the measuring amplifier by a yellow LED. This permits a defective steam trap to be identified easily, even in the field.

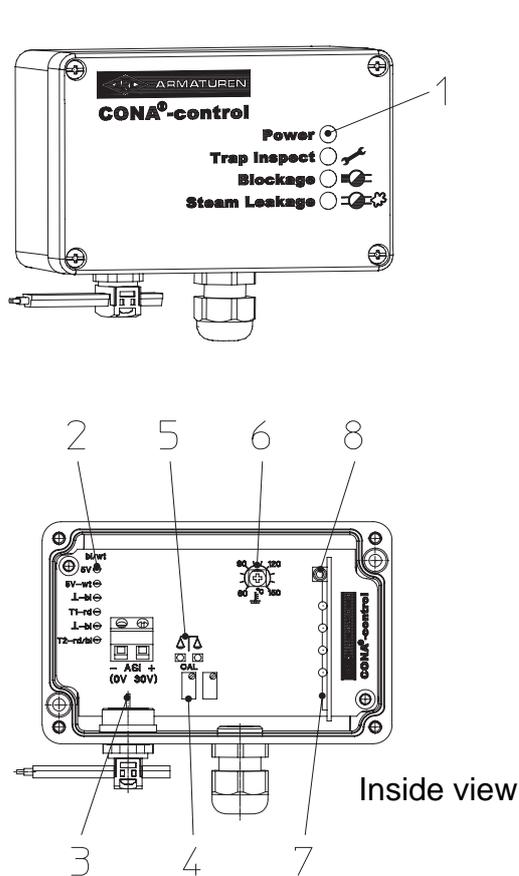
### 4.3 Indications on the CONA<sup>®</sup>-control system

The LEDs on the "central status indication" light up continuously to indicate the existence of a fault. As soon as the steam trap functions correctly again, the LEDs blink to show that the faults are no longer present. By pressing the Reset button, you can reset a stored fault.

Sectional view of test chamber and steam trap	LED on measuring amplifier - indication via bus	Operating status
 <p>Fig. 1</p>	<ul style="list-style-type: none"> <li>○ Trap Inspect *</li> <li>● Blockage</li> <li>● Steam Leakage</li> </ul>	<p><b>Plant / steam trap not in operation</b></p> <p>Sensor surrounded by cold air / steam and temperature is below specified value</p>
 <p>Fig. 2</p>	<ul style="list-style-type: none"> <li>○ Trap Inspect *</li> <li>○ Blockage</li> <li>○ Steam Leakage</li> </ul>	<p><b>Steam trap is working correctly</b></p> <p>Sensor surrounded by hot condensate</p>
 <p>Fig. 3</p>	<ul style="list-style-type: none"> <li>● Trap Inspect *</li> <li>○ Blockage</li> <li>● Steam Leakage</li> </ul>	<p><b>Steam leakage</b></p> <p>Sensor surrounded by steam and temperature is above specified value</p>
 <p>Fig. 4</p>	<ul style="list-style-type: none"> <li>● Trap Inspect *</li> <li>● Blockage</li> <li>○ Steam Leakage</li> </ul>	<p><b>Blocked steam trap</b></p> <p>Sensor surrounded by cold condensate and / or condensate temperature is below specified value</p>

\* If the "central status indication" is used, the fault is stored and the "Trap Inspect" LED blinks.

### 4.4 Measuring amplifier



No.	Designation
1	Status LEDs
2	Contacts for sensor
3	DC or AS-i circuit Input: Input voltage 30 V DC
4	Potentiometer for calibrating temperature sensors
5	LEDs for calibrating temperature sensors
6	Potentiometer for setting blockage detection temperature (default: 95°C)
7	LED - Relay or AS-i bus card
8	Addressing plug (only in conjunction with AS-i bus card)

Fig. 5

#### Detection temperature:

The detection temperature is set to approx. 95°C in the delivery condition. To prevent status indications from being interpreted as faults when the plant is shut down, this temperature limit should be set to a value about 10°C lower than the sub-cooling temperature of the steam trap.

"Steam Leakage" and "Blockage" indications should then appear simultaneously when the plant is shut down but not be interpreted as faults (refer also to "6.3.2 Shutting down the plant").

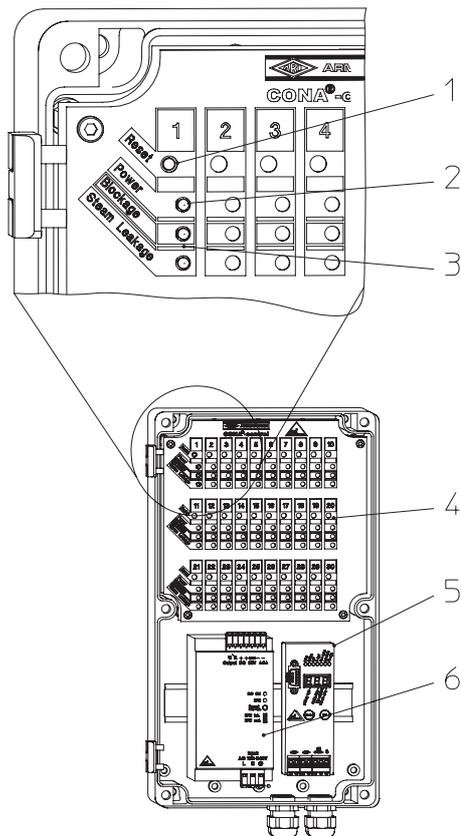
#### To calibrate the sensor:

- Disconnect the heating from the power supply. To do this, withdraw the 5 V plug-in contact (2)
- If possible, submerge the sensor in water so that the temperature sensors reach the same temperature in a very short time. Alternatively, wait four or five minutes before starting the next step
- Using the potentiometer (4), adjust the LEDs so that they all light up with the same brightness
- Re-insert the 5 V plug-in contact for the heating

#### To replace / exchange the LED / AS-i card:

- The measuring amplifier must always be de-energised prior to replacing the LED or AS-i card!
- Withdraw the old card and insert a new card

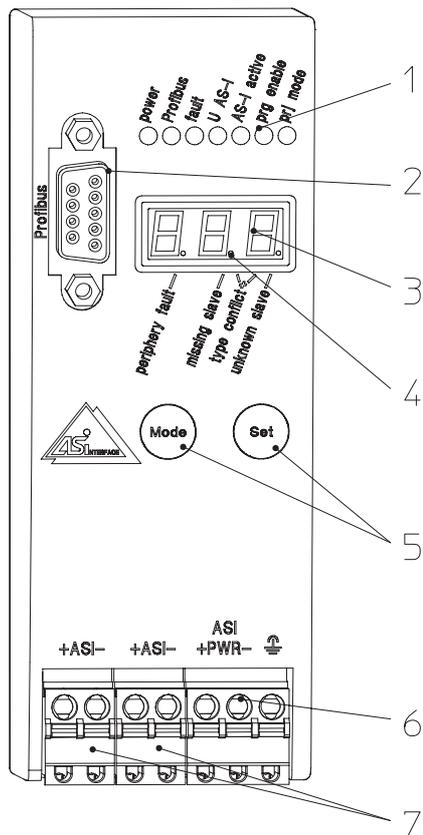
## 4.5 Central status indication



No.	Designation
1	Reset button for resetting stored fault indications < 2 s: Resets the corresponding steam trap > 2 s: Resets all steam traps
2	Power LED per indication card
3	Fault indications for the corresponding steam trap (refer to "4.3 Indications on the CONA®-control system")
4	Indication card Indicates the operating states of up to 30 steam traps
5	AS-i / PROFIBUS gateway
6	Power supply

Fig. 6

### 4.5.1 AS-i / PROFIBUS gateway



No.	Designation
1	Status LEDs
2	PROFIBUS connector
3	Digital display
4	If a "fault" is indicated, the number of the faulty slave and the reason for the fault are shown by a dot
5	Buttons for manual control
6	AS-i power supply
7	AS-i circuit

Fig. 7

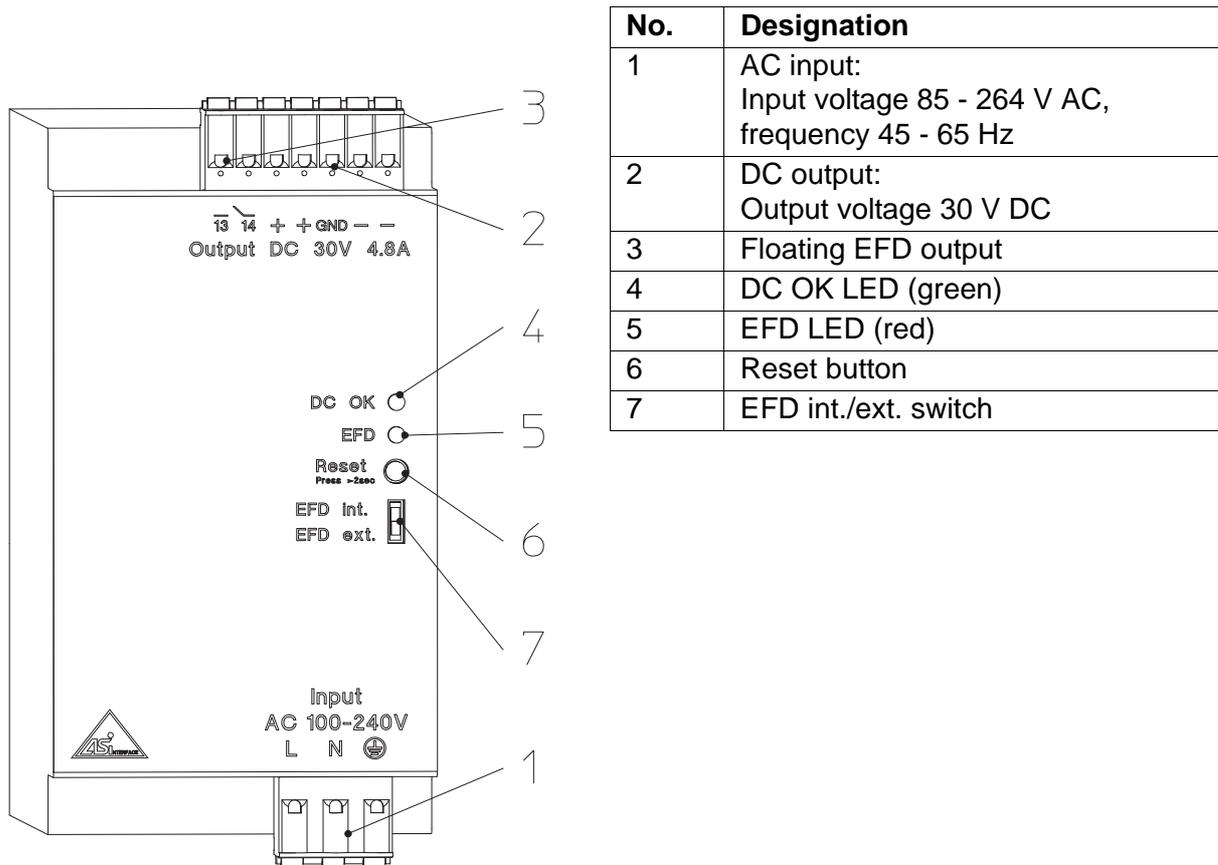


**NOTE !**

- Never connect slaves or repeaters to the power supply cable (ASI PWR).
- Never connect AS-i power supplies or other masters to the AS-i connecting cable.

Status LEDs	Meaning / cause
power	- The master is receiving sufficient power
Profibus	- LED on: The gateway is assigned to a PROFIBUS master
	- LED off: The gateway is not assigned to a PROFIBUS master
fault	- If a "fault" is indicated, the number of the faulty slave and the reason for the fault are shown by a dot
U AS-i	- The AS-i circuit is receiving sufficient power
AS-i active	- Normal operation (the LED blinks to indicate B slaves)
prg enable	- Addresses can be programmed automatically
prj mode	- The AS-i master is in configuring mode

### 4.6 Power supply



No.	Designation
1	AC input: Input voltage 85 - 264 V AC, frequency 45 - 65 Hz
2	DC output: Output voltage 30 V DC
3	Floating EFD output
4	DC OK LED (green)
5	EFD LED (red)
6	Reset button
7	EFD int./ext. switch

Fig. 8

Green "DC OK" LED	Lit	Blinking	Off
<b>Meaning</b>	Output voltage > 27 V	Output voltage < 27 V	No voltage at output
<b>Description</b>	Output voltage and current OK	Power supply in operation but - Fault at load - Current consumption > I <sub>BOOST</sub> - Output short-circuited	Power supply not in operation because - No mains voltage present - Primary fuse has tripped - Device is defective

At ambient temperatures higher than +70°C or if thermal overloading occurs, the device is not switched off. Instead, the output power is reduced sufficiently to protect the device.

#### Earth fault detection (EFD)

If an earth fault is detected in the AS-i system, it is evaluated by means of the EFD LED and a floating switching output.

In the event of an earth fault, the LED lights up, the floating EFD output is opened and if the switch is set to "EFD int." the device is switched off. Press the Reset button for at least two seconds to restart it.

If the switch is set to "EFD ext.", the device continues to operate despite the earth fault.

By pressing the Reset button briefly (< 1 second), you can simulate an earth fault.

## 4.7 Technical data

### 4.7.1 Test chamber



**NOTE !**

*For the technical data of the test chambers, e.g.*

- **Principal dimensions,**
- **Pressure-temperature ratings, limits of use,**
- **Valves with different types of connection, etc.**

*refer to the data sheet.*

### 4.7.2 Measuring amplifier

Ambient temperature:	0 to +70°C
Supply voltage:	30 V DC or via AS-i bus
Housing dimensions (HxWxD):	75 x 125 x 60 mm
Housing material:	Aluminium
Degree of protection:	IP65
Current consumption:	< 100 mA

### 4.7.3 Central status indication

Internal bus system for steam traps:	AS-i bus
Interface for higher-level systems:	PROFIBUS DP Other bus systems on request
Ambient temperature:	0 to +50°C
Supply voltage:	110 - 240 V~; optional: 24 V~
Dimensions (HxWxD):	360 x 200 x 160 mm
Material:	PC / ABS
Degree of protection:	IP65

### 4.7.4 Power supply

Input voltage:	100 V AC - 240 V AC / 45 - 65 Hz
Output voltage:	30 V DC
Ambient temperature:	-25°C to +70°C
Current consumption:	Approx. 2.1 A (120 V AC / 1 A (230 V AC))
Input fuse:	5 A (slow)
Output current:	4.8 A
Degree of protection:	IP20
Weight:	0.9 kg

## 5.0 Installation

### 5.1 General notes on installation



#### **ATTENTION !**

- All work on electrical installations or equipment must be carried out by a qualified electrician, or by another suitably trained person under the guidance and supervision of a qualified electrician, in accordance with the locally applicable electrical rules and regulations.
- The power supply cable must be disconnected from the mains (i.e. de-energised) prior to connecting the central status indication or the power supply. It must remain disconnected for the duration of the connection work. Suitable precautions must be taken to prevent the mains voltage from being re-connected inadvertently.  
Non-observance can result in death, severe personal injury or substantial property damage.

The following points should be taken into account in addition to the general principles governing installation work:



#### **ATTENTION !**

- Remove flange covers if present.
- The interior of the valve and pipeline must be free from foreign particles.
- Note the installation position in relation to the flow (see mark on valve).
- Steam line systems should be designed to prevent water accumulation.
- Lay pipelines so that damaging shear, bending or torsional forces are avoided.
- Protect valves from dirt during construction work.
- Connection flanges must mate exactly.
- Connecting bolts for pipe flanges should be mounted preferably from the counter flange side (hexagon nuts from the valve side).
- Valves must not be used to absorb external forces, e.g. they are not designed to be used as climbing aids or as attachment points for lifting gear.
- Suitable handling and lifting equipment must always be used when installing the valve.  
Refer to the data sheet for weights.
- Centre the gaskets between the flanges.
- Precautions against freezing should be taken as a matter of course in all facilities susceptible to frost.

- The planner / construction company or operator is responsible for positioning and installing the products.
- The valves are designed for application, not influenced from weather.
- For application outside or in adverse environments like corrosion-promoting conditions (sea water, chemical vapours, etc.), special constructions or protective measures are recommended.

## 5.2 External test chamber



**NOTE !**

*Note the installation position of the external test chamber!*

- *In the flow direction directly in front of the steam trap,*
- *Horizontal,*
- *Screw cap / cover pointing downwards!*

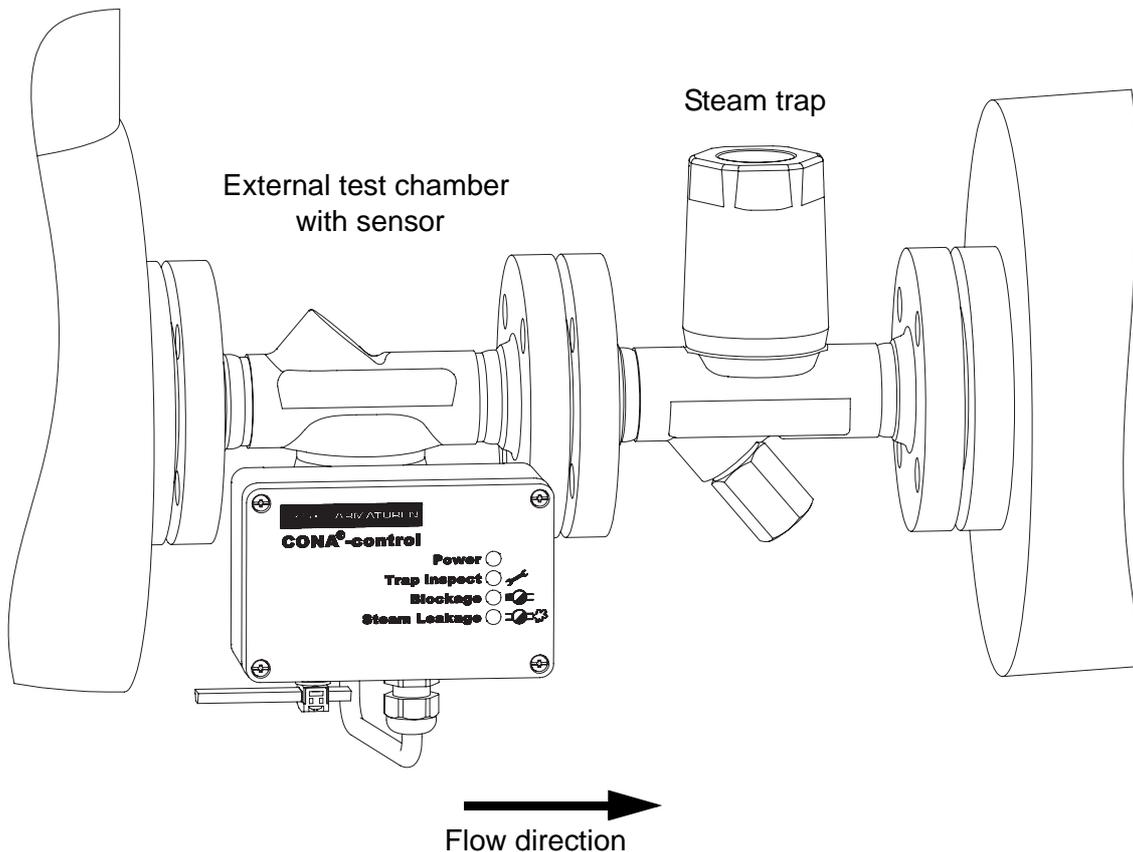


Fig. 9

### 5.2.1 Installation instructions for welding

Please note that only qualified persons using appropriate equipment and working in accordance with the generally accepted rules of sound engineering practice are allowed to install valves by welding.

The plant operator is responsible for ensuring that this is the case.

Refer to the data sheet for information about the form of connection as well as instructions for welding socket and butt weld ends.

All products welded into the piping system should be adequately cooled to prevent any adverse effects on the sensor or damage to sealing rings. The heat-affected zone should be restricted to the immediate weld seam area!

For pre- and post-welding heat treatment, refer to the material specification sheet in DIN EN 10222!

### 5.3 Bolt-on test chamber



**ATTENTION !**

- Make sure the inlet and outlet are shut off prior to all work on the steam trap.  
The device must be de-pressurised and cooled down!

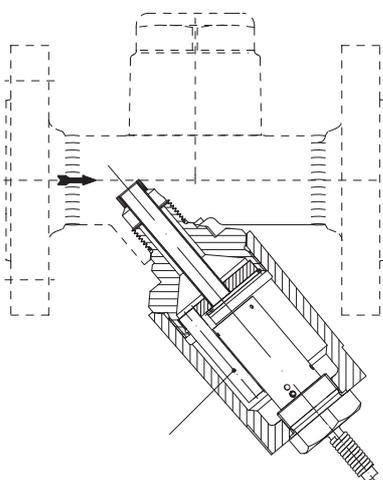


**NOTE !**

Note the installation position!

- Test chamber pointing diagonally downwards.
- For correct function of the bolt-on test chamber, the outlet pipes must **always** be at the lowest point of the body.  
Otherwise steam flow can not be detected.

#### Vertical installation



#### Horizontal installation

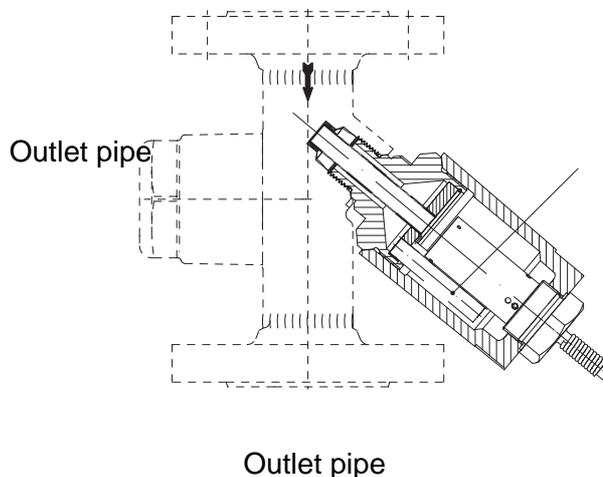


Fig. 10

By unscrewing the sensor, the installation position can be inspected and if necessary corrected. The outlet pipes are just fixed by a circlip and can be turned simply to the right position.

### 5.4 Connecting and laying the AS-Interface circuit

In principle, flat and round cables can be combined. The prevailing external conditions determine whether the cables should be made of rubber (max. 85°C), TPE (max. 105°C), PVC (max. 90°C) or PUR (max. 85°C).



**NOTE !**

- Use a special AS-Interface cable with reverse polarity protection.
- Max. cable length: 100 m.
- If 100 m is too short, several manufacturers such as Bihl&Wiedemann or Pepperl&Fuchs today offer solutions up to 1000 m, for example using repeaters, passive bus terminating resistors or tuners.

Please heed the following points when laying the AS-Interface:

- Always use the yellow, shaped AS-Interface if possible (brown for "+" and blue for "-").

- Even though communication via the AS-Interface cable is insensitive to electromagnetic interference, this cable should nevertheless be laid separately from any power cables. This also applies inside the cabinet!
- Each AS-Interface line must have its own cable. AS-Interface cables must not be laid together with other cables in a bus.
- If, in exceptional cases, single cores are used (e.g. inside the cabinet), always lay parallel core pairs. The individual cores of standard stranded wires should either be laid together or twisted.

## 5.5 Measuring amplifier

### 5.5.1 Notes on installation

	<b>ATTENTION !</b>
	- The mains voltage must coincide with the values indicated on the rating plate.
	- Never touch live parts while carrying out adjustments!
	- Exercise particular caution when working with voltages higher than 24 V! - Never insert or withdraw modular isolating terminals that are still live!

### 5.5.2 Installation procedure

The measuring amplifier can either be mounted directly on a wall or fastened to the pipe or steam trap with a pipe clamp. If it is mounted on the pipe, it should preferably be fastened on the condensate side in order to avoid high temperatures close to the electronics.

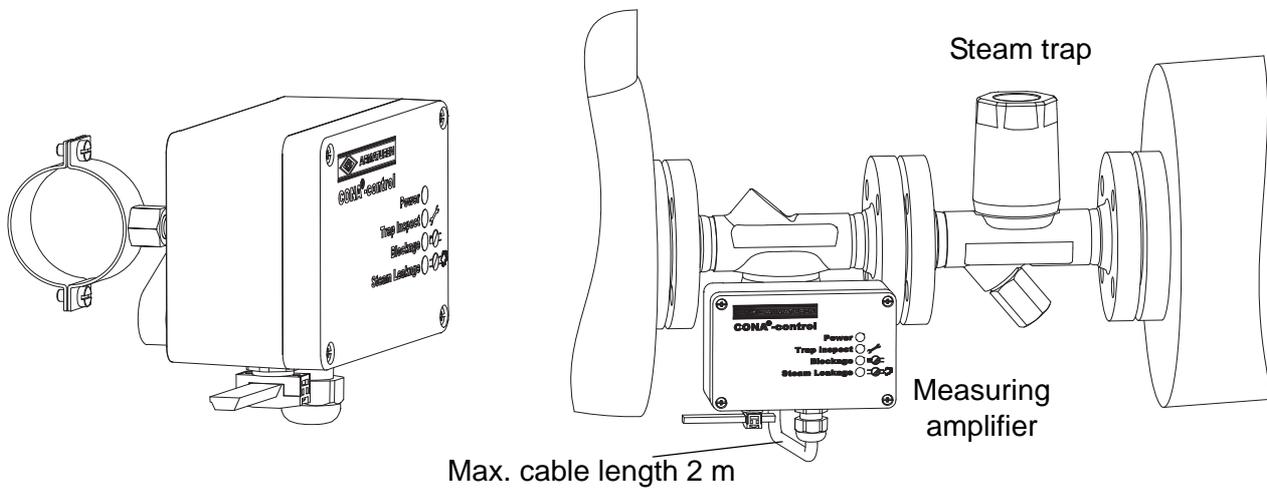


Fig. 11

### 5.5.3 Drilling pattern for wall mounting

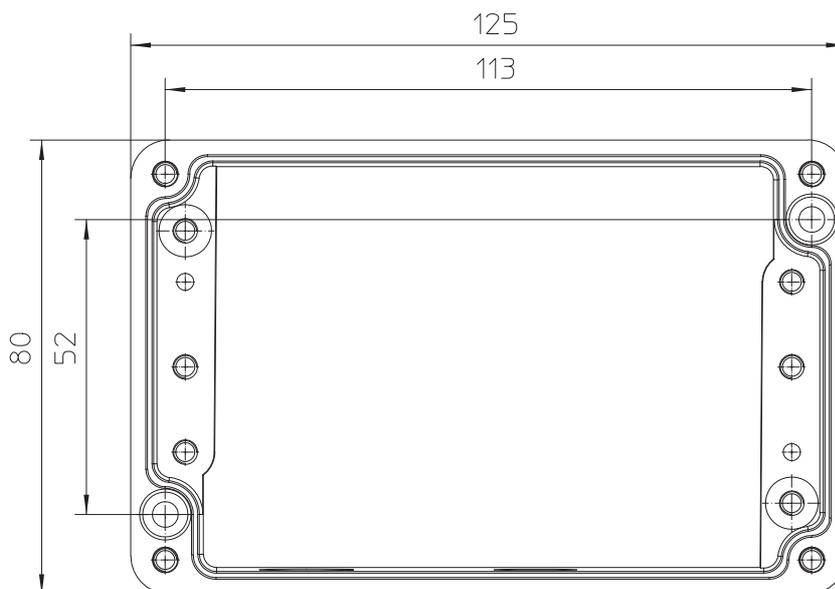
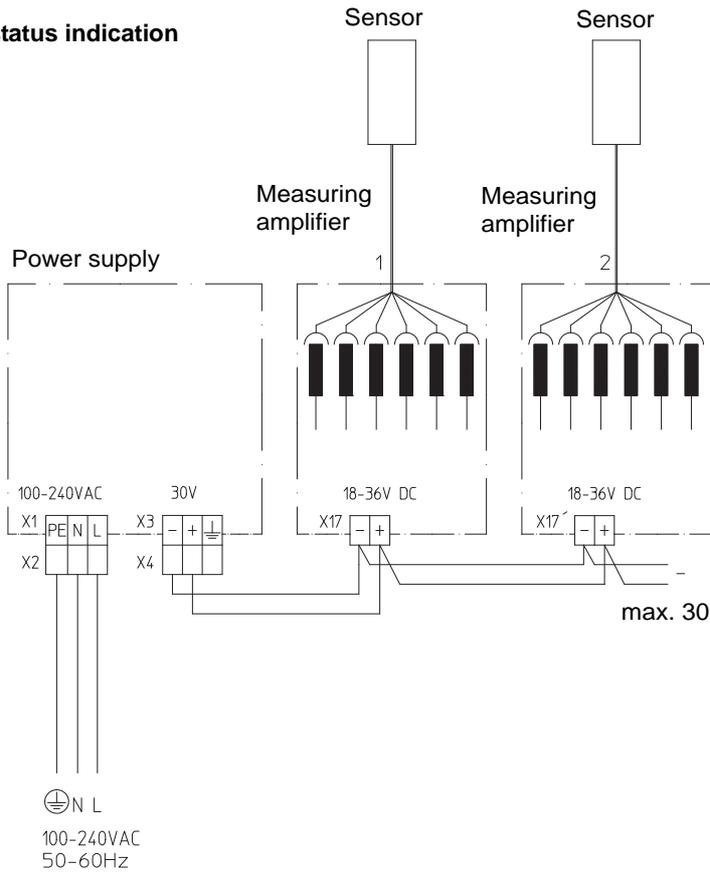


Fig. 12

### 5.5.4 Circuit diagram

Single operation  
 without central status indication



Single operation  
 without central status indication  
 with relay outputs

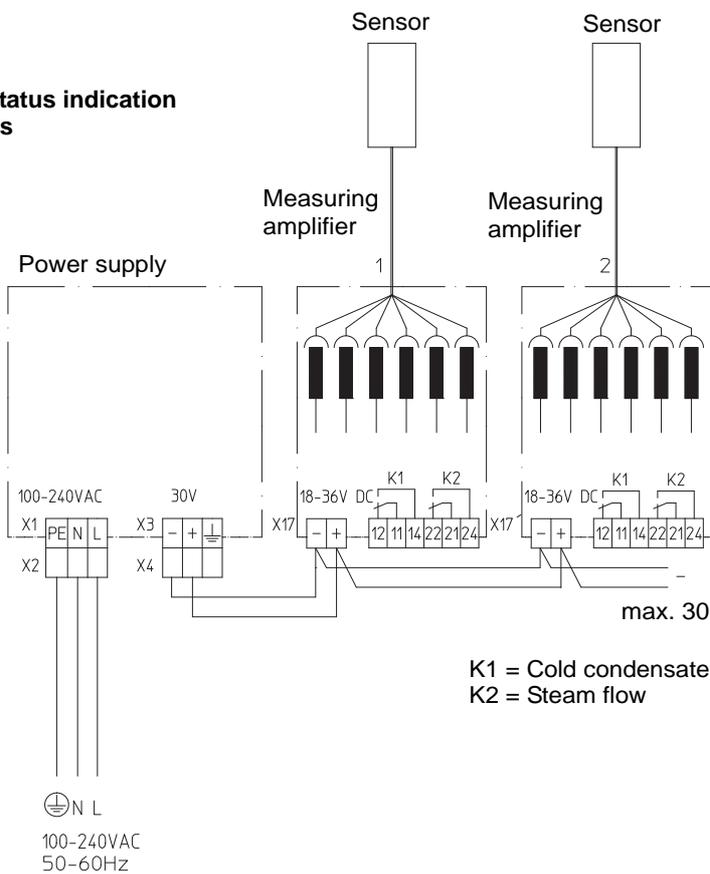


Fig. 13

### 5.5.5 Connection

In the delivery condition the sensor is mounted in the test chamber and connected with cable lugs in the measuring amplifier. The plug-in contacts of the measuring amplifier are marked with the same colours as the sensor wires.

Designation on card	Cable colour		
	Blue / white	Blau / Weiß	
bl/wt	Blue / white	Blau / Weiß	Heating
wt	White	Weiß	
bl	Blue	Blau	Temperature sensor 1
rd	Red	Rot	
bl	Blue	Blau	Temperature sensor 2
rd/bl	Red / blue	Rot / Blau	

#### Standard version / Measuring amplifier iwth relay card:

The cover must be unscrewed in order to connect the power supply. Feed the cable through the gland, then connect the 30 V DC power supply to the "+" and "-" screw-type terminals according to the wire polarity (refer to Fig. 14).

#### Measuring amplifier with bus card:

The measuring amplifier with a bus card has a special gland for the AS-i bus cable. There is consequently no need to open the amplifier cover.

Loosen the bracket of the cable gland with the two screws. Insert the AS-i cable into the gland according to the form and screw the bracket back on again (refer to Fig. 15).

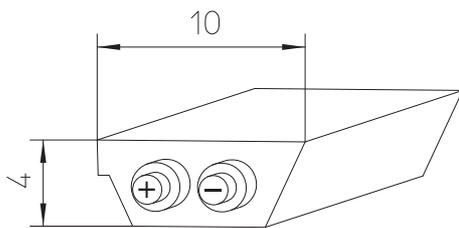


Fig. 14

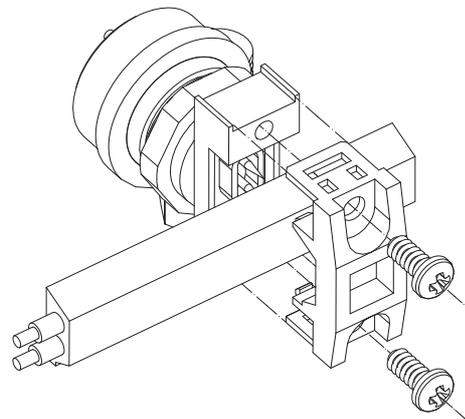


Fig. 15

## 5.6 Central status indication

### 5.6.1 Notes on installation

	<b>ATTENTION !</b>
	- The mains voltage must coincide with the values indicated on the rating plate.
	- Never touch live parts while carrying out adjustments!
	- Exercise particular caution when working with voltages higher than 24 V! - Never insert or withdraw modular isolating terminals that are still live!

### 5.6.2 Installation procedure

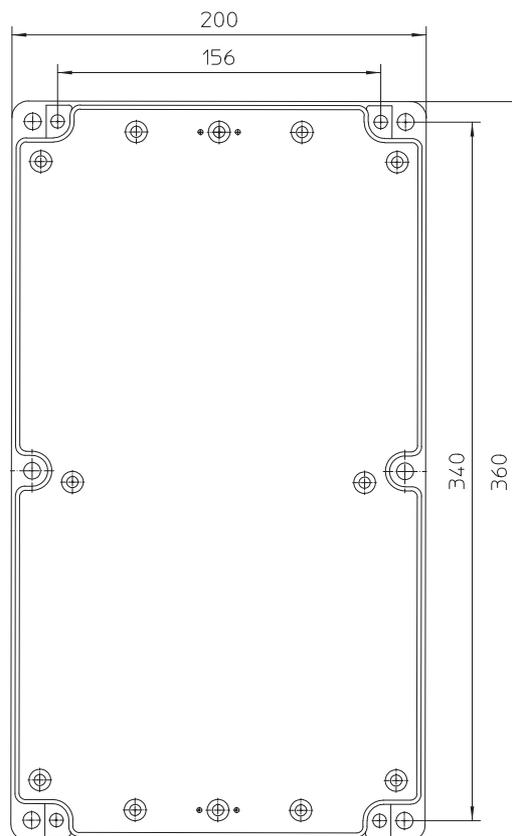


Fig. 16

### 5.6.3 Circuit diagram

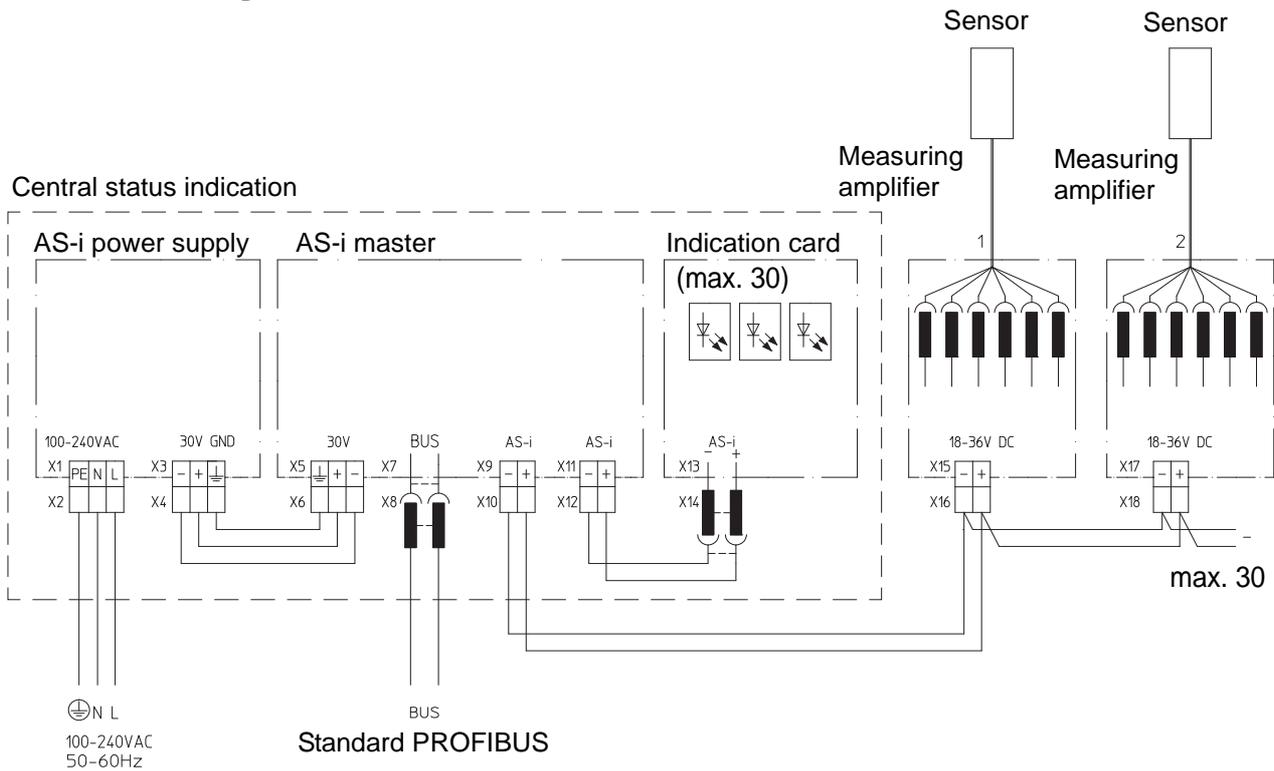


Fig. 17

### 5.6.4 Connection

The power supply and the AS-i gateway are equipped with plug-in spring terminals. The device can thus be connected quickly and easily, and if the terminals need to be disconnected, the disconnected state is clearly visible.

Connectors must only be actuated if they are wattless!

The following cable cross-sections can be connected:

Rigid [mm <sup>2</sup> ]	Flexible [mm <sup>2</sup> ]	AWG	Stripped length L [mm]
0,2 - 2,5	0.2 - 2.5	24 - 12	10

The terminal ends should be stripped in accordance with the table to ensure a reliable connection that is safe from touch!

#### Mains voltage connection on the power supply:

The 100 - 240 V AC mains voltage is connected to L, N and PE (terminal X2). The device can be connected either to a single-phase AC system or to two external conductors of a three-phase system (TN, TT or IT system according to VDE 0100 T300 / IEC 364-3) with a rated voltage of 100 - 240 V AC.

The device is protected by an **internal fuse**. No additional protection is required.

Recommended back-up fuses: 6 A, 10 A or 16 A miniature circuit-breakers, characteristic B (or functionally identical).

Connect a suitable fuse upstream in all DC applications!



**NOTE !**

*If the internal fuse trips, the device is probably defective. In this case, it should be returned to the factory for examination!*

An all-pole disconnect switch must be provided for two-phase operation, i.e. if the device is connected to two external conductors of a three-phase system.

**Slaves:**

Slaves and measuring amplifiers are connected to terminal X10 or X12, depending on their polarity (refer to Fig. 18).

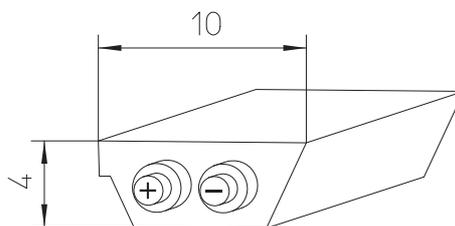


Fig. 18

## 6.0 Putting the system into operation



### **ATTENTION !**

- *The central status indication and the measuring amplifiers are only allowed to be operated without the hood / cover in case of essential adjustment work. Some non-insulated parts of the central status indication are live (dangerous voltage!) while this work is taking place.*
- *Incorrect or careless performance of the adjustment work can result in death, severe personal injury or substantial property damage.*
- *Operation of the central status indication or the measuring amplifier without the hood / cover is prohibited for all purposes other than that described above.*
- *The electronics must be free from moisture.*
- *All local safety instructions must be observed.*

*Before putting a new plant into operation or restarting a plant after repair or modification, always make sure that:*

- *The power supply and ambient temperature coincide with the technical data of the electronics.*
- *All work has been completed correctly.*
- *The hood of the central status indication and the covers of the measuring amplifiers are mounted again following the completion of the adjustment work.*

### **6.1 Measuring amplifiers without a central status indication**

The mains voltage can be switched on after all work has been completed.  
The measuring amplifier or amplifiers are now ready for operation.

## 6.2 Measuring amplifiers with a central status indication

### - Switch on the mains voltage

Thirty measuring amplifiers and thirty indication cards are configured / preset in the factory. If these settings are not correct, the system indicates a "fault" and shows the incorrectly configured slaves (measuring amplifiers and indication cards) on the AS-i / PROFIBUS gateway. The type of slave fault is indicated by a dot.

Proceed as follows to confirm the detected or installed number of measuring amplifiers and indication cards (configuration):

- **Change to configuring mode:** There must not be a bus connection to a higher-level system. Disconnect the bus connector (if connected).

Press the "Mode" button for at least five seconds.

The "prj mode" LED lights up and the connected slaves are shown in the digital display for 0.5 seconds.

- **Store the AS-i configuration:**

To confirm the current configuration:

Press the "Mode" button again for at least five seconds.

The "fault" indications should then disappear and the incorrectly configured slaves should no longer be shown.

The "prj mode" LED lights up when configuring mode is active.

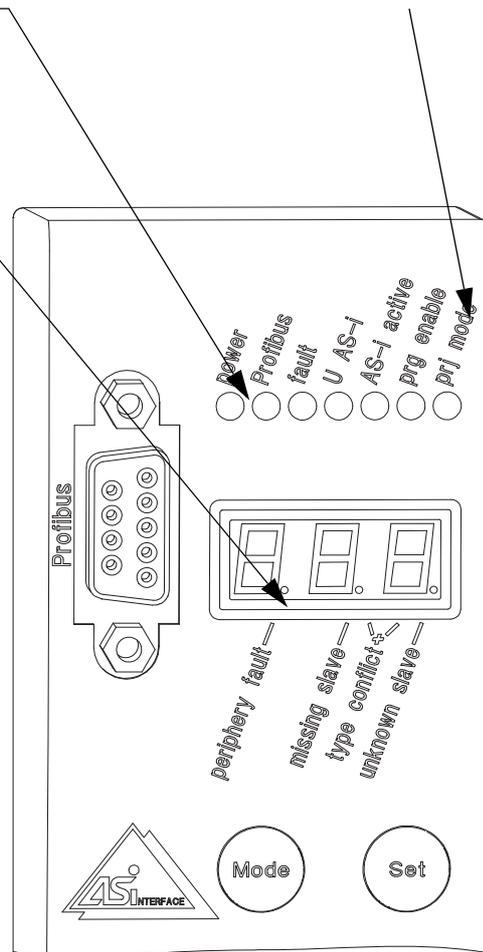


Fig. 19

### 6.2.1 Setting the PROFIBUS-DP address

The AS-i / PROFIBUS gateway is set in the factory to PROFIBUS address 3.

To change the PROFIBUS address, press the "Mode" and "Set" buttons on the AS-i / PROFIBUS gateway for at least five seconds.

The current PROFIBUS address is then displayed, e.g. 003.

By pressing the "Set" button, you can change the PROFIBUS address (up to a maximum of 126) in increments of 1.

By pressing the "Mode" button, you store the set value.

If the display shows 0, you are not allowed to change the address via the PROFIBUS.

By pressing "Set", you can reset the value to 1 to enable the address to be changed via the PROFIBUS.

Confirm the set value by pressing "Mode".

### 6.2.2 Addresses

Each slave (measuring amplifier or indication card) is assigned an address. These addresses are preset in the delivery condition and should not normally be changed.

All slaves (measuring amplifiers and indication cards) must be assigned on the central status indication in a fixed way, as otherwise the internal PLC software will not assign the inputs and outputs correctly.

**Example:** Measuring amplifier 1a is assigned to indication card 1b.

**Address assignment on the central status indication:**

Measuring amplifier	Indication card
1a	1b
2a	2b
3a	3b
...	...
...	...
...	...
30a	30b

You can change a slave address on the AS-i / PROFIBUS gateway. A manual addressing unit or the AS-i Control Tools software package (available as an accessory from specialist dealers) represents a more convenient solution, however.

Before you can change the address of an AS-i slave on the AS-i / PROFIBUS gateway, you must either reset the current slave address to 0 or delete it.

### To delete a slave address:

- Change to configuring mode:  
There must not be a bus connection to a higher-level system. Disconnect the bus connector (if connected).  
Press the "Mode" button for at least five seconds. The "prj mode" LED lights up and the connected slaves are shown in the digital display for 0.5 seconds.
- When the slave address you want to change appears, press "SET". The display stops scrolling. If you release the "SET" button briefly, the next slave is displayed. If you keep the "SET" button pressed for at least five seconds, the selected address is deleted.
- If a slave with the address 00 is displayed as the slave addresses are scrolled, the AS-i master / gateway is still in configuring mode.

### To set the address of slave 0:

- In configuring mode, press the "SET" button briefly. The next free slave address is displayed.
- By pressing the "SET" button briefly, you can select the required free slave address.
- The address blinks if you press the "SET" button for longer than five seconds.
- By pressing the "SET" button briefly, you store the new slave address.

### Store the AS-i configuration:

- To confirm the current configuration:  
Press the "Mode" button again for at least five seconds. The "fault" indications should then disappear and the incorrectly configured slaves should no longer be shown.

## 6.2.3 Process data for higher-level bus systems

If the measuring amplifiers are used with the central status indication, they are preset in the factory to AS-i addresses 1a to 30a. The corresponding indication cards are preset to addresses 1b to 30b.

Indication card 1b is assigned to measuring amplifier 1a, etc.

### Input data according to AS-i V2.1 mode:

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
0	<b>Flags</b>				<b>Slave 1A Measuring Amplifier</b>			
	Configu- ration Active	Periphery Fault	AS-i Power Fail	Config Error	Steam Leakage	Blockage	-	-
1	<b>Slave 2A Measuring Amplifier</b>				<b>Slave 3A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
2	<b>Slave 4A Measuring Amplifier</b>				<b>Slave 5A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
3	<b>Slave 6A Measuring Amplifier</b>				<b>Slave 7A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
4	<b>Slave 8A Measuring Amplifier</b>				<b>Slave 9A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
5	<b>Slave 10A Measuring Amplifier</b>				<b>Slave 11A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
6	<b>Slave 12A Measuring Amplifier</b>				<b>Slave 13A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
7	<b>Slave 14A Measuring Amplifier</b>				<b>Slave 15A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
8	<b>Slave 16A Measuring Amplifier</b>				<b>Slave 17A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
9	<b>Slave 18A Measuring Amplifier</b>				<b>Slave 19A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
10	<b>Slave 20A Measuring Amplifier</b>				<b>Slave 21A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
11	<b>Slave 22A Measuring Amplifier</b>				<b>Slave 23A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
12	<b>Slave 24A Measuring Amplifier</b>				<b>Slave 25A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
13	<b>Slave 26A Measuring Amplifier</b>				<b>Slave 27A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
14	<b>Slave 28A Measuring Amplifier</b>				<b>Slave 29A Measuring Amplifier</b>			
	Steam Leakage	Blockage	-	-	Steam Leakage	Blockage	-	-
15	<b>Slave 30A Measuring Amplifier</b>				<b>Slave 31A not assigned</b>			
	Steam Leakage	Blockage	-	-	Not assigned	Not assigned	Not assigned	Not assigned
16	Reserved				<b>Slave 1B Indication Card</b>			
					-	Reset button	-	-
17	<b>Slave 2B Indication Card</b>				<b>Slave 3B Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
18	<b>Slave 4B Indication Card</b>				<b>Slave 5B Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
19	<b>Slave 6B Indication Card</b>				<b>Slave 7B Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
20	<b>Slave 8B Indication Card</b>				<b>Slave 9B Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
21	<b>Slave 10B Indication Card</b>				<b>Slave 11B Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
22	<b>Slave 12B Indication Card</b>				<b>Slave 13B Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
23	<b>Slave 14B Indication Card</b>				<b>Slave 15B Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
24	<b>Slave 16A Indication Card</b>				<b>Slave 17A Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
25	<b>Slave 18A Indication Card</b>				<b>Slave 19A Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
26	<b>Slave 20A Indication Card</b>				<b>Slave 21A Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
27	<b>Slave 22A Indication Card</b>				<b>Slave 23A Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
28	<b>Slave 24A Indication Card</b>				<b>Slave 25A Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
29	<b>Slave 26A Indication Card</b>				<b>Slave 27A Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
30	<b>Slave 28A Indication Card</b>				<b>Slave 29A Indication Card</b>			
	-	Reset button	-	-	-	Reset button	-	-
31	<b>Slave 30A Indication Card</b>				<b>Slave 31A not assigned</b>			
	-	Reset button	-	-	Not assigned	Not assigned	Not assigned	Not assigned

### Output data according to AS-i V2.1 mode:

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
0	<b>Flags</b>				<b>Slave 1A</b>			
	Protected Mode	Configuration Mode	LOS Master Bit	Offline	-	-	Release LED Trap Inspect by Bus	LED-Trap Inspect
1	<b>Slave 2A</b>				<b>Slave 3A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
2	<b>Slave 4A</b>				<b>Slave 5A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
3	<b>Slave 6A</b>				<b>Slave 7A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
4	<b>Slave 8A</b>				<b>Slave 9A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
5	<b>Slave 10A</b>				<b>Slave 11A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
6	<b>Slave 12A</b>				<b>Slave 13A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
7	<b>Slave 14A</b>				<b>Slave 15A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
8	<b>Slave 16A</b>				<b>Slave 17A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
9	<b>Slave 18A</b>				<b>Slave 19A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
10	<b>Slave 20A</b>				<b>Slave 21A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
11	<b>Slave 22A</b>				<b>Slave 23A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
12	<b>Slave 24A</b>				<b>Slave 25A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
13	<b>Slave 26A</b>				<b>Slave 27A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect
14	<b>Slave 28A</b>				<b>Slave 29A</b>			
	-	-	-	LED-Trap Inspect	-	-	-	LED-Trap Inspect

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
15	<b>Slave 30A</b>				<b>Slave 31A</b>			
	-	-	-	LED-Trap Inspect	Not assigned	Not assigned	Not assigned	Not assigned
16	Reserved				<b>Slave 1B</b>			
	-	-	-	-	-	-	LED-Steam Leakage	LED-Blockage
17	<b>Slave 2B</b>				<b>Slave 3B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
18	<b>Slave 4B</b>				<b>Slave 5B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
19	<b>Slave 6B</b>				<b>Slave 7B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
20	<b>Slave 8B</b>				<b>Slave 9B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
21	<b>Slave 10B</b>				<b>Slave 11B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
22	<b>Slave 12B</b>				<b>Slave 13B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
23	<b>Slave 14B</b>				<b>Slave 15B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
24	<b>Slave 16B</b>				<b>Slave 17B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
25	<b>Slave 18B</b>				<b>Slave 19B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
26	<b>Slave 20B</b>				<b>Slave 21B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage
27	<b>Slave 22B</b>				<b>Slave 23B</b>			
	-	-	LED-Steam Leakage	LED-Blockage	-	-	LED-Steam Leakage	LED-Blockage

Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
28	Slave 24B				Slave 25B			
	-	-	LED- Steam Leakage	LED- Blockage	-	-	LED- Steam Leakage	LED- Blockage
29	Slave 26B				Slave 27B			
	-	-	LED- Steam Leakage	LED- Blockage	-	-	LED- Steam Leakage	LED- Blockage
30	Slave 28B				Slave 29B			
	-	-	LED- Steam Leakage	LED- Blockage	-	-	LED- Steam Leakage	LED- Blockage
31	Slave 30B				Slave 31B			
	-	-	LED- Steam Leakage	LED- Blockage	Not assigned	Not assigned	Not assigned	Not assigned

### 6.3 Operating instructions

Various faults may be indicated when the plant is shut down (see **6.3.2 Shutting down the plant**). These faults must be reset when the plant is started up again.

<b>i</b>	<p><b>NOTE !</b></p> <p><i>All faults that are stored when the plant or part of the plant is shut down must be reset on the central status indication whenever the CONA<sup>®</sup>-control test system or the plant is started up.</i></p> <ul style="list-style-type: none"> <li>- <i>To reset all stored faults, press any RESET button on the central status indication for at least two seconds.</i></li> <li>- <i>To reset a single stored fault, press the appropriate RESET button for less than two seconds.</i></li> </ul>
----------	--

Through film condensation at the sensors, instantaneous steam leakages will be announced lately. First the body temperature must be conditioned to the steam temperature (ca. 10 -15 min.).

The same problem appears at high condensate sub-cooling.

#### 6.3.1 Restart after a power failure

The bus system restarts automatically after a power failure.  
The PLC program also starts automatically.

**All faults that were stored before the power failure are lost!**

### 6.3.2 Shutting down the plant

"Blockage" and "Steam Leakage" faults may be indicated at different times when the plant is shut down. Depending on the type of steam trap or the plant operating conditions, condensate may (re-)accumulate in the test chamber so that only "Blockage" is indicated. These status indications are interpreted as faults and stored by the PLC software!



**NOTE !**

*- Please make a note of all indicated faults prior to shutting down the plant or part of the plant, because shutting down the plant may cause certain faults to be indicated even though they did not occur in normal operation.*

### 6.3.3 Recommendation

We recommend connecting the CONA<sup>®</sup>-control system to the plant control, so that the plant control evaluates all fault indications and sets the "Trap Inspect" LEDs. This permits faults that are indicated when parts of the plant are started up or shut down to be reliably suppressed.

The outlet 1 must be set to Slave 1A in the plant control for this purpose, (from Software version 1.8).

2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
<b>Slave 1A</b>			
-	-	Release LED Trap Inspect by Bus	LED-Trap Inspect

At this outlet the PLC-control of the ASI-/Profibus Gateways detects, that the LEDs „Trap Inspect“ should be set by Bus. The PLC-control saves no errors, respectively old errors are not blinking.

## 7.0 Care and maintenance



**ATTENTION !**

*The power supply cable must be disconnected from the mains (i.e. de-energised) prior to cleaning the electronics. Suitable precautions must be taken to prevent the mains voltage from being re-connected inadvertently.*

*Non-observance can result in death, severe personal injury or substantial property damage.*

The CONA<sup>®</sup>-control monitoring system is practically maintenance-free and regular maintenance at fixed intervals is not necessary.

Remove any dirt from the sensor and the test chamber occasionally, depending on the operating conditions.

Never clean electronic components using liquids or aggressive solvents or agents that are detrimental to health or highly flammable.

We recommend dampening a cloth with cleaning agent rather than applying it directly.

No liquid must be allowed to come into contact with or get inside the electronics.

## 8.0 Troubleshooting

In the event of a malfunction or faulty operating performance, check that all installation and adjustment work has been carried out and completed in accordance with these Operating Instructions.

If you cannot correct the fault with the help of the table in section "9.0 Troubleshooting table", please consult the supplier or manufacturer.

## 9.0 Troubleshooting table



**ATTENTION !**  
*- Read sections 10.0 and 11.0 prior to all dismantling or repair work!*  
*- Read section 6.0 before restarting the plant!*

Fault	Possible cause	Corrective measure
power LED not lit	Mains voltage failure	Check the mains power supply
	Operating voltage is incorrect	Connect the operating voltage indicated on the rating plate
	Electronics have burnt out	Make sure the mains voltage coincides with the value indicated on the rating plate. Replace the electronics
	Terminal not connected correctly or cable does not make proper contact inside terminal	Insert the terminal securely and check the connecting cable

### 9.1 Fault indications on the measuring amplifier

Indication	Meaning	Possible cause	Corrective measure
Blockage	Sensor surrounded by cold condensate and / or condensate temperature is below specified value	Detection temperature is too high	Set a lower detection temperature (refer to 4.4 Measuring amplifier)
		Depending on the steam trap type / plant operating conditions, condensate may collect in the test chamber after the plant has been shut down	No fault The plant / part of the plant is not in operation
		High accumulation of condensate, with the result that the capacity of the steam trap is no longer adequate	Select a steam trap with a higher capacity
		If thermal steam traps are installed, the sub-cooling temperature is too high	Refer to the Operating Instructions for the steam trap
		Blocked strainer or valve inside the steam trap	
		Defective controller inside the steam trap	
Leakage	Steam leakage Sensor surrounded by steam and temperature is above specified value	Dirt has got inside the steam trap control element, with the result that the valve no longer closes	Check the steam trap Refer to the Operating Instructions for the steam trap
		Controller defective	
Blockage + Leakage	Sensor surrounded by cold air / steam	Plant / steam trap not in operation	No fault The plant / part of the plant is not in operation

## 9.2 Fault indications on the AS-i gateway

Indication	Meaning / cause	Corrective measure
power	The master is receiving sufficient power	The AS-i master is functioning correctly
Profibus	LED on: the gateway is assigned to a Profibus master	
	LED off: The gateway is not assigned to a PROFIBUS master	
fault	<p>If a "fault" is indicated, the number of the faulty slave and the reason for the fault are shown by a dot in the digital display</p> <p>Possible causes of the fault:</p> <ul style="list-style-type: none"> <li>- There is an error in the configuration.</li> <li>- At least one configured slave is not detected or at least one detected slave is not configured or the actual configuration data of at least one configured and detected slave does not match the preset configuration.</li> <li>- A periphery fault has occurred in at least one AS-i slave. If both a configuration error and a periphery fault are detected, only the configuration error is indicated.</li> </ul>	<ul style="list-style-type: none"> <li>- Check the slave addresses</li> <li>- Check the configuration and if necessary store the current configuration (refer to 6.2 Measuring amplifiers with a central status indication)</li> <li>- Clear the periphery fault on the slave</li> </ul>
U AS-i	The AS-i circuit is receiving sufficient power	The AS-i circuit is functioning correctly
AS-i active	Normal operation (the LED blinks to indicate B slaves)	Bus communication is active in the AS-i circuit.
prg enable	Addresses can be programmed automatically	If exactly one slave is not detected in the protected operating mode, it can be replaced by an identical slave with the address zero. The master automatically addresses the new slave at the incorrect address. The configuration error is thereby corrected
prj mode	The AS-i master is in configuring mode	Press the "Mode" button for at least 5 seconds. The current configuration is stored and the AS-i master changes to the protected operating mode

### 9.3 Fault indications on the power supply

Green "DC OK" LED	Meaning	Description	Corrective measure
Lit	Output voltage > 27 V	Output voltage and current OK	The power supply is functioning correctly
Blinking	Output voltage < 27 V	Power supply in operation but - Fault at load - Current consumption > IBOOST - Output short-circuited	- Disconnect and exchange the defective load - Reduce the current consumption, either by connecting an additional power supply or by disconnecting any loads that are not required - Remove the short-circuit
Off	No voltage at output	Power supply not in operation because - No mains voltage present - Primary fuse has tripped - Device is defective	

### 10.0 Dismantling the valve and the housing



**ATTENTION !**

*Check the following points carefully:*

- *The piping system must be pressureless.*
- *The medium must be cool.*
- *The plant must be drained.*

## 11.0 Warranty / Guarantee

The extent and period of warranty cover are specified in the "Standard Terms and Conditions of Albert Richter GmbH & Co. KG" valid at the time of delivery or, by way of departure, in the contract of sale itself.

We guarantee freedom of faults in compliance with state-of-the-art technology and the confirmed application.

No warranty claims can be made for any damage caused as the result of incorrect handling or disregard of operating and installation instructions, datasheets and relevant regulations.

This warranty also does not cover any damage which occurs during operation under conditions deviating from those laid down by specifications or other agreements.

Justified complaints will be eliminated by repair carried out by us or by a specialist appointed by us.

No claims will be accepted beyond the scope of this warranty. The right to replacement delivery is excluded.

The warranty shall not cover maintenance work, installation of external parts, design modifications or natural wear.

Any damage incurred during transport should not be reported to us but *rather* to the competent cargo-handling depot, the railway company or carrier company immediately or else claims for replacements from these companies will be invalidated.



**Technology for the Future.**  
**GERMAN QUALITY VALVES**

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