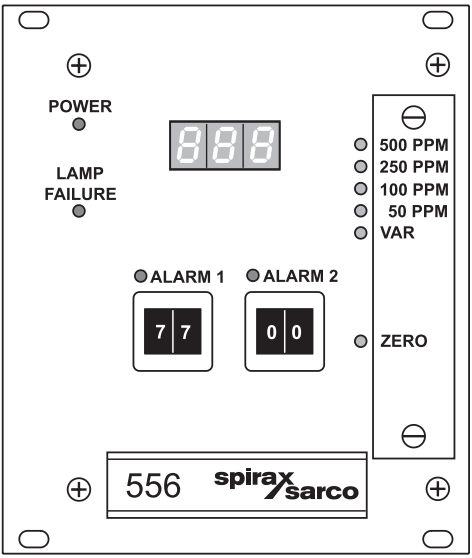
Model 556 Converter

Installation and Maintenance Instructions



Preface

These Installation and Maintenance Instructions have been written to assist the user in proper procedures for trouble-free operation. They explicitly point out that Spirax Sarco assumes no responsibility for loss or damage caused due to improper use of these instructions or products described herein.

On request, these Installation and Maintenance Instructions are available in other languages as well as in digital format (Acrobat® Reader 7.0 required).

Local regulations may restrict the use of this product to below the conditions quoted.

In the interests of development and improvement of the product, we reserve the right to change the specification without notice.

Dated, August 2017

Table of contents

1. Using these Installation and Maintenance Instructions

1.1 Validity of the these Installation and Maintenance Instructions

This instruction manual is valid for the Spirax Sarco Model 556 converter only.

Follow the instruction manual for every operation. If the converter is not used as described in this instruction manual, your safety and the converter function could be affected.

To keep up reliability of the product, enhance its life cycle and avoid down times, you have to follow the instructions given in this manual.

Furthermore, please follow the existing accident prevention and environmental protection instructions, as well as recognized technical instructions for safe and professional working.

1.2 Pictograms and signal words

Especially important information in this instruction manual is marked with the following pictograms:

	**Danger!** This pictogram indicates immediate danger to life and health of persons. The text next to the symbol gives information on how to avoid bodily injuries. If the possible cause of risk can be specified, the corresponding pictogram preceeds instructions:
	**Danger!** Electrical voltage. This pictogram indicates danger due to electrical voltage.
	**Caution!** This pictogram indicates information on how to avoid material damage.
	**Note!** This pictogram indicates instructional or general advice.

2. Returns and disposal

2.1 Declaration of decontamination

For the safety of our employees and because of legal regulations we require a signed 'Declaration of decontamination' before your return can be handled. This signed declaration must be included with the shipping documents on the outside of the packaging.

Any returns which were exposed to hazardous substances and were not professionally decontaminated are not accepted and will be sent back at your cost.

Spirax Sarco's declaration of decontamination and contact information can be found on our website www.Spirax Sarco.com

2.2 Disposal

Special legal regulations apply to the return and disposal of industrial waste equipment. However, manufacturer and user can contractually agree on which party is to fulfill these legal obligations.

Observe current national disposal regulations.
For disposing of packaging material, please separate materials:

- Paper / cardboard
- Plastic

For disposal, disassemble the system components and separate them according to different material groups.

Dispose of materials according to National and Local regulations.

If no agreement has been made, products may be shipped to Spirax Sarco for disposal.

3. Intended use

The converter is exclusively to be used as a converter for Spirax Sarco sensor assemblies according to the technical data.

In combination with inline sensors for turbidity, the converter is used for displaying and processing measuring results.

The converter is only applicable for sensors listed in Section 6 'Technical data'.

The converter is to be installed in a control cabinet, which provides an external release device so that the converter can be switched voltage-free. Reference Section 6 'Technical data'.

The use in explosion proof areas is prohibited.

Unauthorized constructional changes, additional fittings or rebuildings as well as changes to and interference with the converter program are prohibited.

The manufacturer is not liable for damage resulting from use contrary to intended use.

Following these Installation and Maintenance Instructions is part of the intended use.

The content of all serial number plates on Spirax Sarco products is model specific and refers to the time of delivery.

4. Safety

4.1 General safety instructions

Only operate the converter when free from defects and in accordance with the instructions provided in this manual.

Read this instruction manual prior to initial commissioning. This applies especially to persons only operating the converter occasionally, such as maintenance staff.

Observe all safety and information labels on the product and keep them in readable condition.

Inspect the product for signs of physical damage. Report any damage immediately and do not commission the product until corrective actions have been taken.

After maintenance and repair, proper function as well as the fulfillment of the safety requirements and testing must be guaranteed.

Protect the converter from impacts causing corrosion or preventing components from working properly.

Have faulty parts of the measuring system replaced immediately.

Spare parts must comply with the technical requirements defined by Spirax Sarco. This is always guaranteed when using original spare parts.

For maintenance and repair activities, attach a warning sign to the external release device to prevent re-commissioning of the converter.

When malfunctioning, take the product out of operation. Have the malfunctions repaired immediately by a qualified electrician.

The safety instructions are to be supplemented with the current National regulations on accident prevention.

4.2 Safety instructions for works on electrical equipment

Work on electrical equipment has to be carried out by qualified electricians only. The power line connection of the converter must be specified correctly to prevent overload.

Disconnect the voltage supply before connecting the power line. Only connect the power line when voltage-free. Do not use the terminal socket for release since no first-to-mate last-to-break protective ground contact is provided.

Do not work on live active parts of the electrical equipment. When working on the electrical equipment, observe the following safety regulations:

1. Switch voltage-free.

2. Protect against re-commissioning.

3. Check if voltage-free.

4. Cover live parts.

5. Earth and short-circuit.

In case of faults in the power supply, disconnect the converter immediately. In case of a short-circuit, there is a danger of sparking and fire.

Use only original fuses with specified current and triggering characteristics! When a fuse has to be exchanged, first try to detect the cause and clear the fault before exchanging the fuse.

When work on live parts is necessary, use insulated tools only.

5. Description of the converter

The Model 556 converter is a universal device designed for process monitoring and control of a Spirax Sarco sensor assembly.

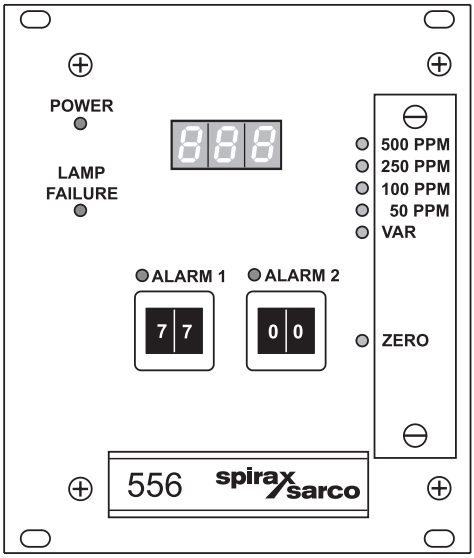


Fig. 1 Model 556 converter

In the converter, both the direct light and the scattered light signal are boosted and a weighted proportional value is obtained. The thus created measurand is proportional to the total volume of particles in the medium. The Model 556 provides four defined and one variable measuring range to be adjusted to your specific process parameters. The LED indicator indicates the percentage of the selected measuring range.

For connection to the process control system, the Model 556 converter is equipped with two independent setpoints and a 4 - 20 mA-output for alarms and real-time process monitoring.

An additional relay output (failsafe) gives alarm in case of lamp or power failure. In a standardized manner, basic system calibration is carried out in ppm DE (mg of diatomaceous earth / l of water). If desired, calibration in FTU (Formazin Turbidity Standard) or EBC (European Brewery Convention) is possible as well.

The converter complies with the highest security standards. The device complies with the requirements of the EMC Directive in accordance with CE.

5.1 Converter front view

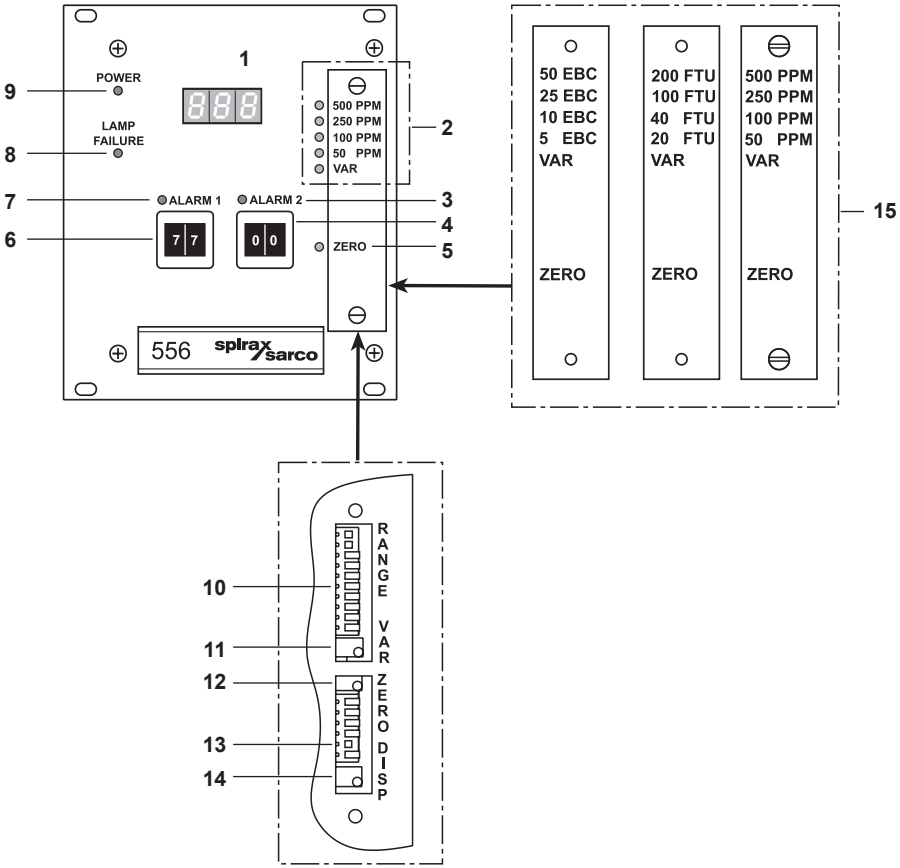


Fig. 2 Model 556 converter - Front view

Numbers stand for:

1. Digital read-out, LED display, 3 digits, height: 7 mm

2. 5 LEDs (yellow), indication of set measuring range

3. LED (red), switch indicator for alarm 2

4. Encoding button for setting alarm 2 in steps of 1% of the respective measuring range

5. LED (green), zero point indication

6. Encoding button for setting alarm 1 in steps of 1% of the respective measuring range

7. LED (red), switch indicator for alarm 1

8. LED (red), lamp failure indication

9. LED (red), power indication

10. DIP switch (RANGE 1 - 10) for measuring range setting

11. Potentiometer (VAR) for setting the variable measuring range

12. Potentiometer (ZERO) for zero point setting

13. DIP switch (DISP 1-2) for setting digital read-out 1

14. Potentiometer for setting digital read-out 1

15. Possible measuring range plates for EBC, FTU and PPM

5.2 Converter rear view

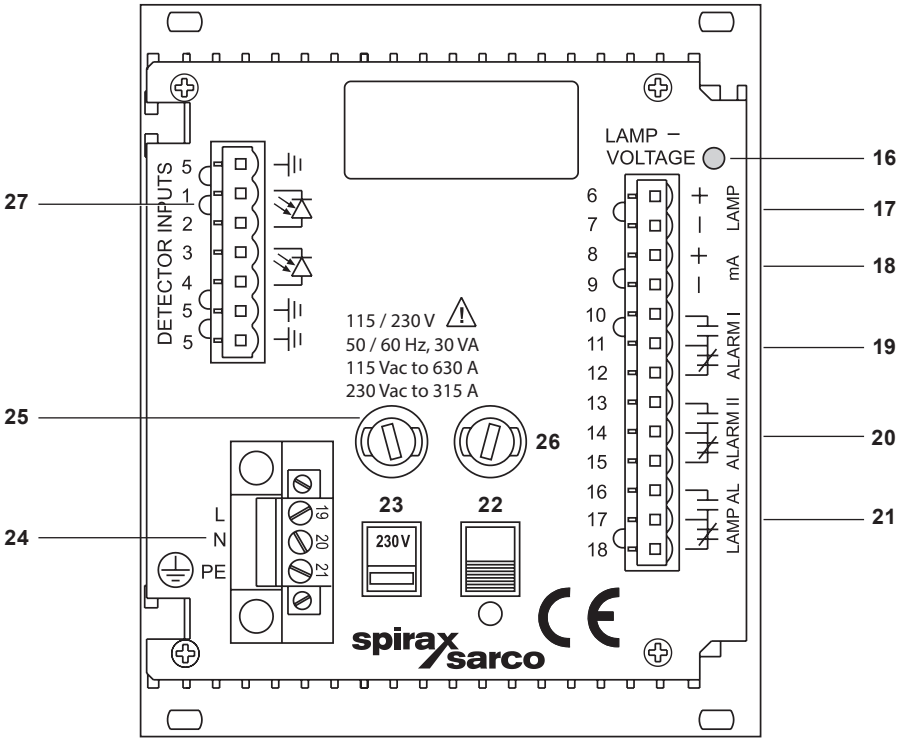


Fig. 3 Model 556 converter - Rear view

Numbers stand for:

16. Potentiometer for lamp voltage

17. Lamp output (only for Spirax Sarco sensors)

18. mA output (4 - 20 mA)

19. Relay output 1

20. Relay output 2

21. Relay output 3

22. Power switch

23. Selector switch for voltage (preset 230 Vac or 115 Vac) - (does not apply for a 24 Vac/dc version)

24. Power supply (fixed)

25. Fuse I
- T 0.315 A for 230 Vac
- T 0.630 A for 115 Vac
- T 1.250 A for 24 Vac/dc

26. Fuse II
- T 0.315 A for 230 Vac
- T 0.630 A for 115 Vac
- T 1.250 A for 24 Vac/dc

27. Detector input (only for Spirax Sarco sensors)

6. Technical data

Table 1 Technical data for the Model 556 converter*

Housing	19" version for mounting in control cabinets 3 U / 21 HP: - Dimensions: **W** 106.3 mm (4.19") **H** 128.4 mm (5.06") **D** 208 mm (8.19") - Material: Aluminium / diverse plastics - Protection: Front IP40 / rear IP20 - (mains supply secured against accidental touching)
Display	1 digital display, 3 digits, LED, height 7mm
Operation	Dip switches, potentiometer, coding switch
LED	1 LED (red): Power on 1 LED (green): Zero 5 LED (yellow): Measuring ranges 2 LED (red): Alarm I and II 1 LED (red): Lamp or system failure
Sensor inputs	1 for Spirax Sarco photometric sensor TF56
Sensor lamp-outputs	1 lamp supply for Spirax Sarco photometric sensor TF56 4.8 ... 7.0 Vdc
mA outputs	1 x 4 - 20 mA (NAMUR) functionally galvanically isolated (min. 500 Vdc) for connection to PELV - Accuracy: < 1 % - Load: < 500 Ohm
Relay outputs	2 independently adjustable SPDT contacts 0 - 250 Vac, 0 - 300 Vdc, 0 - 8 A (refer to load limit curve relay outputs in the manual) - For alarm 1 and 2
Failsafe output	1 SPDT contact to alarm in case of lamp or system failure (active) 0 - 250 Vac, 0 - 300 Vdc, 0 - 8 A (refer to load limit curve relay outputs in the manual)
Cable lengths (sensor)	2, 3, 5, 10, 15, 20, 30 … 100 m (7, 10, 16, 33, 49, 66, 98 …328 ft)
Power supply (Fixed, secured against accidental touching)	115 / 230 Vac, selectable (93.5 - 132 / 187 - 264 Vac, 47 - 64 Hz) or 24 Vac / dc (ac: 20.4 - 26.4 Vac, 47 - 64 Hz; dc: 20.4 - 28.8 Vdc) (SELV / PELV) consider an external release device - Power consumption: < 30 VA
Ambient conditions	Temperature during operation (no direct sunlight): - Converter: 0 to 50 °C (32 to 122 °F) - With optional stainless steel housing S19-42 (IP65): 0 to 40 °C (32 to 104 °F) - With optional plastic housing B19-42 (IP66): 0 to 35 °C (32 to 95 °F) - With optional plastic housing B19-21 (IP66): 0 to 35 °C (32 to 95 °F) - Temperature during transport - (no direct sunlight): -20 to 70 °C (-4 to 158 °F) EN 61010-1 / 2002-08 / class 1
Weights (depends on configuration)	Model 556 with mounting angle: 1.4 - 2.0 kg Model 556 with S19-42 housing: 8.5 - 7.9 kg Model 556 with B19-42 housing: 3.5 - 4.1 kg Model 556 with B19-21 housing: 1.4 - 2.0 kg

* Data given is subject to changes without prior notice.

6.1 Possible sensors

One or more of the following Spirax Sarco sensors can be connected to the converter:

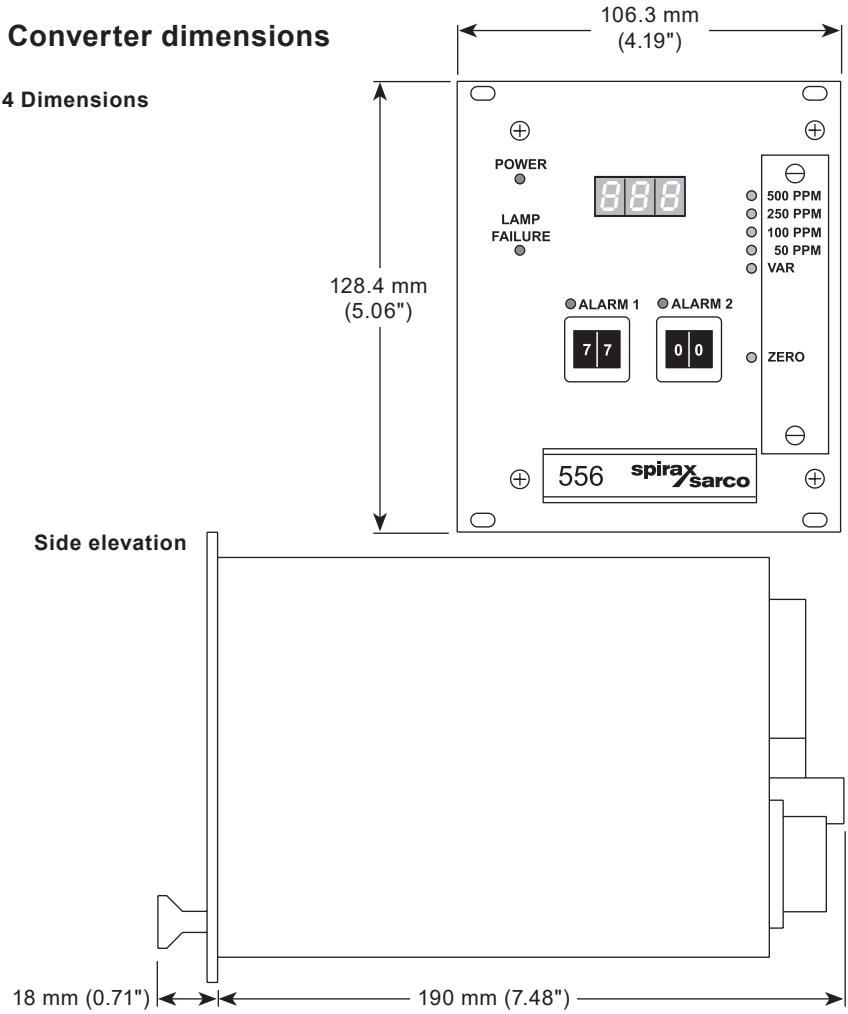
- TF56-N
- TF56-HT-N

Connecting flameproof sensors to the converter is prohibited.

The product specific characteristics of the sensor options is described in the relevant sensor manuals.

6.2 Converter dimensions

Fig. 4 Dimensions



6.2.1
Dimensions for wall mount housing B19-21 - Plastic (ABS) - IP66 (option)

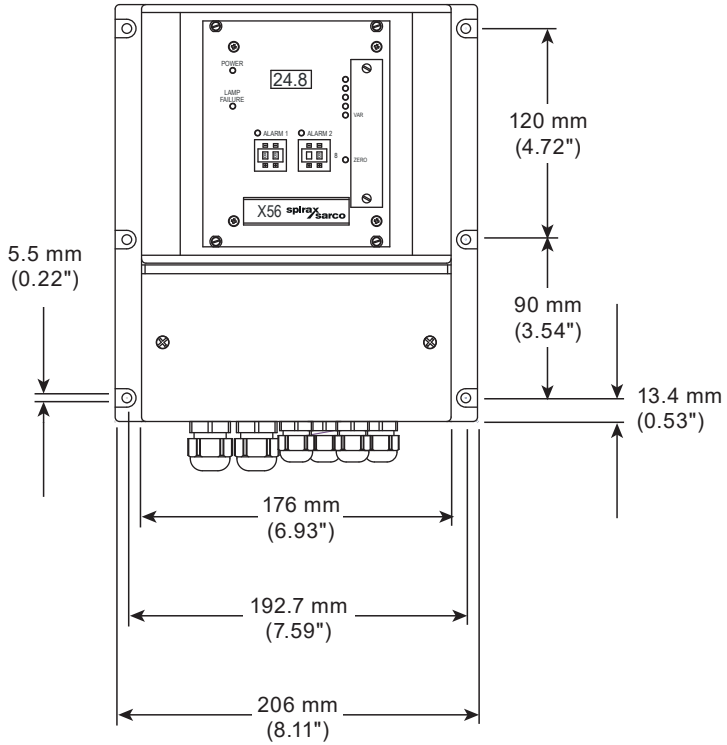
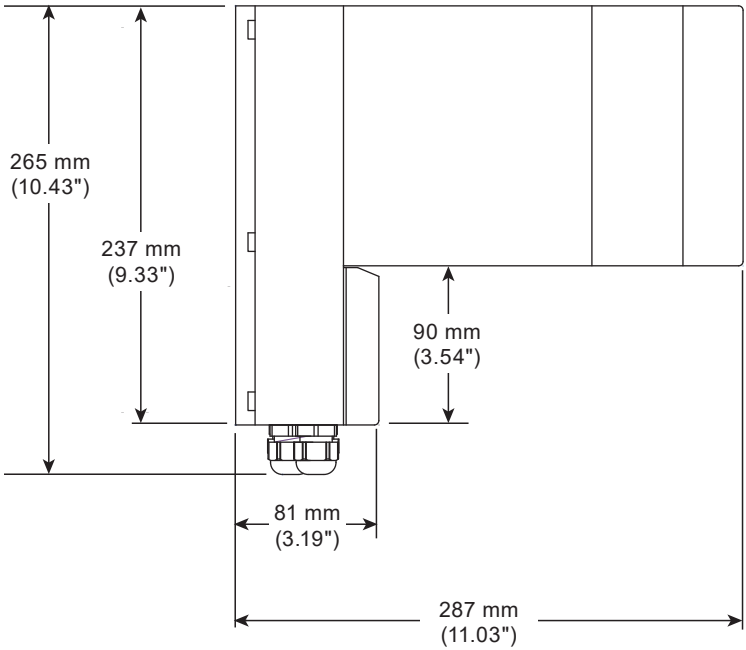
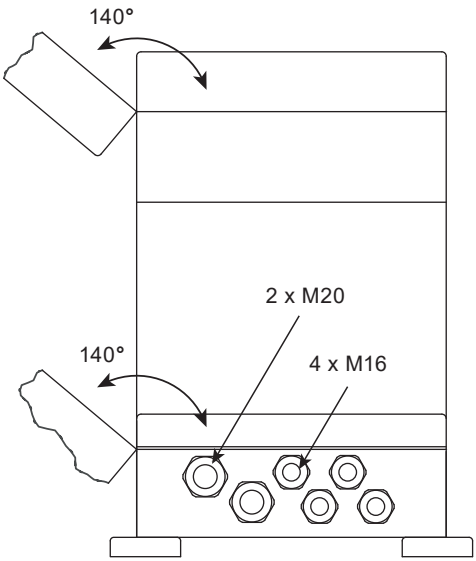


Fig. 5 Dimensions with wall mount housing B19-21


265 mm
(10.43")
237 mm
(9.33")
90 mm
(3.54")
81 mm
(3.19")
287 mm
(11.03")


140°
2 x M20
140°
4 x M16

6.2.2
Dimensions for wall mount housing B19-42 - Plastic (ABS) - IP66 (option)

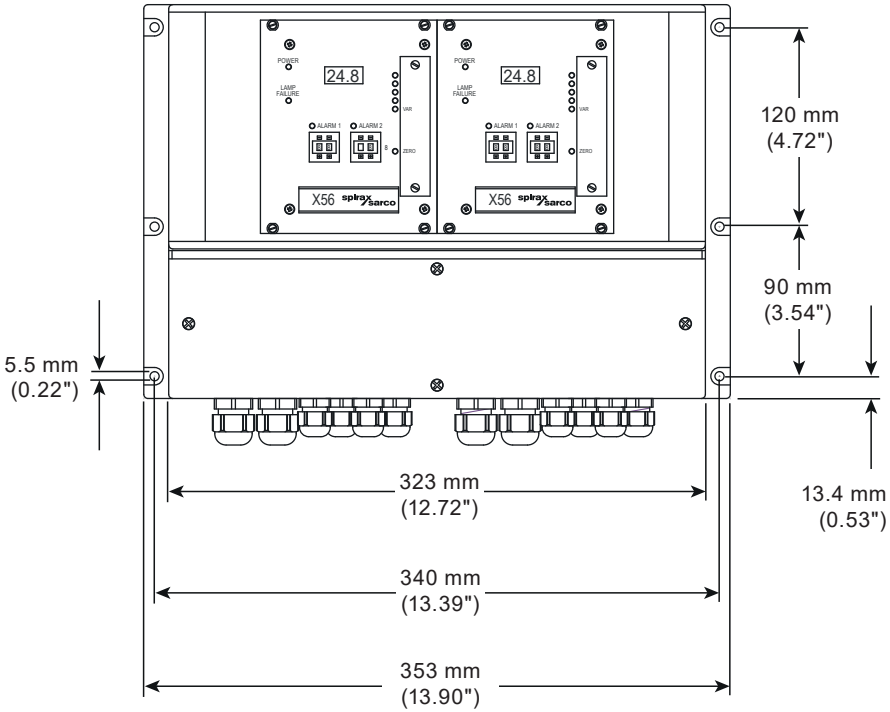
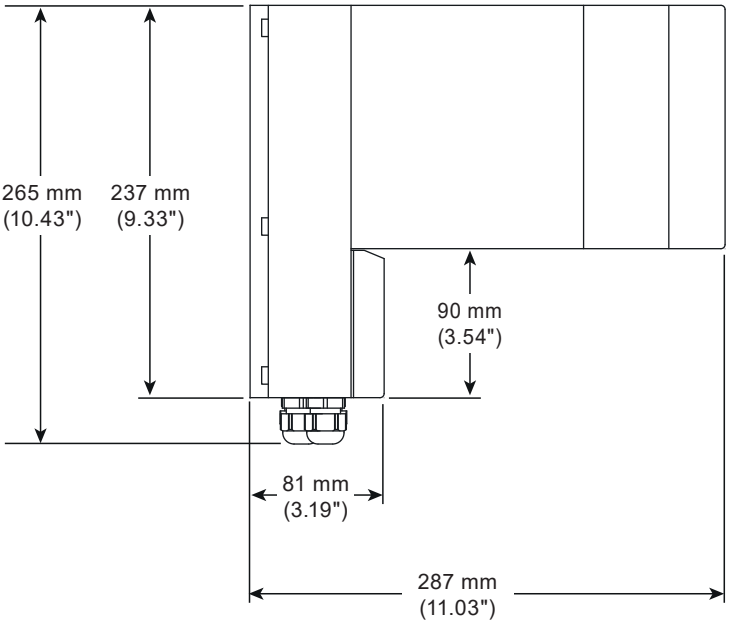
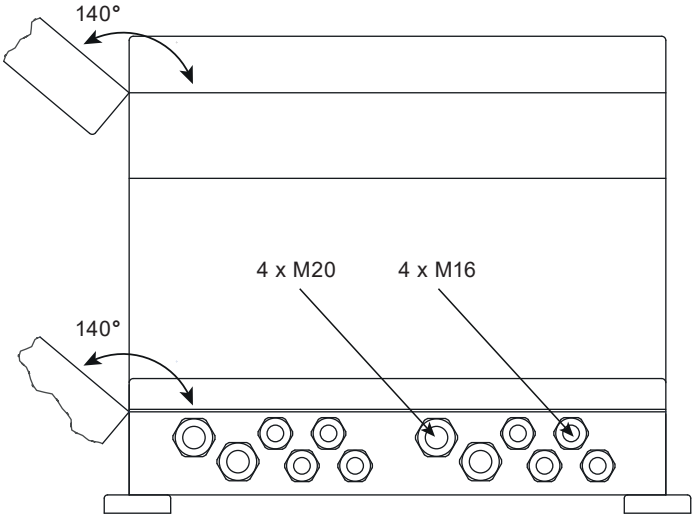


Fig. 6
Dimensions with wall mount housing B19-42


265 mm
(10.43")
237 mm
(9.33")
90 mm
(3.54")
81 mm
(3.19")
287 mm
(11.03")


140°
4 x M20
4 x M16
140°

6.2.3
Dimensions for wall mount housing S19-42 - Stainless steel 1.4301 / SS304 - IP65 (option)

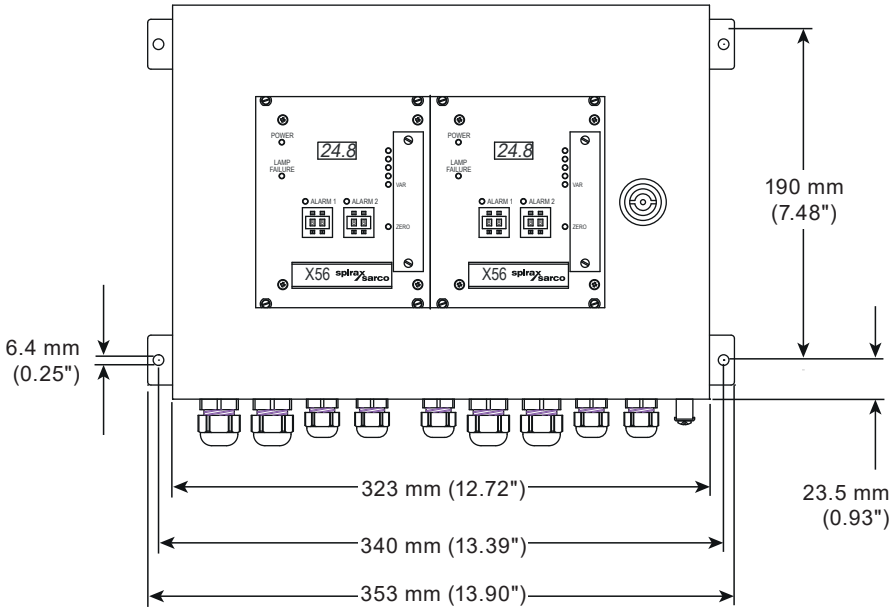
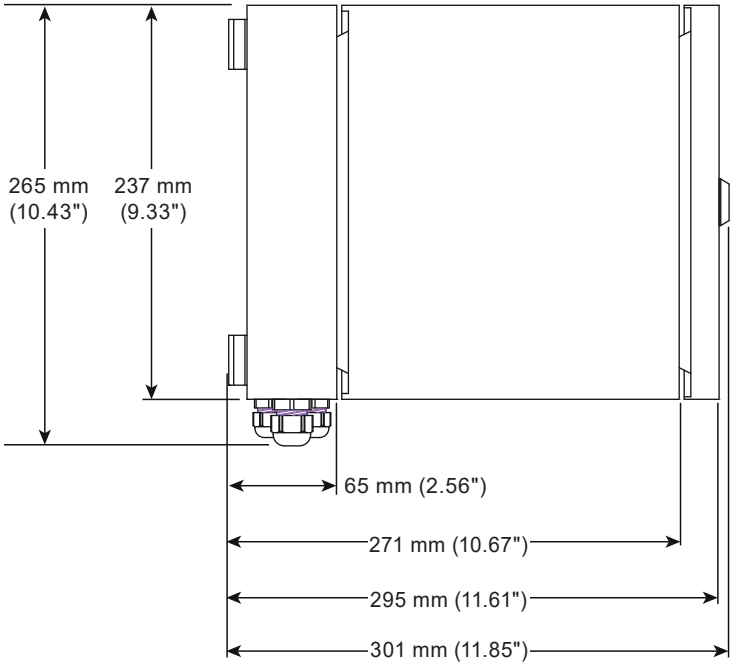
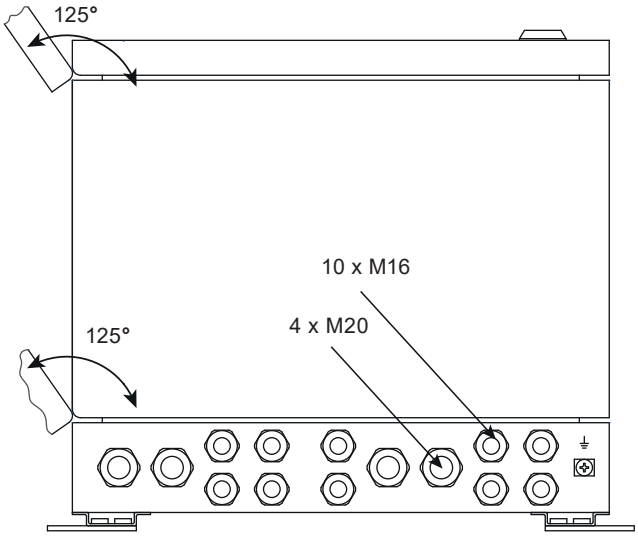


Fig. 7
Dimensions with wall mount housing S19-42 - stainless steel 1.4301 / SS304 - IP65


265 mm
(10.43")
237 mm
(9.33")
65 mm (2.56")
271 mm (10.67")
295 mm (11.61")
301 mm (11.85")


125°
10 x M16
4 x M20
125°

6.2.4 Dimensions for mounting with a mounting angle

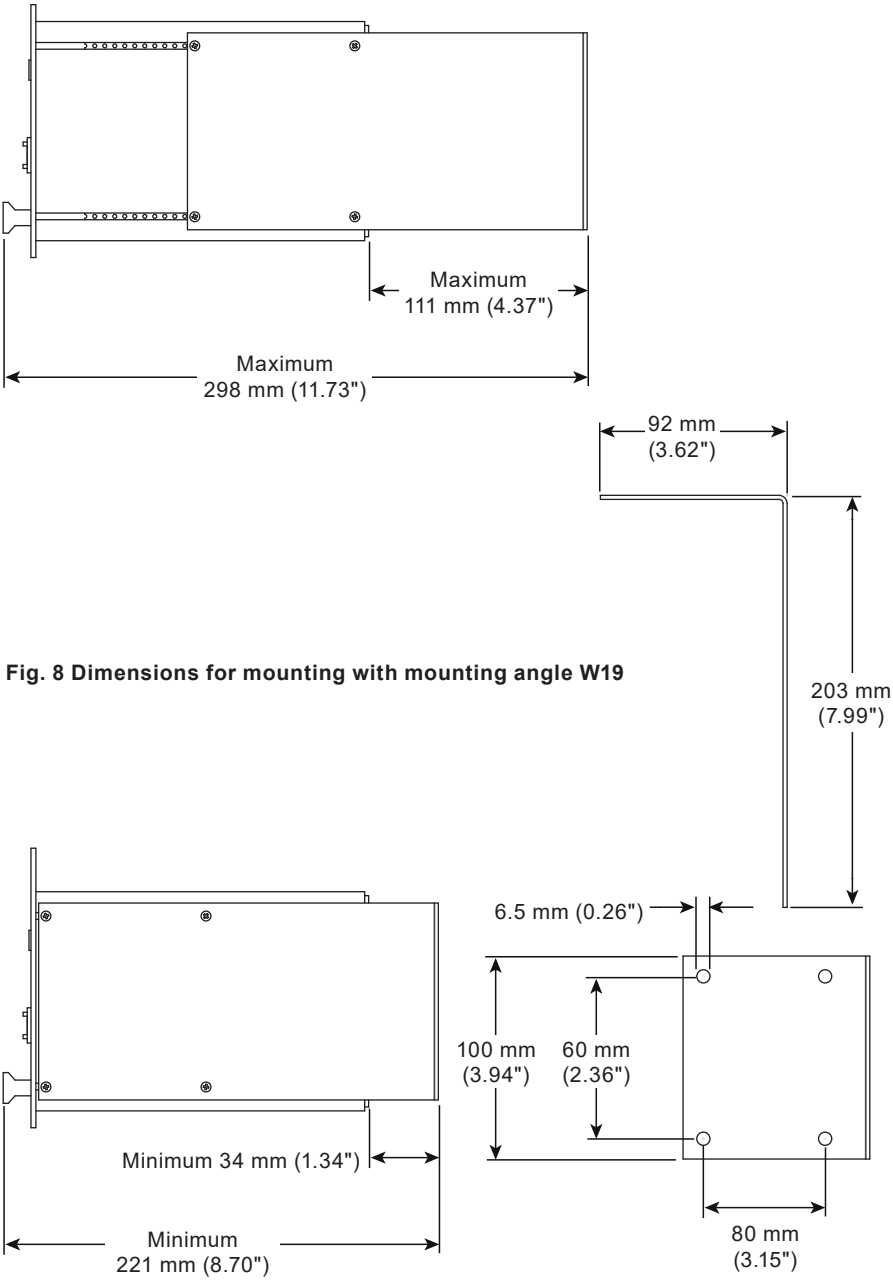


Fig. 8 Dimensions for mounting with mounting angle W19

7. Installation of the converter

Check that all items have been supplied as described on your order placement. Check if there is any detectable damage to the delivery. If you detect any damage or fault, contact our customer service. See preliminary note for our contact data.

7.1 Installation site requirements for standard installation:

- A control cabinet with a cut-out of 106 x 116 mm (4.17" x 4.57") for the converter as well as 4 drill holes M2.5 for fixing are provided. Dimensioning details of the converter are given in Section 6 'Technical data'.
- An external release device on the control cabinet is located close to the converter. With this device the converter can be switched voltage-free.

Tool - Screwdriver ⊗

7.2 Standard installation:

1. Insert the converter into the cut-out in the control cabinet.

2. Fasten the four screws M2.5 x 11 (item **31**, Figure 9) of the converter.

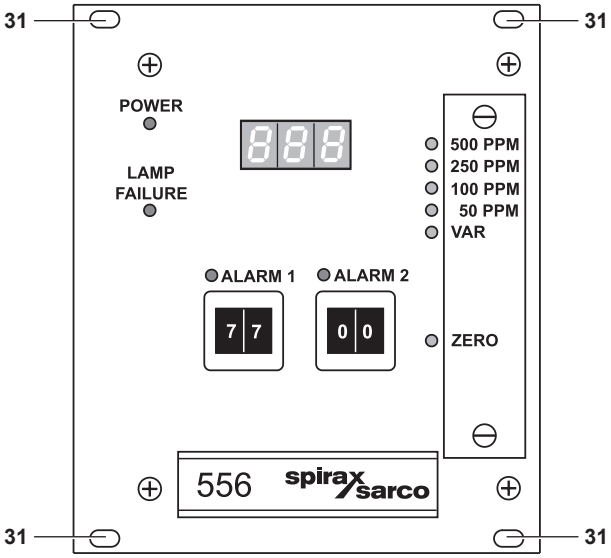


Fig. 9 Front view with screws

7.3 Requirements for mounting with mounting angle:

- The wall, the converter is to be installed to, is of sufficient bearing capacity.
- Weight and dimensioning details of the converter are given in the Section 6 'Technical data'.
- An external release device on the control cabinet is located close to the converter. With this device the converter can be switched voltage-free.

Tool - **Screwdriver** ⊘

- Installation kit W19 consisting of:

  i) 1 x Mounting angle W19

  ii) 2 x Nut plate M2.5 28HP s = 4.5 (H-profile)

  iii) 4 x Screw M2.5 x 8 DIN 7985 A2

7.4 Mounting with mounting assembly:

1. Prepare the wall for fixing the mounting assembly so that the assembly may be fixed to the wall with the small side.
2. Mount the mounting assembly with the large side in a horizontal position.
3. Fix the converter at the right side to the mounting assembly. Fasten the four screws on mounting assembly and converter.

8. Wiring

8.1 General advice on wiring

Danger!

Electrical voltage!

Before connecting, switch the converter power switch (**22**) to O (OFF) position!

All electrical connections must be made by a qualified electrician!

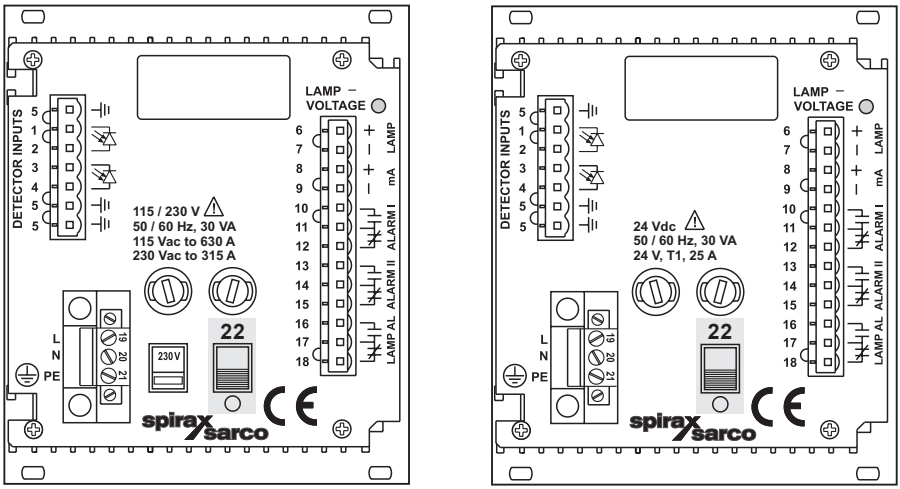


Fig. 10 Power switch on converter 115/230 V (left) and 24 V (right)

- The power switch is only protected against accidental touching. That is why the converter has to be installed in a control cabinet - Reference Section 7 'Installation of the converter'.
- The power supply socket is not provided with a first-to-mate last-to-break protective ground contact. You must therefore provide an external release device.
- The converter is designed for continuous operation and has only to be switched voltage-free for maintenance purposes.

8.2 Connecting the voltage supply 115 or 230 Vac

Tool - Screwdriver ⊘

1. Flip the selector switch (**23**) to the provided voltage supply (115 or 230 Vac).
2. Connect the power supply to the power supply socket (**24**).

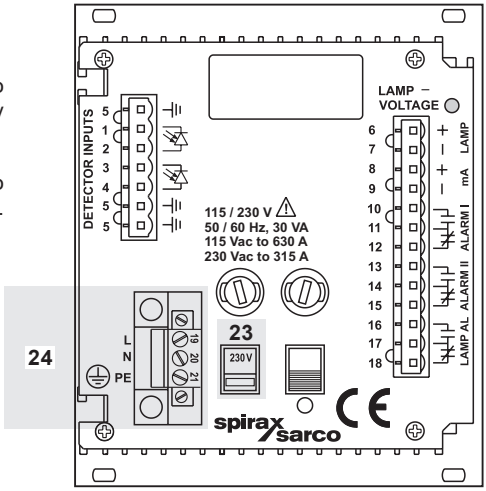


Fig. 11
Connecting the power supply
115 or 230 Vac

8.3 Connecting the voltage supply 24 Vac / dc (option)

Tool - Screwdriver ⊘

1. Check if the voltage is 24 Vac / dc .
2. Connect the power supply to the power supply socket (item **24**).

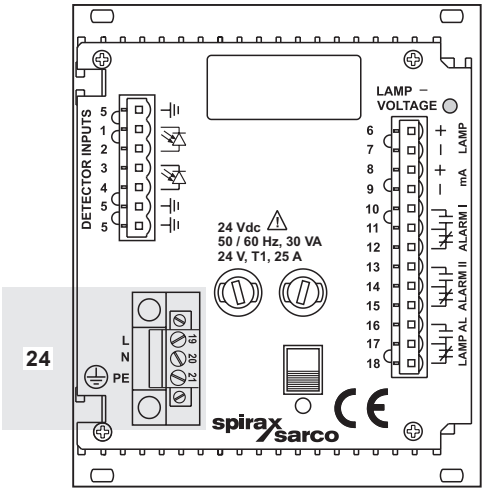


Fig. 12
Connecting the power supply
24 Vac / dc

8.4 Connecting the sensor

Danger!

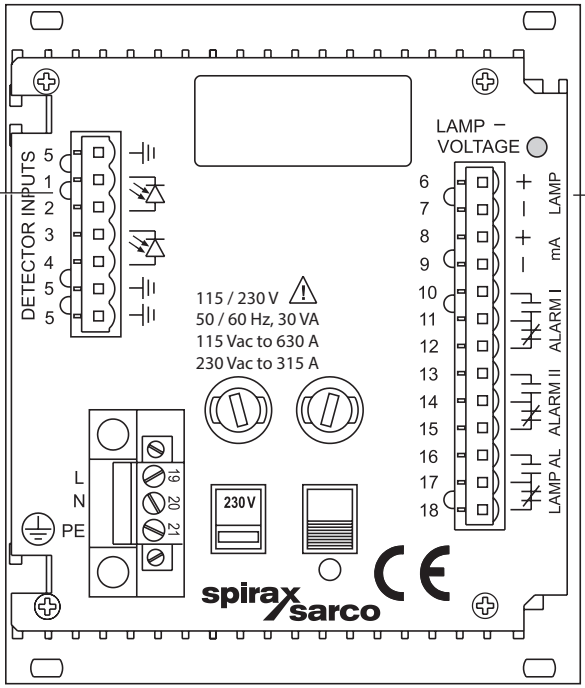
Electrical voltage!

Switch the converter voltage-free before connecting the sensor!

All electrical connections must be made by a qualified electrician!

Connection to the converter - The following connections are on the back of the converter:

Detector inputs (5, 1, 2) and (5, 4, 3)



Lamp outputs (6, 7)

Fig. 13 Detector inputs and lamp outputs of the Model 556 converter

Note!

Stick to the detector inputs and lamp outputs specified in Table 2 below. Thus, danger of mixing inputs and outputs up is minimized.

Table 2 Connections

Number of sensors Sensor type	Detector input connection of the converter	Lamp output	Cable set lengths max.
1 sensor TF56	Detector input (5, 1, 2) Detector input (5, 4, 3)	Lamp output (6, 7)	100 m / 328 ft.

Tool - Screwdriver ⊘

To be able to allocate the end splices unequivocally to the terminals of the converter, each end splice is marked with the number of the correct terminal:

Detector cable to sensor
1 = White (A1)
2 = Brown (A2)
5 = Black (A5)

Detector cable to sensor (reference channel)
3 = White (C3)
4 = Brown (C4)
5 = Black (C5)

Lamp cable to sensor
6 = White or Blue (6)
7 = Brown (7)

Caution!

Lamp voltage must be adjusted to the cable length in order to compensate voltage loss in the cable. Too low lamp voltage can lead to wrong measuring results. Too high lamp voltage reduces the life of the lamp module considerably.

8.4.1 Wiring plan TF56 to Model 556 converter

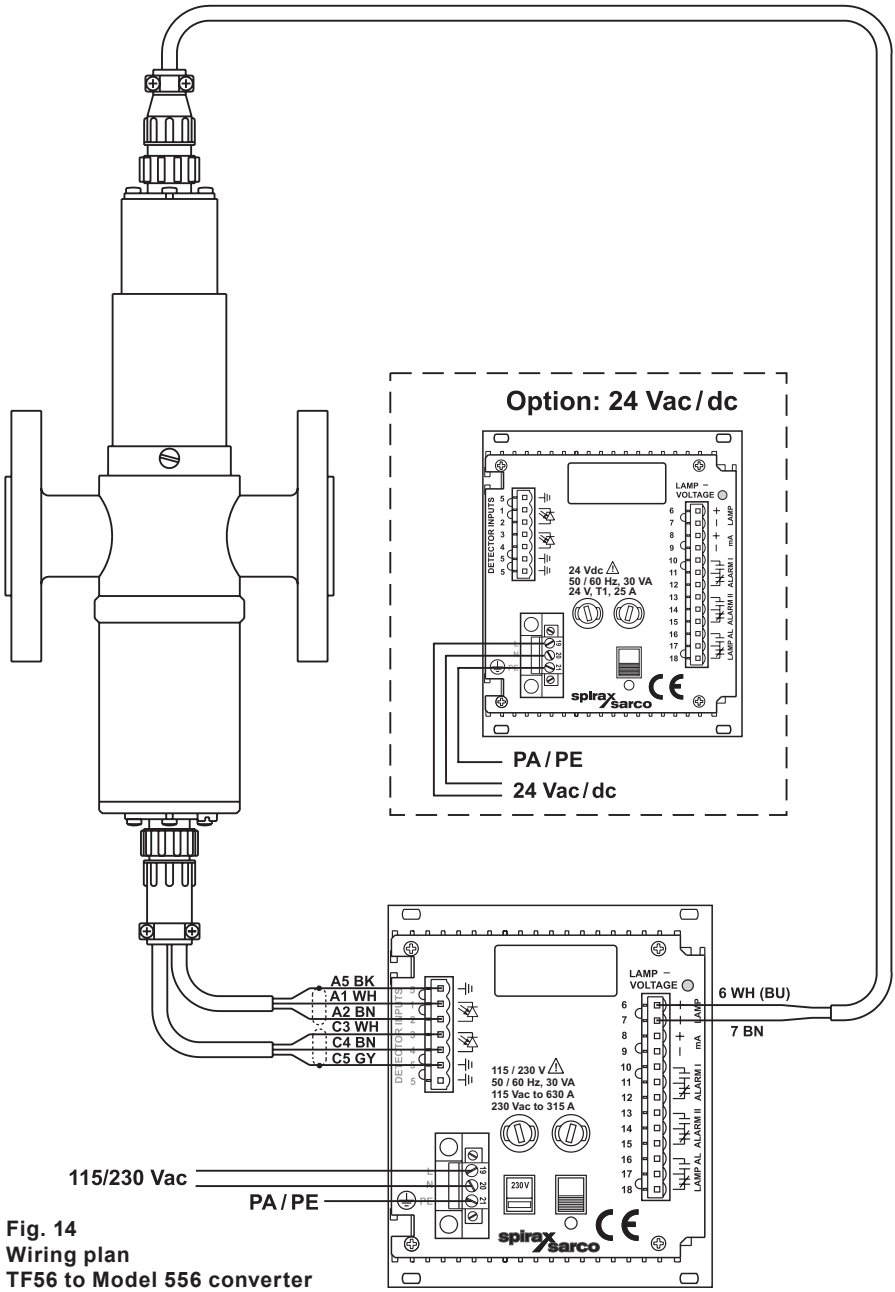


Fig. 14
Wiring plan
TF56 to Model 556 converter

8.5 Connecting the relay outputs

Danger!

Electrical voltage!

Switch the converter voltage-free before connecting the sensor!

All electrical connections must be made by a qualified electrician!

Tool - Screwdriver

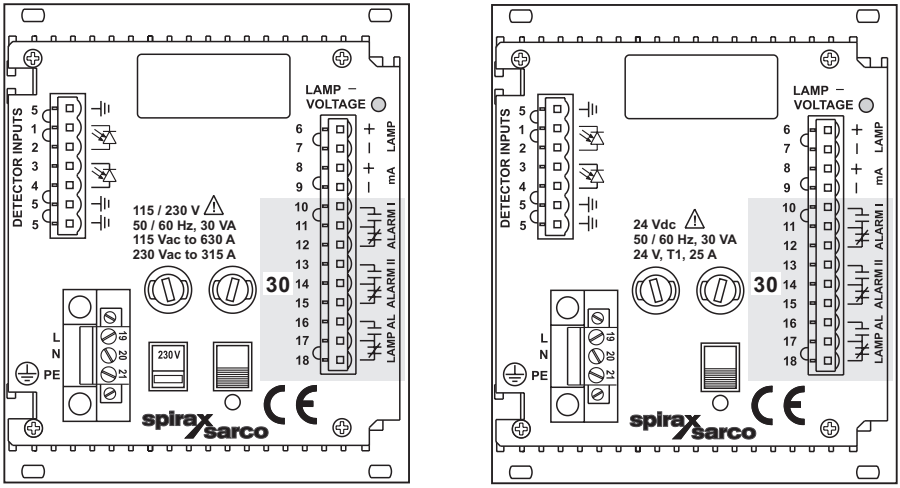


Fig. 15 Relay outputs

The converter is equipped with three relay outputs (**30**):

- Relay output 1 Terminals 10, 11 and 12
- Relay output 2 Terminals 13, 14 and 15
- Relay output 3 Terminals 16, 17 and 18

Relay output 1 may be assigned a limit value for alarm 1, while relay output 2 may be assigned a limit value for alarm 2. Relay output 3 is assigned a minimum value for indication of a lamp failure at the sensor.

The lamp failure relay is operated enabled, i. e. the relay is picked up in normal operational state. If the lamp current falls below the minimum value of approximately 310 mA, the lamp failure relay is disabled. If the corresponding request is given, this allows monitoring regarding lamp and power failure.

Observe the admissible relay output loads:

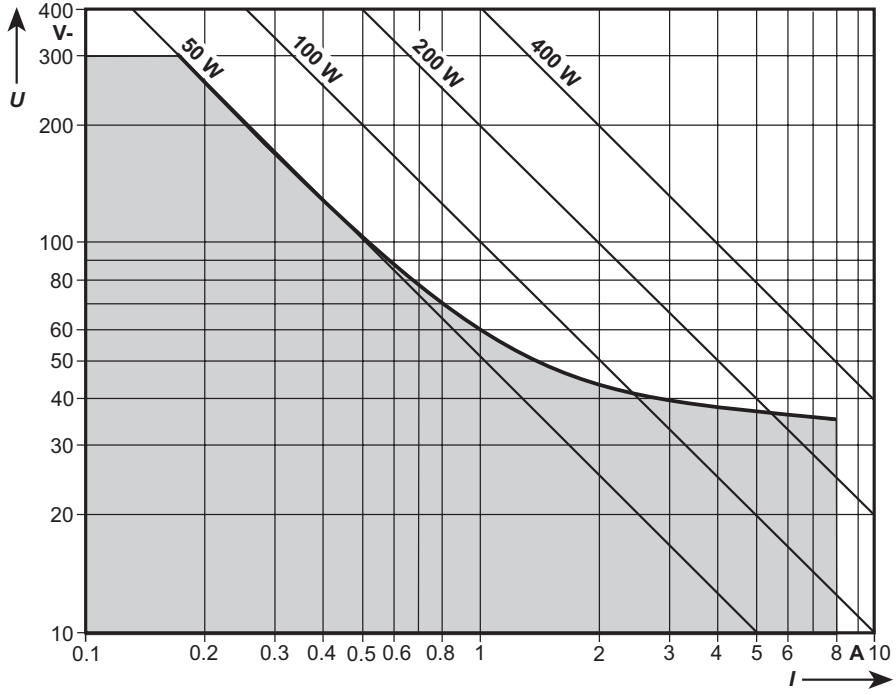


Fig. 16 Load limit curve relay outputs

8.6 Connecting the mA output

Danger!

Electrical voltage!

Switch the converter voltage-free before connecting the sensor!

All electrical connections must be made by a qualified electrician!

Tool - Screwdriver

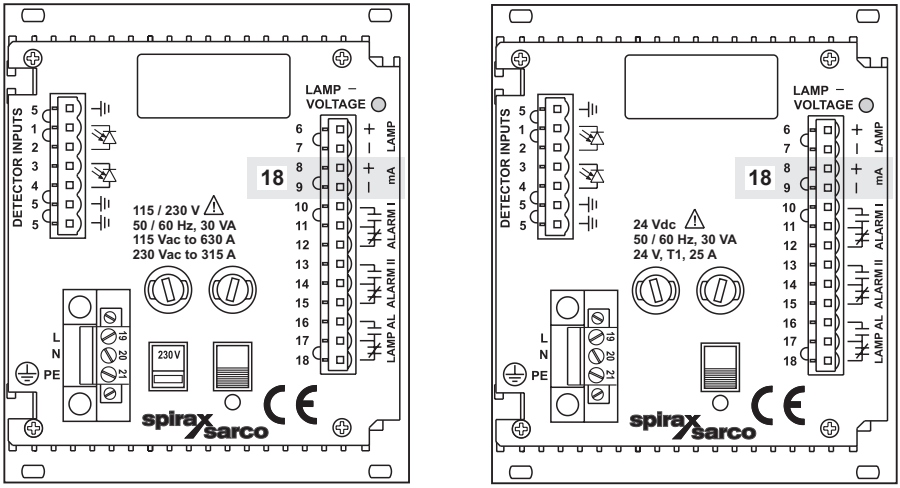


Fig. 17 mA output

For transmittance of the measurement signal, the converter is equipped with an mA output (item **18**) (galvanically isolated > 500 Vdc), set to 4 - 20 mA:

- mA output Terminals 8 + and 9 -

9. Commissioning

9.1 Requirements for commissioning

Before commissioning the converter or the whole measuring system, carry out the following activities:

- Install the armature (see the product specific instruction manual of the armature).
- Check the pipeline with the armature for leaks.
- Check armature windows. They must not be dirty.
- Install the sensor (see the product specific instruction manual of the sensor).
- Ensure that the converter is mounted correctly - Reference Section 7 'Installation ofthe converter'.
- Verify correct wiring of the converter - Reference Section 8 'Wiring'.

9.2 Switching the converter on

1. Flip the converter power switch (**22**) to I (ON) position.

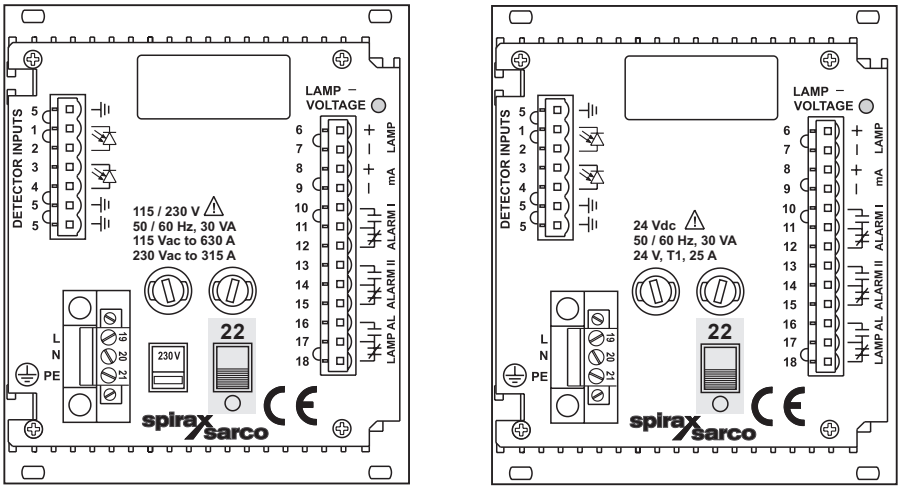


Fig. 18 Power switch on converter 115/230 V (left) and 24 V (right)

2. Switch on the external release device.

3. Wait for approximately 15 minutes, until the system has reached the operating temperature.

9.3 Adjusting lamp voltage

Lamp voltage must be adjusted to the cable length in order to compensate voltage loss in the cable. Too low voltage can lead to wrong measuring results. Too high lamp voltage reduces the life span of the lamp module considerably.

1. Let the lamp module of the sensor operate for at least 3 minutes. During this time the voltage at the lamp output terminals of the converter adjusts depending on the load.

Caution!

The lamp voltage at the converter must not exceed 8.5 Vdc or the system will overheat!

2. Adjust the lamp voltage at the potentiometer (item **16**).

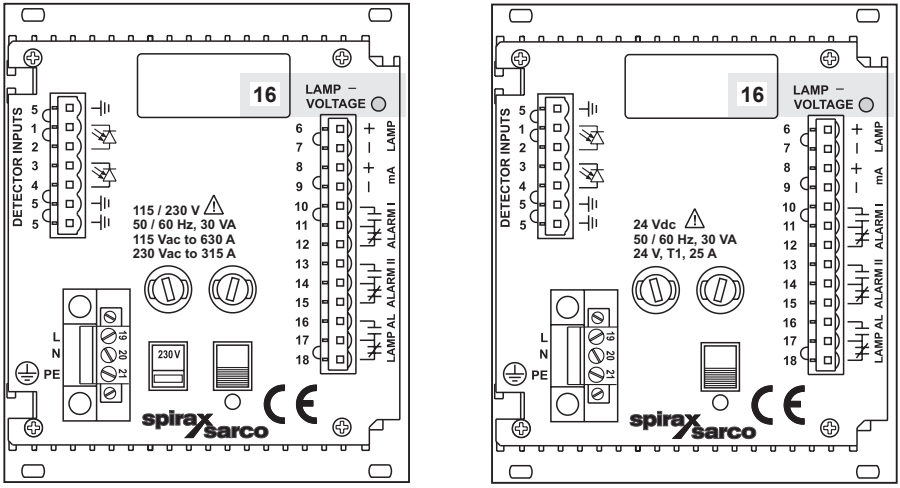


Fig. 19 Potentiometer for lamp voltage

Lamp voltage depends on cable set lengths and sensor type. During operation, lamp voltage has to be constant at 4.8 V at the lamp module. The values in the following table apply to original cable sets only!

Table 3 Lamp voltage depending on cable set lengths

Cable set lengths standard		Lamp voltage [V] depending on connected sensor and cable cross section TF56 to Model 556 converter
m	ft	1.5 mm2
0	0	4.80
2	7	4.84
3	10	4.86
5	16	4.90
10	33	4.99
15	49	5.09
20	66	5.18
25	82	5.28
30	98	5.38
35	115	5.47
40	131	5.57
45	148	5.66
50	164	5.76
60	197	5.95
70	230	6.14
80	262	6.34
90	295	6.53
100	328	6.72
Lamp voltage =		4.80 + 0.0192 / m
Resistance =		12.8 ohms / 1000 m

Standard cross section for lamp cables is 1.5 mm**2**.

Caution!

When cable sets are later shortened, prior to connecting the lamp module, lamp voltage has to be reduced to the corresponding value to avoid overload.

9.4 Setting the zero point

During commissioning, and routine checks, after lamp change or maintenance, always check the system zero point. To check or set the system zero point correctly, proceed as follows:

- Clean the windows of the armature or the probe.
- Fill the armature with clean particle-free water.
- There must not be any gas bubbles in the medium.
- Remove gas bubbles from the windows.
- Cover the armature so as to prevent direct sunlight from penetrating.
- Let the system work for at least 15 minutes before checking the system zero point.

Tool - Screwdriver ⊘

1. Loosen the measuring range plate on the front at both screws.
2. Use a screwdriver to turn the potentiometer (item **12**) anticlockwise until a measured value is displayed, then turn it slowly clockwise to the right.
   - When reaching the zero point, the green 'ZERO' LED (item **5**) lights up. As long as this LED lights up, the zero point is set to +1% of the current measuring range.

If the zero point may not be set, first check sensor contents, windows, lamp and wiring as well as the sensor and the converter serial number and after that repeat the procedure.

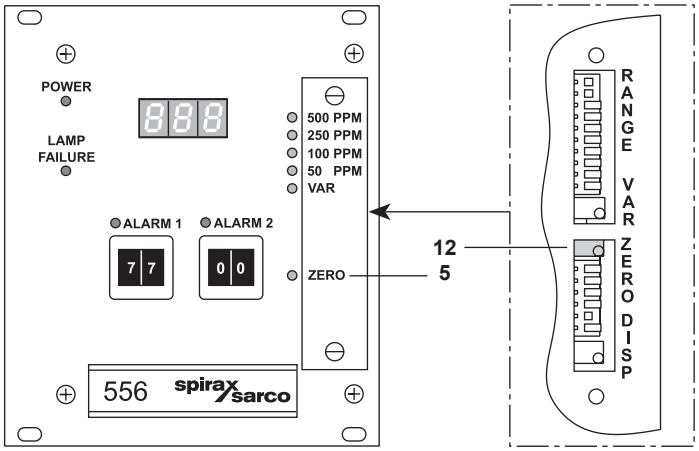


Fig. 20 Potentiometer for zero point setting

9.5 Setting the measuring range

You can set the measuring range at the DIP switch below the measuring range plate on the front. The following 5 measuring ranges are available as standard:

- 0 - 50 ppm 0 - 20 FTU 0 - 5 EBC
- 0 - 100 ppm 0 - 40 FTU 0 - 10 EBC
- 0 - 250 ppm 0 - 100 FTU 0 - 25 EBC
- 0 - 500 ppm 0 - 200 FTU 0 - 50 EBC
- VARIABLE: 0 - 25 to 0 - 500 ppm (factory setting 0 - 25 ppm)
  0 - 10 to 0 - 200 FTU (factory setting 0 - 10 FTU)
  0 - 2.5 to 0 - 50 EBC (factory setting 0 - 2.5 EBC)

Tool - Screwdriver ⊘

1. Loosen the measuring range plate on the front at both screws.
2. According to the following table, switch the DIP switches to ON position (left) or OFF position (right).

Table 4 DIP switch positions

DIP switch	Measuring range:				
	0 - 500 ppm 0 - 200 FTU 0 - 50 EBC	**0 - 250 ppm 0 - 100 FTU 0 - 25 EBC**	**0 - 100 ppm 0 - 40 FTU 0 - 10 EBC**	**0 - 50 ppm 0 - 20 FTU 0 - 5 EBC**	**Variable**
1	**ON**	OFF	OFF	OFF	OFF
2	**ON**	OFF	OFF	OFF	OFF
3	OFF	**ON**	OFF	OFF	OFF
4	OFF	**ON**	OFF	OFF	OFF
5	OFF	OFF	**ON**	OFF	OFF
6	OFF	OFF	**ON**	OFF	OFF
7	OFF	OFF	OFF	**ON**	OFF
8	OFF	OFF	OFF	**ON**	OFF
9	OFF	OFF	OFF	OFF	**ON**
10	OFF	OFF	OFF	OFF	**ON**

3. First, set the largest possible measuring range (500 ppm or 200 FTU / 50 EBC) to get an overview of possible measuring results.
4. Next, select the correct measuring range where none of the measuring results exceeds the measuring range.

   For example: The highest measuring result is 180 ppm = > measuring range to select 250 ppm. This can be checked by increasing an alarm in the widest measuring range until the alarm LED goes off.

Note!

For special uses, the variable measuring range may be set to a customized measuring span. For this, any value from 25 ppm to 550 ppm (or from 10 FTU to 200 FTU / from 2.5 EBC to 50 EBC) is available.

At delivery, the factory setting of this measuring range is 0 - 25 ppm (or 0 - 10 FTU / 0 - 2.5 EBC).

Proceed as follows to set the variable measuring range:

1. Fill the armature with a slightly haze liquid. If the sensor assembly is not yet installed, cover the light beam so that a stable measuring result is obtained within the set measuring range. This fixed measuring range should be selected providing that the desired variable measuring range is included in this fixed measuring range.
2. A multimeter connected at terminals 8 and 9 on the backplate displays the corresponding measuring result in mA.
3. Use a screwdriver to set the desired variable measuring range at the potentiometer (item **11**). Proceed according to this example:
   - Preset measuring range: 0 - 500 ppm mA display (4 - 20):
     12 mA corresponds to a measuring result of 250 ppm
   - Switch to variable measuring range.
   - Variable measuring range: 0 - 350 ppm (desired)
   - Turn the potentiometer (item **11**) to the right (or left), until the following indication appears for the mA-output:
     mA display (4 - 20): 15.4 mA corresponds to a measuring result of 250 ppm
     Adjustment value calculation:

     $$\frac{\text{Measuring result (250 ppm)}}{\text{Desired range (350 ppm)}} \times 16\ \text{mA} + 4\ \text{mA} = 15.4\ \text{mA}$$

   - Check zero point - Reference Section 9.4.

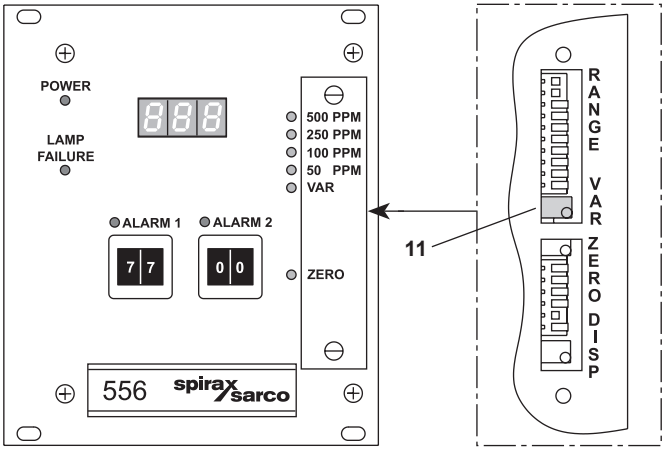


Fig. 21 Potentiometer for measuring range adjustment

9.6 Setting alarms

Limit values

Two alarms that may be set independently are available as standard. Their switching status is indicated at the red LEDs (items **3** and **7**) on the front.

For adjusting the setpoints, actuate the encoding button (item **6**) for alarm 1 and the encoding button (item **4**) for alarm 2.

The alarms are set in steps of 1% of the set measuring range from 0 to 99%. Alarms are enabled with integrators so that the responding behavior is automatically adjusted to the process dynamic. A slight (slow) exceeding of the set limit value leads to delayed alarm, a strong (fast) exceeding leads to immediate alarm.

Alarm in case of lamp failure

A lamp failure or similar system failure is indicated by light-up of the lamp failure LED (item **8**) on the front panel and reported by the lamp failure relay at terminals 16, 17 and 18. As a result, the signals fall below the minimum sensor signal which triggers both limit value relays and makes the alarm LEDs (**3** and **7**) light up. The lamp failure relay is operated enabled, i. e. the relay is picked up in normal operational state. If the lamp current falls below the minimum value of approximately 310 mA, the lamp failure relay is disabled. If the corresponding request is given, this allows monitoring regarding lamp and power failure.

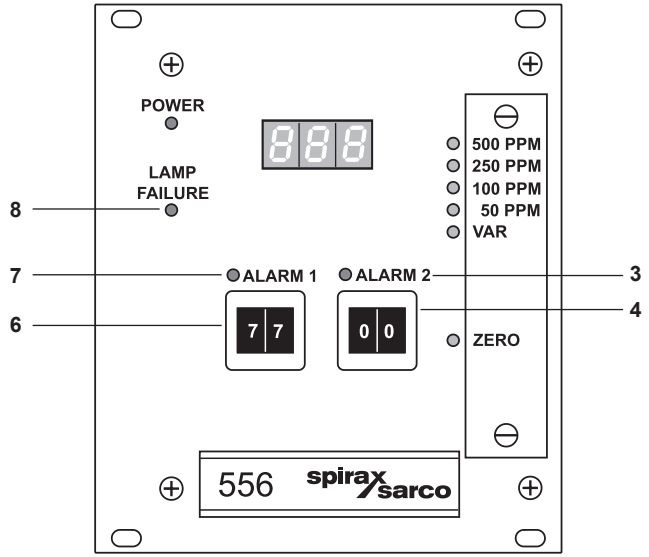


Fig. 22 LEDs and encoding buttons for alarms

9.7 Adjusting the digital read-out

Tool - Screwdriver ⊘

1. Loosen the measuring range plate on the front at both screws.
2. According to the following table, switch the DIP switches 1 and 2 (item **13**) to the ON position (left) or OFF position (right).

Table 5 DIP switch positions

DIP switch	Setting of the decimal place in the digital read-out		
	No decimal place XXX	1 decimal place XX.X	2 decimal places X.XX
1	OFF	ON	OFF
2	OFF	OFF	ON

Proceed as follows to set the end value of the digital read-out:

1. Fill the armature with a slightly haze liquid. You may as well cover the light beam - if the sensor assembly is not yet installed - so that a stable measuring result is obtained within the set measuring range.
2. Connect a multimeter to terminals 8 and 9 on the back of the converter. It displays the corresponding measuring result in mA.
   - mA values mean the following: 4 mA = 0% and 20 mA = 100%
3. Use a screwdriver to set the desired end value of the digital read-out at the potentiometer (item **14**) turning. Proceed according to this example:
   - mA display = 14.4 mA correspond to a display of 65%
   - Adjust the digital read-out to 065. This corresponds to a display from 0 to 100.
   - Adjust the digital read-out to 325. This corresponds to a display from 0 to 500.

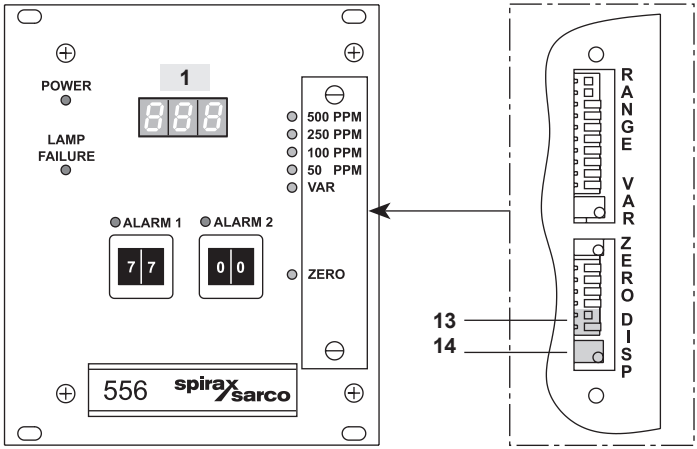


Fig. 23 Potentiometer for digital read-out adjustment

9.8 Other activities when commissioning:

1. Check the system zero point of the converter - Reference Section 9.4.
2. Check the set measuring range - Reference Section 9.5.
3. Check the set alarm limit values - Reference Section 9.6.
4. Document your settings using the form - Reference Section 12.1.
5. Check measuring results with regard to plausibility.
6. If settings and measuring results are correct, enable measuring.

10. Faults

Among other possibilities, you can detect faults whenever an error message appears on the Model 556 converter. Try to clear the fault using the following Table 6. Should you have any difficulty clearing the fault, feel free to contact our customer service. To solve the problem efficiently, we ask you to have the sheet with system data of your sensor or system at hand.

Refer to Section 14, for our contact data.

Table 6 Possible faults and remedies

Possible fault	Possible remarks
Failure of lamp module	- 'Lamp failure' LED of converter flashes. - Signal loss.
Detector failure	-
Condensate formation	Unrealistic, random measuring results.
Wrong results	- Results are fluctuating. - Zero point is drifting.
Connection error	- No function. - No 'Lamp failure' LED message.
Measuring range exceeded	Converter indicates flashing.
mA signal (output)	The mA output provides correct current values when measuring results are low and too low current values when measuring results are high.
	Small deviations given in %
Converter defective	None of the above mentioned errors can be detected.

	Cause	Remedy
	Lamp cable between sensor and converter defective.	- Continuity test of lamp cable - Exchange lamp module.
	Lamp module defective.	- Exchange lamp cable for new one.
	Detector cable between sensor and converter defective.	- Continuity test of detector cable. - Exchange detector cable for new one.
	Detector defective.	- Exchange detector.
	Humidity gets into optical housing and forms condensation deposits on windows.	- Use air purge.
	'O' ring missing or defective.	- Disassemble sensor assemblies and check 'O' rings, exchange if necessary.
	- Sensor body windows are dirty. - Sensor body windows are corroded. - Lamp module near failure, lamp module near the end of its life.	- Clean sensor body window. - Exchange sensor body window for sapphire window. - Exchange lamp module.
	Detector cable between sensor and converter defective.	- Continuity test of detector cable. - Exchange detector cable for new one.
	Sensor cable incorrectly connected to converter.	- Check and revise connections.
	Process conditions.	- Amplify measuring range.
		- If the measuring range cannot be amplified, reduce optical path length.
	Wavelength-dependent detector module reduces the dynamic measuring range, optical filters reduce wanted signal.	- Reduce optical path length and / or change measuring wavelengt.h - Exchange lamp module.
	Connected load > 500 ohms.	- Check resistance of wiring. - Use appropriate mA input.
	Poor calibration of the receiving mA input.	- Compensation by adjusting calibration of the sending mA output.
	-	- Send system (converter and sensor) to Spirax Sarco for checking purposes. If necessary, the sensor body can remain in the pipeline so that only the optical arms and the converter have to be sent.

11. Spare parts and accessories

11.1 Accessories converter

Table 7 Accessories - housings and installation kits

Accessories	Description	Part number
Installation kit X56	4 x Collar screw M2.5 x 11 4 x Plastic sleeve M2.5 2 x Fuse T 0.630 A 115 Vac 2 x Fuse T 0.315 A 230 Vac 2 x Fuse T 1.25 A 24 Vac/dc	1200-3317-0007-00
Installation kit W19	1 x Mounting angle W19 2 x Nue plate M2.5 28HP s=4.5 (H-profile) 4 x Screw M2.5 x 8 DIN7985 A2	1200-3317-0001-00
B19-21 (IP66) 1 x X56	Wall mount housing B19-21 - Material: plastic (ABS) - Protection: IP66 for 1 Converter X56 (Installation kit B19 PN: 1200-3390-0001-00 included)	1200-3317-0002-00
B19-42 (IP66) 1 x X56	Wall mount housing B19-42 - Material: plastic (ABS) - Protection: IP66 for 1 Converter X56 Blind plate for second slot (Installation kit B19 PN: 1200-3390-0001-00 included)	1200-3317-0003-00
B19-42 (IP66) 2 x X56	Wall mount housing B19-42 - Material: Plastic (ABS) - Protection: IP66 for 1 Converter C4000, HazeControl or for 2 Converter X56 (Installation kit B19 PN: 1200-3390-0001-00 included)	1200-3321-0002-00
S19-42 (IP65) 1 x X56	Wall mount housing S19-42 - Material: stainless steel 1.4301 / SS304 - Protection: IP65 for 1 Converter X56 Blind plate for second slot (Installation kit S19 PN: 1200-3390-0003-00 included)	1200-3317-0005-00
S19-42 (IP65) 2 x X56	Wall mount housing S19-42 - Material: stainless steel 1.4301 / SS304 - Protection: IP65 for 1 Converter C4000, HazeControl or for 2 Converter X56 (Installation kit S19 PN: 1200-3390-0003-00 included)	1200-3321-0003-00
Blind plate 3 HE-21TE	Blind plate 3 U-21HP consisting of: 1 x Blind plate 3U-21HP 4 x Collar screw M2.5 x 11 4 x Plastic sleeve M2.5	1200-3390-0004-00

11.2 Small parts fuses

Table 8 Spare parts - fuses

10 pieces each	Part number
115 Vac T 0.630 A	1200-3300-0003-00
230 Vac T 0.315 A	1200-3300-0001-00
24 Vac/dc T 1.25 A	1200-3300-0004-00

12. Appendix

12.1 Installation documentation - hardware

Table 9 Installation documentation - hardware

Measuring task:	
Installation site:	Measuring station no.:
Responsible:	Phone:
Model:	Delivered on:
Ser. No. converter:	Ser. No. sensor:
Process connection:	Line size:
Material:	Gaskets:
Window material:	Optical path length (OPL):
Measuring wavelength:	
Standard settings	
Measuring range:	
Alarm 1	
Alarm 2	
Notes:	

13. Declaration of conformity

EU declaration of conformity		
We,	**optek-Danulat GmbH**	
Address	**Emscherbruchallee 2 45356 Essen Germany**	
declare in sole responsibility that the following measuring systems		
each comprising one converter of the series	**X56 with X=1 or 5**	
as well as one sensor of the series	**AF56 AS56 TF56**	
have been developed, constructed and manufactured in conformity with the requirements of EU directives	**2014/35/EU 2014/30/EU**	published in L96 of 29.03.2014 and
	2011/65/EU	published in L174 of 01.07.2011.
The assessment is based on the application of the standards	**EN 61010-1:2010 EN 61326-2-3:2013 EN 61326-1:2013 EN 61326-2-5:2013 EN 50581:2012**	
Place, date	**Essen, 2017/07/22**	
Signature of the person responsible:	optek-Danulat GmbH Emscherbruchallee 2 45356 Essen • Tel. 0201 / 63 409-0 Dipl. Ing. Jürgen Danulat Managing Director	

14. Contacts

For further help or information regarding your product or its application into your system please contact your local spirax sarco representative. Alternatively visit our international website, select your global location and search / request a visit or telephone call from a Spirax Sarco engineer.

www.spiraxsarco.com