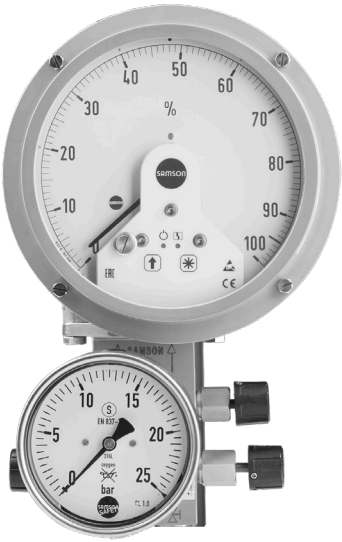
MOUNTING AND OPERATING INSTRUCTIONS

EB 9519 EN

Translation of original instructions



Media 5 with 4 to 20 mA current output

Media 5 with limit switch

Mounted valve block and pressure gauge for operating pressure

Media 5 Differential Pressure and Flow Meter

Edition March 2021

Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

➔ For the safe and proper use of these instructions, read them carefully and keep them for later reference.

➔ If you have any questions about these instructions, contact SAMSON's After-sales Service (aftersalesservice@samsongroup.com).

The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website at ***www.samsongroup.com > Service & Support > Downloads > Documentation***.

Definition of signal words

⚠ DANGER

Hazardous situations which, if not avoided, will result in death or serious injury

⚠ WARNING

Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE

Property damage message or malfunction

Note

Additional information

Tip

Recommended action

1 Safety instructions and measures

Intended use

The Media 5 Differential Pressure and Flow Meter is a transmitter with dp cell. It measures the differential pressure or derived measuring variables and displays the measuring signal. It is suitable for measuring gases or liquids, e.g. liquid level measurement on pressure vessels, differential pressure measurement between flow and return flow pipes, pressure drop measurement on valves and filters as well as flow rate measurement according to the differential pressure method. The device is designed to operate under exactly defined conditions (e.g. operating pressure, process medium, temperature). Therefore, operators must ensure that the device is only used in operating conditions that meet the specifications used for sizing the device at the ordering stage.

In case operators intend to use the device in other applications or conditions than specified, contact SAMSON.

SAMSON does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

➔ Refer to the technical data for limits and fields of application as well as possible uses.

The Media 5 Differential Pressure and Flow Meter without limit contacts can be used to measure flammable gases and liquids in tanks in which hazardous area conditions of Zone 0 are to be expected, provided the operator observes the applicable regulations for measuring flammable gases and liquids in Zone 0. This means that measuring instrument suited for the connection to Zone 0 can be installed provided:

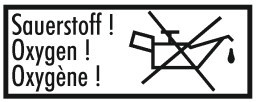
1. The pipes connecting the instruments have been sized and installed according to the German Technical Regulations for Flammable Liquids TRbF 50 or
2. Flame arresters or endurance burning flame arresters have been installed in the two measuring lines.

Whether you have to install flame arresters or endurance burning flame arresters depends on the conditions on site. However, endurance burning flame arresters are preferably to be installed. You are required to contact the appropriate regulatory authority to agree on the necessary measures.

The operator is responsible for meeting the above specified requirements specified (1 and 2). SAMSON does not assume any responsibility if the operator fails to do so.

Notes concerning oxygen service

Devices intended to measure gaseous oxygen are labeled **Oxygen! Keep free of oil and grease!**



These versions are cleaned and assembled under special conditions. When replacing parts that come into contact with gaseous oxygen, e.g. range springs, wear suitable gloves and make sure that the parts do not come into contact with oil or grease.

When returning devices for oxygen service for repair, the sender assumes full responsibility that the devices are handled to meet all requirements stipulated by VBG 62 or similar regulations until they are handed over to the manufacturer. Otherwise, SAMSON does not accept any responsibility.

Reasonably foreseeable misuse

The Media 5 Differential Pressure and Flow Meter is ***not*** suitable for the following applications:

– Use outside the limits defined during sizing and by the technical data

Furthermore, the following activities do not comply with the intended use:

– Use of non-original spare parts
– Performing maintenance activities not described in these instructions

Qualifications of operating personnel

The device must be mounted, started up and serviced by fully trained and qualified personnel only; the accepted industry codes and practices must be observed. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

Personal protective equipment

We recommend wearing the following protective equipment depending on the process medium:

– Protective clothing, gloves, eye protection and respiratory protection in applications with hot, cold and/or corrosive media

➔ Check with the plant operator for details on further protective equipment.

Revisions and other modifications

Revisions, conversions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use. Use of the device is no longer permitted in this case.

Warning against residual hazards

To avoid personal injury or property damage, operators and operating personnel must prevent hazards that could be caused in the device by the process medium and operating pressure by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warning and caution notes in these mounting and operating instructions, especially for installation, start-up and service work.

Responsibilities of the operator

Operators are responsible for proper use and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions to the operating personnel and to instruct them in proper operation. Furthermore, operators must ensure that operating personnel or third parties are not exposed to any danger.

Responsibilities of operating personnel

Operating personnel must read and understand these mounting and operating instructions as well as the specified hazard statements, warning and caution notes. Furthermore, the operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

Referenced standards, directives and regulations

Devices with a CE marking fulfill the requirements of the Directive 2014/30/EU. The EU declaration of conformity is included at the end of these instructions.

Referenced documentation

The following documents apply in addition to these mounting and operating instructions:

– Mounting and operating instructions for mounted pipeline valves (strainers, shut-off valves etc.)

1.1 Notes on possible severe personal injury

⚠ DANGER

Risk of fatal injury due to the impermissible use in an explosive atmosphere.

Operating the Media 5 Differential Pressure and Flow Meter in combination with the option module with 4 to 20 mA current output in potentially explosive atmospheres is only permissible in the current output version **with explosion protection**.

Impermissible use in potentially explosive atmospheres may lead to ignition of the atmosphere and cause death, even with a harmless supply voltage.

➔ Read instructions concerning explosion protection in '4 to 20 mA current output (optional)' in section 8.

1.2 Notes on possible property damage

NOTICE

Notes concerning oxygen service

➔ Devices intended to measure gaseous oxygen are labeled **Oxygen! Keep free of oil and grease!**

These versions are cleaned and assembled under special conditions. When replacing parts that come into contact with gaseous oxygen, e.g. range springs, wear suitable gloves and make sure that the parts do not come into contact with oil or grease.

➔ When returning devices for oxygen service for repair, the sender assumes full responsibility that the devices are handled to meet all requirements stipulated by VBG 62 or similar regulations until they are handed over to the manufacturer. Otherwise, SAMSON does not accept any responsibility.

NOTICE

Risk of damage to the differential pressure and flow meter due to impermissible negative pressure (vacuum) in the measuring chambers.

A negative pressure in the measuring chambers is not permissible during operation.

➔ The following applies: **operating pressure ≥ atmospheric pressure**.

A vacuum in both measuring chambers for a brief period of time, e.g. to clean tanks, is permissible.

Risk of damage and malfunction of the differential pressure and flow meter due to incorrect operation in cryogenic applications.

In cryogenic applications, the process medium circulates during measurement when the equalizing valve is opened, causing the valve block to ice up.

➔ During measurement, the equalizing valve must be closed and the shut-off valves open.

2 Design and principle of operation

The Media 5 Differential Pressure and Flow Meter measures the differential pressure or derived measuring variables and displays the measuring signal. It is suitable for measuring gases or liquids, e.g. liquid level measurement on pressure vessels, differential pressure measurement between flow and return flow pipes, pressure drop measurement on valves and filters as well as flow rate measurement according to the differential pressure method.

The device comprises a differential pressure cell including a measuring diaphragm and range springs as well as an indicating unit including a pointer mechanism and dial plate.

The differential pressure $\Delta p = p_1 - p_2$ produced at the orifice plate creates a force at the measuring diaphragm (1.5), which is opposed by the range springs (1.4).

The movement of the measuring diaphragm and lever (1.8), which is proportional to the differential pressure, is routed from the pressure chamber by a flexible disk (1.9) and transmitted to the pointer mechanism (2.3) over the adjustable transmission element (2.1).

The zero adjuster (see Fig. 6) is used to adjust the pointer according to the scale value.

The differential pressure is shown linear on the dial and the flow rate is shown as a square root graduation.

2.1 Optional modules

The standard version of the Media 5 can be upgraded by installing a limit switch or a 4 to 20 mA current output.

Both options (limit switch or current output) are fitted in the housing of the indicating unit in place of the cover plate. The housing must be opened to operate and adjust them.

Version with limit switch
The gear segment (2.2) supports the metal tags (3.1) and activates the limit switch unit by moving the metal tags into the adjustable proximity switches (3.2).

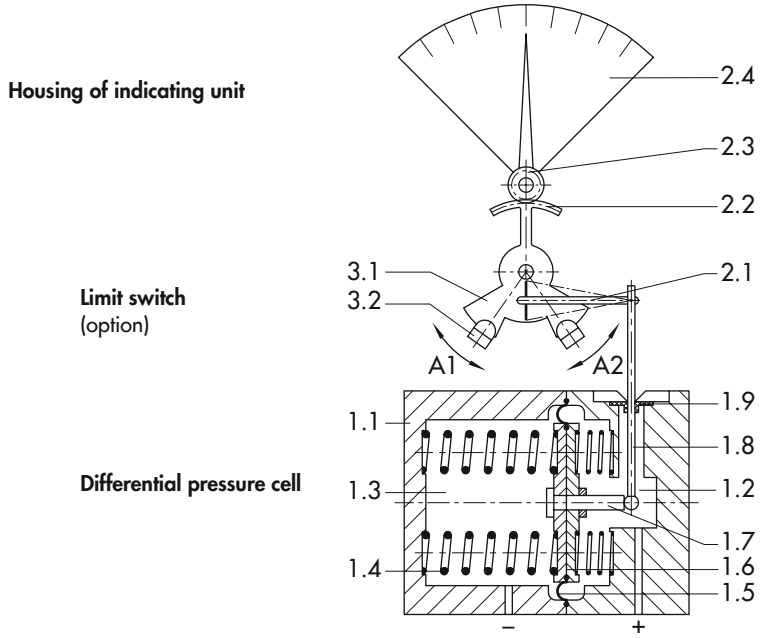
When the metal tag enters the inductive field of the associated proximity switch, it assumes a high resistance (contact open). When the metal tag leaves the inductive field, it assumes a low resistance (contact closed).

The switching function is triggered when the metal tag leaves or enters the proximity switches, depending on the setting of the contacts.

Version with 4 to 20 mA current output
The angle of the pointer axis is measured by a magnetoresistive measuring system and converted into a 4-to-20 mA two-wire measuring signal.

Zero calibration, span calibration, characteristic selection and issuing of a 4 mA or 20 mA test signal are selected over keys on the front.

For the measuring signal output and power supply, a supply voltage U_B in the range from 12 to 36 V (DC) is required.



Differential pressure cell
1.1 dp cell
1.2 High-pressure chamber
1.3 Low-pressure chamber
1.4 Range springs
1.5 Measuring diaphragm
1.6 Diaphragm plates
1.7 Diaphragm stem
1.8 Lever
1.9 Flexible disk

Housing of indicating unit
2.1 Transmission element (span adjuster)
2.2 Gear segment
2.3 Pointer mechanism
2.4 Dial plate

Limit switch (option)
3.1 Metal tag
3.2 Proximity switches A1/A2

Current output (option)
4.1 Status indication (green)
4.2 Error indication (red)
4.3 Execute/confirm key
4.4 Select function/data key

Fig. 1: *Functional diagram of Media 5 with limit switch*

3 Technical data

Table 1: *Technical data* · All pressure in bar (gauge) · All errors and deviations are specified in % of the adjusted measuring span

Media 5 Differential Pressure and Flow Meter										
Measuring range in mbar	0 ... 60	0 to 100	0 to 160	0 to 250	0 to 400	0 to 600	0 to 1000	0 to 1600	0 to 2500	0 to 3600
Measuring span min. in mbar max.	40 to 66	50 to 110	80 to 176	125 to 275	200 to 440	300 to 660	500 to 1100	800 to 1760	1250 to 2750	1800 to 3960
Accuracy class	±4.0 %	±2.5 %		±1.6 %						
Pressure rating	PN 50, overloadable on one side up to 50 bar									
Indicator	Ø160 mm									
Characteristic	Reading linear to the differential pressure									
Deviation from terminal-based linearity	<±2.5 %	<±1.6 % including hysteresis								
Sensitivity	<±0.5 %	<±0.25 %								
Effect of static pressure	<0.03 %/1 bar									
Degree of protection acc. to DIN EN 60529	IP 54 (zero adjustment screw accessible from the outside) IP 65 (zero adjustment screw concealed, inside the housing)									
Weight	Approx. 3 kg without valve block Approx. 5 kg with valve block									
Conformity	CE · EAC									
Limit switch (optional)										
Version	Max. 3 alarm contacts A1, A2 and A3 (limit switches) with inductive pick-up and LED according to EN 60947-5-6									
Control circuit	Values corresponding to connected isolating switch amplifier according to EN 60947-5-6, e.g. KFA6-SR2-Ex2.W									
Proximity switch	SJ3,5-N-LED, for hazardous areas according to PTB 99 ATEX 2219X									
Switching accuracy	<±2 %									
Dead band, approx.	<0.6 %									
Current output (optional)										
Version	Magnetoresistive measuring system									
Supply voltage U_B	12 to 36 V (DC)									
Output signal	4 to 20 mA, two-wire system									
Perm. load R_B in Ω	$R_B = (U_B - 12\ V)/0.020\ A$ ($R \leq 600\ \Omega$ at 24 V and 20 mA)									
Power consumption	103 mW									
Settings	Zero calibration | Span calibration | Characteristic selection | Test function									

Characteristic	Output and reading linear or square root extraction depending on installed flow characteristic Characteristic set at the factory
Deviation from terminal-based linearity	<±0.2 %, related to 270° measuring span
Sensitivity	<±0.05 %, related to 270° measuring span
Effect of ambient temperature in the range from –40 to +80 °C	<0.1 %/10 K for zero and span

Ambient conditions	
Permissible ambient temperature range	–40 to +80 °C
Perm. storage temperature range	–40 to +100 °C
Use of Media 5 with gaseous oxygen	
Max. oxygen pressure	50 bar
Permissible ambient temperature range	–40 to +60 °C

Table 2: *Materials*

Media 5 Differential Pressure and Flow Meter		
Version	Standard version	
dp cell	CW617N (brass)	CrNi steel
Measuring diaphragm and seals	ECO [1]	
Springs, diaphragm plates and functional parts, lever	CrNi steel	
Housing of indicating unit	Polycarbonate	

[1] Other materials on request

i ***Note***

The standard version of the Media 5 Differential Pressure and Flow Meter can be used to measure flammable gases and liquids in tanks in which hazardous area conditions of Zone 0 are to be expected. The relevant regulations on the measurement of flammable gases and liquids of Zone 0 must be observed.

Oxygen service: When the device is used for oxygen service, make sure that the dp cell and any SAMSON accessories (e.g. valve block) only come into contact with gaseous oxygen.

4 Installation

See Fig. 2 on page 15.

4.1 Arrangement of instruments for liquid level measurement

In arrangements as illustrated in the second schematic drawing, the additional height z is included in the measurement. As a result, this height must be as low as possible.

The dimension K (compensation height, 'Diagram 3') can be as large as required by the conditions in the plant.

4.2 Arrangement of devices for flow rate measurement

The decision whether the meter is to be mounted above or below the measuring point or whether compensation chambers are required depends on the process medium and the specific conditions in the plant. The installation drawing shows standard and reverse installation. Standard installation is preferable in any case. Reverse installation can only be used when there is no other possibility, particularly for steam measurements. Refer to VDE/VDI 3512 Sheet 1 for details.

4.3 Media 5 indicating unit

Make sure that the high-pressure line is connected to the high-pressure connection and the low-pressure line to the low-pressure connection.

Special screw fittings are required to connect the differential pressure lines. Depending on the device arrangement, seal any connections left unused with stoppers or vent plugs.

Carefully clean the connections before attaching the differential pressure lines. Do not rinse the device with compressed air or pressurized water.

Mount the device to a pipe, wall or mounting plate free of vibration.

Use mounting part with clamp for pipe mounting to attach it to a vertical or horizontal pipe. Use a mounting part without clamp for wall mounting. A bracket is required for for panel mounting (see section 10).

4.4 Differential pressure lines

Install the differential pressure lines (pipes with 12 mm outside diameter) as shown in Fig. 3. Observe the proper sequence. Use appropriate screw fittings to ensure that the lines do not leak.

Install line sections, which would usually run horizontally, with a constant downward slope of at least 1:20, starting the slope either at the orifice plate or at the point where venting is possible. The smallest permissible bending radius is 50 mm. Thoroughly flush the differential pressure lines before connecting them to the device. Make sure that the high-pressure line is connected to the high-pressure connection and the low-pressure line to the low-pressure connection.

Liquid level measurement

Illustration with SAMSON valve block

H Measuring range
h Measured height
z Additional height
K Compensation height

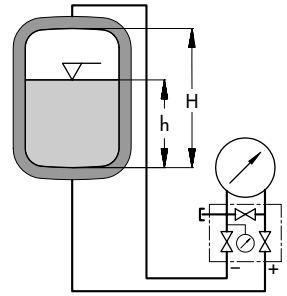


Diagram 1
Measurements in cryogenic systems (liquefied gases)

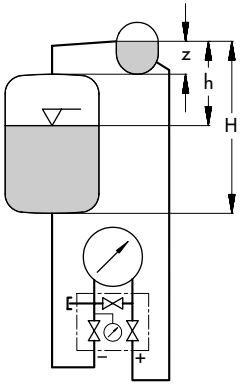


Diagram 2
Measurement on pressure vessels with condensing or non-condensing pressure reserve

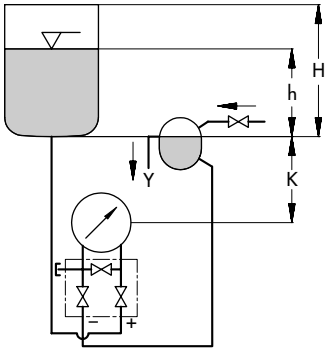
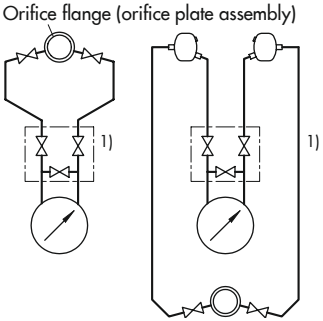


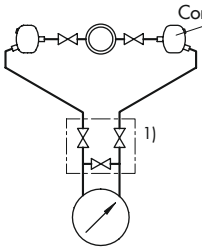
Diagram 3
Measurements on open vessels with the meter located in a low position

Flow rate measurement

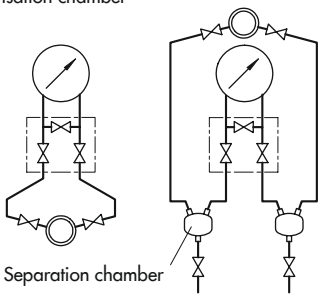
Measurement of liquids



Measurement of steam



Measurement of gases



Installation
Standard Reverse Standard Standard Reverse

1) SAMSON valve blocks can be mounted upside down to ensure the assignment of plus (+) to plus (+) and minus (–) to minus (–) remains unchanged.

Fig. 2: *Arrangement of devices*

4.5 Orifice flange (orifice plate assembly)

The direction of flow must correspond to the arrow on the orifice plate. Unobstructed pipe sections are required upstream and downstream of the orifice plate assembly. For the orifice tubes delivered by SAMSON, these section are ensured by the weld-on calibration pipes. For orifice flanges, the unobstructed pipe section upstream of the orifice plate is specified in the order confirmation. Make sure the orifice plate assembly as well as the gaskets are properly aligned with the pipeline.

Do not install any control valves that constantly change the operating state of the process medium (e.g. manually operated control valves or temperature regulators) upstream of the orifice plate assembly. The operating state must match the conditions calculated during sizing as closely as possible. It is, however, favorable to install equipment that keep the operating state constant (e.g. pressure regulators) upstream of the assembly.

4.5.1 Accessories

We recommend installing a shut-off valve in the differential pressure lines as well as an equalizing valve. They can be used to shut off both differential pressure lines and to bypass the indicating unit when checking zero.

4.5.2 Valve block

A valve block comprising three valves (see Fig. 4) is available (accessories). It is bolted directly to the bottom of the dp cell.

When measuring the flow rate of liquids and gases, the SAMSON valve block can also be mounted upside down. As a result, the assignment of plus (+) to plus (+) and minus (–) to minus (–) remains unchanged. Due to this reverse installation, the pressure gauge connection cannot be used anymore and must be sealed with an O-ring and a G ½ - LH screw cap.

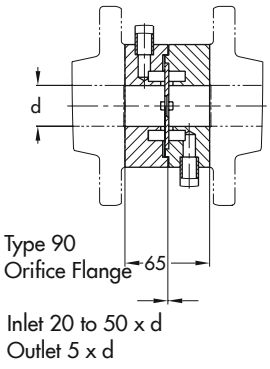
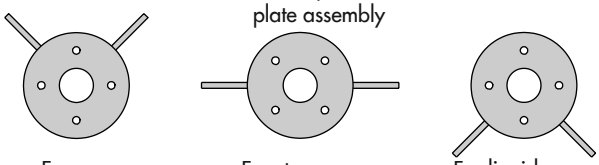


Fig. 3: *Orifice flange (orifice plate assembly)*

NOTICE

The maximum permissible operating pressure for Type 90 is 40 bar in the standard version.

Location of the differential pressure lines on the orifice plate assembly



4.5.3 Shut-off and equalizing valves

As an alternative to the SAMSON valve block, the two shut-off valves as well as the bypass valve/equalizing valve can also be installed as illustrated in Fig. 5.

4.5.4 Compensation chambers

Compensation chambers that establish a constant liquid column are required when measuring steam. When measuring liquids, they are only required when the indicating unit is mounted above the measuring point. For gas measurements, separation chambers are required for condensate separation when the indicating unit is installed below the measuring point.

4.5.5 Accessories for connection

The devices are delivered without screw fittings (oxygen versions are protected against contamination by four NBR blanking plugs). Required screw fittings, screw plugs or vent screws as well as screw joints with restrictions to dampen medium-induced vibration (particularly when measuring gases) must be ordered separately.

Tip

The screw fittings and SAMSON valve blocks with their associated order numbers are listed in Data Sheet ▶ T 9555.

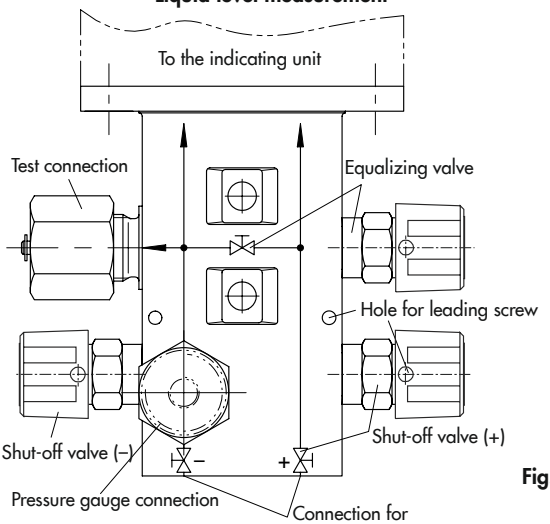


Fig. 4: *SAMSON valve block*

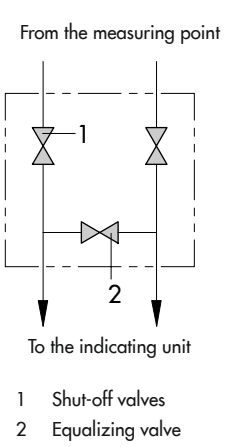


Fig. 5: *Arrangement of shut-off valves and equalizing valves for flow rate measurement*

5 Start-up

NOTICE

Risk of damage to the differential pressure and flow meter due to impermissible negative pressure (vacuum) in the measuring chambers.

A negative pressure in the measuring chambers is not permissible during operation. The following applies:

***Operating pressure ≥ atmospheric pressure**.*

A vacuum in both measuring chambers for a brief period of time, e.g. to clean tanks, is permissible.

NOTICE

In cryogenic applications, the process medium circulates during measurement when the equalizing valve is opened, causing the valve block to ice up.

During measurement, therefore, the equalizing valve must be closed and the shut-off valves open.

See Fig. 2, Fig. 3, Fig. 4 and Fig. 5.

Based on the following valve positions on the valve block upon delivery:

– Open high-pressure shut-off valve (+) and low-pressure shut-off valve (–)
– Closed equalizing valve

If necessary, check zero at the dp cell and put the device back into operation.

5.1 Liquid level measurement

1. Slowly **open** the low-pressure line.
2. **Close** the equalizing valve or bypass of the valve block.
3. Slowly open the high-pressure line.

5.2 Flow rate measurement

For steam measurement

Make sure that the steam does not have direct contact with the measuring diaphragm of the device. To prevent this, screw off the differential pressure lines below the shut-off valves or valve block and fill the device with water.

Alternatively, make sure the shut-off and equalizing valves or valve block are shut off and wait approx. 20 min after start up of the plant (steam in the system) until condensate has collected in the differential pressure lines above the valve and up to the orifice plate.

1. Open the high-pressure line.
2. Close the equalizing valve or bypass of the valve block.
3. Open the low-pressure line.
4. Wait a while. Open both vent screws of the dp cell one after the other until the escaping condensate is free of bubbles. Retighten the screws.

   Vent the compensation chambers in the same way.

   Lightly tap the housing of the indicating unit or the compensation chambers to help let the air escape.

5. Check zero as described in section 6.2 and put the device back into operation.

Note

When using reverse installation (with the device mounted above the measuring point), the differential pressure lines may partly get drained when depressurizing the system.

When starting up the system again, vent the measurement setup to allow it to fill with condensate.

For liquid measurement

1. Slowly open the high-pressure line (turn slowly).
2. Close the equalizing valve or bypass of the valve block.
3. Open the low-pressure line.
4. Undo the vent screw on the dp cell until all the air has escaped. Retighten the screw.
5. Check zero (see section 6.2). Put the device back into operation.

6 Operation

6.1 Zero calibration

The devices are calibrated before delivery. However, after installation, we recommend performing a zero calibration to take the pressure conditions on site in the plant into account.

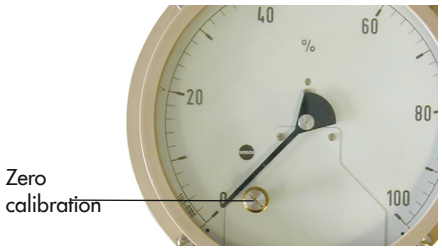


Fig. 6: *Zero adjustment screw*

As a result, errors caused by the mounting position or static pressure are eliminated.

Note

To perform a zero calibration, the equalizing valve on the valve block must be open and all filled control lines must have the correct filling level.

Use the adjustment screw for zero calibration to perform a zero calibration.

1. Remove housing cover, if necessary. In this case, loosen the four hex screws and lift off the cover.
2. Use a screwdriver to place the pointer in the zero position.
3. Replace on the housing cover and fasten it.

6.2 Checking zero

Zero can also be checked while the system is running, provided the differential pressure lines are equipped with shut-off and equalizing valves.

1. Close the shut-off valve in the high-pressure line.

2. Open the equalizing valve.
3. Close the shut-off valve in the low-pressure line to allow the pressures to equalize in the dp cell.

The pointer must indicate zero.

If this is not the case, readjust the zero screw (see Fig. 6) until zero position is reached.

To start-up:

1. Open the low-pressure line.
2. Close the equalizing valve.
3. Slowly but gradually open the high-pressure line all the way.

The device is in operation again.

If a valve block is installed, proceed as described above.

6.3 Water drainage

When measuring gas, drain condensed water from the separation chambers from time to time.

Close valves in the differential pressure lines (valve block) before opening the drain plugs.

6.4 Adjusting and modifying the measuring range

The measuring range of the differential pressure and flow meter is determined by the installed set of range springs.

The device is delivered with the measuring range specified in the order. This means that, subsequently, it can only be modified continuously up to approx. 50 % of the maximum measuring span.

For best results, adjust it on the test bench (Fig. 7, top).

Adjusting zero and checking the measuring range:

1. Unscrew the case cover.
2. Adjust zero in the depressurized measuring chamber using the zero adjustment screw (see section 6.2).
3. Apply pressure to the high-pressure measuring chamber until the pointer indicates 100 % while the low pressure connection is open.
4. Read off the adjusted pressure value at the pressure gauge. It corresponds to the current end value of the measuring range.
5. Disconnect the pressure again.

Correcting and modifying the measuring range:

1. Insert an Allen key or a 3 mm ball end hex tool at the side behind the dial plate into the cone-shaped end of the span adjuster.
2. For adjustment, turn the span adjuster upwards or downwards.

   If you want to increase the measuring range, turn the Allen key downwards in the clockwise direction, a little further away from the fulcrum of the toothed segment.
3. Correct zero as described in section 5.1.
4. Pressurize measuring chamber again until the pointer indicates the end value.

5. Check the end value of the measuring range on the pressure gauge.

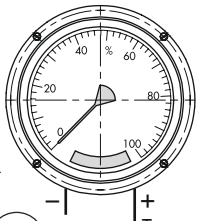
   If it does not correspond with the required measuring range, repeat adjustment procedure until zero and end value are properly adjusted.

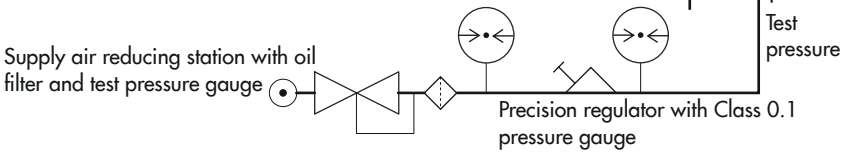
i ***Note***

Be aware that the adjustment is performed on a moving part and, therefore, do not exert any force to it. Do not apply any pressure with the screwdriver in the axial direction. If the spring is mispositioned while adjusting the measuring range and is located on the tag instead of the toothed segment, the pointer goes beyond the 100 % scale range and not to 0 % when there is an input pressure of 0 mbar. In this case, reposition the spring as shown in Fig. 7.

NOTICE

The test medium must free of oil and grease when the device is used to measure oxygen.
Process medium: gaseous oxygen · Max. temperature: +60 °C, max. oxygen pressure: 50 bar
When the device is used for oxygen service, make sure that the dp cell and any SAMSON accessories only come into contact with gaseous oxygen.





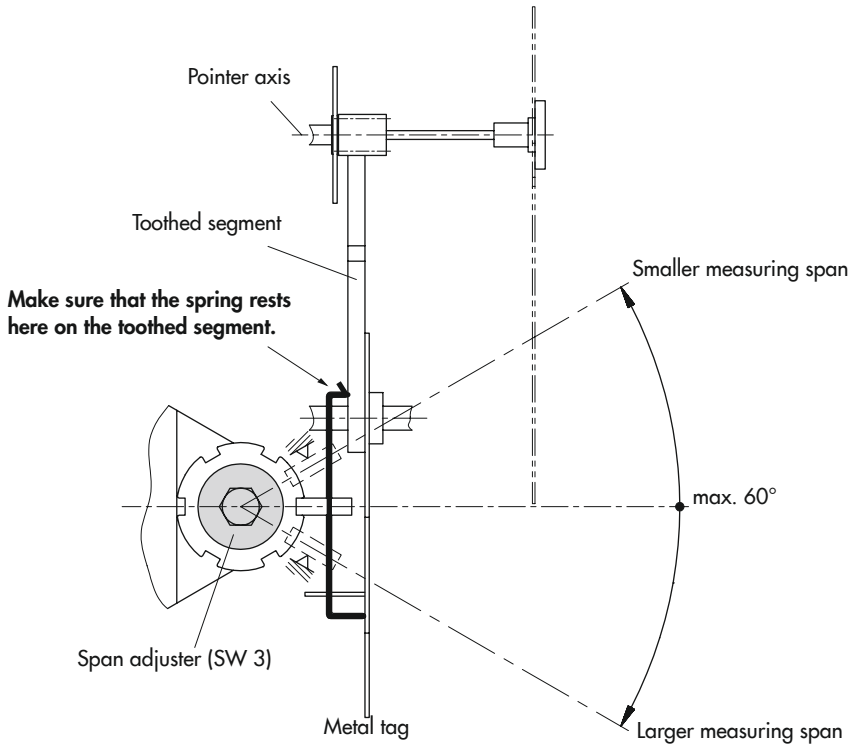


Fig. 7: *Test arrangement and modifying the measuring range*

7 Limit switch (optional)

The option module can be added to the standard version of the Media 5 and installed in the indicating unit.

The limit switch can either be ready installed in the Media 5 device on delivery or retrofitted later.

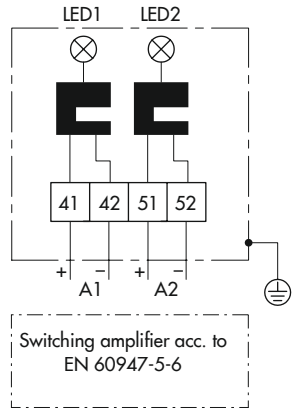
7.1 Electrical connection

The alarm contacts A1, A2 and A3 of the indicator must be connected to an isolating switch amplifier for power supply connection as illustrated in Fig. 8.

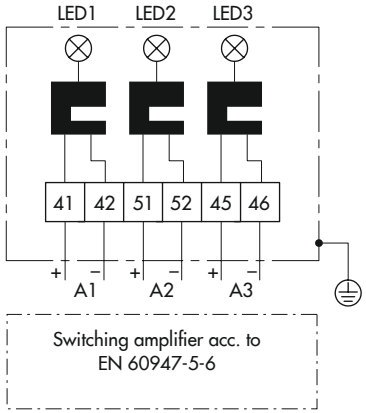
The listed maximum values in the table apply concerning the connection of proximity switches to certified intrinsically safe circuits in the type of protection Ex ia IIC T6 (PTB 99 ATEX 2219 X):

Table 3: *Technical data for limit switch in type of protection Ex ia IIC T6 (PTB 99 ATEX 2219 X)*

Circuit	Type 1			Type 2		
U_i	16 V			16 V		
I_i	25 mA			25 mA		
P_i	34 mW			64 mW		
C_i	50 nF			50 nF		
L_i	250 µH			250 µH		
Temp. class	T6	T5	T4	T6	T5	T4
	73 °C	88 °C	100 °C	66 °C	81 °C	100 °C



Limit switch with **two** alarm contacts – Terminal assignment –



Limit switch with **three** alarm contacts – Terminal assignment –

Fig. 8: *Terminal assignment*

7.2 Adjusting the alarm contacts

The alarm contacts A1, A2 and A3 can be shifted in the assigned adjustment ranges 1.1 and 1.2 or 2.1 and 2.2 using a screwdriver.

Depending on the selected function as a minimum or maximum contact, contact is made when the tag moves into or out of the proximity switch. See 'Overview of functions for alarm contacts' on page 25.

For a more accurate adjustment (test bench), pressurize the measuring chamber to check if the alarm signal is released at the required scale value through the movement of the tag (check the LED of the proximity switch).

If necessary, correct the position of the alarm contact accordingly.

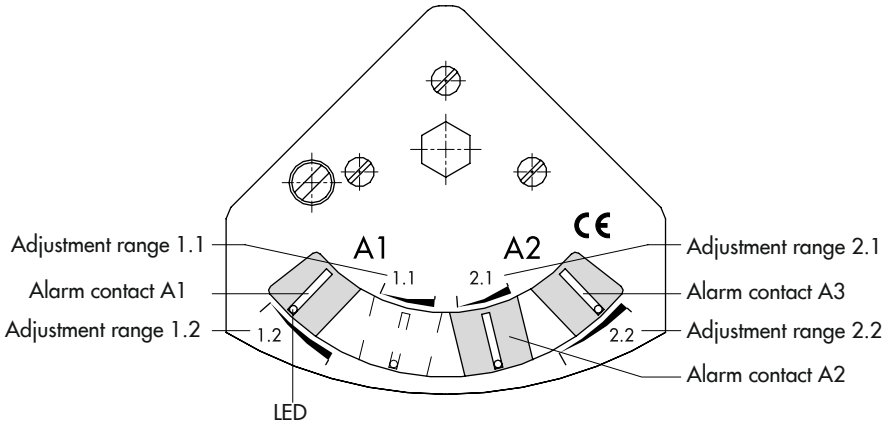


Fig. 9: *Alarm contacts*

Proximity switches with normally closed **function**

Metal tag outside the inductive field (LED on)

Switching signal "ON" (L signal of the proximity switch) · Function: contact closed or output effectively conducting, low resistance (undamped), power consumption ≥ 3 mA

Metal tag inside the inductive field (LED off)

Switching signal "OFF" (0 signal of the proximity switch) · Function: contact open or output effectively non-conducting, high resistance (damped), power consumption ≤1 mA

Overview of functions for alarm contacts

Table 4: *Overview of functions for two alarm contacts A1 and A2*

Overview of functions	Adjustment ranges			
Proximity switch for ...	Min. contact (gas withdrawal)		Max. contact (tank filling)	
Alarm contacts	A1	A2	A1	A2
Metal tag **inside**	1.2	2.1	1.1	2.2
Metal tag **outside**	1.1	2.2	1.2	2.1

Table 5: *Overview of functions for three alarm contacts A1, A2 and A3*

Overview of functions	Adjustment ranges		
Proximity switch for ...	Two min. contacts (gas withdrawal)		One max. contact (tank filling)
Alarm contacts	A1	A2	A3
Activation when metal tag **inside** field	1.2	2.1	2.2

Switching points

Min. contact with decreasing reading

Max. contact with increasing reading

7.3 Retrofitting/replacing the contact unit

The contacts can only be retrofitted or replaced as a complete unit.

Table 6: *RoHS-compliant retrofit contact module for Media 5 · Order numbers*

Retrofit contact module	Function	Order no.
Media 5		
2 inductive limit contacts, SC3,5-NO-BU, acc. to ATEX	Two universal adjustable contacts	1400-8839
3 inductive limit contacts, SC3,5-NO-BU, acc. to ATEX	Two min. and one max. contacts	1400-8840
2 inductive limit contacts, SJ3,5-SN, acc. to ATEX, SIL 3	Two universal adjustable contacts	1402-1772
2 inductive limit contacts, SB3,5-E2-LED, without explosion protection [1)]	Two universal adjustable contacts	1402-1778

[1)] Three-wire version, 10 to 30 V (DC), without isolating switch amplifier, controllable

How to proceed:

1. Unscrew the case cover.
2. Unscrew the two dial plate screws (2) and remove the cover plate. Retighten dial plate screws.

i ***Note***

Before mounting the contact unit, position the alarm contacts A1 and A2 in such a way that one of them rests in the recess of the metal tag and the other one to the side of the tag.

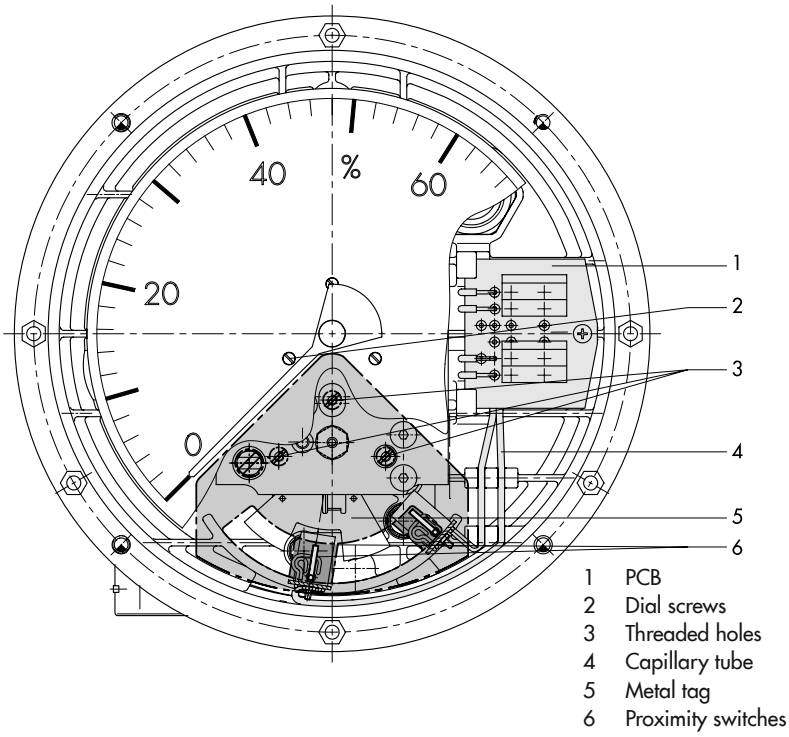


Fig. 10: *Alarm contacts*

3. Insert the contact unit in the measuring unit, ensuring that the spacer sleeves are aligned with the three tapped holes (3) of the indicating unit.
4. Insert M3 screws. Fasten the contact unit, ensuring that the tag can move into the proximity switches without making contact.
5. Place connecting cables (4) in the ducts of the indicating unit housing.
6. Slide the printed circuit board (1) into the bracket and tighten it.
7. Replace the screw plug on the bottom of the housing with the M20x1.5 cable gland.
8. Perform electrical wiring as described in section 6.1 and adjust the contacts as described in section 6.2.
9. Place on the housing case and fasten it.

8 4 to 20 mA current output (optional)

Current firmware version: 1.02

The option module with a 4 to 20 mA current loop can be added to the Media 5 Differential Pressure and Flow Meter. It allows the measured value to be electronically processed for measuring and control tasks. The loop current is proportional to the pressure and is measured from the pointer position of the Media 5 device without any contact or interference.

Fig. 11: *Current output option module installed in the indicating unit*

The option module is installed in the Media 5 device. When ordered together with the Media 5 device, it is installed already in the delivered state. In all other cases, it can be retrofitted by the customer.

The option module is available in versions with or without explosion protection.

0 to 20 mA current output	Material number
No explosion protection	100033844
With explosion protection	100049064

Notes on explosion protection

The option module is available in two different versions:

The following applies to the version **with explosion protection** (100049064):

1. When working on explosion-protected versions of the option module, personnel must undergo special training or instructions or be authorized to work on explosion-protected devices in hazardous areas.
2. The current loop must be supplied only by a supply unit which has an equivalent or higher explosion protection approval. Its electrical connection data must be lower or identical to those in the explosion protection certificate of the Type 5005-3 device.
3. Permission to operate the option module in hazardous areas becomes void after the following events:
   - **One of the permissible electrical values listed in the explosion-protection certificate is exceeded, even when only briefly.** To continue operation of the option module in hazardous areas in such cases, SAMSON or persons with corresponding qualifications must provide evidence that all safety/ protection features within the device or module are fully effective.

– **The specifications described in 2. for the supply unit are not observed.** Operation of the option module must not be continued in such cases. The option module must be replaced.

The following applies to the version **without explosion protection** (100037024):

– Use of the option module in hazardous areas is not permissible.

8.1 Retrofitting

The retrofit kit includes the following parts:

1 Printed circuit board with operating controls
2 Terminal board
3 Magnetoresistive measuring system with mating plate
4 Self-adhesive dot on film
5 Cable gland
6 Nameplate (label)

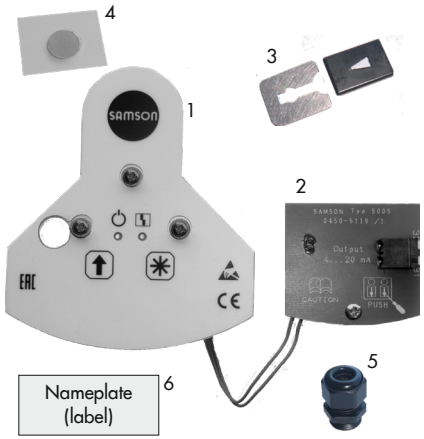
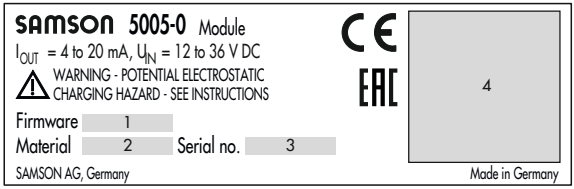


Fig. 12: *Current output option module*

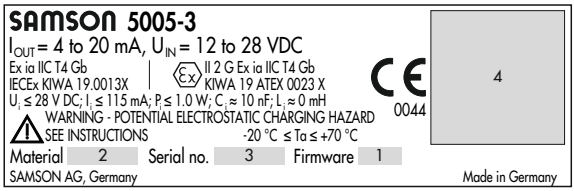
8.2 Nameplate

A self-adhesive nameplate is included in the retrofit kit for the option module. It must be affixed to the indicating unit after the option module is installed. A nameplate is already affixed when the option module is already installed upon delivery (see Fig. 13).

Nameplate of version without explosion protection:



Nameplate of version with explosion protection:



1 Firmware version
2 Material number
3 Serial number
4 QR code to go to product documentation

Fig. 13: *Nameplates of the 4 to 20 mA current output*

8.3 Technical data

4 to 20 mA current output	Module 100049064 with explosion protection [1]	Module 100037024 without explosion protection
Version	Magnetoresistive measuring system	
Supply voltage U_B	12 to 28 V DC	12 to 36 V DC
Output signal	4 to 20 mA, two-wire system according to DIN 66258	
Perm. load R_B in Ω	$R_B = (U_B - 12\ V)/0.020\ A$ | (R ≤600 Ω at 24 V and 20 mA)	
Power consumption	0.252 mW for 12 V DC and 21 mA	
Settings	Zero calibration | Span calibration | Characteristic selection | Test function	
Characteristic	Output and reading linear or square root extraction depending on installed flow characteristic Characteristic set at the factory	
Deviation from terminal-based linearity	<±0.2 %, related to 270° measuring span	
Sensitivity	<±0.05 %, related to 270° measuring span	
Effect of ambient temperature in the range from –40 to +80 °C	<0.1 %/10 K for zero and span	
Type of protection	ATEX: II 2 G Ex ia IIC T4 Gb IECEx: Ex ia IIC T4 Gb	–
Conformity	CE · EAC	

[1] The technical data for the explosion-protected devices may be restricted by the limits specified in the test certificates.

8.4 Installing the option module

⚠ DANGER

Risk of fatal injury due to the ignition of an explosive atmosphere.

➔ *For mounting and electrical installation in hazardous areas, observe the explosion protection approvals as well as the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use. EN 60079-14 applies in Europe.*

➔ *Installation, operation or maintenance of the differential pressure meter must only be performed by personnel with qualifications according to Clause 4.5 of IEC 60079-14 who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.*

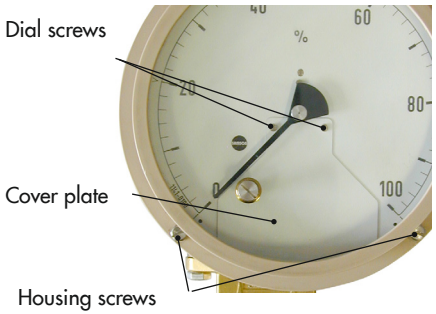
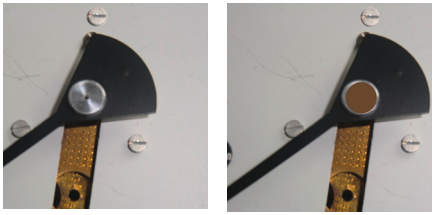


Fig. 14: *Standard version of Media 5 · Indicating unit with cover plate*

1. Undo the four housing screws. Remove the housing cover.
2. Unscrew the two dial plate screws and remove the cover plate. Retighten dial plate screws.
3. Place the magnetoresistive measuring system on the pointer.
   - Self-adhesive dot on film: pull off brown backing.
   - Stick the film with self-adhesive dot, adhesive side facing downward, centrally on the pointer axis.
   - Pull off film. Make sure that the self-adhesive dot remains stuck on.
   - Place the magnetoresistive measuring system, with the **arrow** pointing toward the **pointer**, onto the pointer axis. Press it down.



Pointer axis before attachment

Pointer axis with self-adhesive dot · Film pulled off

Fig. 15: *Attaching the magnetoresistive measuring system*

4. Turn the pointer from the zero position to the approx. 90° position.

5. Slide the mating plate underneath the pointer and magnetoresistive measuring system to fasten the elements together. Make sure it fits properly. Pay attention to the counterweight at the end of the pointer.

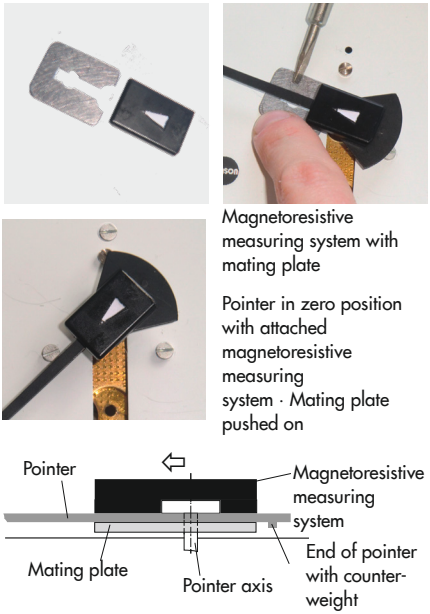


Fig. 16: *Fixing the magnetoresistive measuring system*

6. If the terminal board has not yet been connected, connect the connecting cable and connector at the back of the printed circuit board.

   Plug the micro connector into the socket on the printed circuit board.

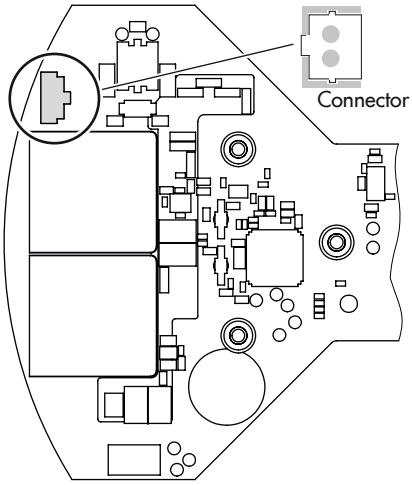


Fig. 17: *Back of the printed circuit board · Connector for the terminal board*

7. Place on the current output option module with connected terminal board in place of the cover plate.

Fig. 18: *Current output option module · Fastening screws*

8. Fasten the option module using the three fastening screws (Phillips Z1)
9. Insert the terminal board at the side underneath the dial plate.

   Use Phillips screwdriver to tighten the retaining screw.
10. Insert the connecting cable into the guiding of the indicating unit.

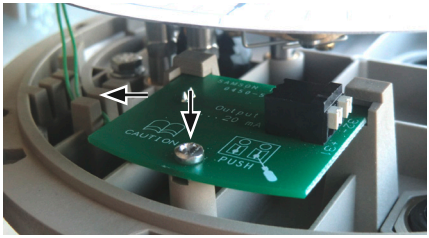


Fig. 19: *Inserting the terminal board*

11. Guide the measuring signal lines (min. 8 mm stripped length) through the cable gland and connect them to the spring-cage terminal (31, 32) on the terminal board (see Fig. 20). Observe the correct polarity.

Measuring signal connection

The option module with current output is designed as a two-wire system.

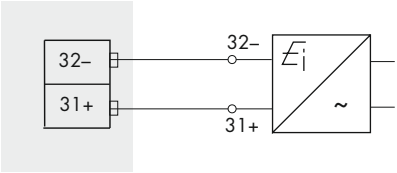


Fig. 20: *Measuring signal connection in two-wire system*

The option module consists of an actively controlled current loop with a 4 to 20 mA loop current. This current depends on the position of the pointer on the Media 5 device:

– Pointer position 0 to 270° corresponds with the 4 to 20 mA loop current.

The measuring signal and supply voltage of the option module are transmitted by the same pair of wires. It is connected to the terminal board over two spring-cage terminals.

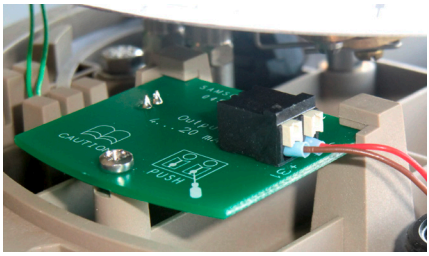


Fig. 21: *Connecting the measuring signal lines on the terminal board*

The Media 5 Differential Pressure and Flow Meter supplies a 4 to 20 mA current regardless of the supply voltage.

NOTICE

Risk of the supply voltage falling lower than the required level due to the use of a shunt.

➔ *To maintain the functioning of the option module when a shunt is used, apply the following formula to take the loop voltage into account:* $U_{Loop\text{-}min} = 12\ V + (R_{shunt} \times 21\ mA)$

8.5 Setting the option module

The option module has a **green** LED (1) and a **red** LED (2) as well as a ⬆ key (3) and ✳ key (4) to perform settings.

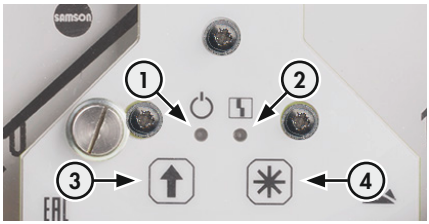


Fig. 22: *Operating controls*

Green LED	**Status indication** (standard operation)
Red LED	**Error indication** (LED permanently on) Press ✳ key to confirm. The unit is restarted.
✳ key	**Execute/confirm** The **red** LED blinks briefly once to indicate that a function is being performed. After completion, the unit returns to standard operation.
⬆ key	**Select function/data**

The **green** LED indicates standard operation of the option module. Four different levels can be selected.

Press the ⬆ key to change between levels. The LED blinking pattern indicates which level has been selected.

Level	Blinking pattern
Zero calibration	▮ ▮ ▮
Span calibration	▮▮ ▮▮
Characteristic	▮▮▮ ▮▮▮ ▮▮▮
4 mA/20 mA ammeter	▮▮▮▮ ▮▮▮▮ ▮▮▮▮

Zero calibration

The electric zero is adapted to the mechanical zero. As a result, a 4 mA signal is also issued at Δp = 0 bar corresponding to the pointer's zero point.

Zero can be calibrated in the scale range between approx. –5° and 135° (see Fig. 23).

Activate ***zero calibration*** level

Key	LED	Function
1x⬆ key	**Green**	Blinking pattern ▮ ▮ ▮
✳ key	**Red**	Zero calibration active The **red** LED blinks briefly once to indicate that calibration is in progress. Current pointer position ≙ 4 mA.
	Green	Change to standard operation

The **red** LED is permanently lit (error indication) if the calibration range is exceeded.

Span calibration

The measuring span can be calibrated continuously without affecting zero or the measuring accuracy (see Fig. 23). The pointer position corresponds to the end point with 20 mA output signal.

As a result, the end points can easily be adapted to the measured medium, especially when attachable or multiple dial plates are used.

A measuring span calibration is possible in the pointer range **>95°** (based on the pointer's zero point, see Fig. 23).

The **red** LED is permanently lit (error indication) if the calibration range is exceeded.

Activate ***span calibration*** level

Key	LED	Function
2x⬆ key	**Green**	Blinking pattern ▮▮ ▮▮
✳ key	**Red**	Span calibration active The **red** LED blinks briefly once to indicate that calibration is in progress. Current pointer position ≙ 20 mA.
	Green	Change to standard operation

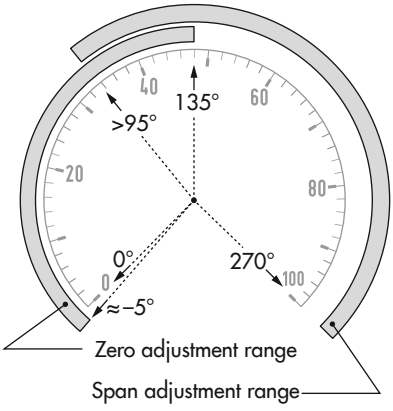


Fig. 23: *Zero and span calibration ranges*

Characteristic

Three characteristics are available.

– Linear ▮ ▮ ▮
– Root-extracting ▮▮ ▮▮
– User-defined ▮▮▮ ▮▮▮ ▮▮▮ (factory setting)

Activate ***characteristic*** level

Key	LED	Function
3x⬆ key	**Green**	Blinking pattern ▮▮▮ ▮▮▮ ▮▮▮
✳ key	**Red**	The blinking pattern indicates which characteristic is currently selected.
⬆ key	**Red**	Every time the key is pressed, the blinking pattern changes: ▮ ▮ ▮ ⬆ ▮▮ ▮▮ ⬆ ▮▮▮ ▮▮▮ ▮▮▮ Blinking pattern ≙ Characteristic.
✳ key	**Red**	Confirm.
	Green	Change to standard operation

4 mA/20 mA ammeter

To calibrate the assessment unit, 4 and 20 mA test signals are issued.

Activate ***4 mA/20 mA ammeter*** level

Key	LED	Function
4x⬆ key	**Green**	Blinking pattern ▮▮▮▮ ▮▮▮▮ ▮▮▮▮
✳ key	**Red**	Blinking pattern ▮ ▮ ▮ ≙ 4 mA output.
⬆ key	**Red**	Blinking pattern ▮▮ ▮▮ ≙ 20 mA output.
✳ key	**Red**	Exit function.
	Green	Change to standard operation

Canceling operation

Operation can be canceled at all times without data being saved.

➔ Press ⬆ key together with the ✳ key:

The option module returns to standard operation.

Error message

A permanently lit **red** LED indicates an error (e.g. zero or span calibration range exceeded, ammeter defective).

➔ Press ✳ key to confirm.

The option module is restarted and goes into standard operation.

Operation timeout

If no key is pressed within three minutes while a level is active, the unit automatically returns to standard operation.

The option module returns to standard operation.

8.6 Servicing explosion-protected devices

➔ Observe the following for servicing equipment in a section relevant for explosion protection:

- It must not be put back into operation until a qualified inspector has assessed the equipment according to explosion protection requirements, has issued an inspection certificate or given the device a mark of conformity. Inspection by a qualified inspector is not required if the manufacturer performed a routine test on the device before putting it back into operation. Document the passing of the routine test by attaching a mark of conformity to the device.
- Replace explosion-protected components only with original, routine-tested components by the manufacturer.
- Devices that have already been used outside hazardous areas and are intended for future use inside hazardous areas must comply with the safety requirements placed on serviced devices. They must be subjected to testing according to the specifications in EN 60079-19.
- EN 60079-19 applies to servicing explosion-protected devices.
- Use the protective cable designed by SAMSON when interconnecting non-intrinsically safe set point calibrators with intrinsically safe equipment for repair, calibration etc. to ensure that components relevant to explosion protection are not damaged.

9 Dial faces

Dial face versions (see ▶ T 9545)

In addition to the dial plates according to EN 837 shown in Fig. 24, the dial faces can be designed in various indication ranges and sizes:

- With linear or square root graduation
- Customized inscriptions
- A maximum of four attachable dial plates supplied with the meter for various media and applications
- Units, such as m^3, kg, liter, %, mmWS, inchH_2O, mbar, bar, m^3/h, kg/min etc.
- Others customized details

Fig. 24: *Media 5 with dial face according to EN 837*

This allows, for example customized dials for filling level measurement to be calculated based on the tank geometry data.

The customized dial face is adapted to the specified application range.

9.1 Attachable dial plates

To allow the indicator to be used for several applications, SAMSON offers exchangeable dial plates. They are delivered with the device to match the application.

This way the indicator can be fitted with up to five different dial plates. In this case, to adapt indicator to a special application, place the attachable dial plate over the main dial face.

The associated attachable dial plates are stored behind the main dial face.

Inserting the attachable dial plate

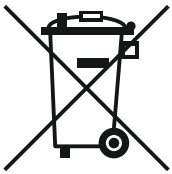
1. To remove the housing cover, loosen the four hex screws (housing screws).
2. Remove the housing cover.
3. Select suitable dial plate and push it over the front dial face. Use the three pins on the main dial face to position the dial plate.

Note

*A cover plate (if mounted) must **not** be removed.*
*For the version with limit switch or current output, the contact unit must **not** be removed as well.*

4. Place on the housing cover and fasten it.
5.

10 Disposal



We are registered with the German national register for waste electric equipment (stiftung ear) as a producer of electrical and electronic equipment, WEEE reg. no.: DE 62194439

➔ Observe local, national and international refuse regulations.

➔ Do not dispose of components, lubricants and hazardous substances together with your other household waste.

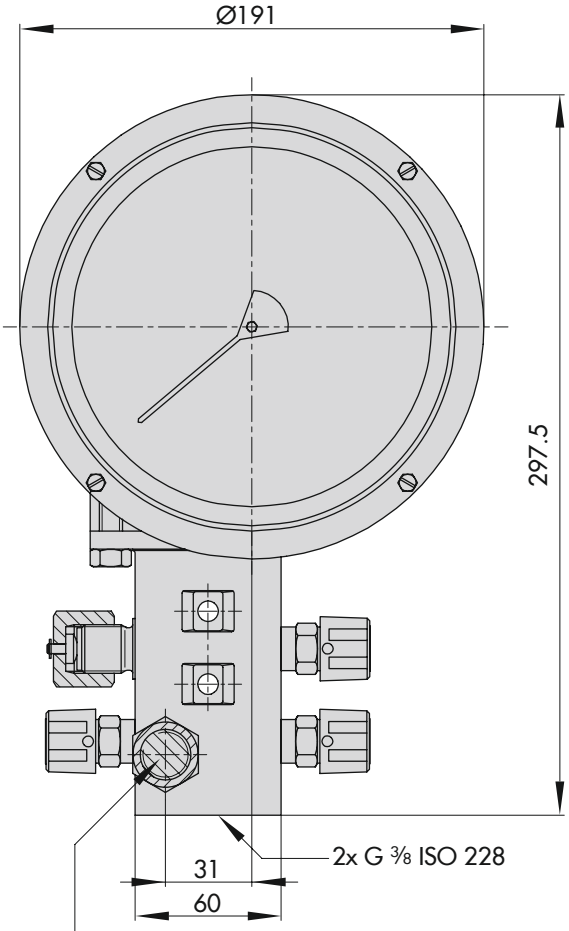
Note

We can provide you with a recycling passport according to PAS 1049 on request. Simply e-mail us at aftersalesservice@samsongroup.com giving details of your company address.

Tip

On request, we can appoint a service provider to dismantle and recycle the product.

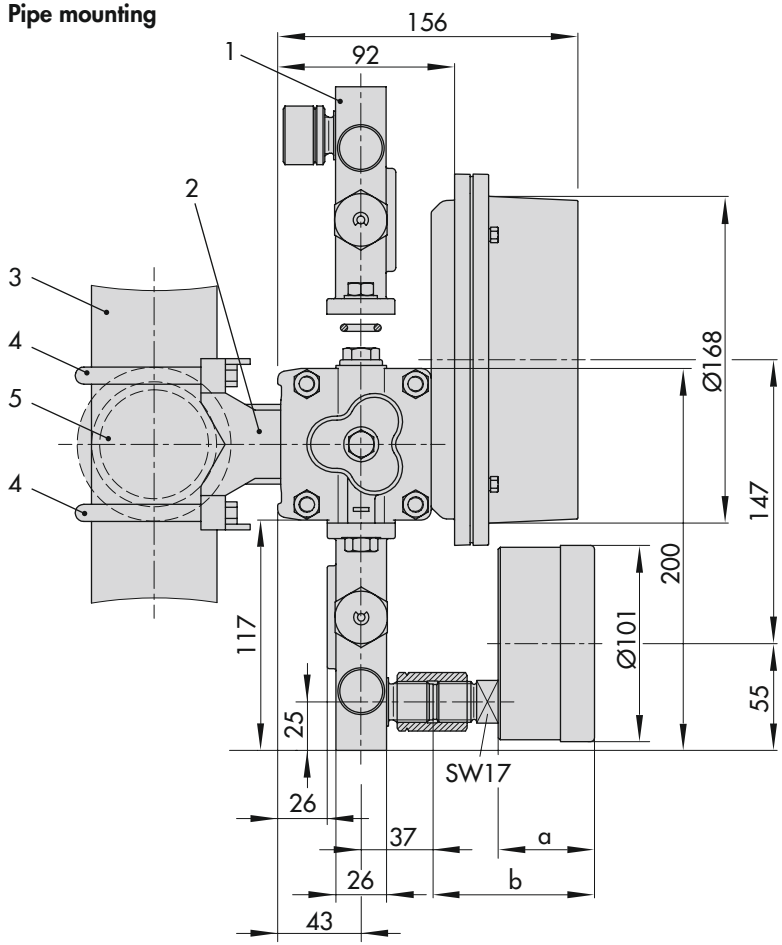
11 Dimensions



Pressure gauge connection

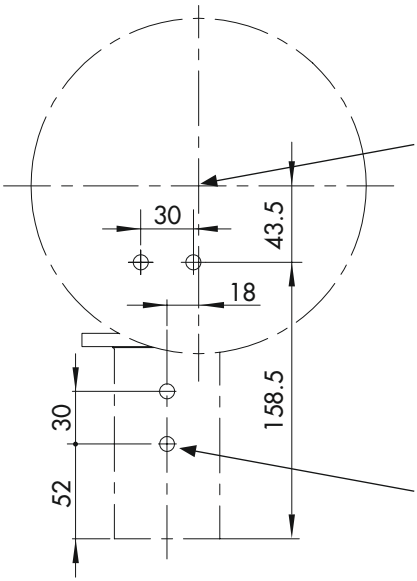
For pressure gauge NG 100 · Male thread G ½ B-LH with coupling sleeve G ½, DIN 16283 and 12x2 O-ring for pressure gauge NG 63, G ¼ female thread with seal

Pipe mounting



1 Valve block for upside down mounting
2 Mounting part
3 Vertical pipe
4 Clamp
5 Horizontal pipe

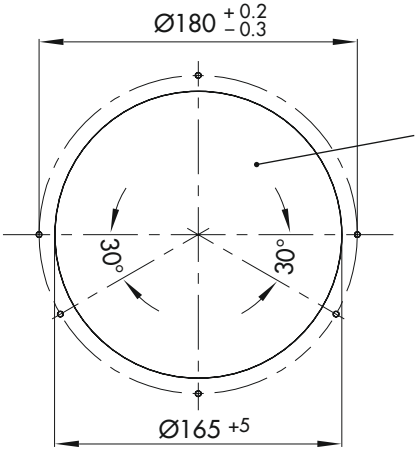
Wall/panel mounting



Center of the indicator unit

Two Ø8.5 mm holes for fastening to the valve block (M8 screws)

Panel mounting



Panel cut-out

Six M4 tapped holes or Ø4.5 mm holes for hex bolts with M4 nuts. Optionally 3 x 120° or 4 x 90° can be used.

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EU Konformitätserklärung / EU Declaration of Conformity / Déclaration UE de conformité

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller/
This declaration of conformity is issued under the sole responsibility of the manufacturer/
La présente déclaration de conformité est établie sous la seule responsabilité du fabricant.

Für das folgende Produkt / For the following product / Nous certifions que le produit

Differenzdruck- und Durchflussmesser Media 5 und Media 05 /
Differential Pressure and Flow Meter Media 5 and Media 05 /
Mesure de pression différentielle et de débit Media 5 ou Media 05
Typ/Type/Type 5005

wird die Konformität mit den einschlägigen Harmonisierungsrechtsvorschriften der Union bestätigt /
the conformity with the relevant Union harmonisation legislation is declared with/
est conforme à la législation d'harmonisation de l'Union applicable selon les normes:

EMC 2014/30/EU	EN 61000-6-2:2005, EN 61000-6-3:2007 +A1:2011, EN 61326-1:2013
RoHS 2011/65/EU	EN 50581:2012

Hersteller / Manufacturer / Fabricant:

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Deutschland/Germany/Allemagne

Frankfurt / Francfort, 2017-07-29

Im Namen des Herstellers/ On behalf of the Manufacturer/ Au nom du fabricant.

i.V. Gert Nahler

Gert Nahler
Zentralabteilungsleiter/Head of Department/Chef du département
Entwicklung Automation und Integrationstechnologien/
Development Automation and Integration Technologies

i v. H. Zager

Hanno Zager
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Responsable de l'assurance de la qualité

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Revison 07

SMART IN FLOW CONTROL

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Für das folgende Produkt / For the following product / Nous certifions que le produit

Differenzdruck- und Durchflussmesser Media 5 /
Differential Pressure and Flow Meter Media 5 /
Mesure de pression différentielle et de débit Media 5
Typ / Type / Type 5005
Option 4-20 mA

wird die Konformität mit den einschlägigen Harmonisierungsrechtsvorschriften der Union bestätigt /
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