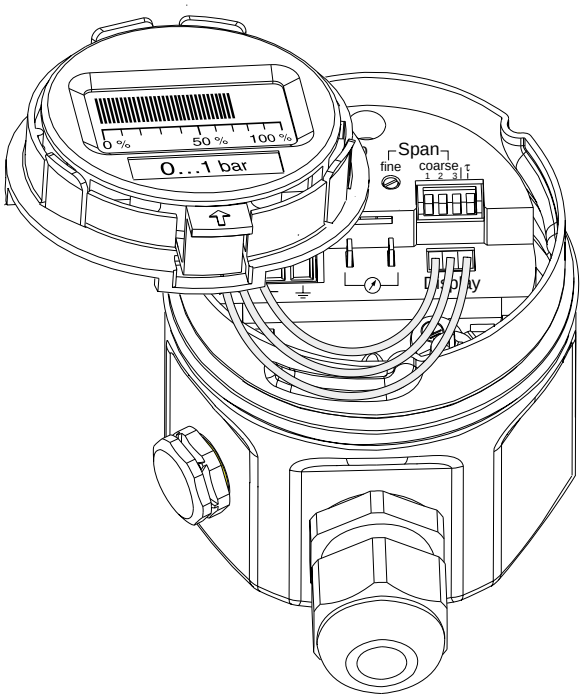
BA 200O/98/en/07.01
Software version 1.0
52011569

Barcon Pressure Transmitter
Barcon PPC (with analogue electronics)
Barcon LHC (with analogue electronics)

Operating Instructions



PEPPERL+FUCHS

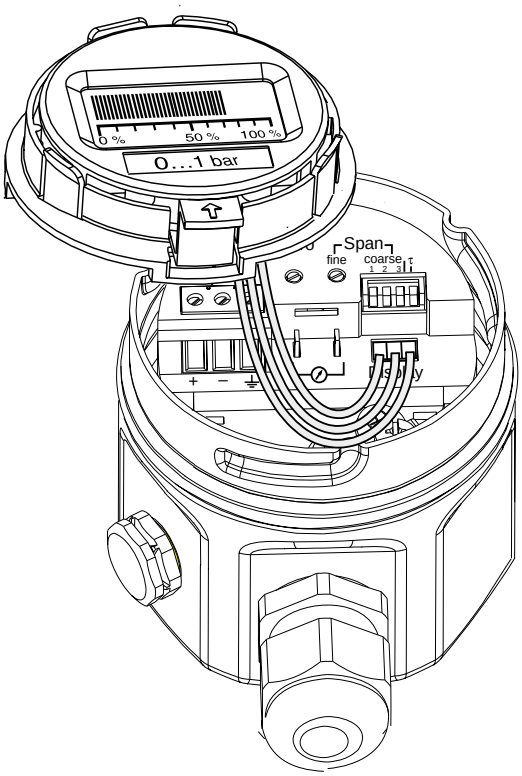
Short operating instructions

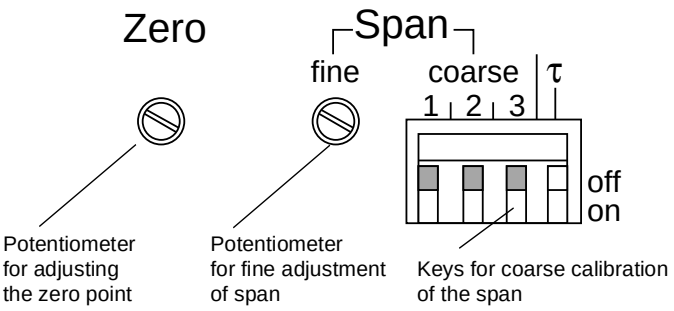
Analogue display

(Response of the analogue display see page 23)

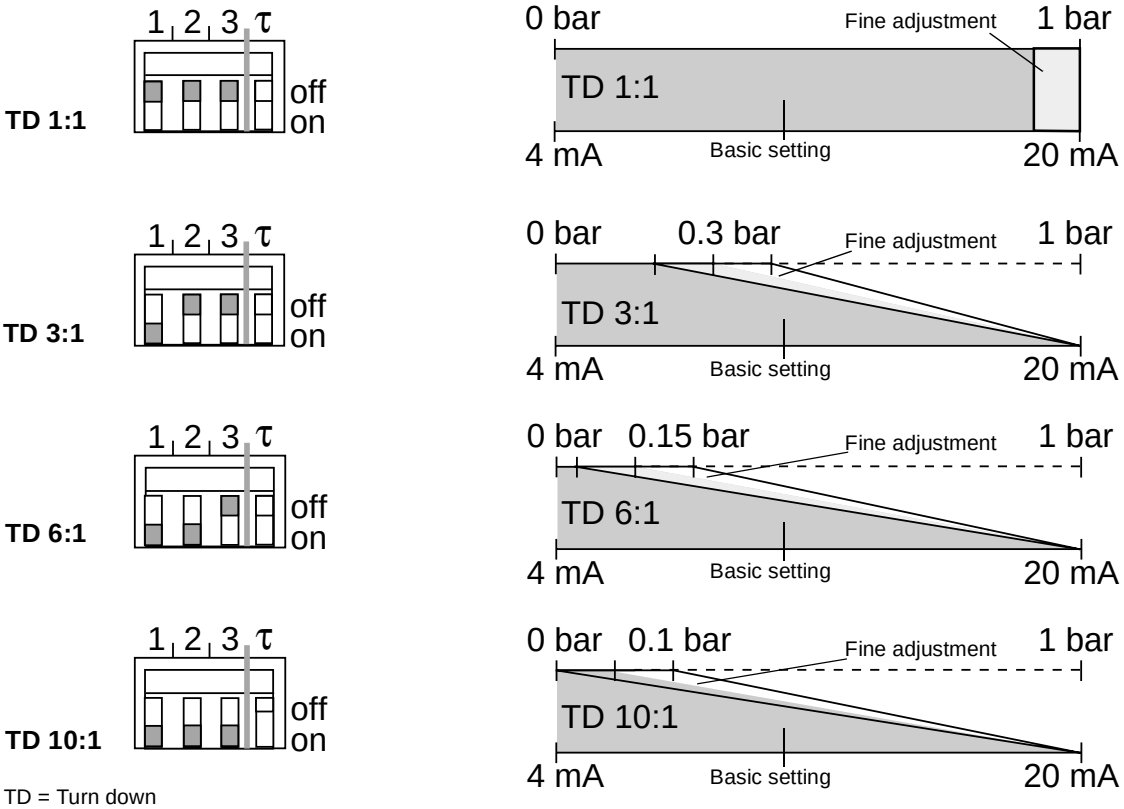
Operating elements

(function of the operating elements see page 21)





The analogue display shows the pressure as a ratio of the measuring range on the bargraph.



TD = Turn down
(measuring range spread)

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Notes on safety

Approved usage

The Barcon is a pressure transmitter for measuring gauge or absolute pressure depending on the version.

Mounting, commissioning, operation

The Barcon has been designed to operate safely in accordance with current technical, safety and EU standards. If installed incorrectly or used for applications for which it is not intended, however, it is possible that application-related dangers may arise, e. g. product overspill by incorrect installation or adjustment. For this reason, the instrument must be installed, connected, operated and maintained by personnel that are authorised by the user of the facility and who are suitably qualified. The manual is to be read and understood, and the instructions followed. Modifications and repairs to the device are permissible only when they are expressly approved in the manual.

Explosion-hazardous area

The measuring system used in the explosion-hazardous area must comply with all existing national standards. The instrument can be supplied with the following certificates as listed in the table. The certificates are designated by the last letters of the order code on the nameplate (see table below).

Ensure that technical personnel are sufficiently trained.

All measurement and safety regulations which apply to the measuring points are to be observed.

PEPPERL+FUCHS

Typecode Barcon: □□□-□□□-□□□□-□□□□-□□□□□-□□

Code	Certificate	Protection
NA	Standard	None
EX	ATEX	ATEX II 1/2 G EEX ia IIC T6
E1	ATEX	ATEX II 2 G EEX ia IIC T6
SX	ATEX	ATEX II 1/2 D EEX ia IIC T6
S2	ATEX	ATEX II 1/3 D (non- Ex power supply)
E2	ATEX	ATEX II 3 G EEx nV IIC T5 (Zone 2)
CG	CSA	General Purpose
C1	CSA	CSA IS (suitable for Div. 2) Cl. I, II, III, Div. 1, Groups A…G
CD	CSA	CSA Cl. I, Div. 2, Groups A …D, Cl. II, III, Div. 1, Groups E…G
FM	FM	FM IS (non incendive) Cl. I, II, III, Div. 1, Groups A…G
FD	FM	FM DIP, Cl. II, III, Div. 1, Groups A…G
TI	TIIS	TIIS Ex ia IIC T6

Table S.1 Certificates for applications in explosion hazardous areas

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Safety conventions

In order to highlight safety-relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding icon in the margin.

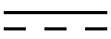
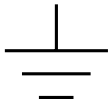
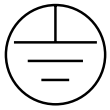
Safety conventions

Symbol	Meaning
 Note!	**Note!** A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned
 Caution!	**Caution!** Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument
 Warning!	**Warning!** A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument

Explosion protection

	**Device certified for use in explosion hazardous area** If the device has this symbol embossed on its name plate it can be installed in an explosion hazardous area
	**Explosion hazardous area** Symbol used in drawings to indicate explosion hazardous areas. • Devices located in and wiring entering areas with the designation "explosion hazardous areas" must conform with the stated type of protection
	**Safe area (non-explosion hazardous area)** Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. • Devices located in safe areas stiill require a certificate if their outputs run into explosion hazardous areas.

Electrical symbols

	**Direct voltage** A terminal to which or from which a direct current or voltage may be applied or supplied
	**Alternating voltage** A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied
	**Grounded terminal** A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system
	**Protective grounding (earth) terminal** A terminal which must be connected to earth ground prior to making any other connection to the equipment
	**Equipotential connection (earth bonding)** A connection made to the plant grounding system which may be of type e. g. neutral star or equipotential line according to national or company practice

1 Introduction

Application

The Barcon PPC and the Barcon LHC pressure transmitter measures the pressure of gases, vapours and liquids and is used in all areas of chemical and process engineering.

Operating principle

Ceramic sensor

The system pressure acts directly on the rugged ceramic diaphragm of the pressure sensor deflecting it by a maximum of 0.025 mm (0.0098 in). A pressure-proportional change in the capacitance is measured by the electrodes on the ceramic substrate and diaphragm. The measuring range is determined by the thickness of the ceramic diaphragm.

Metal sensor

The process pressure deflects the separating diaphragm with a filling liquid transmitting the pressure to a resistance bridge. The bridge output voltage, which is proportional to pressure, is then measured and processed.

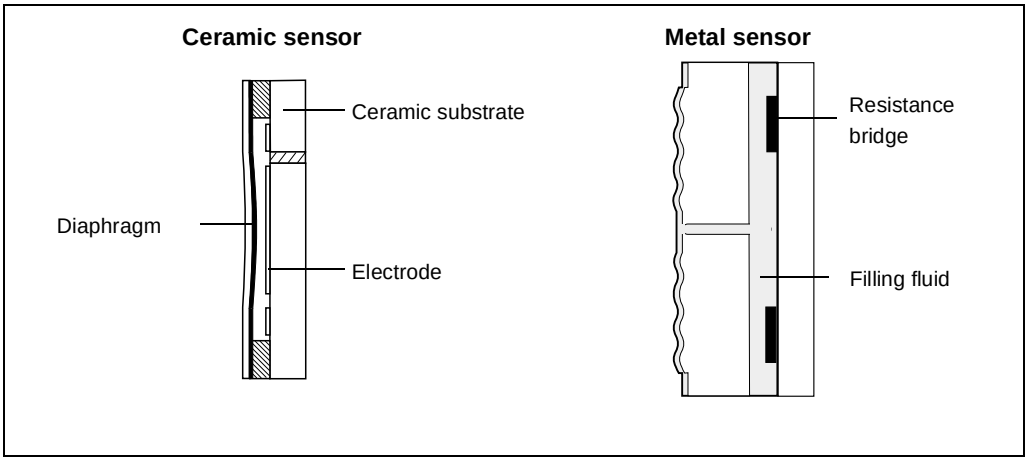


Fig. 1.1: Construction of the sensor

Measuring system

The complete measuring system in a simple application consists of

- a Barcon pressure transmitter with 4 mA … 20 mA signal output and
- a power supply of 11.5 V … 45 V DC.

An optional analogue display can be directly plugged onto the electronic insert using a holder. It shows the pressure on a bargraph as a ratio of the measuring range.

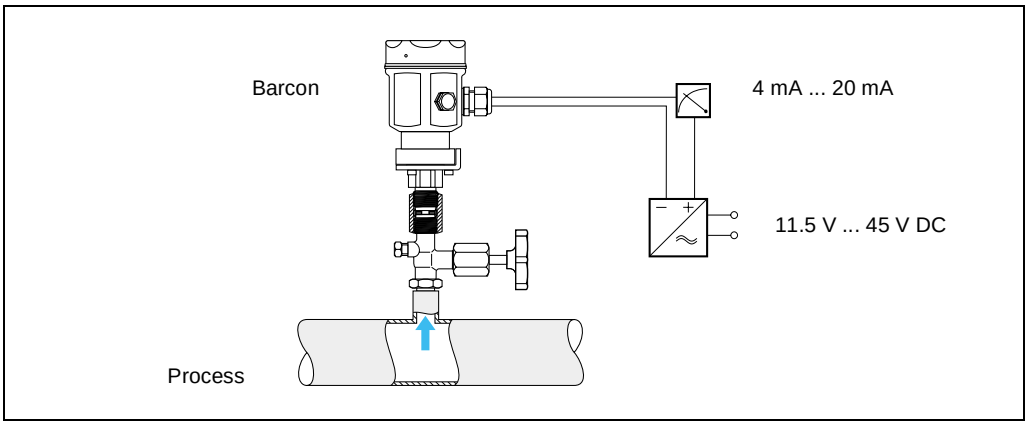


Fig. 1.2: Measuring system

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2 Installation

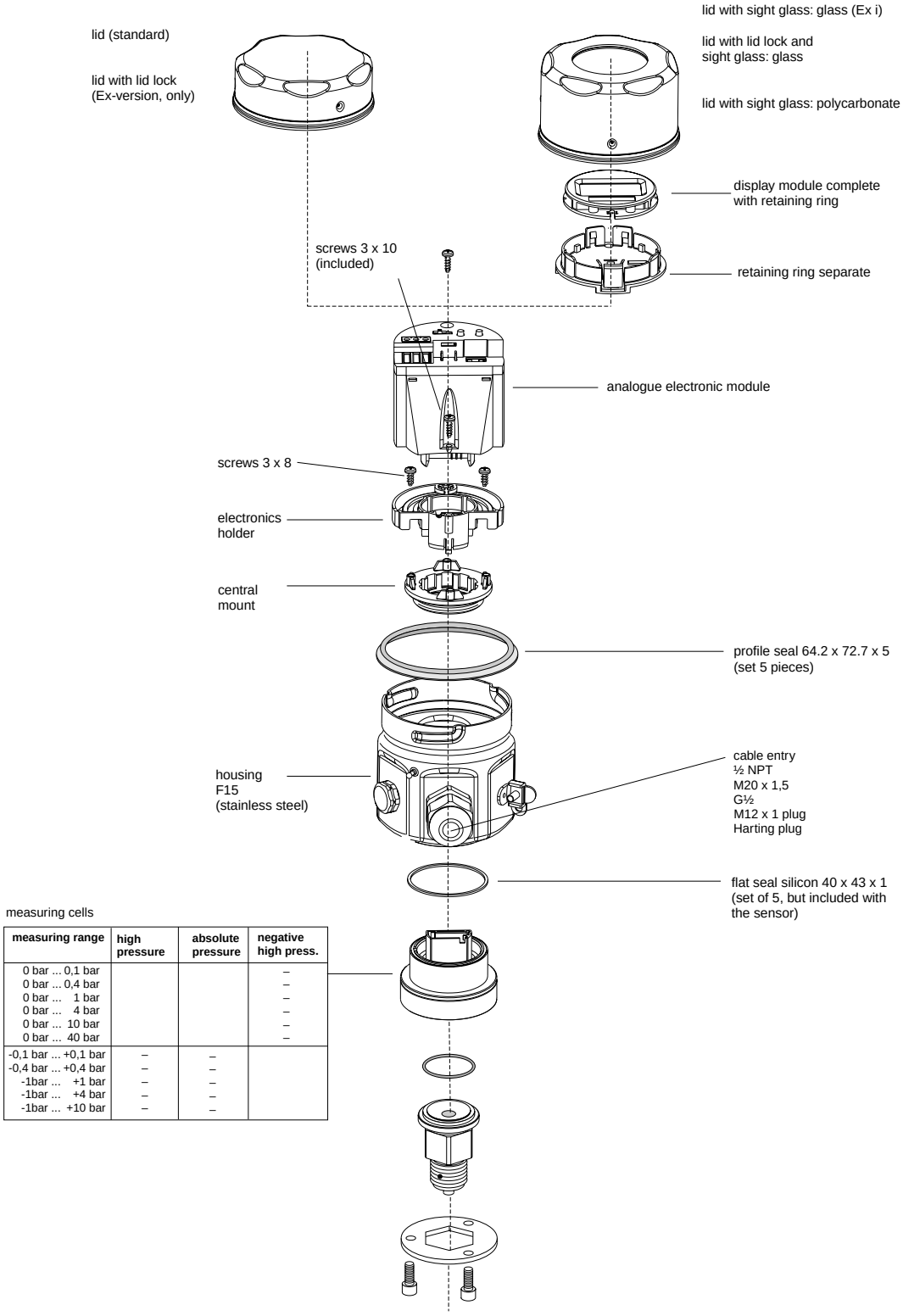
This section describes:

Contents

- the mechanical design of Barcon,
- the mechanical installation of Barcon with and without diaphragm seal,
- the electrical connection.

2.1 Mechanical design of devices

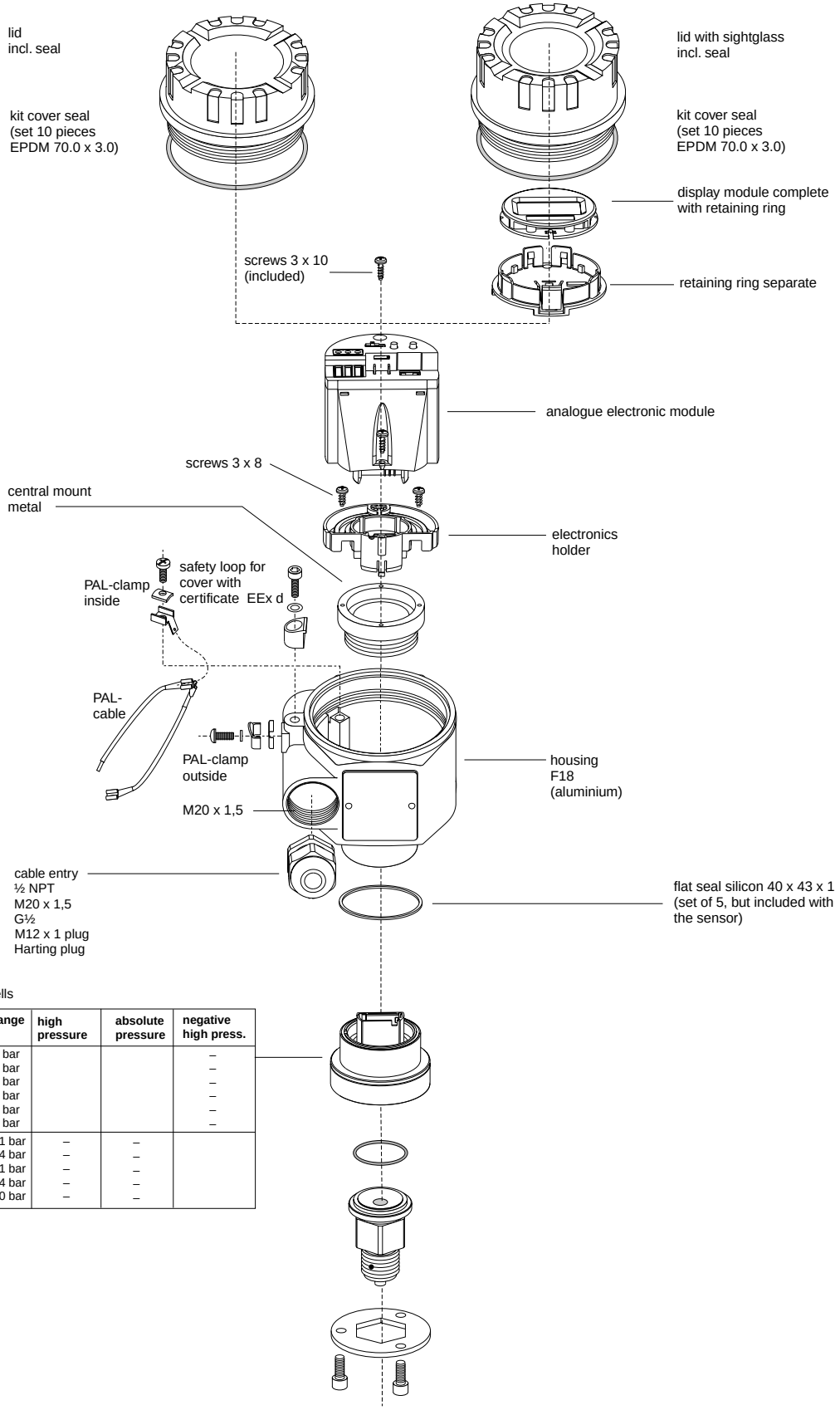
Mechanical design of Barcon with stainless steel housing



measuring cells

measuring range	high pressure	absolute pressure	negative high press.
0 bar ... 0,1 bar			–
0 bar ... 0,4 bar			–
0 bar ... 1 bar			–
0 bar ... 4 bar			–
0 bar ... 10 bar			–
0 bar ... 40 bar			–
-0,1 bar ... +0,1 bar	–	–	
-0,4 bar ... +0,4 bar	–	–	
-1bar ... +1 bar	–	–	
-1bar ... +4 bar	–	–	
-1bar ... +10 bar	–	–	

Mechanical design of Barcon with aluminium housing



measuring cells

measuring range	high pressure	absolute pressure	negative high press.
0 bar ... 0,1 bar			–
0 bar ... 0,4 bar			–
0 bar ... 1 bar			–
0 bar ... 4 bar			–
0 bar ... 10 bar			–
0 bar ... 40 bar			–
-0,1 bar ... +0,1 bar	–	–	
-0,4 bar ... +0,4 bar	–	–	
-1bar ... +1 bar	–	–	
-1bar ... +4 bar	–	–	
-1bar ... +10 bar	–	–	

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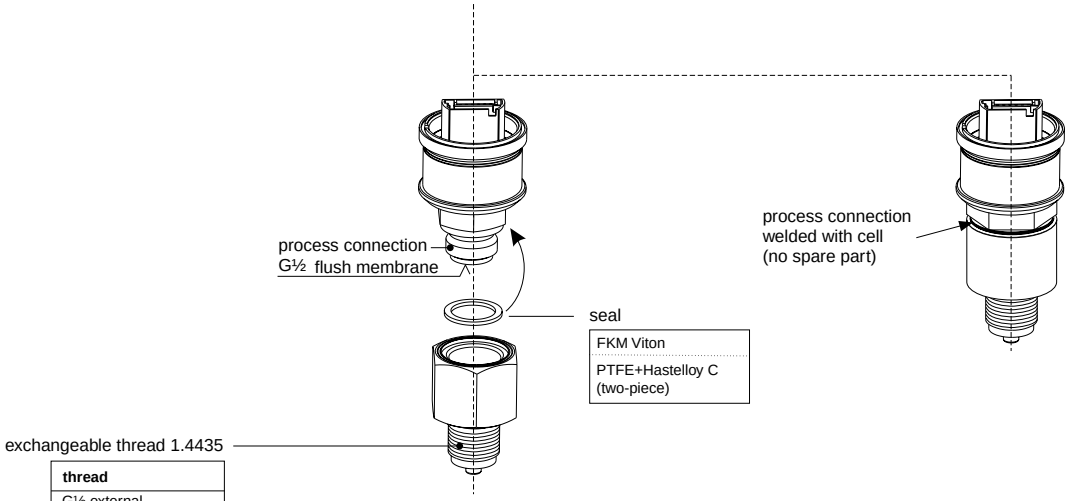
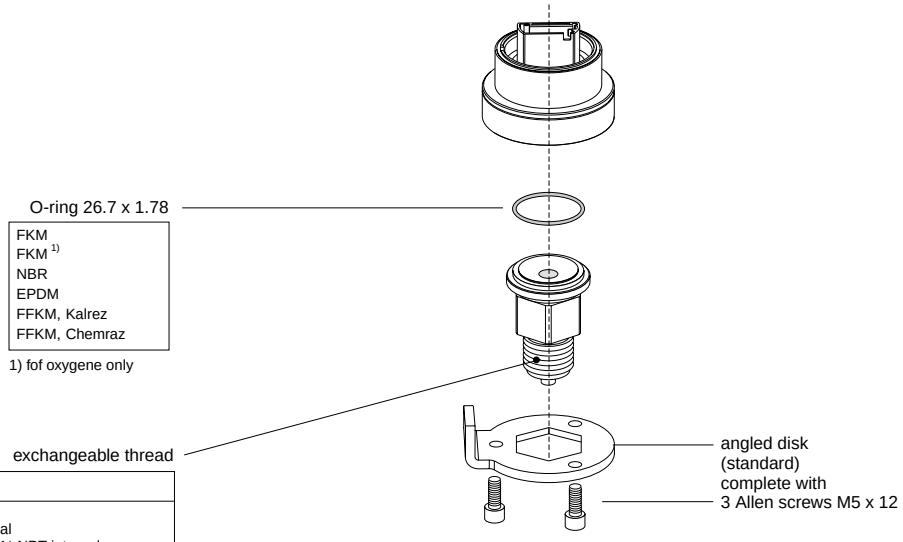
Process connection PPC-M10



thread
G½ external
½ NPT external
½ NPT internal
PF ½ external
PT ½ external
M20 x 1,5 external

Process connection PPC-M20

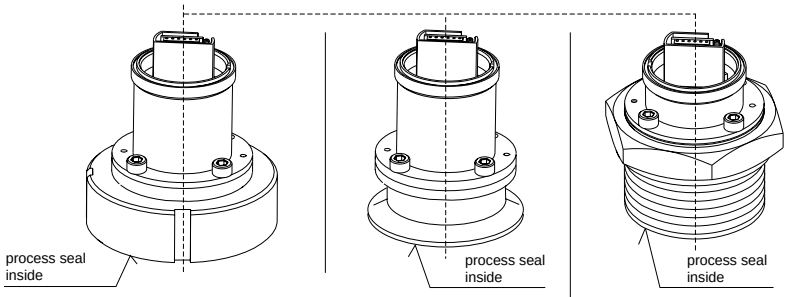


FKM
FKM [1)]
NBR
EPDM
FFKM, Kalrez
FFKM, Chemraz

1) fof oxygene only

thread
G½ external
M20 x 1.5 external
½ NPT external, ¼ NPT internal
½ NPT internal, 11.4 mm internal
PT ½ external
G½ external, G¼ internal
G½ external, 11.4 mm internal
PF ½ external
G½ external, Hastelloy
½ NPT external, ¼ NPT internal, Hastelloy

Process connection LHC-M20



measuring cell with sanitary couplings 1.4435

DIN 11851, DN 50
DIN 11851, DN 40
DIN 11864-1-A DN 40
DIN 11864-1-A DN 50
SMS 1½"
SMS 2"

Clamp 2"
Varivent 68 mm
DRD D = 65 mm
APV Inline PN 40

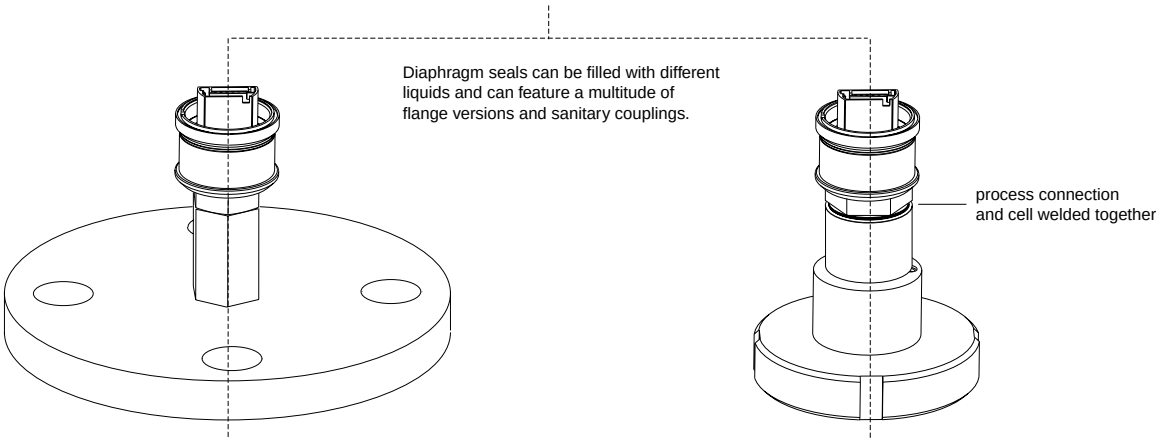
threaded boss 1.4435

G2
2 NPT

process seals of the membrane O-rings 26.7 x 1.78		FKM FFKM Kalrez FKM[1)]	
	FDA listed	EPM NBR	

1) for oxygene only

Process connection LHC-M40



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2.2 Mounting instructions without diaphragm seal

Barcon without diaphragm seal – PPC-M10, PPC-M20 – LHC-M20

The Barcon without diaphragm seal is mounted in the same way as a manometer. The use of shut-off valves and pigtails is recommended. The position depends upon the application.

- Measurement in gases:
  Mount on the shut-off valve above the tapping point so that condensate can run back into the process.

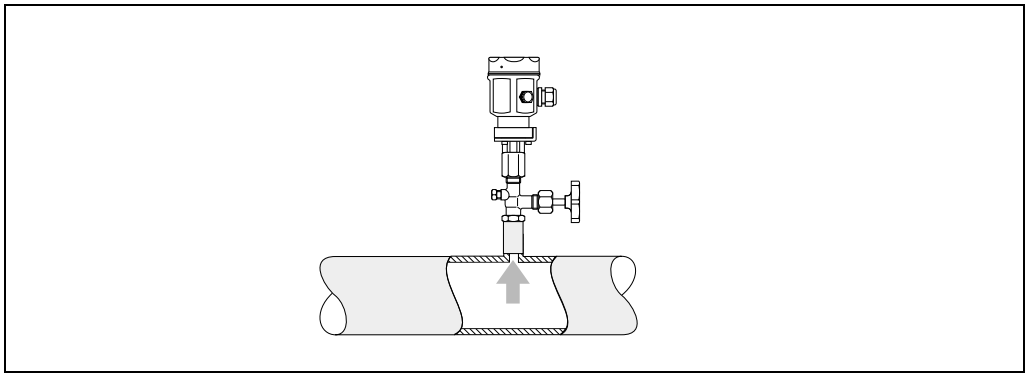

Fig. 2.1: Mounting on a shut-off valve for measuring gases

- Measurement in steam:
  Mount with a pigtail above the tapping point.
  The pigtail reduces the temperature in front of the diaphragm to almost ambient temperature. Before start-up, the pigtail must be filled with water.

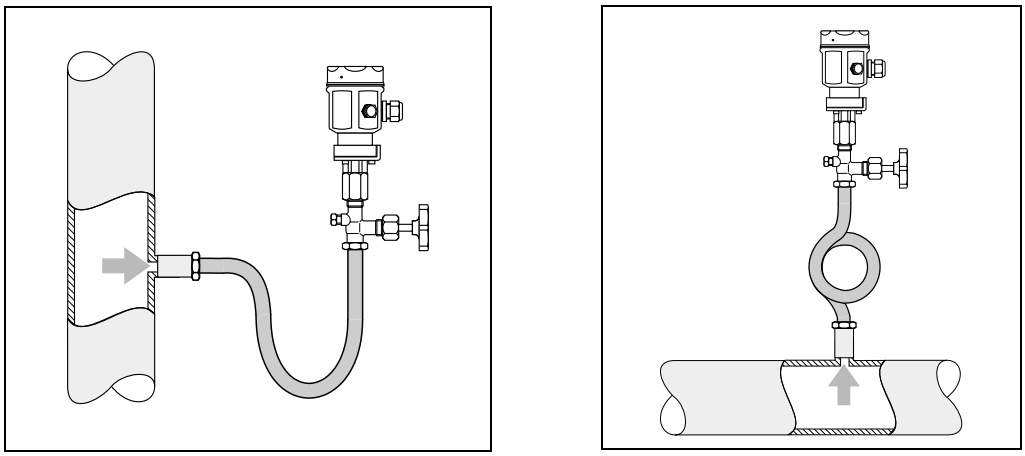

Fig. 2.2: left: Mounting with a U-shaped pigtail for measuring steam
right: Mounting with a circular pigtail for measuring steam

- Measurement in liquids:
  Mount on the shut-off valve below the tapping point or at the same height.

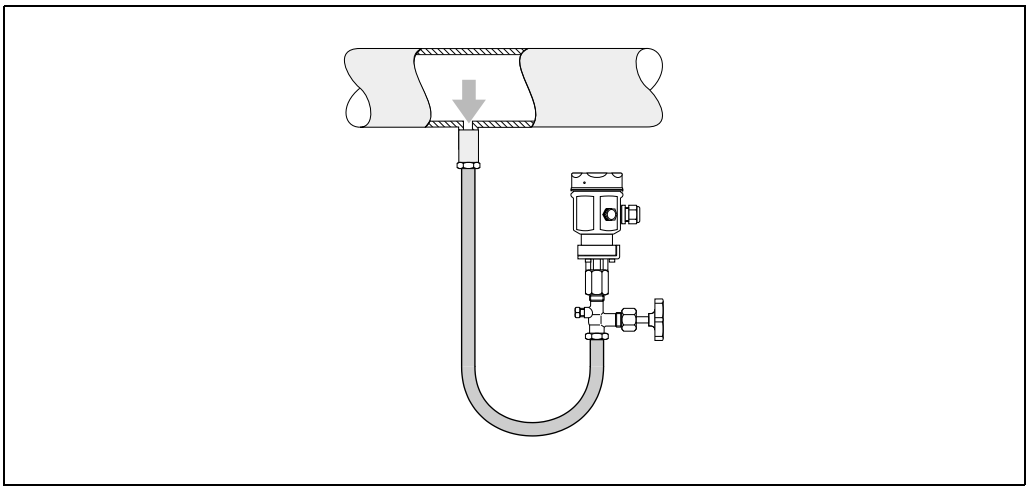

Fig. 2.3: Mounting on a shut-off valve for measuring liquids

Mounting the PPC-M10

The PPC-M10 with metal sensor is available in the following versions:

- with flush-mounted diaphragm or
- with adapter and internal diaphragm.
  The adapter can be screwed on or welded in.

A gasket is enclosed according to the material used and version.

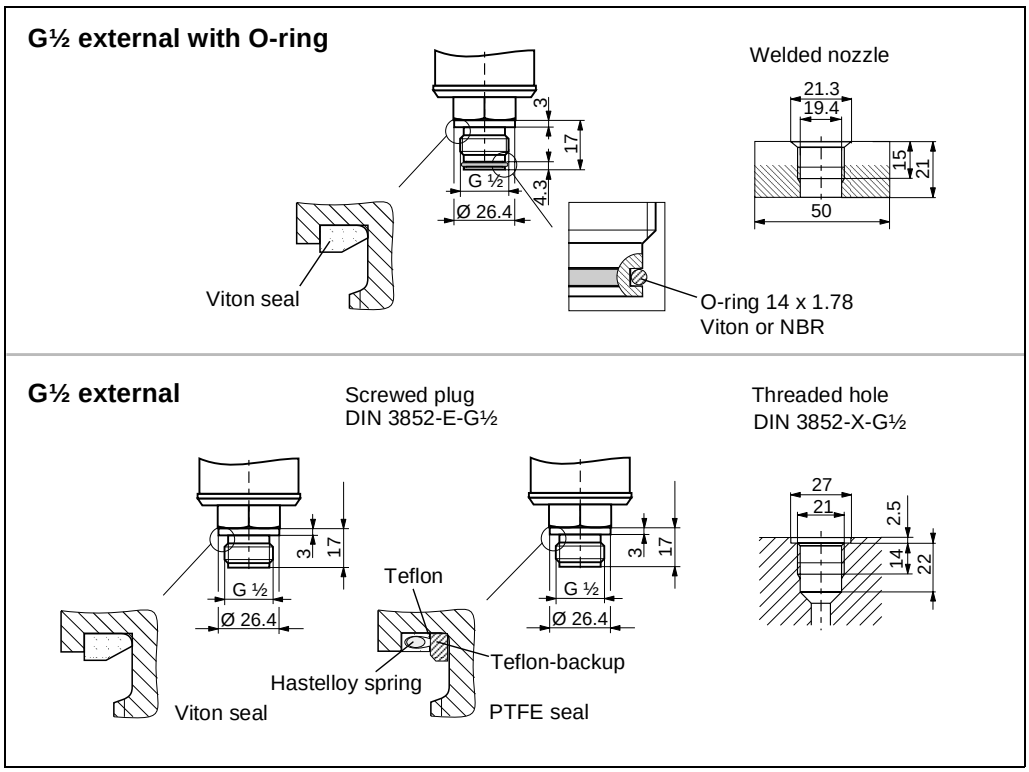

Fig. 2.4: PPC-M10 with flush-mounted diaphragm

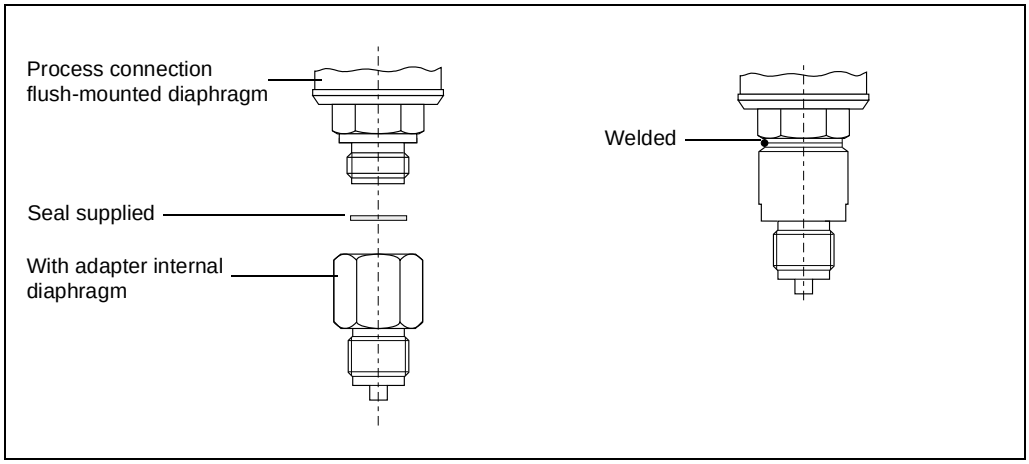

Fig. 2.5: PPC-M10 with screwed or welded adapter.With welded adapter max. torque 80 Nm

2.3 Mounting instructions with diaphragm seal

Barcon with diaphragm seal – LHC-M40

The Barcon with diaphragm seal is screwed in, flanged or clamped, depending on the type of diaphragm seal.

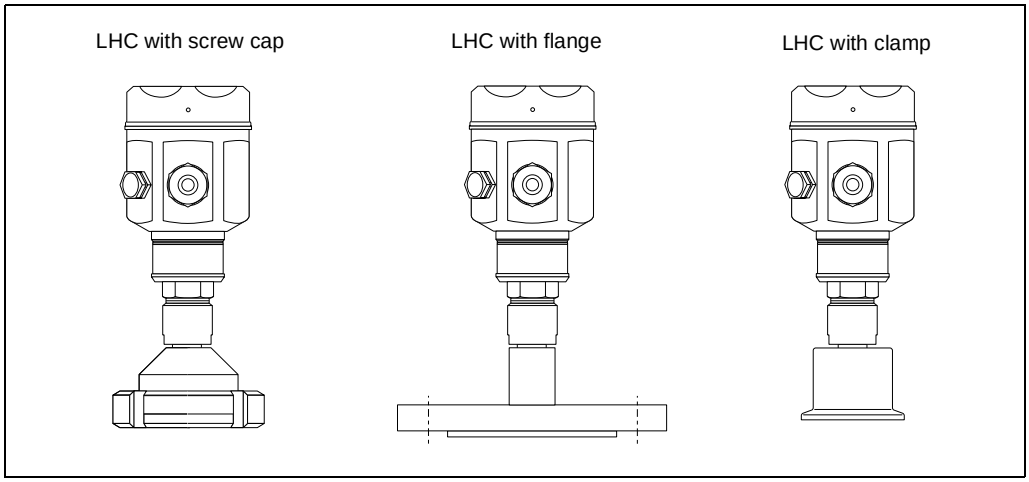

Fig. 2.6: Diaphragm seal versions

- The protective cap of the diaphragm seal should only be removed just before mounting in order to protect the diaphragm.
- The diaphragm of the diaphragm seal of the Barcon must not be dented or cleaned with pointed or hard objects.
- The diaphragm seal and the pressure sensor together form a closed and calibrated system which is filled with filling fluid through a hole in the upper part of the sensor. The following rules should be observed:
  - This hole is sealed and is not to be opened.
  - The instrument should only be turned by the diaphragm seal at the point provided and not by the housing.

Mounting with temperature spacers

The use of temperature spacers is recommended for constant extreme product temperatures that can cause the maximum permissible ambient temperature of +85 °C (+185 °F) to be exceeded.

- Note when mounting that the temperature spacer increases the maximum height by 100 mm (3.94 in).
- Due to the water column in the temperature spacer, the increased height also causes a zero point shift of approx. 10 mbar (0.15 psi).

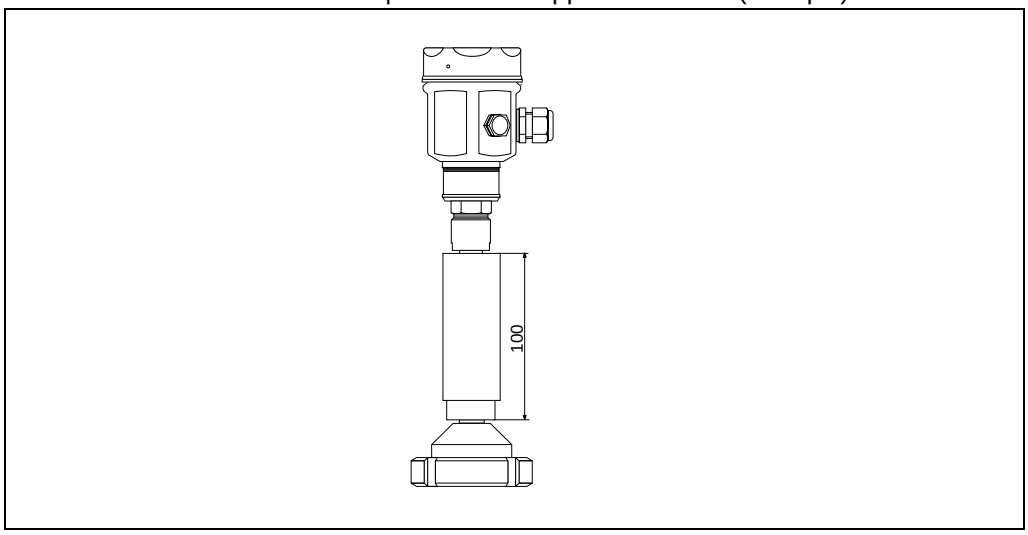

Fig. 2.7: Mounting with temperature spacers

Mounting with capillary tubing

To protect from high temperature, moisture or vibration, or where the mounting point is not easily accessible, the housing of the Barcon can be mounted with a capillary tube to one side of the measuring point.

A bracket for mounting on a wall or pipe is available for this.

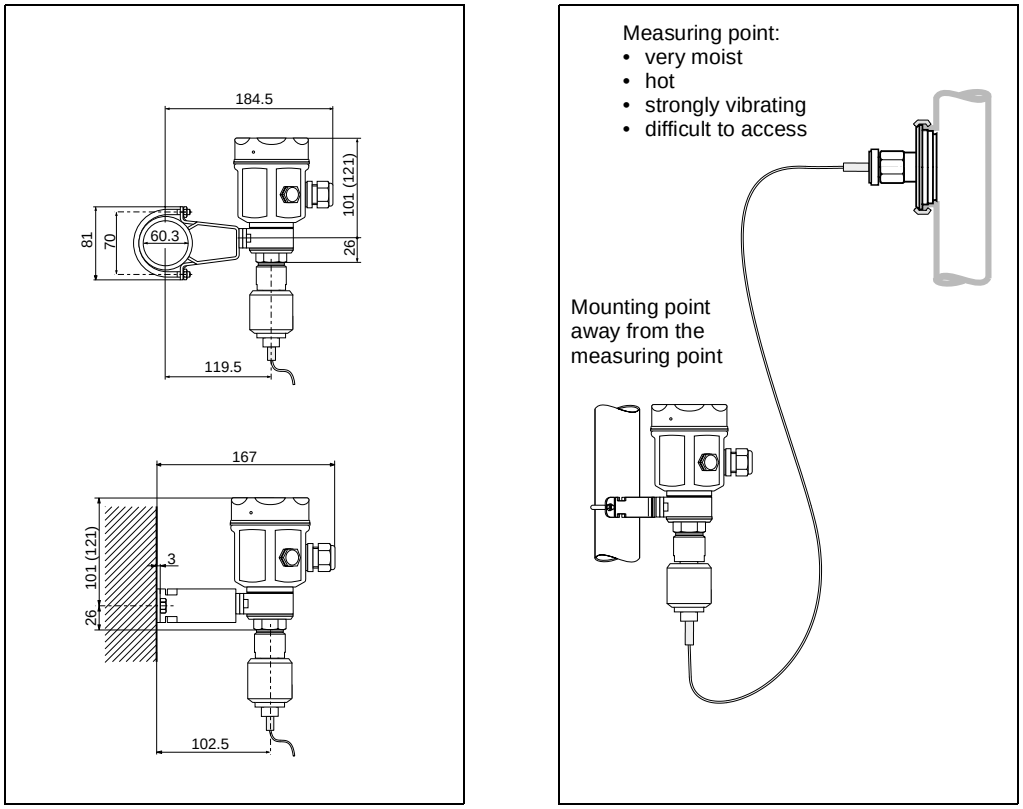

Fig. 2.8: Mounting with capillary tubing and bracket away from the measuring point. Values in brackets apply to instruments with a raised cover.

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2.4 Mounting accessories

PPC-M20:
Wall and pipe mounting with bracket

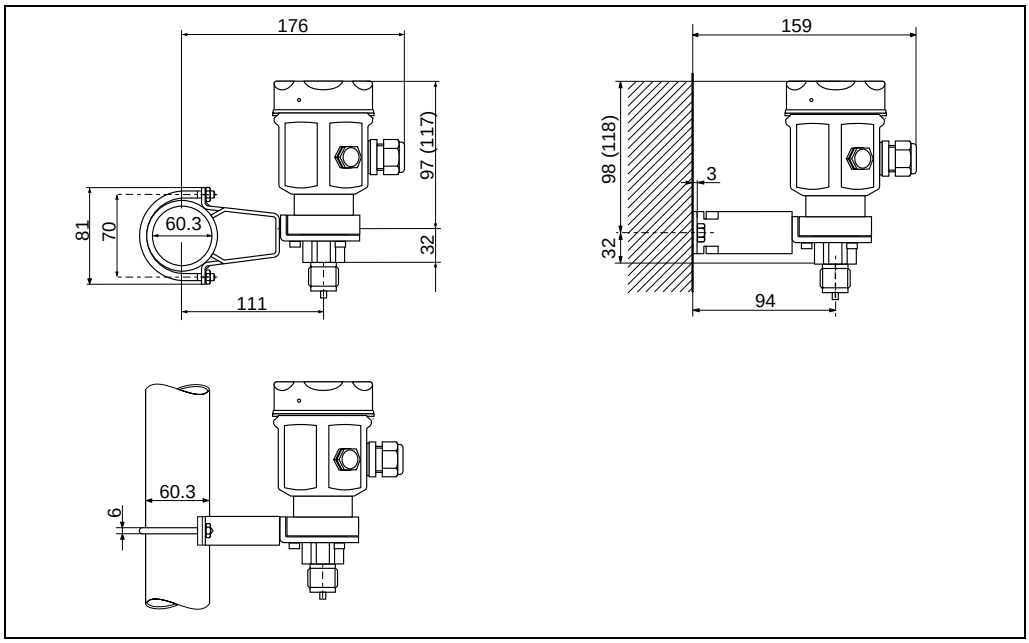


Fig. 2.9: left: Mounting with bracket on a vertical pipe
right: Mounting with bracket on a wall.

Values in brackets apply to instruments with a raised cover.

PPC-M10:
Wall and pipe mounting with bracket

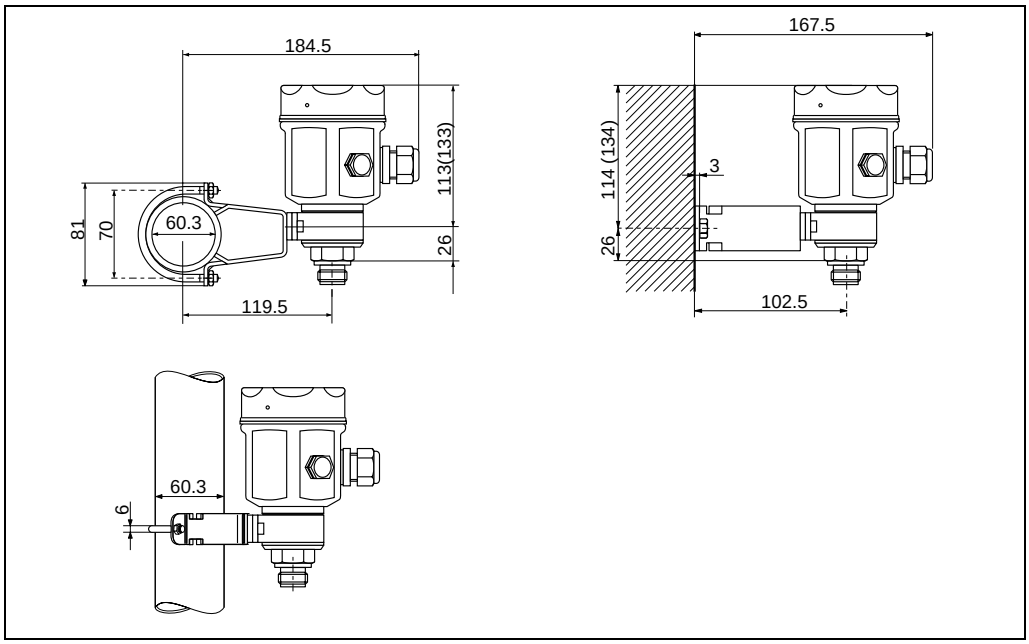


Fig. 2.10: left: Mounting with bracket on a vertical pipe
right: Mounting with bracketon a wall.

Values in brackets apply to instruments with a raised cover.

2.5 Electrical connection

Transposed, screened two-wire cabling is recommended for the connecting cable. Max. wire diameter: 2.5 mm^2 solid conductor

The power supply voltage is:

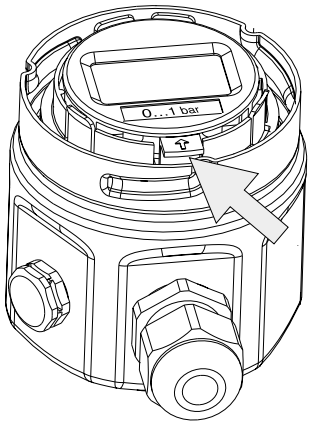
- 11.5 V … 45 VDC

Internal protection circuits against reverse polarity, HF interference and overvoltage peaks

A test signal can be measured using the terminal plugs for this purpose without interrupting measurement.

Cable connection

- Unscrew the cover
- If present, remove the retainer ring with analogue display. In addition:
  - Push up the catch with the arrow until the grip of the retaining ring is audibly released.
  - Loosen the retainer ring carefully to prevent the display cable from breaking. The plug of the display can remain plugged in.
- Insert the cable through the cable entry
- Connect the cable wires as shown in the connection diagram.
- Where appropriate, replace the retainer ring with an analogue display. The grip of the retainer right clips in with an audible click.
- Screw down the cover

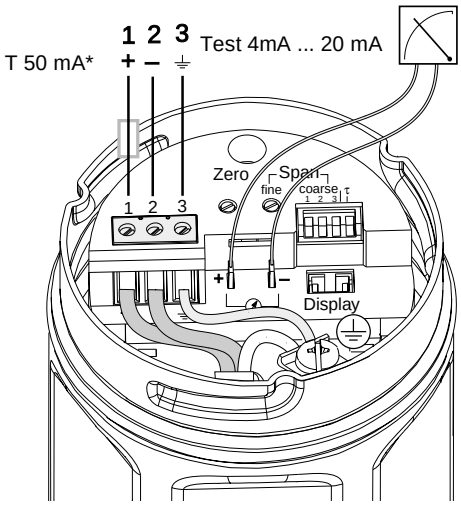


To loosen the holder from the electronic insert, push latch with arrow upwards.

Fig. 2.11: Lifting off the display and removing the retaining ring

Note

Terminal 3 on the electronic insert is for grounding and is already wired internally. If the connecting cable also has a screening or ground cable within it, then this may only be connected to the internal ground terminal of the housing, not to Terminal 3 (see circuit diagram).



Note!

Always connect the potential compensation line (if present) to the internal ground terminal of the housing, **not** to Terminal 3.

Fig. 2.12: Connection

** For versions with certificate ATEX 100, II 1/3 D (not Ex power supply) the instrument must always be protected by a 50 mA (slow-blow) fuse.*

Plug	**Plug assignment**			
	Terminal	Function	Wire colour code	
Harting plug	1 2 8	+ - PE	Blue (BL) Brown (BN) Green-Yellow (GNYE)	
Plug M12 x 1		+ - PE	Red (RD) Black (BK) Green (GN)	

3 Operation and start-up

Contents

This section describes:

- Access to the operating elements and the function of the analogue display
- Position and function of the operating elements on the electronic insert
- Calibration and start-up of the Barcon

3.1 Access to the operating elements, the function of the analogue display

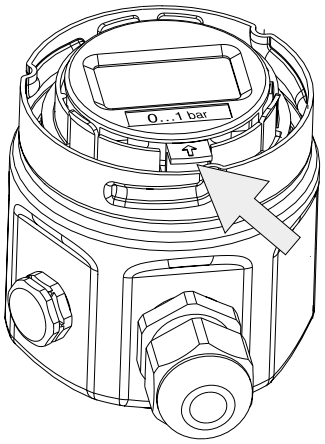
Lifting display for operation

The analogue display is delivered already mounted when it is ordered with the instrument. The analogue display with the retaining ring must therefore be removed before operating.

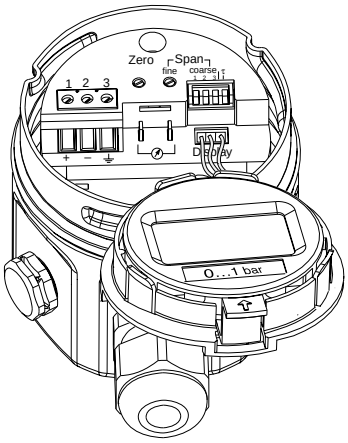
If you want to order an analogue display at a later date, then please observe the instructions in chapter 4.3 "Mounting the analogue display".

Removing the display:

- Push up the catch with the arrow until the grip of the retaining ring on the electronic insert clicks.
- Loosen the retainer ring and lift off carefully to prevent the display cable from breaking.
- For reading the display during operation, plug the display onto the edge of the housing or let it hang down loosely by its cable next to the housing.



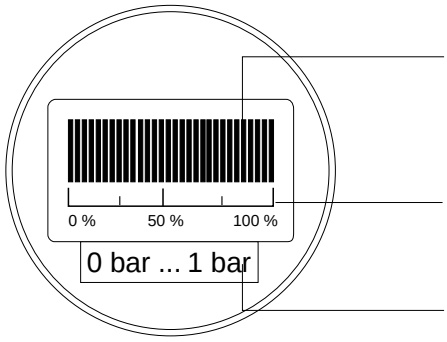
To loosen the holder from the electronic insert, push catch with arrow upwards.



Lifting off the display with retaining ring for operation.

Fig. 3.1: left: Loosening the retaining ring
right: Lifting off the display with retaining ring for operation

Function of the display



- Bargraph as trend display of measuring range 0 % … 100 %. This corresponds to a current output of 4 mA … 20 mA
  The bargraph and scale flash on signal overrun (current larger than 20 mA).
- Scale
  The scale flashes on underrun (current smaller than 4 mA).
- Cell measuring range

Fig. 3.2: Function of the display

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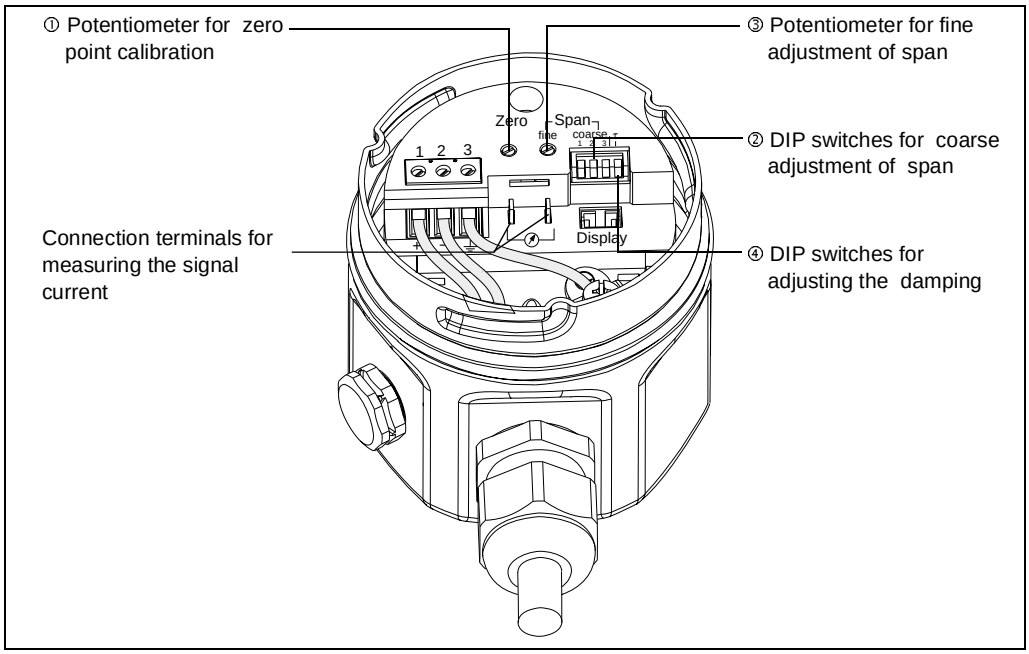
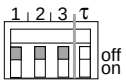
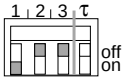
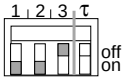
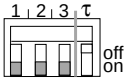
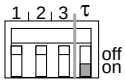
3.2 Position and function of the operating elements on the electronic insert

Position of the operating elements



Function of the operating elements

No.	Operating element	Function
①	Potentiometer for zero point calibration	Calibration of zero point ± 10 %
②	DIP switches for coarse calibration of the measuring span	For coarse calibration of the measuring span a spread between 1:1 and 10:1 can be selected. Switch positions: 1:1  3:1  6:1  10:1 
③	Potentiometer for fine calibration of the measuring span	Fine adjustment of the measuring span
④	DIP switches for calibrating damping	 **off:** Damping 0 s **on:** Damping 2 s

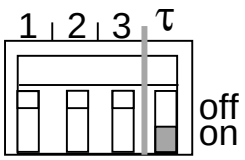
3.3 Calibration and start-up

Preparatory work

- Connect up electrically the Barcon (see chapter 2.5 "Electrical connection").
- Connect a multimeter (4 mA … 20 mA) to the connection terminals provided.
- Ensure that a pressure can be generated within the required measuring range.

Damping

The damping τ affects the speed with which the output signal and the analogue display react to changes in pressure. A DIP switch unit is available for calibrating the damping:



- Switch position **off**: Damping 0 s
- Switch position **on**: Damping 2 s

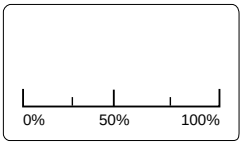
Example

The example used here is for calibrating a 0 bar … 1 bar measuring cell.

Zero point adjustment

Zero point calibration is carried out using the potentiometer for zero point adjustment. Carry out the zero point adjustment as follows:

- Enter exactly 0 bar for the zero point (ambient pressure for gauge measurements or vacuum for absolute measurements).
- Adjust the multimeter to exactly 4 mA.

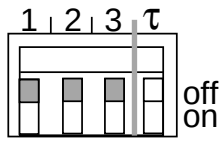
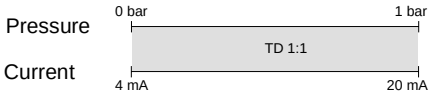
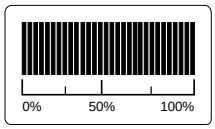
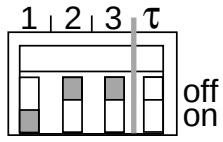
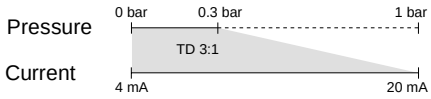
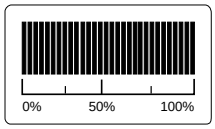
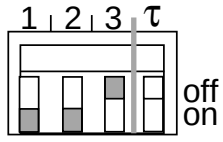
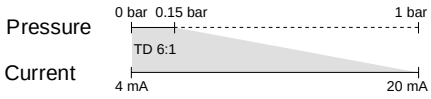
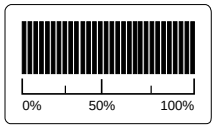
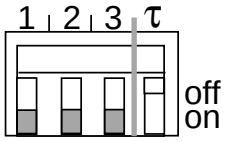
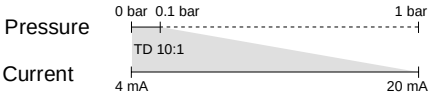
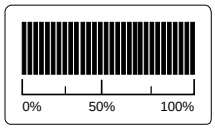
Pressure	Current	Response of analogue display
0 bar	Set to exactly 4 mA	Display of 0 %  The scale does not flash. (The scale begins to flash immediately a point is set which is below the cell measuring range. In this case readjust the value until the scale stops flashing.)

Adjusting the measuring span

Three DIP switches are available for course adjustment of the measuring span. Depending on the switch position, a measuring range spread (also known as turndown or TD) can be selected for 1:1 (to 2:1), 3:1, 6:1 or 10:1. Fine adjustment is carried out using the fine adjustment potentiometer of the measuring span.

Carry out the measuring span adjustment as follows:

- Enter exactly the pressure required for the measuring span.
- Adjust the multimeter to exactly 20 mA.
  - Limit the measuring span by selecting one of the measurement range spreads using the DIP switches for coarse adjustment.
  - Adjust exactly the measuring span required using the potentiometer for fine adjustment of the measuring span.

DIP switch positions	Pressure	Response of the analogue display
TD 1:1 	Cell measuring range: 0 bar … 1 bar Measuring range set: 0 bar … 1 bar 	Display of 100 %  The bargraph does not flash.*
TD 3:1 	Cell measuring range: 0 bar … 1 bar Coarse measuring range set: 0 bar … 0.3 bar (TD 3:1) 	Display of 100 %  The bargraph does not flash.*
TD 6:1 	Cell measuring range: 0 bar … 1 bar Coarse measuring range set: 0 bar … 0.15 bar (TD 6:1) 	Display of 100 %  The bargraph does not flash.*
TD 10:1 	Cell measuring range: 0 bar … 1 bar Coarse measuring range set: 0 bar … 0.1 bar (TD 10:1) 	Display of 100 %  The bargraph does not flash.*

** Bargraph and scale begin to flash immediately a full scale value is set which exceeds the cell measuring range. In this case read just the value until the bargraph and scale stop flashing.*

4 Maintenance and Repair

4.1 Repair

If the Barcon must be sent to Pepperl+Fuchs for repair, then a note should be enclosed containing the following information:

- An exact description of the application
- The chemical and physical characteristics of the product.
- A brief description of the error.

Before sending in the Barcon to Pepperl+Fuchs for repair, please take the following protective measures:

- Remove all traces of the product. This is particularly important if the product is dangerous to health, e. g. corrosive, poisonous, carcinogenic, radioactive, etc.
- We do request that no instrument should be returned to us without all dangerous material being completely removed as it can, e. g. penetrate into fissures or diffuse through plastic.


Caution!

Caution!

Instruments with certificates of conformity or design approval must be sent in for repair as complete units only.

4.2 Replacement parts

In the chapter 2.1The shows all replacement parts which can be ordered from Pepperl+Fuchs.

When ordering replacement parts, please note the following:

- If parts given in the order code are to be replaced, then ensure that the order code (instrument designation) on the nameplate is still applicable.
- If the instrument designation on the nameplate has changed then a modified nameplate must also be ordered. The information about the new instrument must then be entered on the modified nameplate. This must then be attached to the housing of the Barcon.
- If a new sensor is ordered as a spare part, it is usually supplied as the complete mounted device with housing and process connection, but without the electronic insert.
- Only the process connection on the PPC-M20 can be exchanged by the customer. For all other versions, the process connection ordered is supplied with the complete housing, but without the electronic insert.
- It is not possible to convert a standard instrument into an Ex instrument by replacing its parts. The appropriate regulations are to be observed when certified instruments are to be repaired.

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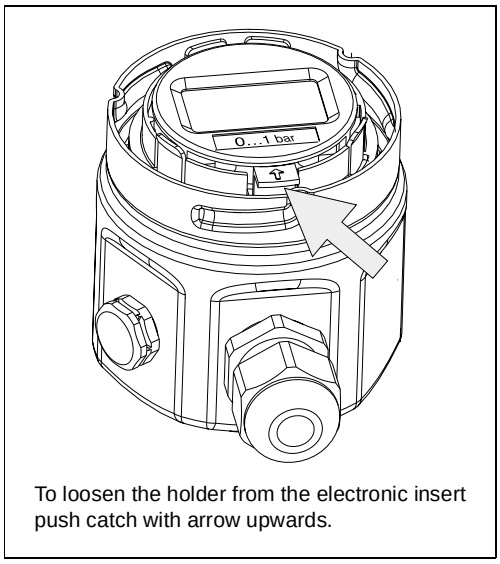
4.3 Mounting the analogue display

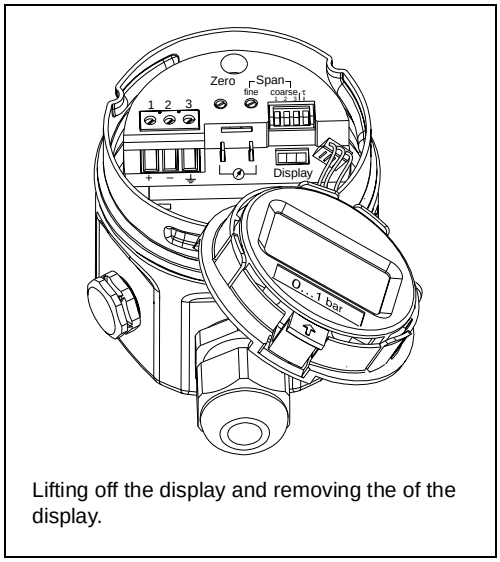
The analogue display is delivered already mounted when it is ordered with the instrument. In cases of damage, accessories can be ordered.

Removing the display

- Push up the latch with the arrow until the grip of the retaining ring on the electronic insert is heard to click.
- Loosen the retainer ring and lift off carefully to prevent the display cable from breaking.
- Remove the plug of the display from the electronic insert.



To loosen the holder from the electronic insert push catch with arrow upwards.

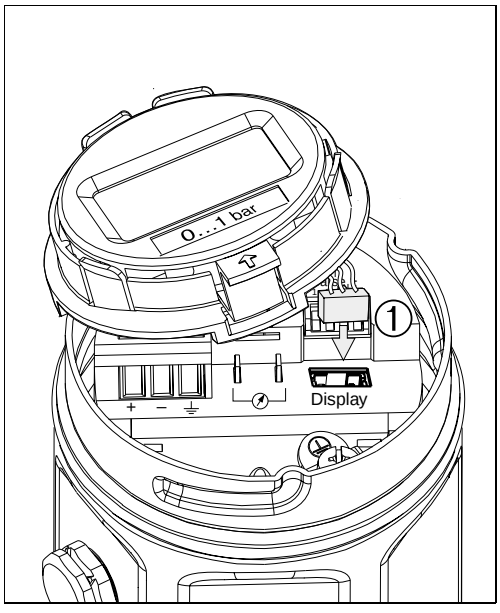


Lifting off the display and removing the of the display.

Fig. 4.1: left: Loosening the retaining ring
right: Removing the display

Mounting the display

- Insert the plug of the display in the jack in the electronic insert provided for this purpose and clip in ①.
- Insert the pin on the retaining ring into the hole in the electronic insert provided for this purpose ②.
- Firmly press down the retaining ring with the display onto the electronic insert. The stop makes an audible click.



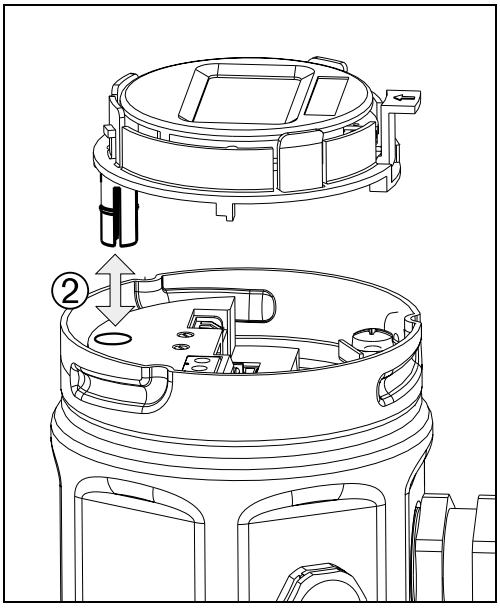


Fig. 4.2: Mounting the display

4.4 Replacing the electronic insert

If the existing analogue electronic insert is to be replaced with another analogue electronic insert, then it can be ordered under the following order No.:

- LHC-Z100: Electronics Barcon, 4 mA … 20 mA, analogue
  After replacing the electronic insert the instrument must be recalibrated. Information on adjustment is given in chapter 3 "Operation and start-up".

If the existing analogue electronic insert is to be replaced with a digital electronic insert, then the information contained in BA 201O, supplied with the digital electronic insert, applies.

Removing the electronic insert

- If appropriate, loosen the retaining ring and lift off and remove the plug of the display from the electronic insert.
- Remove the cable from the electronic insert.
- Loosen screws ① and ② on the electronic insert.
- Lift out the electronic insert.

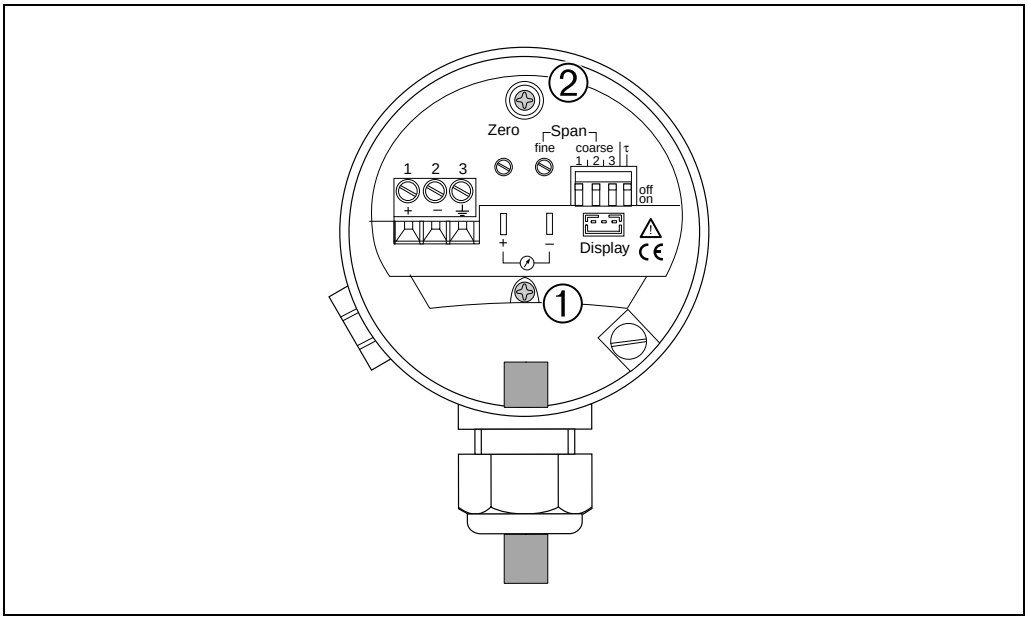


Bild 4.3: Position of screws ① and ② for removing the electronic insert

Mounting the electronic insert

- Plug in the new electronic insert and tighten screws ① and ②.
- Connect the connecting cable as shown in connection diagram in chapter 2.5 "Electrical connection".
- Carry out a calibration as shown in chapter 3 "Operation and start-up".
- If appropriate, mount the display.

4.5 Changing the measuring cell

If the measuring cell is to be changed then Pepperl+Fuchs offers a complete housing with the new measuring cell and process connection required but without an electronic insert. Therefore, when changing the measuring cell, simply remove the electronic insert from the old housing and install it in the new one. After changing the measuring cell. the Barcon must be recalibrated.

- Ordering a housing with measuring cell and process connection:
  PPC-M□0-□□□□-□□□□-□□NA□-□□
  LHC-M20-□□□□-□□□□-□□NA□-□□
  LHC-M40-□□□□-□□□□□-□□NA□-□□
- For instructions on mounting the electronic insert see chapter 4.4 "Replacing the electronic insert"
- For instructions on calibration see chapter 3 "Operation and start-up".

4.6 Changing the gasket

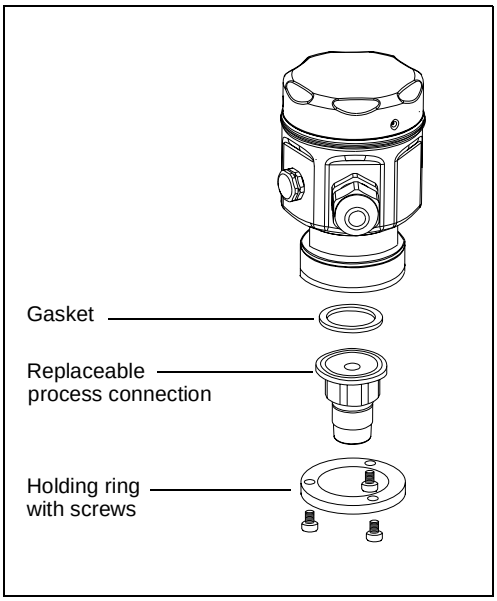
The gasket in contact with the medium and inside the spigot of the Barcon PPC-M20 can be replaced. Except for the PTFE gasket, all gaskets can thus be interchanged as required. The different temperature limits should be observed for individual materials.

Gasket		Temperature limits
1	FPM, Viton	-20 °C*
6	FPM, Viton grease-free	-10 °C*
A	FPM, Viton oil and grease-free for oxygen	-10 °C … +60 °C
8	NBR (DVGW)	-20 °C … +80 °C
2	NBR	-20 °C*
7	FFKM, Kalrez compound 4079	+5 °C*
4	EPDM	-40 °C*

** Upper temperature limit according to specifications of standard instrument*

Changing the gasket

- Loosen the screws on the retaining ring of the process connection.
- Remove the retaining ring and the process connection
- Replace gasket.
  The surfaces on each side of the gasket and the gasket itself must be free from dirt fibre and dirt.
- Secure the process connection with the retaining ring and screws



5 Technical data

General information

Manufacturer	Pepperl+Fuchs
Instrument	Pressure transmitter
Designation	PPC-M10, PPC-M20, LHC-M20, LHC-M40

Application

Measurement of absolute and gauge pressure in gases, vapours, liquids

Operation and system design

Measuring principle

Barcon PPC-M20, LHC-M20 with ceramic sensor	The pressure causes a slight deflection of the ceramic diaphragm of the sensor. The change in the capacitance is proportional to the pressure and is measured by the electrodes of the ceramic sensor. Volume of chamber: approx. 2 mm³ (0.078 in³)
Barcon PPC-M10, LHC-M40 with metal sensor	The process pressure acting on the metallic separating diaphragm of the sensor is transmitted via a filling fluid to a resistance bridge. The change in the output voltage of the bridge is proportional to the pressure and is then measured. Volume of chamber: smaller than 1 mm³ (0.039 in³)
Measuring system	• Barcon and power supply e. g. via transmitter power pack • Calibration via potentiometers for zero point and span • Plug-in analogue display for showing measured values
Construction	Aluminium or SS housing, for process connections see page 9
Signal transmission	4 mA … 20 mA, 2-wire

Input

Measured variables	Absolute or gauge pressure

Measuring ranges

PPC-M20, LHC-M20				PPC-M10, LHC-M40			
Type of pressure	Measure-ment limits	Min. span (TD 10:1)	Overload	Type of pressure	Measure-ment limits	Min. span (TD 10:1)	Overload
	bar	bar			bar	bar	bar
gauge	0 ... 0.1	0.01	4	gauge	0 ... 1	0.1	4
gauge	0 ... 0.4	0.04	7	gauge	0 ... 4	0.4	16
gauge	0 ... 1	0.1	10	gauge	0 ... 10	1	40
gauge	0 ... 4	0.4	25	gauge	0 ... 40	4	160
gauge	0 ... 10	1	40	gauge	0 ... 100	10	400
gauge	0 ... 40	4	60	gauge	0 ... 400	40	600
gauge	-0.1 ... 0.1	0.02	4	gauge	-1 ... +1	0.2	4
gauge	-0.4 ... 0.4	0.08	7	gauge	-1 ... +4	0.5	16
gauge	-1 ... +1	0.2	10	gauge	-1 ... +10	1.0	40
gauge	-1 ... +4	0.5	25				
gauge	-1 ... +10	1.0	40				
absolute	0 ... 0.4	0.04	7	absolute	0 ... 1	0.1	4
absolute	0 ... 1	0.1	10	absolute	0 ... 4	0.4	16
absolute	0 ... 4	0.4	25	absolute	0 ... 10	1	40
absolute	0 ... 10	1	40	absolute	0 ... 40	4	160
absolute	0 ... 40	4	60	absolute	0 ... 100	10	400
				absolute	0 ... 400	40	600

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Resistance to low pressures LHC-M20, PPC-M20	for sensors with nominal values 0.1 bar: to 0.7 $bar_{absolute}$ for all other sensors: to 0 $bar_{absolute}$
PPC-M10, PPC-M40	to 10 $mbar_{absolute}$
Calibration range (turndown)	via DIP switches to TD 10:1
Zero point increase and decrease	± 10 % of cell measuring range

Output

Output signal	Analogue signal 4 mA … 20 mA
Signal on alarm Signal overrun (> 20.5 mA): Signal underrun (< 3.6 mA):	Bargraph and scale on the display flash Scale flashes
Integration time	Depending on switch position: off: 0 s; on: 2 s

Accuracy

Reference conditions	DIN IEC 770 T_U = 25 °C (+77 °F)
Linearity including hysteresis and reproducibility (based on the limit point method to DIN IEC 770)	M20: ± 0.2 % of set span M10, M40: ± 0.3 % of set span
Linearity at low absolute pressure ranges (due to performance limits of currently available DKD calibration rigs)	Absolute: for ≥ 40 mbar to < 100 mbar: ± 0.3 % of set span
Warm-up time	200 ms
Rise time	60 ms
Response time	180 ms
Long-term drift	0.1 % (FS) per year
Thermal effects with reference to the set span; TD = nominal value/set span	for -10 °C … +60 °C (+14 °F … +140 °F): ± (0.3 % x TD + 0.3 %)
	for -40 °C … -10 °C (-40 °F … +14 °F): ± (0.5 % x TD + 0.5 %)
	+60 °C … +85 °C (+140 °F … +185 °F) ± (0.5 % x TD + 0.5 %)
Temperature coefficient (maximum TK) (But not exceeding the error due to thermal effects.)	for zero signal and span: for -10 °C … +60 °C (+14 °F … +140 °F): ± 0.15 % of nominal value/10 K
	for -40 °C…-10 °C (-40 °F … +14 °F): ± 0.2 % of nominal value/10 K
	+60 °C … +85 °C (+140 °F … +185 °F): ± 0.2 % of nominal value/10 K
Vibration effects	None (4 mm in path peak-to-peak 5 HZ … 15 Hz, 2 g: 15 Hz … 150 Hz, 1 g: 150 Hz … 2000 Hz)

Process conditions

Mounting conditions	Any position
Ambient conditions	
Ambient temperature	-40 °C … +85 °C (-40 °F … +185 °F)
Ambient temperature range (short-term)	-40 °C … +100 °C (-40 °F … +212 °F)
Storage temperature	-40 °C … +85 °C (-40 °F … +185 °F)
Climatic class	4K4H to DIN EN 60721-3
Protection	IP66/Nema 4x with cable gland IP68 (1 m water over 24 h) or Nema 6P (1.8 m water over 30 min.) with assembled cable with reference air feed
Electromagnetic compatibility	Interference emission to EN 50081-1, Interference immunity to EN 50082-2 and NAMUR NE 21: influence < 0.5 %

Process conditions

Process temperature	PPC-M10, PPC-M20: -40 °C … +85 °C (-40 °F … +185 °F) LHC-M20: -40 °C … +125 °C (-40 °F … +257 °F) LHC-M40: -40 °C … +85 °C (-40 °F … +185 °F)
Process temperature range	Cleaning temperature for Barcon flush-mounted +150 °C (+302 °F) up to 60 minutes, diaphragm seal with temperature spacer and high-temperature oil max. 350 °C (+662 °F)
Process pressure	corresponds to permissible overload

Mechanical construction

Design

Housing	• Type F15 (stainless steel) or type F16 (aluminium) optional electrical connection via • cable gland M20 x 1.5 • cable entry G½, ½ NPT • Harting plug, M12 x 1 plug • assembled cable with reference air feed
Process connections	All common thread versions, flush-mounted connections and diaphragm seals

Materials

Housing		Stainless steel 1.4404 (AISI 316L) or cast aluminium housing with protective polyester based powder
Nameplate Stainless steel housing Aluminium housing		 Engraved on housing with laser 1.4301 (AISI 304)
Process connections	PPC-M10	• 1.4435 (SS 316L), adapter 1.4435 (SS 316L)
	PPC-M20	• 1.4435 (SS 316L), Hastelloy 2.4819 (C 276)
	LHC-M20, LHC-M40	• 1.4435 (SS 316L)
Process diaphragm	PPC-M20, LHC-M20	• Al_2O_3 aluminium oxide ceramic
	PPC-M10	• 1.4435 (SS 316L)
	LHC-M40	• 1.4435, Hastelloy C276, Tantal, PTFE-Folie auf 1.4435
Seals		FPM Viton, FPM Viton grease-free, FPM Viton oil and grease-free for oxygen, EPDM, Kalrez, NBR, DVGW version with NBR seal
Mounting accessories		Bracket for pipe and wall mounting 1.4301 (SS 304)
Filling fluid in diaphragm seals		Silicone oil, vegetable oil, glycerine, high-temperature oil, FLUOROLOBE grease-free for oxygen

Measuring cell

Filling fluid	PPC-M20, LHC-M20	• None, dry cell sensor
	PPC-M10, LHC-M40	• optional silicone oil or inert oil (Voltalef) for oxygen • Vegetable oil (FDA listed)

Display and operating interface

Display	Plug-in display with bargraph of pressure (30 segments)
Operation	• Calibration of zero point and span via two potentiometers and DIP switches on the instrument • Calibrating the damping via DIP switches on the instrument

Power supply

Power supply	11.5…45 V DC
Overvoltage category	II to DIN EN 61010-1
Ripple	No effect for 4 mA … 20 mA signal up to ± 5 % residual ripple within permissible voltage range

Certificates and approvals

Ignition protection	see "Notes on safety" page 6
CE mark	By attaching the CE Mark, Pepperl+Fuchs confirms that the instrument fulfils all the requirements of the relevant EC directives.

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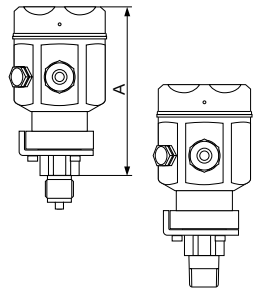
Dimensions

PPC-M20

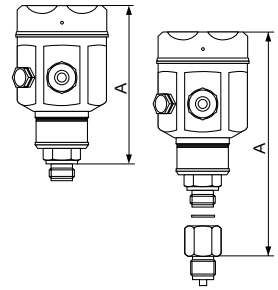


Thread

	Max. height
• G½ external	155.0 mm
• G½ external, G¼ internal	155.0 mm
• G½ external, Ø11.4 mm internal	155.0 mm
• ½ NPT external, ¼ NPT internal	155.0 mm
• ½ NPT external, Ø 11.4 mm internal	155.0 mm
• PF ½ external	155.0 mm
• PT ½ external	155.0 mm
• M20 x 1.5 external	155.0 mm

Dimensions
1 mm = 0.039 in
1 in = 25.4 mm

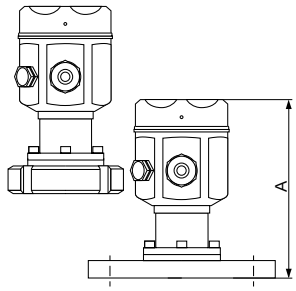
PPC-M10



Thread flush-mounted or with internal adapter

	Max. height
Diaphragm flush-mounted:	
• G½ external	162.0 mm
• G½ external with O-ring for welded nozzle	162.0 mm
Diaphragm flush-mounted:	
• G½ external	197.5 mm
• ½ NPT external	197.5 mm
• ½ NPT internal	184.5 mm
• PF ½ external	195.5 mm
• PT ½ external	197.5 mm
• M20 x 1.5 external	197.5 mm

LHC-M20



Dairy connections

	Max. height
• Triclamp 2"	172.5 mm
• SMS 1½"	172.5 mm
• SMS 2"	172.5 mm
• DIN 11851	
• DN 40, PN 40	172.5 mm
• DIN 11851	
• DN 50, PN 40	172.5 mm
• Varivent,	
• D = 68 mm	172.5 mm
• DRD flange	
• D = 65 mm	172.5 mm

Threaded bosses

	Max. height
• G1½	172.5 mm
• G2	173.5 mm
• 1½ NPT	172.5 mm
• 2 NPT	173.5 mm
• M44 x 1.25	172.5 mm

Flanges

	Max. height
DIN 2527	
• DN 50, PN 40	172.5 mm
• DN 80, PN 40	172.5 mm
ANSI B16.5 with sealing strip	
• 1½"	172.5 mm
• 2"	172.5 mm
• 3"	172.5 mm
• 4"	172.5 mm
JIS B 2210	
• JIS 10K 50A RF	172.5 mm

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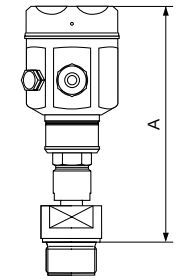
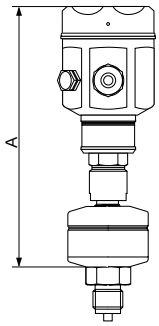
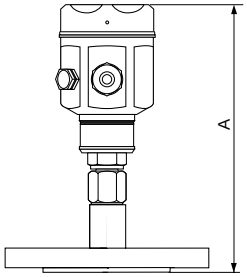
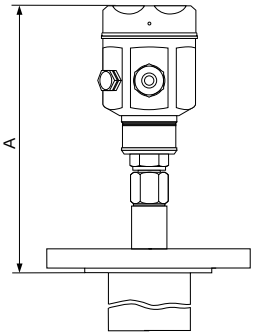
LHC-M40	Diaphragm seal, flange









Threaded bosses	Max. height
• G1½, DIN ISO 228/1, from 0.4 bar span	232.5 mm
• G2, DIN ISO 228/1from 0.1 bar span	237.5 mm
• 1½ NPT, ANSI B 1.201, from 0.4 bar span	233.5 mm
• 2 NPT, ANSI B 1.201, from 0.1 bar span	233.5 mm
• Spacer with G½, EN 16288, Form 6kt	237.5 mm
• Spacer with ½ NPT, ANSI B 1.201	237.5 mm

Flanges, dimensions to DIN 2527	
• DN 25, PN 64/160	255.0 mm
• DN 25, PN 250	255.0 mm
• DN 25, PN 400	255.0 mm
• DN 50, PN 10/40	255.0 mm
• DN 50, PN 64	261.0 mm
• DN 50, PN 100/160	265.0 mm
• DN 50, PN 250	273.0 mm
• DN 50, PN 400	287.0 mm
• DN 80, PN 10/40	259.0 mm

Flanges with extension, dimensions to DIN 2527	
• DN 50, PN 10/40, Extension 50 mm	255.0 mm
• DN 80, PN 10/40, Extension 50 mm	259.0 mm
• DN 50, PN 10/40, Extension 100 mm	255.0 mm
• DN 80, PN 10/40, Extension 100 mm	259.0 mm
• DN 50, PN 10/40, Extension 200 mm	255.0 mm
• DN 80, PN 10/40, Extension 200 mm	259.0 mm

Flanges, dimensions to ANSI B16.5 with sealing strip Form RF	
• 1", 400/600 lbs	250.5 mm
• 1", 900/1500 lbs	254.5 mm
• 1", 2500 lbs	254.5 mm
• 2", 150 lbs	254.5 mm
• 2", 300 lbs	257.5 mm
• 2", 400/600 lbs	267.0 mm
• 2", 900/1500 lbs	280.0 mm
• 2", 2500 lbs	295.0 mm
• 3", 150 lbs	254.5 mm
• 3", 300 lbs	259.0 mm
• 4", 150 lbs	259.0 mm
• 4", 300 lbs	262.5 mm

Flanges with extension, dimensions to ANSI 16.5	
• 2", 150 lbs, extension 2"	254.5 mm
• 3", 150 lbs, extension 2"	254.5 mm
• 4", 150 lbs, extension 2"	254.5 mm
• 2", 150 lbs, extension 4"	254.5 mm
• 3", 150 lbs, extension 4"	254.5 mm
• 4", 150 lbs, extension 4"	254.5 mm
• 2", 150 lbs, extension 6"	254.5 mm
• 3", 150 lbs, extension 6"	254.5 mm
• 4", 150 lbs, extension 6"	254.5 mm

Dimensions
1 mm = 0.039 in
1 in = 25.4 mm

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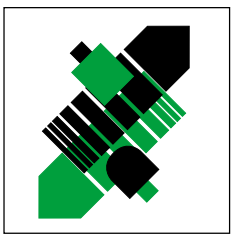
One Company, Two Divisions.



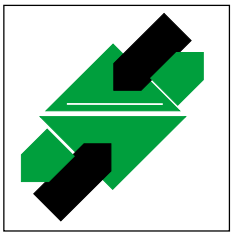
Factory Automation Division

Product Range

- Digital and analogue sensors
- in different technologies
  - Inductive and capacitive sensors
  - Magnetic sensors
  - Ultrasonic sensors
  - Photoelectric sensors
- Incremental and absolute rotary encoders
- Counters and control equipment
- Identification Systems
- AS-Interface

Areas of Application

- Machine engineering
- Conveyor or transport
- Packaging and bottling
- Automotive industry



Process Automation Division

Product Range

- Signal conditioners
- Intrinsically safe interface modules
- Remote Process Interface (RPI)
- Intrinsically safe field bus solutions
- Level control sensors
- Process measuring and control systems engineering at the interface level
- Intrinsic safety training

Areas of Application

- Chemical industry
- Industrial and community sewage
- Oil, gas and petrochemical industry
- PLC and process control systems
- Engineering companies for process systems

Service Area

Worldwide sales, customer service and consultation via competent and reliable Pepperl+Fuchs associates ensure that you can contact us wherever or whenever you need us. We have subsidiaries worldwide for your convenience.

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