

# Sensor Retraction Tool

ZM-WA-025-040 PN 250 for moisture sensor L 166x

## Operating manual

BA 090404





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Document: BA 090404  
Revision: ZM-WA-025-040 PN 250  
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valid as from: 04.09  
22.01.2014

# 1 Introduction

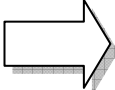




## 1.1 How to use this operating manual

This operating manual supports the user of the sensor retraction tool ZM-WA-025-040 PN 250 in installation, operation and maintenance.

The layout of the document is meant to make handling easier. Numbering is done chapter by chapter, i.e. the headline presents the respective chapter number and the page number for this chapter. Important text elements are highlighted optically.

### Signs and symbols

In this operating manual, the following signs and symbols are used to highlight text passages which are of essential importance.

	<p><b>Pointers</b> This arrow points to particularities which have to be minded during operation.</p>
	<p><b>Warning</b> This sign calls your attention to text passages whose non-observance or inexact observance may cause damages or destructions at parts of the system.</p>
	<p><b>Caution!</b> This sign precedes text passages whose non-observance may endanger human health and lives.</p>
	<p><b>Reference</b> This sign refers to further information in other manuals, chapters or sections.</p>
	<p><b>Behaviour guideline</b> This sign shows that an activity to be carried out is described. For activities consisting of several working steps, these steps are marked by listing signs or numbers, e.g.:</p> <ul style="list-style-type: none"> <li>• Loosen cross-head screws</li> <li>• Remove casing cover</li> </ul>

## 1.2 Incoming goods inspection, transport, storage

- Check the packing for damages!  
Notify your supplier about any damages of the packing.  
Keep the damaged packing until clarification.
- Check the content for damages!  
Notify your supplier about any damages of the content delivered.  
Keep the damaged goods until clarification.
- Check the scope of delivery on completeness by means of the delivery documents and your order.
- For storage and transport, the unit has to be packed in a shock-proof and humidity-proof packing. The original packing offers optimal protection. Apart from that, the admissible ambient conditions have to be observed (☞ section 2.2 Technical data).
- For any further questions, contact your supplier or your supplier's sales centre.

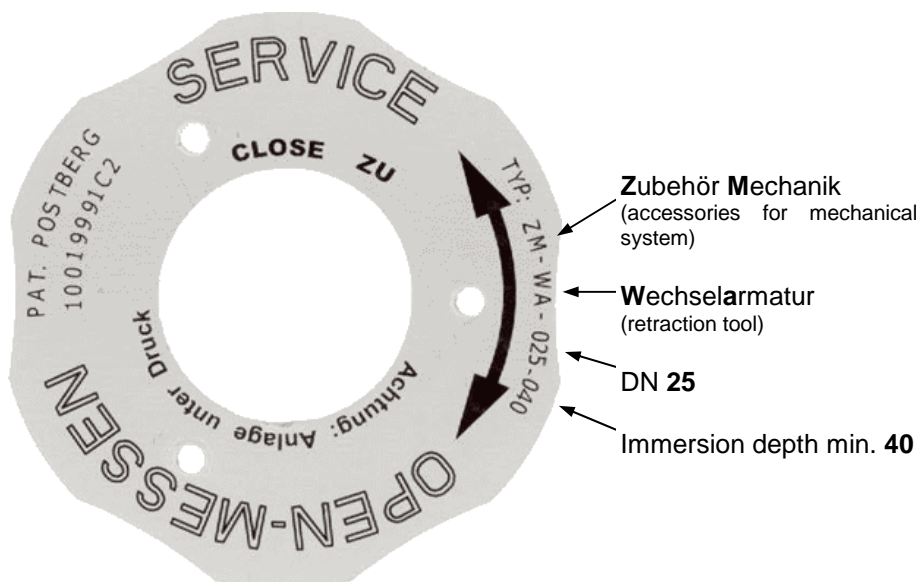
## 1.3 Deliverable parts

- Sensor retraction tool in the ordered version
- CF-weld connecting piece PN250 short or long version (optionally stainless steel or steel) including orientation pin.
- CF-blind flange PN250 (optionally in stainless steel / steel)
- Mounting kit for sensor retraction tool HD consisting of:
  - 4 x cylinder head screws DIN 6912 M16 x 30, A2 in accordance with ADW2
  - 1 x o-ring PBCOMPAC 40,87 x 3,53 FKM
  - 1 x hook wrench DIN 1816
- Mounting and operating manual in English
- Closing plug ½" with sealing
- Protective cap

For any further questions, please contact your supplier or your supplier's sales centre.

## 1.4 Identification of the sensor retraction tool

On the order code located on the type plate, you can see the fitting version. Please compare it with your order.



The shop test is certified by a material marking carried out by the TÜV (Technical Supervisory Association).

The technical data with serial number are laser-marked as follows on the flange nozzle of the sensor retraction tool:

DN 25 PN 250  
1.4571 -30/+60°C  
Date ... Serial number ...

## 1.5 Declaration of conformity for the sensor retraction tool

It is herewith certified that the sensor retraction tool type ZM-WA-025-040 PN 250, German patent no. 10019991C2; European patent no. 1148317, has been built in a fail-safe way and tested according to the current state of the art and has left the factory in a perfect safe condition

The relevant provisions and European norms listed below have been taken into account:

- Fundamental safety requirements in accordance with EU directive DGRL 97/23
- Inspection certificate EN 10204 3.2
- Safety requirements DIN 3230 part 5
- US version in accordance with NACE MR 0175/ISO 15165
- Test DIN EN 12266-1
- Calculation DIN 3840
- Material DIN 30690-1
- Technical documentation VDI 4500 sheet 1:1995
- Preparation of instruction in accordance with DIN EN 62079:2001
- Climatic test report S06-472
- Making and serial number see laser labelling at the flange nozzle of the sensor retraction tool.

## 1.6 Warranty

The devices have been built in compliance with the valid regulations and have left the factory in perfect condition.

If you still find any reason for objecting to our product, we will repair free of charge all deficiencies which are proven to result from a factory error, provided that you notify us of the deficiency immediately after having realised it and within the warranty period stipulated by us.

Damages resulting from inappropriate use and from the non-observance of the operating manual are excluded from this warranty.

The warranty period for type ZM-WA-025-040 PN 250 is 12 months. Unless defined otherwise, the warranty period for accessory parts is 6 months. Warranty services do not cause an extension of the warranty period.

Besides, the warranty does not apply if the sensor retraction tool has been opened - unless this has been explicitly described for maintenance purposes in the operating manual - or if serial numbers at the device have been changed, damaged or removed.

If apart from the warranty services, necessary repairs, adjustments or similar works have been carried out, the warranty services are free of charge while the other services as well as transport and packing are invoiced.

Any further or other claims, above all for damages not concerning the sensor retraction tool and the sensor, are excluded - unless a liability is required by law.

Services after the period of warranty

Of course we are at your disposal even after the warranty period has expired. In the case of functional disturbances, send us your device together with a short description of the fault. Please give your phone number for the case of questions on our part.



## 2 Device description

### 2.1 Task and fields of application

#### Interface between engineering and measurement technology

The manually operated sensor retraction tool ZM-WA-025-040 PN 250 is designed for the installation of the moisture sensor L166x in containers and pipelines. The moisture sensor is designed for humidity measurement with the fibre-optical hygrometer HYGROPHIL F 5673.

The sensor retraction tool is the process interface and connects the sensor to the actual process. It is the key for an exact and reproducible measurement. The reliable transformation of the physical value into an electrical value is decided at this place.

#### Advantages of the sensor retraction tool

European patent 1148317

- Mounting and dismounting of the sensor is possible without interruption of the operating sequence of the system. This consequently guarantees a high availability of the system.
- The high-pressure version with ball-bearing makes possible manual operation up to 250 bar.
- The direct measurement in the main flow of the pipeline guarantees exact measurement results and offers a higher measurement precision than the indirect measurement in the bypass.
- On the inflow side, the sensor is protected against contamination. Result: High endurance and availability of the system.
- Random measurements of different physical measurands, e.g. pressure, temperature, humidity, are possible at one tapping point, by means of a mobile measuring device.
- Sensors can be dismantled while the system is running. This simplifies many processes such as :
  - sensor cleaning
  - sensor replacement if sensor is defective
  - recalibration by means of periodic check of sensors.
- When the sensor has been dismantled, the system can be operated with closing plug mounted (☞ sections 3.3 and 4.7).
- Application in pipelines from DN 50 to DN 1400. The connection of the pipeline to the sensor retraction tool is always the PBCOMPAC® flange in DN25. The Compac flange is patented worldwide and has been awarded the "Inventor Prize of Switzerland".

## 2.2 Technical data

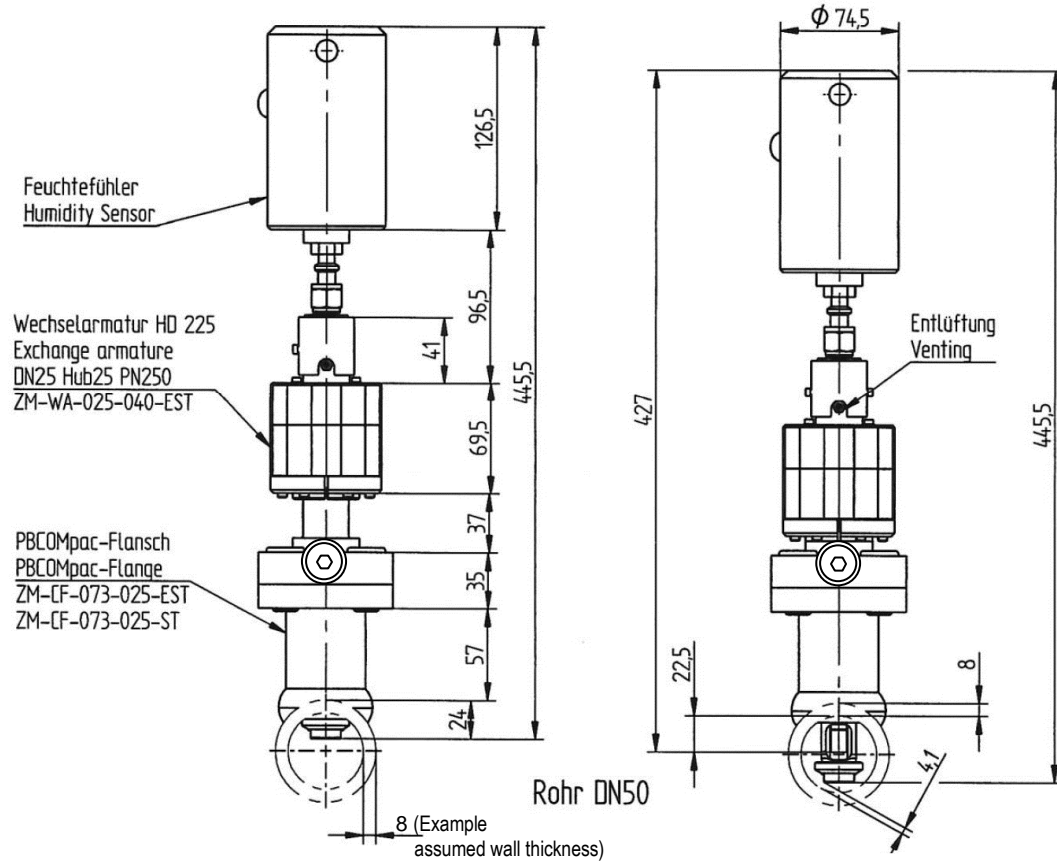
### 2.2.1 Sensor retraction tool

Operating temperature	-30...+ 60 °C
Weight	5,2 kg
Material	1.4571

Dimensions: tube DN50

Sensor eingefahren; Sensor retracted

Sensor ausgefahren; Sensor down and in place

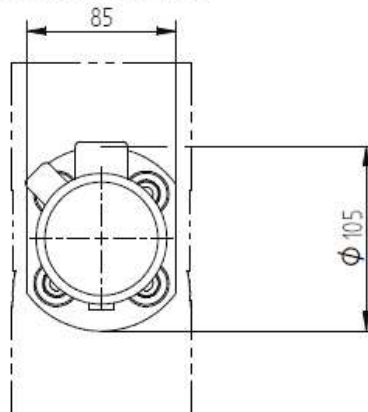


Achtung!  
Stellung des PIN muß immer  
in Anströmrichtung sein  
Caution!  
Pin position should always be  
on the inflow direction

Schraubverbindung:  
4x Zylinderschraube DIN6912  
M16x30 gemäß ADw2  
Material A2-70

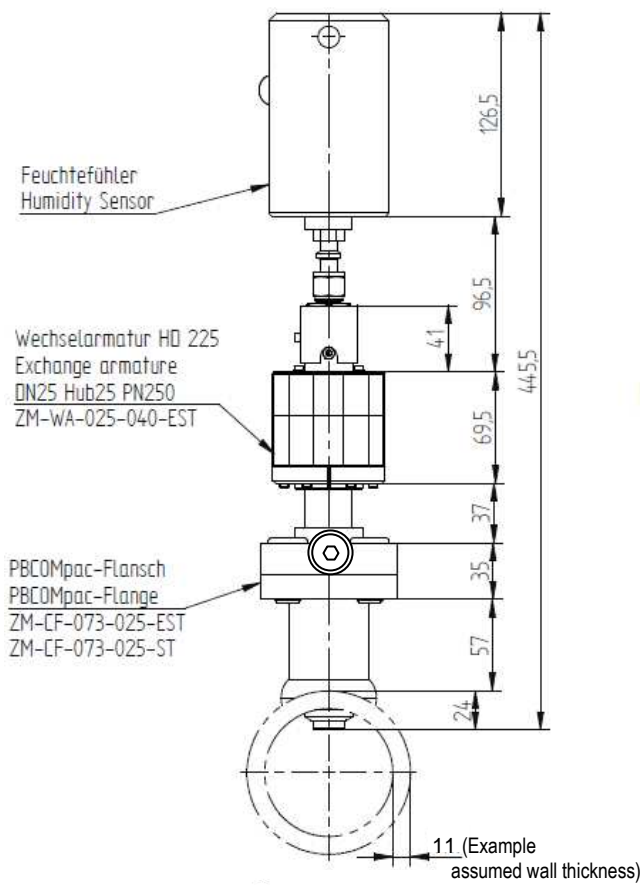
recommended: Tightening torque - using torque wrench  
lubricated: min 52 Nm – max. 114 Nm  
unlubricated: min 145 Nm – max. 239 Nm.

Draufsicht; Top View

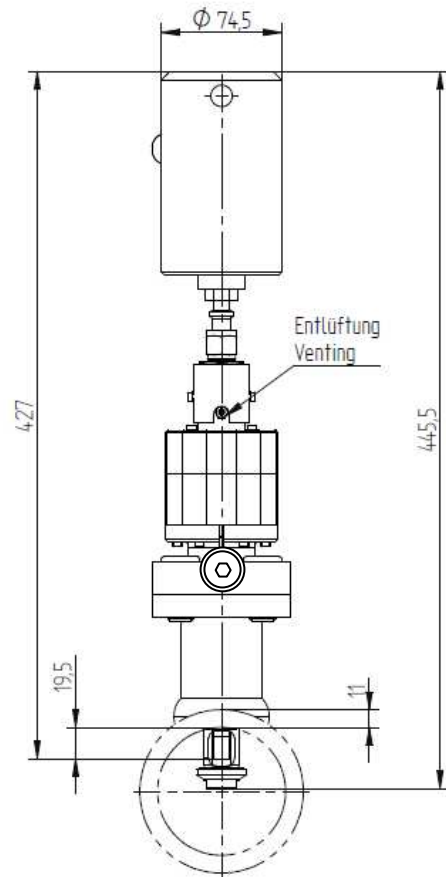


Dimensions: tube DN80

Sensor eingefahren; Sensor retracted

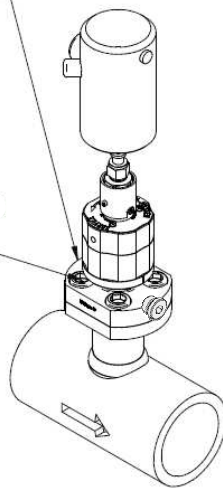


Sensor ausgefahren; Sensor down and in place



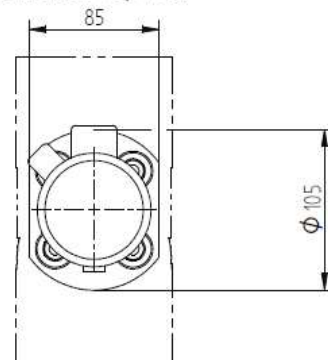
Achtung!  
Stellung des PIN muß immer  
in Anströmrichtung sein  
Caution!  
Pin position should always be  
on the inflow direction

Schraubverbindung:  
4x Zylinderschraube DIN6912  
M16x30 gemäß ADW2  
Material A2-70



recommended: Tightening torque - using torque wrench  
lubricated: min 52 Nm – max. 114 Nm  
unlubricated: min 145 Nm – max. 239 Nm.

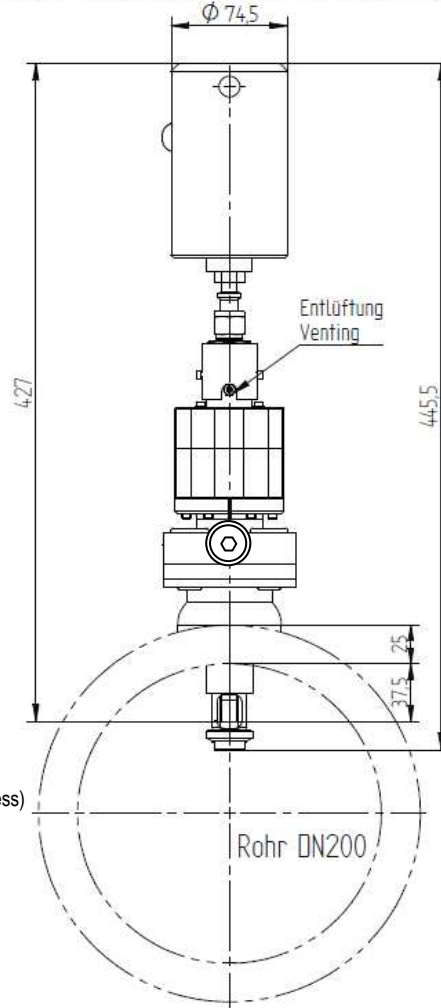
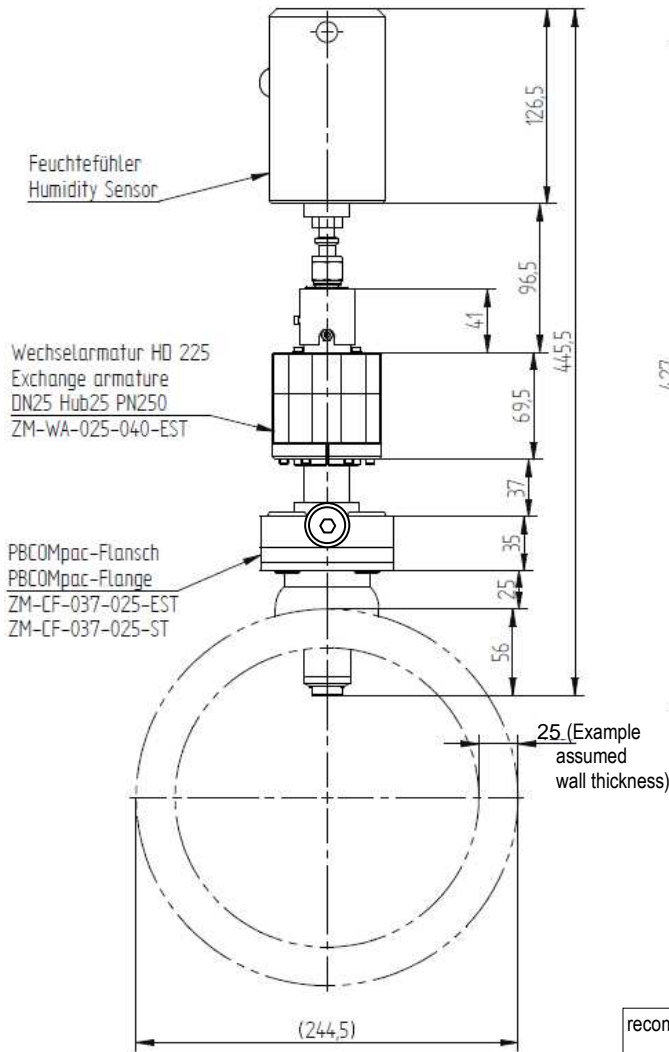
Draufsicht; Top View



Dimensions: Tube DN200

Sensor eingefahren; Sensor retracted

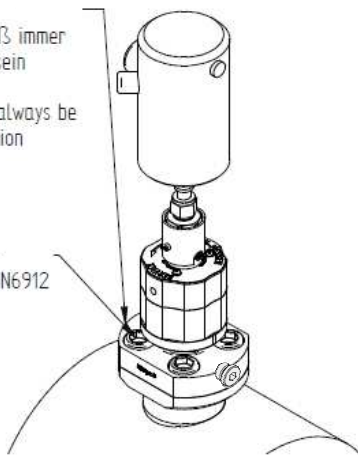
Sensor ausgefahren; Sensor down and in place



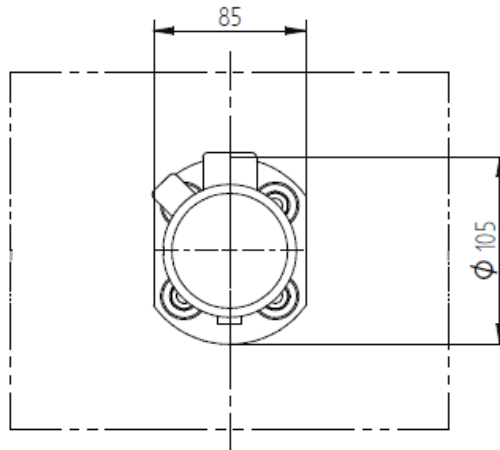
recommended: Tightening torque - using torque wrench  
lubricated: min 52 Nm – max. 114 Nm  
unlubricated: min 145 Nm – max. 239 Nm.

Achtung!  
Stellung des PIN muß immer  
in Anströmrichtung sein  
Caution!  
Pin position should always be  
on the inflow direction

Schraubverbindung:  
4x Zylinderschraube DIN6912  
M16x30 gemäß ADw2  
Material A2-70



Draufsicht; Top View

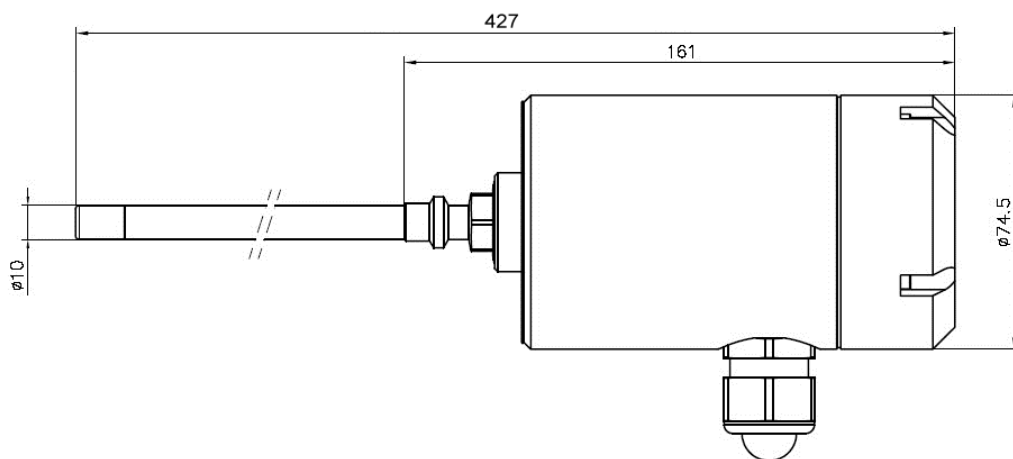


## 2.2.2 Moisture sensor L166x

Due to its porous structure, the probe is designed for the range of trace humidity. Only one sensor element covers the dewpoint range from +20 °C DT up to about -80 °C DT with application temperatures up to 95 °C. Condensation does not affect the probe. After having been dried, it can be applied without any recalibration, i.e. it can be operated mostly without any problems in processes where temporary condensation occurs.

Permissible working temperature	-30...+60 °C
Permissible storage temperature	-30...+ 60 °C
Integrated Pt100	DIN IEC 751, 4-wire class A
Max. permissible working pressure	100 bar, 200 bar on request with certificate (gas-pressure test)
Calibrated Range	-80 ... +20 °C DT
Accuracy	+/- 1 K
Material	Shaft: 1.4571 Sensor head: POM
Protection type	IP 65 (in built-in state)
Approvals	ATEX, CSA, CRN, GOST

Dimensions in mm



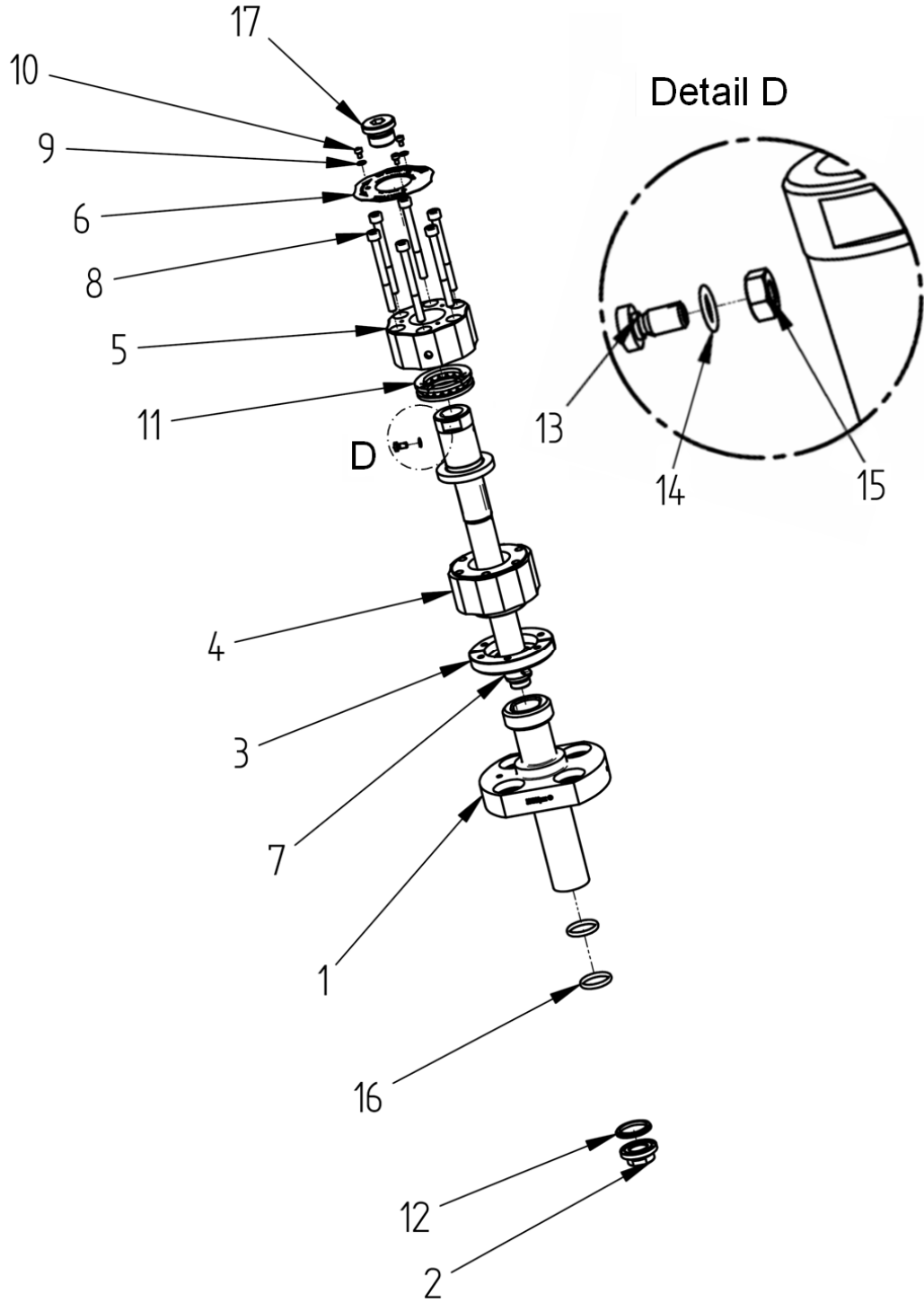
L166x



The maximum permissible pressure in the system is limited by the maximum permissible working pressure of the sensor.

## 2.3 Spare parts

### 2.3.1 Sensor retraction tool



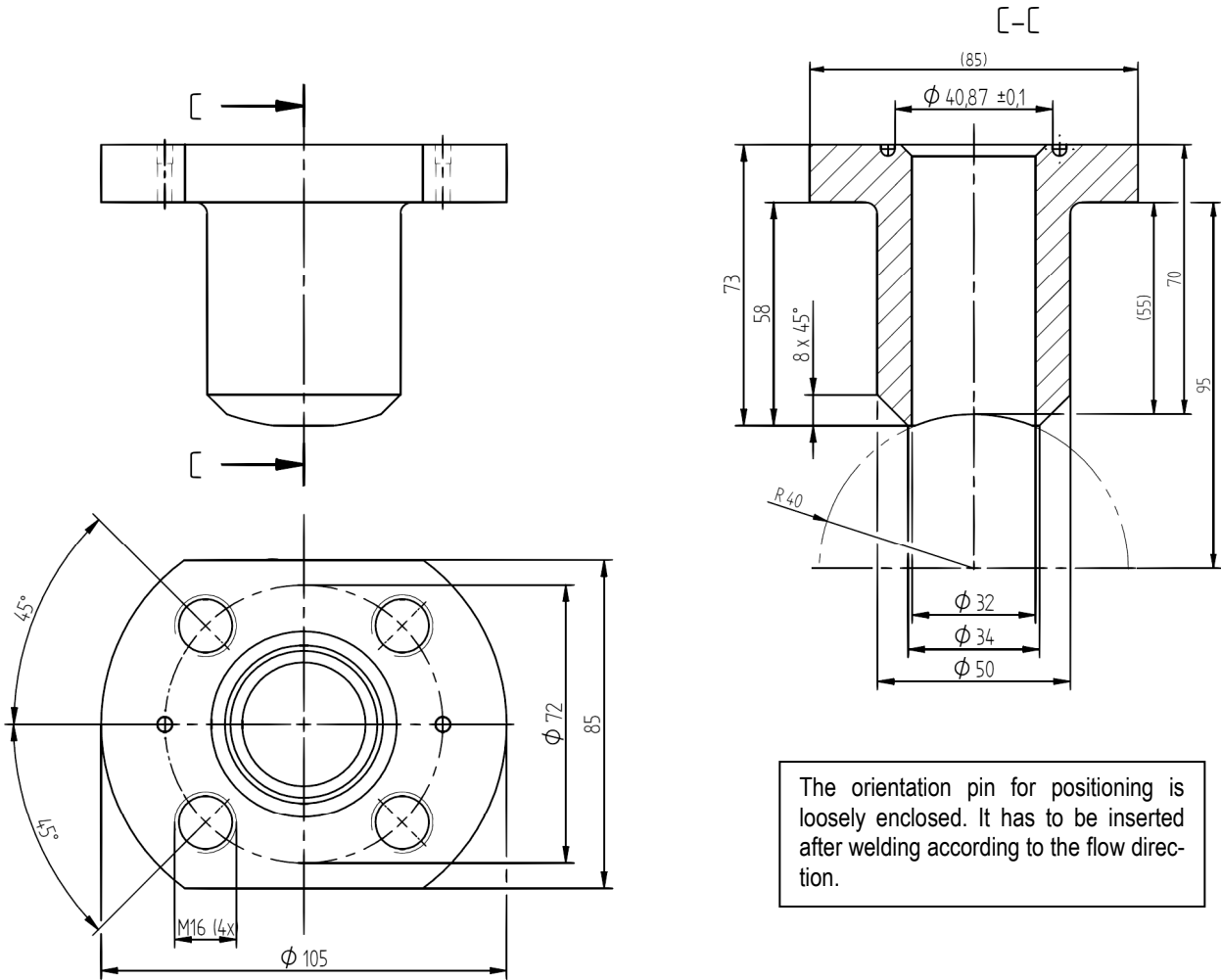
Pos.No.	Number	Designation	Detail	Material
1	1	Flange tube		1.4571
2	1	Cap nut	M16 x 1,5	1.4571
3	1	Lock ring, two parts	D 70 x 8	1.4571
4	1	Adjustment nut		Red bronze RG7
5	1	Bearing retainer		1.4571
6	1	Label disc	Ø 68 x 0,5	EN AW-6060
7	1	Sensor holder		1.4571
8	6	Cylinder head screw	ISO 4762 - M6x65	A4-70
9	1	Washer (labeling)	DIN 125-1 A - 3,2	A4
10	3	Cylinder head screw (labeling)	ISO 4762 - M3x5	A2-70
11	1	Deep groove ball thrust bearing	DIN 711 51106 30x47x11	1.4125
12	1	Sealing ring (cap nut)	22,9 x 29 x 2,7	PTFE sheer
13	1	Spindle (ventilation)		1.4571
14	2	O-ring (ventilation)	4 x 1,2	FKM GLT 75
15	1	Hexagon nut (ventilation)	DIN 934	1.4571
16	2	O-ring (flange nozzle)	21,89 x 2,62	FKM GLT 75
17	1	Closing plug with sealing	G½" type. VSTi 1/2 ES Fa.Landefeld	VA 2.2

## 2.3.2 Weld connecting piece / blind flange

The CF-weld connecting piece is available in two lengths for different tube diameters. Each version is available in steel or stainless steel.

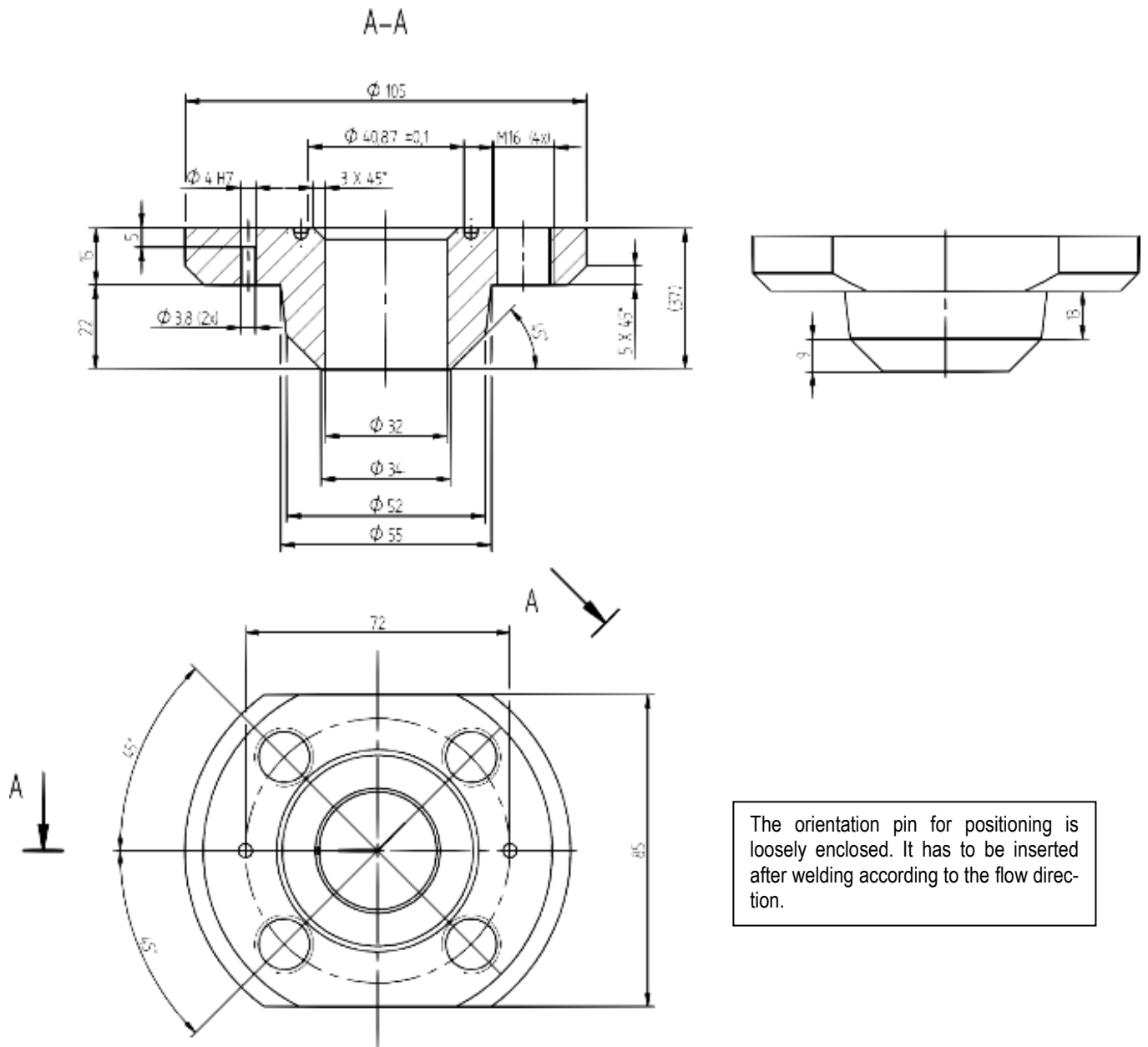
The weld connecting piece is used for mounting the PBCOmpac® flange connection to the sensor retraction tool (☞ section 4.4) or for mounting the blind flange for operation without sensor retraction tool and measuring device (☞ section 4.6).

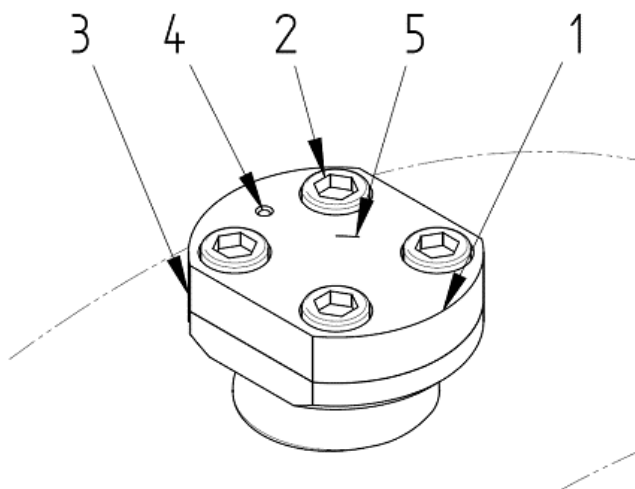
*Weld connecting piece, long version  
for nominal diameter DN 50 ... including DN 100*





Weld connecting piece, short version  
for nominal diameter from including DN 100





Flange set for pipeline completely in steel						
Pos.	No.	Designation	Detail	Material	Drawing no.	Quality verification
1	1	CF-blind flange	DN25 PN250	TStE 355 (1.0566)	PB-000384	DIN EN 10204 3.2
2	4	Cylinder head screw	DIN 6912 - M16x30	A2-70 ADW2		
3	1	CF-weld connecting piece long or short version	DN25 PN250	TStE 355 (1.0566)	PB-000382	
4	1	Orientation pin	∅ 4x10	1.4305	DIN 7	
5	1	O-ring PBCOmpac®	40,87x3,53	FKM		

Flange set for pipeline completely in stainless steel						
Pos.	No.	Designation	Detail	Material	Drawing no.	Quality verification
1	1	CF-blind flange	DN25 PN250	1.4571	PB-000337	DIN EN 10204 3.1
2	4	Cylinder head screw	DIN 6912 - M16x30	A2-70 ADW2		
3	1	CF-weld connecting piece	DN25 PN250	1.4571	PB-000334	
4	1	Orientation pin	∅ 4x10	1.4305	DIN 7	
5	1	O-ring PBCOmpac®	40,87x3,53	FKM		

## 2.3.3 Moisture sensor L166x

Designation	Type	Specification	Order no.
Moisture sensor with integrated Pt 100	L 166x	Immersion depth 225 mm	302471

Technical data ↗ section 2.2.2.



For instructions on further spare parts and accessory parts for the measurement system, see operating manual HYGROPHIL F 5673.

## 3 Safety precautions

### 3.1 Designated use

The sensor retraction tool ZM-WA-025-040 PN 250 is exclusively designated for the use in pipeline systems for natural gas unless the calibration certificate explicitly allows the use for other gases.

Due to its constructional version, it can be operated in pressurised systems up to PN250.

Before beginning the drilling and welding works, the system must be depressurised. Before mounting or dismounting the sensor retraction tool, a depressurised system state has to be created.

Any use other than the described one challenges the safety of human beings and of the complete measuring device and is not admissible.

The manufacturer is not liable for damages resulting from improper or inappropriate use or installation.

In order to prevent device damages or health hazards, there must not be any manipulations at the sensor retraction tools with tools not explicitly described in this operating manual.

The replacement of the sensors while the operation is running must take place by observing the working steps described in the operating manual, i.e. the sensor retraction tool must be on "CLOSE" position.

The sensor retraction tool ZM-WA-025-040 PN 250 can only be operated under the ambient conditions described in the technical data. Otherwise measurement inaccuracies may occur and equipment disturbances cannot be excluded.

For the user's safety and for the functional capability of the devices, the startup steps, inspections and maintenance works recommended by the manufacturer have to be observed and carried out.

For reasons of clearness, this instruction does not include all information details.

If you need further information or if any special problems occur which have not been described in detail in this instruction, you can ask the manufacturer for the required information.

Read this operating manual before taking the fitting into operation. Keep this operating manual at a place which is accessible for all users at any time. Please help us improve this operating manual. We thank you in advance for your suggestions.

## 3.2 Mounting, startup and operation

The sensor retraction tool has been built in a fail-safe way and tested according to the current state of the art and has left the factory in a perfect safe condition

The relevant provisions and European norms have been taken into account (☞ section 1.5 Declaration of conformity).

As user you are responsible for the observance of all applying safety provisions, among others:

- installation regulations
- local norms and regulations.

The manufacturer has done everything that is necessary for guaranteeing safe working. The user must make sure that the devices are erected and installed in a way that their safe use is not impaired.

The devices are factory-tested and have been delivered in a fail-safe state.

This operating manual contains information and warnings to be observed by the user in order to make possible a safe operation.

- Mounting, startup, operation and maintenance of the measuring device only to be carried out by qualified and specialised staff. Specialised staff must be authorised by the system operator to carry out the mentioned activities.
- Specialised staff must have read and understood this operating manual and follow the instructions of this operating manual.
- Before the startup of the overall measuring unit, check all connections on their correctness.
- Do not take into operation any damaged products and protect them against accidental startup. Mark the damaged product as defective.
- Disturbances at the measuring unit only to be repaired by authorised and qualified staff.
- If disturbances cannot be repaired, you have to put the products out of operation and protect them against accidental startup.
- Repairs not described in this operating manual only to be carried out directly by the manufacturer or by the service organisation.

### 3.3 Protective devices

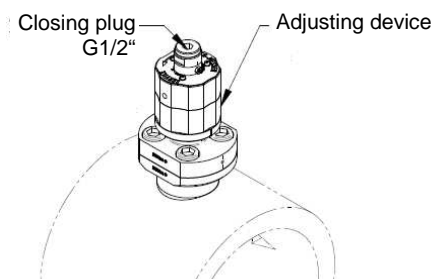
In order to prevent operating errors and disturbances at the sensor retraction tool, can the sensor retraction tool be equipped with the protective devices listed below:

#### Closing plug

For the operation without sensor, an operating error does not result in a gas leakage as the adjusting device is set towards OPEN-MESSEN.

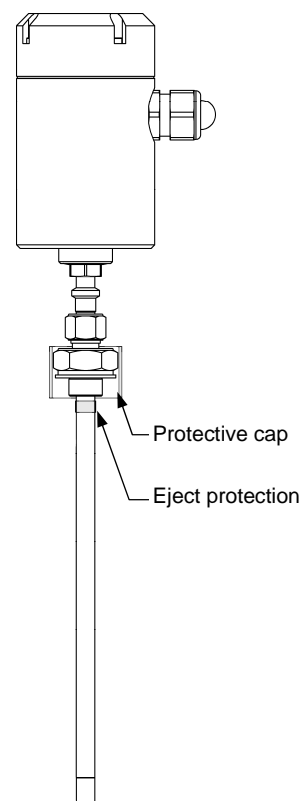
For the operation with sensor, the closing plug can be parked at the flange nozzle.

Operation without measuring device with sensor retraction tool → section 4.7.



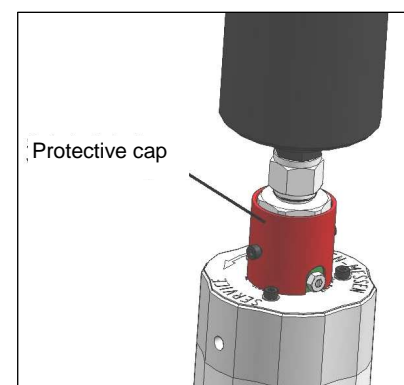
#### Eject protection

When the sensor in the sensor retraction tool is in the measure position (OPEN-MESSEN), the eject protection positioned in front of the sensor prevents the sensor from shooting out after an operating error at the Swagelok connection.



#### Protective cap for Swagelok connection

In order to prevent operating errors at the Swagelok connection, the area around the Swagelok connection (wrench size 27mm) is covered by the protective cap (dismounting of sensor → section 5.5 Sensor replacement).



*Disclaimer of liability*

BARTEC BENKE GmbH and its vicarious agents only assume liability in the case of deliberate acts or gross negligence. The extent of liability in such a case is limited to the value of the order placed with BARTEC BENKE GmbH. BARTEC BENKE accepts no liability for any damage resulting from non-observance of the safety regulations or from non-compliance with the operating instructions or operating conditions. Secondary damage is excluded from the liability.

## 4 Mounting

### 4.1 Description of PBCOmpac<sup>®</sup> flange

The groove constructed for accommodating the sealing element (o-ring) is dimensioned in a way that the mounting screws can be tightened up to the full surface contact of the support surfaces.

COMPAC<sup>®</sup> flange connections behave differently from conventional DIN flange connections with flat seals and have to be tightened less. A complete sealing is achieved by means of lower screw tightening forces.

As soon as the full surface contact of the support surfaces is reached, a considerable resistance is felt. This resistance is a sign for proper installation and sufficient screw tightening forces.

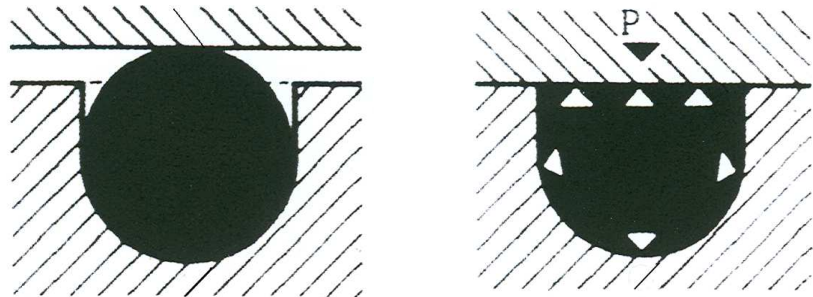
Consequently, when COMPAC<sup>®</sup> flange connections are mounted, there is no risk that screws are already overtightened during mounting.

Besides, when the full surface contact of the support surfaces is reached, the proper strain (deformation and compression) of the sealing element is automatically enforced while an unwanted injury or overstraining of the sealing element is excluded.

The groove serving to accommodate the sealing element is largely protected during storage, transport and mounting.

Slight scratches on the flange contact surfaces, even in the groove area, are coped with by the COMPAC<sup>®</sup> sealing system without any impairment of the sealing effect as the sealing element is pressed to the flange surface opposite to the groove with high pressure force and therefore is able to fill scratches or indentations with sealing material.

Principle of the COMPAC<sup>®</sup> sealing system:



This new flange generation is indispensable for the interaction of engineering and measurement technology. The COMPAC<sup>®</sup> flange is the linking element to measurement technology and meets all requirements of an accurate measurement.

Apart from a lower weight and constructional volume, these new flanges offer more tightness efficiency and leakage safety.

*Example:*

- previous DIN flange DN 250, PN 100, weight 81,40kg  
COMPAC<sup>®</sup> flange DN 250, PN 100, weight 15,22kg
- previous ANSI DN 25 with blind flange, PN 250, weight 8,0kg  
PBCOmpac<sup>®</sup> DN 25 with blind flange, PN 250, weight 2,0kg.

## 4.2 Required tools

You need the following tools to install the sensor retraction tool ZM-WA-025-040 PN 250 into the process and to install the sensor L166X:

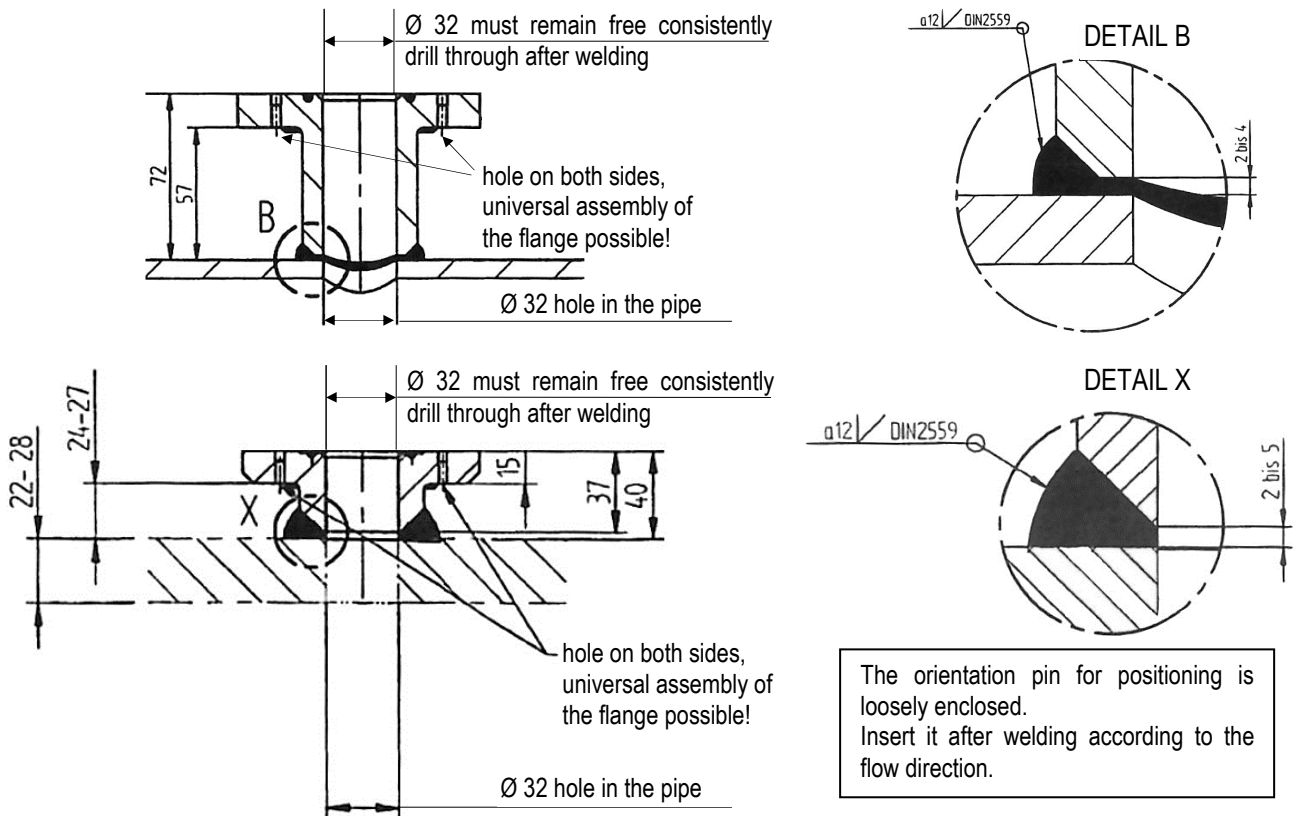
- hexagonal wrench 2,5 mm (protective cover)
- hexagonal wrench 10 mm (plug)
- hexagonal wrench 14 mm (flange screw)
- open-jaw wrench (wrench size 27mm) (Swagelok)
- open-jaw wrench (wrench size 19mm) (Swagelok)
- open-jaw wrench (wrench size 7mm) (pressure compensation)
- usual screwdrivers (pressure compensation)
- hook wrench with pin DIN 1816 sizes 68-75 (☞ section 5.1)

## 4.3 Welding connection to pipeline with PBCOMPAC<sup>®</sup> flange

In order to prevent a bimetallic weld in the welding connection to the pipeline, the material of the flanges has to be steel or stainless steel in accordance with the pipeline. The matching blind flange is supplied with the material.

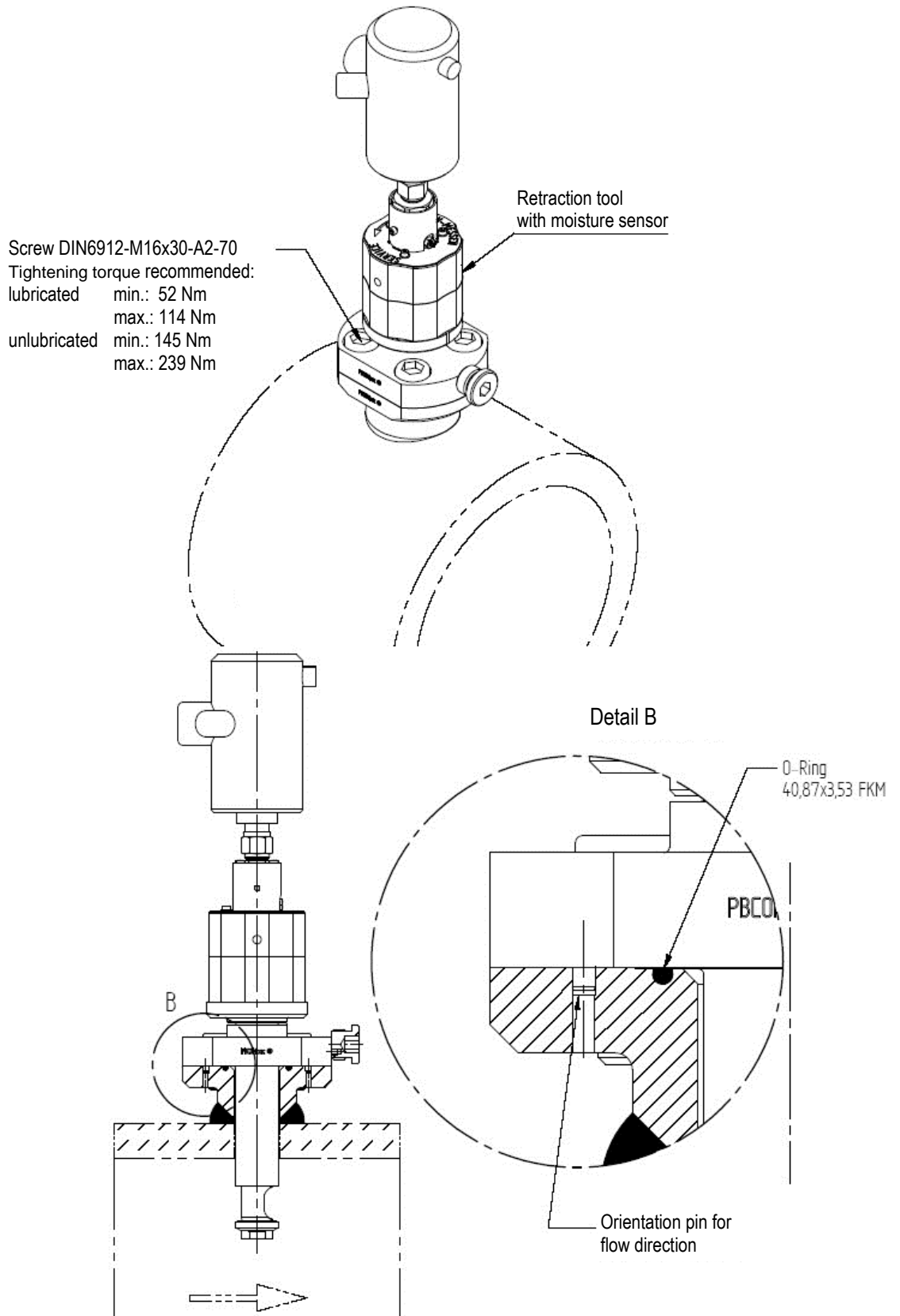
COMPAC<sup>®</sup> flanges have to be welded without distortion so that the tightness achieved after mounting can reach an optimum.

- ☑ Before welding, remove the o-ring from the groove!
  - Before inserting the o-ring, make sure the groove is clean.
  - The orientation pin is located on the inflow side – at the front as seen from the flow direction.
- ☑ For passing through the sensor retraction tool, a hole  $> \text{Ø}32$  has to be at the whole length (drill after welding).
- ☑ After these steps, clean the working area involved.





## 4.4 PBCOmpac<sup>®</sup> flange connection to sensor retraction tool with sensor



## 4.5 Determine the mounting location

The mounting location should be easily accessible and vibration-free. The ambient temperature must not be higher than 60°C (mind possible heat radiation).

Before being mounted or dismounted, the sensor retraction tool has to be depressurised!

Please keep in mind that a mounting space of at least 620 mm is required for dismounting the sensor.

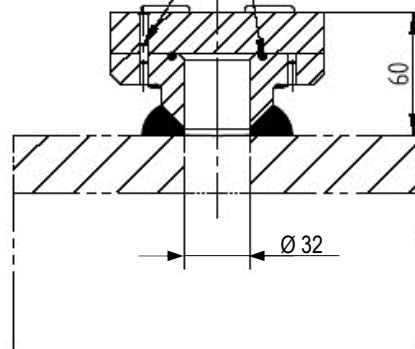
For mounting, you have to mind the direction of inflow (☞ section 4.8)

## 4.6 Mounting without measuring device: with blind flange

Attention!

Orientation pin must always be positioned in inflow direction

O-Ring  
40,87x3,53 FKM



Screw DIN6912-M16x30-A2-70

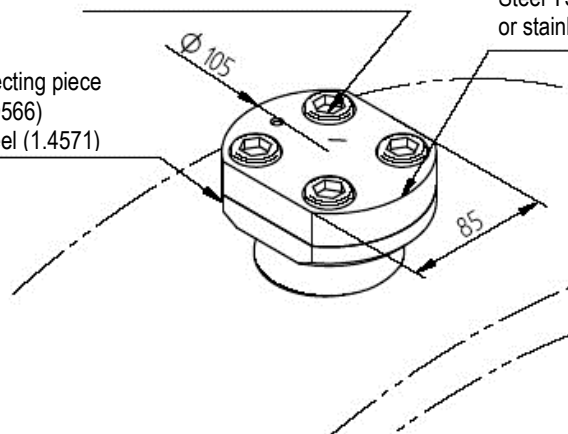
Tightening torque recommended:

greased min.: 52 Nm  
max.: 114 Nm

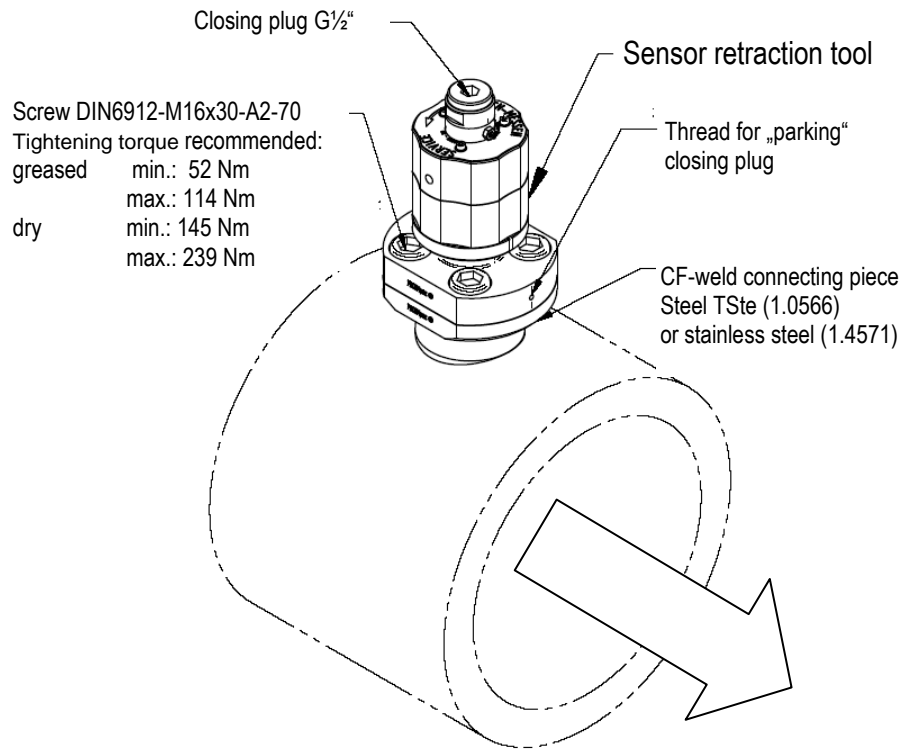
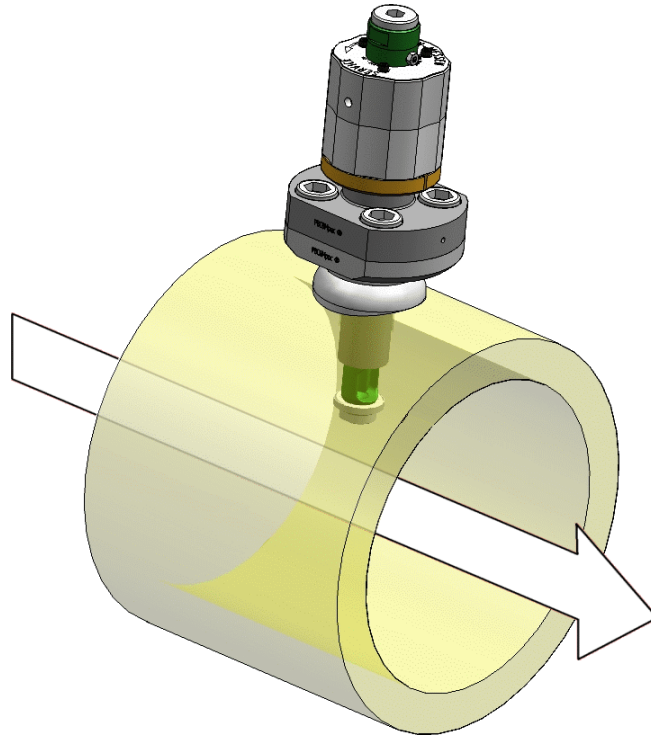
dry min.: 145 Nm  
max.: 239 Nm

CF- blind flange  
Steel TSte (1.0566)  
or stainless steel (1.4571)

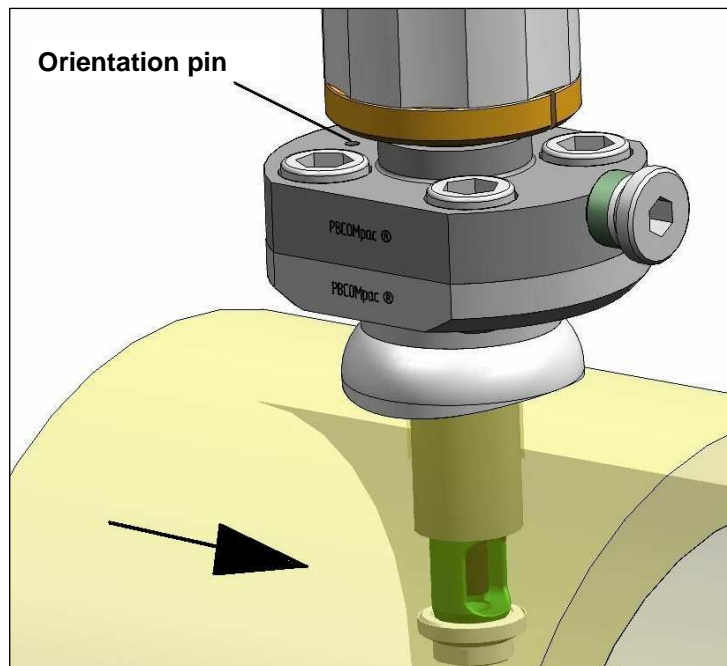
CF-weld connecting piece  
Steel TSte (1.0566)  
or stainless steel (1.4571)



## 4.7 Operation without measuring device: with sensor retraction tool



## 4.8 Direction of flow



The extendable sensor holder must be tight on the direction of inflow (window closed) so that the sensor is protected against liquid phases (glycol, water, oil, etc.).

## 4.9 Immersion depth

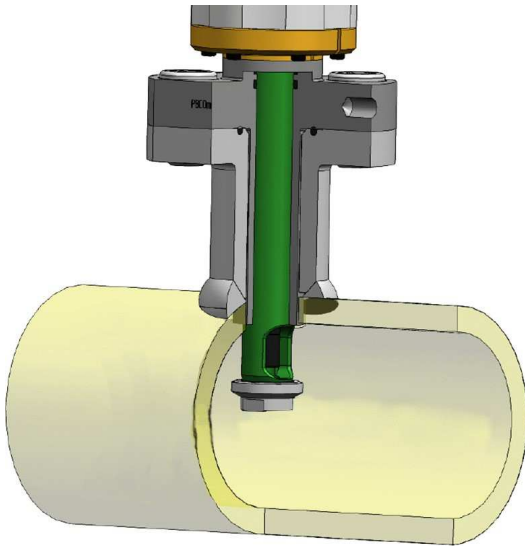
Upstroke is 25 mm, immersion depth is 30...64 mm measured from the inner wall of the pipeline. For the construction, possible wall thickness values of the pipeline ranging from 5...39 mm have been taken into consideration.

This means that for a wall thickness of 5 mm, the immersion depth including upstroke is 76 mm, for a wall thickness of 39 mm the immersion depth including upstroke is 42 mm.

For pipes with nominal from DN 50 up to DN 100 (including) is the long version of the weld connecting piece available.

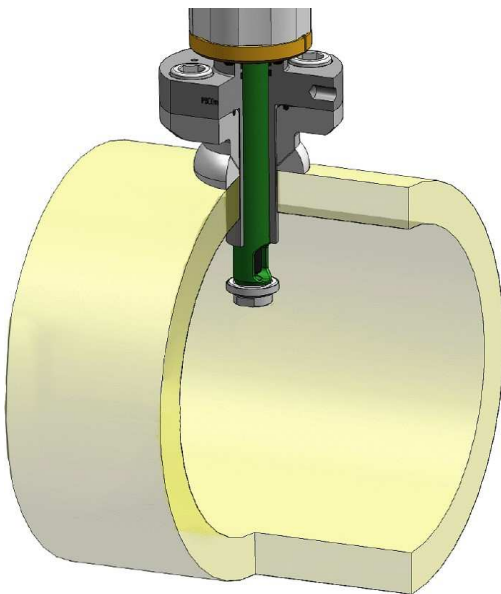
Relation nominal diameter to tube

Example PN 250



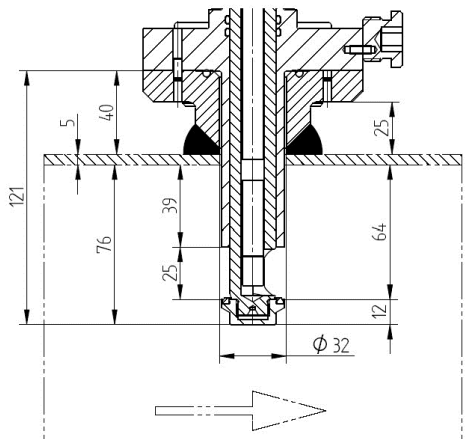
Favoured nominal widths / pipelines $\leq 100\text{mm}$		
Nominal width [mm]	Outer $\varnothing$ [mm]	Wall thickness [mm]
DN 50	60,3	6,3
DN 65	76,1	8
DN 80	101,6	11
DN 100	127	14,2

Example PN 100

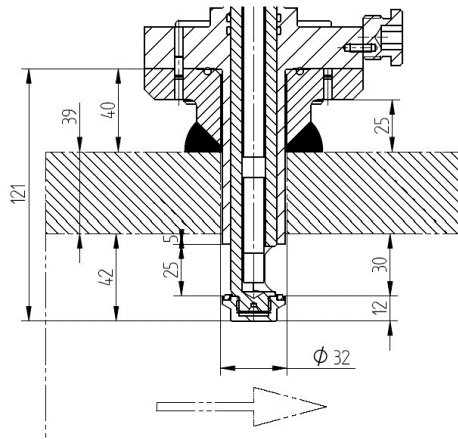


Favoured nominal widths / pipelines $\geq 100\text{mm}$		
Nominal width [mm]	Outer $\varnothing$ [mm]	Wall thickness [mm]
100	114,3	5
150	168,3	6,4
200	219,1	6,5
250	273,0	8,0
300	323,9	8,9
400	406,4	12,5
500	508,0	14,6
600	610,0	14,2
700	711,0	16,0
800	813,0	18,2
900	914,0	21,0
1000	1016,0	23,2
1100	1118,0	25,6
1200	1220,0	28,0
1400	1420,0	32,3

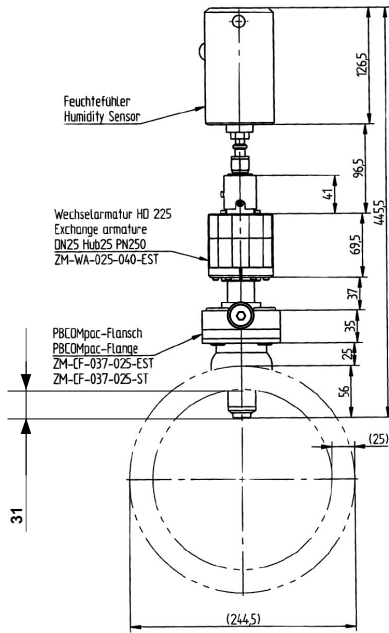
Mounting examples for the immersion depth



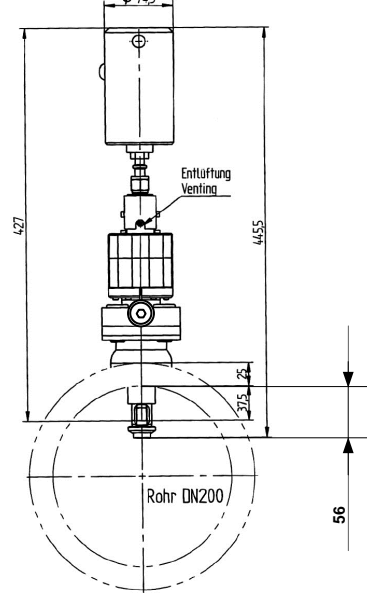
Sensor eingefahren, Sensor retracted



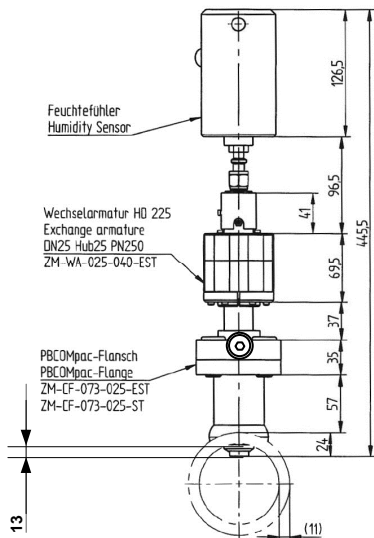
Sensor ausgefahren, Sensor down and in place



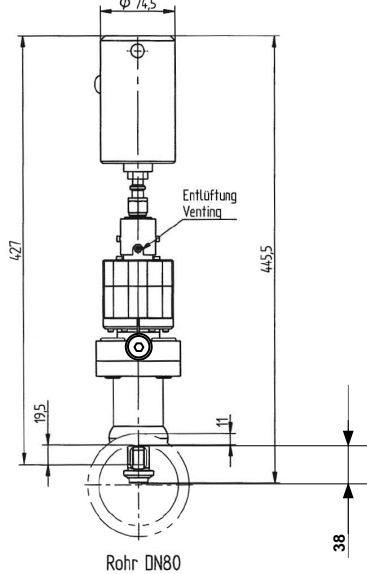
Sensor eingefahren, Sensor retracted



Sensor ausgefahren, Sensor down and in place



13



38

## 4.10 Installation of the sensor in the sensor retraction tool

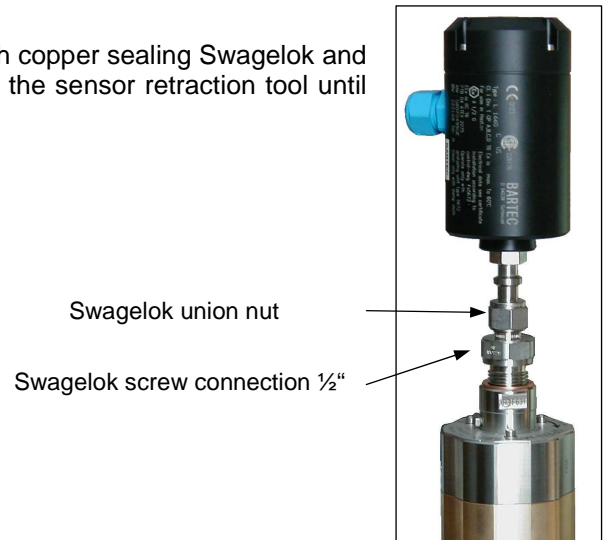
The delivery scope of the sensor includes the copper sealing for the Swagelok screw connection with the appurtenant red protective cover.

Make sure that the sensor retraction tool is in "SERVICE" position (☞ section 5.2).

- ☑ Before installing the sensor, dismount the closing plug  $\frac{1}{2}$ " by means of a hexagonal wrench 10 mm and "park" it at the thread hole M10 designed for that purpose.



- ☑ Insert the sensor with copper sealing Swagelok and protective cover into the sensor retraction tool until the stop position.



- ☑ Fasten the sensor with the sensor retraction tool with the Swagelok screw connection  $\frac{1}{2}$ " with the open-jaw wrench (wrench size 27mm). Do not forget to check the copper sealing!
- ☑ At first manually tighten the Swagelok union nut with cutting ring. Now adjust the sensor.
- ☑ By means of a screw wrench, tighten the union nut just firmly enough that the screw connection cannot be moved manually any longer.
- ☑ From this point on, tighten the nut by  $1\frac{1}{4}$  turns.
- ☑ To mount the protective cover for the Swagelok protective cover, proceed in the following order:
  - Push the protective cover down to the adjusting device: screws must point to the flat area (wrench size 26mm)
  - Tighten screws M3.

## 4.11 Final installation check

- After mounting, check the following connections on tightness:
  - Flange connection PBCOmpac<sup>®</sup> flange
  - Venting screw
  - Swagelok screw connection
- Turn the adjusting device manually, by means of the hook wrench if required.
  - Turn clockwise (rightwards): sensor retraction tool moves towards "OPEN-MESSEN".
  - Turn anticlockwise (leftwards): sensor retraction tool moves towards "SERVICE".

## 4.12 First commissioning

Before operating the sensor retraction tool, make sure that the sensor has been installed correctly and that the venting screw as well as the Swagelok screw connection including the sensor cover have been tightened as prescribed.

At the beginning, the sensor retraction tool has to be in "SERVICE" position (sensor chamber closed)!



Under no circumstances untighten the Swagelok screw connection as long as the sensor chamber is under pressure. This is always the case when the sensor retraction tool is not in the final "SERVICE" position.

Turn the sensor retraction tool by hand or with the hook wrench clockwise towards "OPEN-MESSEN" until the stop. Now the sensor is in measuring position.



# 5 Operation

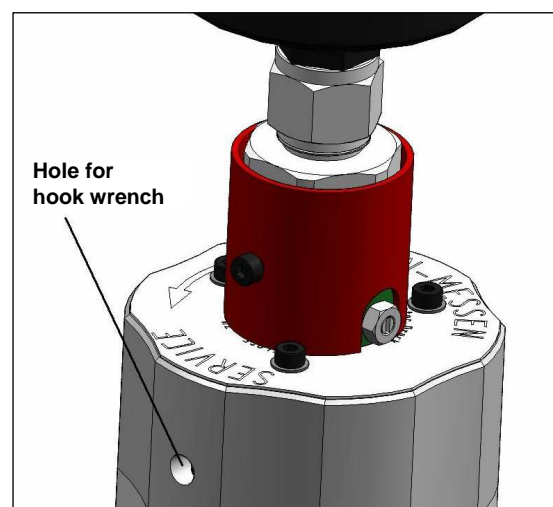
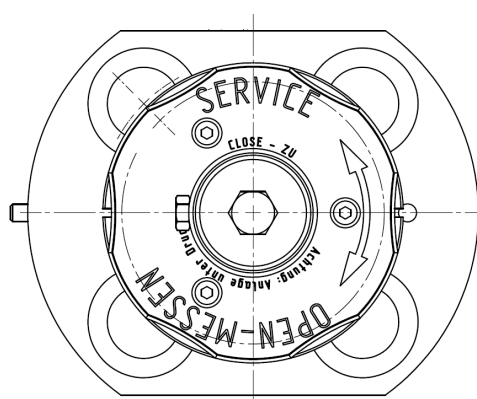
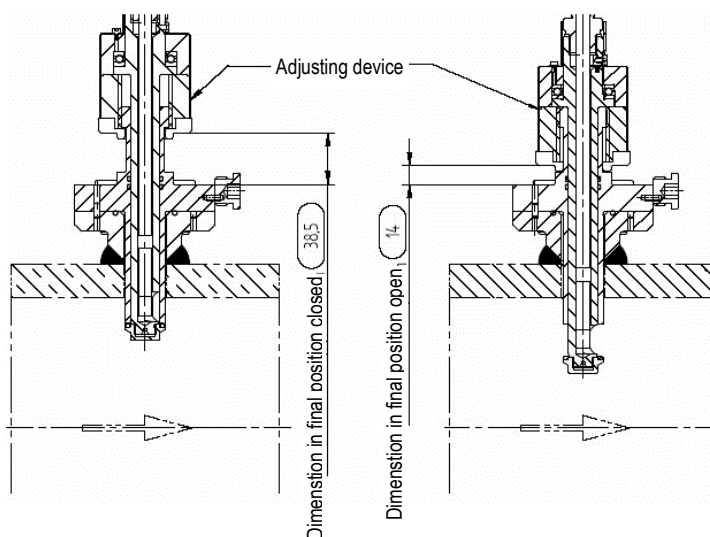
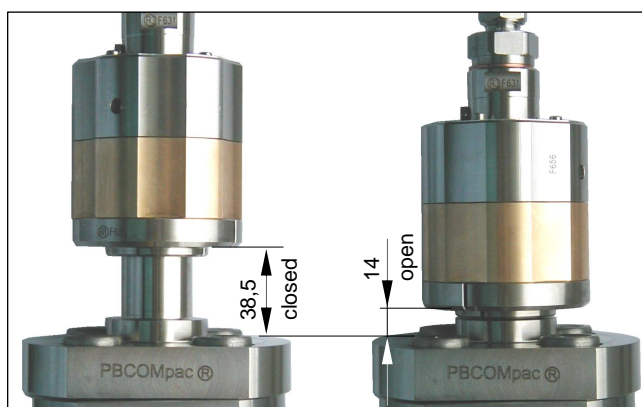
## 5.1 Function



Manually operated sensor retraction tools allow the mounting and dismantling of the sensor under process conditions, i.e. the relevant process or main flow need not be interrupted.

By turning the adjusting device, you move the sensor in the sensor retraction tool downwards (clockwise) or upwards (anticlockwise).

- Turn the adjusting device manually, by means of the hook wrench if required.
  - Turn clockwise (rightwards): sensor retraction tool moves towards "OPEN-MESSEN" .
  - Turn anticlockwise (leftwards): sensor retraction tool moves towards "SERVICE" .

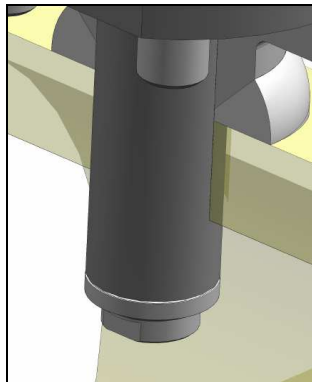
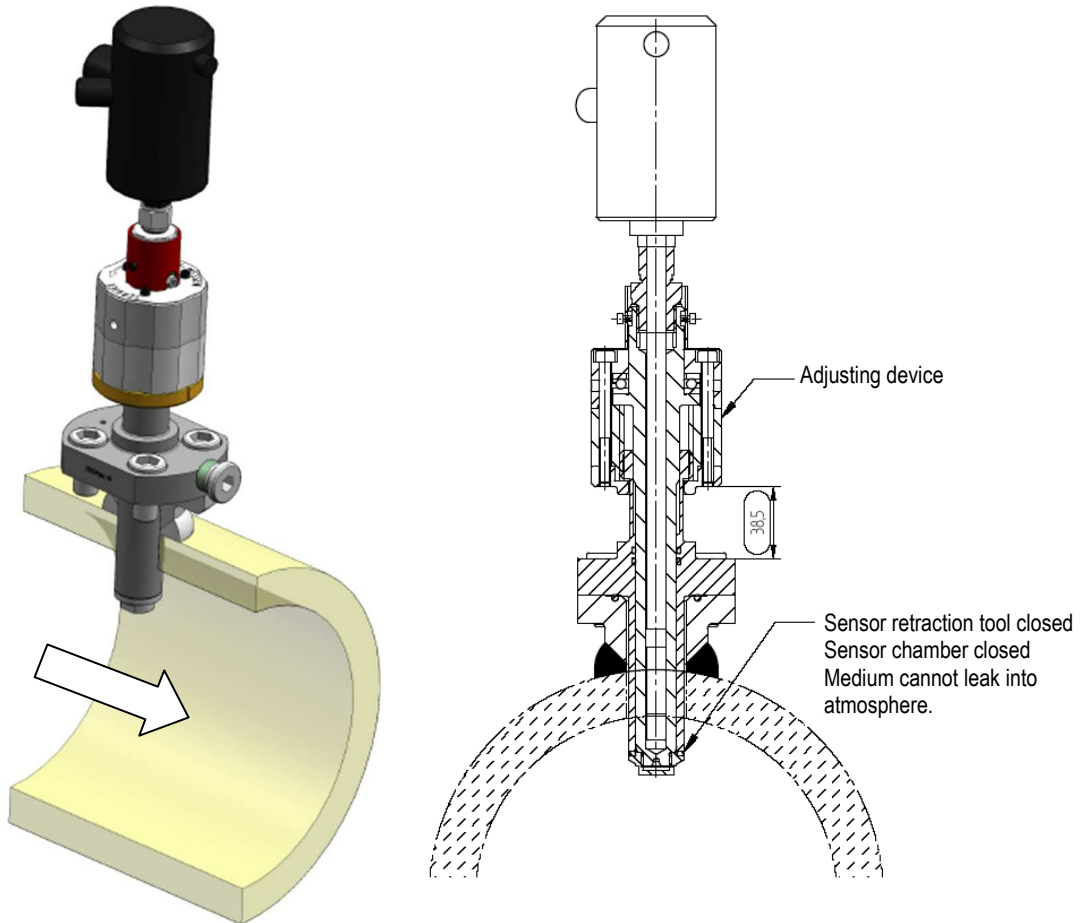


## 5.2 “SERVICE” position

The adjusting device has been turned anticlockwise until stop into the “SERVICE” position. The sensor chamber is closed.

The distance between the flange and the adjusting device is about 38,5 mm in this case.

After having been vented, the sensor can be dismantled.

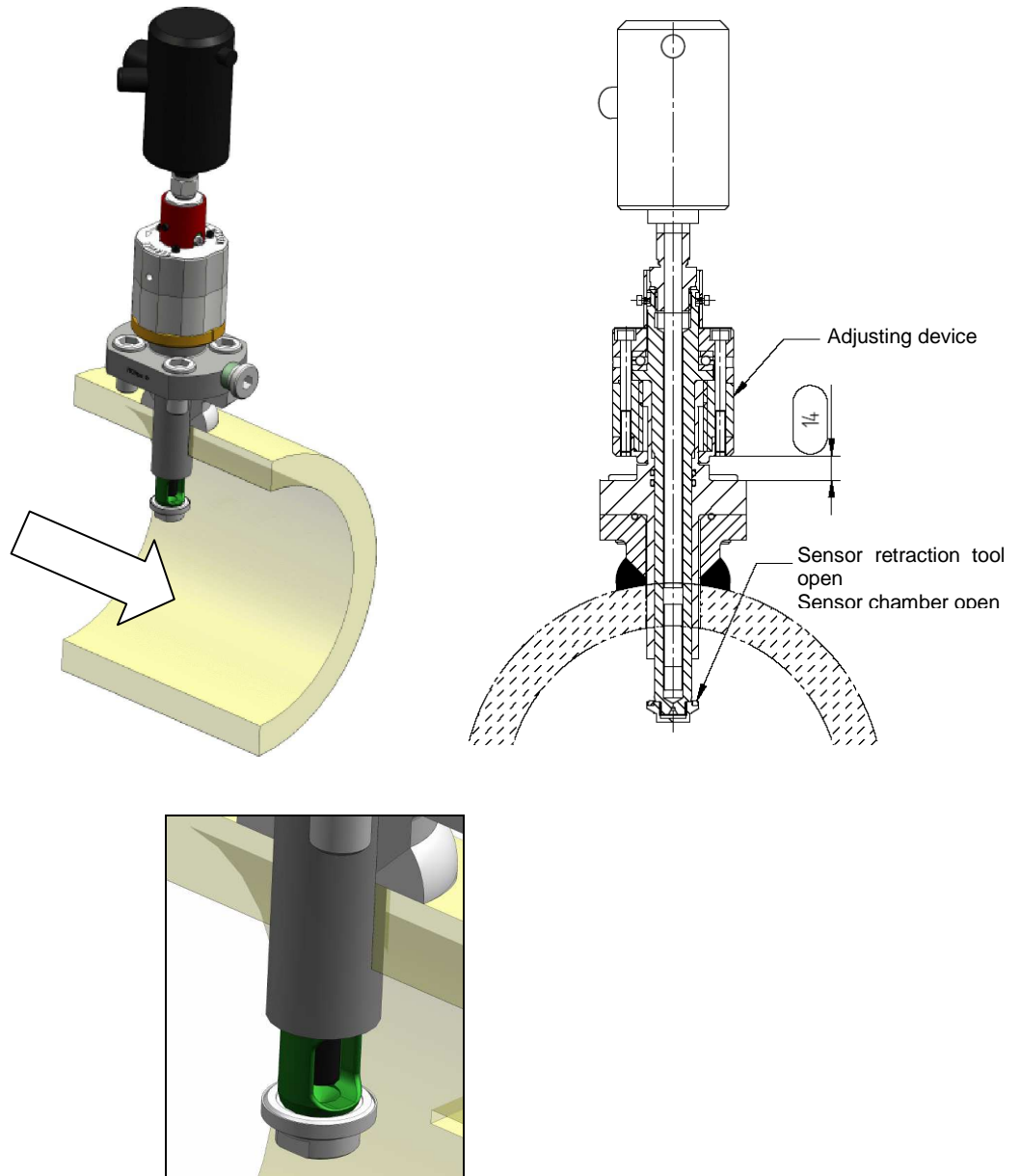


## 5.3 “OPEN-MESSEN“ position

Adjusting device has been turned clockwise until the stop to the "OPEN-MESSEN" position.

The sensor chamber is opened. **The sensor must not be dismantled.**

The distance dimension between the flange and the adjusting device is approx. 14 mm in this case.

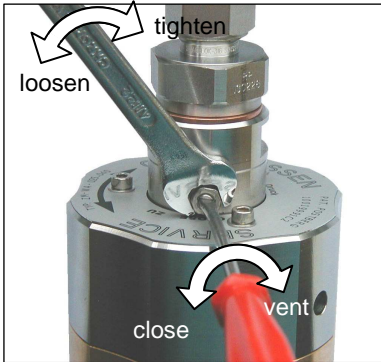


## 5.4 Venting / pressure compensation



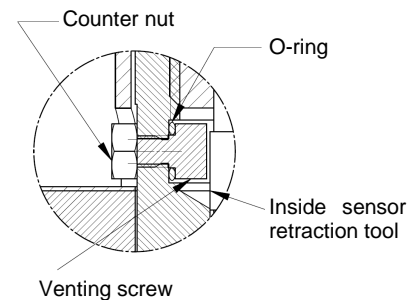
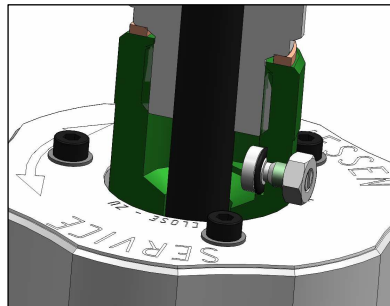
Do not untighten the Swagelok screw connection / closing plug before depressurising the sensor retraction tool!

Carry out the venting only in the "SERVICE" position!

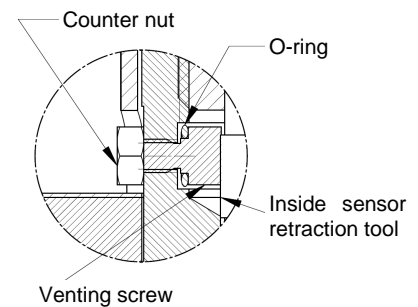
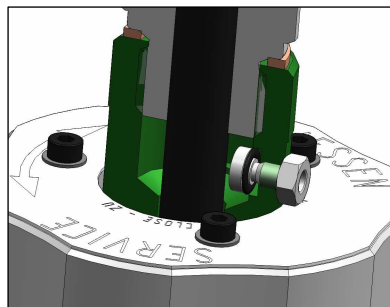


- ☑ Close the sensor retraction tool → "SERVICE" position (☞ section 5.2).
- ☑ Loosen the counter nut of the pressure compensation screw (open-jaw wrench (wrench size 7mm) by turning anticlockwise - leftwards).
- ☑ After loosening the counter nut, turn the venting screw inwards with the screwdriver (clockwise turning) until the venting audibly begins.
- ☑ When no residual pressure is left any more, untighten the Swagelok screw connection and take the sensor out (☞ section 5.5).
- ☑ Tighten the venting screw again (anticlockwise turning) and lock it with the counter nut (clockwise turning).

Venting closed,  
counter nut tightened

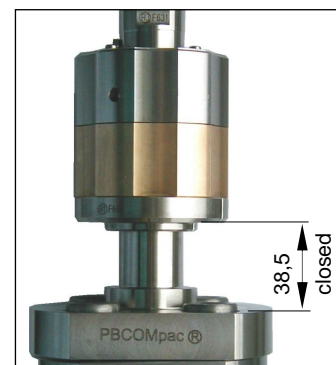


Venting open,  
counter nut loosened



## 5.5 Sensor replacement

- ✔ **Close sensor retraction tool**
  - Manually turn the adjusting device of the sensor retraction tool anticlockwise with the hook wrench towards the "SERVICE" position until the stop. The difference measure between adjusting device and flange = 38,5mm.



- ✔ **Create pressure compensation**
  - Untighten counter nut for pressure compensation (open-jaw wrench (wrench size 7mm))
  - Turn the venting screw inwards with the screwdriver (clockwise turning) until the venting audibly starts.
  - Wait until depressurised state has been reached.
  - Tighten the venting screw again (anticlockwise turning) and lock it with the counter nut.



Never take the sensor out without having created a pressure compensation before. Otherwise the sensor would be pressed like a projectile out of the sensor retraction tool as soon as the thread is not engaged any longer.

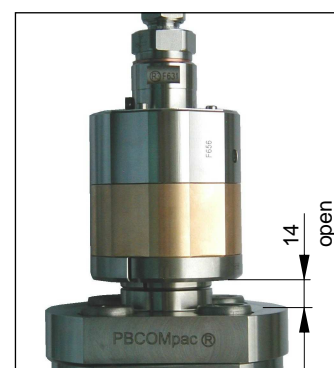
- ✔ **Remove sensor**
  - When there is no residual pressure any longer, untighten the Swagelok screw connection by means of the open-jaw wrench (wrench size 27mm)
  - Remove the sensor.

- ✔ **Insert new sensor**

For mounting a new sensor you have to use a copper seal.

- Insert the sensor with copper seal Swagelok and protective cover into the sensor retraction tool until the stop is reached.
- The Swagelok screw connection can repeatedly be mounted and dismounted.
- Tighten the screw connection (☞ section 4.10).

- ✔ **Open sensor retraction tool**
  - Manually turn the adjusting device of the sensor retraction tool clockwise with the hook wrench towards the "OPEN-MESSEN" position (☞ section 5.3).



Before readjusting the sensor retraction tool to the "OPEN-MESSEN" position for measuring, do not forget to make sure that the sensor has been mounted correctly. Otherwise the system pressure might leak in an uncontrolled way through the sensor retraction tool!



## 6 Maintenance

### 6.1 Cleaning the sensor retraction tool

The maintenance intervals have to be specified individually for each system. Experience has shown that the sensor retraction tool should be examined not later than in the course of the usual revision works. Dry o-rings should be greased.



All adjustment and maintenance works at the sensor retraction tool only to be carried out when the pipeline is depressurised.

### 6.2 Cleaning the sensor

You must clean the sensor:

- before each calibration / examination
- regularly during operation

The cleaning intervals depend on how dirty the sample gas is.



Handle the sensor very carefully. The moisture-sensitive layer is very susceptible to knocks and scratches. Never use pointed or sharp edged objects to clean the sensor.

Damage may result in incorrect measurements.

- Take the sensor out of the measuring line.

Use soft cleaning cloths only.

- Clean the sensor tip with a soft cloth twisted to a tip, preferably one impregnated with alcohol (☞ section 6.3).  
BARTEC BENKE recommends OpticPads CT811 supplied by CleanTex, or similar products



- Wipe the surface several times with a soft cloth to remove any residues of alcohol.

Use the cloths only once!

- Reinsert the sensor in the measuring line.



- Always clean the sensor only with the approved cleaning agents (see section 6.3).
- Do not use any abrasive cleaning agents. They may cause irreparable sensor damages.
- According to requirements, carry out a new check after the cleaning.

Sensor L1660

If a L1660 sensor is used you can unscrew the protective cap. If you cannot undo the cap by hand, loosen it carefully with pliers.

After cleaning the sensor tip, screw the protective cap carefully back on the sensor.

## 6.3 Cleaning agents

For cleaning the sensor, use tensid containing (alkaline) agents or water-soluble organic solvents (e.g. ethanol).

For removing different contaminations, especially fats and oils, we recommend to use isopropanol.



Do not use halogen-containing organic solvents and acetone. These solvents may destroy plastic parts of the sensor retraction tool or of the sensor and are suspected of causing cancer (e.g. chloroform).



# 7 Troubleshooting

## 7.1 Replacement of damaged parts



Damages at the sensor retraction tool which affect its being pressure-proof must be repaired by authorised and qualified staff. After each repair, the technical data of the specifications, e.g. pressure test, must be checked by specialised staff.

Replace all other damaged parts immediately. For ordering, use the details in section 2.3 Spare parts or contact your supplier.

## 7.2 Replacement of o-rings and sealing rings

- Keep the sealing surfaces of the sensor retraction tool free of dirt
- Remove adhesive deposits from time to time
- In case of leakages, contact your supplier



Danger of medium leaking!  
Replacement of sealings only by authorised and specialised staff.

The following o-rings and sealing rings can be replaced:  
(☞ parts list in sections 2.3.1 and 2.3.2):

- 2 o-rings of flange tube (☞ section 2.3.1; pos. 16)
- 1 o-ring + 1 o-ring for venting (☞ section 2.3.1; pos. 14)
- 1 sealing ring of cap nut (☞ section 2.3.1; pos. 12)
- o-ring PBCOmpac (☞ section 2.3.2; pos. 5)

You need fat (e.g. Syntheso Glep 1) to grease the o-rings. For instructions on the required tools, ☞ section 4.2 Required tools.



When working with parts in contact with the medium, protect yourself against medium residues and high temperatures by wearing protective gloves and goggles.

## 7.3 Dismounting the sensor retraction tool

- 2 Disconnect the sensor retraction tool from the process.  
Proceed as follows:
  1. Depressurise the part of the system where the sensor retraction tool has been installed.
  2. Turn the adjusting device of the sensor retraction tool to the "SERVICE" position.
  3. Vent the sensor retraction tool.
  4. Unscrew the sensor retraction tool.
  5. For the further operation, screw on the blind flange.



If the system is not depressurised while the sensor retraction tool is dismounted, the health of human beings is endangered and damages at the system may occur.

## 7.4 Return shipment

In case of repair, please return the sensor retraction tool to the BARTEC sales centre.  
For the return shipment, use the original packing.

## 7.5 Disposal



According to their respective material, sensor retraction tool and sensor have to be disposed of separately. Please observe the local regulations.

The design of BARTEC sensors takes into account as well as possible the environmental safety. In accordance with EU directive 2002/96/EG, BARTEC sensors have to be disposed of separately at disposal facilities for electrical and electronical devices or can be sent to BARTEC for disposal. They must not be disposed of together with the unsorted municipal solid waste.



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