
User Manual

Model PR20
Retractable fitting for
combined pH/redox electrodes



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1. GENERAL

1-1. Description

The retractable fitting with ball-valve allows a safe insertion and retraction of a combined pH/reference electrode while the process is under pressure. It can be mounted in a variety of positions as long as the electrode is in an almost vertical position with the tip pointing downward (see fig. 2-1).

The insertion depth can be selected on site. A minimum insertion depth of 0.2 mtr. into the process liquid is advised to have a fast temperature response. A special 'memory' ring is provided to remember the position of the electrode after retraction. To protect any loss of process liquid the mechanism for releasing the probe is designed to operate only when the ball-valve is closed. The combined pH/reference electrode can be replaced or calibrated easily. The especially designed cable has integrated leads for the temperature sensor, shielding and liquid earth. The end is pre-finished with cable endings for easy mounting to industrial transmitters.

1-2. Features

- A safe "through the valve" insertion and retraction design.
- Additional safety through a special designed 'T-bar' locking mechanism.
- Maintenance, replacement and calibration of the electrode without interruption of the process.

- Adjustable insertion depth for optimal measuring position in the process.
- Easy replacement of the electrode.
- Improved sealing and damping by addition O-rings.
- Integrated liquid earth and temperature sensor (Pt100 or Pt1000 to IEC 751 or DIN 43760).
- Simplified installation by optional ball-valves with flanged or tapered connections.
- Available in two different materials and two different lengths (0.5 mtr. and 1 mtr.)

1-3. Safety precautions

The PR20 has been designed to give maximum safety in operation. For optimum safety a flanged ball-valve is recommended.

Yokogawa does not accept any claims or penalties on possible damages or accidents which occurred by operation of the PR20 fitting.

The installation of the probe is to be implemented under the local safety regulations for pressurised vessels or pipe-lines for retraction or insertion. The instructions given in this manual must be followed exactly.

2. UNPACKING AND CHECKING

2-1. Unpacking and inspection

When you receive the PR20 retractable fitting it is packed in a cardboard box. Open the box and check that the model code on the fitting is the same as on the packing list (see §2-4). The model code with serial number of the fitting are on an identification plate fixed on the protection ring.

Also check that the options you ordered are supplied. These options are delivered in separate bags. If you have any problems or questions, please contact the nearest Yokogawa service centre or sales organisation for assistance.

2-2. Mounting location

The PR20 fitting is intended to be used for in-line pH measurement. When it is delivered with an optional ball-valve or when it is used in combination with a locally purchased 1 inch ball-valve, the process does not need to be interrupted for maintenance of the sensor. The location can be in a large diameter pipeline or a vessel. The angle of the fitting with the horizon should not be less than 15 degrees (see fig. 2-1).

The pressure- and temperature ratings of the electrode inside the fitting determine the maximum rating of the measurement point.

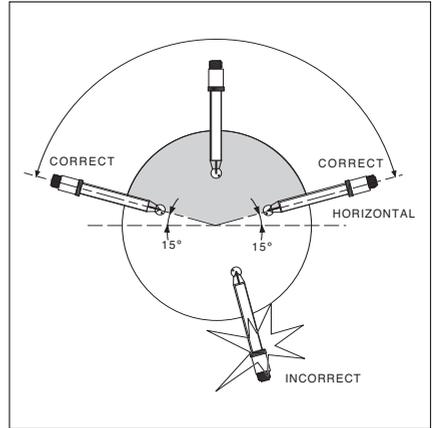


Fig. 2.1. Angle of fitting

Warranty

Yokogawa Europe B.V. warrants that the goods delivered are made from new materials to the best workmanship available. Malfunction of any of the delivered goods or parts, can only lead to replacement of the damaged parts. No claims can be made to damages or accidents resulting from the use of the goods. No claims can be made to the expected or promised performance of the goods under any circumstances.

Damaged goods or parts should be sent to the local Service organisation for warranty claim purposes. Yokogawa has the right to deny warranty claims after investigation of the data and the materials.

2-3. Specifications

Materials (wetted parts)

Probe

Model PR20-S : Stainless steel AISI 316

Model PR20-T : Titanium

O-ring seals

: Viton 70° shore

Silicone rubber 50° shore

Non-wetted parts : Stainless steel (AISI 316) and polyphenylene sulphide (PPS)

Process conn. : 1¹/₄" BSP-female (see modelcode for other connections)

Insertion length : The dimensional drawing indicates the maximum insertion length for both specified probe lengths.

Pressure/temperature ratings

Static conditions : 2 MPa at 20°C, 500 kPa at 125°C

Operating

conditions : max. 500 kPa, max. 100°C

Weight

: Approx. 2.5 kg. (SS316 version without ball-valve)

Specification of the optional sensors

SC21-AAP26 : 1 to 500 kPa at 0 to 110°C, (pH/ref electrode)

SC21-AGP26 : 1 to 500 kPa at 0 to 110°C, (pH/ref electrode)

SC21-ALP26 : 1 to 500 kPa at 0 to 110°C, (pH/ref electrode)

SC21-AGP24 : 1 to 500 kPa at 0 to 80°C, (pH/ref electrode)

SC29-PTP29 : 1 to 500 kPa at 0 to 110°C, (Redox/ref electrode)

2-4. Model and codes

Model	Suffix code	Description
PR20		Retractable fitting
Material	-S -T	Stainless steel AISI 316 Titanium
Probe length*)	-05 -10	0.5 mtr. 1 mtr.
Cable length	-05 -10	5 mtr. 10 mtr.
Temp. sensor	-T1 -T2	Pt1000 Pt100
Style	*B	Style code
Adapters	/YYY	See separate table
Certificates	/M /T	Material certificate 3.1B according to EN-10-024 (DIN 50049) on wetted parts Test certificate for hydrostatic pressure test (2 MPa at ambient temperature)
Combined electrode	/EB /EG /EH	SC21-AAP26 SC21-AGP24 SC21-AGP25

* **Note:** The insertion depth of the probe is given in the dimensional drawing.

Options

Adapter

Model

Adapter only

1" BSP-male

1" NPT-male

DIN flange DN25 PN16

ANSI flange 1" 150 lbs

Option code

PR20-S PR20-T

Drawing

/SBS	/TBS	A
/SNS	/TNS	A
/SDS	/TDS	B, C
/SUS	/TUS	B, C

Adapters and ball-valve

1" BSP-female

1" NPT-female

DIN flange DN25 PN16

ANSI flange 1" 150 lbs

/SBB	/TBB	A, D
/SNN	/TNN	A, D
/SDD	/TDD	B, C, E
/SUU	/TUU	B, C, E

Adapter with flush ports

DIN flange DN25 PN16

ANSI flange 1" 150 lbs

/SES	/TES	F, C
/SVS	/TVS	

Adapter with flush ports and ball-valve

DIN flange DN25 PN16

ANSI flange 1" 150 lbs

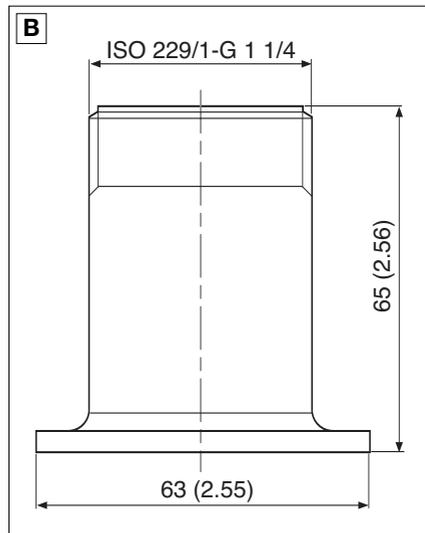
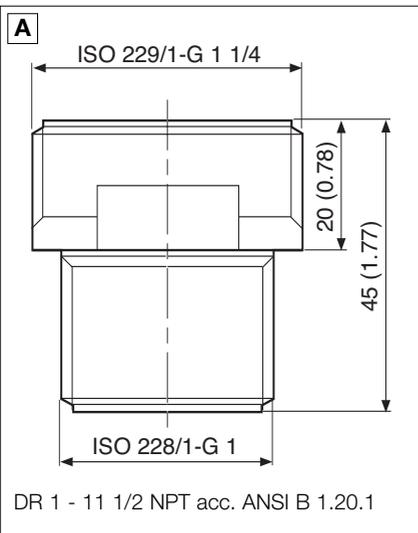
/SED	/TED	F, C, E
/SVU	/TVU	F, C, E

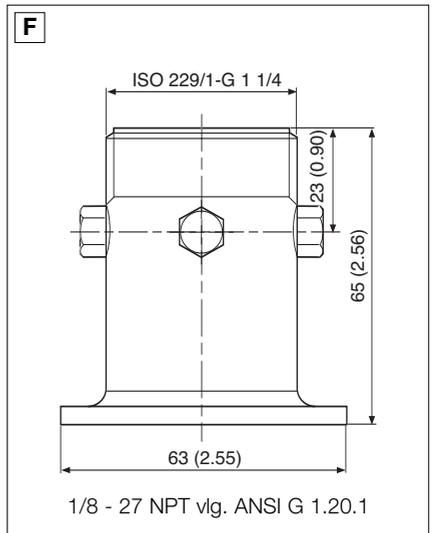
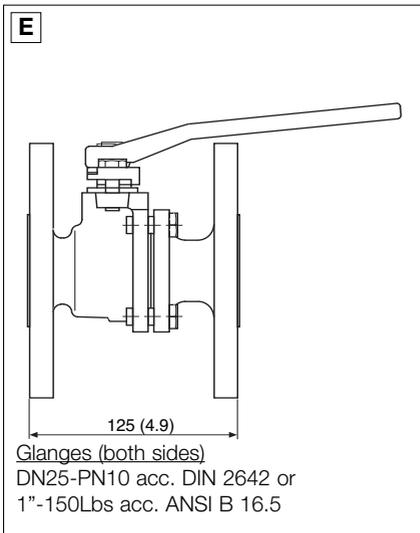
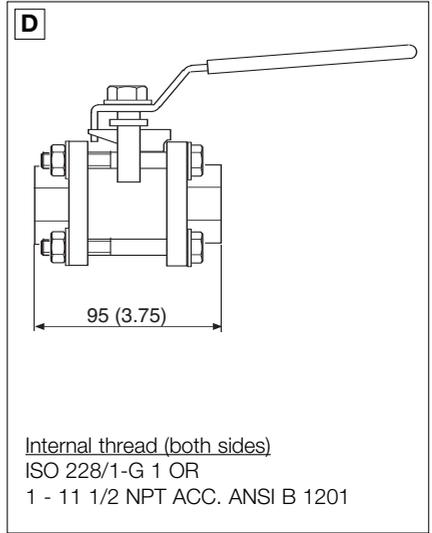
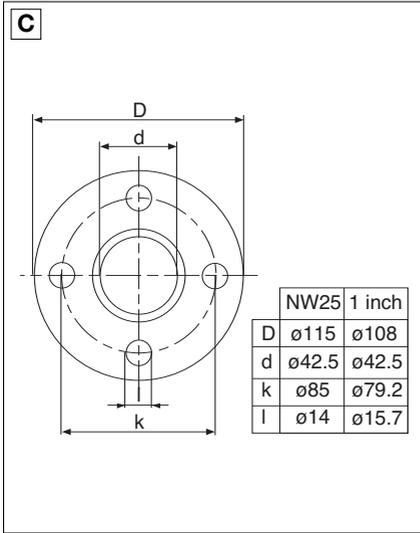
Weld in adapters

Straight welding

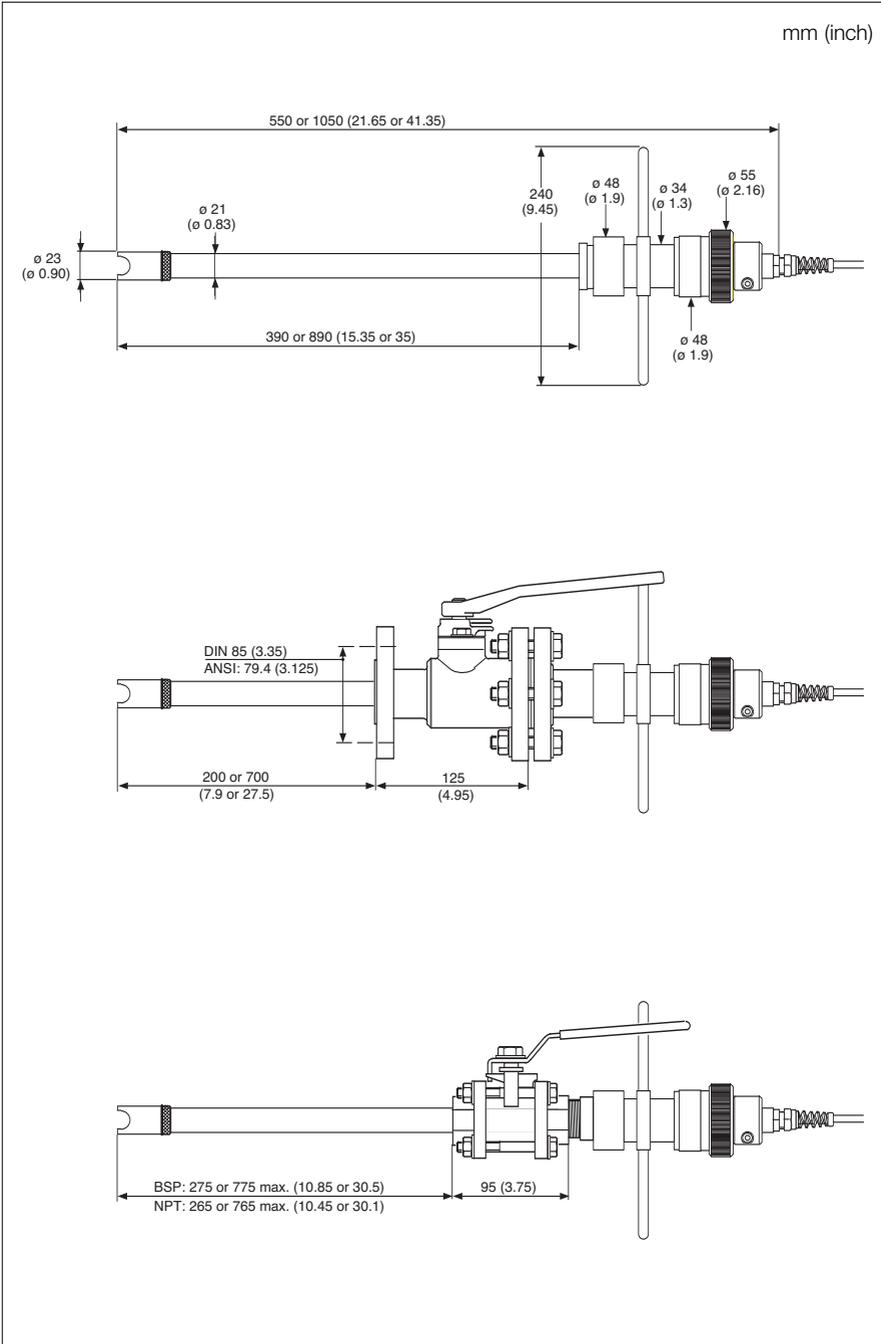
Angled at 15 degrees

/SWR
/SWA





2-5. Dimensions



3. INSTALLATION AND WIRING

3-1. General

It is important to have the point of measurement in a location that is representing the process composition. Check whether the specifications of the electrode fulfill the maximum occurring process conditions. The fitting has several optional connection possibilities. Check that you received the correct size and type. Install the fitting at a convenient location for maintenance and calibration. For maintenance or calibration the probe will need a space of about 2 mtr. for total retraction (depending on probe length and optional process adapters and/or ball-valves). The position of the fitting must be within 15 degrees of the horizon with the tip pointing downward (see fig. 2-1). Installation in a bend of a pipe-line is a good measurement position.

When inserting the PR20 retractable fitting in a perpendicular position to the process flow, the flow velocity will put a mechanical force on the probe. Take care that this force is not too large. It is recommended to have the PR20 retractable fitting positioned at a 45° angle into the process stream.

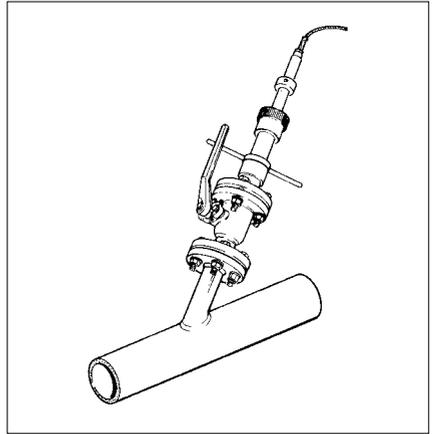


Fig. 3-1a. Pipe mounting

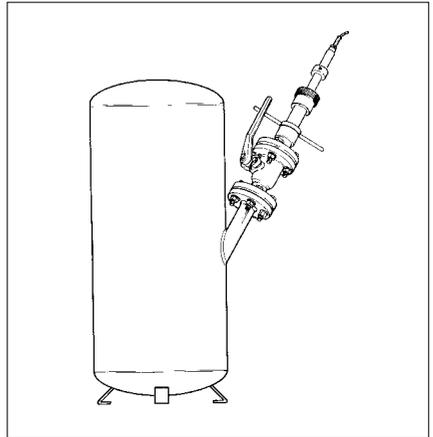


Fig. 3-1b. Tank mounting

ATTENTION

Do not insert the fitting into the process without the electrode mounted! Prevent liquid to come into contact with the connector plug. Start with the assembly of the electrode into the probe and follow the instructions for the preparation of a new electrode (see §3-3).

3-2. Accessories

Optional accessories are delivered separately. When a ball-valve is ordered as an option, this should be mounted to the measuring position first. When the ball-valve in place, the process line is secure.

If the ball-valve has a tapered connection, it needs to be locked with the supplied glue. Next the adapter at the other side of the ball-valve needs to be mounted. This adapter has 1 1/4" BSPP-male thread at one side and matching connection for the ball-valve at the other side. Mount the adapter on the ball-valve and lock it with the supplied glue.

3-3. Preparing the electrode

1. Remove the "wet" pocket.
Squeeze it to let in air
Remark:
The electrode used with the retractable fitting if supplied separately or as an option with the fitting. The electrode is ready for immediate use because it is shipped in a 'wet' pocket.

2. Remove the two O-rings (not used). These O-rings are supplied with the electrode and NOT used in the PR20 retractable fitting.
3. Mount the separately delivered O-ring on the connector plug. Push the spacer and the O-ring over the electrode. This is a plastic tube + O-ring delivered with the PR20.

3-4. Mounting the electrode

1. Push the cage onto the electrode (see fig. 3-4.)
2. Press the assembly into the probe.
3. Tighten it by turning clock-wise.
Note:

The cage fits firmly on the electrode, caused by the O-rings inside the cage. The assembly of electrode and cage can be tightened until it stops. No tools are necessary.

IMPORTANT NOTICES

Before the electrode is inserted into the process, the electrode needs to be cleaned and calibrated. The calibration procedure is normally described in the instruction manual of the pH transmitter. Before the cage is pushed onto the electrode, the stopper should be removed (see Nr. 30 in the exploded view).

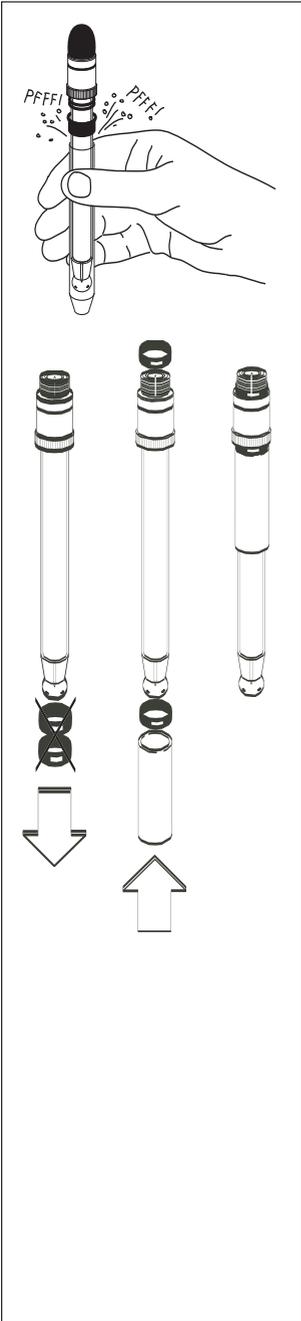


figure 3.3 preparing the electrode for use

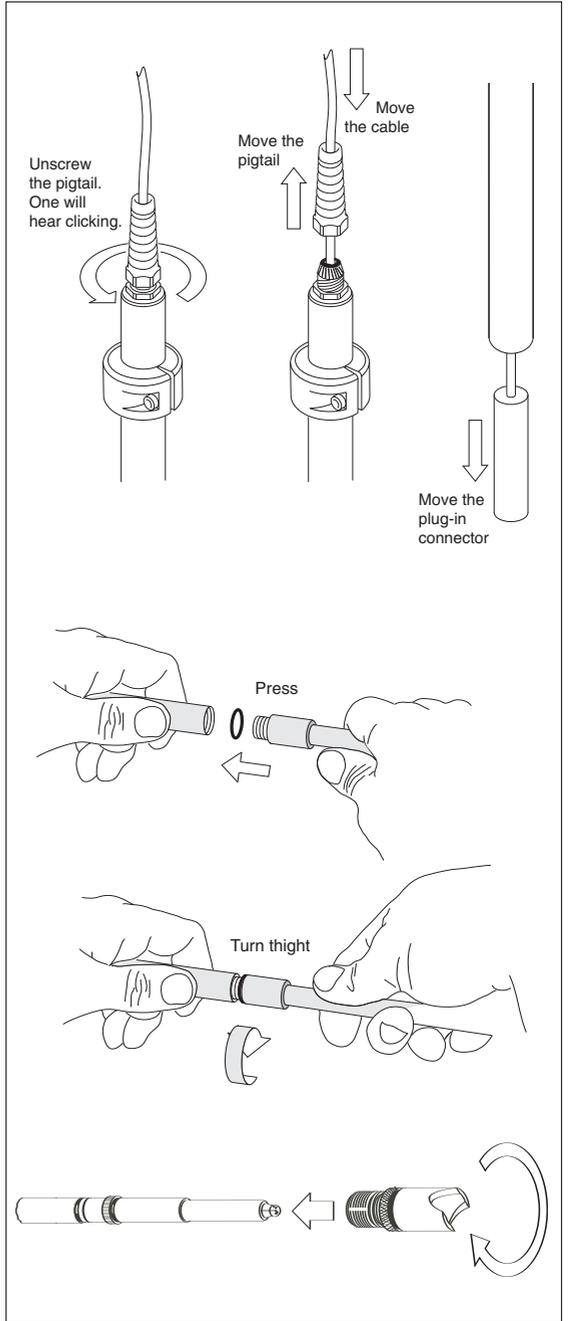


figure 3.4 Mounting the electrode in the PR20 fitting

3-5. Probe insertion

Insert the probe according to next procedure (see also fig. 3-5):

1. Position the probe for insertion.
 2. Turn the T-bar key clockwise
 3. Open the ball-valve.
 4. Push the probe into the process.
 5. Fix the probe by turning the fixing screw clockwise.
2. Pushing the probe into the process needs a force to overcome the pressure of the system and the friction of the damping rings in the fitting.
 3. The locking mechanism can be turned until the probe is firmly fixed at the measuring position.
 4. The memory ring can be fixed at the actual insertion position. See §3-6 on adjusting the insertion depth.

Remarks:

1. Turning the T-bar key can ONLY be done when the valve is closed. Make sure the probe is firmly fixed.

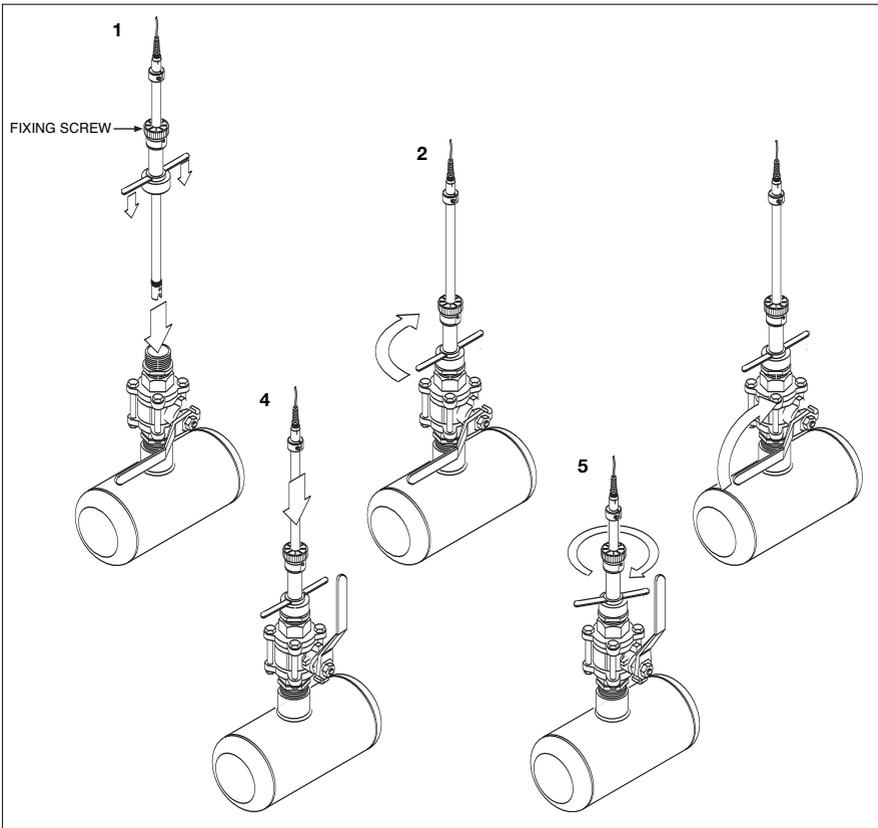


Fig. 3-5. Probe insertion

3-6. Adjusting the insertion depth

The insertion depth of the electrode can be adjusted to your preference (see fig. 3-6). An insertion depth of at least 0.2 m is recommended for a fast response of the temperature sensor. This sensor is located above the combined electrode. When the probe is inserted for 0.2 m or more the temperature sensor will follow the process temperature accurately.

The 'memory' ring can be positioned at the actual insertion position of the probe. The "Allan" key, supplied with the fitting is used to fix the 'memory' ring at the desired

position. The maximum insertion depth is related to the probe length mentioned in the model code of the fitting.

3-7. Wiring

The cable used in the PR20 retractable fitting is prepared for easy connection to pH transmitters. The numbering of the wires is accordingly to the standard numbering of Yokogawa transmitters.

Remark:

To make full use of the capabilities of the combined pH/Reference electrode, the cooperation with Yokogawa pH transmitters is preferred.

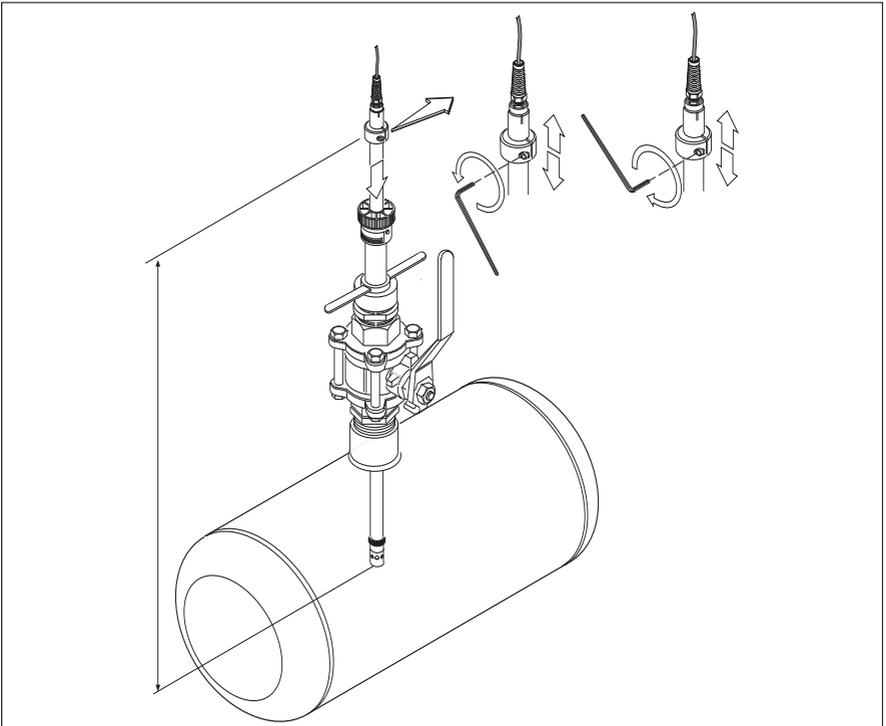


fig. 3-6 variable insertion depth

4. MAINTENANCE

4-1. General

Before the combined electrode can be serviced, the probe with the electrode should be physically separated from the process. The PR20 retractable fitting can be retracted from the measuring position in the maintenance position by following the procedure described in §4-2.

When (optional) flush ports are available, it is not necessary to disassemble the probe as indicated in items [4] and [5] of fig. 4-2. The flush ports enable you to clean and/or calibrate the electrode in the position shown in [3] of fig. 4-2. For replacement of the electrode the probe has to be disassembled.

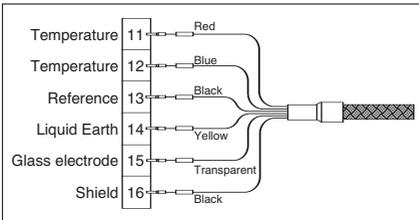


Fig. 4.1. Cable markers

4-2. Cleaning

Retract the probe from the process for cleaning the electrode (see also fig. 4-2):

1. Release the fixing screw.
2. Pull out the probe.
3. Close the ball-valve (*).
4. Unlock the probe.
5. Take out the probe.

* If flush ports are available the sensor can be flushed with cleaning liquid.

! ATTENTION:

1. **Stand clear when releasing the fixing screw! Due to the process pressure the probe can be pressed out.**
2. **The T-bar can only be operated when the ball-valve is closed. Make sure it is closed completely.**
3. The friction of the O-rings will slow down the probe when it is retracted.
4. When the sensitivity of the electrode has decreased or the response has slowed down, the electrode should be cleaned.

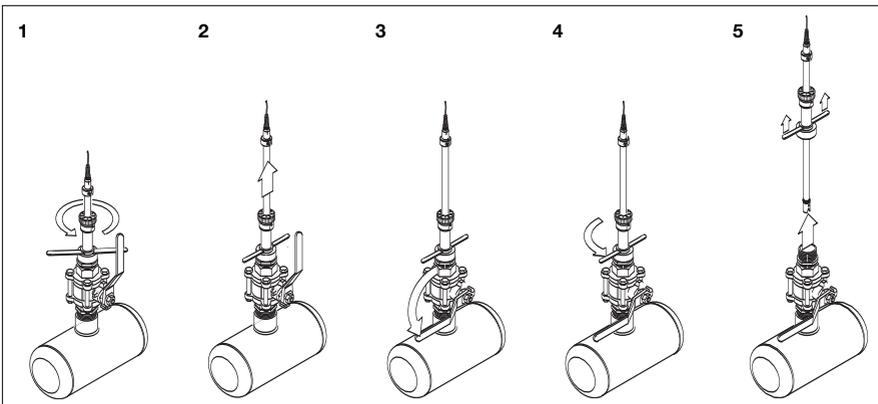


Fig. 4.2. Exsertion of the probe

If cleaning with hot water is not sufficient, more aggressive water based agents should be used.

- Deposits of limes, hydroxides or carbonates can be removed by immersing the electrode in a solution containing diluted hydrochloric acid. Afterwards rinse the electrode with water.
- Deposits of oil and fat can be removed with hot water in conjunction with a detergent. When the results are unsatisfactory a mild (carbonate based) abrasive can be used.
- Protein (albuminous) deposits should be removed with a protein enzymatic solution. For instance a solution containing 8.5 ml concentrated hydrochloric acid and 10 gr pepsin in 1 litre water.

ATTENTION

Avoid using non-polar solvents like tri-chloro ethylene, toluene or hexane. Even cleaning with ethanol or acetone is not recommended. These solvents will break up the gel-layer on the glass bulb and afterwards needs to remain soaked in water for at least 12 hours before functioning normal.

The PTFE diaphragm of the combined electrode can sometimes be regenerated by putting it in hot (60 to 80°C) 1 molar Potassium chloride (KCl) solution and letting it cool to room temperature. After cleaning the probe is re-inserted into the process by following the reverse procedure (see §3-5).

4-3. Calibration

It is recommended to start calibration with a clean electrode. Always calibrate a new electrode.

With the electrode connected to the transmitter a calibration can take place. Check the appropriate chapters in the instruction manual of the pH transmitter for details.

To take out the probe for cleaning the electrode, follow the procedure described in §4-2.

General procedure for calibration

To calibrate a pH transmitter two buffer solutions with known pH value are required. It is recommended that one buffer solution has a value near pH 7.

Depending on the liquid to be measured the second buffer solution should either be in the acidic or base area. Normally the buffers pH 4.01 or 9.22 are used.

Generally the procedure for calibration is as follows:

- Clean the electrode
- Rinse the electrode with water
- Immerse the electrode in the first buffer solution (pH 7)
- Adjust the asymmetry setting of the transmitter for reading a known value
- Rinse the electrode with water
- Immerse the electrode in the second buffer (pH 4 or pH 9)
- Adjust the slope setting of the transmitter for reading a known value
- Rinse the electrode with water.

During calibration the temperature compensation should be active. It is advised to, calibrate with buffer solutions at a temperature near the process temperature.

After calibration the probe with electrode is replaced following the procedure in §3-5.

4-4. Replacing the electrode

Start with removing the probe by following the procedure described in §4-2.

- 1 Turn the cage anti-clockwise
- 2 Pull out the assembly.
- 3 Take off the cage, spacer and O-ring.

Now the electrode can be exchanged for a new one. See §3-3 for preparation of the new electrode.

4-5. Replacing the O-rings

The drawing (see fig. 4-3) shows the position of the sealing O-rings on the outside and the inside of the cage. Exchange them when renewing the electrode.

The O-rings are available as spare parts. Refer to the exploded view for the numbers.

The protection cage can be split into two parts. The threaded part [24] contains five O-rings. Three O-rings on the outside [26 and 27]

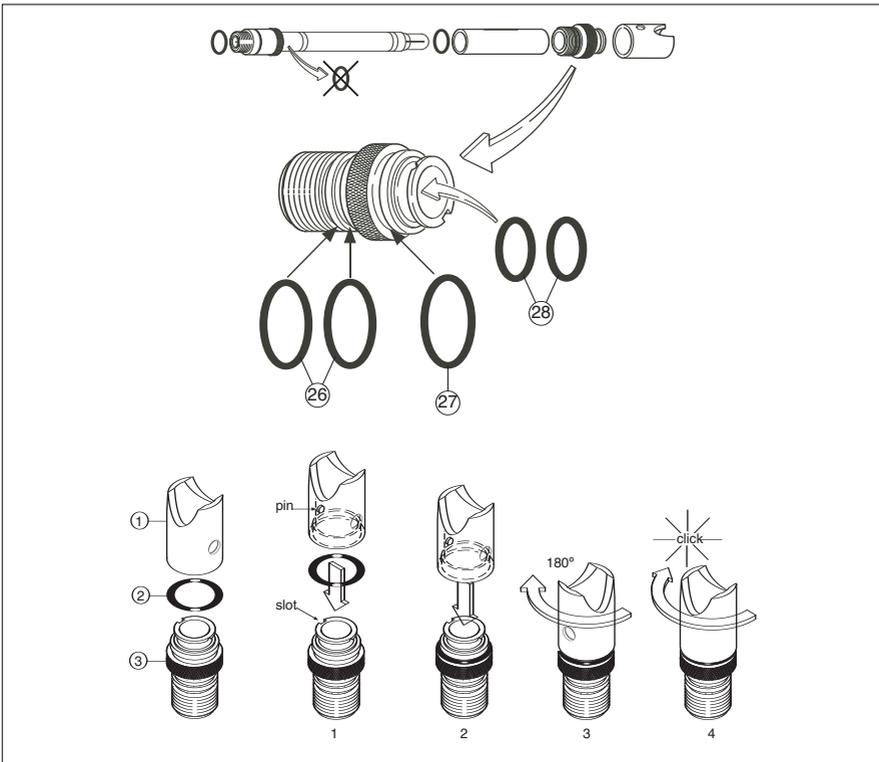


Fig. 4-3. Replacing the O-rings

can be replaced by new ones easily.

Two O-rings [28] are located inside the protection cage and need to be taken out, using a pointed tweezers or needle. This will damage the material, so the rings cannot be used again.

Put in new O-rings without using mechanical tools, preferably with your fingers. Fold the O-ring before inserting it into the cage. It will pop into place easily.

The single O-ring [14] at the connector is delivered with the fitting and seals the plug for moisture. Replace it when it is damaged or when you think it is necessary.

4-6. Replacing the cable

Follow the procedures for retraction and disassembling from the previous chapters (see §4-1 to 4-5). After removing the electrode the cable can be removed by disassembling the cable gland [2] as indicated in the exploded view in chapter 5.

Then the cable [1] can be removed and a new one can be inserted. Reassemble the cable gland onto the cable and tighten it.

4-7. Flush port connections

The PR20 retractable fitting can be equipped with (optional) flush ports on the flanged adapters. This enables you to flush the electrode with water or cleaning agent when the probe is in the fully retracted position (see fig. 4-4).

There are four (4) flush ports available. They can be used according to your preferences. The flush ports are tapered 1/8" NPT-female for small diameter connectors.

It is also possible to make buffer solution flow through and calibrate the combined electrode probe without dismounting the probe.

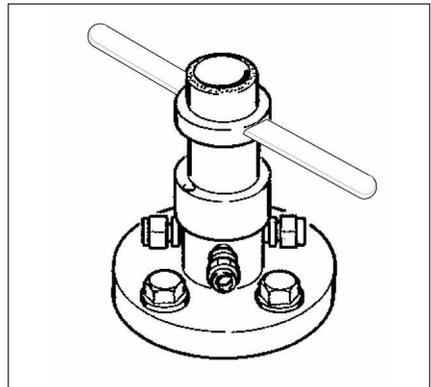
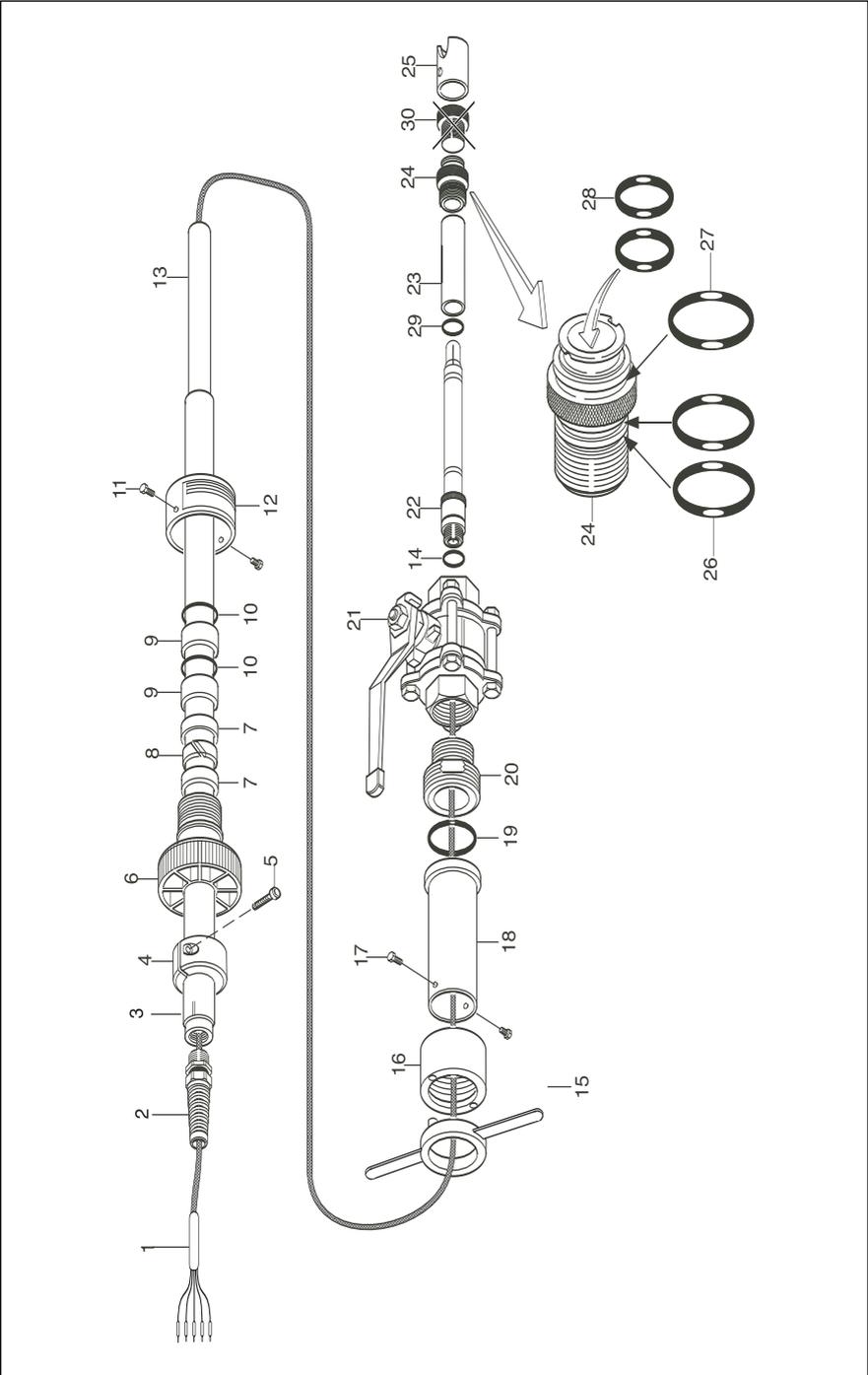


Fig. 4-4. Flush ports



5. EXPLODED VIEW	
1	Cable with plug-in connector
2	Cable gland
3	Outer tube
4	Positioning ring
5	"Allan" screw
6	Main fixing screw
7	Squeezing ring (2pcs)
8	Clamping ring
9	Bushing (2pcs)
10	O-rings (2pcs), Viton 70° shore (20.2x3.5)
11	Fixing screws (2 pcs)
12	Protection ring
13	Inner tube
14	O-ring Viton 70° shore (12x1)
15	T-bar with key
16	Nut
17	Fixing screws (2 pcs)
18	Chamber
19	O-ring Viton 70° shore (29.7 x 3.5)
20	Adapter (optional)
21	Ball-valve (optional)
22	Combined pH/reference electrode
23	Spacer
24	Electrode holder
25	Protection sleeve
26	O-rings (2 pcs), Viton 70° shore (15.6 x 1.78)
27	O-ring, Viton 70° shore (17.12 x 2.62)
28	O-rings (2 pcs), Viton 70° shore (11 x 3)
29	O-ring EPDM 70° shore (11.92 x 2.62)
30	Stopper (remove)

6. SPARE PARTS LIST	
K1520AX O-ring set 1	26, 27, 28, 14
K1520AY O-ring set 2	10, 19
K1520KA Holder set (AISI 316)	24, 25, 26, 27, 28
K1520KE Holder set (titanium)	24, 25, 26, 27, 28
K1520AW Gland set	2
K1520LP Cable 5 m (Pt100)	1
K1520LQ Cable 5 m (Pt1000)	1
K1520LS Cable 10 m (Pt100)	1
K1520LT Cable 10 m (Pt1000)	1
K1520AZ Spacer	23
K1520KD Clamp ring	8
K1520KC Fixing screw	6
K1520KF Positioning ring	4, 5
K1520TA Clamping set	7, 8, 9
K1520TF Nut	16
K1520TK Key	15
K1520TN Outer tube	3
K1520UB Clamping set (Titanium)	7, 8, 9
K1520UH Outer tube 1.0 m (SS)	3
K1520UF Outer tube 0.5 m (Ti)	3
K1520UJ Outer tube 1.0 m (Ti)	3

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