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# General Specifications

## Model FU20-FTS and FU20-MTS Differential pH/ORP-sensor

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### Overview

The FU20-FTS and FU20-MTS is a successful development in pH sensor technology, available from Yokogawa. This sensor has the measuring technology from differential sensor and the ruggedness of the appreciated wide body FU20 design in one product.

Most pH sensors are using silver/silver chloride reference cells with an open junction to the process. With the differential technology, the junction is not in direct contact with the process. This is for many applications beneficial because you will not poison silver/silver chloride reference. In a wide range of applications this solution has proven very effective and remains a cost effective solution.

Lifetime of the conventional sensors dependent of regular maintenance of the pH probes. Regular, cleaning is required to eliminate reference poisoning. 70-80% of industrial users will fully benefit from using differential sensor technology in their high temperature and pressure applications.

### Example applications:

- pH monitoring in brine solutions applied in chemical industry
- The bleaching process in pulp and paper
- SO<sub>2</sub> scrubber applications
- Tail gas, Quench Tower with sulfides

### Features

In differential pH measurement solution provided by Yokogawa below features deliver benefits in customers application:

- No junction
- No open connection from the process to the inside of sensor
- No possibility of poisoning reference element
- No use of diaphragm hence no issues of plugging or coating of junction diaphragm
- No outflow of electrolyte so no depletion issues
- NEW FU20-MTS release with FFKM



## Cation Reference Differential pH/ORP Electrode, FU20-FTS

This version encompasses the benefits of the cation reference into a PVDF rugged body with a 3/4" NPT. The wide body sensor (26mm diameter) holds four separate measuring elements in one unbreakable and chemical resistant PVDF body. The FU20-FTS is targeted for those applications where the cation differential reference is the best solution, but need a more durable body than a 12mm glass.

### Specification

#### Measuring elements

- : Na-glass electrode
- : pH-glass electrode
- : Silver chloride reference
- : Solid platinum electrode
- : Pt1000 temperature sensor.

#### Wetted parts

- Sensor body : PVDF-(GF25+TZ4)
- Earthing pin : Solid Platinum
- Measuring Sensor : L-glass, pNa-glass
- LE glass tube : AR-glass
- Sealing : Viton -FTS FFKM, EPDM -MTS
- Body insert : PVDF

#### Functional specifications (at 25°C)

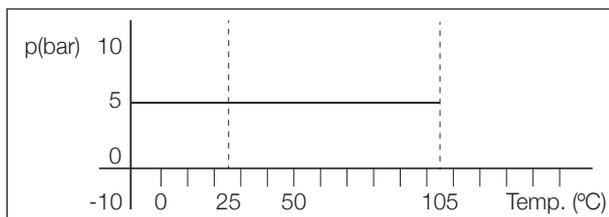
- Isothermal point : pH7, pNa 0
- Reference system : Salt sensitive, Ag/AgCl in 1M KCl
- Glass impedances : Nominal: 750 MΩ
- Liquid outlet : Non-flow no junction
- Temperature element : Pt1000 to IEC 751
- Asymmetry potential : 0 ± 15 mV
- Linearity pH (Slope) : > 90% in pH 2-12 with pH = pNa+2

#### Dynamic specifications

- Response time pH : t90 < 15 sec. (for 7 to 4 pH step)
- Response time temp. : t90 < 120 sec. (for 10 °C step)
- Stabilization time pH : < 2 min. (for 0.02 pH unit during 10 sec.)

#### Operating range

- pH : 2 to 14
- ORP : -1500 to 1500 mV
- Temperature : 0 to 105 °C (14 to 221 °F)
- Pressure : p(bar)



Conductivity : > 10 μS/cm ting range

**Note:** The pH operating range at room temperature is 2-14 pH, but at high temperatures or range outside 2-12 pH the lifetime will be seriously shortened.

## Regulatory standards

- CE** : Decision 768/2008/EC **CE**
- ATEX : Directive 201734/EU, as amended by Regulation (EC) no. 1882/2003
  - Certificate no. : DEKRA 11ATEX0014
  - Electrical data :  XII 1 G Ex ia IC T3...T6 Ga : For sensor input circuit connected to a certified intrinsically safe circuit with the following maximum values:  
 Ui = 18 V; Ii = 170 mA; Pi = 0.4 W;  
 Li = 0 mH; Ci = 0 nF (VP type) or Certified intrinsically safe Yokogawa pH/ORP transmitter Model FLXA21 series or Model FLXA202 series.
  - Special conditions (X) : T6 for Tamb. -40 °C to +40 °C  
 T4 and T5 for Tamb. -40 °C to +55 °C  
 T3 for Tamb. -40 °C to +105 °C
  -  **WARNING** : Electrostatic charges on the sensor enclosure shall be avoided.
  - ROHS II : Directive 2011/65/EU  
 Applying article category 9; Industrial monitoring and control instruments; ion selective electrodes
  - Pressure : Directive 97/23/EC, as amended by Regulation (EC) no. 1882/2003
  - Applying article : 3.3 (Sound Engineering Practice)
  -  **WARNING** : Damaging the screw thread of the sensor might influence the maximum process pressure.  
 : Sensor contains glass parts which if broken can cause cutting injuries.
  - IECEX**
  - Applying standards : IEC 60079-0: 2012  
 IEC 60079-11: 2012  
 IEC 60079-26: 2007
  - Certificate no. : IECEx DEK 11.0064X Ex ia IIC T3... T6 Ga

**Note:** When the sensor has been connected to none intrinsically safe equipment which exceeds the restrictions regarding the sensor input circuit (see electrical data), the restrictions regarding the sensor input ( see electrical data) the sensor is not suitable anymore for intrinsically safe use.

**MODEL CODES**

Model Code	Suffix	Option	Description
FU20			Wide Body sensor
Cable length	-03 -05 -10 -20 -VP -VS		3 m cable 5 m cable 10 m cable 20 m cable No Cable; Vario Pin connector not available for MTS No Cable; Vario Pin for SENCOM connector } not available for FTD, MTS and FTS
Temp. Sensor	-T1 -T2		Pt1000 Pt100 (not available for FTD, FTS, MTS and VS)
Model	-NPT -FSM -FTD -FTS -MTS		PPS body / Tapered Thread / Dome shaped PPS body / Tapered Thread / Flat Surface PVDF body / Tapered Thread / Dome shaped PVDF body / Tapered Thread / Salt Sensitive membrane/ Silicone sealing PVDF body / Tapered Thread / Salt Sensitive membrane/ FFKM sealing
Options		/HCNF /FPS /NSS /NTI /BSS /BTI	Complete Hastelloy cleaning system Adapter F*40 from PPO 1" NPT, SS316 1" NPT, Titanium 1" BSP, SS316 1" BSP, Titanium

**Dimensional drawing**

Dimensions in mm (inches)

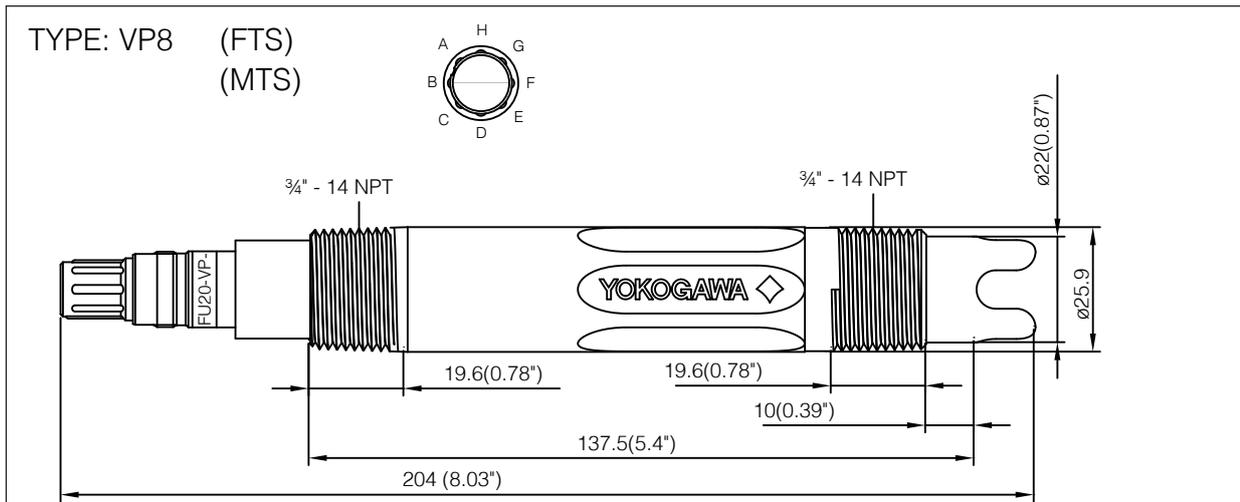


Fig 1. Dimensional drawing FU20-FTS

**Connection scheme for variopin options**

pin	VP6	VP8
A	pH	pH
B	Ref	pH guard
C	pH Guard	Ref
D	LE/ORP	Ref Guard
E	Temp	Temp
F	Temp	Temp
G	-	LE/ORP
H	-	-

Fig 2. Pin assignment scheme VP6 and VP8 compassion

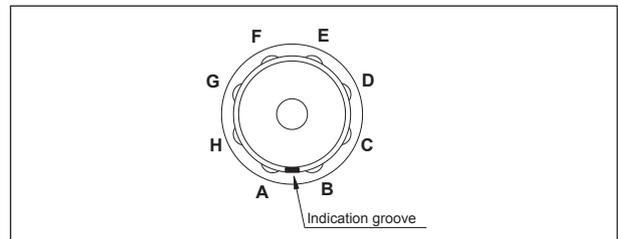


Fig 3. Connections FU20-FTS/MTS

### Installation options

The differential FU20 sensor can be implemented in process applications using either :

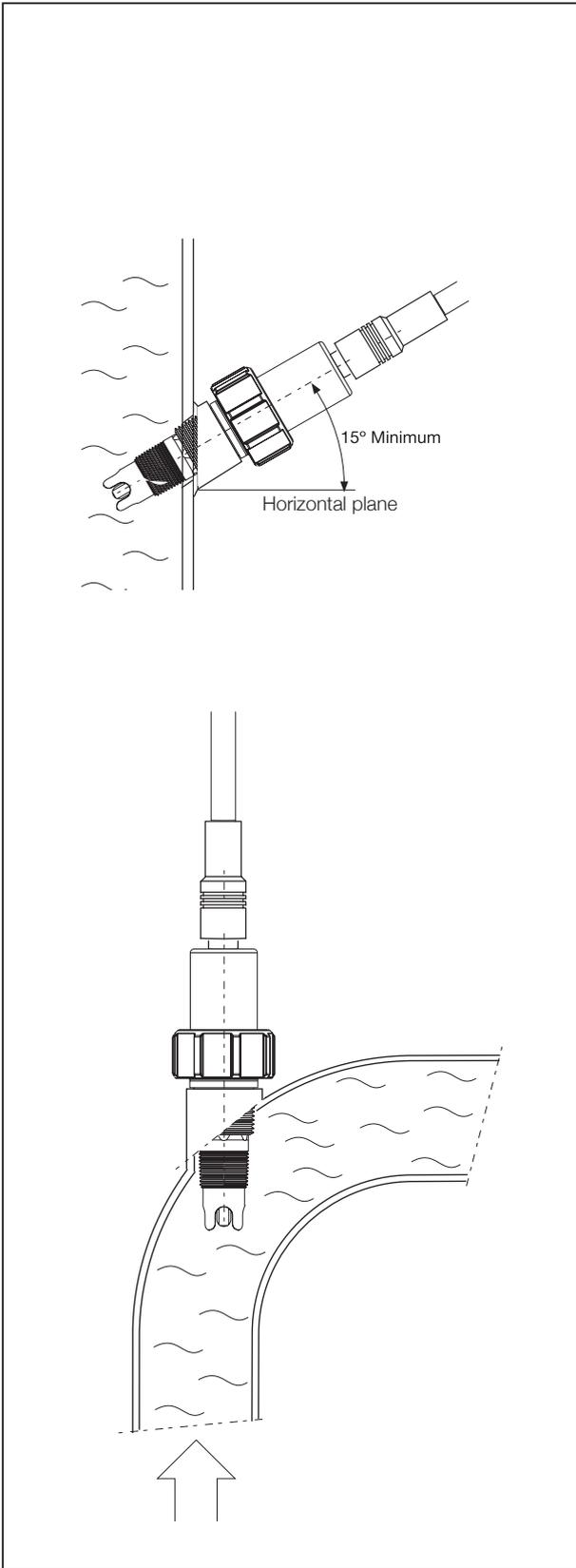


Fig 4. Direct process connection using the 3/4" NPT thread using available adapters.

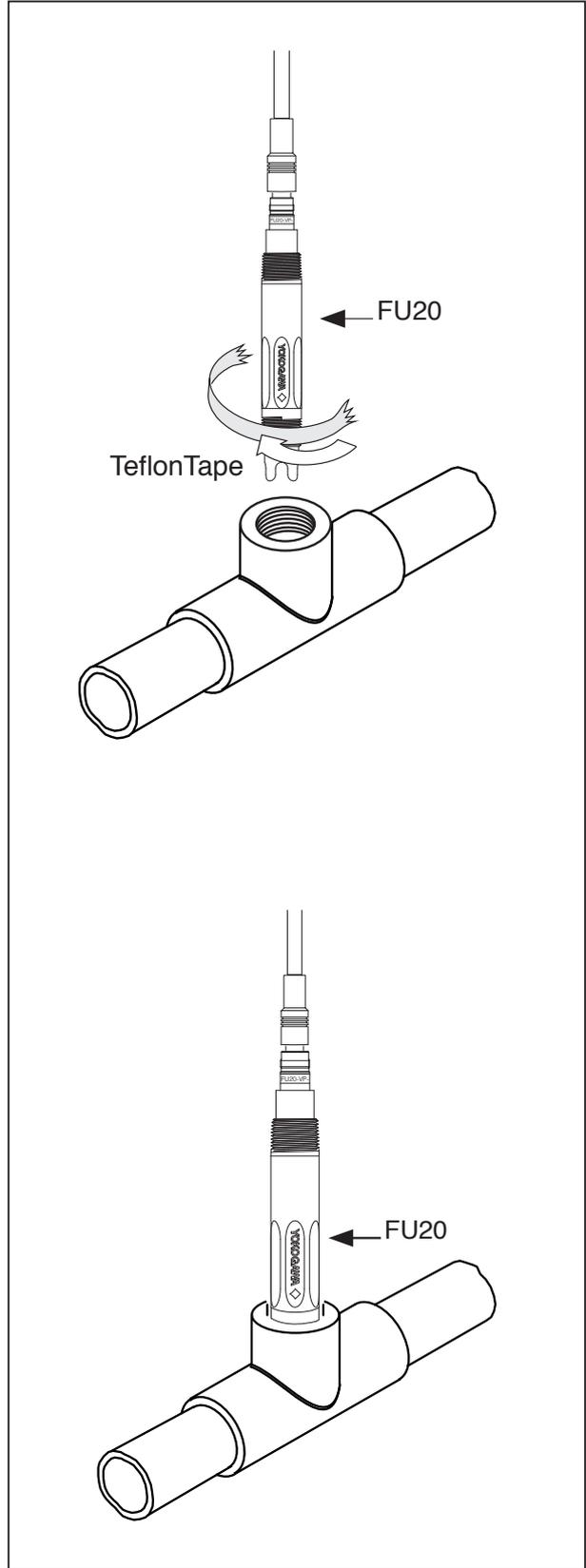


Fig 5. T-piece installation using 3/4" NPT Thread

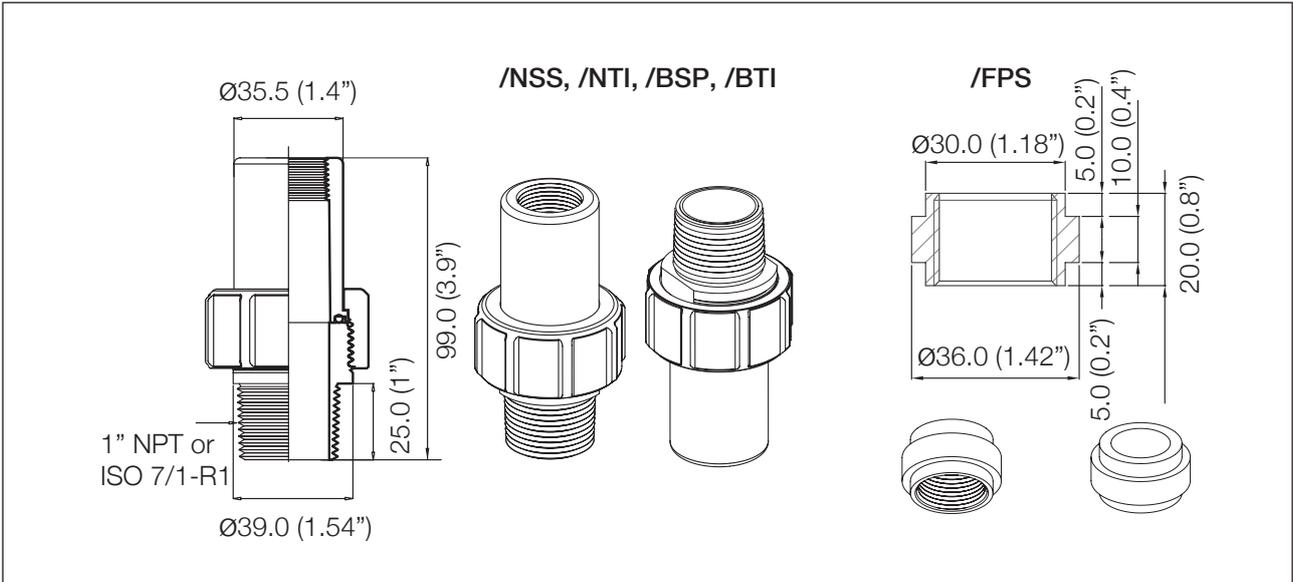


Figure 6. Dimensions 1" FU20-FTS/MTS adapter Stainless Steel & Titanium and FU20-FTS/MTS adapter for FF40, FS40 and FD40 fittings

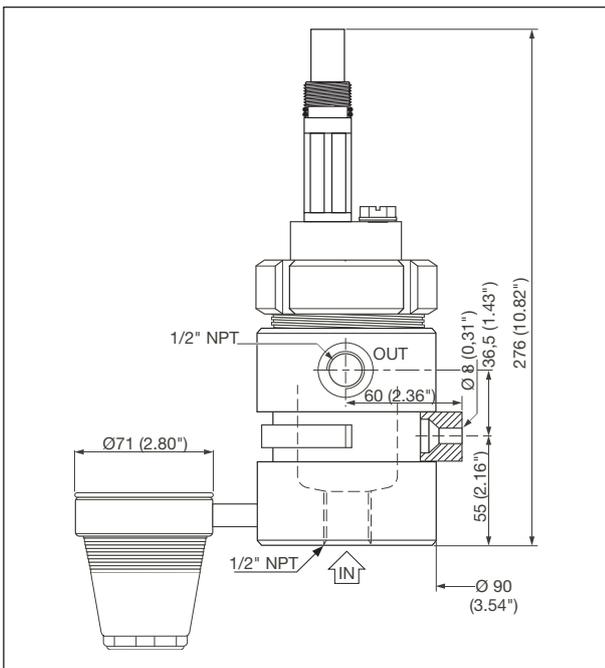


Fig 7. Installation example FU20-FTS/MTS in FF20 flow fitting PP/PVDF

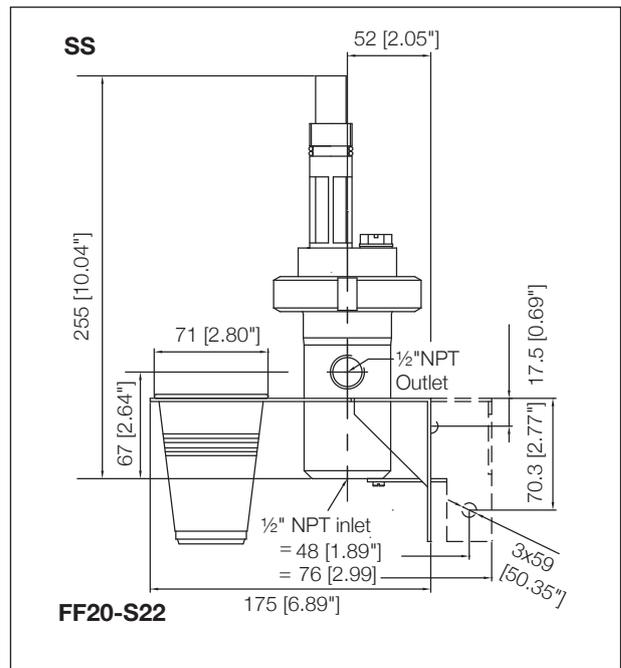


Fig 8. Installation example FU20-FTS/MTS in FF20-flow fitting SS

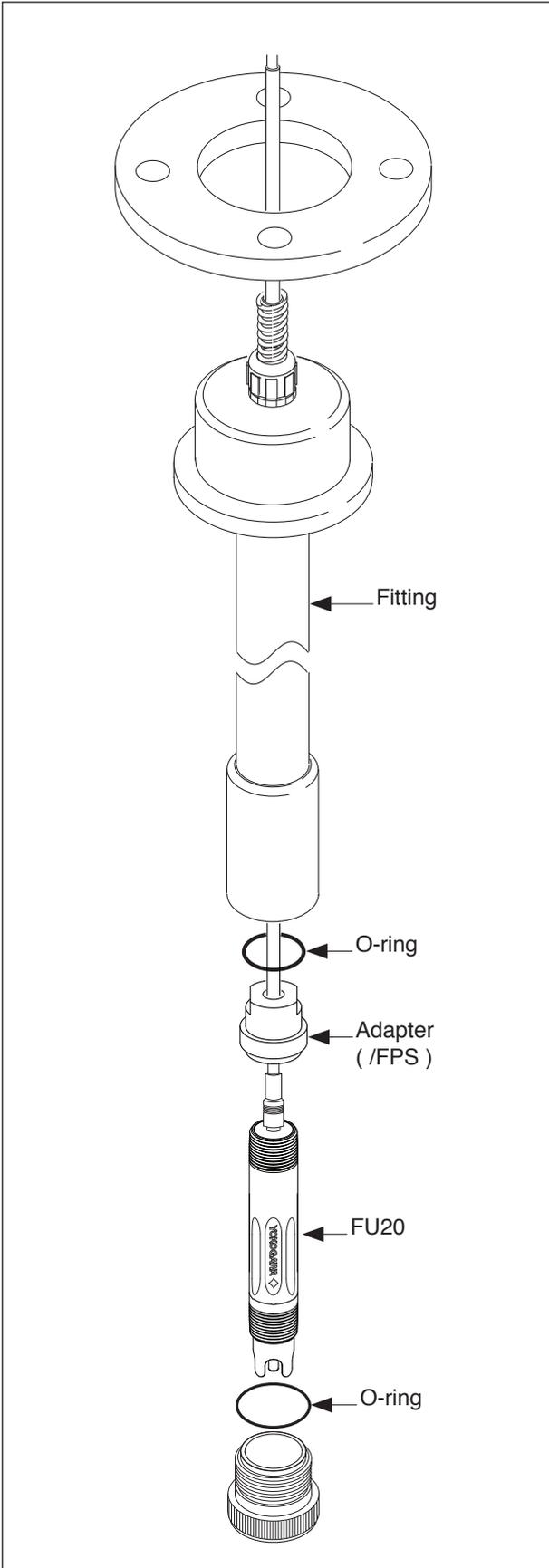


Fig 9. Installation examples for the FU20 in FD40

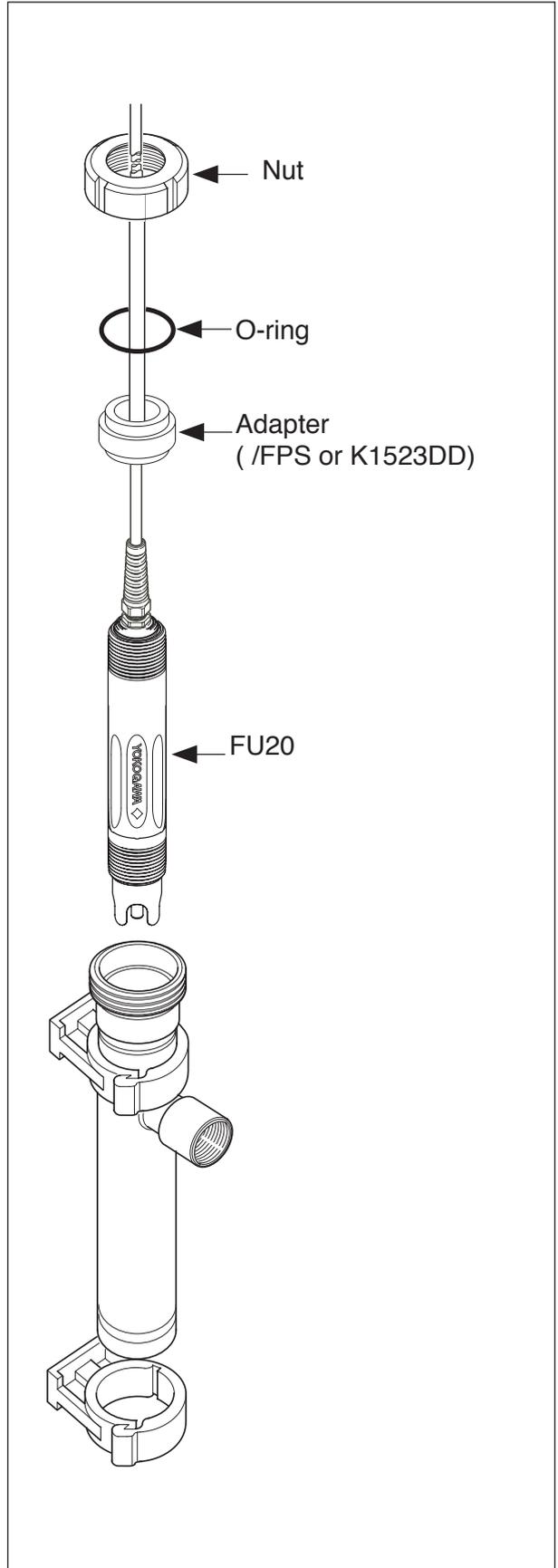
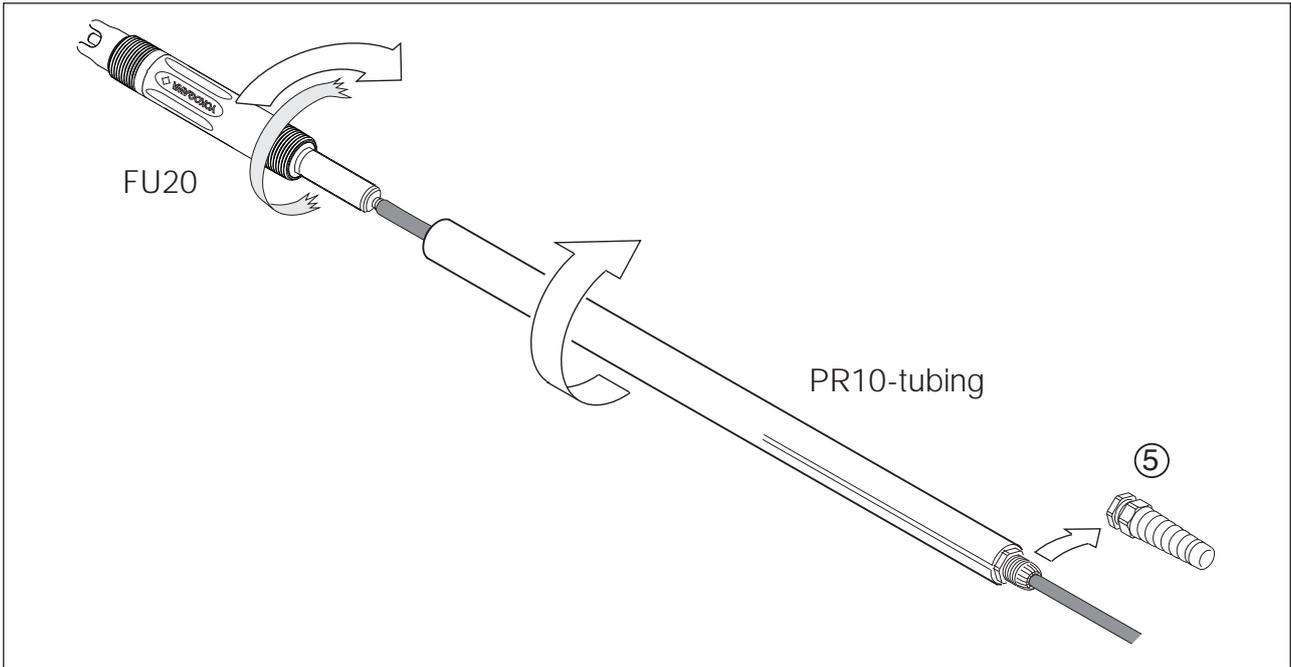


Fig 10. Installation examples for the FF40



**Fig 11. Installation in PR10 retractable fitting**

For detailed information refer to the instruction manual coming with the retractable fitting.

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