

---

# General Specifications

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

---

### Overview

The FU20-FTS and FU20-MTS are successful developments 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 EPDM O-ring and FFKM sealing



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

This version encompasses the benefits of the cation reference into a PVDF rugged body with a ¾" 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 : FTS- Viton silicone, MTS- EPDM,FFKM
- 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 : 5bar max over complete T range
- 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

### IECEX

- Applying standards : IEC 60079-0  
: IEC 60079-11
- Certificate no. : IECEx DEK 11.0064X, issue 1  
Ex ia IIC T3...T6 Ga

### CE

- ATEX : Directive 2014/34/EU
- Applying standards : EN IEC 60079-0  
EN 60079-11
- Certificate no. : DEKRA 11ATEX0014 X, issue 2  
 II 1 G Ex ia IIC T3...T6 Ga
- ROHSII : Directive 2011/65/EU  
Applying sensors, detectors and (ion sensitive) electrodes
- PED : Directive 2014/68/EU  
Applying article 4.3  
(Sound Engineering Practice)
- LVD : Directive 2014/35/EU
- Applying standards : NEN-EN-IEC 61010-1  
ANSI/ISA 61010-1  
CAN/CSA-C22.2 No. 61010-1

### FM-United States

- Applying standards : FM Class 3600  
FM Class 3610  
FM Class 3810  
ANSI/ISA 60079-0  
ANSI/ISA 60079-11
- Certificate no. : FM20US0123X  
IS CL I, DIV 1, GP ABCD, T3...T6  
CL I, ZN 0, AEx ia IIC, T3...T6 Ga
- Control Drawing : D&E 2020-023-A50

### FM-Canada

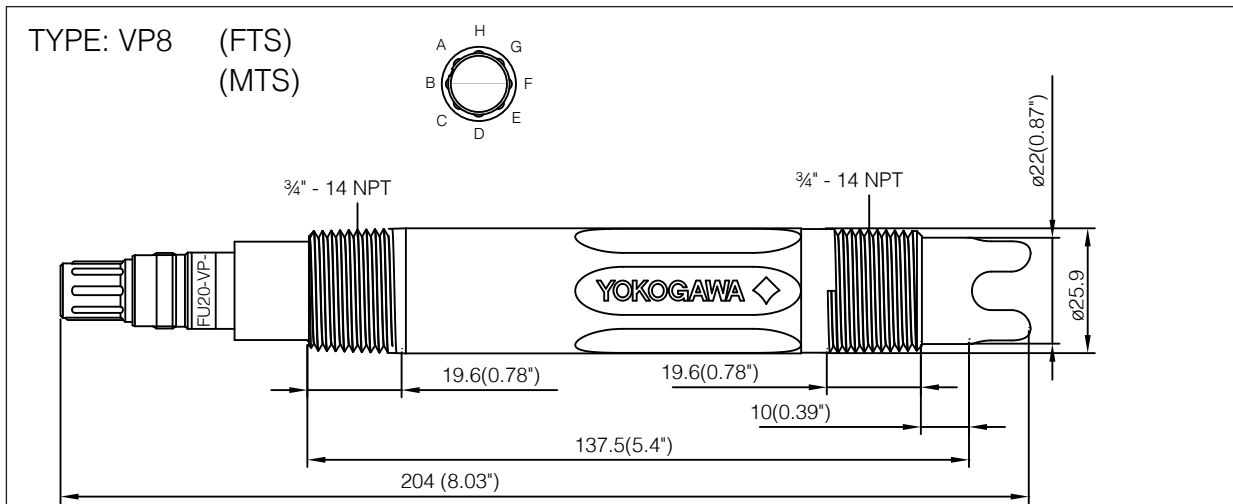
- Applying standards : CAN/CSA-C22.2 No. 60079-0  
CAN/CSA-C22.2 No. 60079-11
- Certificate no. : FM20CA0062X  
IS CL I, DIV 1, GP ABCD, T3...T6  
CL I, ZN 0, Ex ia IIC, T3...T6 Ga
- Control Drawing : D&E 2020-023-A51

**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 SA11 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)

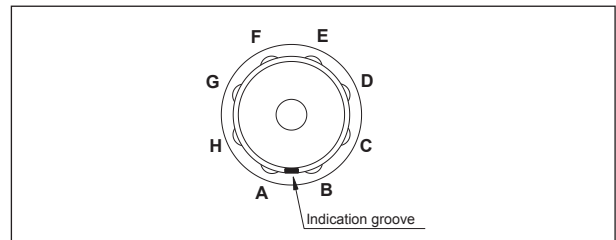


**Fig 1. Dimensional drawing FU20-FTS**

**Connection scheme for variopin options**

pin	VP8 (FTS-VP)	VP8 (FTS/MTS/VS)
A	pH	pH
B	pH Guard	pH Guard/ID-VCC
C	Ref	Ref
D	Ref Guard	Ref Guard
E	Temp	Temp
F	Temp	Temp/ID-GND
G	LE	LE
H	-	ID-DATA

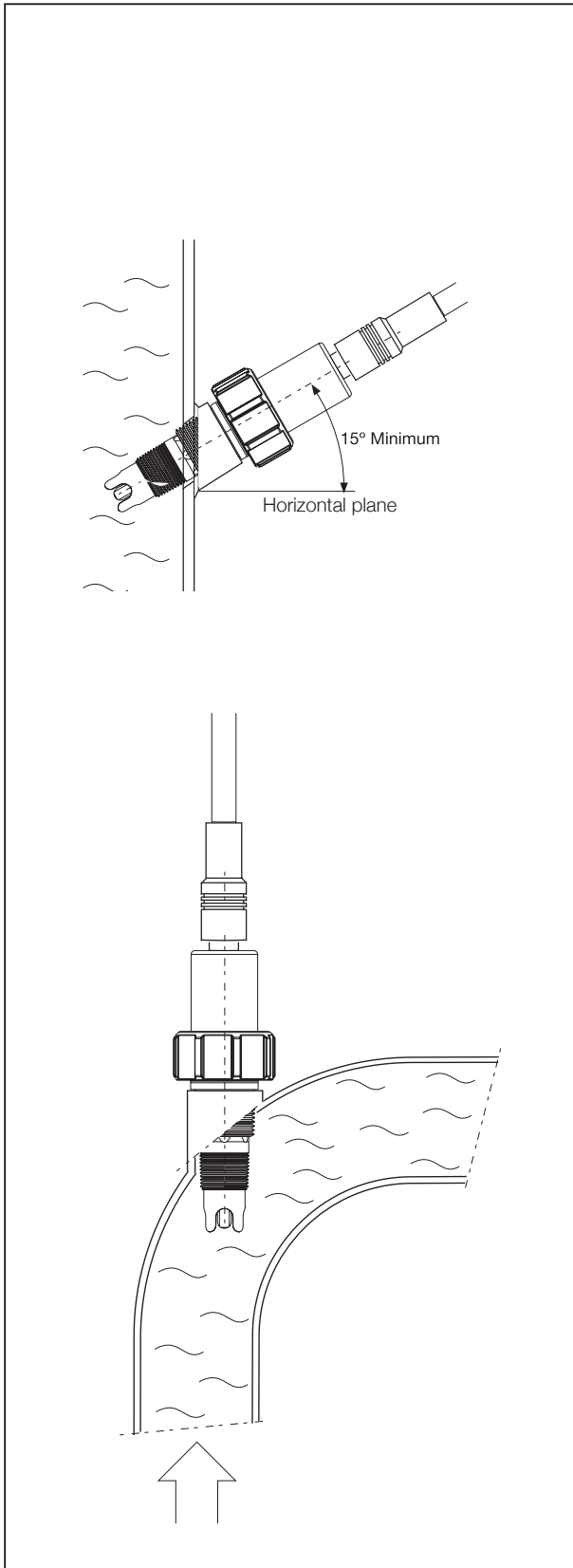
**Fig 2. Pin assignment scheme VP8**



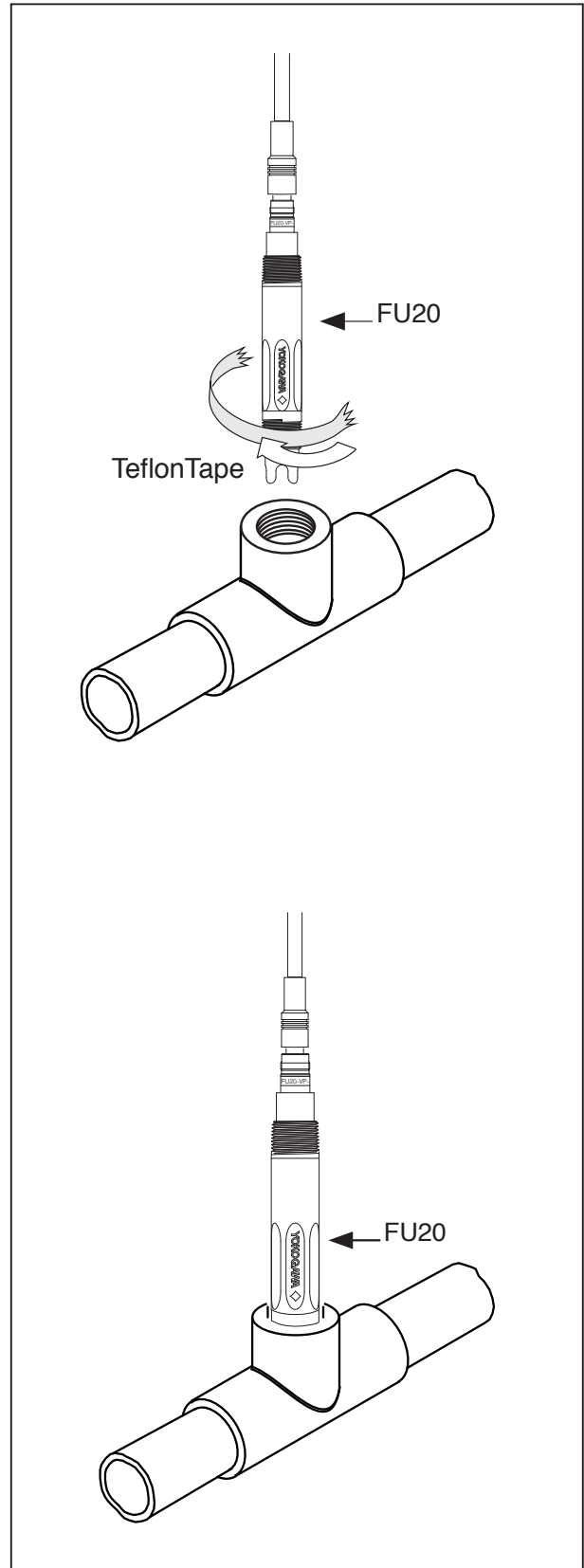
**Fig 3. Connections FU20-FTS/MTS**

**Installation options**

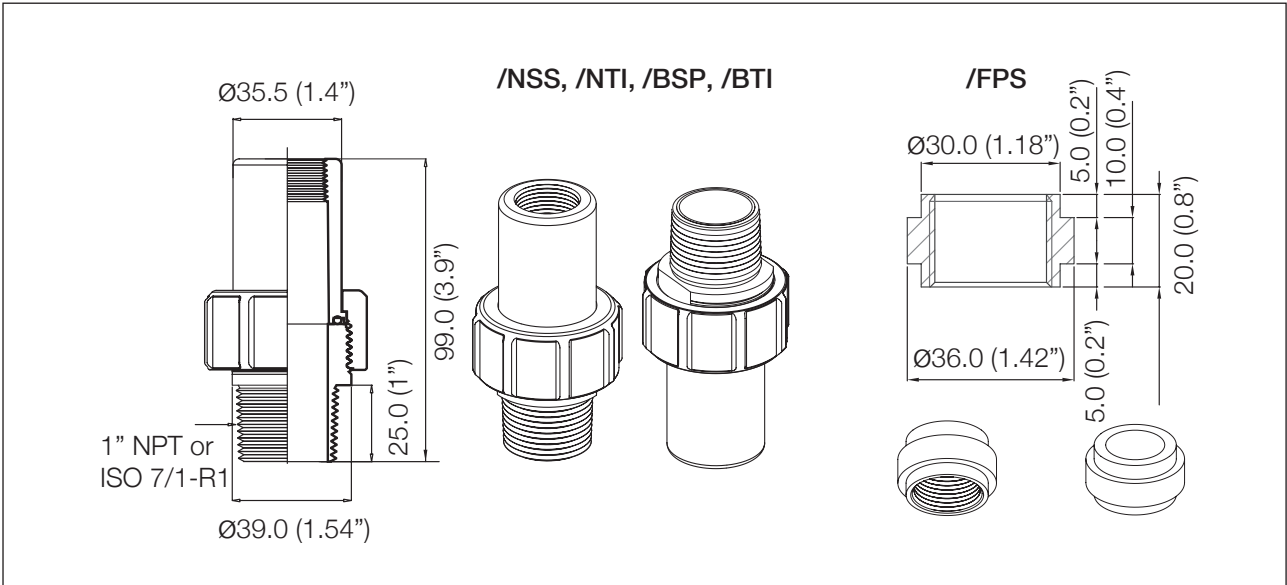
The differential FU20 sensor can be implemented in process applications using either :



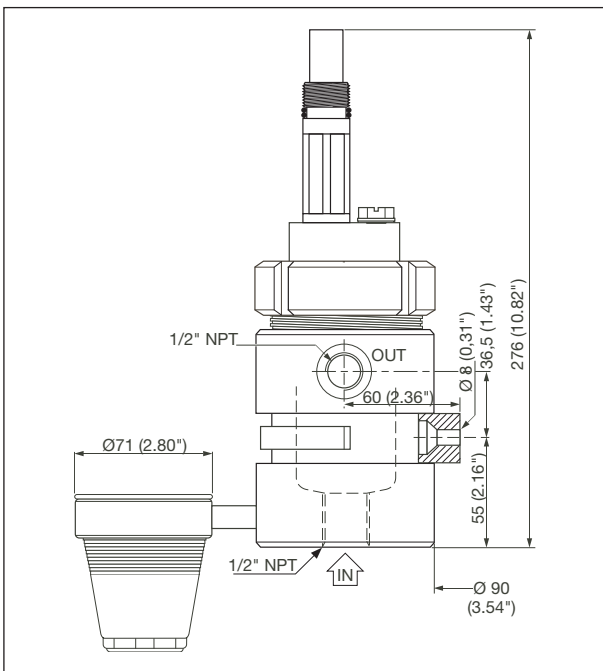
**Fig 4. Direct process connection using the 3/4" NPT thread using available adapters.**



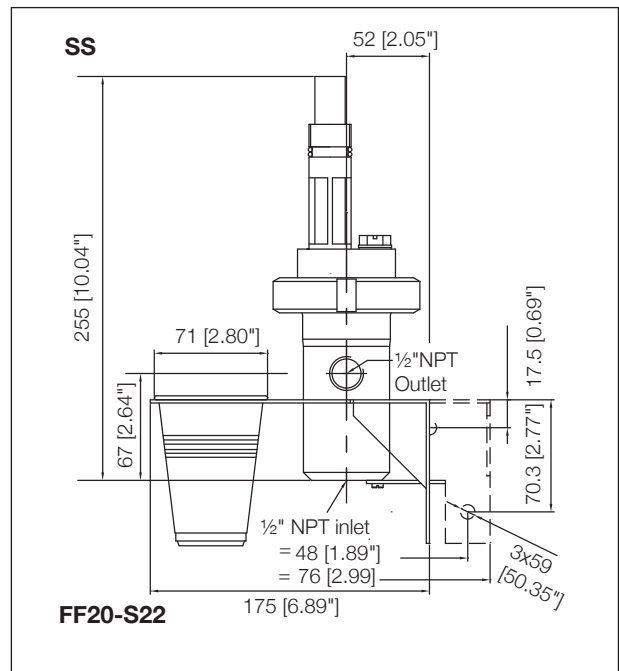
**Fig 5. T-piece installation using 3/4" NPT Thread**



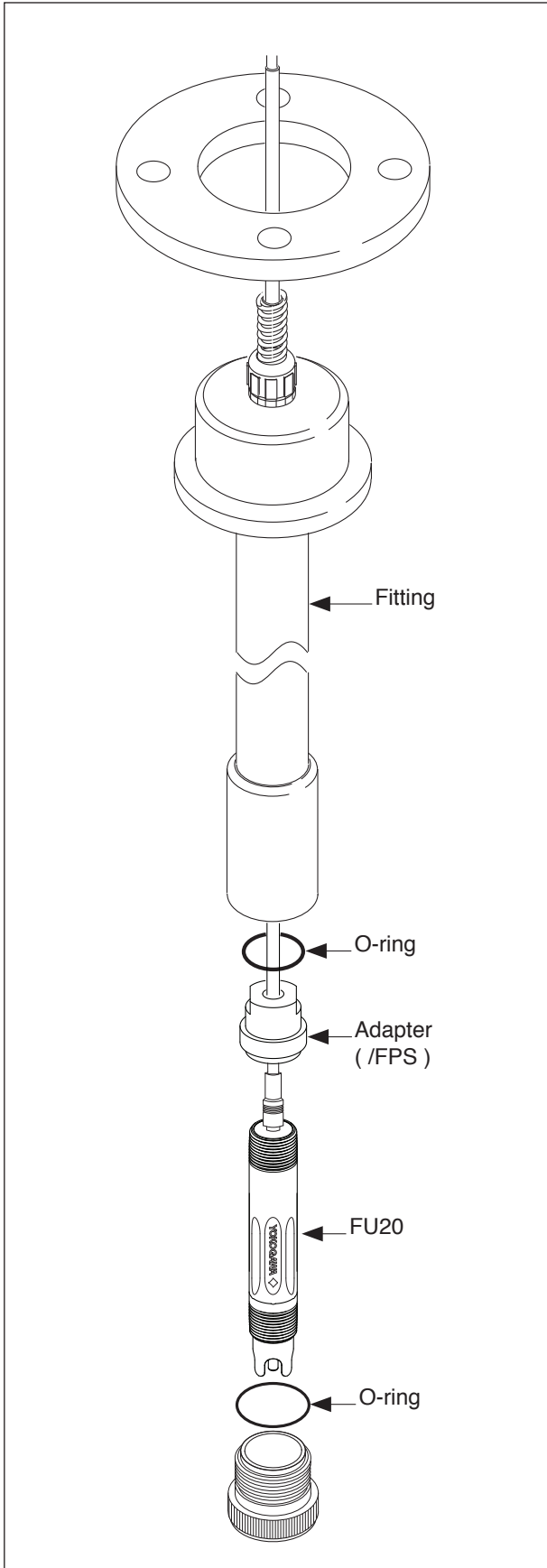
**Figure 6. Dimensions 1" FU20-FTS/MTS adapter Stainless Steel & Titanium and FU20-FTS/MTS adapter for FF40, FS40 and FD40 fittings**



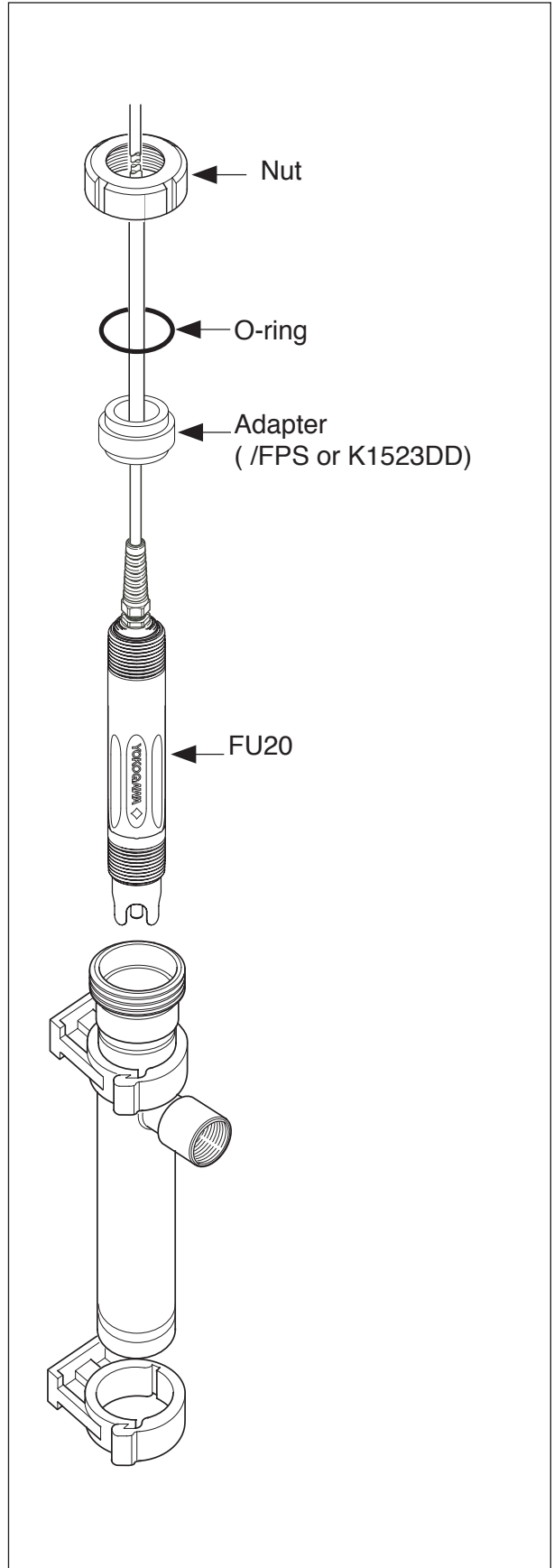
**Fig 7. Installation example FU20-FTS/MTS in FF20 flow fitting PP/PVDF**



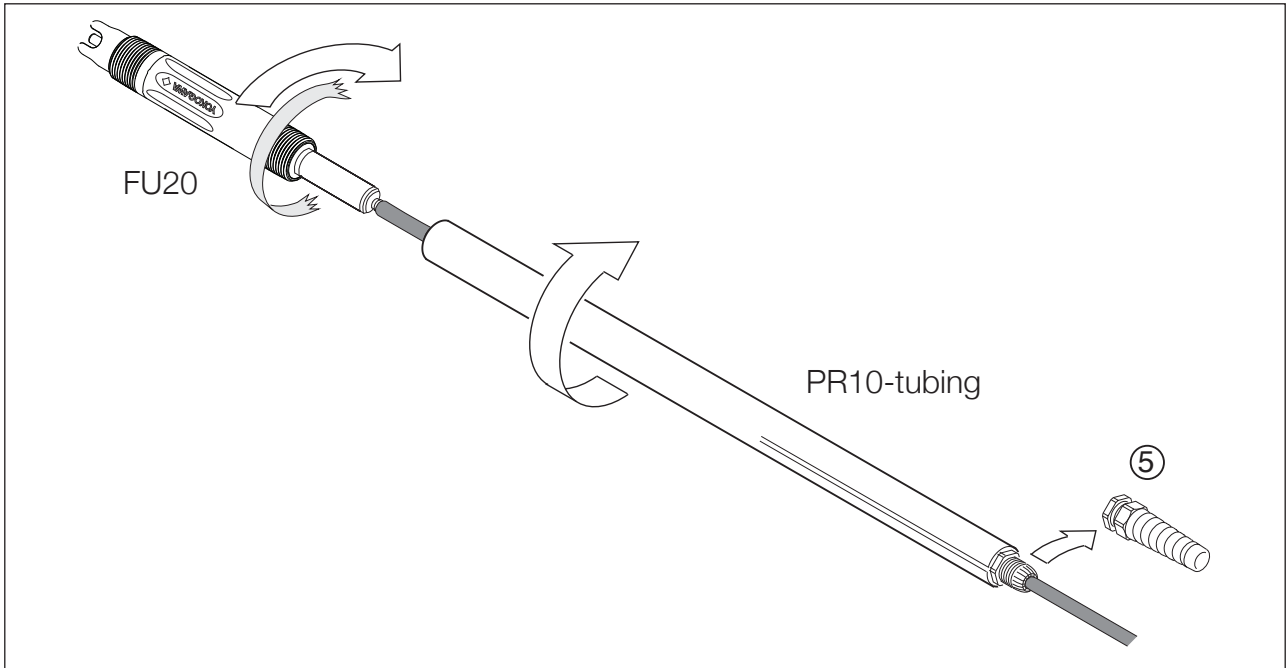
**Fig 8. Installation example FU20-FTS/MTS in FF20-flow fitting SS**



**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.

**YOKOGAWA ELECTRIC CORPORATION**  
World Headquarters  
9-32, Nakacho 2-chome, Musashino-shi  
Tokyo 180-8750  
Japan  
[www.yokogawa.com](http://www.yokogawa.com)

**YOKOGAWA CORPORATION OF AMERICA**  
2 Dart Road  
Newnan GA 30265  
USA  
[www.yokogawa.com/us](http://www.yokogawa.com/us)

**YOKOGAWA EUROPE BV**  
Euroweg 2  
3825 HD AMERSFOORT  
The Netherlands  
[www.yokogawa.com/eu](http://www.yokogawa.com/eu)

**YOKOGAWA ELECTRIC ASIA Pte. LTD.**  
5 Bedok South Road  
Singapore 469270  
Singapore  
[www.yokogawa.com/sg](http://www.yokogawa.com/sg)

**YOKOGAWA CHINA CO. LTD.**  
Room 1801, Tower B, THE PLACE  
No.100 Zunyi Road  
Changing District, Shanghai, China  
[www.yokogawa.com/cn](http://www.yokogawa.com/cn)

**YOKOGAWA MIDDLE EAST B.S.C.(c)**  
P.O. Box 10070, Manama  
Building 577, Road 2516, Busaiten 225  
Muharraq, Bahrain  
[www.yokogawa.com/bh](http://www.yokogawa.com/bh)

Yokogawa has an extensive sales and distribution network. Please refer to the European website ([www.yokogawa.com/eu](http://www.yokogawa.com/eu)) to contact your nearest representative.



**YOKOGAWA** ◆