General Specifications

Model PH20, FU20 and FU24
4 in 1 pH sensor

GS 12B6J3-01E-A

Yokogawa's family of wide body sensors is suited for a wide variety of processes. The sensors share the same unique features:

- Long life double junction Ag/AgCl reference system with polymerized saturated KCl fill including AG^{+} ion trap.
- PTFE reference diaphragm to prevent fouling and reduce measurement error.
- Integral Pt1000 element for accurate temperature measurements
- Double junction combined with ion-trap to prolong the life of the reference probe even in chemically unfavorable environments.
- Platinum ORP/LE electrode for accurate simultaneous pH and ORP measurements.
- Versatile in-line, immersion or off-line installation.
- Polymerized electrolyte to extend the sensors life time.



For general purpose applications the FU20 is the sensor of choice:

The FU20 combination sensor exemplifies Yokogawa motto, "Simply the Best" sensor technology. The wide body sensor (26 mm diameter) holds four separate measuring elements in one unbreakable and chemical resistant PPS 40GF (RytonTM) body. Installation is simple with the integrated industrial 3/4" tapered thread. Temperature fluctuations are compensated for extending sensor life. The FU20 is targeted at those applications where simplicity, accuracy and reliability are required for pH or redox(ORP) measurements. This means that in 90% of the known applications this sensor will be an excellent choice.

For more difficult applications the FU24 sensor will be the better choice:

The FU24 is also made with a chemical resistant PPS 40GF body. It is particularly useful in harsh applications with fluctuating pressure and/or temperature. These processes shorten sensor life because the process fluids move in and out of the sensor under influence of frequent pressure and/or temperature fluctuations. This results in fast desalting and dilution of the reference electrolyte which in turn changes the reference voltage causing a drifting pH measurement.

By incorporating the successful Yokogawa patented Bellow system integrated in the FU24 electrode, a strong pressure compensation mechanism is created. The built-in bellow ensures immediate interior pressure equalization to the outside pressure, making the sensor virtually insensitive to external pressure variations.

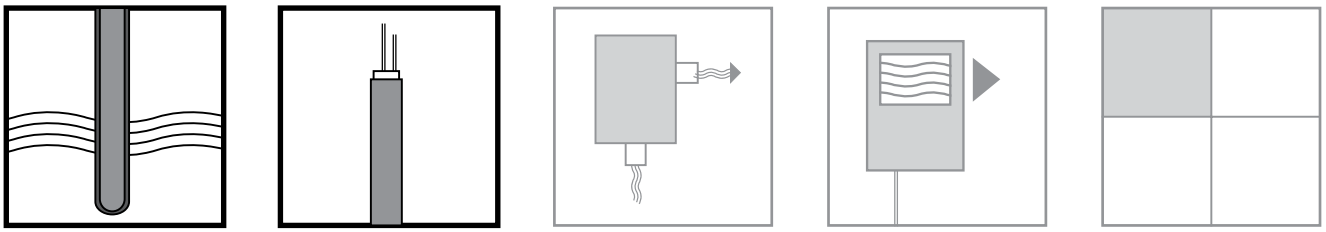
A slight overpressure caused by the bellow tension, prevents fluid ingress and maintains a positive ion flow out of the sensor. This feature is of particular interest in pure water applications.

In applications where chemical resistance is a vital issue the PH20 will be the choice:

The PH20 body is made of chemically resistant PVDF. The sensor is nicknamed "Tempress" because of the patented compensation for changes in the process temperature and pressure. A simple mechanical feature makes the sensor more accurate, and gives it a longer lifetime. The compensation panels flex to accommodate changes in pressure and temperature, thus avoiding large differential pressures across the diaphragm. This prevents most problems associated with the reference junction.

Both FU20 and FU24 are also available with VP connector. This makes installation easier. All sensors are delivered with a Quality Certificate.

System Configuration



Sensors | Cables | Fittings | Transmitters | Accessories

YOKOGAWA
Yokogawa Corporation of America
2 Dart Road, Newnan, Georgia U.S.A. 30265
Tel: 1-800-888-6400 Fax: 1-770-254-0928

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13th Edition

General Specifications FU20

Measuring elements : pH glass electrode
: Silver chloride reference system
: Platinum electrode
: Pt1000 temperature sensor.

Construction materials

Body	: PPS 40GF (glass filled Ryton)
Earthing pin	: Solid platinum
O-ring	: None
Reference junction	: Porous PTFE
Cable	: Coaxial with 4 extra leads
Sheet material	: Thermoplastic rubber
Measuring Sensor	: G-Glass

Functional specifications (at 25°C)

Isothermal point	: pH 7
Reference system	: Ag/AgCl with saturated KCl
Glass impedance	
- Dome shape	: nominal 200MΩ, G-glass
- Flat Surface	: nominal 700MΩ, G-glass
Junction resistance	: 1 to 10 kΩ
Temperature element	: Pt1000 to IEC 751
Asymmetry potential	: 8 ± 15 mV
Slope	: > 96 % (of theoretical value)

Dynamic specifications (at 25°C)

Response time pH step (7 to 4)
: < 15 sec for 90%
Response time temp step (10°C)

- Dome shape	: < 1 min for 90%
- Flat surface	: < 1.5 min for 90%

Stabilisation time (0.02 pH/10 s)
: < 2 minutes

Operating range

pH	: 0 - 14*
Temperature	: -10 to 105ºC (14 to 221 °F)
Pressure	: 0 to 10 bar (0 to 145 PSIG)
Conductivity	: > 50 µS/cm
Storage temperature	: -10 to 50ºC (-22 to 122 °F)

* The pH range at room temperature is 0 -14 pH, but at high temperatures the lifetime will be seriously shortened outside 2 - 12 pH range.

General specifications FU24

Measuring elements : pH glass electrode
: Silver/Silver Chloride reference
: Solid Platinum electrode
: Pt1000 temperature sensor.

Construction materials

Wetted materials:

Body	: PPS 40GF (glass filled Ryton)
O-ring	: Viton
Earth Pin	: Solid platinum
Reference Junction	: Porous PTFE
Measuring Sensor	: G-Glass

Functional specifications

Isothermal point	: pH 7
Glass impedance	
Dome shape	: nominal 200 MΩ
Flat Surface	: nominal 700 MΩ
Reference system	: Double junction, Ag/AgCl with saturated KCl, including Ag^+ ion trap
Junction resistance	: 1 to 15 kΩ
Temp. element	: Pt1000 to IEC 751
Asymmetry potential	: 8 ±15 mV
Slope	: > 96 % (of theoretical value)

Note: The temperature sensor included in the FU24 is intended to provide indication and cell compensation. The construction has not been tested to the pressure vessel standards required for plant temperature control.

Dynamic specifications

Response time pH step (7 to 4)
: < 15 sec for 90%
Response time temp step (10°C)

Dome shape	: < 1 min for 90%
Flat Surface	: < 1.5 min for 90%

Stabilization time (0.02 pH unit/10 s)
: < 2 minutes

Operating range

pH	: 0 to 14
Temperature	: -10 to 105 °C (14 to 221 °F)
Pressure	: 0 to 10 bar (0 to 145 PSIG)
Storage temp.	: -15 to 50 °C (5 to 122 °F)

Note: The FU24 is suitable for pure water applications.

Note: Specifications should not be considered in isolation. For example the pH range can be 2-12pH, where the measurement is at elevated temperatures. For advice about specific applications please contact your local sales office.

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General Specifications PH20

Measuring elements : pH glass electrode
: Silver/Silver chloride reference system.
: Platinum electrode
: Pt1000 temperature sensor.

Construction materials

Body	: PVDF
Earthing pin	: Solid platinum/glass
O-ring	: Viton
Reference junction	: Porous PTFE
Cable	: Coaxial with 4 extra leads
Sheet material	: Thermoplastic rubber
Measuring Sensor	: G-Glass

Functional specifications (at 25°C)

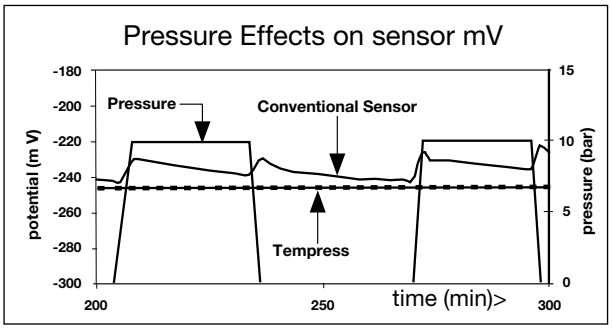
Isothermal point	: pH 7
Reference system	: Ag/AgCl with saturated KCl
Glass impedance	: 200 MΩ (nominal), G-glass
Junction resistance	: 1 to10 kΩ
Temperature element	: Pt1000 to IEC 751
Asymmetry potential	: 8 ± 15 mV
Slope	: > 96 % (of theoretical value)

Dynamic specifications (at 25°C)

Response time pH step (7 to 4)
: < 5 sec for 90%
Response time temp. step (10°C)
: < 1 min for 90 %
Stabilisation time (0.02 pH/10 s)
: < 1 minute

Operating range

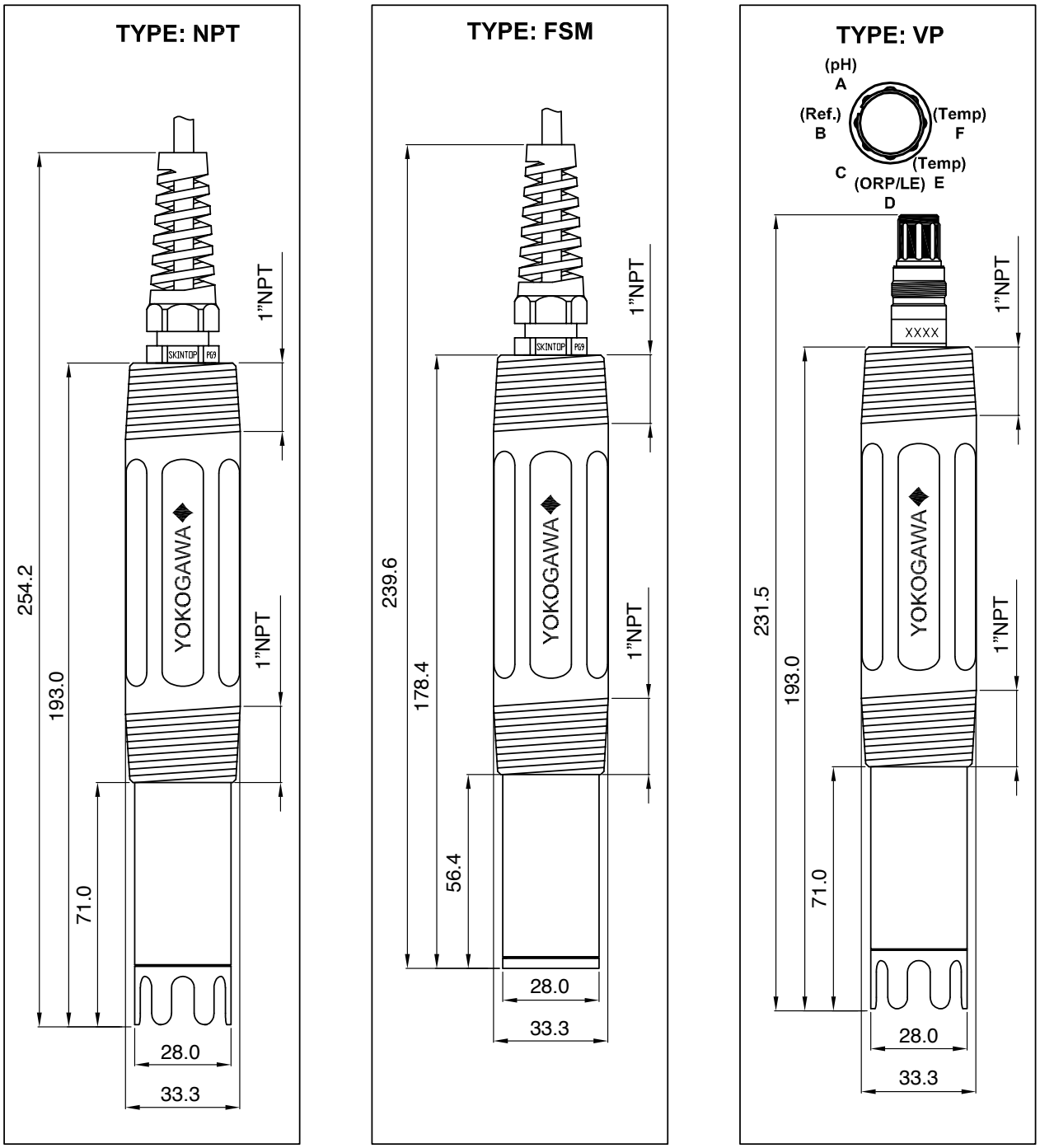
pH	: 0 - 14*
Temperature	: -10 to 105ºC (14 to 212 °F)
Pressure	: 0 to 10 bar (0 to 142 PSIG)
Conductivity	: > 50 µS/cm
Storage temperature	: -10 to 50ºC (-22 to 122 °F)



The erratic trend of the standard sensor shows the progressive contamination of its reference junction. The graph indicates between 0.1 to 0.4 pH error with the conventional sensor while the readings from the PH20 are extremely stable.

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Dimensions FU24

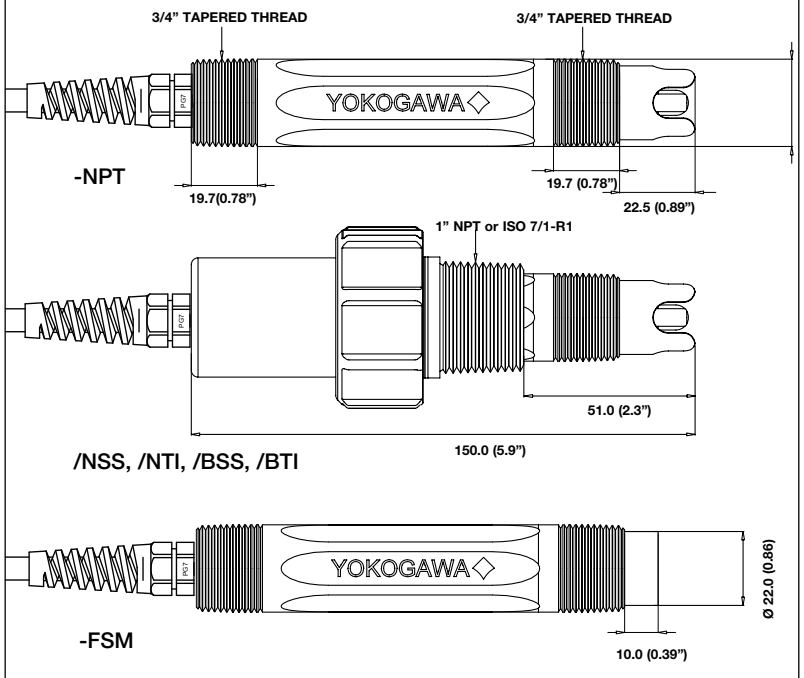


Unit: mm

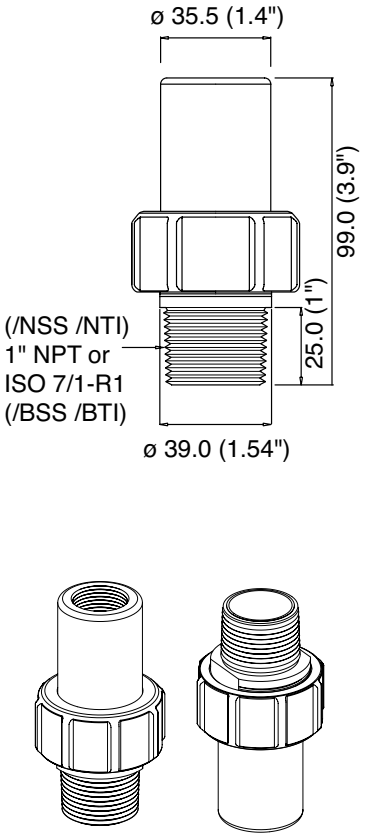
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Dimensions

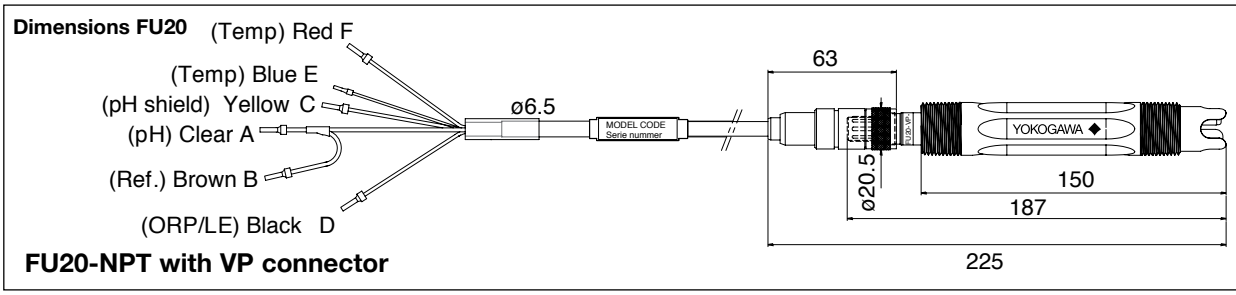
Dimensions FU20



FU20 Adapter

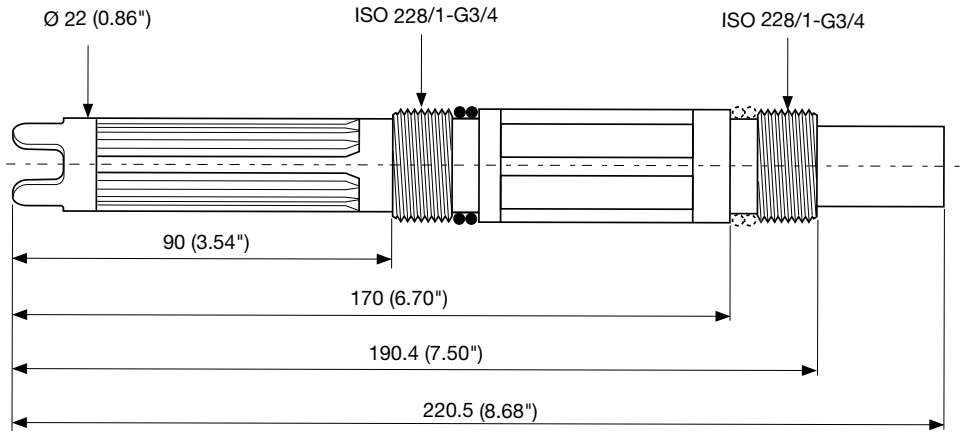


Dimensions FU20



FU20-NPT with VP connector

PH20

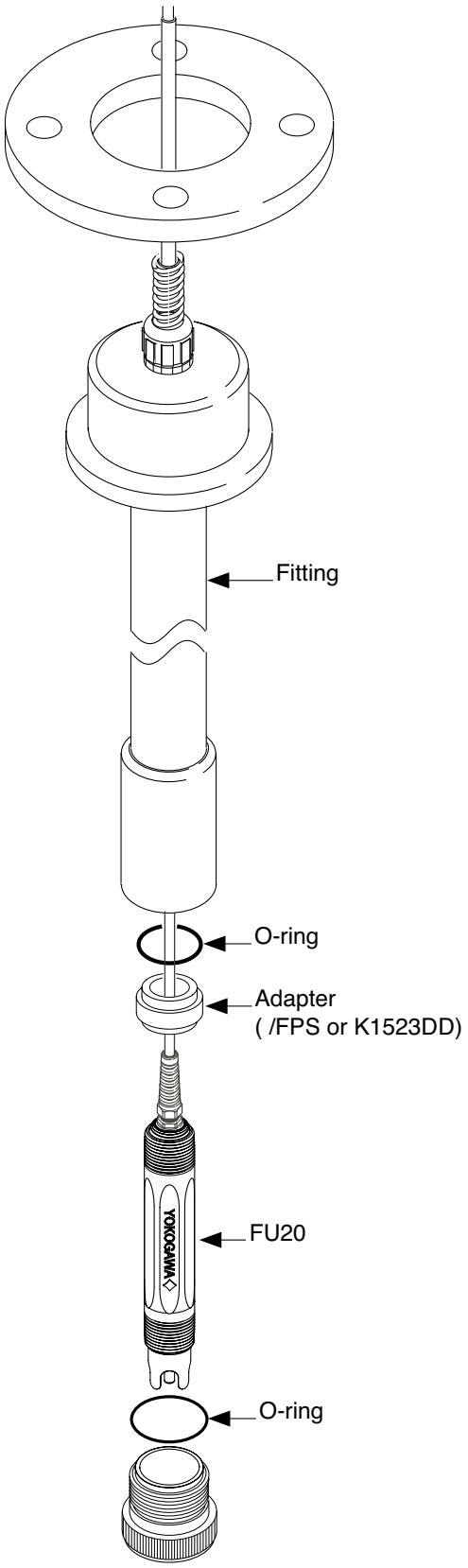


Unit: mm (inches)

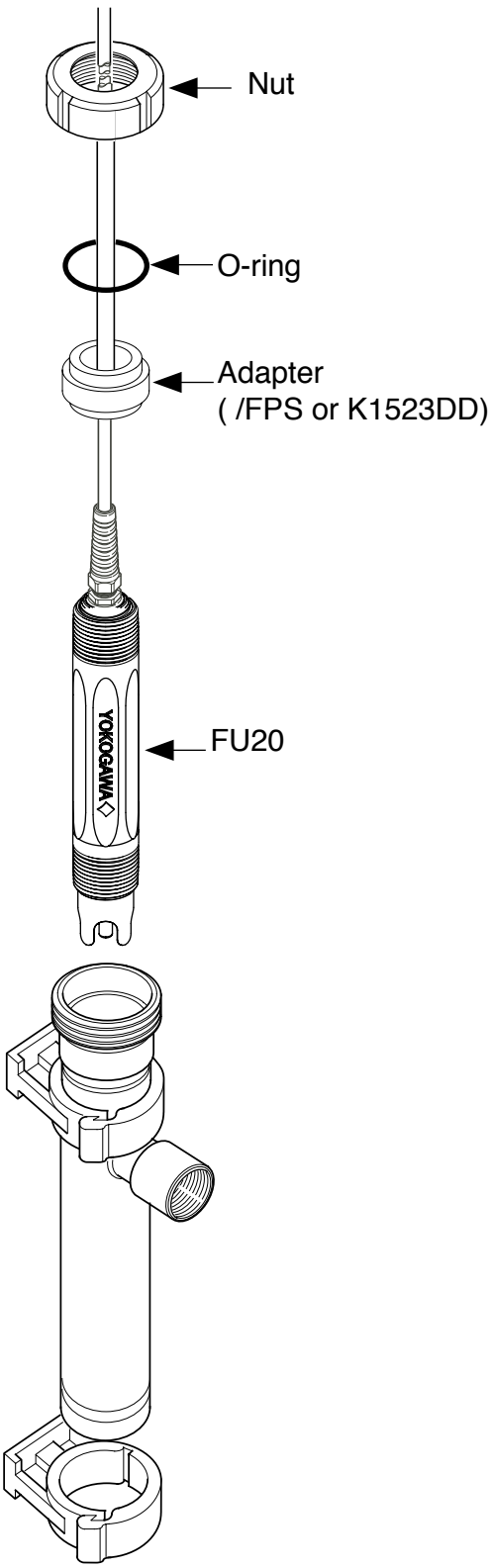
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Installation examples using the FU20 adapter range

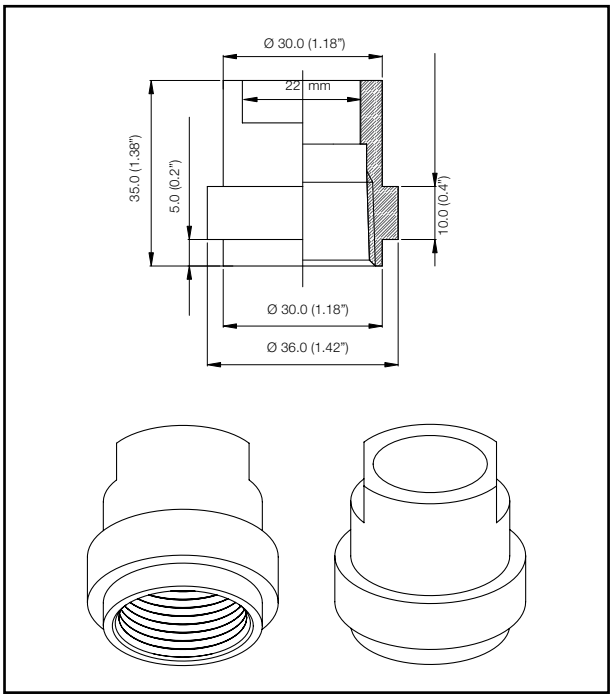
FD40 also for FF40 and FS40



FF40 example



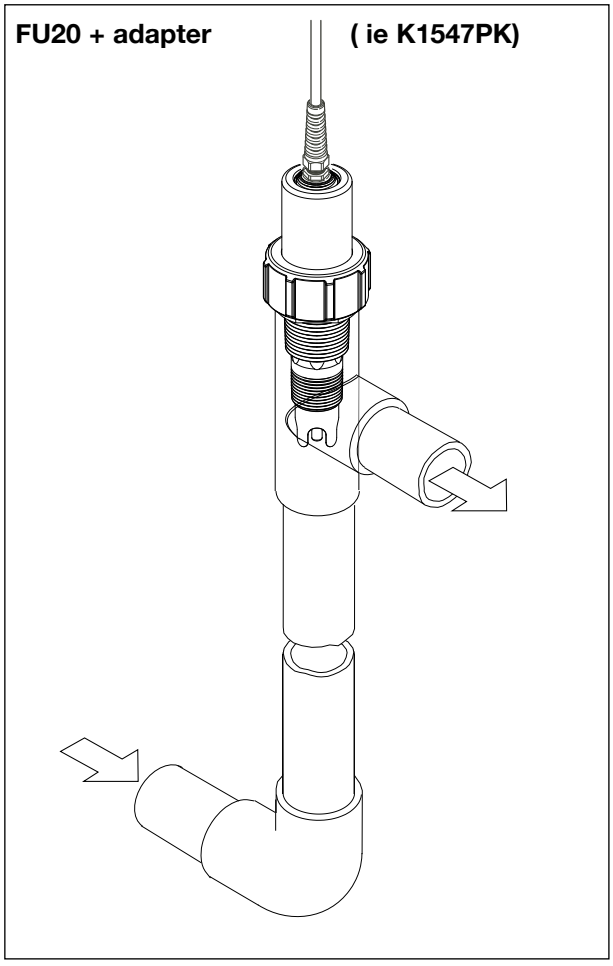
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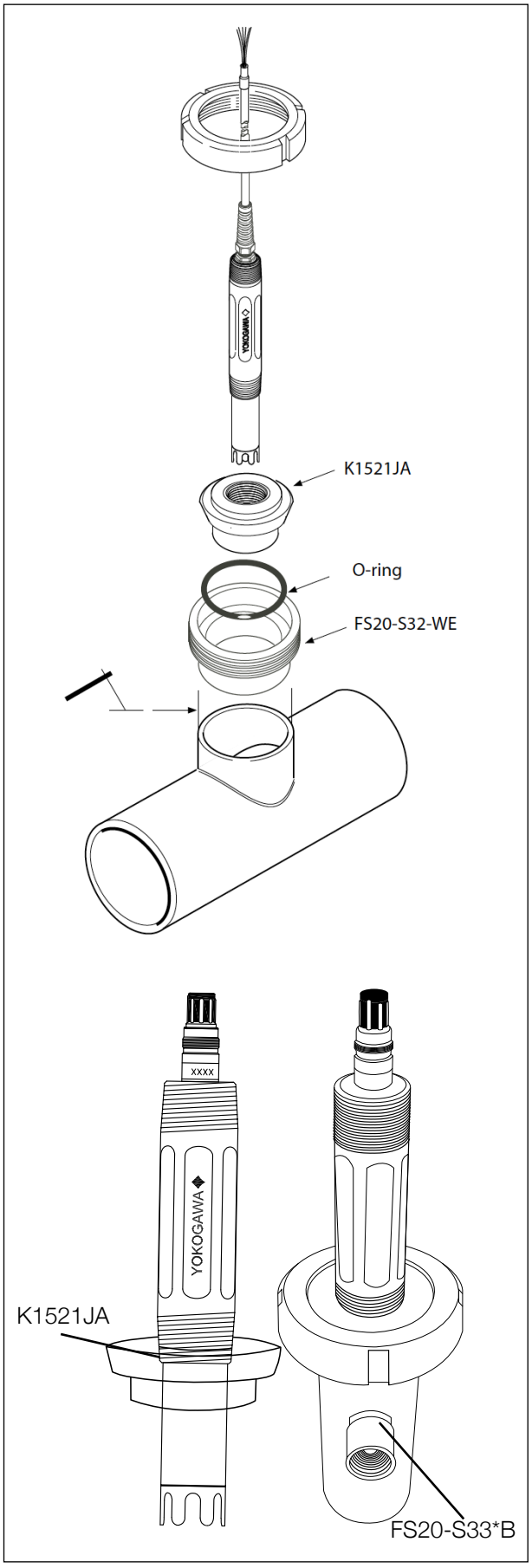
Dimensions Ryton adapter for FF40, FS40 and FD40 fittings (/FPS or K1523DD) for use with FU20.

Note: old part K1523DC is not compatible with VP connector and sensors manufactered after December 2009.

FU20 + adapter (ie K1547PK)

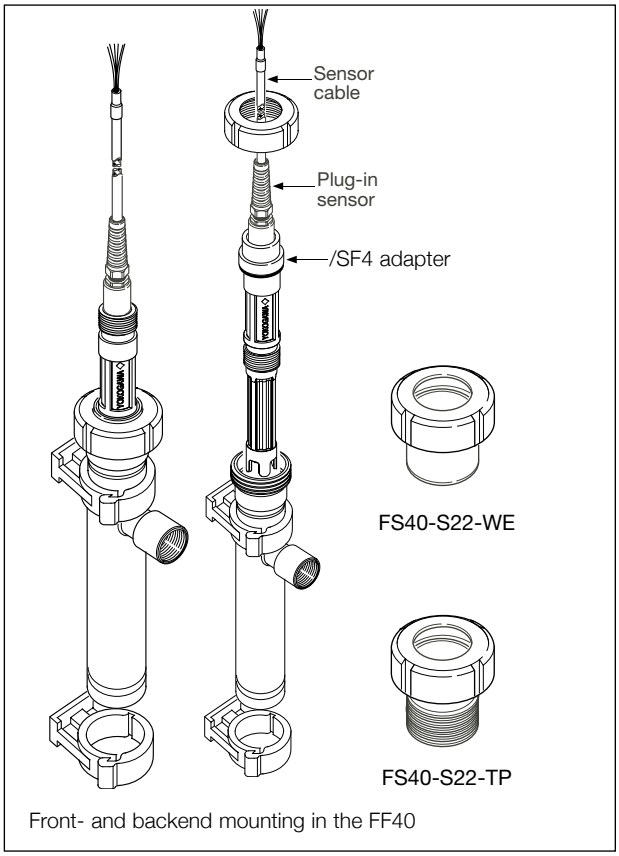


FS20/FF20 installation example for FU24 + adapter



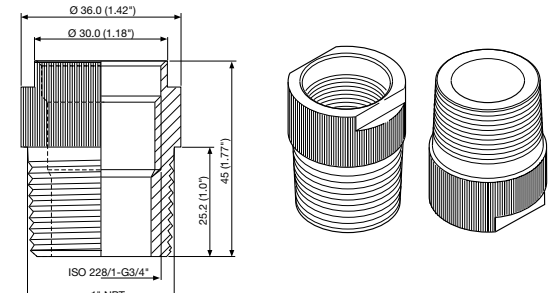
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Installation examples using the PH20 adapter range

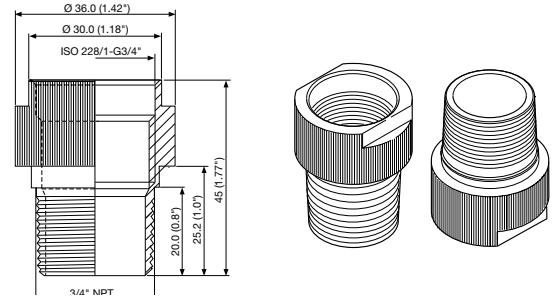


Front- and backend mounting in the FF40

Using the /SF4 adapter, the PH20 can be mounted in the standard range of conductivity flow fitting (FF40..), the immersion fittings (FD40-..) and sub-assemblies (FS40..). The adapter can be mounted on the front thread, or the back thread dependent on the required insertion depth.



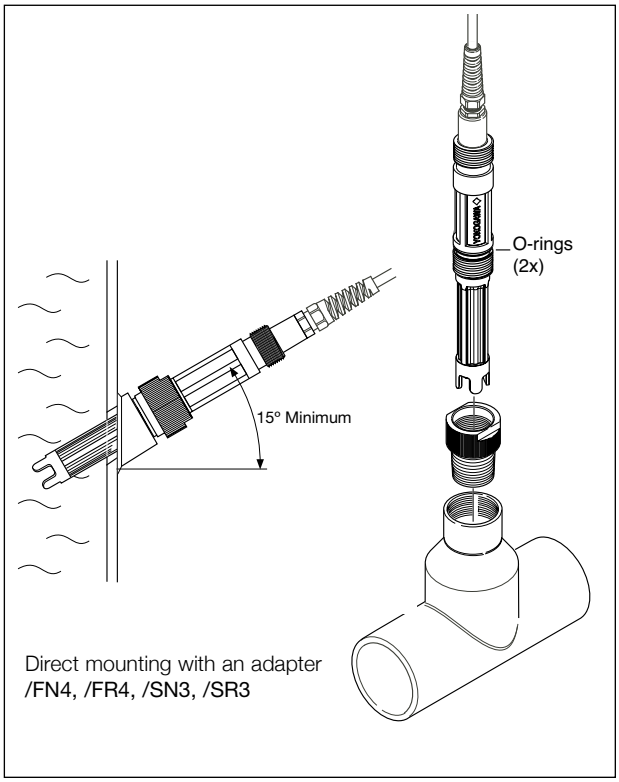
/FN4 (1" NPT) and /FR4 (1" ISO 7/1-R1)



/SN3 (3/4" NPT) and /SR3 (3/4" ISO 7/1-R)

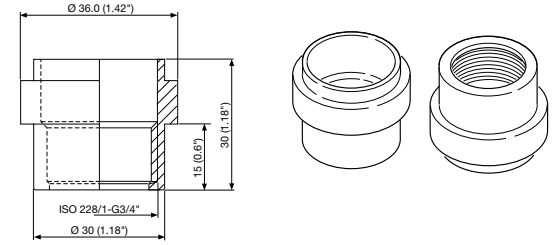
adapter options PH20 /□□□

- 3: 3/4"
- 4: 1"
- N: NPT
- R: ISO 7/1-R1
- F: PVDF
- S: Stainless steel



Direct mounting with an adapter
/FN4, /FR4, /SN3, /SR3

Unit: mm (inches)



/SF4. Adapter for FF40, FS40 and FD40 fittings

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Model and Suffix codes

Model code	Suffix code	Option code	Description
FU20			Wide body sensor
	-VP		Variopin connector
Cable length	-03		3 meter
	-05		5 meter
	-10		10 meter
	-20		20 meter
Temp. element	-T1		Pt1000
Model	-NPT		Dome shape model
	-FSM		Flat surface model
Options		/HCNF	Hastelloy cleaning system, or spare part number K1547PJ
		/FPS	Adapter F*40 from noryl, or spare part number K1523DD
		/NSS	1" NPT adapter, SS (316L), or spare part number K1547PK
		/NTI	1" NPT adapter, Titanium, or spare part number K1547PM
		/BSS	1" BSP adapter, SS (316L), or spare part number K1547PL
		/BTI	1" BSP adapter, Titanium, or spare part number K1547PN

Model code	Suffix code	Option code	Description
FU24			Combined pH sensor
Sensor connection	-05		5m fixed cable
	-10		10m fixed cable
	-VP		Variopin connector
Temperature sensor	-T1		Pt1000
Sensor tip	-FSM		Self cleaning, flat surface
	-NPT		Heavy duty, dome shaped
Reference system	- N		Non-flowing
Accessories		K1521JA	Adapter to place into F*20 assemblies, 316SS
		K1521JB	Adapter to place into F*20 assemblies, PVDF

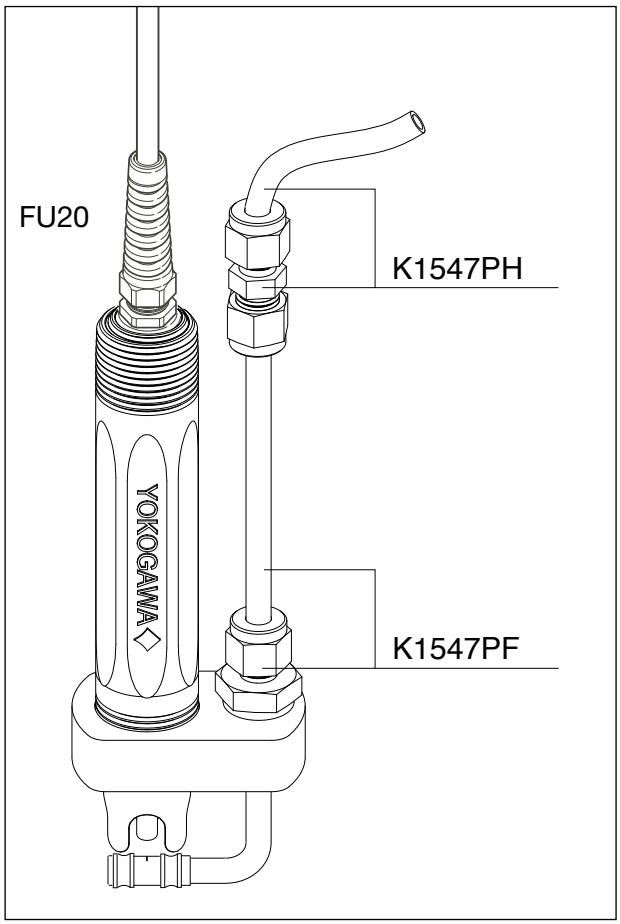
Model code	Suffix code	Option code	Description
PH20			4-in-1 pH sensor
Material	-F		PVDF
Membrane	-G		Dome shaped
Cable length	-02		2 meter
	-05		5 meter
	-10		10 meter
	-20		20 meter
	-30		30 meter
Temp. element	-T1		Pt1000
	-N -A		Always -N -A
Options		/SN3	Stainless steel 3/4" NPT adapter (316L), or spare part number K1541QA
		/SR3	Stainless steel 3/4" R adapter (316L), or spare part number K1547QB
		/FN4	PVDF 1" NPT adapter, or spare part number K1547PC
		/FR4	PVDF 1" R adapter, or spare part number K1547PD
		/SF4	Stainless steel adapter for FF40, FS40 and FD40 fitings, or spare part number K1547QF
		/HCNF	Hastelloy cleaning system - when no fitting used, or spare part number K1547PJ
		/HCN2	When FF20 or FS20 are used, or spare part number K1547PA

Model code	Suffix Code	Option code	Description
WU10			Sensor cable
Connector type	-V		Variopin
Cable type	-S		Single Coax
Cable length		-02	2 meters
		-05	5 meters
		-10	10 meters
		-15	15 meters
		-20	20 meters

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Spare parts PH20, FU20, FU24 & cleaning system

Part no.	Description
K1500EK	O-rings Viton 6.07x1.78 (5x2)
K1500ER	O-ring set Viton FF20-S22
K1511DP	O-rings Viton 21.9x2.62 (5x2)
K1511DQ	O-rings EPDM 21.9x2.62 (5x2)
K1521JA	SS adapter for FU24 for us in F*20 holder
K1547PC	/FN4 for PH20
K1547PD	/FR4 for PH20
K1547PE	/PH8 for PH20
K1547PG	Nozzle and mounting HCN4
K1547PP	Spare Part EPDM spraying valves
K1547QA	/SN3 for PH20
K1547QB	/SR3 for PH20
K1547QF	/SF4 for PH20
K1500FR	O-rings Viton 29.82x2.62 (5)
K1500FS	O-rings EPDM 29.82x2.62 (5)
K1500FT	O-rings Silicone, 29.82x2.62 (5)
K1520ZD	Mounting nut for PH20
K1523DD	/FPS, FU20-mounting in F*40
K1547PK	Adapter 1" NPT, SS 316 for FU20
K1547PL	Adapter 1" BSP, SS 316 for FU20
K1547PM	Adapter 1" NPT, Ti for FU20
K1547PN	Adapter 1" BSP, Ti for FU20
K1547PJ	Hastelloy cleaning unit HCNF
K1547PF	Nozzle and mounting HCN2/3/F



Option /HCNF

Spare Parts

Prod. No.	Description
M1100EU	Starters Kit: (3x 500 ml)
Buffer Solutions pH 4.01 / 6.87 / 9.18	
M1263VM	Buffer Solution pH 4.01, 1 Gallon
M1263VN	Buffer Solution pH 6.87, 1 Gallon
M1263VP	Buffer Solution pH 9.18, 1 Gallon

Connection equipment	
BA10	Junction box for pH extension cables
WF10-xxx-F	pH signal cable with terminated ends. Specify length in whole meters
WU10-V-S-XX	Variopin cable

Cleaning system for FU20 & PH20

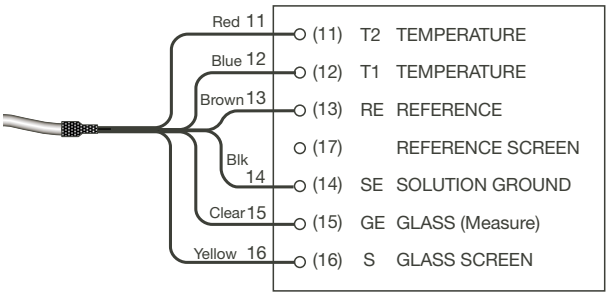
Some applications require frequent cleaning of the electrode. For these applications Yokogawa designed a chemical cleaning system that can either be used in the Yokogawa fitting range (HCN2, HCN3 or HCN4) or as back-end mounting option for the PH20 and FU20. The /HCNF option comes with a hastelloy cleaning nozzle, Stainless steel mounting and ferrules sets and a nylon tube of 10 meters.

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Wiring of the PH20 / FU20 / FU24

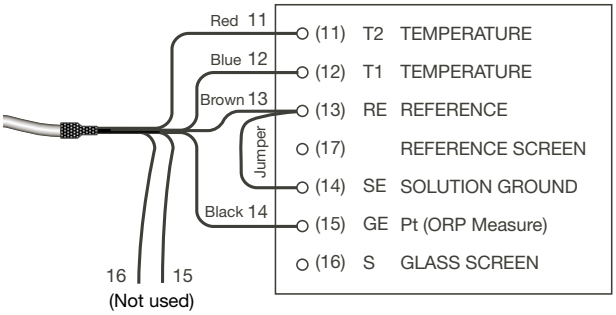
Conventional pH (& ORP) wiring
Connect the cable versions PH20, FU20 or FU24 to the EXA or EXAxt PH analyzer as shown. With this configuration, it is possible to measure ORP (or rH) at the same time (Refer to the EXA or EXAxt manual for appropriate impedance jumper and Service Code settings).

pH (& ORP) WIRING DIAGRAM
Color Callouts are only for when using a Variopin Cable.
Number Callouts are for integral Cable.



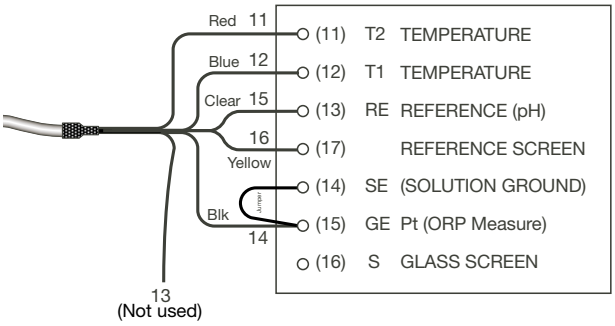
Wiring for ORP measurement with normal reference
Connect the PH20, FU20 or FU24 to the EXA PH analyzer as shown. Refer to the EXA manual for appropriate impedance jumper and Service Code settings.

ORP WIRING DIAGRAM with normal reference



Wiring for ORP measurement with pH reference
Connect the PH20, FU20 or FU24 to the EXA Glass PH analyzer as shown. Refer to the EXA manual for appropriate impedance jumper and Service Code settings.

ORP WIRING DIAGRAM with pH sensor as reference



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