

General Specifications

Hamilton Industrial Electrodes for pH/Redox

When you purchase an analyzer system from Yokogawa, you know you are getting the ultimate technology fit for your purpose. Because Yokogawa is a global leader in analyzer technology based on an outstanding track record of continuous innovation. And now Yokogawa has signed a Global Preferred Vendor Agreement with the Hamilton Company a world leader in sensor technology.

This agreement is to supply sensors to meet the stringent requirements of the pharmaceutical and biotechnology industries and in food production processes such as fermentation.

Hamilton Company

The Hamilton Company is a global enterprise with a long track record in fluid measurement. For over 50 years, Hamilton has been using quality materials and skilled workmanship and has a life-long commitment to precision, accuracy and quality. The Sensor Technology Group designs and manufactures sensors for the measurement of pH, temperature, conductivity, and dissolved oxygen. These sensors have a well-established reputation for long-life and fast stable readings in both laboratory and in-line process applications.

Vigilance

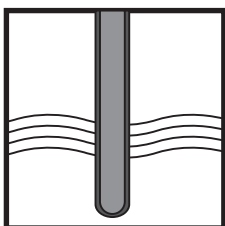
Our agreement with Hamilton as Global Preferred Vendor for state-of-the-art sensors is in line with Yokogawa's strategy as a vigilant supplier and our commitment to leading edge technology. The combined expertise of Yokogawa and Hamilton ensures that your total analyzer systems give accurate, reliable performance. Because we have subjected the Hamilton sensors in combination with our analyzers to rigorous testing under different operating conditions. By joining forces, we offer you world-class technologies in the one system, giving top class performance.



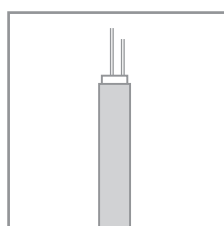
Features

- Includes the new analytical Instrumentation standard: Variopin connector
- Autoclavable and Sterilisable pH sensors
- Build-in temperature sensor when Variopin type connector is selected
- Sensors and fittings complement Yokogawa products
- Sensors qualify fully for Biotechnology, Pharmaceutical and food production applications
- Sanitary fittings
- Autoclavable electrode for biotechnology, pharmaceutical and chemical applications
- ATEX certified sensors and fittings
- Certificate downloadable from www.Hamiltoncompany.com

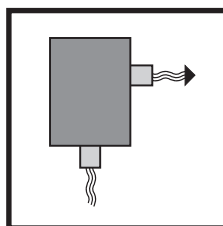
System configuration



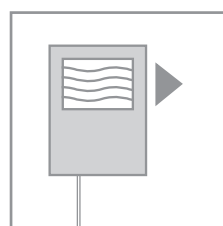
Sensors



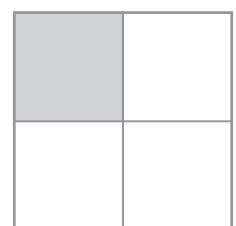
Cables



Fittings



Transmitters



Accessories

Combined pH electrodes (Flow)

Both sensors have a special reference system called the EVER-F. The AgCl reservoir is separated from the reference electrolyte by a diffusion distance preventing poisoning of the reference system and keeping the Ag in the reference system, avoiding black ceramics. These sensors fit into most common pressurizable armatures for electrodes with a reservoir diameter of about 30 mm.

Features Chemotrode

- Temperature range 0-130°C
- Steam sterilizable
- High Quality Ag/AgCl reference system
- Maximum pressure : 6 bar
- pH range 0-14

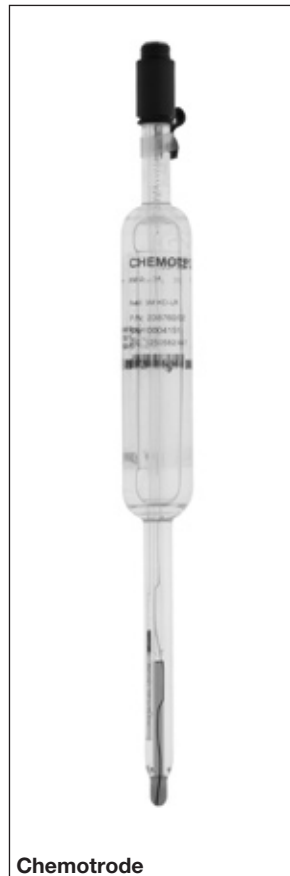
Part No.	Description
10/238760	Chemotrode 120
10/238762	Chemotrode 150
10/238766	Chemotrode 250

Additional characteristics of Chemotrode Bridge

- Build in Pt100 in VP Version
- One platinum single pore diaphragm for clog-free operation
- Refillable with Skylyte electrolyte
- Suitable for harsh applications where there is a possible of poisoning

Part No.	Description
10/238753	Chemotrode Bridge VP 120
10/238754	Chemotrode Bridge VP 150
10/238770	Chemotrode Bridge 120
10/238772	Chemotrode Bridge 150

Note: The ATEX certificate is downloadable from the Hamilton website: www.Hamiltoncompany.com



Combined pH electrodes (Non-flow)

The non-flow type sensors are filled with a polymer electrolyte which can be used from pH 0-14 and can withstand temperatures from -10° to 130°C. This high temperature rating also means that these sensors are also steam sterilizable.

Features

- Very stable readings in most ion weak solutions
- range 0 to 14 pH
- All sensors available with DIN and VP connector
- Built-in temperature sensor (VP version)

Additional characteristics of Polilyte Pro (VP)

- Suitable for samples containing solids, bacteria or sludge as well as normal drinking water
- Maximum pressure: 6 bar
- Suitable for process temperatures from -10°C up to 60°C
- Pt1000 in VP-version
- Stable measurement in low-conductive solutions

Part no.	Description
10/238411	Polilyte PRO 120
10/238417	Polilyte PRO VP 120

Additional characteristics of Polilyte HT(VP)

- Up-side down mounting with VP-type possible
- Steam sterilizable and autoclavable
- Withstands continuous high process temperatures
- Maximum pressure: 6 bar at 130°C
- Suitable for high alkali processes

Part no.	Description
10/238431	Polilyte HT 120
10/238432	Polilyte HT 225
10/238428	Polilyte HTVP 120
10/238429	Polilyte HTVP 225

Additional characteristics of Polyclave (VP)

- Maximum pressure: 6 bar
- Maximum temperature 130°C
- Withstands CIP, steam sterilizable and autoclavable
- Up-side down mounting with VP-type possible

Part no.	Description
10/238450	Polyclave 120
10/238452	Polyclave 170
10/238455	Polyclave VP 120
10/238456	Polyclave VP 225

Additional characteristics of Easyferm

- Maximum pressure: 4 bar
- Not suitable for use in media with citric acid or in the case of frequent CIP

Part no.	Description
10/238490	Easyferm 120
10/238492	Easyferm 225
10/238494	Easyferm 325

Additional characteristics of Easyferm plus (VP)

- Withstands CIP, steam sterilizable and autoclavable
- Pt100 in VP-versions
- High performance coartramic diaphragms prevent clogging due to proteins
- Maximum: 6 bar at 135°C

Part no.	Description
10/238633	Easyferm Plus VP 120
10/238634	Easyferm Plus VP 225
10/238635	Easyferm Plus VP 325
10/238645	Easyferm Plus 325



Polilyte Pro



Polilyte HTVP



Polyclave



Easyferm plus VP

Additional characteristics of Mecotrode (VP)

- 3 High performance ceramic diaphragms
- Specially suitable for applications with a higher pH or higher temperatures
- Maximum: 6 bar at 130°C
- Maximum: 16 bar at 25°C

Part no.	Description
10/238801	Mecotrode 120
10/238437	Mecotrode 120 Pt100 VP

Additional characteristics of Features Fermotrode

- Maximum pressure: 400 kPa (4 bar at 130°C)
- pH range 0 - 14
- 3 high performance ceramic junctions for lower risk of blocking
- Not suitable for use in processes with citric acid or in case of frequent CIP

Part no.	Description
10/238480	Fermotrode 120
10/238482	Fermotrode 150
10/238484	Fermotrode 200
10/238486	Fermotrode 250

Additional characteristics of Clarytrode

- Specially suited for HF applications
- Pt100 in VP type
- Maximum 6bar at 100°C
- C 0.01M / 200mg / L HF at 20°C
- or 0.05M / 1000mg / HF at 50°C

Part no.	Description
10/238821	Clarytrode 120
10/238831	Clarytrode VP 120

Consumables

Part no.	Description	
10/238079	Hamilton Electrolyte 0,1M KCl,	100 ml
10/238939	Hamilton Electrolyte 3M KCl viscous,	500 ml
10/238036	Hamilton Electrolyte 3M KCl,	100 ml
10/238936	Hamilton Electrolyte 3M KCl,	500 ml
10/238931	Hamilton Storage Solution,	500 ml
10/238038	Protelyte, 100 ml (Fermotrode)	
10/238037	Skylite, 100 ml (Chemotrode)	
10/238937	Skylite, 500 ml (Chemotrode)	
10/238290	Cleaning Solution Set (2x500mL A+B + 1x500mL Storage Solution)	
10/238317	Duracal Buffer pH 4.01	250 ml
10/238217	Duracal Buffer pH 4.01	500 ml
10/238917	Duracal Buffer pH 4,01	3 x 500 ml
10/238318	Duracal Buffer pH 7.00	250 ml
10/238218	Duracal Buffer pH 7.00	500 ml
10/238918	Duracal Buffer pH 7,00	3 x 500 ml
10/238319	Duracal Buffer pH 9.21	250 ml
10/238219	Duracal Buffer pH 9.21	500 ml
10/238919	Duracal Buffer pH 9.21	3 x 500 ml
10/238321	Duracal Buffer pH 10.01	250 ml
10/238223	Duracal Buffer pH 10.01	500 ml
10/238923	Duracal Buffer pH 10,01	3 x 500 ml
10/238228	Hamilton Redox-Buffer 271 mV	500 ml
10/238227	Hamilton Redox-Buffer 475 mV	500 ml
10/238322	Hamilton Redox-Buffer 475 mV	250 ml

**Mecotrode VP****Fermotrode****Clarytrode****Clarytrode VP**

Armatures for Industrial Applications

Retractofit and retractomatic

This armature allows the user to install maintenance-free electrodes in critical processes. The main advantage of this design is that the sensor can be withdrawn while the process is running (i.e. for cleaning, calibration or even to replace the electrode), without interrupting the process. The armature is very easy to use and maintain. Two tube connectors allow access to the rinsing chamber. A closed insertion tube converts these armatures to a sampling system for diverse applications. Both accessories can easily be exchanged for the standard insertion tube using only gentle hand pressure.

Additional features Retractofit

- The design allows the use of sensors with 210 to 225 mm shaft length
- An integral safety mechanism prevents the armature from being inserted into the sample without an electrode installed.
- Only one press of the red button is needed to move the electrode into or out of the process. All o-rings are easily replaced without special tools.
- A shortened insertion tube that allows use of the armature in narrow bore pipes for which the standard insertion tube is too long.
- Designed for applications in the chemical and waste water industry.
- All wetted steel parts are replaced by PEEK with the Retractofit PEEK

Additional features Retractofit Bio

- This armature is designed for applications where sanitary concerns are critical.
- The armature is steam sterilizable and autoclavable.
- The SS DIN 1.4435 (SS 316) and the FDA approved EPDM O-rings withstand typical CIP cleanings.
- Check with your dealer for the right O-ring position or weld-in socket!

Additional features Retractomatic

- Powerful 24 VDC drive
- Controlled from a simple time switch to a computerized process control system such as PLC's
- In the retracted position, the electrode is retained in a chamber where it can be kept moist, cleaned and even calibrated.
- Two switches for reporting electrode position or for control of external instruments (pumps, magnetic valves)
- Fixed cable length 5 m.

Part no.	Description
10/237202	Weld-In Socket 15°, for armatures with o-ring at 25 mm
10/237290	Service Kit for Retractomatic
10/237230	Blind Plug for Weld-In socket
10/237239	Service Kit for Retractofit & Retractomaster
10/237240	Retractofit
10/237252	Pressure Adapter
10/237255	Insertion tube short for Retractofit/-matic
10/237260	Retractomatic
10/237278	Insertion tube closed for Retractofit/-matic
10/237338	Service Kit for Flexifit Bio & Retractofit Bio (FDA)
10/237339	Kalrez Kit for Retractofit, Retractomatic & Retractomaster
10/237440	Retractofit BIO OP = 25mm
10/237480	Retractofit BIO PEEK OP = 25mm
10/237490	Retractofit PEEK 25



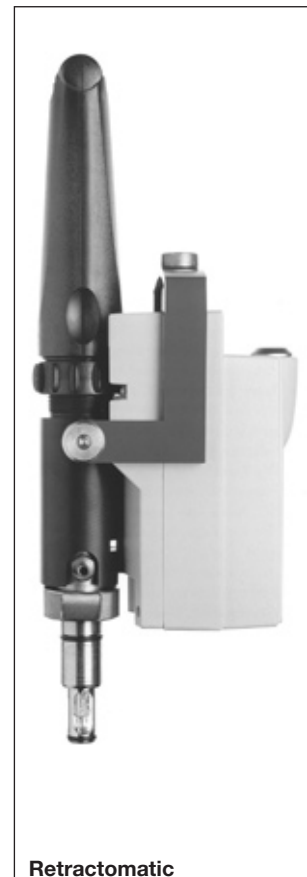
Retractofit



Retractofit PEEK



Retractofit Bio



Retractomatic

Masterfit and retractomaster

Suitable for applications where high accuracy or long-term stability is required in conjunction with liquid electrolyte electrodes. Such electrodes must be pressurized to ensure flow of the electrolyte solution. The retractable version can be used when cleaning or recalibration during the process is desirable.

The armatures allow electrodes to be mounted on pipe work or tanks with a weld-in socket. There are no awkward flat seals for sealing the armature. Large windows allow visual inspection of the electrolyte level in the installed electrode. Both armatures have an integrated manometer into the housing to easily check for the pressure. All O-rings are easily replaced without special tools.

Additional feature Masterfit

- Temperature range: -10°C to 130°C
- Maximum pressure: 6 bar
- Suitable for all electrodes with electrolyte reservoir with shaft length 250mm.
- Mechanical connection 1 1/4
- Fitted with a tension lever that allows a slow release of the pressure
- Three stainless steel pins protect the electrode tip from damage
- Available in three insertion depths for vessels or fermenters of different wall thicknesses.

Part no.	Description
10/237200-OP	Masterfit 120
10/237225-OP	Masterfit 150
10/237235	Masterfit 200
10/237245	Masterfit 250
10/237252	Pressure Adapter
10/237320	FlexiFlange (1-1/2" fange, wetted parts PTFE)
10/237910	Flange-Adapter for Masterfit 120 with 150'-a-length electrodes
10/237229	Service Kit for Masterfit
10/237319	Kalrez Kit for Flexifit & Masterfit

Additional feature Retractable

- Suitable for applications in which liquid electrolyte electrodes must be used and cleaning or recalibration during the process is desirable.
- The armature is very easy to use and maintain. Only one press of the red button is needed to move the electrode into or out of the process.
- In the retracted position, the electrode is retained in a chamber where it can be kept moist, cleaned and even calibrated. This can all be done without process interruption or disassembly of the armature. Two tube connectors allow access to the rinsing chamber.

Part no.	Description
10/237255	Insertion tube short for Retractablefit/-matic
10/237278	Insertion tube closed for Retractablefit/-matic
10/237930	Flange flowthrough cell PFA
10/237202	Weld-In Socket 15°, for armatures with o-ring at 25 mm
10/237230	Blind Plug for Weld-In socket
10/237213	Glass cylinder Masterfit



*Please specify the desired O-ring position (OP) in your order.

Sanitary Non-Retractable Armatures

Maintenance-free sensors with a standard 12 x 120 mm design and PG 13.5 thread will fit perfectly. Steam sterilizable, autoclavable and CIP compatible cleaning are possible with the sanitary design. The materials used are SS DIN 1.4435 (SS 316) and the EPDM O-rings are FDA approved.

Additional features Flexifit VV

- Temperature range: -10°C to 130°C
- Maximum pressure: 6 bar
- Suitable for Tuchenhagen VARIVENT sanitary process connections.
- The 15° version might be used for classic sensors with the need for vertical mounting of the connector head
- The 0° version is ideal when using Hamilton electrodes for up-side-down mounting

Additional features Flexifit TC

- Designed for mounting on TriClamp 1.5" process connections.
- The short immersion depth makes this armature perfect for small flow-through cells.
- Good sensor protection with 3 protection rods

Additional features Flexifit Bio

- G1 1/4" process connection
- The surface quality is N5 (Ra = 0.4 µm) electropolished.
- The armature comes with a material certificate.
- Good sensor protection with 3 protection rods
- Good sanitary design (easy cleaning and no sensor clogging).

Additional features Flexi Flow SL 10

- Flowthrough armature
- Swagelok process connectors
- Materials: D1.4435 and O-rings of FDA-EPDM

Part No.	Description
10/237202	Weld-In Socket 15°, for armatures with o-ring at 25 mm
10/237219	Service Kit for Flexifit
10/237230	Blind Plug for Weld-In socket
10/237331-OP	Flexifit BIO
10/237338	Service Kit for Flexifit Bio & Retractofit Bio
10/237340	FlexiFlow SL 10 (flow cell for 120 mm sensors with 10mm Swagelog connectors)
10/237344	Flexifit VV-0
10/237345	Flexifit VV-15
on request	Flexifit BIO 225
on request	Flexifit BIO 325

* Please specify the desired O-ring position (OP) in your order.



Flexi Fit VV-0



Flexi Fit VV-15



Flexi Flow SL10



Flexi Fit Bio



Flexi Flow SL 10

Cables for Industrial Applications, type WU20D

When you need optimal pH or Redox measuring results, the complete measuring loop not only requires highly qualified sensors and transmitters but also the special purpose sensor cables.

The program of Yokogawa includes a range of high quality, low-noise cables for accurate transmission of low voltage signals even in areas where interference is present. They have a shield with an internal anti-noise sheath and can be connected to all pH and ORP (Redox) electrodes fitted with an O-connector. At the electrode end the cables are provided with a socket having spring gilded contacts for secure connection to the sensor. The combination electrode plug and cable socket is watertight and temperature resistant up to 125°C. It meets the requirements of IP 65.

Features

- Internal anti-noise sheath for accurate measurement.
- Gold plated spring O-connectors parts, for good electrical contact under the most severe conditions.
- Coaxial plug and socket with watertight sealing that meets the requirements of IP 65.
- Cables for industrial appl. and for laboratory use are available.

Coax Cables

These cables are for connecting to **single or combined** sensors fitted with an O-plug. For use at higher temperature specifications (up to 110°C continuously or 125°C for short times) and the most severe conditions.

Triax Cables

These cables are for connecting to **combined** sensors fitted with an O-plug or to **single** sensors with an O-plug for use in areas where electrical interference is present. They have both inner, and outer shielding. In areas where electrical interference is likely we recommend to use the Triax electrode cable type WU20D-LT. marked with a blue strip.

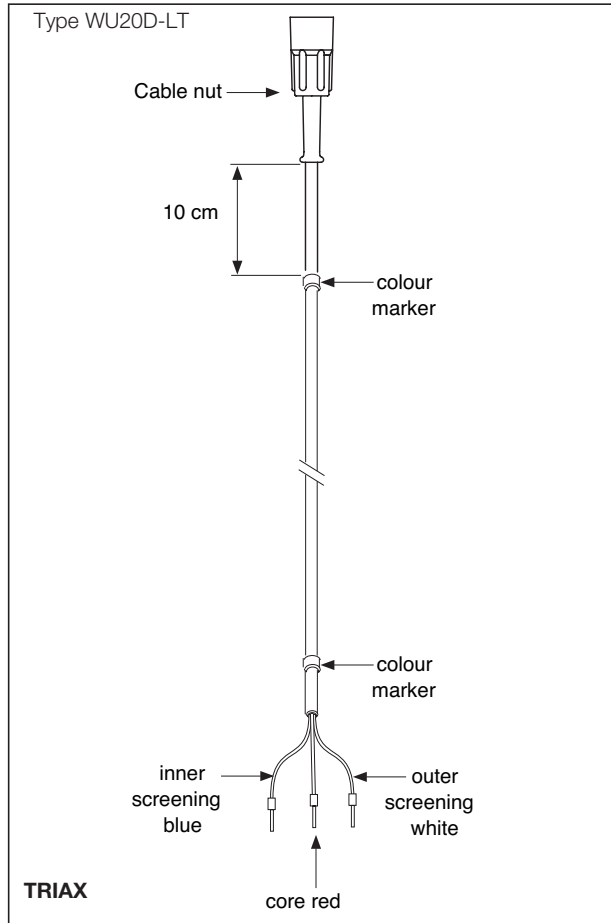
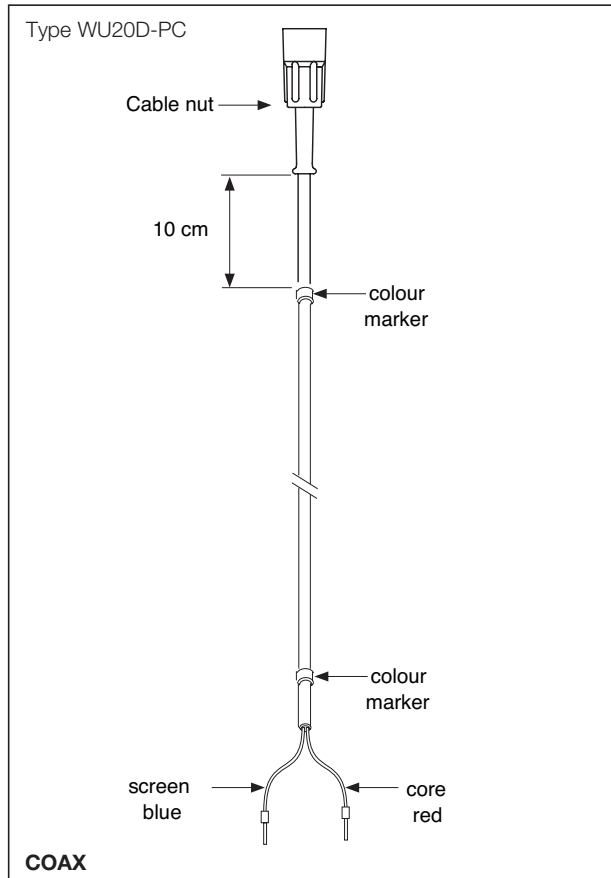
Notes:

1. For industrial applications the cables can be colour coded with the following marks:
 - Measuring electrode: red
 - Reference electrode: yellow
 - Temperature electrode: green
 - Combined electrode: blue

Adhesive markers are provided for this purpose and should be fitted to both ends of the cables.
2. To secure optimal conditions, the cables may not be damaged or shortened. For protection of the cables there are special hoses available of 5 or 10 mtr. (K1500CJ, K1500CK respectively)
3. Suitable for use in intrinsically safe areas.

Specifications

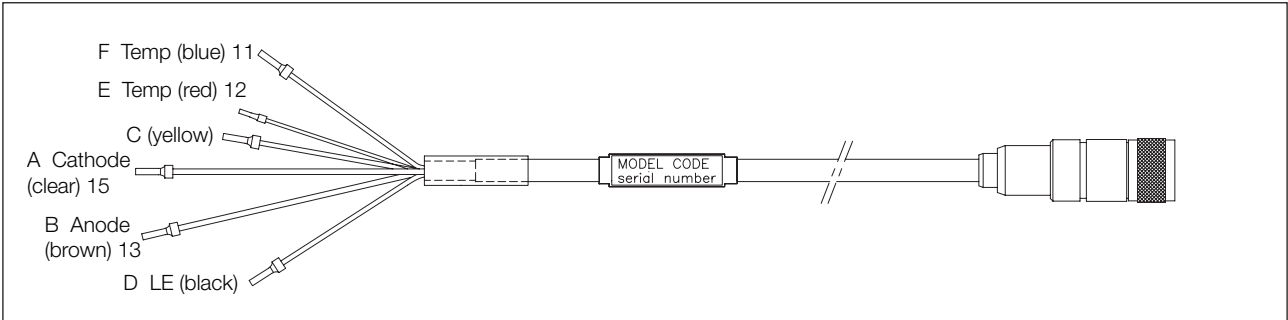
Bending radius	: min. 50 mm
Max. temperature	:
- type WU20D-PC	: 110°C (continuously) 125°C (for short times)
- type WU20D-LT	: 70°C (continuously)
Wire connections	: 2 mm contact pins



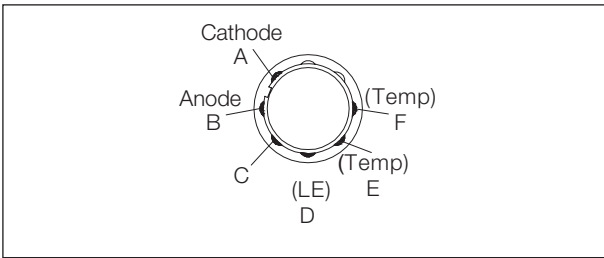
Cables for Industrial Applications

- Internal anti-noise sheath for accurate measurement.
- Gold plated spring O-connectors parts, for good electrical contact under the most severe conditions.
- Coaxial plug and socket with watertight sealing that meets the requirements of IP 65.
- Cables for industrial appl. and for laboratory use are available.

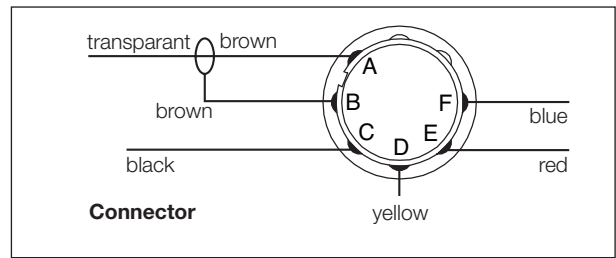
Dimensions



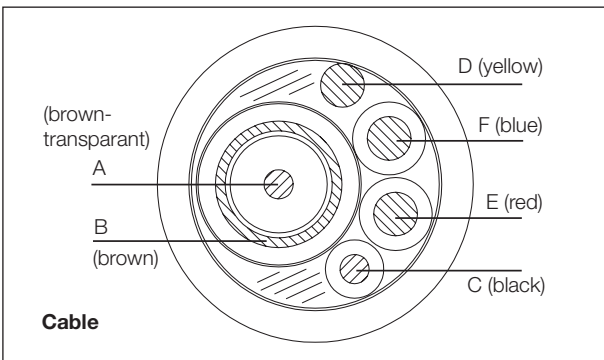
Connector lay out



Connector wiring



Cable lay out



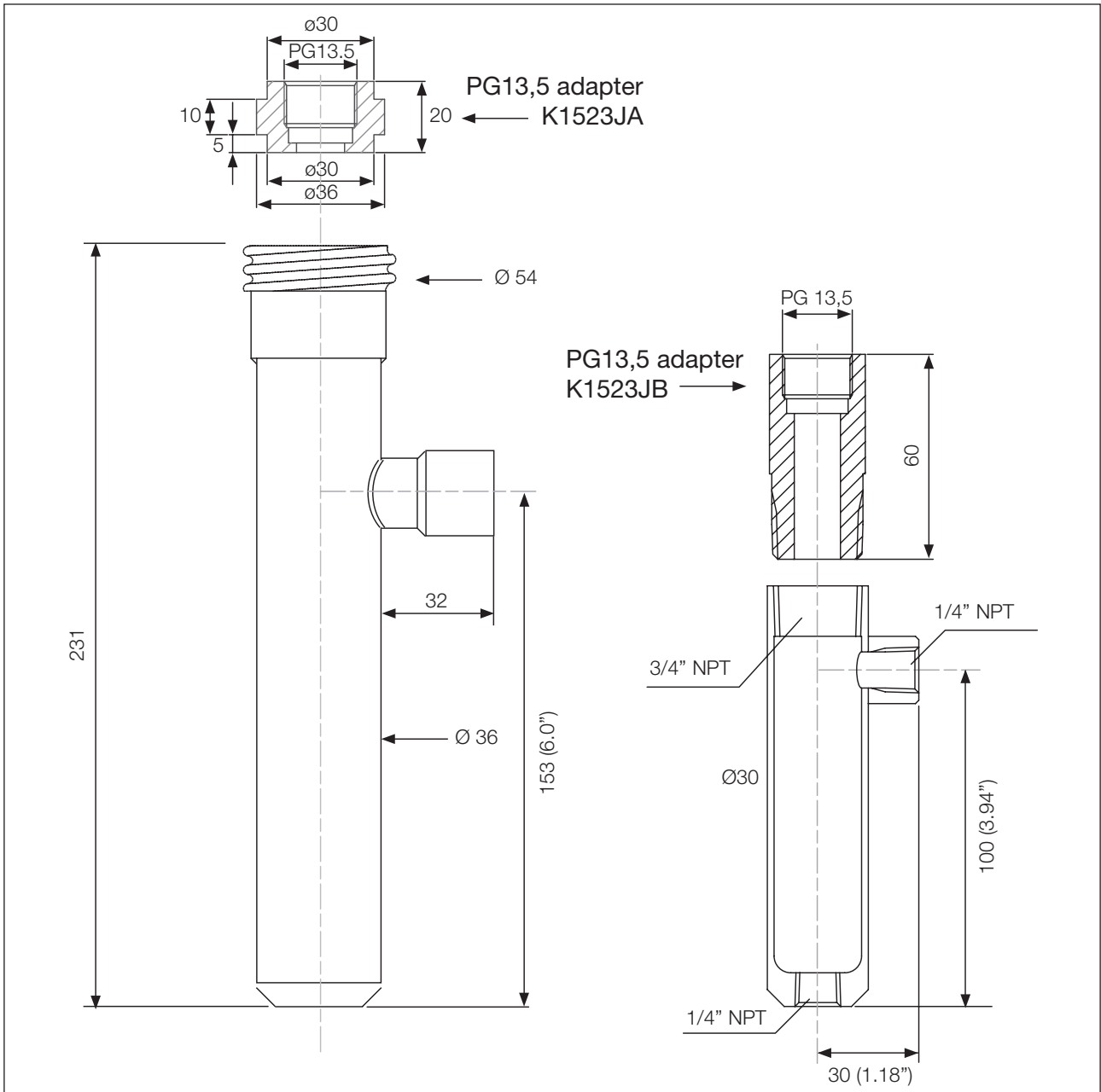
Plugs for weld-in sockets
 Enables weld-in sockets to to be capped when the armature is removed. Seals at 25 mm. Other dimensions on request!



Model and Suffix codes

Model	Suffix Code	Description
WU10		Universal sensor cable
Connector type	-V	Variopin
Cable type	-S	Single Coax
Cable length	-03	3 meters
	-05	5 meters
	-10	10 meters
	-15	15 meters
	-20	20 meters

Model	Suffix code	Description
WU20D		Electrode cable
Type	-PC	COAX
	-LT	TRIAX
Length in m	01	1 mtr
	02	2 mtr
	05	5½ mtr
	10	10 mtr
	15	15 mtr
	20	20 mtr
	25	25 mtr



Flow fitting FF40
with K1523JA: Adapter to fit sensors with a PG13,5
process connection in FF40/FS40 and FD40 fittings.
Material: Polypropylene

Flow fitting option /FF K1598AC (incl. 3.1 B certificate)
with Adapter K1523JB to fit sensors with PG13,5 process
connection

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