Data sheet DS/TBX5–EN Rev. E

TB(X)5 Series
pH/Redox (ORP) sensors for process monitoring

The most durable pH/Redox (ORP) sensors in the world

Next Step™ Solid State reference
— eliminates poisoning, pumping and plugging

Advantage™ Series with solution ground rod
— permits continuous sensor diagnostics

Comprehensive selection of measuring electrodes
— sensors designed to suit all application requirements

Combination style construction
— measuring, reference and temperature elements, all in one compact body

Insertion, submersion, flow-through and hot-tap
— increases flexibility of installation

Integral potted cable
— no in-process high impedance connections

Comprehensive selection of wetted materials
— assures compatibility with design, budget and process

Operating temperatures up to 140°C (284°F)
— the highest glass temperature limit on the market

Operating pressures up to 21 bar (300 psi) and higher
— the highest pressure limit on the market

The Most Durable pH/Redox (ORP) Sensors in the World

A well deserved reputation for ruggedness, longevity and accuracy hallmark the TB(X)5 Series pH/Redox sensors. The sensors are easily applied to most industrial measurement needs. They are renowned for their ability to outperform conventional sensors in the industries' toughest process applications.

Solid-state Next Step™ reference technology is the foundation for all TB(X)5 Series electrodes. The totally solid inner reference chamber is charged with potassium chloride (KCl). This non-liquid reference all but eliminates poisoning, plugging and pumping problems that plague conventional liquid, slurry and gel designs.

The Next Step Advantage™ series incorporates a solution ground rod that enables sensor diagnostics.

All measurement functions are combined in one compact body: reference, measuring electrode, temperature sensor and ground rod. Using an integral potted cable, a completely sealed assembly is provided without in-process high impedance connections.

These advances in reference design, combined with superior glass electrode technology, result in an industrial sensor with unequalled durability and flexibility.

Wide Variety of Sensors for Most Industrial Applications

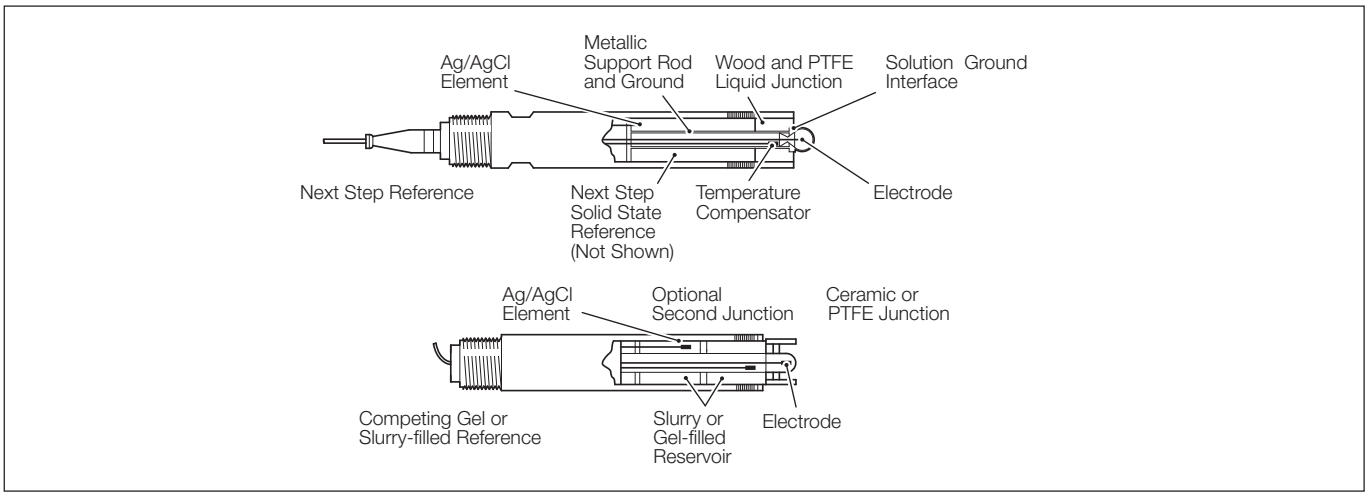
ABB offers a wide variety of standard sensors for most applications. These include variations in body style, measuring electrode type and shape, temperature compensator, junction type and shape and cable. Next Step Advantage™ sensors also allow choice of solution ground and O-ring materials.

Durable Electrodes

The TB(X)5 electrode design eliminates failures due to thermal stress caused by rapid temperature excursions. Unlike other sensors that use a large inner air bubble for expansion absorption, TB(X)5 electrodes use a unique inner plunger; providing more effective protection against temperature fluctuations.

The glass manufacturing process uses inoffensive components. The glass contains no barium, cobalt or uranium oxides. The impedance is low enough to maintain signal integrity, yet high enough to remain chemically durable with little or no sodium ion (Na^+) error.

The electrodes are available in several measuring element types ensuring greatest process optimization.



Sensor Construction

Electrode Types and Ratings

Code	Type	Description	Ratings			
			Range	Operating Temperatures		Impedance at 25°C (77°F)
				°C	°F	
1	Flat glass	High density duty with heavy fouling. Electrode flush with liquid junction. Low Na^+ error.	0 to 14pH	10 to 100	60 to 212 [1]	650MΩ
2	General purpose glass	For light to medium duty and lower temperature applications. Not for high pH.	0 to 12pH	0 to 100	32 to 212	200MΩ
5	Redox (ORP)	Platinum (Pt) element.	0 to ±2000mV	0 to 140	32 to 284	1kΩ
6	Antimony (Sb)	Metal pH electrode for abrasive or HF processes.	3 to 11pH	–20 to 80	–4 to 176	1kΩ
F	Fluoride/Acid	Resistant to etching by up to several percent HF and strong acids.	0 to 12pH	10 to 80 [2]	50 to 176 [2]	500MΩ
J	Coating resistant High temperature	Versatile and suitable for high and low pH, strong chemicals.	0 to 14pH	10 to 140	50 to 284	500MΩ

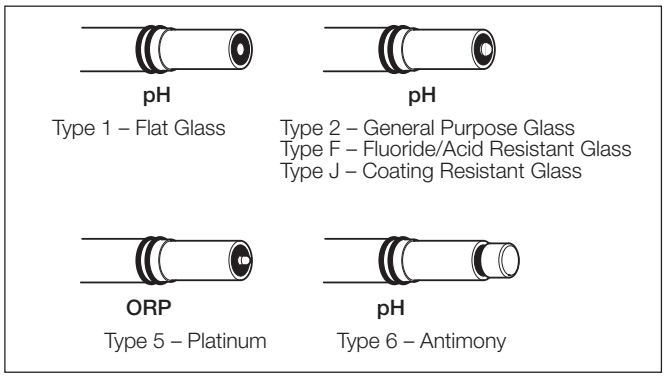
Notes. 1) 0 to 121°C (32 to 250°F) for sterilization cycles
2) 50°C (122°F) max. recommended for high HF concentration

Body Style

Sensor bodies are constructed of Kynar (PVDF) or Ryton (PPS). TB5 Series sensors use Solid-State Next Step™ references. The TB(X)5 Series denotes Next Step Advantage™ types with integral solution ground.

Sensor Models and Applications

Model Number		Body	Application
Solid-state Next Step™	Next Step Advantage™		
TB551	TBX551	PPS	In-line, Twist-lock, Submersion
TB556	TBX556	PVDF	In-line, Threaded, Submersion
TB557	TBX557	PVDF	Ball valve retractor, Hot-tap
TB561	TBX561	PVDF	In-line, Sterilizable
TB562	TBX562	PVDF	Sanitary, Sterilizable
TB564	TBX564	PVDF	High pressure retractor, Hot-tap
TB567	TBX567	PPS	In-line, High pressure



Electrodes Types

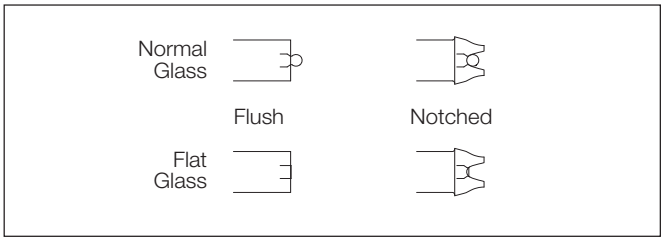
Reference Junction Styles

To promote TB(X)5 electrode process efficiency, reference junctions are available as either wood or PTFE, each also offered in flush or notched forms.

The hardwood junction is recommended for all general purpose duties particularly those requiring high resistance to coating. PTFE junctions are promoted for continuous processes over 11.0 pH or those containing known wood delignifiers such as strong caustics, bleaches and other oxidizers.

Flush junctions have no process protrusions and therefore supply excellent self-cleaning properties when used with flat glass and fitted at 90° in process pipelines.

Notched junctions provide an integral protection guard for normal bulb-style glasses and are especially suited for retractable and immersion sensors.



Junction Styles

Junction Styles

Style	Description	Application
Flush	Flush with end of sensor	In-line, heavy fouling processes
Notched	Extends beyond junction providing electrode protection	Hot-tap (ball-valve) and immersion sensors

Reference Junction Selection

Sensor TB(X)	Flush			Notched		
	Wood	PTFE	Electrodes	Wood	PTFE	Electrodes
551	✓	✓	1, 2, 5, 6, F, J	✗	✗	✗
556	✓	✓	1, 6	✓	✓	1, 2, 5, F, J
557	✓	✓	1, 6	✓	✓	1, 2, 5, F, J
561	✓	✓	1, 5, F, J	✓	✓	1, 5, F, J
562	✓	✓	1, 2, 5, F, J	✗	✗	✗
564	✓	✓	6	✓	✓	2, 5, F, J
567	✓	✓	2, 5, 6, F, J	✗	✗	✗

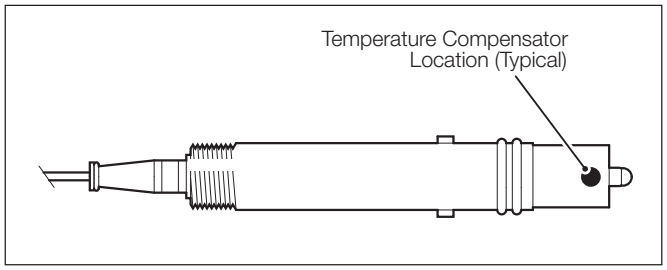
Note. ✓ = Valid selection ✗ = Invalid selection

Temperature Compensation

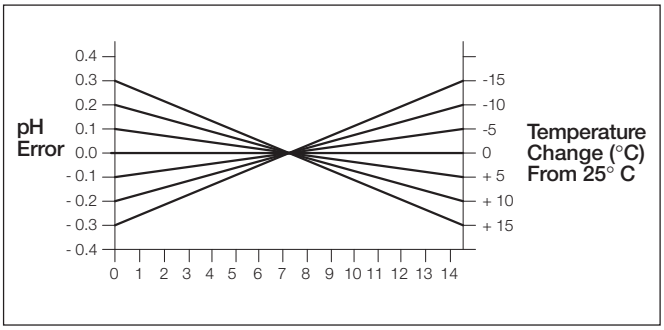
Temperature compensators enable analyzers to adjust for temperature effects on the glass pH electrode output (Nernst). Selected analyzers can also use this measurement to compensate for solution pH temperature effects.

Sensors can be ordered with integral temperature sensors or as external units.

The integral temperature compensator is available in two forms; Balco 3k and Pt100.



Integral Temperature Compensator



pH Error without Temperature Compensation

Cable Options

TB(X)5 sensors offer complete flexibility of cabling options throughout the range. All cables are potted inside the sensor ensuring environmental protection.

The standard cable length for most sensors is 1.5m (5 ft.). However, cables can be supplied as any continuous size up to 9m (30 ft.).

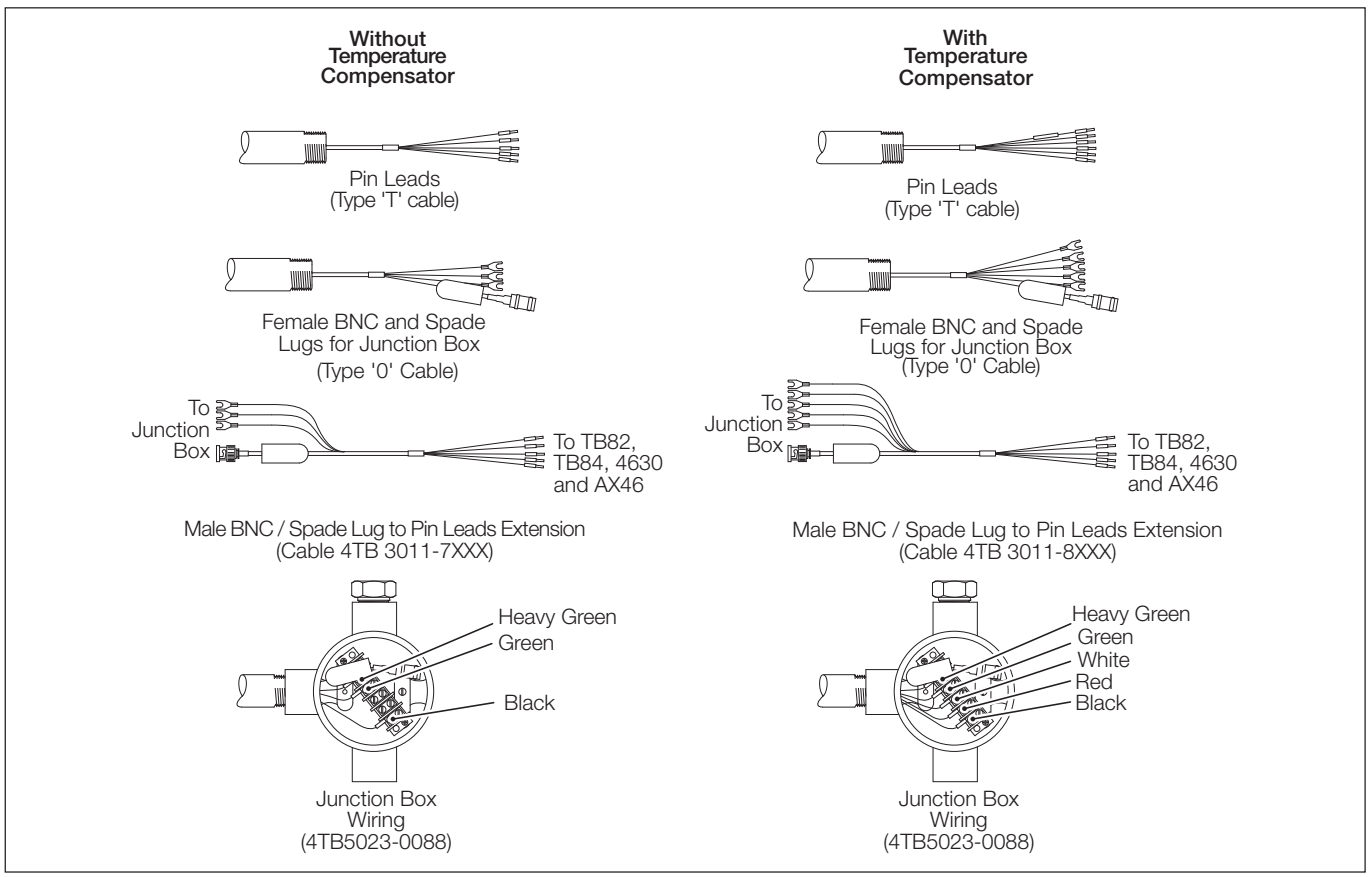
Standard accessories include junction boxes and submersion (immersion) couplers, typically used with extension cables for direct connection to ABB-TBI instruments.

Extension cables also permit distances between sensor and instrument of up to 30m (100 ft.) without external preamplifier.

A BNC/TC to pin terminal adapter is available for connection to TB82, TB84, 4630 and AX46 Series instruments.

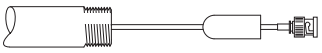
Sensors with pin terminals are selected with code option 'T'.

Next Step Advantage Sensor Cables and Junction Box Wiring (TBX5 Models)



Solid State and Next Step Reference Sensor Cables and Junction Box Wiring (TB5 Models)

Without Temperature Compensator

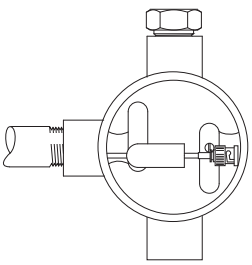


Male BNC
Type 'F'
cable

Pin Leads
Type 'T'
cable

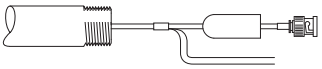
Extension Cable
(Cable 4TB3011-1XXX)

Pin Extension Cable
(Cable 4TB3011-3XXX)

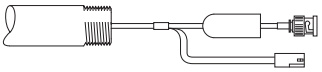


Junction Box Wiring
(4TB5023-0162)

With Temperature Compensator

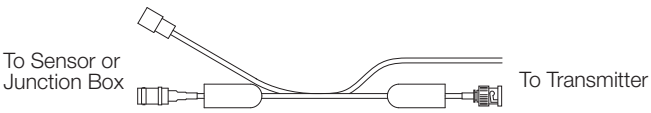


Male BNC and Tinned
Temperature Compensator Leads
Type 'F' cable

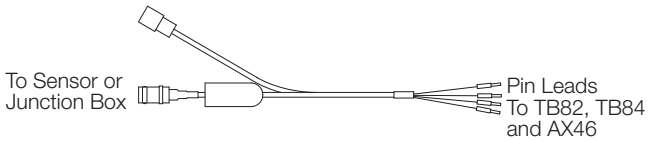


Male BNC and Extension
Cable Connector on
Temperature Compensator Leads
Type 'F' cable

Pin Leads
Type 'T' cable



Female BNC to Male BNC Extension
with Temperature Compensator
Connector to Tinned Leads
(Cable 4TB 3011-2XXX)



Pin Lead Extension
with Temperature Compensator Connector
(Cable 4TB3011-4XXX)

Note.
Junction box supplied without cable glands 4TB9515-0165
for use with conduit.

Models TB551 & TBX551 Ryton Sensors

Models TB(X)551 sensors are in-line flow-through or submersible (immersion), general purpose, twist-lock style sensors. The sensor body is molded from chemically resistant Ryton (PPS).

The sensor can be adapted to 1 in. fittings by either a threaded Ryton receptacle or a twist-lock receptacle. The twist-lock receptacle is available in Kynar (PVDF) or stainless steel.

Optional electrode guards protect the electrode in submersion (immersion) applications.

Models TB(X)551 Ryton Sensors

Specification

Applications

In-line, flow-through, submersible (immersion)

Max. pressure/temperature

690kPa (100 psi) at 140°C (284°F)

Features

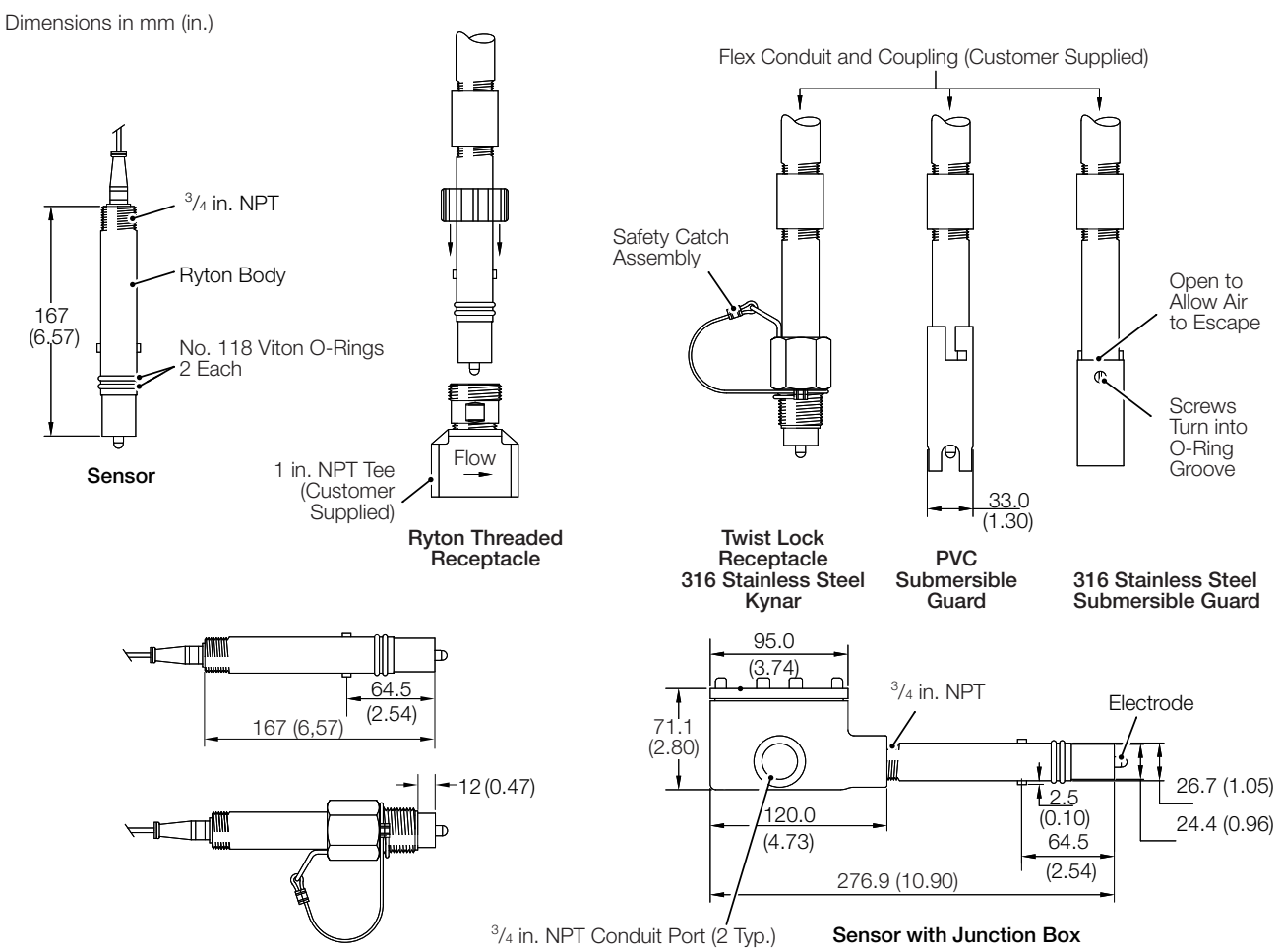
Low cost, universal type.

Adapter for twist-lock, or threaded-cap, insertion

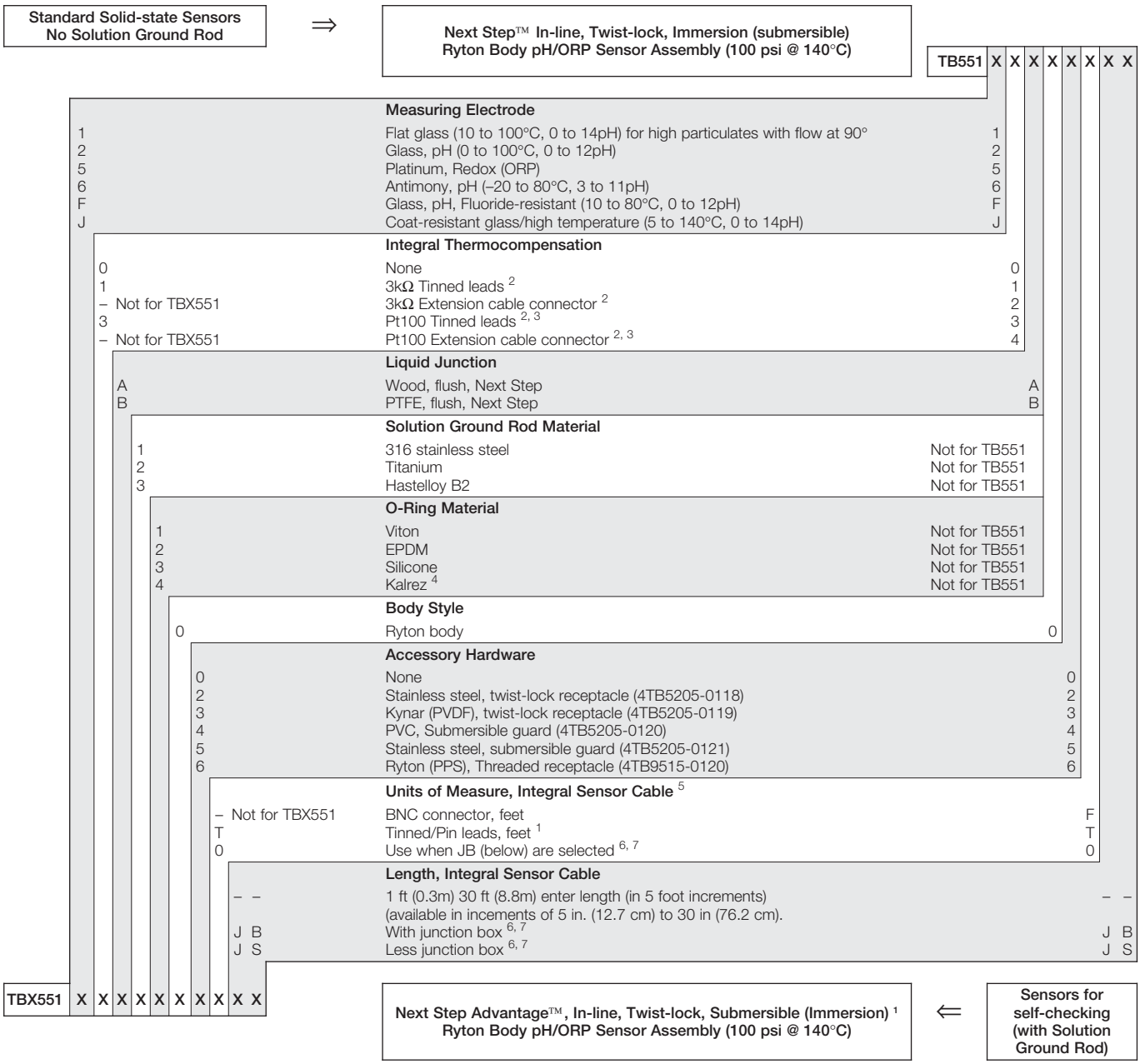
Material

Body	Ryton (Polyphenylene Sulphide)
Junction	Wood or PTFE
Junction types	Flush

Overall Dimensions – Models TB(X)551



Ordering Information – Models TB(X)551



Notes.

1) For direct connection to TB82, TB84, 4630/35 and AX46 transmitters or other supplier devices, using terminal blocks.
2) Not available for Platinum, Redox (ORP), or Antimony, pH, electrodes (codes 5 & 6).
3) Not available for fluoride-resistant electrodes (code F). Compatible with TB82, TB84, 4630/35 and AX46 instruments.
4) Kalrez O-rings only for solution ground sleeve. External O-rings are Viton. External Kalrez O-ring kits available separately.
5) TB551 only. There are 2 options to connect to TB82 or TB84 transmitters:

   Option 1 – use BNC/TC to PIN adapter with conduit fitting or BNC/TC to PIN adapter. In either case temperature compensator code must be 2 or 4.

   Option 2 – select T in integral cable code, not designed for use with extension cables or junction box.
6) TB551: junction box mounted on sensor. Cable length approx. 102mm (4 in.). Requires extension cable.
7) TB(X)551: when selecting JB or JS, cable length is approx. 102mm (4 in.). Requires extension cable. If junction box is ordered separately and longer cable lengths are required, enter length under code for integral cable.

Models TB556 & TBX556 Kynar Sensors

Models TB(X)556 Sensors are threaded style sensors suitable for submersion (immersion) and insertion into the process pipes.

Mounting thread size is 3/4 in. NPT.

The sensor is available in several insertion lengths from the standard 40mm (1.5 in.) to a maximum of 127mm (5 in.).

The sensor body is molded from chemically resistant Kynar (PVDF).

Models TB(X)556 Kynar Sensors

Specification

Applications

3/4 in. NPT process connection, In-line, submersion (immersion)

Max. pressure/temperature

690kPa (100 psi) at 80°C (176°F)
276kPa (40 psi) at 140°C (284°F)

Material

Body	Kynar (PVDF) as standard
Junction	Wood or PTFE
Junction types	Flush (Antimony and flat glass only)
	Notched (recommended)

Flow-through

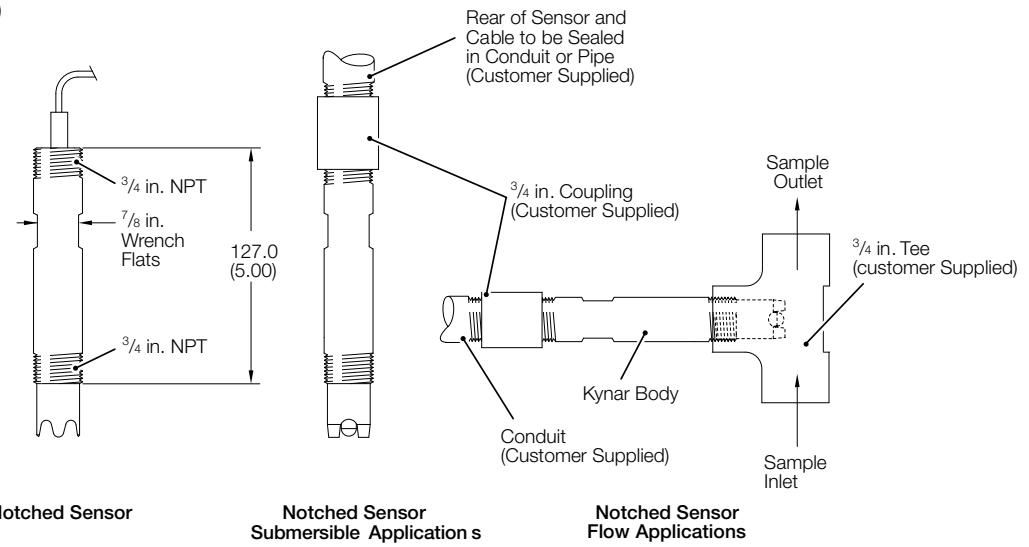
Specify insertion depth in code

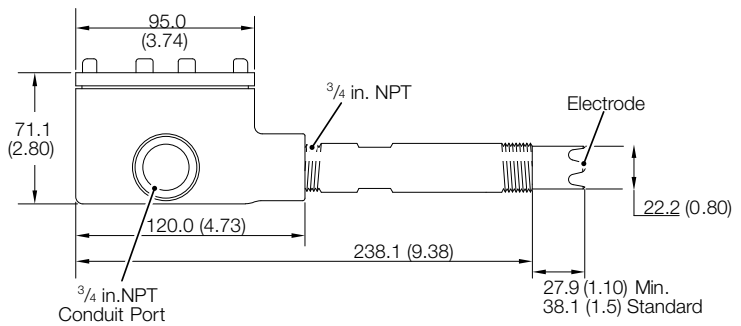
Submersion/Immersion

With notched junction

Overall Dimensions – Models TB(X)556

Dimensions in mm (in.)





Note.
27.9mm (1.1 in.) insertion depth not available on TBX Advantage sensors with solution grounds

Ordering Information – Models TB(X)556

Standard Solid-state Sensors No Solution Ground Rod ⇒ **Next Step™ In-line, Threaded, Submersible (Immersion) Kynar Body pH/ORP Sensor Assembly (40 psi @ 140°C; 100 psi @ 90°C)**

TB556 X X X X X X X X

Measuring Electrode

1	Flat glass (10 to 100°C, 0 to 14pH) for high particulates with flow at 90° [1]	1
2	Glass, pH (0 to 100°C, 0 to 12pH)	2
5	Platinum, Redox (ORP)	5
6	Antimony, pH (–20 to 80°C, 3 to 11pH) [1]	6
F	Glass, pH, Fluoride-resistant (10 to 80°C, 0 to 12pH)	F
J	Coat-resistant glass/high temperature (5 to 140°C, 0 to 14pH)	J

Integral Thermocompensation

0	None	0
1	3kΩ Tinned leads [2]	1
Not for TBX556	3kΩ Extension cable connector [2]	2
3	Pt100 Tinned leads [2, 3]	3
Not for TBX556	Pt100 Extension cable connector [2, 3]	4

Liquid Junction

A	Wood, flush, Next Step reference [4]	A
B	PTFE, flush, Next Step reference [4]	B
D	Wood, notched, Next Step reference [5]	D
E	PTFE, notched, Next Step reference [5]	E

Solution Ground Rod Material

1	316 stainless steel	Not for TB556
2	Titanium	Not for TB556
3	Hastelloy® B2	Not for TB556

O-Ring Material

1	Viton®	Not for TB556
2	EPDM	Not for TB556
3	Silicone	Not for TB556
4	Kalrez®	Not for TB556

Body Style

0 0	Submersible (Immersion) probe [6]	0 0
– – Not for TBX556	1.1 in. Insertion depth	1 1
1 5	1.5 in. insertion depth	1 5
5 0	5.0 in. insertion depth	5 0

Integral Sensor Cable [7]

– Not for TBX556	BNC connector, feet	F
T	Tinned/Pin leads, feet [8]	T
0	Use when JB (below) are selected [9, 10]	0

Length, Integral Sensor Cable

– –	1 ft (0.3m) to 30 ft (8.8m) enter length (in 5 foot increments)	– –
J B	With junction box [9, 10]	J B
J S	Less junction box [9, 10]	J S

TBX556 X X X X X X X X X X

Next Step Advantage™, In-line, Threaded, Submersible (Immersion) Kynar Body pH/ORP Sensor Assembly (40 psi @ 140°C 100 psi @ 90°C) ⇐ **Sensors for self-checking (with Solution Ground Rod)**

Notes.

1) Antimony pH electrodes supplied only with flush junctions (codes A & B).
2) Not available for, Redox (ORP), or Antimony, pH, electrodes (codes 5 & 6).
3) Not available for fluoride-resistant electrodes (code F). Compatible with TB82, TB84, 4630/35 and AX46 instruments.
4) Flush junctions for flat glass pH and Antimony electrodes only (codes 1 & 6).
5) Notched junctions not available for Antimony electrodes.
6) Manufactured as 1.5 in.depth, includes cable strain relief.
7) There are 2 options to connect TB556 to TB82 or TB84 transmitters:

   Option 1 – use BNC/TC to PIN adapter with conduit fitting or BNC/TC to PIN adapter. In either case temperature compensator code must be 2 or 4.

   Option 2 – select T in integral cable code, not designed for use with extension cables or junction box.
8) For direct conection to type TB82, TB84, 4630/35 and AX46 transmitters, or other supplier devices, using terminal blocks.
9) TB556: junction box or submersible (immersion) connector mounted on sensor. Cable length approx. 102mm (4 in.). Requires extension cable for Temperature compensator code must be 0, 2 or 4.
10) TB(X)556: junction box mounted on sensor. Cable length approx. 102mm (4 in.). Requires extension cable for connection to transmitter. If junction box is ordered separately and longer cable lengths are required, enter cable length in code for integral cable.

Models TB557 & TBX557 Hot-Tap Retractable Sensors

Models TB(X)557 sensors are hot tap, ball valve insertion sensors. They enable sensor maintenance or replacement without interrupting the process.

An integral safety anti-blowout lip is incorporated into the sensor design, preventing accidental sensor removal. Unlike chain restraints, this safety-by-design is an integral part of the sensors' construction.

The sensor is inserted through a standard 1½ in. or 1¼ in. full port ball valve. Ease of disassembly aids sensor replacement.

Connection to a ball valve is by compression fitting available in either hand-tight with 1¼ in. NPT threads or wrench-tight with 1 in. NPT threads.

Additional fittings enable the assembly to be flushed and drained in situ and uses a 1½ in. NPT threads for connection to the ball valve.

Models TB557 and TBX557 Sensors

Specification

Applications

Insertion, Hot-tap

Max. pressure/temperature

690kPa (100 psi) at 80°C (176°F)
276kPa (40 psi) at 140°C (284°F)

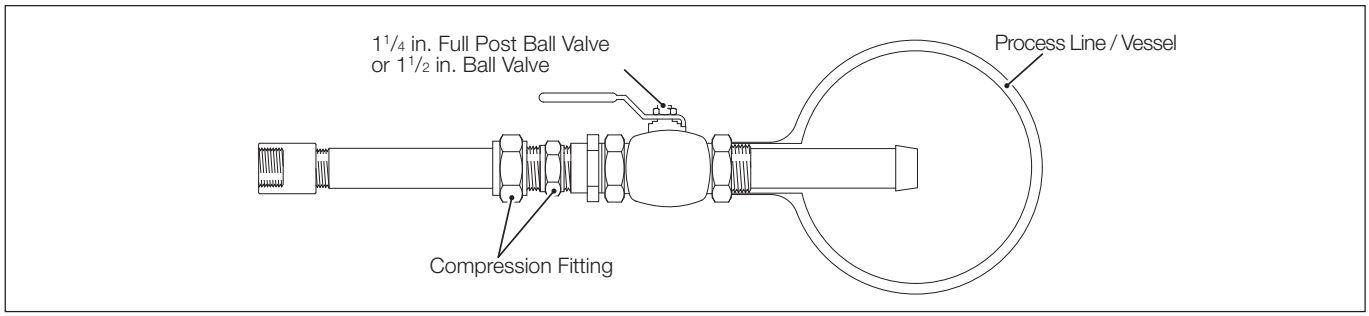
Features

Insert/retract without disturbing process flow
Replaceable electrode
Anti-blowout lip
No internal high-impedance connection

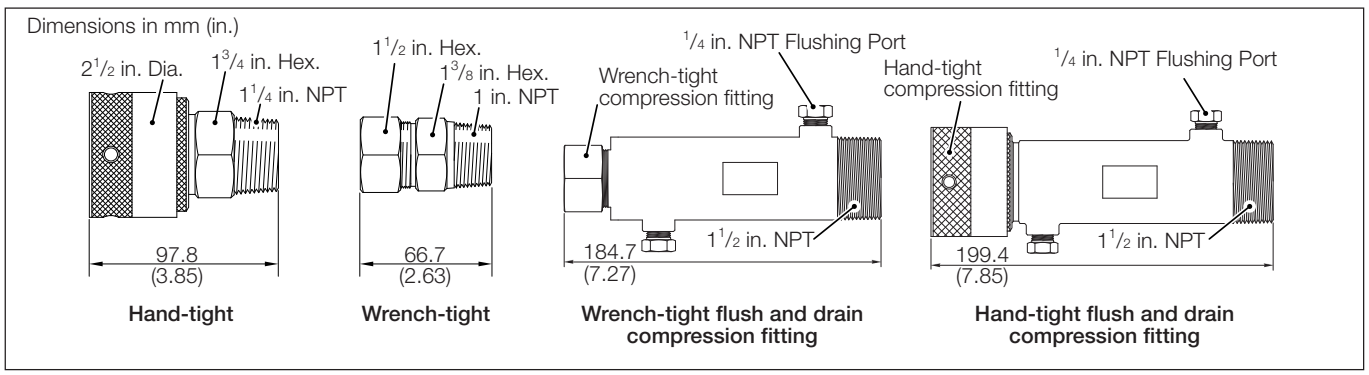
Material

Electrode Body	Kynar (PVDF) as standard
Sensor sheath variants	316 stainless steel
	Hastelloy or Titanium
External O-rings	Viton
Junction	Wood or PTFE
Junction types	Flush (Antimony only)
	Notched (recommended)
Lengths	Standard 400mm (16 in.)
	Maximum 910mm (36 in.)

Overall Dimensions – Ball Valve

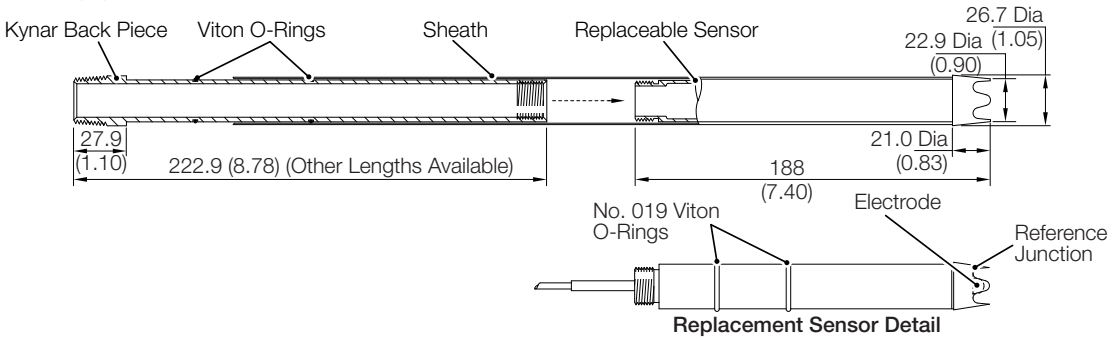


Overall Dimensions – Compression Fittings

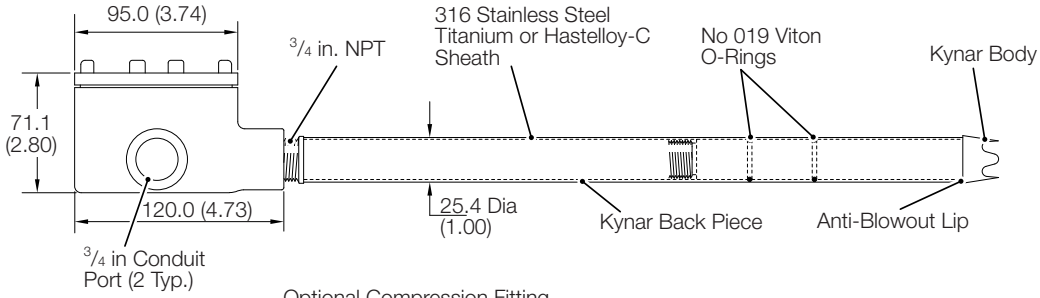


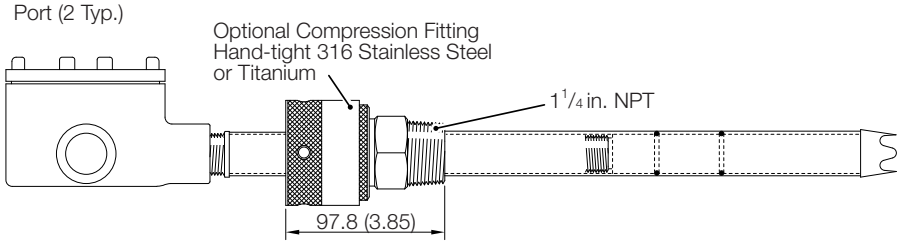
…Overall Dimensions – Models TB(X)557

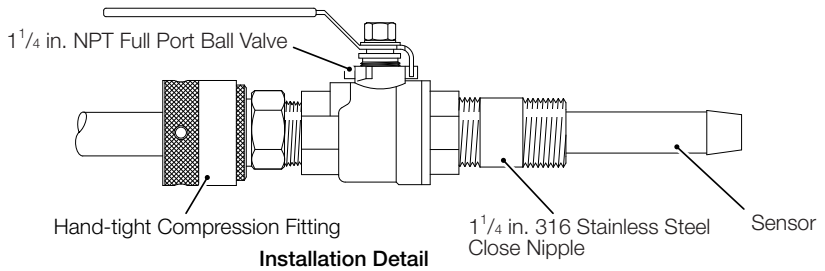
Dimensions in mm (in.)



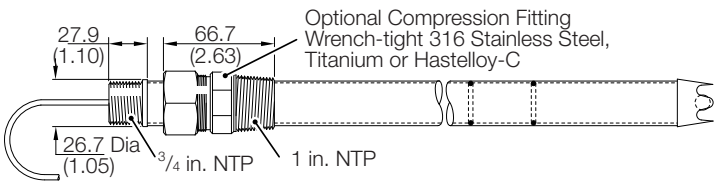
Replacement Sensor Detail

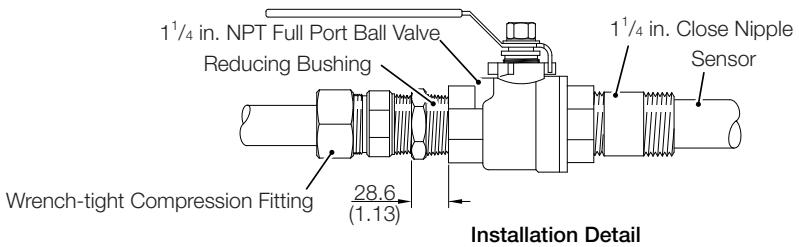






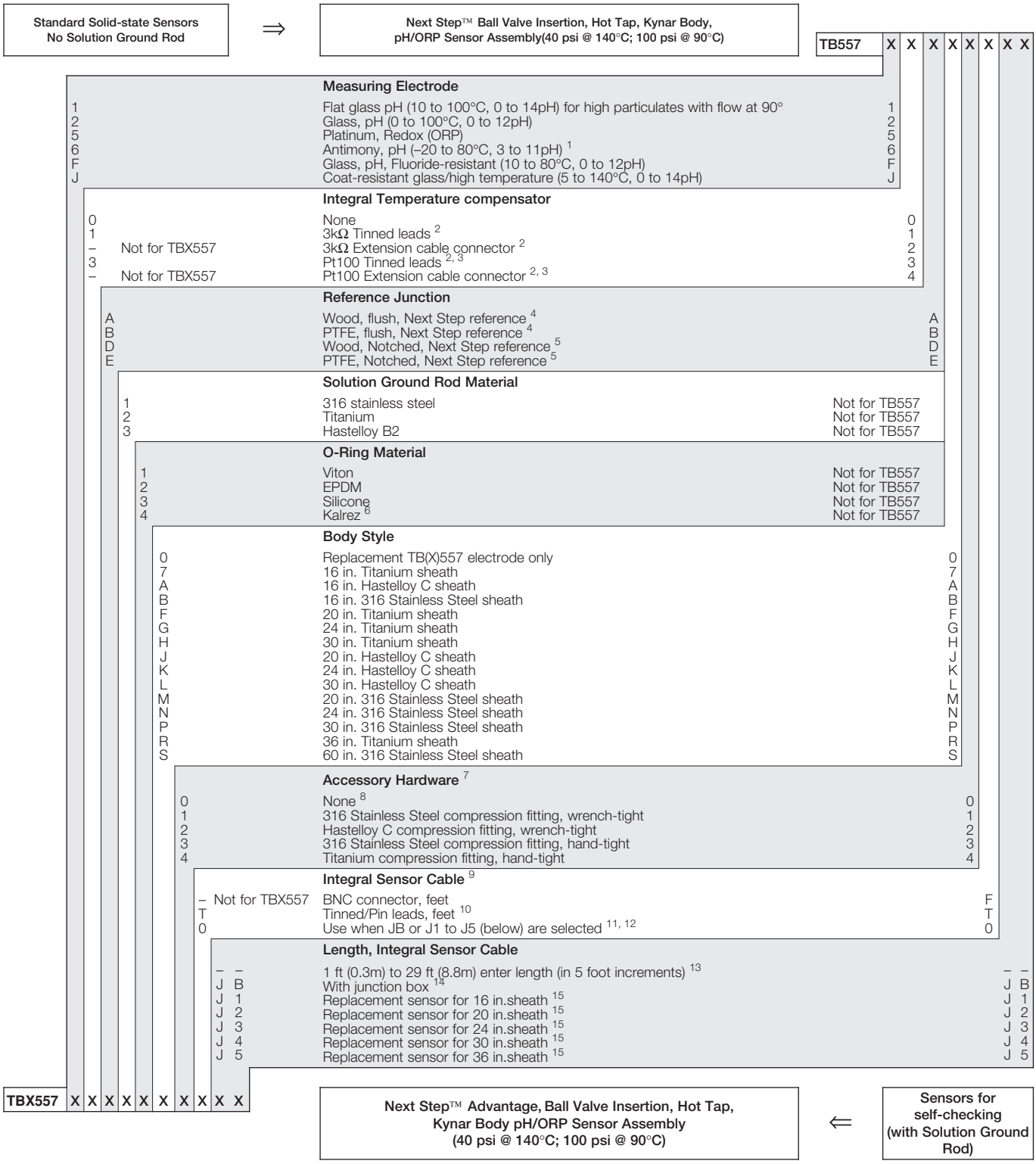
Installation Detail





Installation Detail

Ordering Information – Models TB(X)557



Notes.

1) Antimony pH electrodes supplied only with flush junctions (codes A & B).
2) Not available for, Redox (ORP), or Antimony, pH, electrodes (codes 5 & 6).
3) Not available for fluoride-resistant electrodes (code F). Compatible with TB82, TB84, 4630/35 and AX46 instruments.
4) Flush junctions for Antimony electrodes only (code 6).
5) Not available for Antimony electrodes (code 6).
6) Kalrez O-rings only for solution ground sleeve. External O-rings are Viton. External Kalrez O-ring kits available separately.
7) Standard hardware kits have Viton O-rings.
8) Applicable for all body styles. Mandatory for replacement sensors (code 0 in Body Style section).
9) There are 2 options to connect TB557 to TB82 or TB84 transmitters:

   Option 1 – use BNC/TC to PIN adapter with conduit fitting or BNC/TC to PIN adaptor. In either case temperature compensator code must be 2 or 4.

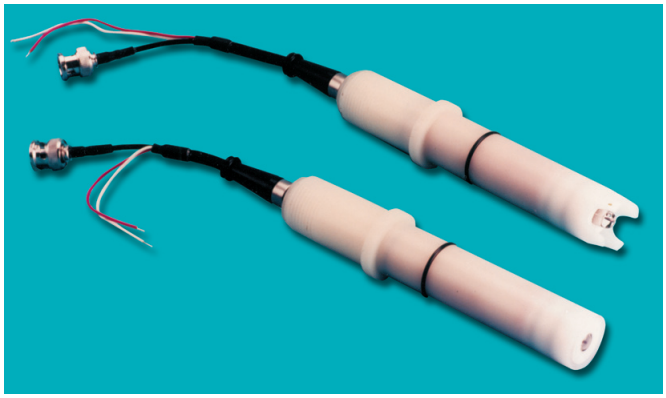
   Option 2 – select T in integral sensor code, not designed for use with extension cables or junction box.

10) For direct connection to type TB82, TB84, 4630/35 and AX46 transmitters, or other supplier devices, using terminal blocks.
11) TB557: junction box mounted on sensor. Cable length varies to match body length style. Order code for body style and accessory hardware anything except zero. Requires extension cable. Order code for temperature compensator must be 0, 2 or 4.
12) TB(X)557: junction box mounted on sensor. Cable length approx. 102mm (4 in.). Order code for body style and accessory hardware anything except zero. Code – # # # # # # # 0, J, B. Requires extension cable. If junction box is ordered separately and longer cable lengths are desired, enter cable length in integral sensor code.
13) Standard cable length of 4 ft (1.2m) as measured from rear of sensor assembly with 16 in. sheath only. Max. 29 ft (8.8m) cable only available with 16 in. sheath. Longer sheaths decrease length accordingly.
14) Applicable to sensors with junction boxes only.

Models TB561 & TBX561 Sterizable Sensors

Models TB(X)561 sensors are designed for sterilizable or in-line applications and for measurements in process vessels or lines requiring periodic sterilization or cleaning. They are also used in the TB18 Safe-T-Clean valve and 4TB9515-0190 stainless steel flow cell.

The sensors are available with a bushing and union nut but can also be retro-fitted into standard DN25 bushings with 0.983 in. to 0.995 in. internal diameters. All hardware required for use with the TB18 Safe-T-Clean or 4TB9515-0190 Flowcell is included with valve or Flowcell when purchased.



Models TB561 and TBX561 Sensors

Specification

Applications

Batch processing with steam or chemical sterilization, fermenters, glass-lined reactors, pharmaceuticals, food and beverage

Max. pressure/temperatures

690kPa (100 psi) at 90°C (176°F)
448kPa (65 psi) at 121°C (250°F)
276kPa (40 psi) at 140°C (284°F)

Material

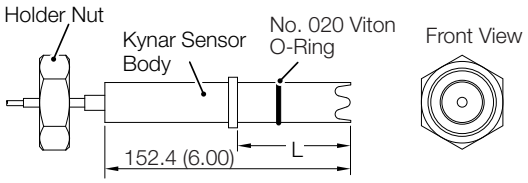
Electrode body	Kynar (PVDF) as standard
Junction	Wood or PTFE
Junction types	Flush
	Notched

Insertion depths

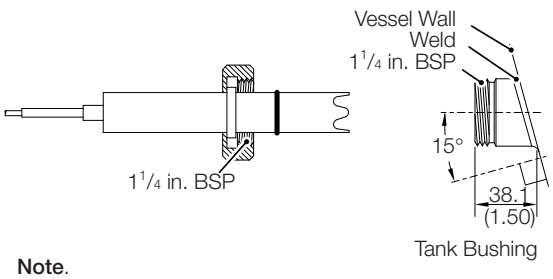
70mm, 100mm, 150mm or 200mm
(100mm required for TB18 Safe-T-Clean valve and Flowcell)

Overall Dimensions – Models TB(X)561

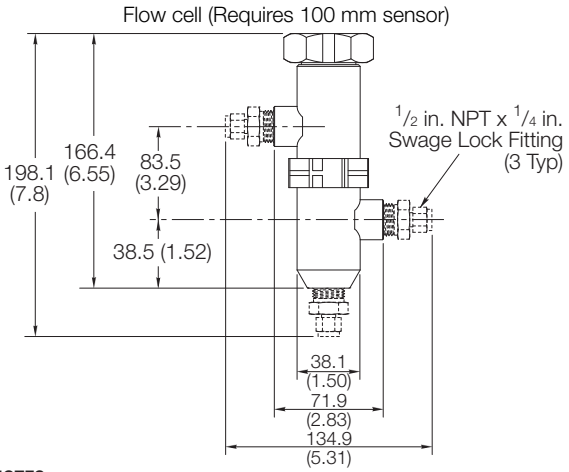
Dimensions in mm (in.)



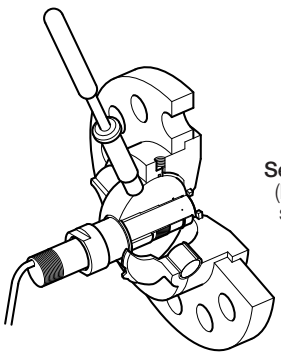
Order Code 070:L = 70.0 (2.76)
Order Code 100:L = 100.0 (3.94)
Order Code 150:L = 150.0 (5.91)
Order Code 200:L = 200.0 (7.87)



Note.
Holder nut slides over sensor and threads onto tank bushing



NOTES.
1. DASHED LINES REPRESENT DIMENSIONS OF FLOW CELL KIT WITH SWAGE LOCK FITTINGS.
2. FLOW CELL KIT WITHOUT SWAGE LOCK FITTINGS 4TB9515-0223
   FLOW CELL KIT WITH SWAGE LOCK FITTINGS 4TB9515-0190



Safe-T-Clean Sensor Valve TB18
(Requires 100mm sensor with flush liquid junction)

Ordering Information – Models TB(X)561

Standard Solid-state Sensors No Solution Ground Rod ⇒ **Next Step™ Sterilizable Kynar Body pH/ORP Sensor Assembly (65 psi @ 121°C)**

TB561 X X X X X X X X X

Measuring Electrode

1	Flat glass (10 to 100°C, 0 to 14pH) for high particulates with flow at 90°[8]	1
2	Glass, pH (0 to 100°C, 0 to 12pH)	2
5	Platinum, Redox (ORP)	5
F	Glass, pH, Fluoride-resistant (10 to 80°C, 0 to 12pH)	F
J	Coat-resistant glass/high temperature (5 to 140°C, 0 to 14pH)	J

Integral Temperature Compensator

0	None	0
1	3kΩ Tinned leads [2]	1
Not for TBX561	3kΩ Extension cable connector [2]	2
3	Pt100 Tinned leads [2]	3
Not for TBX561	Pt100 Extension cable connector [2]	4

Reference Junction

A	Wood, flush, Next Step	A
B	PTFE, flush, Next Step	B
D	Wood, notched, Next Step[7]	D
E	PTFE, notched, Next Step[7]	E

Solution Ground Rod Material

1	316 stainless steel	Not for TB561
2	Titanium	Not for TB561
3	Hastelloy B2	Not for TB561

O-Ring Material

1	Viton	Not for TB561
2	EPDM	Not for TB561
3	Silicone	Not for TB561
4	Kalrez [3]	Not for TB561

Insertion Depth [4]

0 7 0	70mm	0 7 0
1 0 0	100mm[9]	1 0 0
1 5 0	150mm	1 5 0
2 0 0	200mm	2 0 0

Units of Measure, Integral Sensor Cable [5]

– Not for TBX561	BNC connector, feet	F
T	Tinned/Pin leads, feet [1]	T
0	Use when JB/JS (below) are selected [6, 7]	0

Integral Sensor Cable

– –	1 ft (0.3m) to (30 ft) 8.8m enter length (in 5 foot increments)	– –
J B	With junction box [6, 7]	J B
J S	Less junction box/submersible coupler [6, 7]	J S

TBX561 X X X X X X X X X X

Next Step Advantage™, Sterilizable [1] Kynar Body pH/ORP Sensor Assembly (65 psi @ 121°C) ⇐ **Sensors for self-checking (with Solution Ground Rod)**

Notes.

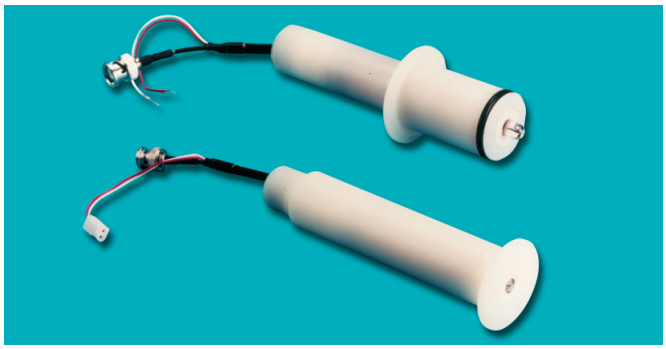
1) For direct connection to type TB82, TB84, 4630/35 and AX46 transmitters or other supplier devices, using terminal blocks.
2) Not available for Platinum, Redox (ORP), electrodes (code 5).
3) Kalrez O-rings only for solution ground sleeve. External O-rings are Viton. External Kalrez O-ring kits available separately.
4) Insertion depth measured from wetted face of sensor flange to tip of guard.
5) TB561only. There are two options to connect to TB82 or TB84 transmitters:

   Option 1 – use BNC/TC to PIN adapter with conduit fitting or BNC/TC to PIN adapter. In either case temperature compensator code must be 2 or 4.

   Option 2 – select T in integral cable code, not designed for use with extension cables or junction box .
6) TB561: junction box mounted on sensor. Cable length approx. 102mm (4 in.). Requires extension cable. If junction box is ordered separately and longer cable lengths are required enter length under code position for integral cable.
7) Not compatible with all TB18 Safe-T-Clean valve styles.
8) Required for use in most TB18 Safe-T-Clean valves.
9) Required for use with TB18 Safe-T-Clean valves and 4TB9515-0190 Flowcell. Consult TB18 Product Specification sheet for comprehensive measuring electrode selection.

Models TB562 & TBX562 Sanitary Sensors

Models TB(X)562 sensors are designed for processes needing the use of sanitary (hygienic) fittings. These sensors have a 1½ in. tri-clamp flange fitting and are suitable for processes using steam or chemical cleaning.



Models TB(X)562 Sensors

Specification

Applications

Food & Beverage, Dairy, Pharmaceuticals

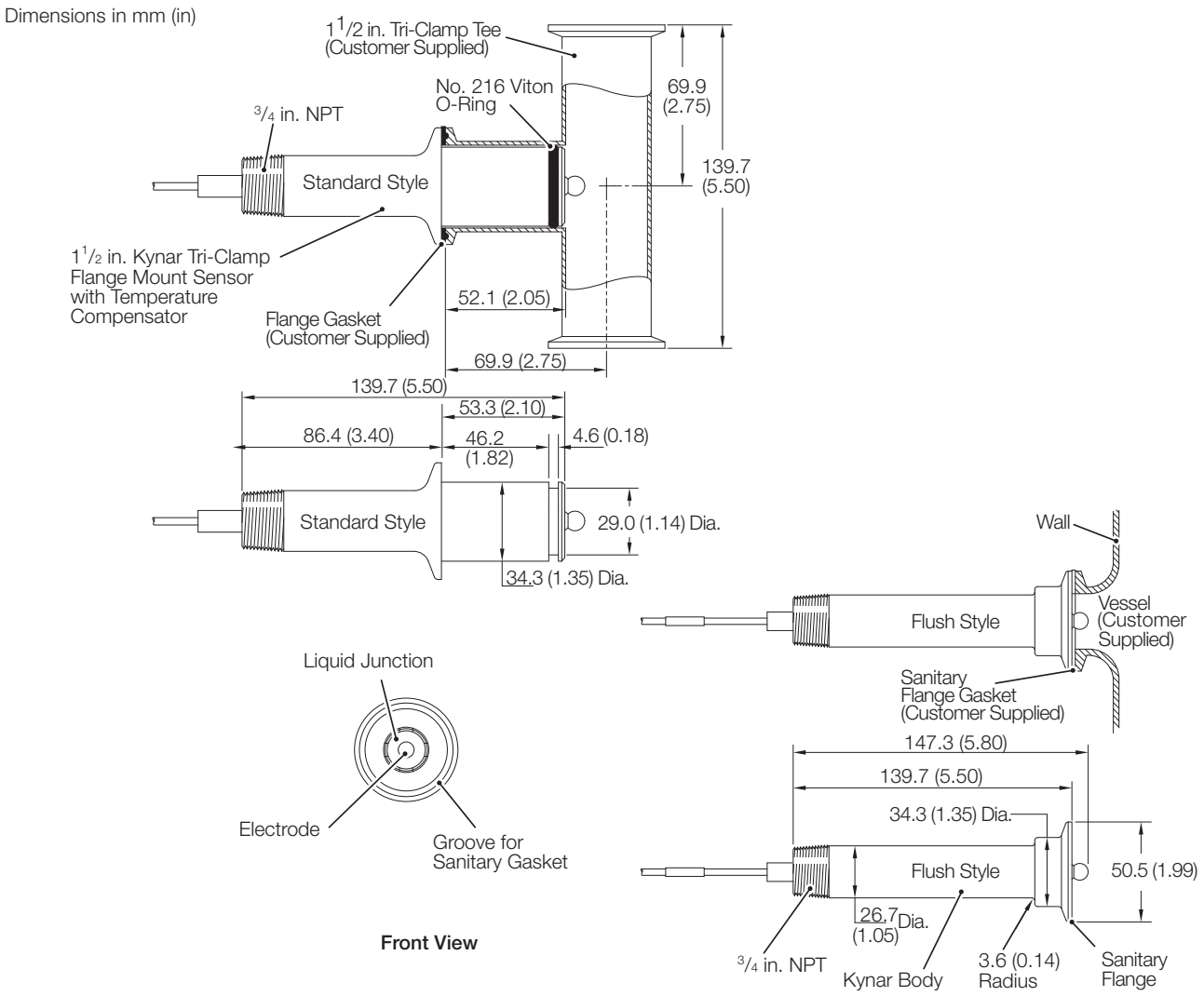
Max. pressure/temperature

690kPa (100 psi) at 90°C (176°F)
448kPa (65 psi) at 121°C (250°F)
276kPa (40 psi) at 140°C (284°F)

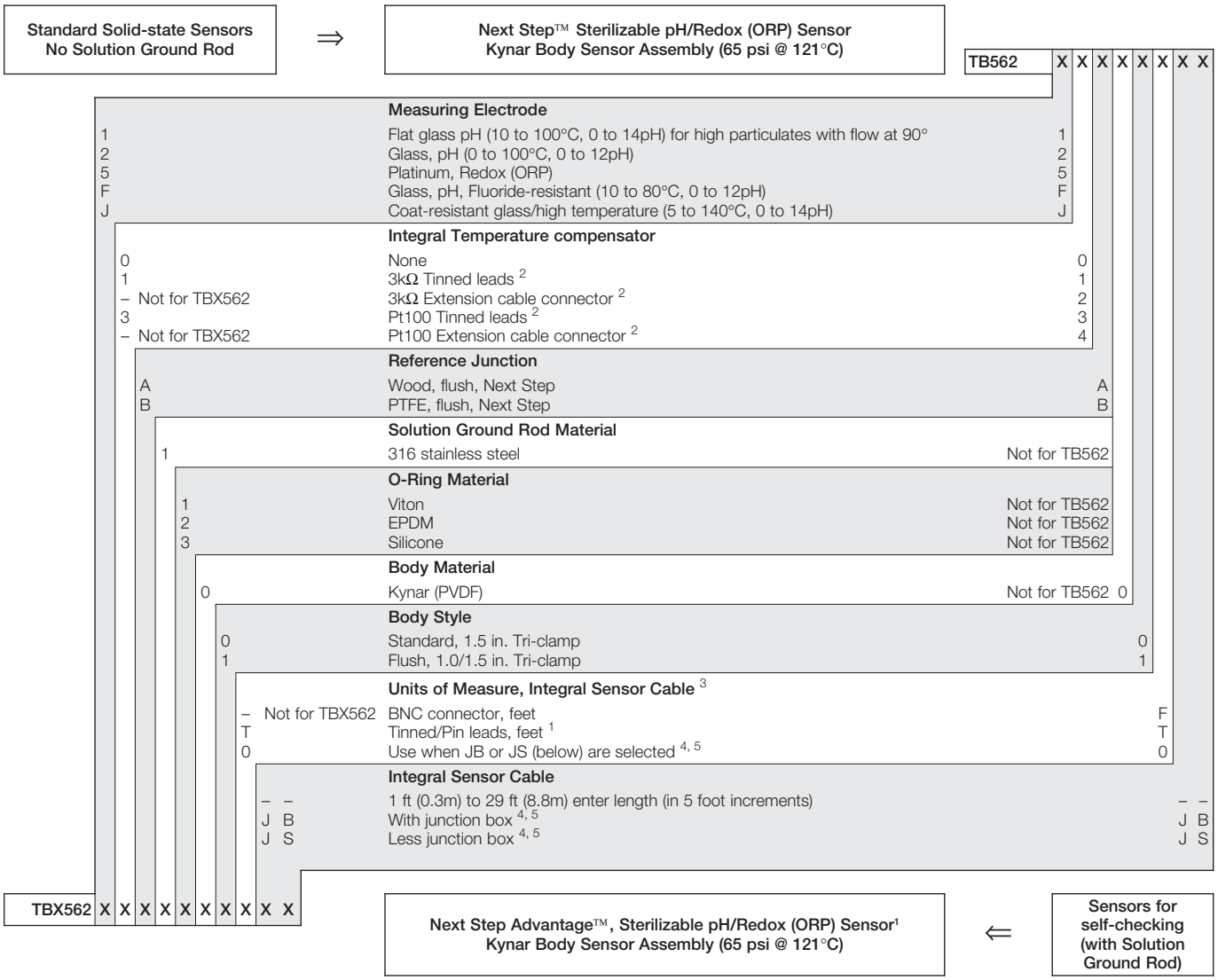
Material

Electrode body	Kynar as standard
External O-ring	Viton
Junction	Wood or PTFE
Junction types	Flush
Mounting	1½ in. polished sanitary tube flange 1 in. and 1½ in. tri-clamp for flush style

Overall Dimensions – Models TB(X)562



Ordering Information – Models TB(X)562



Notes.

1) For direct connection to type TB82, TB84, 4630/35 and AX46 transmitters or other supplier devices using terminal blocks.
2) Not available for Platinum, Redox (ORP), electrodes (code 5).
3) TB562 only. There are two options to connect to TB82 or TB84 transmitters:

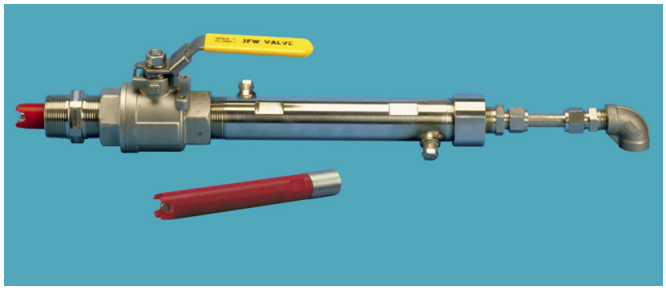
   Option 1 – use BNC/TC to PIN adapter with conduit fitting or BNC/TC to PIN adapter. In either case temperature compensator code must be 2 or 4.

   Option 2 – select T in integral cable code, not designed for use with extension cables or junction box.
4) TB562: junction box mounted on sensor. Cable length approx. 102mm (4 in.). Requires extension cable. Temperature compensator code position must be 0, 2 or 4.
5) TB(X)561: when selecting JB or JS cable length is approx. 102mm (4 in.). Requires extension cable. If junction box is ordered separately and longer cable lengths are required enter length under code position for integral cable.

Models TB564 & TBX564 High Pressure Hot-tap Retractable Sensors

Models TB(X)564 are high pressure, hot-tap, ball-valve, insertion sensors. They permit sensor maintenance or replacement without interrupting the process.

A retraction housing is provided for isolating the sensor body from the operator. Using 1/4 in. taps, the housing can be flushed during retraction or pressurized before insertion.



Models TB564 and TBX564 Sensors

Specification

Applications

High pressure, hazardous materials

Max. pressure/temperature

2065kPa (300psi) at 140°C (284°F)

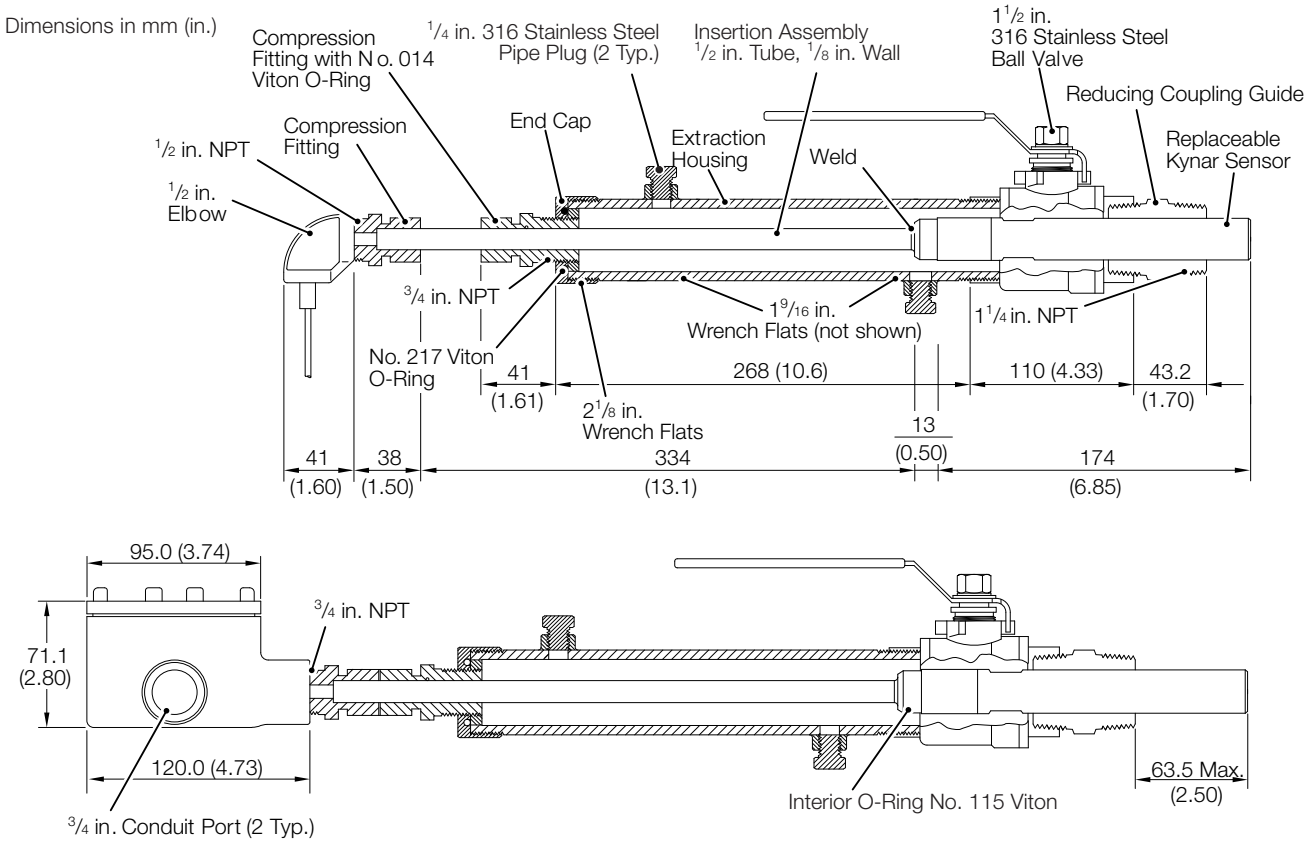
Features

Insert/Retract without disturbing process
Retraction housing for safety
Taps for flushing or pressurizing

Material

Electrode body	Kynar (PVDF)
Ball-valve/hardware	316 stainless steel (other materials on request)
External O-rings	Viton
Junction	Wood or PTFE
Junction Types	Flush (Antimony only) Notched (recommended)

Overall Dimensions – Models TBX564



Note.
All pipe threads have Loctite PST sealant applied at the Factory.

Ordering Information – Models TBX564

Standard Solid-state Sensors No Solution Ground Rod ⇒ **Next Step™, High Pressure Hot-tap pH/Redox (ORP) [1] Sensor Assembly (300 psi @ 140°C)**

TB564 X X X X X X X X

Measuring Electrode

1	Flat glass (10 to 100°C, 0 to 14pH) for high particulates with flow at 90° [11]	1
2	Glass, pH (0 to 100°C, 0 to 12pH)	2
5	Platinum, Redox (ORP)	5
6	Antimony, pH (20 to 80°C, 3 to 11pH) [2]	6
F	Glass, pH Fluoride-resistant (10 to 80°C, 0 to 12pH)	F
J	Coating-resistant glass/high temperature (5 to 140°C, 0 to 14pH)	J

Integral Temperature compensator

0	None	0
1	3kΩ Tinned leads [3]	1
– Not for TBX564	3kΩ Extension cable connector [3]	2
3	Pt100 Tinned leads [3, 4]	3
– Not for TBX564	Pt100 Extension cable connector [3, 4]	4

Reference Junction

A	Wood, Flush, Next Step [2]	A
B	PTFE, Flush, Next Step [2]	B
D	Wood, Notched, Next Step [5]	D
E	PTFE, Notched, Next Step [5]	E

Solution Ground Rod Material

1	316 stainless steel	Not for TB564
2	Titanium	Not for TB564
3	Hastelloy B2	Not for TB564

O-Ring Material

1	Viton	Not for TB564
2	EPDM	Not for TB564
3	Silicone	Not for TB564
4	Kalrez [6]	Not for TB564

Body Style

0	Standard, Kynar sensor body	0

Accessory Hardware

0	None [7]	0
9	Complete Model TB(X)564 sensor assembly **with** ball-valve	9
A	Model TB(X)564 sensor hardware **without** ball-valve	A

Units of Measure, Integral Sensor Cable [8]

– Not for TBX564	BNC connector, feet [10]	F
T	Tinned/Pin leads, feet [1] (Recommended)	T
0	Use when JB/JS (below) are selected [9]	0

Integral Sensor Cable

– –	1 ft (0.3m) to 30 ft (8.8m) enter length (in 5 foot increments)	– –
J B	With junction box [9]	J B
J S	Less junction box [9]	J S

TBX564 X X X X X X X X X X

Next Step Advantage™ High Pressure Hot-tap pH/Redox (ORP) Sensor Assembly (300 psi @ 140°C) ⇐ **Sensors for self-checking (with Solution Ground Rod)**

Notes.

1) For direct connection to type TB82, TB84, 4630/35 and AX46 transmitters or other supplier devices using terminal blocks.
2) Antimony electrodes only supplied with flush junctions (code A and B).
3) Not available for Platinum, Redox (ORP), or Antimony, pH, electrodes (code 5 and 6).
4) Not available for fluoride-resistant electrodes (code F). Compatible with TB82, TB84, 4630/35 and AX46 instruments.
5) Not available for Antimony electrodes (code 6).
6) Kalrez O-rings for solution ground sleeve only. External O-rings are Viton. External Kalrez O-ring kits available separately.
7) Requires installation of BNC connector kit.
8) There are two options to connect TB564 to TB82 or TB84 transmitters:
   Option 1 – use BNC/TC to PIN adapter with conduit fitting or BNC/TC to PIN adapter. In either case temperature compensator code must be 2 or 4.
   Option 2 – select T in sensor cable code, not designed for use with extension cables or junction box.
9) Junction box mounted on insertion rod. Cable length approx. 254mm (10 in.). Requires extension cable to connect to transmitter. Order code for temperature compensator must be 0, 2 or 4. If sensor is ordered without accessory hardware a junction box must be ordered separately.
10) Requires BNC field mount for replacement sensors.
11) Maximum pressure: 690 kPa (100 psi).

Models TB567 & TBX567 High Pressure In-Line Sensors

Models TB(X)567 sensors are high pressure, in-line sensors. Their permissible pressure and temperature ratings are unique in the industry.

After consultation with ABB, customers have exceeded the standard ratings of 1724kPa (250 psi) at 100°C (212°F). Many installations are operating at over 6895kPa (1000 psi).

The assembly comprises two parts: a 316 stainless steel housing and a molded Ryton sensor body.

Models TB567 and TBX567 Sensors

Specification

Applications

High pressure insertion

Max. pressure/temperature

1380kPa (200 psi) at 140°C (284°F)
1725kPa (250 psi) at 100°C (212°F)

Features

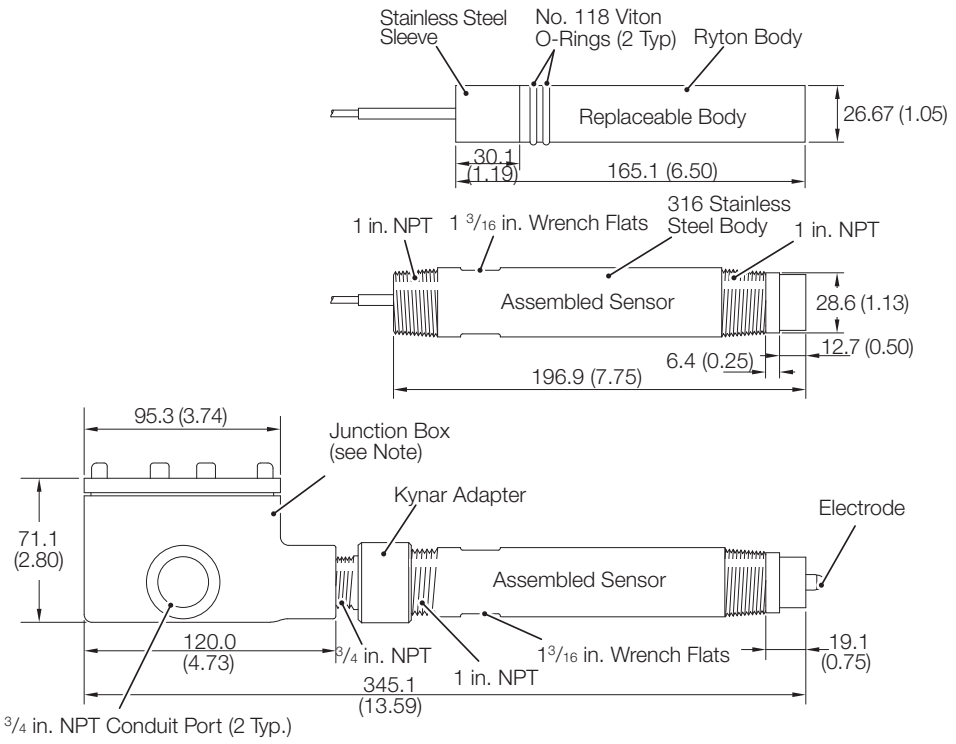
2-piece sensor, double O-ring
Sealed body with stainless steel sleeve

Materials

Electrode body	Ryton (Polyphenylene sulphide)
Outer sleeve	316 stainless steel (other materials available)
External O-rings	Viton
Reference junction	Wood or PTFE
Junction type	Flush

Overall Dimensions – Models TB(X)567

Dimensions in mm (in.)



Ordering Information – Models TB(X)567

Standard Solid-state Sensors No Solution Ground Rod ⇒ **Next Step™ In-Line High Pressure pH/Redox (ORP) Sensor Assembly (200 psi @ 140°C)**

	TB567	X	X	X	X	X	X	X	X
Measuring Electrode									
2 Glass, pH (0 to 100°C, 0 to 12pH)		2							
5 Platinum, Redox (ORP)		5							
6 Antimony, pH (20 to 80°C, 3 to 11pH) [2]		6							
F Glass, pH Fluoride-resistant (10 to 80°C, 0 to 12pH)		F							
J Coat-resistant glass/high temperature (5 to 140°C, 0 to 14pH)		J							
Integral Temperature compensator									
0 None			0						
1 3kΩ Tinned leads [3]			1						
– Not for TBX567 3kΩ Extension cable connector [3]			2						
3 Pt100 Tinned leads [3, 4]			3						
– Not for TBX567 Pt100 Extension cable connector [3, 4]			4						
Reference Junction									
A Wood, flush, Next Step				A					
B PTFE, flush, Next Step				B					
Solution Ground Rod Material									
1 316 stainless steel					Not for TB567				
2 Titanium					Not for TB567				
3 Hastelloy B2					Not for TB567				
O-Ring Material									
1 Viton					Not for TB567				
2 EPDM					Not for TB567				
3 Silicone					Not for TB567				
4 Kalrez [5]					Not for TB567				
Body Style									
0 Model TB(X)567 Sensor body						0			
Accessory Hardware									
0 None							0		
D Model TB(X)567 316 stainless steel sensor housing							D		
Units of Measure, Integral Sensor Cable [6]									
– Not for TBX567 BNC connector, feet								F	
T Tinned/Pin leads, feet [1]								T	
0 Use when JB/JS (below) are selected [7]								0	
Integral Sensor Cable									
– – 1 ft (0.3m) to 30 ft (8.8m) enter length (in 5 foot increments)									– –
J B With junction box [7]									J B
J S Less junction box [7]									J S

	TBX567	X	X	X	X	X	X	X	X	X

Next Step Advantage™, In-Line High Pressure pH/Redox (ORP) [1] Sensor Assembly (200 psi @ 140°C) ⇐ **Sensors for self-checking (with Solution Ground Rod)**

Notes.

1) For direct connection to type TB82, TB84, 4630/35 and AX46 transmitters or other supplier devices using terminal blocks.
2) Antimony pH electrodes only supplied with flush junctions (code A and B).
3) Not available for Platinum, Redox (ORP), or Antimony, pH, electrodes (code 5 and 6).
4) Not available for fluoride-resistant electrodes (code F). Compatible with TB82, TB84, 4630/35 and AX46 instruments.
5) Kalrez O-rings for solution ground sleeve only. External O-rings are Viton. External Kalrez O-ring kits available separately.
6) There are two options to connect TB567 to TB82 or TB84 transmitters:

   Option 1– use BNC/TC to PIN adapter with conduit fitting or BNC/TC to PIN adapter. In either case temperature compensator code must be 2 or 4.

   Option 2 – select T in sensor cable code, not designed for use with extension cables or junction box.
7) Junction box mounted on sensor. Cable length approx. 254mm (10 in.). Requires extension cable to connect to transmitter. Order code for temperature compensator must be 0, 2 or 4. If sensor is ordered without accessory hardware a junction box must be ordered separately.

Accessories

Automatic Cleaners

ABB sensors are designed to resist fouling and plugging especially when placed in sufficient velocity.

Sometimes a lack of velocity or the precipitative properties of the liquid require the use of an automatic cleaner.

ABB supplies jet-wash type cleaning facilities for submersion (immersion) TB556 sensors with 1 1/2 in. insertion depth.

When coupled to a customer-supplied solenoid valve delivering wash fluid, effective cleaning can be initiated by ABB pH instrumentation such as the TB84PH or AX46 Series. For example, the TB84PH can be configured:

- Wash cycle time 0 to 99.99 hours
- Wash on time 0 to 999 seconds
- Wash recovery time 0 to 999 seconds
- Hold function ON or OFF

Specification

Model

4TB5205-0232

Materials

PVC, Polypropylene

316 stainless steel

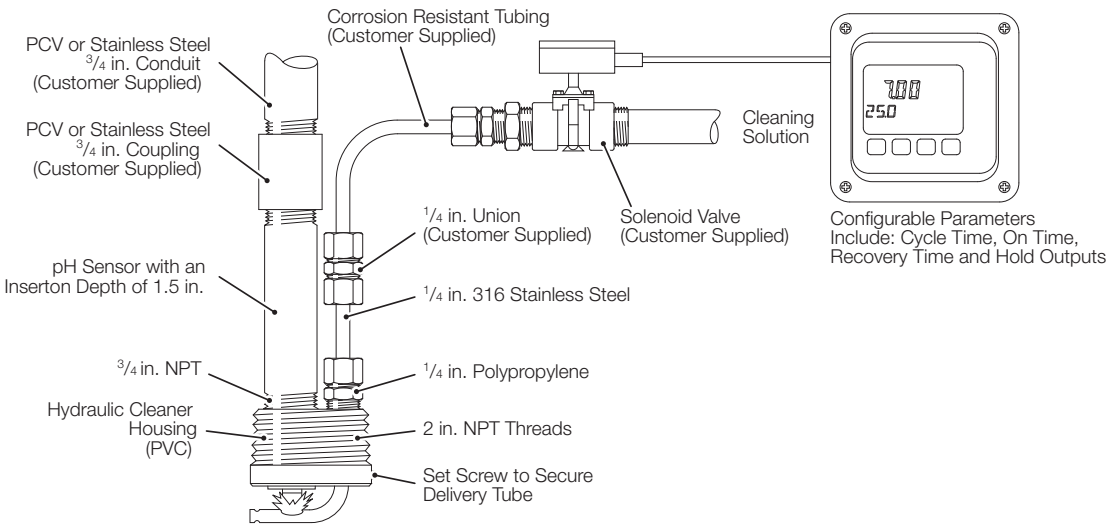
Max. pressure/temperature

690kPa (100 psi) at 40°C (104°F)

276kPa (40 psi) at 60°C (140°F)

Hydraulic Cleaner with Models TB(X)556 Sensor

Hydraulic Cleaner Application Example



…Accessories

Ball-Valves for TB(X)557 Sensors

Model	Description
4TB5205-0174	1¼ in. 316 stainless steel Includes 1¼ in. to 1 in. reducing bushing with 1¼ in. nipple. For wrench-tight compression hardware 4TB4953-0024 only.
4TB5205-0175	1½ in. Kynar (PVDF) Includes 1½ in. to ¼ in. reducing bushing with 1½ in. nipple. For wrench-tight compression hardware 4TB4953-0019 only.
4TB5205-0217	1¼ in. 316 stainless steel Includes 1¼ in. nipple. For hand-tight compression hardware 4TB4953-0006 only.
4TB5205-0218	1½ in. Kynar (PVDF) Includes 1½ in. to 1¼ in. reducing bushing with 1½ in. nipple. For hand-tight compression hardware 4TB4953-0060 or 4TB4953-0065 only.
4TB5205-0254	1½ in. 316 stainless steel Includes 1½ in. to 1¼ in. reducing bushing with 1½ in. nipple. For hand-tight compression hardware 4TB4953-0060 only.
4TB5205-0255	1½ in. 316 stainless steel Includes 1½ in. to 1 in. reducing bushing with 1½ in. nipple. For hand-tight compression hardware 4TB4953-0024 only.

pH/Redox (ORP) Transmitters

Model	Description
TB82PH Advantage Series pH/Redox/pIon Transmitter	– 2-wire 24V d.c. 4 to 20mA – Certified intrinsically safe – SMART-key programming – On-line sensor diagnostics – Configurable output – Multi-temperature compensations – Adjustable damping – Hold output – Configurable security code – HART communication – NEMA 4X/IP65 housing – CE approved
TB84PH Advantage Series pH/Redox/pIon Transmitter	– AC-powered instrument – SMART-key programming – On-line sensor diagnostics – Configurable output – Multi-temperature compensations – Adjustable damping – Hold output – Configurable security code – NEMA 4X/IP65 housing – CE approved – 3-relay outputs – 2 analog outputs – Wash control function
AX460 pH/Redox Transmitter	– AC-powered instrument – Simple menu programming – Configurable output – Multi-temperature compensations – Hold output – Configurable security code – NEMA4/IP65 housing – ¼ DIN panel-mount housing – CE approved – 3 relay outputs – 2 analog outputs – Wash control function

Acknowledgements

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