

ABB MEASUREMENT & ANALYTICS | DATA SHEET

TB4CS

4-electrode conductivity sensor



Measurement made easy

Low maintenance sensor with the widest operation range available (0 to 2000 mS/cm)

4-electrode measurement

- increases accuracy, stability, flexibility and security

Rugged construction and materials

- sensors capable of withstanding the toughest chemical processes at extreme temperatures and pressures

Overcome and compensate for fouling effects

- reduces cleaning frequency

Extent of fouling notification and fouled sensor relay

- enables conductivity instrument to notify a dirty sensor condition

Installation flexibility

- in-line, Twist-lock, immersion, Tri-Clamp, flow-cell, TB18 Safe-T-Clean valve and retractable hot-tap

Suitable for all measurements

- from low to high solution concentrations
- compensates for polarization effects

4-electrode conductivity sensors for process monitoring

ABB is the industry leader in advancements resulting in the increased accuracy, dependability and environmental limits of on-stream conductivity sensors. The conductivity sensor line permits resolutions of 0.01 $\mu\text{S}/\text{cm}$, full-scale ranges of 1 S/cm, pressure ratings to 2,068 kPag (300 psig) and temperature ratings of 200 °C (392 °F). Group A sensors have a measurement range spanning five decades of conductivity or TDS concentration.

The ABB 4-electrode conductivity system provides ultimate sampling flexibility, sensor reliability, rangeability and helpful operating and maintenance information. Smart circuitry detects and compensates for the buildup of deposits and scale and corrosion products on the sensor. It also provides an alarm before the interference becomes so serious as to affect the conductivity signal. The dirty sensor alarm output is a contact closure, a digital signal, or any other easily observed format.

Anti-fouling 4-electrode circuit

The 4-electrode conductivity system consists of two current electrodes and two potential electrodes, a high impedance amplifier providing feedback to an amplitude-controlled oscillator, a conductivity sensing circuit with associated load resistor and display and a dirty sensor alarm circuit.

Feedback from the high impedance amplifier causes the oscillator to vary its amplitude output to maintain a constant excitation field, created by the current electrodes in the solution, as sensed by the potential electrodes. The current required to create the excitation field passes through the load resistor and is sensed as a voltage drop by the conductivity sensing circuit. The amount of excitation current required to maintain a constant excitation field in a solution is directly proportional to conductivity. If fouling of the electrodes occurs, the AC potential at the electrodes increases to drive the excitation through the deposits to maintain the constant excitation field. The increase in potential at the current electrodes compensates for the increase in interface resistance at them. The high impedance amplifier draws no current; therefore, the voltage drop across deposits on the potential electrodes is negligible and contributes no significant error.

The dirty sensor alarm circuit measures the oscillator amplitude. The amplitude stays below a predefined threshold during normal operation. If the amplitude exceeds that threshold, the conductivity measuring instrument notifies, via an alarm, readout, or other method, that the sensor needs cleaning.

Sensor groups and ranges

There are two groups of 4-electrode conductivity sensors. The rangeability of any sensor is defined by the physical structure of the electrodes and the electronic circuitry of the associated instrument. The physical structure of the electrodes determines the sensor cell constant; however, the concept of sensor cell constants is more applicable to 2-electrode sensors. Unlike 4-electrode sensors, as manufactured by ABB, the rangeability of 2-electrode sensors is restricted by current density and polarization. 4-electrode sensors are not limited by these factors. The result is a virtual dimensionless sensor constant with wide rangeability.

The actual measurement range is determined by the sensor group and the instrument range or range factor in use. All ABB conductivity instruments are multi-range types. This provides numerous application options for any sensor and instrument combination.

ABB 4-electrode conductivity sensors are arranged in two groups, loosely adhering to the sensor cell constant structure in the following manner:

- **Group A:** General purpose for 0 to 2,000,000 $\mu\text{S}/\text{cm}$.
- **Group B:** Low to medium range for 0 to 2,000 $\mu\text{S}/\text{cm}$.

Table 1 provides a list of sensors and ranges.

Sensor groups and sensors		Measurement range ACA592EC, AX430, TB82EC, TB84EC
A	TB451, TB454, TB457, TB461, TB464A, TB468, TB471	0.0 to 2,000,000 $\mu\text{S}/\text{cm}$ (autoranging)
B	TB464B, TB465, TB475	0.00 to 2,000 $\mu\text{S}/\text{cm}$ (autoranging)

Table 1 Ranges for conductivity instruments

Sensor	Max. temperature		Max. pressure ¹		Mounting arrangement
	°C	°F	KPag	psig	
TB451	140	284	689	100	Sterilizable
TB454	100	212	689	100	Twist-lock insertion, submersion
TB457	175	347	861	125	Sterilizable
TB461, TB465	200	392	1550	225	Direct insertion, submersion, separate flow cell
			689	100	Ball valve insertion
TB464	200	392	1378	200	Sterilizable, submersion, separate flow cell, TB18 Safe-T-Clean valve
TB468	100	212	689	100	Direct insertion, submersion
	140	284	275	40	Hot tap, ball valve insertion
TB47	200	392	2068	300	High pressure retractable hot-tap, ball valve insertion

¹ Temperature affects maximum allowable pressure. Refer to individual sensor specifications for details

Table 2 Ratings and mounting arrangements for conductivity sensors

Temperature Compensation

The effect of temperature on conductivity is significant therefore, to ensure measurement accuracy, conductivity must be compensated to a reference temperature (typically 25°C [77 °F]).

To provide accurate and fast response to temperature changes, ABB conductivity sensors are equipped with integral temperature compensators which are compatible with all ABB transmitters. Figure 1 shows the typical location of the integral temperature compensation element.

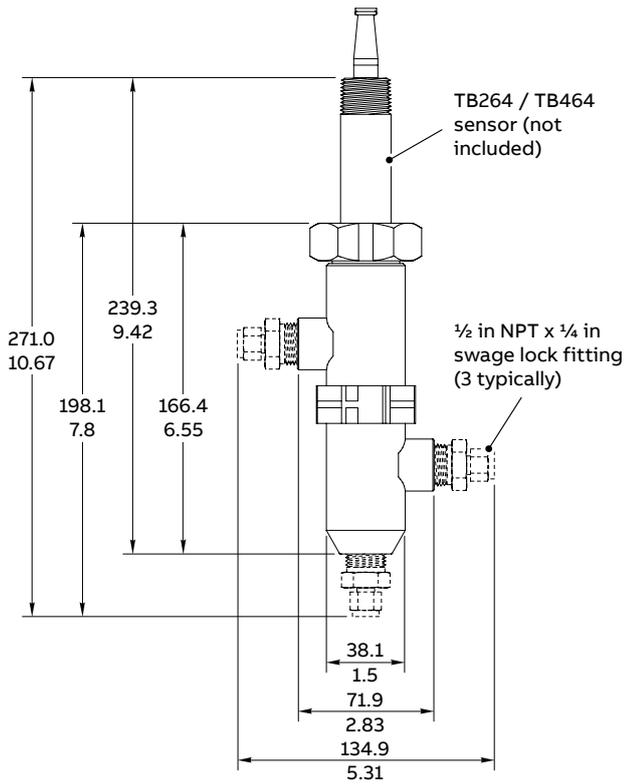


Figure 1 Temperature compensator location

Flow Cells

The flow cell (Figure 2) is available for both conductivity and pH sensors. It is designed for use with the TB264 2-electrode conductivity sensors, TB464 4-electrode conductivity sensors and TB(X)561 pH/ORP sensors. Multiple inlet and outlet ports provide flexibility with installation, calibration and mounting configurations. The sensor can be inserted and removed from the flow cell quickly and easily without disconnecting the sensor from the instrument or junction box.

Dimensions in mm (in)



Notes.

- Dashed lines represent the dimensions of the flow cell kit with swage lock fittings.
- Flow cell kit without swage lock fittings: 4TB9515-0223.
Flow cell kit with swage lock fittings: 4TB9515-0190.

Figure 2 Flow cell kits

TB451 Kynar® sterilizable Tri-Clamp conductivity sensors

TB451 sensors (Figure 3) have an integral Tri-Clamp fitting for use in sanitary services. ABB offers two styles of these sensors. The first is a flush-face style that meets the process at the Tri-Clamp fitting. The second has an extended face designed to meet the process at the end of a Tri-Clamp fitting such as a tee.

The extended-face type is O-ring sealed to prevent the process solution from getting behind the electrode face where cleaning chemicals will not reach. This style of sensor can be sized to fit either 1.0 or 1.5 in tubing. The flush style can be used with either size.

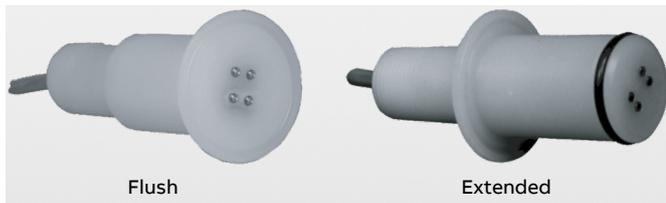


Figure 3 TB451 sensor

Specification

Applications

- Food
- Beverage
- Brewery
- Dairy
- Pharmaceutical services where process lines must be sterilized and/or chemical or steam cleaning takes place

Maximum pressure / temperature

- 689 kPag (100 psig) at 90 °C (194 °F)
- 447 kPag (65 psig) at 121 °C (250 °F)
- 275 kPag (40 psig) at 140 °C (284 °F)

Materials

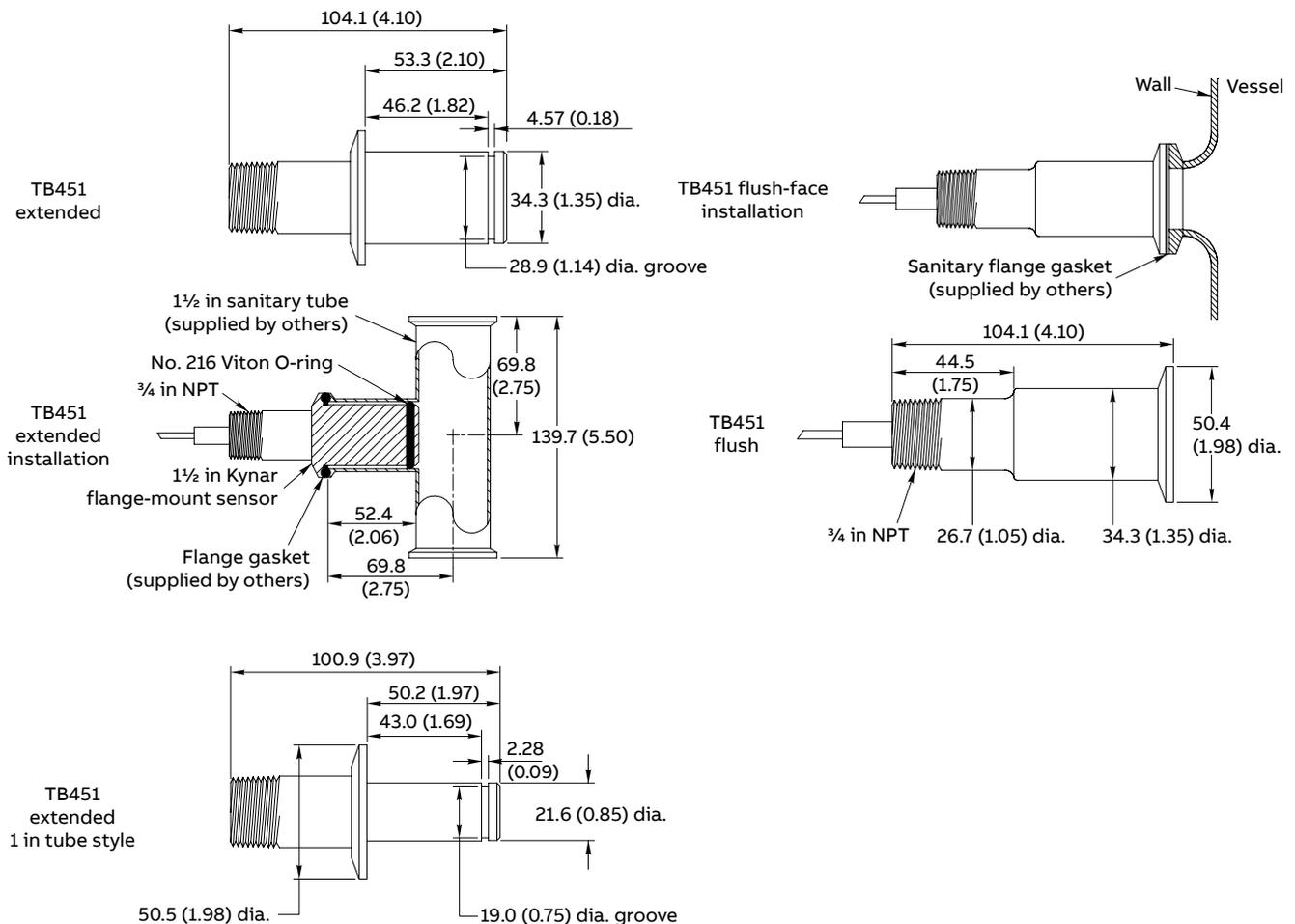
Body:	Virgin Kynar (PVDF)
Electrodes:	316 stainless steel
O-rings:	Viton

Special features

- Integral Tri-Clamp flange
- Security from crevice formation in process

Dimensions

Dimensions in mm (in)



Ordering information

TB451 Kynar sterilizable Tri-Clamp conductivity sensor – range 0 to 2,000,000 μS/cm	TB451	X	X	X
Integral temperature compensation				
3 K Ω		E		
Tri-Clamp style				
Extended style for 1.5 in tube, 2 in flange, Tri-Clamp				1
Extended style for 1.0 in tube, 2 in flange, Tri-Clamp				2
Flush style for 1.0 or 1.5 in tube, 2 in flange, Tri-Clamp ¹				3
Integral cable length in m (ft)				
No cable, junction box (4TB5023-0088) included				0
1.5 (5)				1
3.0 (10)				2
4.5 (15)				3
6.0 (20)				4
7.6 (25)				5
9.1 (30)				6
10.6 (35)				7
12.1 (40)				8
13.7 (45)				9
15.2 (50)				A
22.8 (75)				B
30.4 (100)				C

¹ Flush flange insertion depths: TB451 is 20.32 mm (0.80 in)

TB454 twist-lock conductivity sensor

TB454 sensors (Figure 4) combine versatility, easy access and low cost into one compact package. The sensor is suitable for either in-line or immersion installations. It fits into a 1 in NPT receptacle and is inserted with a push and 180-degree twist to lock for in-line installations. There is also a Ryton® (PPS) holder with screw cap available. The wide rangeability of this sensor makes it a perfect match for almost all less aggressive conductivity measurements.



Figure 4 Endura TB454 sensor

Specification

Applications

- Cooling towers
- Water and waste monitoring
- Packaged water systems

Maximum pressure / temperature

690 kPa (100 psi) at 100 °C (212 °F)

Materials

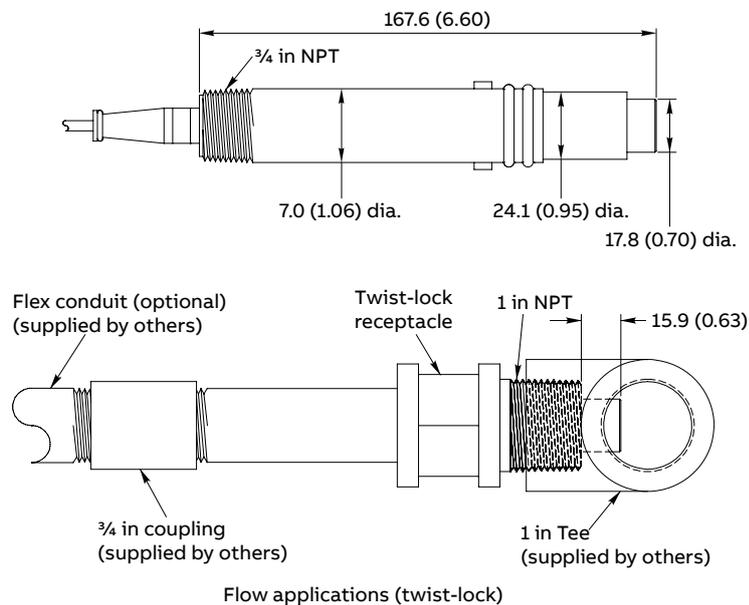
Body:	Ryton (PPS)
Electrodes:	316 stainless steel
Insulator:	Polyether-ether ketone (PEEK)
O-rings (internal):	Viton
O-rings (external):	Buna-N

Special features

Twist-lock insertion simplifies access

Dimensions

Dimensions in mm (in)



Ordering information

TB454 twist-lock conductivity sensor – range 0 to 2,000,000 µS/cm	TB454	X	X	X	X
Body style					
Standard	0				
Integral temperature compensation					
3 KΩ			E		
Mounting accessories					
None					0
1 in NPT 316 stainless steel twist-lock receptacle					2
1 in NPT Ryton threaded receptacle					3
Integral cable length in m (ft)					
No cable, junction box included					0
1.5 (5)					1
3.0 (10)					2
4.5 (15)					3
6.0 (20)					4
7.6 (25)					5
9.1 (30)					6
10.6 (35)					7
12.1 (40)					8
13.7 (45)					9
15.2 (50)					A
22.9 (75)					B
30.5 (100)					C

TB457 stainless steel sterilizable Tri-Clamp conductivity sensors

Endura TB457 sensors (Figure 5) have 316 stainless steel bodies and integral Tri-Clamp fittings for use in applications requiring steam sterilization. The electrode tips and electrodes are sealed with an FDA-approved silicon potting material. ABB offers two styles of these sensors. The first has a flush face that meets the process at the Tri-clamp fitting. The second has an extended face designed to place the electrodes into the process past the fitting. The extended face version is narrow enough to enable rinsing chemicals or steam to surround the wetted surfaces to ensure effective cleaning.

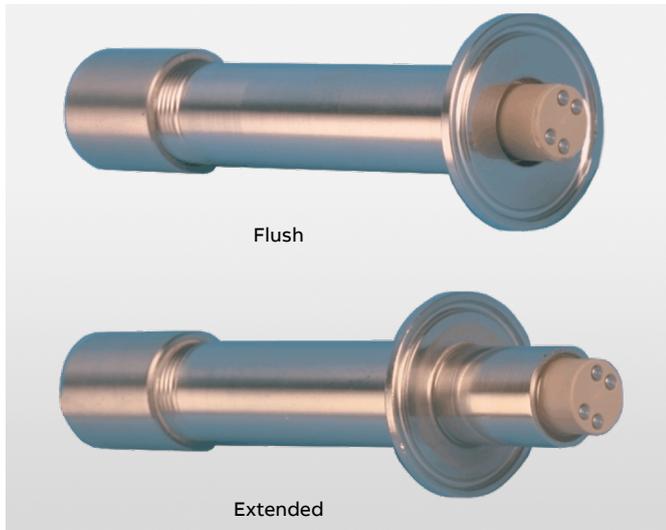


Figure 5 TB457 sensor

Specification

Applications

Processes where process lines must be kept sanitary and / or chemical or steam cleaning takes place – for example:

- Food
- Beverage
- Dairy
- Pharmaceutical services

Maximum pressure / temperature

861 kPag (125 psi) at 175 °C (347 °F)

Materials

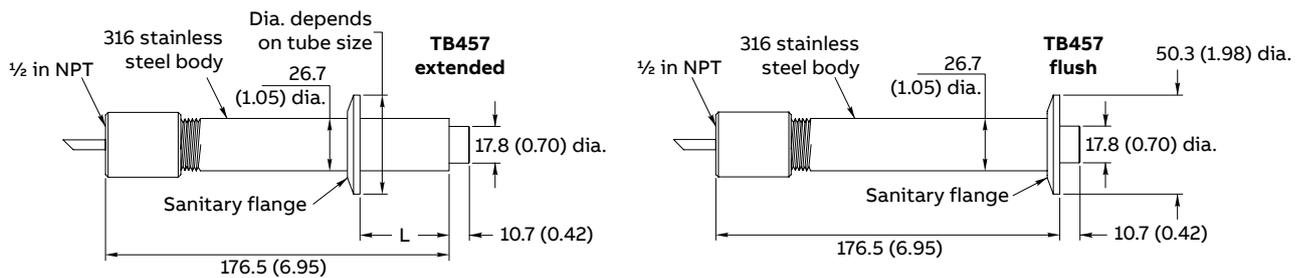
Body, flange and electrodes:	316 stainless steel
Insulator:	PEEK
O-rings (internal):	Viton (sealed with FDA-approved silicone potting material)

Special features

- Tri-clamp fitting
- Wide conductivity range

Dimensions

Dimensions in mm (in)



If:

50.3 (1.98) dia. for 25.4 (1.00) pipe / 38.1 (1.50) tube, L = 33.0 (1.30)

64.0 (2.52) dia. for 38.1 (1.50) pipe / 50.8 (2.00) tube, L = 50.8 (2.00)

Ordering information

TB457 stainless steel sterilizable Tri-Clamp conductivity sensor – range 0 to 2,000,000 μS/cm	TB457	X	X	X
Integral temperature compensation				
3 K Ω		E		
Tri-Clamp style				
Extended style for 1.5 in tube, 2 in flange, Tri-Clamp				1
Extended style for 2.0 in tube, 2.5 in flange, Tri-Clamp				2
Flush style for 1.0 or 1.5 in tube, 2 in flange, Tri-Clamp				5
Integral cable length in m (ft)				
No cable, junction box included				0
1.5 (5)				1
3.0 (10)				2
4.5 (15)				3
6.0 (20)				4
7.6 (25)				5
9.1 (30)				6
10.6 (35)				7
12.1 (40)				8
13.7 (45)				9
15.2 (50)				A
22.9 (75)				B
30.5 (100)				C

TB461 and TB465 in-line, immersion or hot-tap (retractable) conductivity sensor

Ruggedly constructed of 316 stainless steel, these sensors withstand the most demanding processes and measurement requirements. TB46X insertion / submersion sensors (Figure 6) are easily installed into process lines and vessels by the ¾ in NPT insertion threads or immersed directly into fluids by the back threads.

TB46X hot-tap sensors (Figure 6) are directly inserted and removed from lines and vessels without disturbing the process via either a 1½ in normal or 1¼ in full port ball valve (provided separately). This series is the most versatile offered by ABB. Full spectrum conductivity measurement is achieved by the wide rangeability of the sensor.



Figure 6 TB461 and TB465 sensors

Specification

Applications

- In-line / immersion:
 - Boiler measurements
 - Sewer monitoring
 - Cooling towers
 - Condensate
 - De-ionizers and other water treatment applications
 - Heat exchangers
 - Concentration monitoring
 - All other general conductivity measurements
- Retractable hot-tap:
 - Boiler condensate measurements
 - Pulp stock lines
 - Sealed vessel monitoring
 - All other general conductivity measurements requiring sensor insertion / removal without process disturbance

Maximum pressure / temperature

- In-line / immersion:
 - 1,550 kPag (225 psi) at 200 °C (392 °F)
- Retractable hot-tap
 - 689 kPag (100 psi) at 200 °C (392 °F)

Materials

Body, electrodes and compression fittings:	316 stainless steel
Insulator:	PEEK
O-rings (internal):	Viton
Compression fitting	Nylon (ball valve insertion only ferrule)

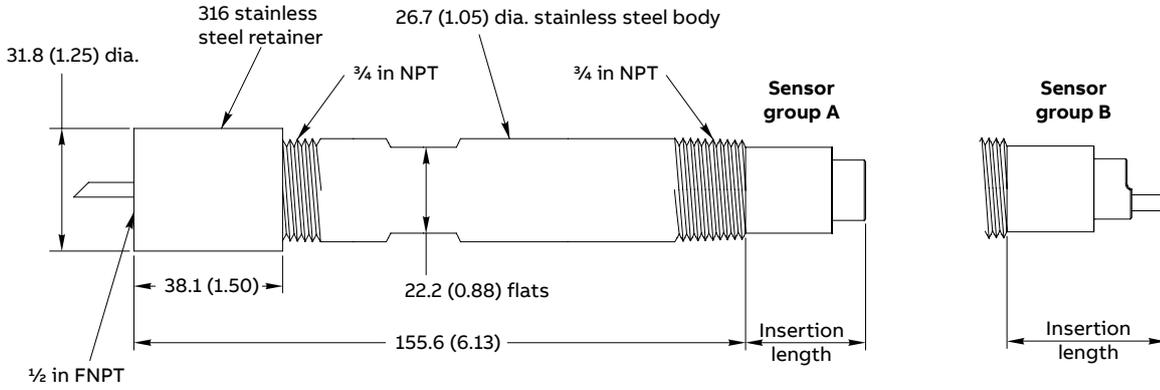
Special features

- In-line / immersion
 - Interchangeable and replaceable electrode tips
 - Direct measurement above 100 °C (212 °F) without coolers with proper anti-flashing installation
- Retractable hot-tap
 - Interchangeable and replaceable electrode tips
 - Accidental sensor blowout prevented by anti-blowout lip machined into sensor body.

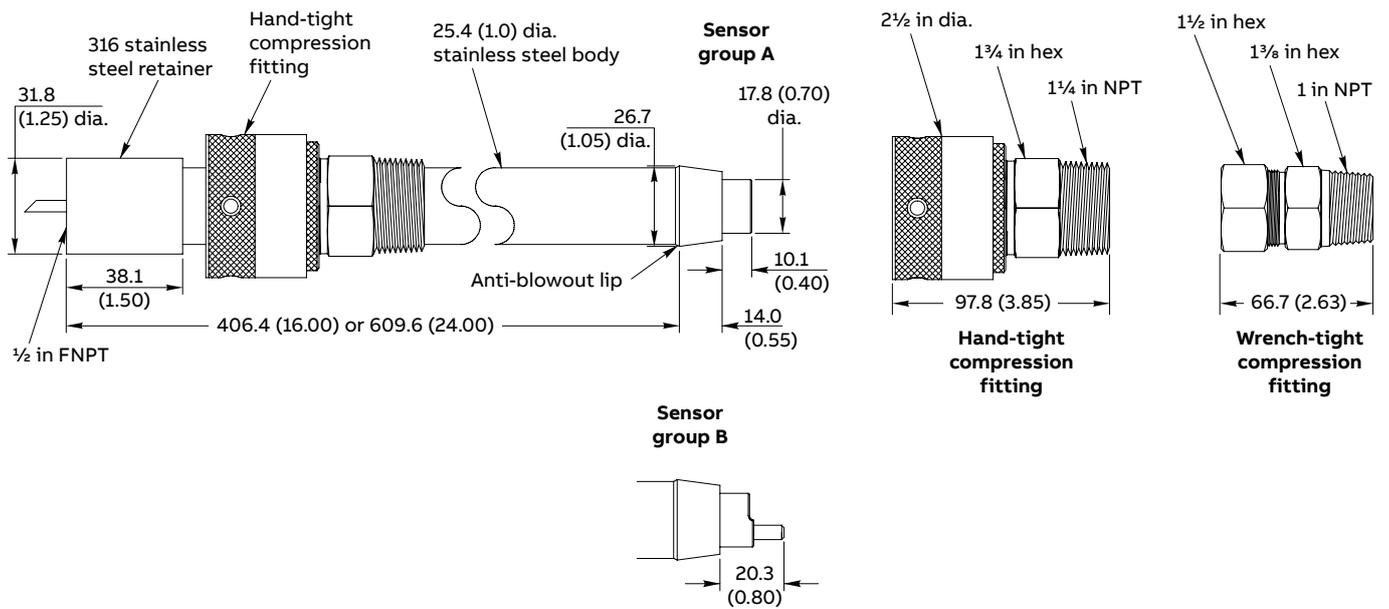
Dimensions

Dimensions in mm (in)

TB46 In-line / immersion



TB46 hot-tap



...TB461 and TB465 in-line, immersion or hot-tap (retractable) conductivity sensor

Ordering information

TB461 in-line, immersion or hot-tap (retractable) conductivity sensor – range 0 to 2,000,000 $\mu\text{S}/\text{cm}$	TB461	X	X	X	X	X	X	X	X
Sensor style									
In-line insertion or immersible	0								
Hot-tap, no hardware, 16 in length	1								
Hot-tap, no hardware, 24 in length	4								
Hot-tap, no hardware, 30 in length	5								
Hot-tap, no hardware, 36 in length	6								
Integral temperature compensation									
3 $\text{K}\Omega$							E		
Hot-tap mounting hardware and compression fittings									
No hardware ¹								0	
Hand-tight, 316 stainless steel, Viton O-ring, 1¼ in NPT ²								1	
Wrench-tight, 316 stainless steel, Viton O-ring, 1 in NPT ²								2	
Flush and drain housing, wrench-tight, 316 stainless steel, Viton O-ring, 1½ in NPT ²								B	
Flush and drain housing, wrench-tight, 316 stainless steel, EPDM O-ring, 1½ in NPT ²								C	
Flush and drain housing, wrench-tight, 316 stainless steel, Kalrez O-ring, 1½ in NPT ²								D	
Flush and drain housing, wrench-tight, titanium, Viton O-ring, 1½ in NPT ²								F	
Flush and drain housing, wrench-tight, titanium, EPDM O-ring, 1½ in NPT ²								G	
Flush and drain housing, wrench-tight, titanium, Kalrez O-ring, 1½ in NPT ²								H	
Flush and drain housing, hand-tight, 316 stainless steel, Viton O-ring, 1½ in NPT ²								P	
Flush and drain housing, hand-tight, 316 stainless steel, EPDM O-ring, 1½ in NPT ²								Q	
Flush and drain housing, hand-tight, 316 stainless steel, Kalrez O-ring, 1½ in NPT ²								R	
Flush and drain housing, hand-tight, titanium, Viton O-ring, 1½ in NPT ²								T	
Flush and drain housing, hand-tight, titanium, EPDM O-ring, 1½ in NPT ²								U	
Flush and drain housing, hand-tight, titanium, Kalrez O-ring, 1½ in NPT ²								V	
Integral cable length in m (ft)									
No cable, junction box (4TB5023-0088) included									0
1.5 (5)									1
3.0 (10)									2
4.5 (15)									3
6.0 (20)									4
7.6 (25)									5
9.1 (30)									6
10.6 (35)									7
12.1 (40)									8
13.7 (45)									9
15.2 (50)									A
22.9 (75)									B
30.5 (100)									C
Additional insertion length for in-line insertion style									
Standard length (1.25 in) ^{3,4}									0 0 0
2.0 in ^{3,1}									2 . 0
3.0 in ^{3,1}									3 . 0
4.0 in ^{3,1}									4 . 0
5.0 in ^{3,1}									5 . 0
6.0 in ^{3,1}									6 . 0
7.0 in ^{3,1}									7 . 0
Insulator tip material									
PEEK									

¹ In-line insertion and immersion sensor style only

² Hot-tap sensor style only

³ Distance measured from end of threads to tip of electrodes

⁴ This is the default standard insertion length for in-line insertion and hot-tap styles

TB465 in-line, immersion or hot-tap (retractable) conductivity sensor – range 0 to 2,000 µS/cm	TB465	X	X	X	X	X	X	X	X	
Sensor style										
In-line insertion or immersible	0									
Hot-tap, no hardware, 16 in length	1									
Hot-tap, no hardware, 24 in length	4									
Hot-tap, no hardware, 30 in length	5									
Hot-tap, no hardware, 36 in length	6									
Integral temperature compensation										
3 KΩ		E								
Hot-tap mounting hardware and compression fittings										
No hardware ¹								0		
Hand-tight, 316 stainless steel, Viton O-ring, 1¼ in NPT ²								1		
Wrench-tight, 316 stainless steel, Viton O-ring, 1 in NPT ²								2		
Flush and drain housing, wrench-tight, 316 stainless steel, Viton O-ring, 1½ in NPT ²								B		
Flush and drain housing, wrench-tight, 316 stainless steel, EPDM O-ring, 1½ in NPT ²								C		
Flush and drain housing, wrench-tight, 316 stainless steel, Kalrez O-ring, 1½ in NPT ²								D		
Flush and drain housing, wrench-tight, titanium, Viton O-ring, 1½ in NPT ²								F		
Flush and drain housing, wrench-tight, titanium, EPDM O-ring, 1½ in NPT ²								G		
Flush and drain housing, wrench-tight, titanium, Kalrez O-ring, 1½ in NPT ²								H		
Flush and drain housing, hand-tight, 316 stainless steel, Viton O-ring, 1½ in NPT ²								P		
Flush and drain housing, hand-tight, 316 stainless steel, EPDM O-ring, 1½ in NPT ²								Q		
Flush and drain housing, hand-tight, 316 stainless steel, Kalrez O-ring, 1½ in NPT ²								R		
Flush and drain housing, hand-tight, titanium, Viton O-ring, 1½ in NPT ²								T		
Flush and drain housing, hand-tight, titanium, EPDM O-ring, 1½ in NPT ²								U		
Flush and drain housing, hand-tight, titanium, Kalrez O-ring, 1½ in NPT ²								V		
Integral cable length in m (ft)										
No cable, junction box (4TB5023-0088) included								0		
1.5 (5)								1		
3.0 (10)								2		
4.5 (15)								3		
6.0 (20)								4		
7.6 (25)								5		
9.1 (30)								6		
10.6 (35)								7		
12.1 (40)								8		
13.7 (45)								9		
15.2 (50)								A		
22.9 (75)								B		
30.5 (100)								C		
Additional insertion length for in-line insertion style										
Standard length (1.25 in) ^{3,4}								0	0	0
2.5 in ^{3,1}								2	.	0
3.5 in ^{3,1}								3	.	0
4.5 in ^{3,1}								4	.	0
5.5 in ^{3,1}								5	.	0
6.5 in ^{3,1}								6	.	0
7.5 in ^{3,1}								7	.	0
Insulator tip material										
PEEK										

¹ In-line insertion and immersion sensor style only

² Hot-tap sensor style only

³ Distance measured from end of threads to tip of electrodes

⁴ This is the default standard insertion length for in-line Insertion and hot-tap styles

TB464 flow-cell or Safe-T-Clean conductivity sensor

TB464 sensors (Figure 7) are compatible with a bushing nut and union or can be retro-fitted into standard DN25 bushings with 0.983 to 0.995 in internal diameters. They are also available for installation into 4TB9515-0190 and 4TB9515-0223 flow cells or the TB18 Safe-T-Clean sensor valve. The TB464 quickly and easily installs into the flow cell without twisting the sensor cable.

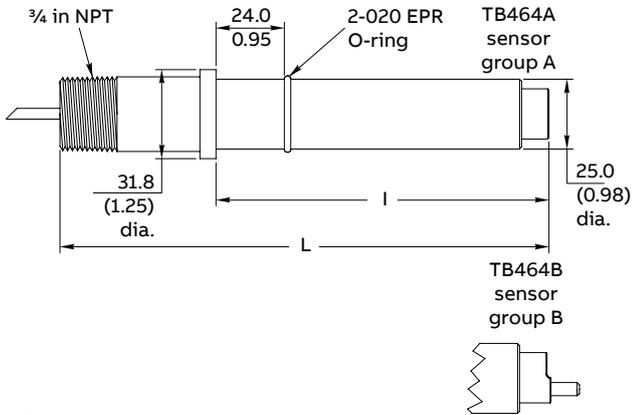


Figure 7 TB464 sensor

Dimensions

Dimensions in mm (in)

TB464 sensor



When:

I = 100.0 (3.94), L = 154.9 (6.10);

Specification

Applications

- Cooling towers
- Packaged water systems
- Exchange columns,
- Heat exchangers
- All other low to medium range conductivity measurements

Maximum pressure / temperature

1,378 kPag (200 psi) at 200 °C (392 °F)

Materials

Body and electrodes:	316 stainless steel
Insulator:	PEEK
O-rings (internal):	Viton
O-rings (external):	Ethylene propylene

Special features

- Easy installation into a flow cell, any available 25 mm port, or the TB18 Safe-T-Clean sensor valve
- Flexible insertion depth

TB464 flow cell kits

See Figure 2 on page 5.

Ordering information

TB464 flow-cell and Safe-T-Clean conductivity sensor – ranges 0 to 2,000 and 0 to 2,000,000 µS/cm	TB464	X	X	X	X	X	X	X	X	X	X
Measurement range											
'A' range – 0 to 2,000,000 µS/cm	A										
'B' range – 0 to 2,000 µS/cm ¹	B										
Integral temperature compensation											
3 KΩ	E										
O-ring material											
EPR, standard			1								
Electrode material											
316 stainless steel					1						
Reserved											
Reserved for future use						0					
Body length in mm											
100 ²							1	0	0		
Integral cable length in m (ft)											
No cable, junction box included											0
1.5 (5)											1
3.0 (10)											2
4.5 (15)											3
6.0 (20)											4
7.6 (25)											5
9.1 (30)											6
10.6 (35)											7
12.1 (40)											8
13.7 (45)											9
15.2 (50)											A
22.9 (75) ³											B
30.5 (100) ³											C
Insulator tip material											
PEEK											2

¹ Not compatible with TB18 Safe-T-Clean valve

² Required for use with 4TB9515-0223 / 4TB9515-0190 flowcell or TB18 Safe-T-Clean valve

³ Available only on 'A' range (0-2,000,000 µS/cm) configuration

TB468 insertion or hot-tap conductivity sensor with hastelloy electrodes for corrosive service (Group A)

TB468 sensors are available in either in-line insertion (TB4680) (Figure 8) or hot-tap styles (TB4683). The insertion style is also submersible. A Kynar (PVDF) body and Hastelloy® C electrodes enable use in aggressive applications where 316 stainless steel is not advised.



Figure 8 TB4680 sensor

Specification

Applications

- Concentration monitoring of process streams that would corrode 316 stainless steel electrodes
- Condensate and heat exchanger monitoring with potential for acid intrusion

Maximum pressure / temperature

TB4680:	689 kPag (100 psi) at 50 °C (122 °F)
In-line / immersion:	354 kPag (50 psi) at 100 °C (212 °F)
TB4683:	275 kPag (40 psi) at 90 °C (194 °F)
Hot-tap	138 kPag (20 psi) at 140 °C (284 °F)

Materials

Body:	Kynar (PVDF)
Hot-tap sheath, pressure ring and electrodes:	Hastelloy C
Hot-tap compression fitting:	PTFE

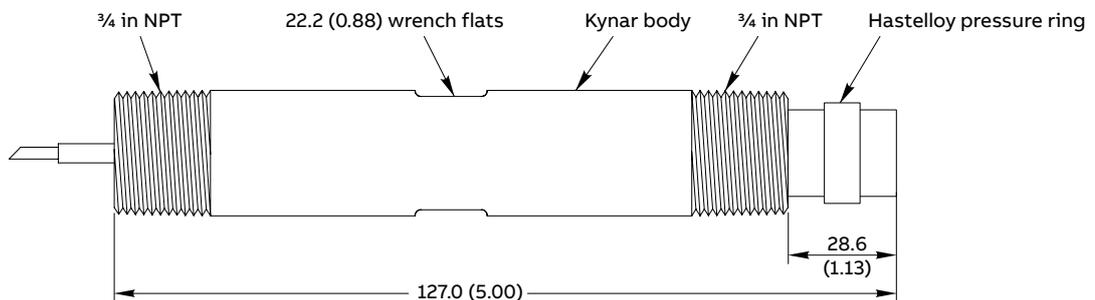
Special features

- Corrosion resistance
- Hastelloy Electrodes

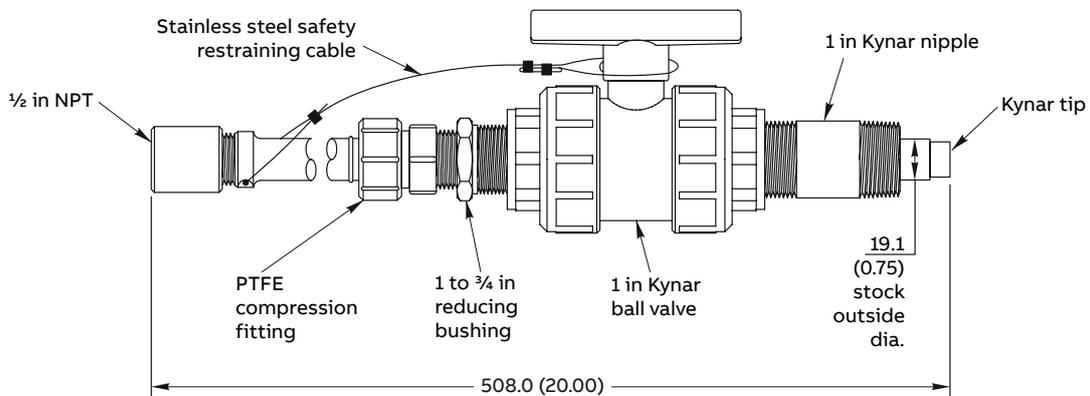
Dimensions

Dimensions in mm (in)

TB4680 insertion style



TB4683 hot-tap style



Ordering information

TB468 in-line or hot-tap conductivity sensor with hastelloy electrodes for corrosive service – range 0 to 2,000,000 $\mu\text{S}/\text{cm}$	TB468	X	X	X	X
Sensor type					
Insertion of immersion		0			
Retractable hot-tap ¹		3			
Integral temperature compensation					
3 K Ω			E		
Mounting accessories					
None					0
PTFE compression hardware ²					1
Integral cable length in m (ft)					
No cable, junction box included					0
1.5 (5)					1
3.0 (10)					2
4.5 (15)					3
6.0 (20)					4
7.6 (25)					5
9.1 (30)					6
10.6 (35)					7
12.1 (40)					8
13.7 (45)					9
15.2 (50)					A
22.9 (75)					B
30.5 (100)					C

¹ Does not include ball valve

² Not available with sensor type '0' (insertion or immersion)

TB47 high pressure retractable hot-tap sensor

TB47 sensors (Figure 9) are designed for service in systems that exceed the pressure ranges of standard hot-tap sensors. Equipped with an extraction housing with purge ports and optional ball valve, the assembly enables maintenance or sensor replacement without the need for complete process shutdown.

For safety reasons ABB recommends reducing the operating pressure below 690 kPa (100 psi) during insertion and retraction of the sensor assembly.

Ruggedly constructed of 316 stainless steel, these sensors withstand the most demanding processes and measurement requirements.



Figure 9 TB471 sensor

Specification

Applications

- Boiler condensate measurements
- Pulp stock lines
- Sealed vessel monitoring
- Pulp liquor
- Toxic chemical monitoring
- Heat exchangers
- Concentration monitoring
- All other conductivity measurements requiring special worker safety considerations

Maximum pressure / temperature

2,068 kPag (300 psig) at 200 °C (392 °F)

Materials

Sensor and valve bodies, electrodes, extraction housing, insertion / body assembly, compression fitting:	316 stainless steel
Insulator:	PEEK
O-rings (internal):	Viton
O-rings (external):	Ethylene propylene
Compression fitting ferrule	Kynar (PVDF)
Ball valve seats	PTFE

Special features

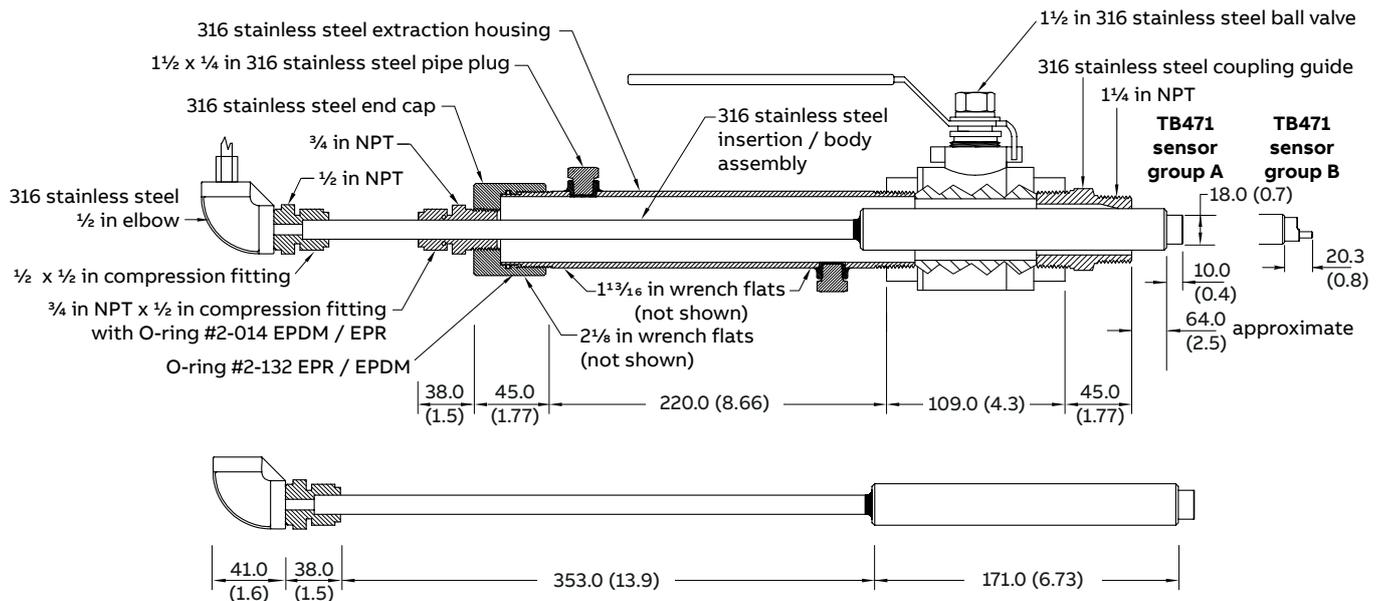
- High pressure capability*
- Purgeable sensor extraction housing

* Safe operating limits are recommended during retraction / insertion; 690 kPa (100 psi) maximum.

Dimensions

Dimensions in mm (in)

All dimensions nominal



Ordering information

TB47 high pressure retractable hot-tap conductivity sensor – ranges 0 to 2,000 and 0 to 2,000,000 $\mu\text{S}/\text{cm}$	TB47	X	X	X	X	X
Measurement range						
'A' range – 0 to 2,000,000 $\mu\text{S}/\text{cm}$		1				
'B' range – 0 to 2,000 $\mu\text{S}/\text{cm}^1$		5				
Hot-tap material						
316 stainless steel			6			
Integral temperature compensation						
3 K Ω				E		
Mounting accessories						
TB47 complete sensor assembly with ball valve and coupling						0
TB47 complete sensor assembly without ball valve and coupling						6
TB47 replacement sensor only						7
Integral cable length in m (ft)						
No cable, junction box included						0
1.5 (5)						1
3.0 (10)						2
4.5 (15)						3
6.0 (20)						4
7.6 (25)						5
9.1 (30)						6
10.6 (35)						7
12.1 (40)						8
13.7 (45)						9
15.2 (50)						A
22.9 (75) ¹						B
30.5 (100) ¹						C

¹ Available only for 'A' range (0 to 2,000,000 $\mu\text{S}/\text{cm}$) configuration

Acknowledgements

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