

TB82

Conductivity transmitters

2-Wire

Loop-powered transmitters
that reduce installation costs in
hazardous areas



Intuitive user interface

- Easy to use menus guide the operator through set-up, calibration and maintenance

Full range of conductivity sensors

- Make measurements in ultra-pure or high conductivity applications

Advanced Digital Communications

- Available with PROFIBUS® PA, FOUNDATION™ Fieldbus or HART communications

Hazardous area transmitters

- Withstand the harshest environments
- NEMA 4X / IP65 housings

Large, Easy-to-Read Display

- Shows primary measurement along with user-selectable secondary display (temperature, output current or sensor input)

Programmable Security Codes

- Prevents unauthorized modifications to transmitter configuration and calibration

Intrinsically Safe, Non-incendive Design

- Permits use in hazardous areas

General Description

The ABB TB82 Series of two-wire conductivity transmitters are available in three base configurations to utilize ABB's two-electrode, four-electrode or toroidal (electrodeless) sensors, allowing for installations ranging from ultra-pure water to the most difficult chemical applications.

The TB82 Series is available with traditional programmable outputs or with advanced digital communications utilizing FOUNDATION Fieldbus (FF), PROFIBUS PA (PA) or HART.

Setup, maintenance and operation in the field is simple. Easy to follow instructions appear above each Smart Key. The user-friendly interface provides for straightforward transmitter configuration and calibration.

A unique secondary display clearly defines each menu option when programming the transmitters. During normal operation, the secondary display may be configured to show process temperature, current output, concentration type, raw conductivity or software revision depending upon configuration.

The TB82 series transmitters meet current CE, NEMA 4X, IP65, CSA, FM, ATEX and FISCO requirements.

Sensor Compatibility and Ranges

Sensor compatibility is determined by the TB82 model number. The TB82 Series is available in three base configurations. The TB82TE connects to ABB 2-electrode sensors, TB82EC to ABB 4-electrode sensors, and TB82TC to ABB toroidal sensors. A menu choice during programming makes changing from one cell constant or sensor group simple; no jumpers or manual adjustments required.

Temperature Compensation

The TB82 is compatible with a variety of automatic temperature compensation elements. See Specification section.

Programmable Security Code

The transmitter has a three-digit security code to prevent unauthorized modifications that may be applied to any combination of the following menus: Calibration, Output/Hold, Security, and Configure.

Basic or Advanced Programming Modes

(FOUNDATION Fieldbus, PROFIBUS PA models and HART available in Advanced mode only)

Available with either Basic or Advanced programming modes at time of purchase, the Advanced mode offers an expanded feature set for more complex operations, such as:

- **Nonlinear and concentration analyzer modes**

Available Mode	TB82TE	TB82EC	TB82TC
0 to 15% NaOH		•	•
0 to 20% NaCl		•	•
0 to 18% HCl		•	•
0 to 20% H ₂ SO ₄		•	•
User-defined	•	•	•

- **Advance temperature compensation modes**

Available Mode	TB82TE	TB82EC	TB82TC
0 to 15% NaOH		•	•
0 to 20% NaCl		•	•
0 to 18% HCl		•	•
0 to 20% H ₂ SO ₄		•	•
User-defined	•	•	•
Pure water neutral salt	•	•	
Pure water trace base	•	•	
Pure water trace acid	•	•	

- **Analog pulse diagnostic output**

Impresses a user-defined 0.16 to 16 mA pulse on the 4 to 20 mA output to alert operator of a fault condition. (Not available on transmitters with digital communication.)

Diagnostics

The transmitter constantly monitors both itself and the sensor to ensure reliability and accuracy. Upon detection of a diagnostic condition, the transmitter provides diagnostic notification by flashing FAULT on the display and supplying a pulse on the analog output (if activated on non-HART devices).

Transmitters equipped with Foundation Fieldbus or PROFIBUS PA send a complete diagnostic description over the network to the controller. This allows for easy, immediate troubleshooting. Pressing FAULT info on the transmitter provides a short description and fault codes on the secondary display. The FAULT icon remains active until problem has been resolved.

Adjustable Damping

Damping is helpful in process environments where noise is present. It is a capacitive type lag where reaction to any signal change is slowed according to the entered time constant. For example, the response to a step input change reaches approximately 63 percent of its final value in five seconds for five seconds of damping.

Communications

FOUNDATION Fieldbus (FF) addresses modern instrument users' needs for flexibility and cost savings, while providing a whole host of additional features.

- Measurement variable quality and diagnostic conditions transmitted during each scheduled data transfer
- Easily configured remotely or locally
- Transmission of multiple process variables utilizes two Analog Input Blocks (AI)
- Transmitter characteristics such as device name, manufacturer and serial number via a Standard Resource Block
- Configuration and calibration capability via custom Enhanced Transducer Block
- Provides calibration Methods on supported host tools and systems

PROFIBUS PA (PA) is a standardized, open, digital communications system for process automation.

- Configuration, calibration and trending available via a Device Type Manager (DTM) when used on compatible host tools and systems
- Measurement variable quality and diagnostic conditions transmitted during each scheduled data transfer
- Remote and local configuration capability
- Choice of Standard Analyzer Profile or Manufacturer Specific Profile — conforms to PROFIBUS PA Profile requirements v. 3.0
- GSD files available on all product variations
- Utilizes one Physical, one Transducer, and two

HART communications protocol provide remote programming via any HART compatible primary or secondary communications device.

- Digital communications through a low-level modulation superimposed on the standard 4-to-20 mA current loop
- Accommodates Universal, Common Practice and Device Specific Command Sets for functionality within HART networks and for use with HART hand-held terminals
- Driver files for various host systems and tools available

Calibration

The TB82 features a simple and straightforward one-point or two-point calibration of the primary process variable and temperature. Calibration data may be manually edited.

Specifications

Type

- 2-wire Conductivity Transmitter:
- 2-Electrode Model TB82TE
 - 4-Electrode Model TB82EC
 - Toroidal Model TB82TC

Input Sensor Types

- TB82TE: ABB 2-electrode sensors
- TB82EC: ABB 4-electrode sensors
- TB82TC: ABB toroidal sensors

Input Temperature Compensation Types

Temperature Element	TB82TE	TB82EC	TB82TC
Pt 100	•	•	•
Pt 1000	•		•
3 kΩ RTD		•	•
4.75 kΩ RTD		•	

Temperature Display Range

-20° to 300°C (-4° to 572°F)

Advance Temperature Compensation Modes

Mode	TB82TE	TB82EC	TB82TC
0 to 15% NaOH		•	•
0 to 20% NaCl		•	•
0 to 18% HCl		•	•
0 to 20% H ₂ SO ₄		•	•
User-defined	•	•	•
Pure water neutral salt	•	•	
Pure water trace base	•	•	
Pure water trace acie	•	•	

Measurement Ranges

2-Electrode Conductivity – Model (TB82TE)

Cell Constant	Measurement Range	Display Resolution	Auto-range
0.01	0 to 199.9 µS/cm	0.001 µS/cm	1.999 to 19.99 to 199.9 µS/cm
0.10	0 to 1999 µS/cm	0.01 µS/cm	19.99 to 199.9 to 1,999 µS/cm
1.00	0 to 19.99 mS/cm	0.1 µS/cm	199.9 to 1999 to 19.99 µS/cm

4-Electrode Conductivity - Model TB82EC

Sensor Group	Measurement Range	Display Resolution	Auto-range
A	0 to 1999 mS/cm	0.1 S/cm	199.9 to 1999 S/cm to 19.99 to 199.9 to 1999 mS/cm
B	0 to 1999 S/cm	0.01 S/cm	19.99 to 199.9 to 1999 S/cm

Toroidal Conductivity - Model TB82TC

Sensor	Measurement Range	Display Resolution	Auto-range
Toroidal	0 to 1999 mS/cm	0.1 S/cm	199.9 to 1999 S/cm to 19.99 to 199.9 to 1999 mS/cm

Accuracy

Display: +/-0.5% of measurement range per decade (TB82EC,TC)
 +/-1.0% of measurement range per decade (TB82TE)
 Output: +/-0.02 mA
 Temperature: 1°C or 1°F

Repeatability

Display: +/-0.5% of measurement range per decade(TB82EC & TC)
 +/-1.0% of measurement range per decade (TB82TE)
 Output: +/-0.02 mA
 Temperature: 1°C to 1°F

Stability

Display: +/-2 LSD typical, +/-5 LSD max
 Output: +/-0.01 mA
 Temperature: 1°C or 1°F

Output

Isolated 4-20 mA, Linear and Non-linear (non-fieldbus models)

Output Minimum Span

Sensor	TB82TE	TB82EC	TB82TC
Cell Constant 0.01	1 µS/cm		
Cell Constant 0.10	10 µS/cm		
Cell Constant 1.00	100 µS/cm		
Group A		100µS/cm	
Group B		10 µS/cm	
Toroidal			100 µS/cm

Concentration: 5% of maximum configured concentration

Output Maximim Span (Full scale settings)

Sensor	TB82TE	TB82EC	TB82TC
Cell Constant 0.01	199.9 µS/cm		
Cell Constant 0.10	1999 µS/cm		
Cell Constant 1.00	19.99 mS/cm		
Group A		1999 mS/cm	
Group B		1999 µS/cm	
Toroidal			1999 mS/cm

Concentration: 1999 digits

Damping

Adjustable: 0.0 to 99.9 seconds

Environmental (Temperature)

Operating: -20° to 60°C (-4° to 140°F)
 LCD: -20° to 60°C (-4° to 140°F)
 Storage: -40° to 70°C (-40° to 158°F)
 Humidity: up to 95% RH

Enclosure

NEMA 4X and IP65, anodized aluminum alloy with polyester powder coating

Size (1/2 DIN)

H x W x D: 144.0 x 144.0 x 171.0 mm (5.67 x 5.67 x 6.73 in.)
 Min. panel depths: 144.8 mm (5.70 in.)
 Max. panel thickness: 9.5 mm (0.38 in.)
 Panel cutout:
 135.4 [+1.3, -0.8] by 135.4 [+1.3, -0.8] mm (5.33 [+0.05, -0.03] by 5.33 [+0.05, -0.03] in.)
 Weight: 1.9 kg (4.2 lb)
 3.4 kg (7.5 lb) with pipe mounting hardware

Conduit Connections

Two (2) each: 22.2 mm (0.875 in.) holes in enclosure that accepts 1/2 inch hubs

Lightning Suppressor

Installed integral to the transmitter to suppress lightning induced transients. Tested to suppress 10 successive 8 by 20-µsec pulses with a peak value of 20 kA (reference IEEE C62.41)

Power Requirements

Standard:	14.0 to 53 VDC (14.0-42 VDC for certified applications)
HART:	14 to 53 VDC (14-42 VDC for certified applications). For HART communication, a 250 Ω resistor is required; 19 VDC minimum voltage required. 14 VDC required for liftoff
Foundation Fieldbus & PROFIBUS PA bus powered:	9-32 VDC (non-I.S. model) 9-24 VDC (I.S. model) 15 mA quiescent current consumption

Agency Certifications ¹

ATEX 100A

ATEX Category II 1G; EEX ia, Zone 1; Group IIC, T4 when used with appropriate barriers

Canadian Standards Association (CSA)

Intrinsic safety: Class I, II, III; Division 1; applicable Groups A, B, C, D, E, F and G; when used with appropriate barriers. T3C

Non-incendive: Class I, Division 2, Groups A, B, C, and D. Class II, Division 2, Groups E, F and G. Class III, Division 2

Factory Mutual (FM)

Intrinsic Safety: Class I, II, III; Division 1; applicable Groups A, B, C, D, E, F and G; when used with appropriate barriers. T3C (Max ambient Temperature: 60° C

Non-incendive: Class I, Division 2, Groups A, B, C, and D. Class II, Division 2, Groups F and G. Class III, Division 2. T5

Fieldbus Intrinsically Safe Concept (FISCO)

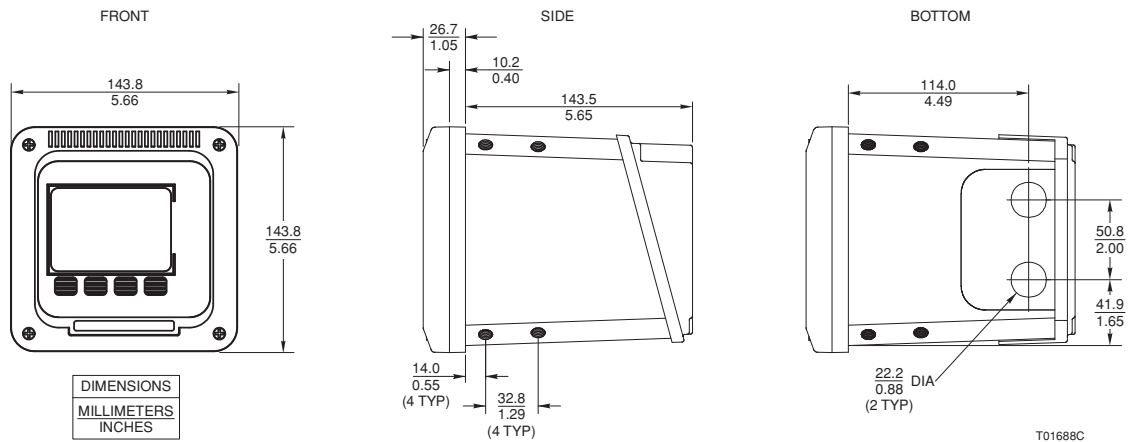
Fieldbus products (FF and PA) meets the requirements for the FISCO model

EMC Requirements

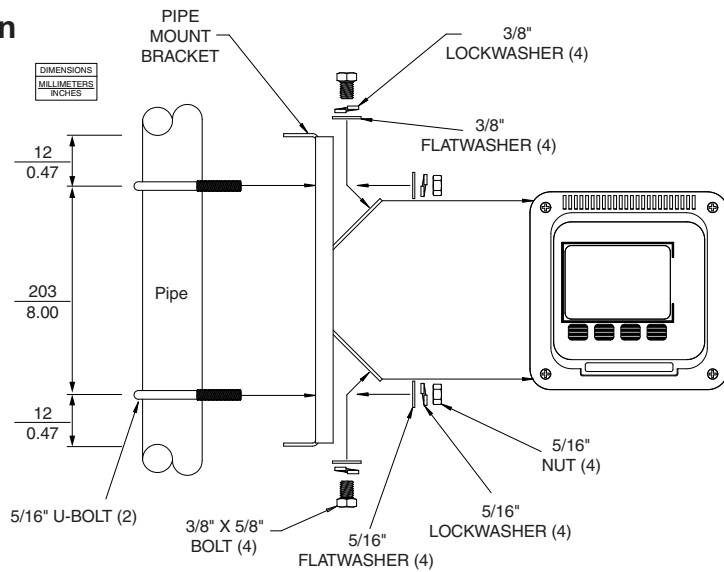
CE Certified — complies with all applicable European Community product requirements, specifically those required to display the CE markings on the product nameplate.

Note 1 - Contact factory on availability

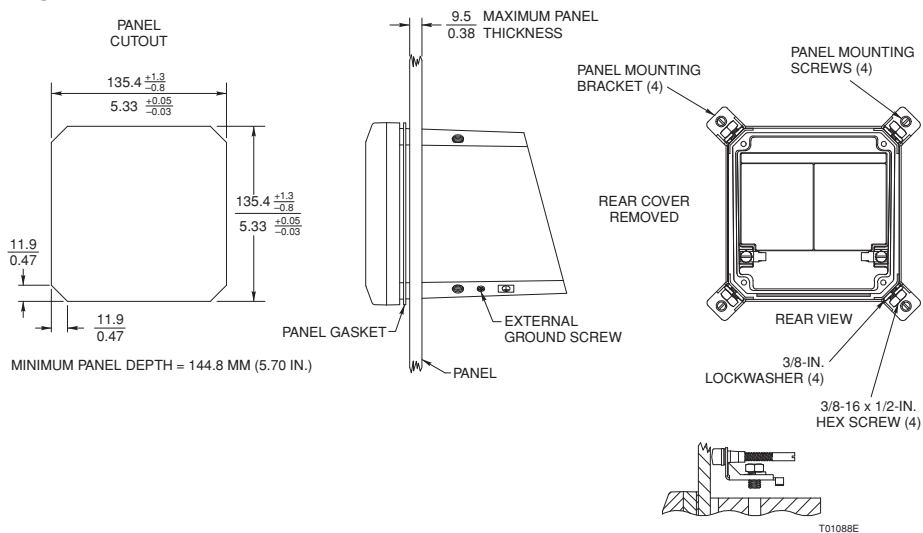
Overall Dimensions



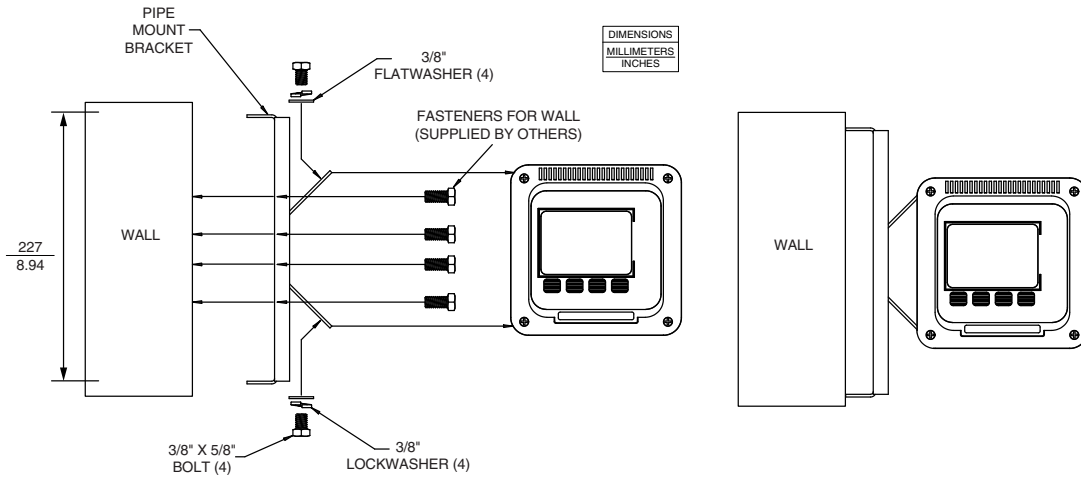
Pipe Mounting Option



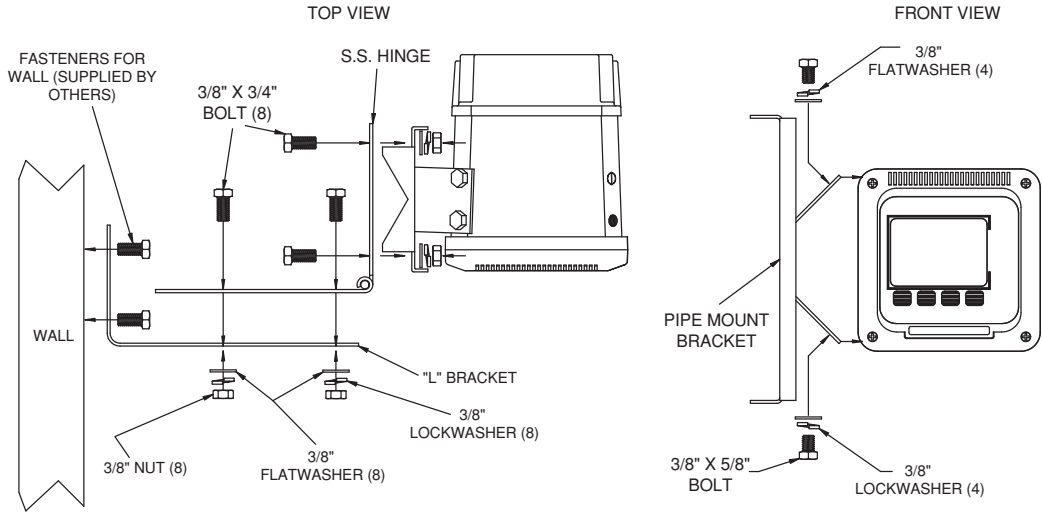
Panel Mounting Option



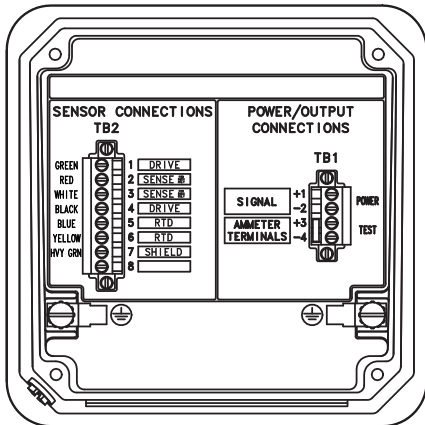
Wall (Side) Mounting Option



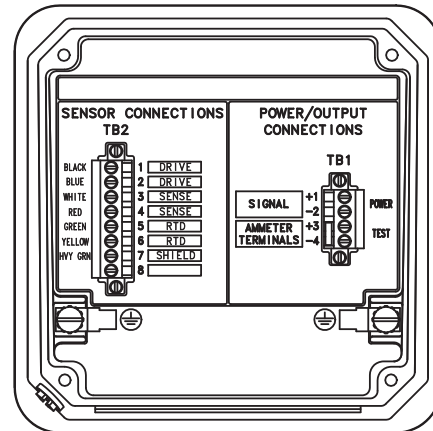
Wall/Hinge (Rear) Mounting Option



Terminal Blocks



TB82EC and TB82TE
2-electrode & 4-electrode



TB82TC
Toroidal (Electrodeless)

	Model TB82	XX	X	X	1	0	X	X	X
Base Model	T B 8 2								
Input Type									
2-Electrode		T							
4-Electrode		E							
Toroidal (Electrodeless)		C							
		T							
		C							
Programming Option¹									
Basic			1						
Advanced			2						
Digital Communications Option									
None (Analog Only)				0					
HART				1					
FOUNDATION Fieldbus				2					
PROFIBUS PA				3					
Lightning Suppressor									
Included					1				
Housing Type									
Powder Coated Aluminum						0			
Mounting Options									
None							0		
Pipe							1		
Wall/Hinge (Rear Mount)							2		
Panel							3		
Wall (Side Mount)							4		
Agency Approvals									
None								0	
FM (Factory Mutual)								1	
CSA (Canadian Standards Association)								2	
ATEX 100A								3	
Tag									
None									0
Stainless									1
Mylar									2

Accessories:

Part Number	Description
4TB9515-0123	Panel Mounting Kit
4TB9515-0124	Pipe Mounting Kit
4TB9515-0125	Hinge Mounting Kit
4TB9515-0156	Wall Mounting Kit

Product Instruction Manuals: (One copy supplied with instrument at no charge)

Notes:

- Advanced *Programming Option* must be selected for HART, FOUNDATION Fieldbus or PROFIBUS PA *Digital Communication Option*



TB82EC 4-Electrode Transmitter

TB82TC Toroidal Transmitter

TB82TE 2-Electrode Transmitter

Notes

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