high-accuracy
measurement
instruments

FICHA TÉCNICA DE PRODUTO

PRODUCT DATASHEET

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ABB MEASUREMENT & ANALYTICS | DATA SHEET

TB82

2-wire conductivity transmitters

Measurement made easy

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 together 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
- enables use in hazardous areas

General description

The ABB TB82 2-wire conductivity transmitters are available in three base configurations to use ABB's 2-electrode, 4-electrode or toroidal (electrodeless) sensors, allowing for installations ranging from ultra-pure water to the most difficult chemical applications.

The TB82 is available with traditional programmable outputs or with advanced digital communications using 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 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 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 3-digit security code to prevent unauthorized modifications to any combination of the following menus: Calibration, Output / Hold, Security and Configure.

Basic or advanced programming modes

Note. FOUNDATION Fieldbus, PROFIBUS PA models and HART are available only in advanced mode.

Available with either basic or advanced programming modes at time of purchase, the advanced mode offers an expanded feature set for more complex operations, for example:

- **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_2SO_4		✔	✔
User-defined	✔	✔	✔

- **Advanced temperature compensation modes**

Available mode	TB82TE	TB82EC	TB82TC
0 to 15 % NaOH		✔	✔
0 to 20 % NaCl		✔	✔
0 to 18 % HCl		✔	✔
0 to 20 % H_2SO_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 the 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 enables 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 the 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 % of its final value in 5 seconds for 5 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 using 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 analog input blocks

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.

Specification

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)

Advanced temperature compensation modes

Mode	TB82TE	TB82EC	TB82TC
0 to 15 % NaOH		✔	✔
0 to 20 % NaCl		✔	✔
0 to 18 % HCl		✔	✔
0 to 20 % H_2SO_4		✔	✔
User-defined	✔	✔	✔
Pure water neutral salt	✔	✔	
Pure water trace base	✔	✔	
Pure water trace acid	✔	✔	

Measurement ranges

TB82TE – 2-electrode conductivity

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

TB82EC – 4-electrode conductivity

Sensor group	Measurement range	Display resolution	Auto-range
A	0 to 1,999 mS/cm	0.1 µS/cm	0 to 199.9 µS/cm 0 to 1,999 µS/cm 0 to 19.99 mS/cm 0 to 199.9 mS/cm 0 to 1,999 ms/cm
B	0 to 1999 µS/cm	0.01 µS/cm	0 to 19.9 µS/cm 0 to 199.9 µS/cm 0 to 1,999 µS/cm

TB82TC – torodial conductivity

Sensor group	Measurement range	Display resolution	Auto-range
Torodial	0 to 1,999 mS/cm	0.1 µS/cm	0 to 199.9 µS/cm 0 to 1,999 µS/cm 0 to 19.99 mS/cm 0 to 199.9 mS/cm 0 to 1,999 ms/cm

Accuracy

Display

- ±0.5 % of measurement range per decade (TB82EC and 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 and 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 to 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		100 µS/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	1,999 µS/cm		
Cell constant 1.00	19.99 mS/cm		
Group A		1,999 mS/cm	
Group B		1,999 µS/cm	
Toroidal			1,999 mS/cm

Concentration: 1999 digits

Damping

Adjustable between 0.0 and 99.9 seconds

…Specification

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 (½ 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 depth

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 each: 22.2 mm (0.875 in) holes in enclosure that accept ½ in 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 V DC (14.0 to 42 V DC for certified applications)

HART

14 to 53 V DC (14 to 42 V DC for certified applications).
For HART communication, a 250 Ω resistor is required;
19 V DC minimum voltage required. 14 V DC required for liftoff

Foundation Fieldbus & PROFIBUS PA bus powered

9 to 32 V DC (non-I.S. model)
9 to 24 V DC (I.S. model)
15 mA quiescent current consumption

Agency certifications

ATEX Directive 2014/34/EU and
IECEx LCIE 16.0012X

ATEX Category II 1G; Ex 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)

Non-incendive:

- Class I; Division 2; Groups A, B, C, D; T3C
- Class II; Division 2; Groups E, F, G; T3C
- Class III; Division 2; T5

Fieldbus Intrinsically Safe Concept (FISCO)

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

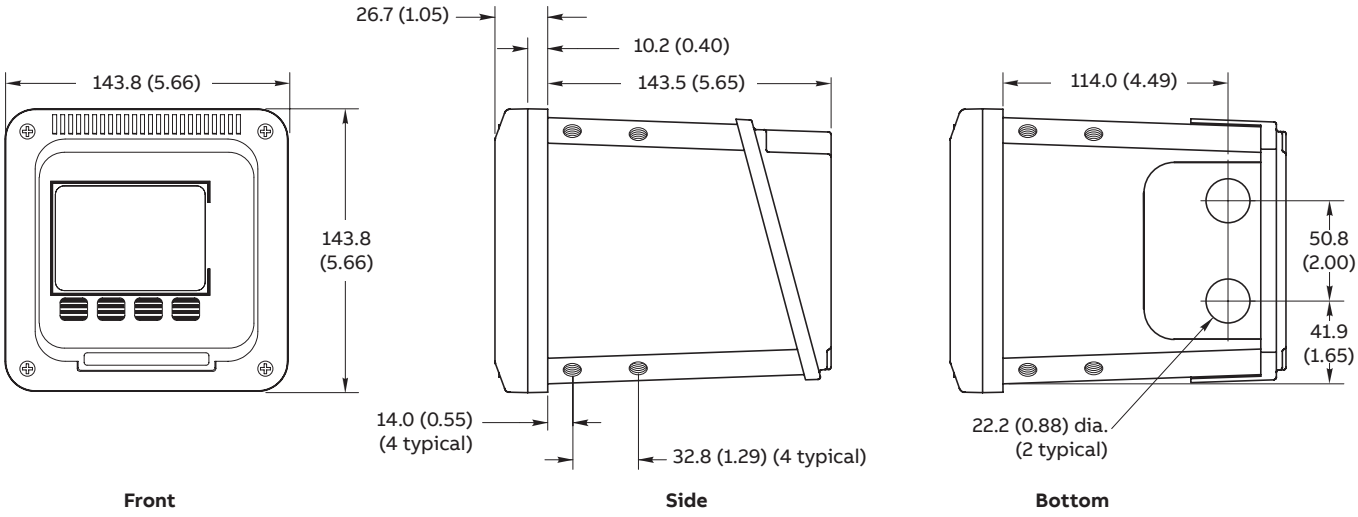
EMC requirements

Conforms to the Directive 2014/30/EU and EN 61326-1 for CE marking

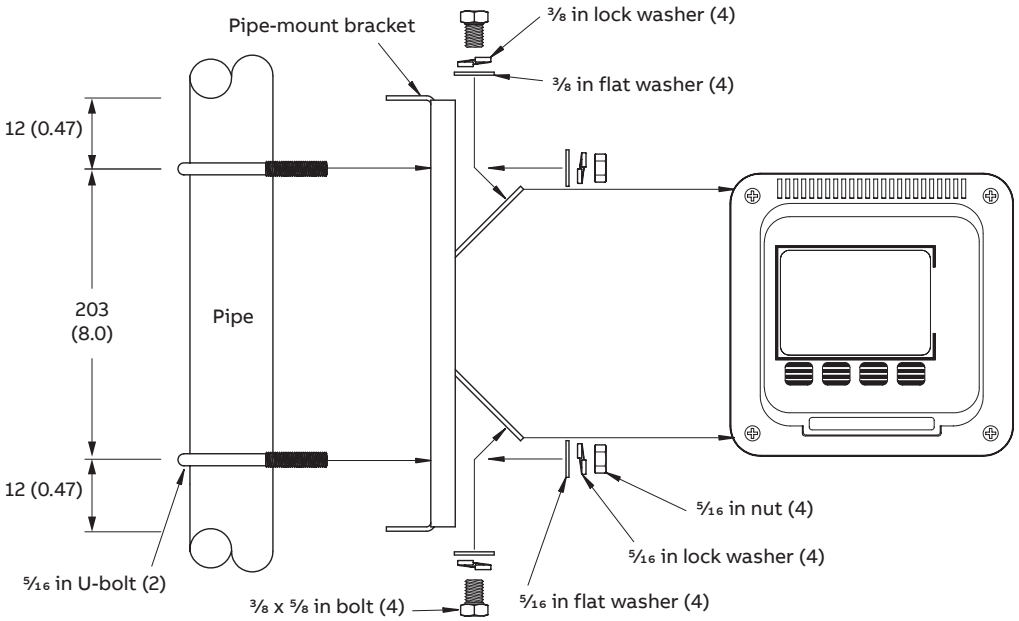
Dimensions

Dimensions in mm (in)

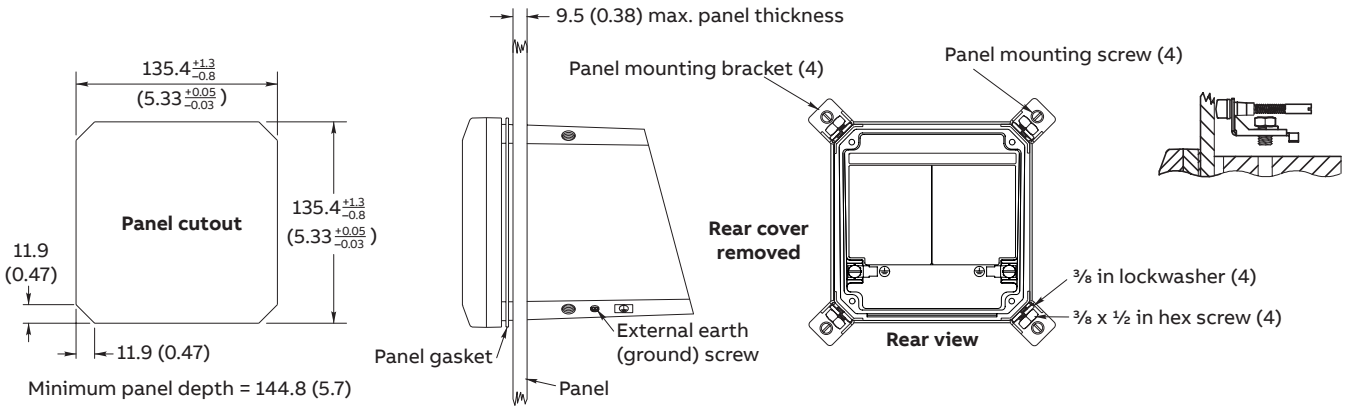
Transmitter



Pipe-mount option



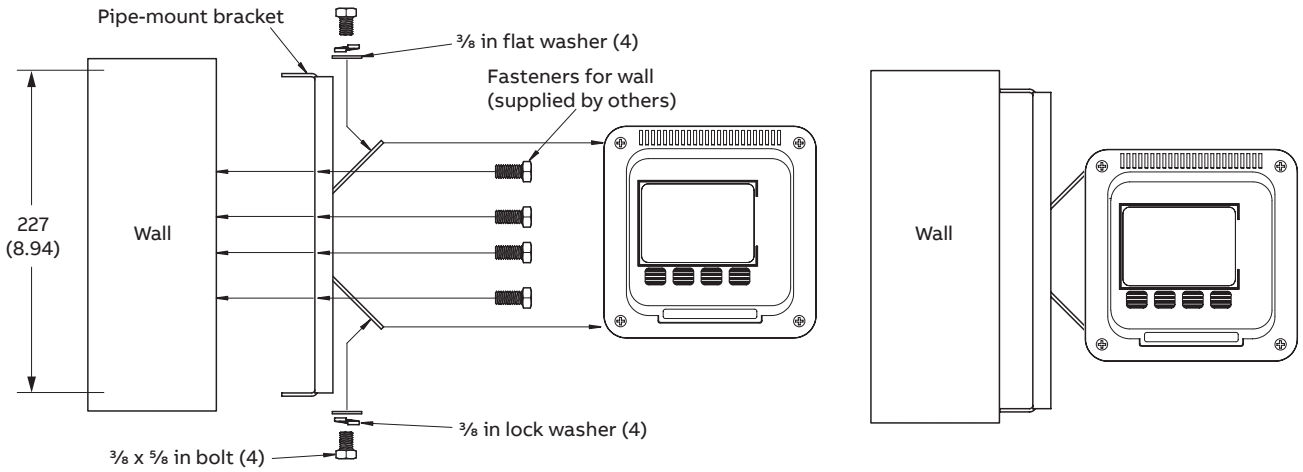
Panel-mount option



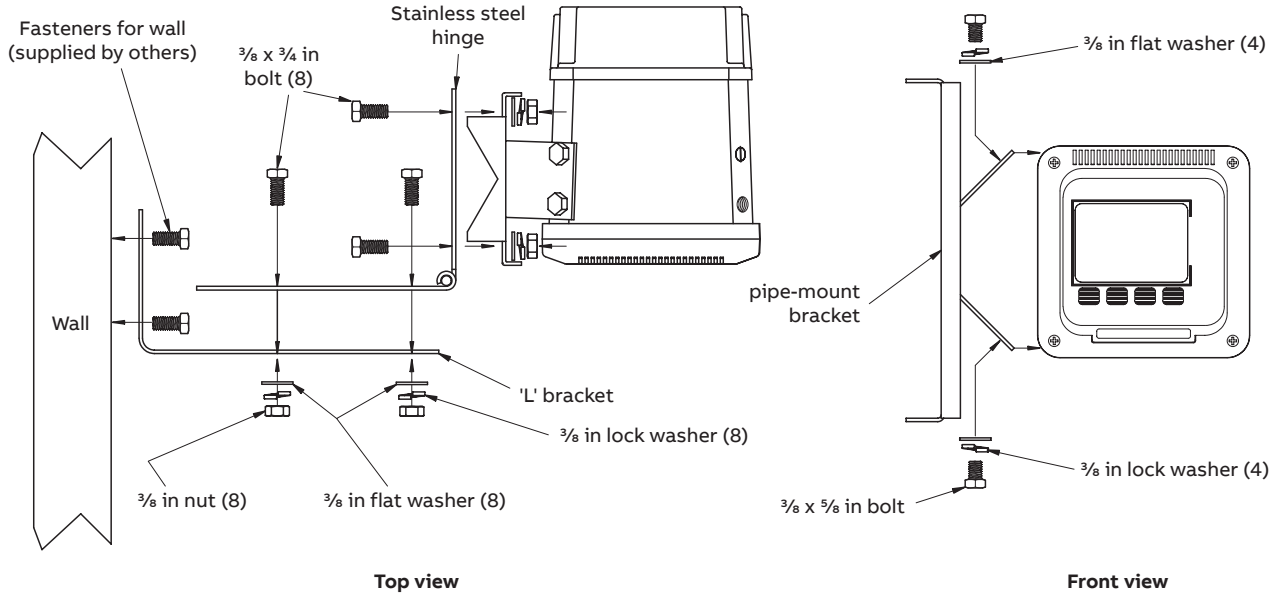
...Dimensions

Dimensions in mm (in)

Wall (side) mounting option

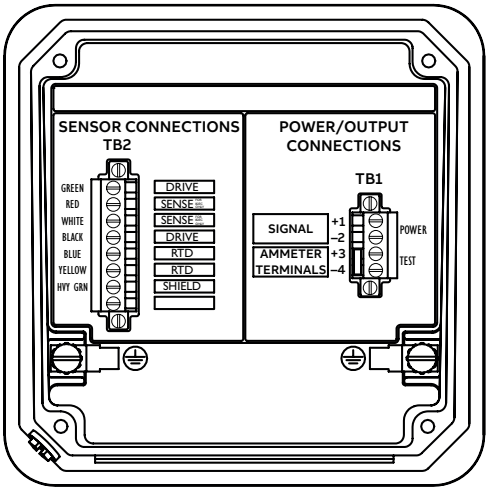


Wall / Hinge (rear) mounting option

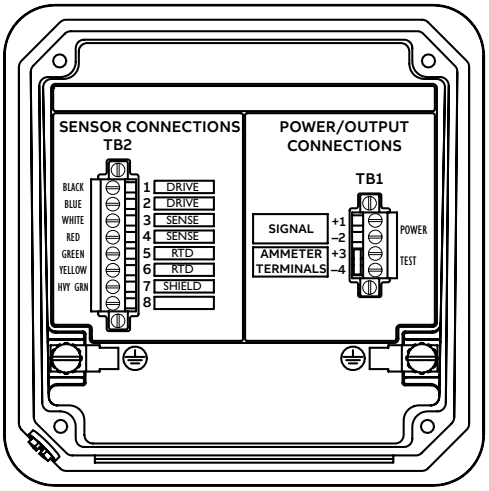


Top view **Front view**

Electrical connections



TB82EC and TB82TE
2-electrode and 4-electrode



TB82TC
Toroidal (electrodeless)

Ordering information

2-wire conductivity transmitter – base model	**TB82**	**XX**	**X**	**X**	**X**	**0**	**X**	**X**	**X**
Input type									
2-electrode		TE							
4-electrode		EC							
Toroidal (electrodeless)		TC							
Programming option[1]									
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 / IECEx								3	
Tag									
None									0
Stainless steel									1
Mylar									2

[1] Advanced programming option must be selected for HART, FOUNDATION Fieldbus or PROFIBUS PA digital communication option

Accessories

Panel-mount kit:	4TB9515-0123
Pipe-mount kit:	4TB9515-0124
Hinge-mount kit:	4TB9515-0125
Wall-mount kit:	4TB9515-0156

Acknowledgements

- Mylar is a registered trademark of Dupont Teijin Films.
- HART is a registered trademark of the HART Communication Foundation.
- PROFIBUS is a registered trademark of PROFIBUS and PROFINET International (PI).
- FOUNDATION is a registered trademark of the Fieldbus Foundation

TB82EC 4-electrode transmitter

TB82TC toroidal transmitter

TB82TE 2-electrode transmitter

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measurement
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Our offering:

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