

# Analytical Instruments

## Two-Wire pH, ORP, pIon Transmitters

### Model TB82PH Series

- **Designed With the Real World in Mind**  
Easy to use menus guide the operator through set-up, calibration and maintenance
- **Simple Menu Guided Configuration**  
Allows users to easily setup and customize transmitter to suit their specific needs
- **Advanced Digital Communications**  
Available with PROFIBUS® PA, FOUNDATION™ Fieldbus or HART communications
- **Industrially Hardened Design**  
Transmitters that withstands the harshest environments
- **Large, Easy-to-Read Display**  
Shows primary measurement along with user-selectable secondary display (temperature, output current or sensor input)
- **Industrial<sup>IT</sup> Level 1 Conformance**  
Seamlessly integrates onto existing ABB control systems. Also certified for use on Delta V® control platform and may be used on nearly every available control platform.
- **Programmable Security Codes**  
Prevents unauthorized modifications to transmitter configuration and calibration
- **Intrinsically Safe, Non-incendive Design**  
Permits use in hazardous areas



**TB82PH - a leap forward in 2-wire pH/ORP/pIon transmitter technology**



## General Description

The rugged ABB Type TB82 Series of two-wire pH, ORP (REDOX), plon transmitter is designed for a broad range of industries from chemical, power, and pulp & paper to water & wastewater treatment.

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, mV or software revision depending upon configuration.

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

## Sensor Compatibility

The TB82PH transmitter accepts ABB pH, oxidation/reduction potential (ORP) and ion-selective (plon) sensors in addition to most competitors.

## Calibration

In addition to the traditional two-point calibration, the TB82 features a simple one-point process calibration to adjust for offsets that may occur when the sensor is in process. When initiating a two-point calibration, the user has the option to hold the analog output at a defined level. If necessary, the TB82 may be easily reset back to a factory calibration.

## 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 and HART models 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:

- **Automatic Nernstian With Solution Coefficient**  
Temperature compensates the sensor output to standard temperature value of 25° C using the Nernst equation and a solution coefficient
- **Ion Concentration**  
Converts a plon sensor output to concentration units such as parts per million or parts per billion
- **Analog pulse diagnostic output:**  
Impresses 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.

Sensor faults that active the diagnostic notification are:

- Broken glass electrode <sup>1</sup>
- High reference impedance <sup>1</sup>
- Shorted or damaged cable
- Open cable
- Sensor is not in contact with solution <sup>1</sup>
- Shorted or open temperature compensator
- Ground loop <sup>1</sup>

*Note <sup>1</sup>: requires the use of pH sensors with solution ground rods such as the ABB TBX5 series sensors.*

## 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 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 handheld terminals
- Driver files for various host systems and tools available. Visit [www.abb.com/instrumentation](http://www.abb.com/instrumentation).

## Specifications

### Type

2-wire pH, ORP, plon transmitter

### Input Sensor Types

pH:	Glass, antimony (Sb), custom iso-potential and asymmetric potential
ORP:	Platinum (Pt), gold (Au)
plon:	Sodium (Na), chloride, sulfide, etc.

### Input Range

pH:	0 to 14 pH (with -2 to +16 pH over range)
ORP/plon:	+/- 1999 mV

### Input Temperature Compensation Types

Pt 100, 3 k $\Omega$  Balco RTD

### Temperature Display Range

-20° to 300° C (-4° to 572° F)

### Temperature Compensation Modes

pH/ORP/plon:	Manual Nernstian, standard automatic Nernstian, automatic Nernstian with solution coefficient
--------------	---

### Accuracy, Repeatability, Non-linearity

pH display:	+/- 0.01 pH
ORP display:	+/- 1 mV
plon display:	+/- 1 mV
Temperature Display:	1° C or 1° F
Output:	+/- 0.02 mA (non-FF devices)

### Lightning Suppressor

Installed integral to the transmitter to suppress lightning induced transients. Tested to suppress 10 successive 8 by 20- $\mu$ sec 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  $\Omega$  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

#### 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.

### Stability

pH: +/- 0.01 pH  
ORP/plon: +/- 1 mV  
Output: +/- 0.01 mA  
Temperature: 1° C or 1° F

### Dynamic Response

3 secs for 90% step change at 0.00 sec damping

### Output

pH: Isolated 4 to 20 mA, linear and nonlinear, configurable across full pH range  
ORP/plon: Isolated 4 to 20 mA, linear and nonlinear, configurable across full range

### Output Minimum Span

pH: 1.00 pH  
ORP/plon: 100 mV

### Output Maximum Span (Full scale settings)

pH: 14 pH units  
ORP/plon: -1999 to 1999 mV

### 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

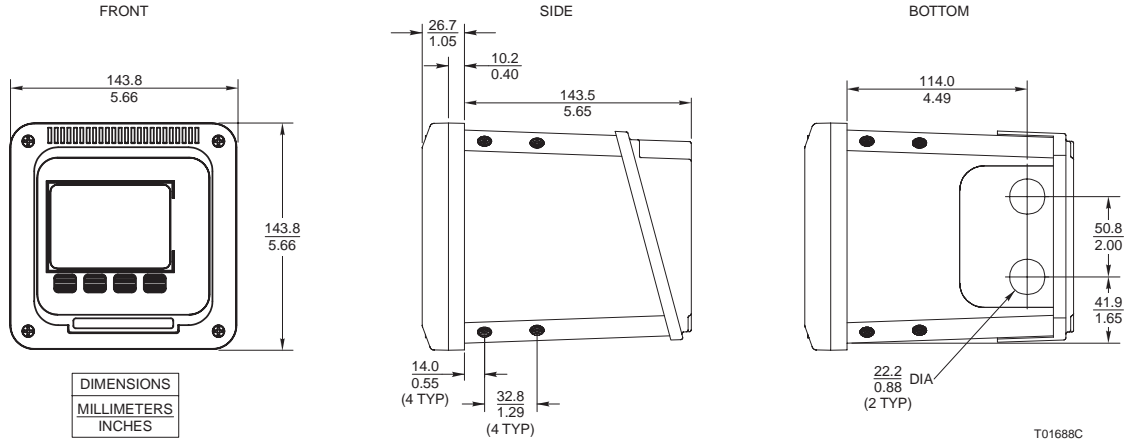
### Size (1/2 DIN)

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

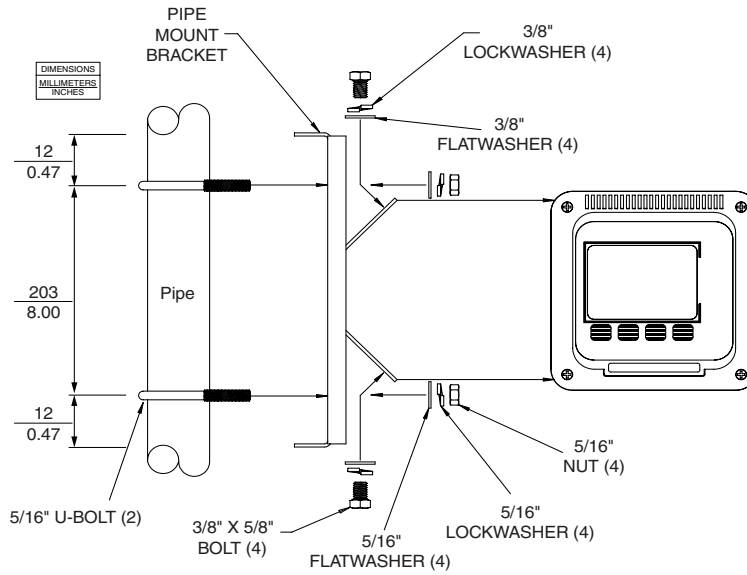
### Conduit Connections

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

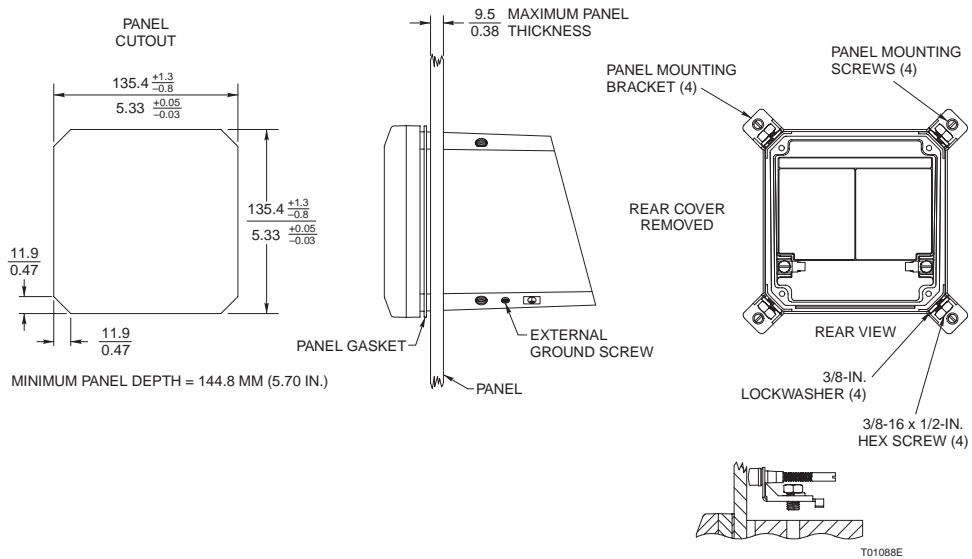
### Overall Dimensions



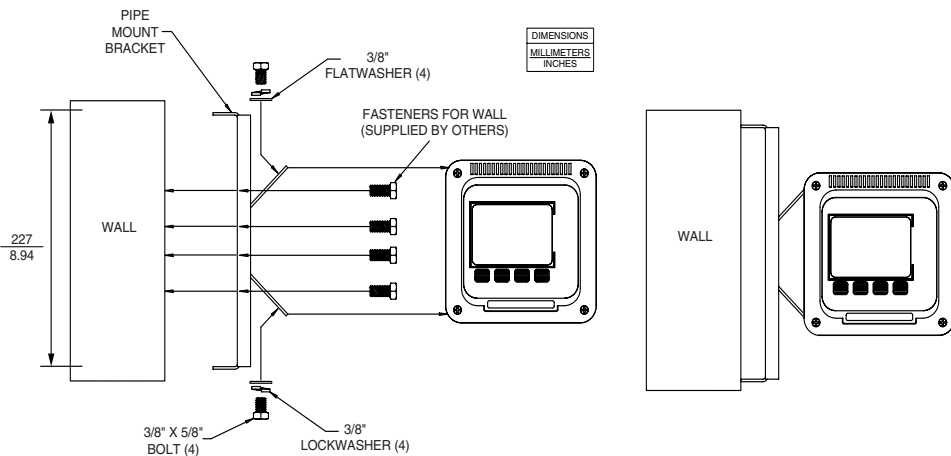
### Pipe Mounting Option



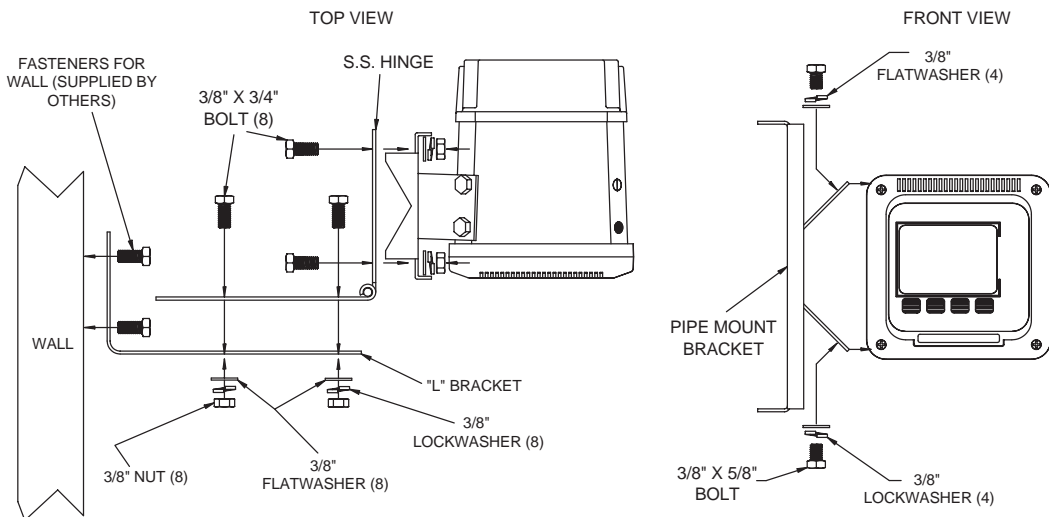
### Panel Mounting Option



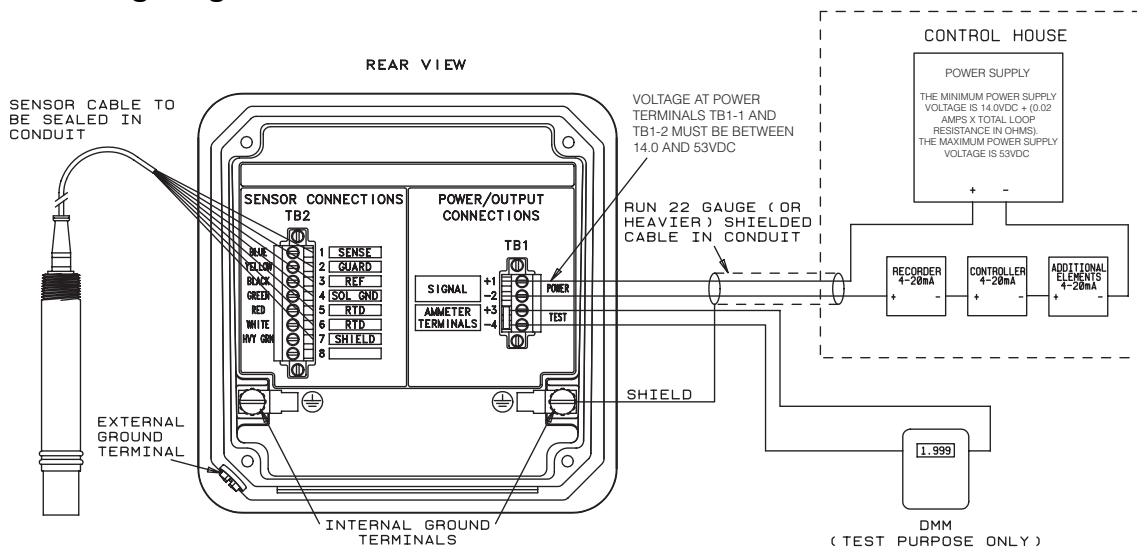
## Wall (Side) Mounting Option



## Wall/Hinge (Rear) Mounting Option



## Typical Wiring Diagram



	Model TB82	PH	X	X	1	0	X	X	X
<b>Base Model</b>	TB82								
<b>Input Type</b> pH, ORP, plon		PH							
<b>Programming Option<sup>1</sup></b> Basic Advanced			1 2						
<b>Digital Communications Option</b> None (Analog Only) HART FOUNDATION Fieldbus PROFIBUS PA				0 1 2 3					
<b>Lightning Suppressor</b> Included					1				
<b>Housing Type</b> Powder Coated Aluminum						0			
<b>Mounting Options</b> None Pipe Wall/Hinge (Rear Mount) Panel Wall (Side Mount)							0 1 2 3 4		
<b>Agency Approvals</b> None FM (Factory Mutual) CSA (Canadian Standards Association) ATEX 100A								0 1 2 3	
<b>Tag</b> None Stainless Mylar									0 1 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
4TB9515-0164	BNC Adapter
4TB9515-0166	BNC Adapter with Liquid Tight Cable Fittings

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

Notes:

1. "Advanced" Programming Option must be selected for HART, FOUNDATION Fieldbus and PROFIBUS PA Digital Communication Option

Notes

---

ABB has Sales & Customer Support  
expertise in over 100 countries worldwide

[www.abb.com](http://www.abb.com)

The Company's policy is one of continuous product  
improvement and the right is reserved to modify the  
information contained herein without notice.

Printed in USA (2.7.06)

© ABB 2006



**ABB Inc.**  
125 East County Line Road  
Warminster, PA 18974  
USA  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

**ABB Inc.**  
9716 S. Virginia St., Ste E  
Reno, NV 89521  
USA  
Tel: +1 775 850 4800  
Fax: +1 775 850 4808

**ABB Limited**  
Oldends Lane, Stonehouse  
Gloucestershire, GL 10 3TA  
UK  
Tel: +44 (0)1453 826661  
Fax: +44 (0)1453 829671