

# Endura APA592 pH / Redox (ORP) transmitter

Rugged design transmitter for  
industrial applications



#### Unique 24 V DC two-wire transmitter

- Dual compartment design
- Tropicalized circuit boards
- Coated aluminum options
- IP 66 / 67, NEMA 4X Enclosure

#### Through-the-glass (TTG) programming configuration

- No exposed internal circuitry
- Reduces the downtime in hazardous areas

#### Easy and flexible installation

- Intrinsically safe
- Non-incendive
- Dust-ignition proof
- Flameproof
- Explosion-proof

#### Output options

- 4 to 20 mA with HART signal

#### Continuous sensor and self-monitoring

- Electronics self-check
- Advanced sensor diagnostics

#### Configuration

- Easy-to-configure menus
- FDT / DTM, EDD HART programming

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# Endura APA592

## pH / Redox (ORP) transmitter

### The Endura family of products

ABB's Endura family of analytical transmitters are designed for the requirements of industrial customers. These 2-wire 24 V DC instruments are used in measurement and control applications in a broad range of industries including chemical, pulp & paper, mining, and petroleum refining.

#### Sensor compatibility

The APA592 transmitter is fully compatible with ABB's full range of glass, antimony, and redox (ORP) electrodes. Additionally, this transmitter is compatible with many competitor sensor inputs. The APA592 has automatic temperature sensor recognition for both 2- and 3-wire RTD inputs for common inputs such as Pt100, Pt1000, and 3k Balco.

#### Rugged, yet familiar design

All ABB electronics are based around a common design platform. The programming structure of the menus is similar from product to product. This means that operators spend less time learning how to work with a new product. The menu structure is based on a simple, mobile-phone style programming format.

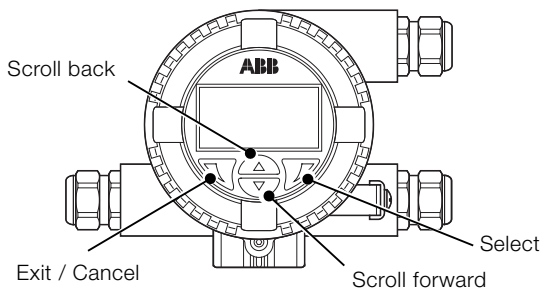


Fig. 1: Navigation keys

The APA592 is supplied as standard with a durable, powdercoat epoxy, aluminum housing suitable for corrosive environments. All programming can be done through the window display on the front of the transmitter. This means that internal circuitry is never exposed to the atmosphere. This feature is especially critical in hazardous areas as the transmitter does not need to be isolated from the ignition source. As added protection, each circuit board is conformal coated to prevent corrosion should humidity ever enter the transmitter enclosure.

#### Calibration and sensor replacement

As pH and Redox (ORP) sensors are consumable, they require periodic calibration and replacement. The APA592 transmitter provides automatic temperature sensor recognition. This feature reduces the setup time when a new sensor is installed. Two-point buffer calibrations are now simplified with automatic buffer recognition with temperature correction. In addition to the traditional two-point buffer calibration, the APA592 has a simple, single-point process calibration. The process calibration removes any offset in pH reading created by the process conditions.

A calibration trend stores the last five values of sensor slope and offset with time stamp. This data can be accessed through EDD and DTM.

### Diagnostics (NE107 based)

The APA592 transmitter has continuous self-monitoring of the electronics, input power, and sensor characteristics to ensure a reliable, accurate measurement. Operating diagnostic faults can be read through the operator screen on the LCD display.

#### Sensor diagnostics include the following:

- Low pH measuring electrode impedance (broken glass)
- High reference impedance
- Ground loops present or shorted sensor cable (damaged sensor cable)
- Open sensor cable or sensor out of solution
- Temperature over / under range (short- or open-circuited temperature sensor)

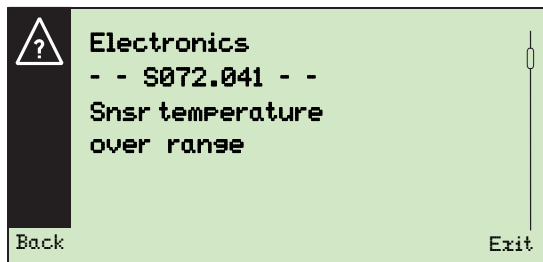


Fig. 2: Example diagnostic message

Some sensor diagnostics require the use of a pH sensor with a solution ground connection such as the AP200 and TBX5 series sensor products.

### Communications

#### HART

Standard digital HART Version 5.9 provides communication with any HART primary or secondary device. The HART signal is superimposed on the standard 4 to 20 mA current output.

Error messages can also be sent over the HART digital signal for monitoring in the DCS control system. If simultaneous faults have occurred, the APA592 can display them in order of severity.

Hart programming can be done through DTM software or with conventional EDD. The latest version of the HART software can be downloaded from [www.abb.com/analytical-instruments](http://www.abb.com/analytical-instruments).

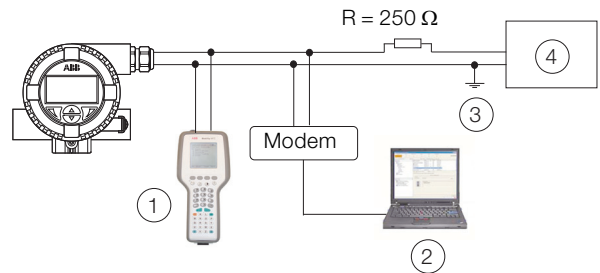


Fig. 3: HART communications

1. DHH801, FC475
2. FDT/DTM technology or EDD technology
3. Ground connection (optional)
4. ABB Asset Vision Professional or DCS config.

# Endura APA592

## pH / Redox (ORP) transmitter

### Technical data

<b>Input</b>		<b>Compensation modes</b>	
<b>Process variable</b>		pH:	
pH:	Glass, antimony (Sb)	– Manual	
ORP (Redox):	Platinum (Pt), Gold (Au)	– Automatic Nernstian,	
plon:	Custom user-programmable	– Nernstian with solution coefficient	
<b>Resistance</b>		ORP / plon:	
Glass:	$>1 \times 10^{13} \Omega$	– Manual, solution compensation coefficient	
<b>Range</b>		<b>Dynamic response</b>	
pH:	0 to 14 pH (–2 to 16 pH over range)	<3 Seconds for 90 % step change at 0.00 second dampening	
ORP:	–1500 to +1500 mV	<b>Output</b>	
<b>Resolution / accuracy / linearity / stability</b>		<b>Signal</b>	
pH:	$\pm 0.01 \text{pH}$	Configurable:	
ORP / plon:	$\pm 1 \text{mV}$	– 4 to 20 mA (standard with HART)	
<b>Temperature</b>		– User-programmable linear and non-linear across the entire range	
<b>Sensor</b>		Dynamic range:	
Auto-recognition:		– 3.9 to 20.75 mA	
PT100, PT1000, 3 k $\Omega$ Balco 2- and 3-wire inputs		(3.8 mA = low alarm level, 21.5 mA = high alarm level)	
<b>Input range</b>		<b>Minimum span</b>	
–20 to 200 °C (–4 to 392 °F)		1 pH / 100 mV	
<b>Accuracy / stability</b>		<b>Maximum span</b>	
$\pm 0.1 \text{ °C}$ (0.18 °F) after calibration		14 pH / 3000 mV	
		<b>Damping</b>	
		Adjustable 0.0 to 99 seconds	

## Power supply (polarity safe)

### Supply voltage

$U_s = 12$  to  $42$  V DC (general purpose installations)

$U_s = 12$  to  $30$  V DC (Intrinsically Safe Ex ia)

### Maximum permissible ripple

Maximum ripple for supply voltage during communication in accordance with HART FSK physical layer specification, version 8.1 (08/1999) section 8.1

### Under-voltage protection

$U_{\text{Terminal-Mu}} < 12$  V results in  $I_a = 3.8$  mA

### Maximum load

$R_{\text{load}} = (\text{supply voltage} - 12 \text{ V}) / 22 \text{ mA}$

Max. load  $\Omega$  depending on supply voltage (V DC)

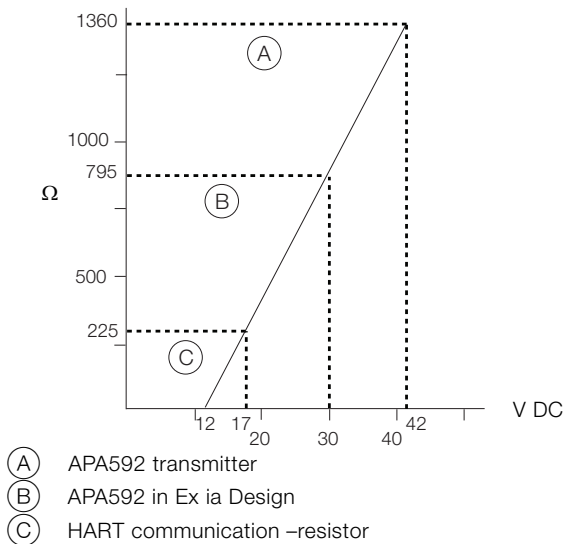


Fig. 4: Maximum load

## General information

### Display update speed

< 250 milliseconds

### Environmental (temperature)

Operating:  $-20$  to  $60$  °C ( $-4$  to  $140$  °F)

Storage:  $-40$  to  $80$  °C ( $-40$  to  $176$  °F)

### Humidity

< 95 % RH non-condensing

### Enclosure protection

Aluminum, die cast, chromized inside / outside,  $70 \mu\text{m}$  epoxy powdercoat (aluminum, magnesium content < 6 %, copper-free < 0.5 %)

### Weight

1.3 Kg (3 lb.)

### Cable gland protection

IP66 and 67 for plastic glands supplied with general purpose / intrinsically-safe instruments. IP67 for stainless glands required for Ex d explosion-proof instruments.

### EMC and RF interference

Emission and immunity for Class A and B equipment in accordance with EU Directive 2004/108/EEC for Class A and Class B equipment.

### Galvanic isolation

900 V DC for 1 second  
(insulation test voltage)

# Endura APA592

## pH / Redox (ORP) transmitter

### Equipment markings

#### Intrinsic safety – FM and CSA

FM Class I, Div. 1, Groups A, B, C, D  
Class II/III, Div. 1, Group E, F, G; T4 Ta = 60 °C

CSA Class I, Div. 1, Groups A, B, C, D  
Class II, Div. 1, Groups E, F, G  
Class III, Div. 1; T4

#### Intrinsic safety – ATEX / IECEx

Approved for:

– II 1G Ex ia IIC T4  
– II 1D Ex iaD A20 IP66 T135 °C, -20 °C ≤ Tamb ≤ 60 °C

#### Intrinsically safe and Ex ia IIC hazardous area

Parameter	Supply circuit
Maximum voltage	$U_i = 30 \text{ V}$
Maximum input current	$I_i = 160 \text{ mA}$
Maximum power	$P_i = 0,8 \text{ W}$
Internal inductance	$L_i = 0,5 \text{ mH}$
Internal capacitance	$C_i = 5 \text{ nF}$

#### Type n (non-sparking) – ATEX / IECEx

Approved for:

II 3 G Ex nA IIC T4  
II 3 D Ex tD A22 IP66 T135 °C, -20 °C ≤ Tamb ≤ 60 °C

#### Non-incendive – FM\* and CSA

FM Class I, Div. 2, Groups A, B, C, D  
Class II/III, Div. 2, Group F, G; T4 Ta = 60 °C

CSA Class I, Div. 2, Groups A,B,C,D  
Class II, Div. 2, Groups F, G  
Class III, Div. 2; T4

\*When installed in accordance with the installation drawing P0909, refer to User Guide (OI/APA592-EN) Appendix B.

#### Explosion-proof, ignition-proof – FM and CSA

FM XP, Class I, Div. 1, Groups A,B,C,D  
Class II/III, Div. 1, Group E, F, G; T4 Ta = 60 °C

CSA Class I, Div. 1, Groups A,B,C,D  
Class II, Div. 1, Groups E, F, G  
Class III, Div. 1; T4

#### Flameproof and dust protection – ATEX / IECEx

Approved for:

II 2 G Ex d IIC T4  
II 2 D Ex tD A21 IP66 T135 °C, -20 °C ≤ Tamb ≤ 60 °C

#### Agency enclosure ratings

IP66 and IP67  
NEMA 4X

#### Approvals

##### CE mark

The APA592 including type B LCD display / configuration software meets all requirements for the CE mark in accordance with the applicable directives 2004/108/EC (EMC), 2006/95/EC (LVD) and 94/9/EC (ATEX).

##### Ex ia (Zone 0):

LCIE 11 ATEX 3058 X  
IECEx LCI 11.0050X

##### Ex d (Zone 1):

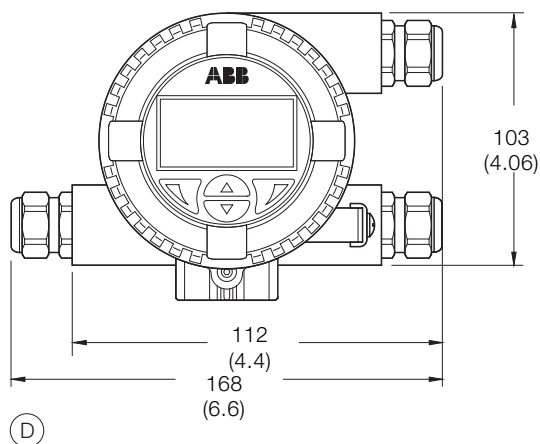
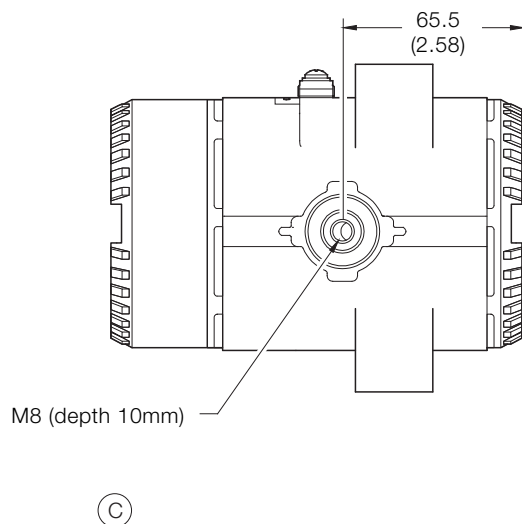
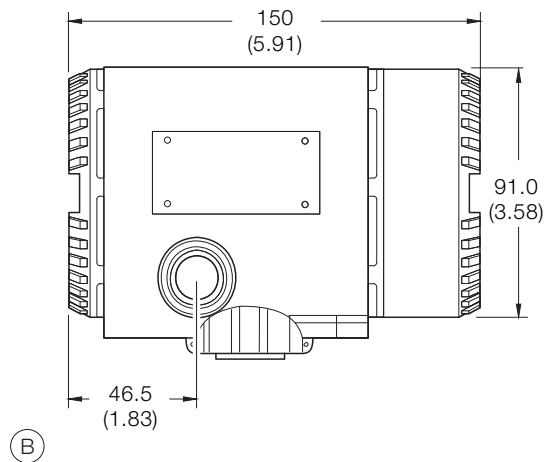
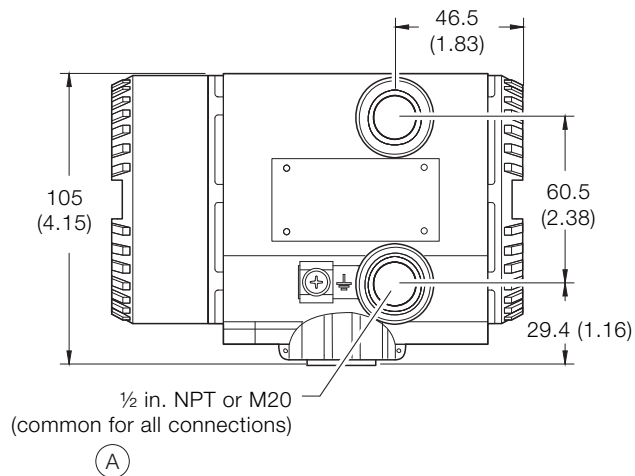
LCIE 11 ATEX 3057 X  
IECEx LCI 11.0049X

##### Ex nA (Zone 2):

LCIE 11 ATEX 1005 X  
IECEx LCI 11.0048X

## APA592 Transmitter dimensions

Dimensions in mm (inches)

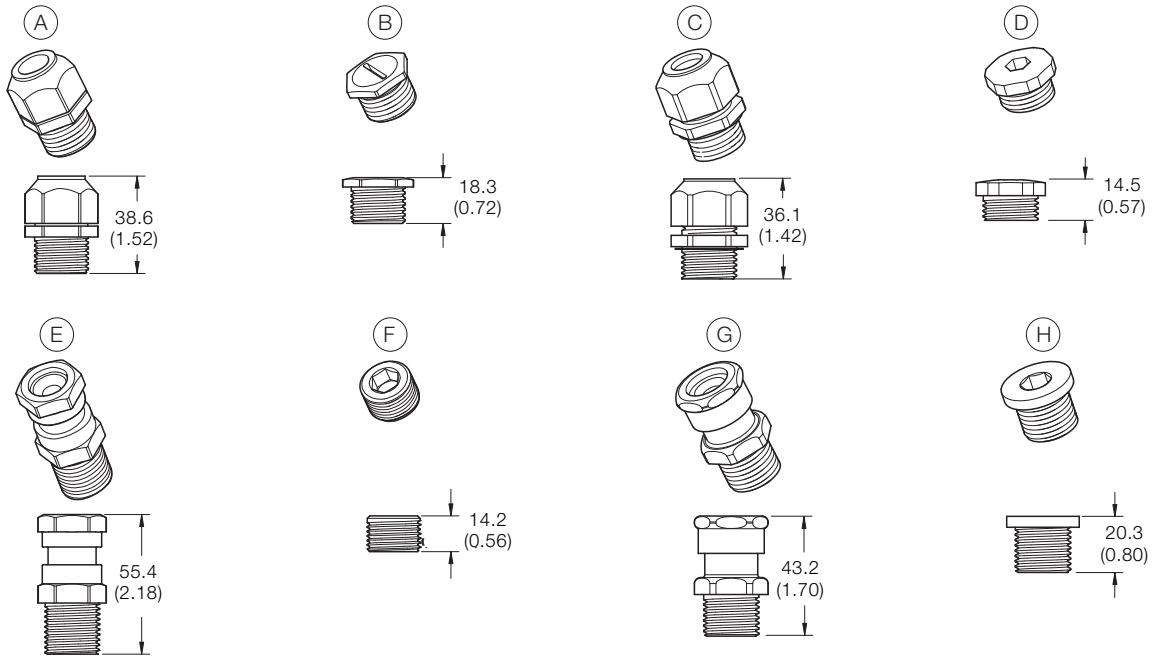


- (A) Housing, left side view (display installation facing left) without cable glands (conduit threads NPT 1/2 in. or M20)
- (B) Housing, right side view (display installation facing right) without cable glands (conduit threads NPT 1/2 in. or M20)
- (C) Housing, bottom view (fastening screw thread M8 (depth 10 mm))
- (D) Housing, front view

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## Fitting dimensions

Dimensions in mm (in.)



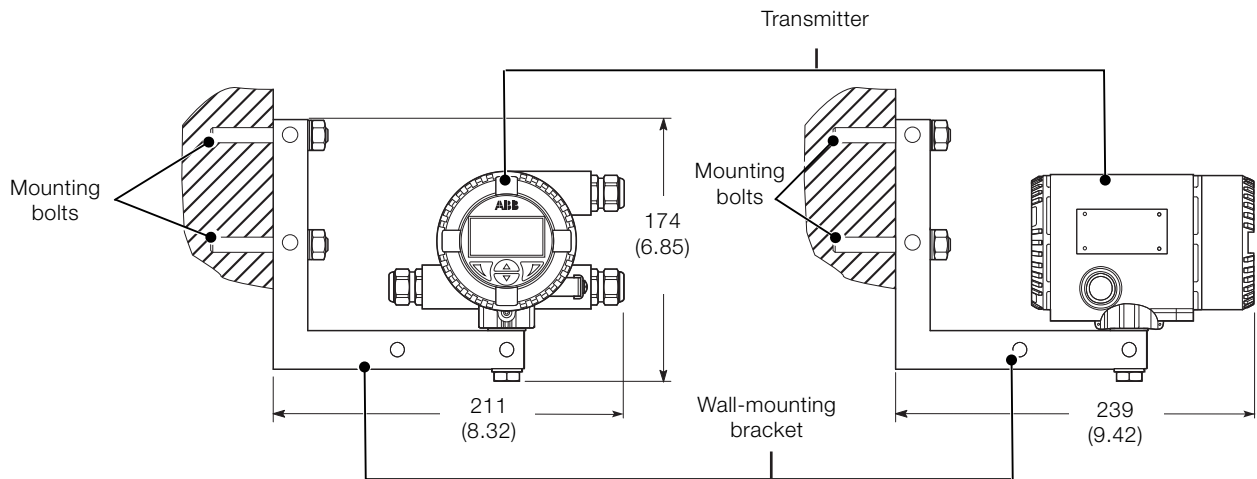
- (A) 1/2 in. NPT nylon cable gland (supplied for all non-Explosion-proof housing versions)
- (B) 1/2 in. NPT nylon conduit plug (supplied for all non-Explosion-proof housing versions)
- (C) M20 nylon cable gland (supplied for all non-Explosion-proof housing versions)
- (D) M20 nylon conduit plug (supplied for all non-Explosion-proof housing versions)
- (E) 1/2 in. NPT 316 stainless steel Ex d (Explosion-proof) cable gland (not included, must be ordered separately if user installations require it)
- (F) 1/2 in. NPT 316 stainless steel conduit plug (supplied when any Ex d options are ordered)
- (G) M20 316 stainless steel Ex d (Explosion-proof) cable gland (not included, must be ordered separately if user installations require it)
- (H) M20 316 stainless steel Ex d (Explosion-proof) conduit plug (supplied when any Ex d options are ordered)

## Mounting and dimensions

The wall and pipe installation set supports variable installation positions. Examples of some of the mounting options are shown below. The transmitter mounting screw allows infinitely adjustable positioning (0° to 360°) of the transmitter.

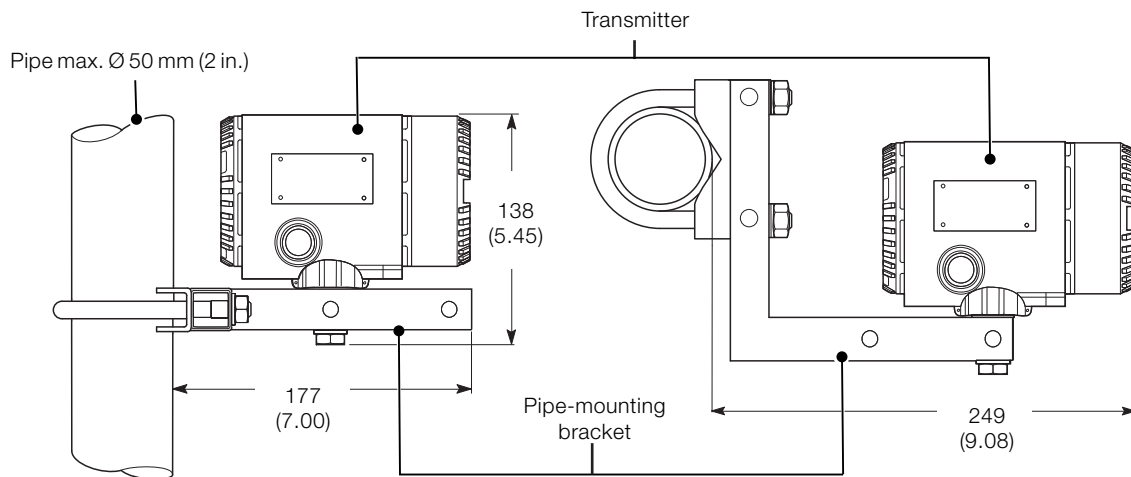
### Wall-mounted installation

Dimensions in mm (in.)



### Pipe-mounted installation

Dimensions in mm (in.)



# Endura APA592

## pH / Redox (ORP) transmitter

### Ordering information

Endura transmitter series	APA592-	X X	X X	X	X	X	Code
<b>Input</b>							
pH, ORP (Redox), pION	P H						See next page
<b>Explosion protection certification</b>							
Without		Y 0					
FM (Factory Mutual) – Intrinsic Safety		F 1					
FM (Factory Mutual) – Explosion-proof (requires Exd gland not included)		F 2					
FM (Factory Mutual) – Non-incendive		F 3					
CSA (Canadian Standards Association) – Intrinsic Safety		C 1					
CSA (Canadian Standards Association) – Explosion-proof (requires Exd gland not included)		C 2					
CSA (Canadian Standards Association) – Non-incendive		C 3					
ATEX / IECEx – Intrinsic Safety		A 1					
ATEX / IECEx – Flameproof (requires Ex d gland not included)		A 2					
ATEX / IECEx – Type n (non-sparking)		A 3					
<b>Housing</b>							
Powder coated aluminum					A		
<b>Cable conduits</b>							
M20 x 1.5						1	
NPT 1/2 in.						2	
<b>Output signal</b>							
HART digital communication and 4 to 20 mA							H

Additional ordering information	Code
<b>Mounting hardware</b>	
None	B0
Pipe or wall	B2
<b>Identification tags</b>	
None	T0
Stainless steel	T1
Mylar	T2
<b>Documentation language</b>	
German	M1
Italian	M2
Spanish	M3
French	M4
English	M5
Portuguese	M6
<b>Accessories (order separately)</b>	
1/2 in. NPT nylon cable gland (one each) – IS	4TB9515-0285
1/2 in. NPT nylon conduit plug (one each) – IS	4TB9515-0286
M20 nylon cable gland (one each) – IS/NI	4TB9515-0287
M20 nylon conduit plug (one each) – IS/NI	4TB9515-0288
1/2 in. NPT 316 stainless steel Ex d (Explosion-proof) cable gland (one each)	4TB9515-0289
1/2 in. NPT 316 stainless steel Ex d (Explosion-proof) conduit plug (one each)	4TB9515-0290
M20 316 stainless steel Ex d (Explosion-proof) cable gland (one each)	4TB9515-0291
M20 316 stainless steel Ex d (Explosion-proof) conduit plug (one each)	4TB9515-0292
Spare wall- and pipe-mount kit	4TB9515-0283

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