

ABB MEASUREMENT & ANALYTICS | DATA SHEET

Endura APA592

pH / Redox (ORP) transmitter



Measurement made easy

Rugged design transmitter for industrial applications

Unique 24 V DC 2-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 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

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.

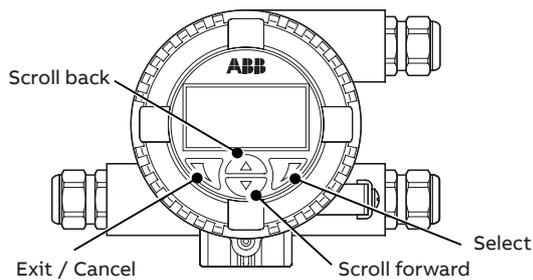


Figure 1 Navigation keys

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)

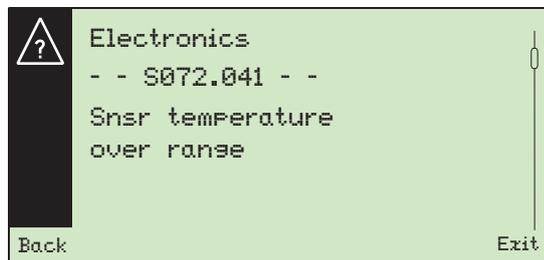


Figure 2 Example diagnostic message

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

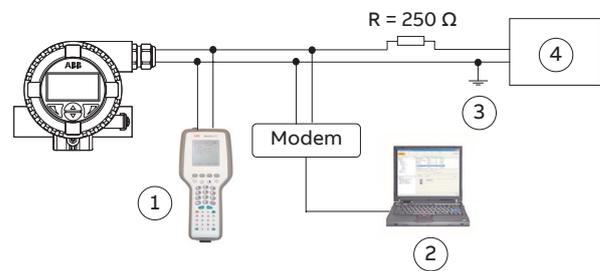
HART

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



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

Figure 3 HART communications

Technical data

Input

Process variable

pH: Glass, antimony (Sb)
 ORP (Redox): Platinum (Pt), Gold (Au)
 plon: Custom user-programmable

Resistance

Glass: $>1 \times 10^{13} \Omega$

Range

pH: 0 to 14 pH (-2 to 16 pH over range)
 ORP: -1500 to +1500 mV

Resolution / accuracy / linearity / stability

pH: ± 0.01 pH
 ORP / plon: ± 1 mV

Temperature

Sensor

Auto-recognition:
 Pt100, Pt1000, 3 k Ω Balco 2- and 3-wire inputs

Input range

-20 to 200 °C (-4 to 392 °F)

Accuracy / Stability

± 0.1 °C (0.18 °F) after calibration

Compensation modes

pH:

- Manual
- Automatic Nernstian,
- Nernstian with solution coefficient

ORP / plon:

- Manual, solution compensation coefficient

Dynamic response

<3 Seconds for 90 % step change at
 0.00 seconds dampening

Output

Signal

Configurable:

- 4 to 20 mA (standard with HART)
- User-programmable linear and non-linear across entire range.

Dynamic range:

- 3.9 to 20.75 mA
 (3.8 mA = low alarm level, 21.5 mA = high alarm level)

Minimum span

1 pH / 100 mV

Maximum span

14 pH / 3000 mV

Damping

Adjustable 0.0 to 99 seconds

...Technical data

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

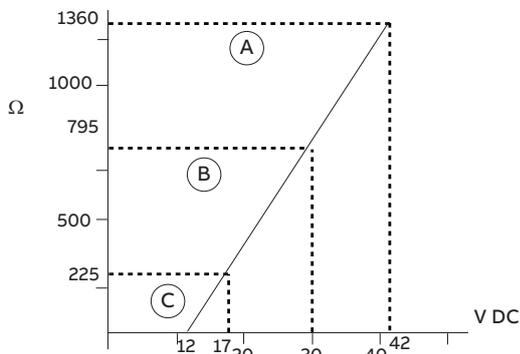
Under-voltage protection

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

Maximum load

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

Max. load Ω depending on supply voltage (V DC)



(A) APA592 transmitter

(B) APA592 in Ex ia Design

(C) HART Communication – resistor

Figure 4 Maximum load

General information

Display update speed

< 250 ms

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)

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, $-20\text{ °C} \leq T_{amb} \leq 60\text{ °C}$

Intrinsically safe and Ex ia IIC hazardous area

| Parameter | Supply circuit |
|-----------------------|----------------|
| Maximum voltage | Ui = 30 V |
| Maximum input current | Ii = 160 mA |
| Maximum power | Pi = 0,8 W |
| Internal inductance | Li = 0,5 mH |
| Internal capacitance | Ci = 5 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, $-20\text{ °C} \leq T_{amb} \leq 60\text{ °C}$

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

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, $-20\text{ °C} \leq T_{amb} \leq 60\text{ °C}$

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

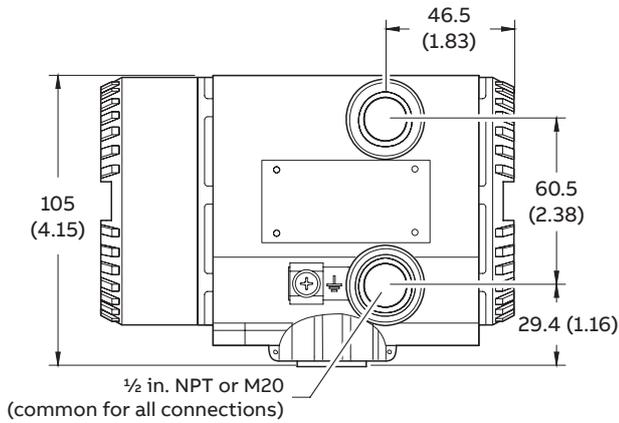
Ex nA (Zone 2)

LCIE 11 ATEX 1005 X
IECEX LCI 11.0048X

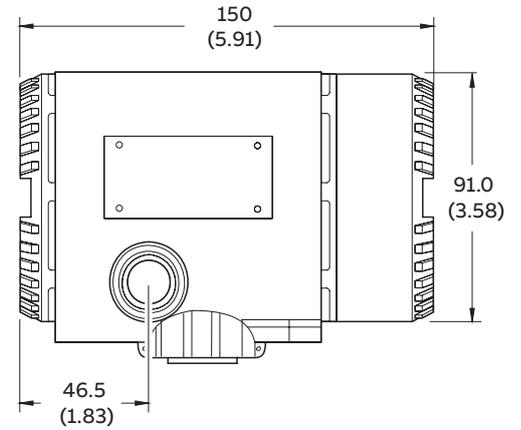
* When installed in accordance with the installation drawing P0909, refer to the User Guide ([OI/APA592-EN](#)) Appendix B.

APA592 Transmitter dimensions

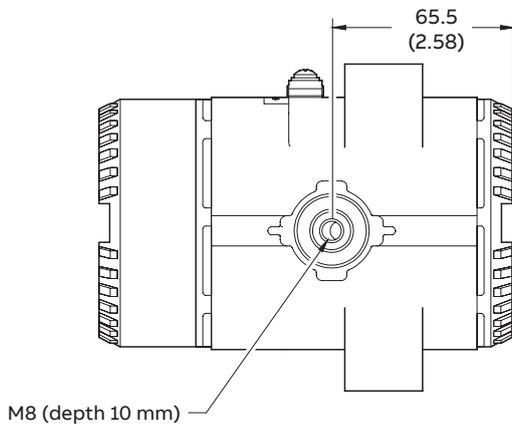
Dimensions in mm (inches)



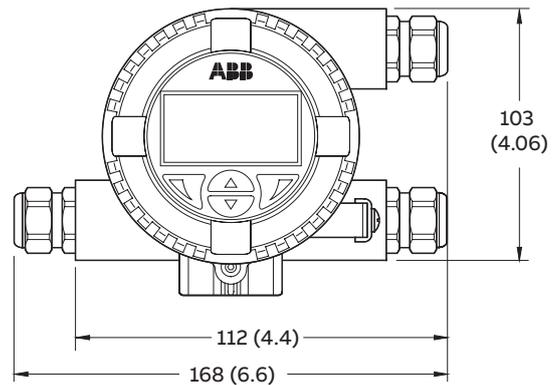
(A)



(B)



(C)

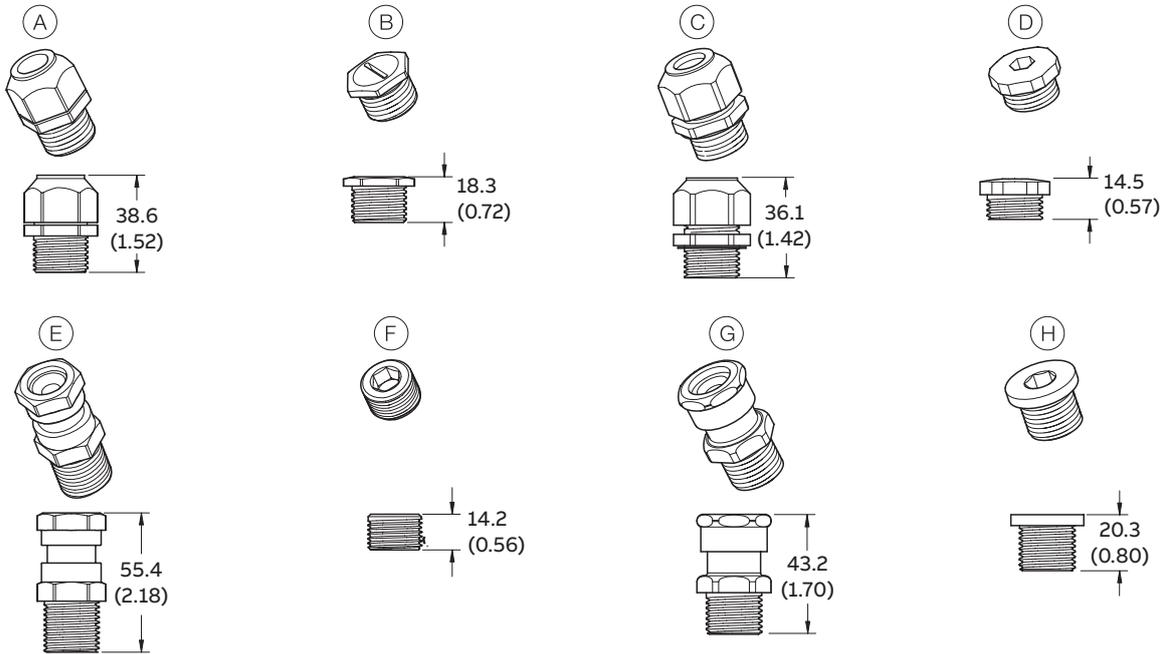


(D)

- (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

Fitting dimensions

Dimensions in mm (in.)



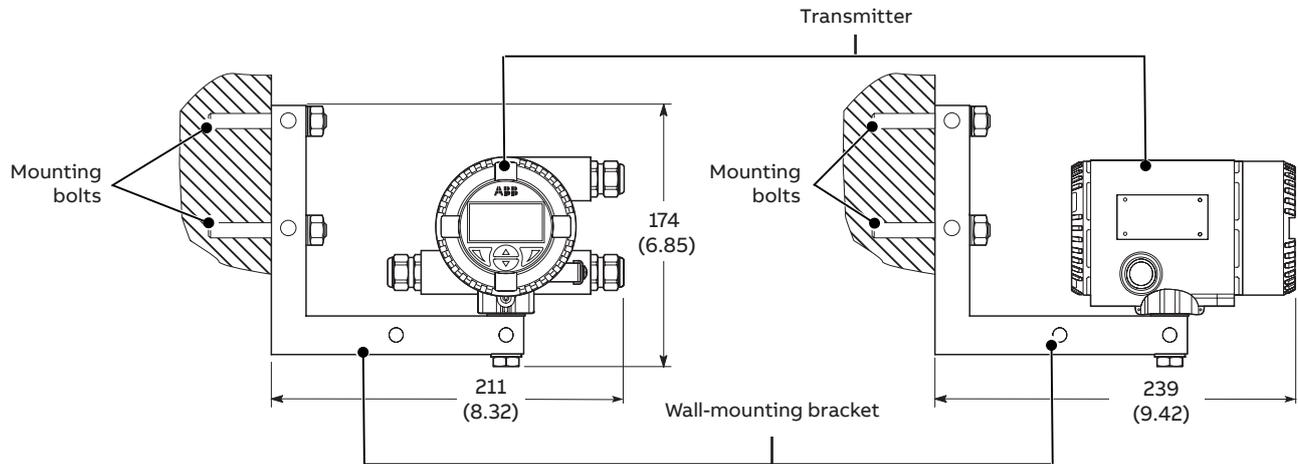
- (A) 1/2 in. NPT nylon cable gland (supplied for all non-explosion-proof housing versions)
- (B) 1/2 in. NPT nylon conduit plug (supplied for all non-explosion-proof housing versions)
- (C) M20 nylon cable gland (supplied for all non-explosion-proof housing versions)
- (D) M20 nylon conduit plug (supplied 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.

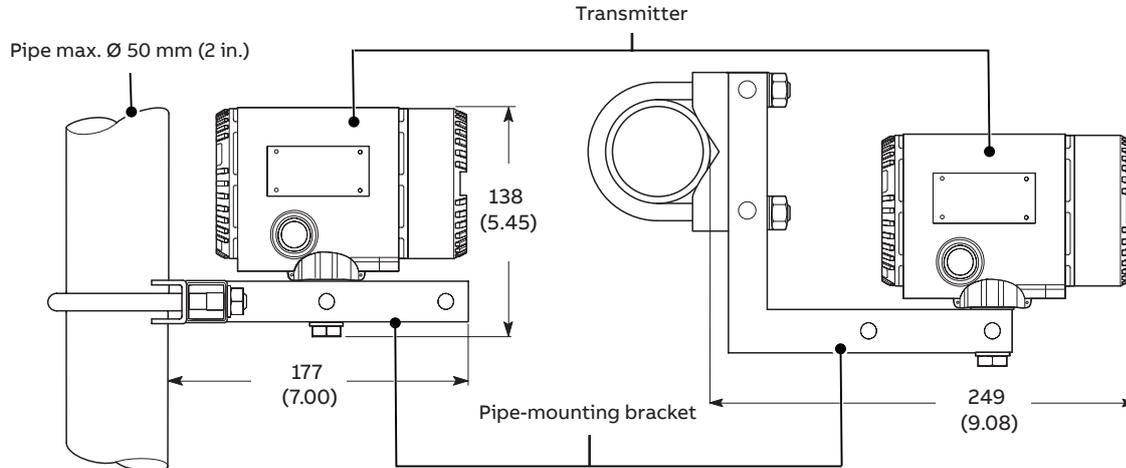
Wall-mounted installation

Dimensions in mm (in.)



Pipe-mounted installation

Dimensions in mm (in.)



Ordering information

| Endura transmitter series | APA592- | XX | XX | X | X | X | Code |
|--|---------|----|----|---|---|--------|----------------------------------|
| Input pH, ORP (Redox), pION | | PH | | | | | |
| Explosion protection certification | | | | | | | |
| Without | | | Y0 | | | | |
| FM (Factory Mutual) – intrinsic safety | | | F1 | | | | |
| FM (Factory Mutual) – explosion-proof (requires Exd gland not included) | | | F2 | | | | |
| FM (Factory Mutual) – non-incendive | | | F3 | | | | |
| CSA (Canadian Standards Association) – intrinsic safety | | | C1 | | | | |
| CSA (Canadian Standards Association) – explosion-proof (requires Exd gland not included) | | | C2 | | | | |
| CSA (Canadian Standards Association) – non-incendive | | | C3 | | | | |
| ATEX / IECEx – intrinsic safety | | | A1 | | | | |
| ATEX / IECEx – flameproof (requires Exd gland not included) | | | A2 | | | | |
| ATEX / IECEx – type n (non-sparking) | | | A3 | | | | |
| Housing Powder coated aluminum | | | | | A | | |
| Cable conduits M20 x 1.5 NPT ½ in. | | | | | | 1 2 | |
| Output signal HART digital communication and 4 to 20 mA | | | | | | | H |
| Additional ordering information | | | | | | | |
| Mounting hardware None Pipe or wall | | | | | | | B0 B2 |
| Identification tags None Stainless steel Mylar | | | | | | | T0 T1 T2 |
| Documentation language German Italian Spanish French English Portuguese | | | | | | | M1 M2 M3 M4 M5 M6 |

Accessories (order separately)

| | |
|--|--------------|
| ½ in. NPT nylon cable gland (one each) – IS | 4TB9515-0285 |
| ½ 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 |
| ½ in. NPT 316 stainless steel Ex d (explosion-proof) cable gland (one each) | 4TB9515-0289 |
| ½ 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 |

Acknowledgements

HART is a registered trademark of the HART Communication Foundation.



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