Data sheet DS/ACA592-EN

Endura ACA592
Conductivity transmitter

Rugged design transmitter for industrial applications



Transmitter options for all sensor types
— 2-Electrode sensors for low conductivity measurement
— 4-Electrode sensors for wide range conductivity applications and slurries
— Toroidal conductivity for corrosive and heavy coating 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 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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The Endura family of products

ABB's Endura family of analytical transmitters are designed for the requirements of industrial customers. These 2-wire 24 VDC 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 ACA592 transmitter is fully compatible with ABB's full range of conductivity sensors. 2-electrode, 4-electrode and toroidal conductivity transmitter options allow users to measure conductivity in applications from clean water to harsh chemicals.

The ACA592 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.

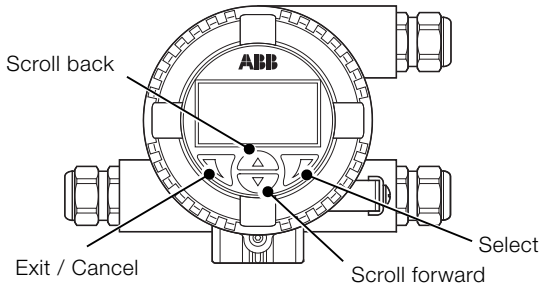


Fig. 1: Navigation keys

The ACA592 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.

Transmitter selection

Selection of an Endura 2-electrode, 4-electrode or toroidal conductivity transmitter and related sensor should be based on the requirements of the application.

Model	Sensor type	Cell constant or group	Suggested measurement range	Suggested applications
ACA592–TE	2-electrode	0.01	0 to 5 µS/cm	Ultrapure water
		0.1	5 to 500 µS/cm	Boiler water
		1.00	500 to 2000 µS/cm	Potable water
ACA592–EC	4-electrode	Group A	5 µS to 1000 mS/cm	Pulp stock, river water
		Group B	20 to 1000 µS/cm	Fouled condensate
ACA592–TC	toroidal electrode-less		1000 µS/cm to 2000 to mS/cm	Corrosive liquids Chemical concentration Applications that coat traditional sensors

Concentration measurement

For users that use conductivity to infer liquid concentration, ABB provides pre-installed concentration curves for many common chemicals as well as a user-defined curve for customers to input their own conductivity vs. concentration curve.

Concentration measurement options / range

— 0 to 15 % NaOH
— 0 to 20 % NaCl
— 0 to 18 % HCl
— 0 to 20 % H_2SO_4
— User-defined

Diagnostics (NE107 based)

The ACA592 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:

— Dirty sensor alarm
— Ground loops present or shorted sensor cable (damaged sensor cable)
— Open sensor cable
— Temperature over / under range (short- or open-circuited temperature sensor)

Diagnostics availability is dependent on the transmitter model.

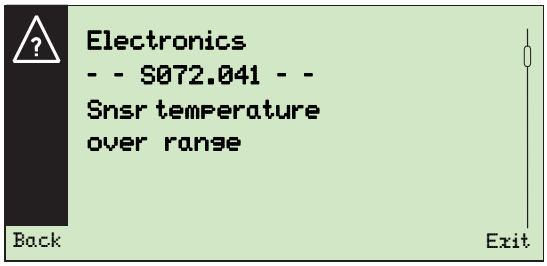


Fig. 2: Example diagnostic message

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 ACA592 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.

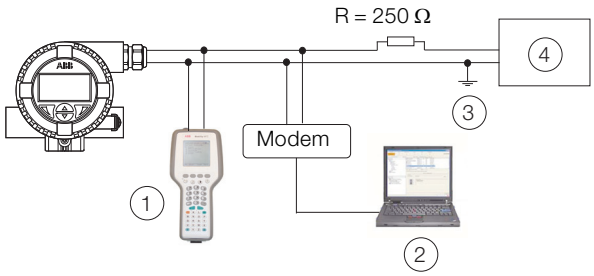


Fig. 3: HART communications

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

Endura ACA592
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Technical data

Input

Sensor types

ACA592–TE: ABB 2-electrode sensors
ACA592–EC: ABB 4-electrode sensors
ACA592–TC: ABB toroidal sensors

Measurement range and resolution

ACA592–TE (2-electrode conductivity transmitter):

Cell constant	Measurement range	Resolution / Accuracy Linearity / Stability
0.01	0 to 200 µS/cm	0.001 µS/cm
0.1	0 to 2000 µS/cm	0.01 µS/cm
1	0 to 20000 µS/cm	0.1 µS/cm

ACA592–EC (4-electrode conductivity transmitter):

Sensor group	Measurement range	Resolution / Accuracy Linearity / Stability
Group A	0 to 2000 mS/cm	0.1 µS/cm
Group B	0 to 2000 µS/cm	0.01 µS/cm

ACA592–TC (toroidal conductivity transmitter):

Sensor	Measurement range	Resolution / Accuracy Linearity / Stability
ABB toroidal	0 to 2000 mS/cm	1.0 µS/cm

Temperature

Temperature compensation

Temperature element	ACA592– TE	ACA592– EC	ACA592– TC
Pt100	✔	✔	✔
Pt1000	✔	✔	✔
3k Balco		✔	

Input range

–20 to 200 °C (–4 to 392 °F)

Accuracy / stability

±0.1 °C (0.18 °F) after calibration

Temperature compensation modes

Measured liquid – ACA592–EC and ACA592–TC:
— 0 to 15 % NaOH
— 0 to 20 % NaCl
— 0 to 18 % HCl
— 0 to 20 % H_2SO_4
— User-defined

Measured liquid – ACA592–TE:
— Pure H_2O neutral salt
— Pure H_2O trace base
— Pure H_2O trace acid
— User-defined:

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

Sensor type	ACA592– TE	ACA592– EC	ACA592– TC
0.01 Cell	1 µS/cm		
0.10 Cell	10 µS/cm		
1.00 Cell	100 µS/cm		
Group A		100 µS/cm	
Group B		10 µS/cm	
Toroidal			100 µS/cm

Maximum span

Sensor type	ACA592– TE	ACA592– EC	ACA592– TC
0.01 Cell	200 µS/cm		
0.10 Cell	2000 µS/cm		
1.00 Cell	20 mS/cm		
Group A		2000 mS/cm	
Group B		2000 µS/cm	
toroidal			2000 mS/cm

Damping
Adjustable 0.0 to 99 seconds.

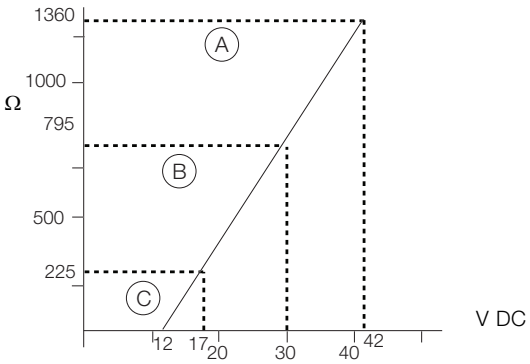
Power supply (polarity safe)

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

Maximum load
Rload = (supply voltage –12 V) / 22 mA
Max. load Ω depending on supply voltage (V DC)



(A) ACA592 transmitter, (B) ACA592 in Ex ia Design
(C) HART Communication – resistor

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 µm 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
Emitted electromagnetic interference in accordance with EN61326-1 for Class A and Class B equipment.

Galvanic isolation
900 V DC for 1 second
(insulation test voltage)

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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 ºC

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 V
Maximum input current	I_i = 160 mA
Maximum power	P_i = 0,8 W
Internal inductance	L_i = 0,5 mH
Internal capacitance	C_i = 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 °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 ºC

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 the User Guide (OI/ACA592/EC–EN, / OI/ACA592/TE–EN or OI/ACA592/TC–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 ºC

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 ACA592 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):

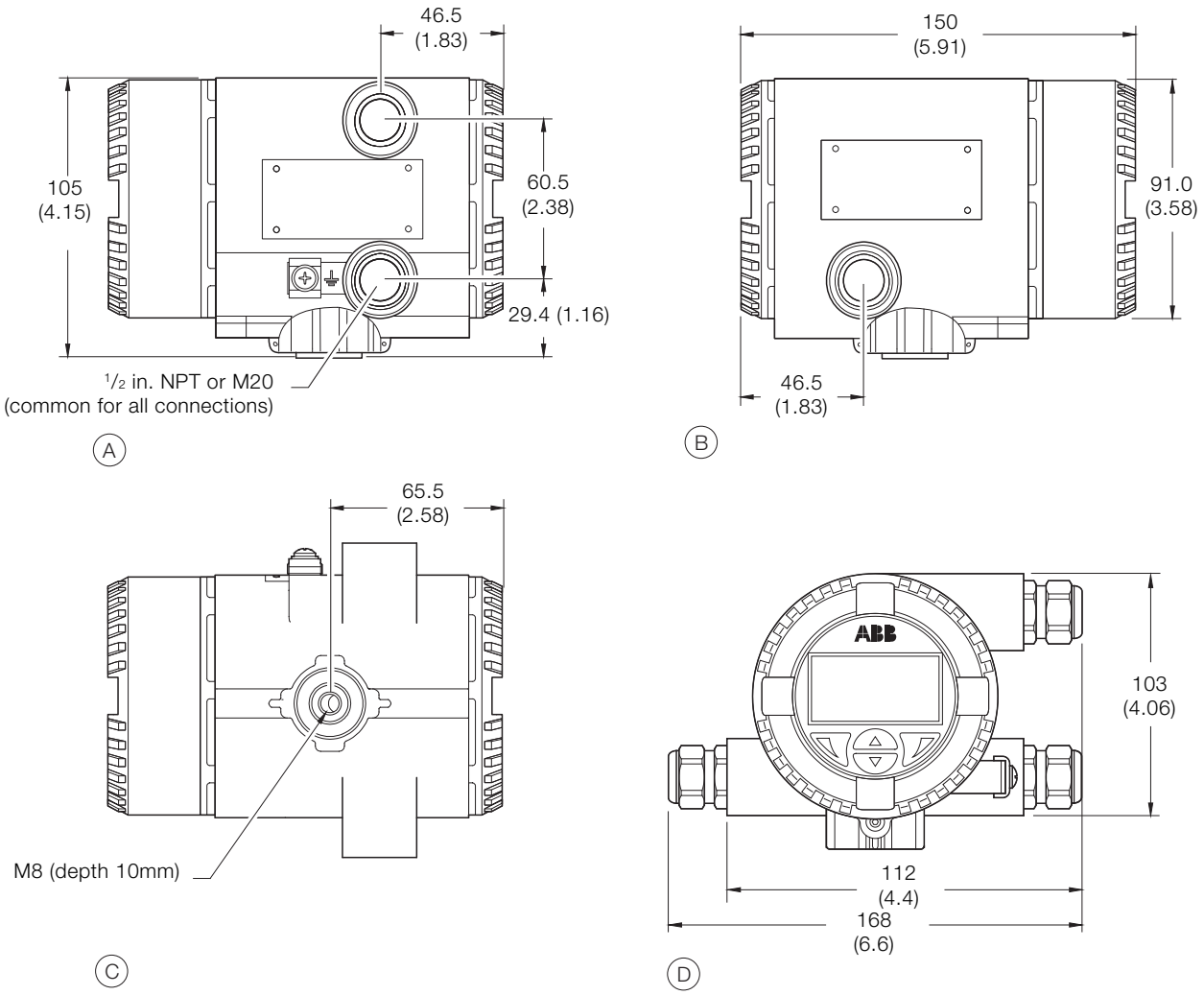
LCIE 11 ATEX 3057 X
IECEx LCI 11.0049X

Ex nA (Zone 2):

LCIE 11 ATEX 1005 X
IECEx LCI 11.0048X

ACA592 Transmitter dimensions

Dimensions in mm (inches)

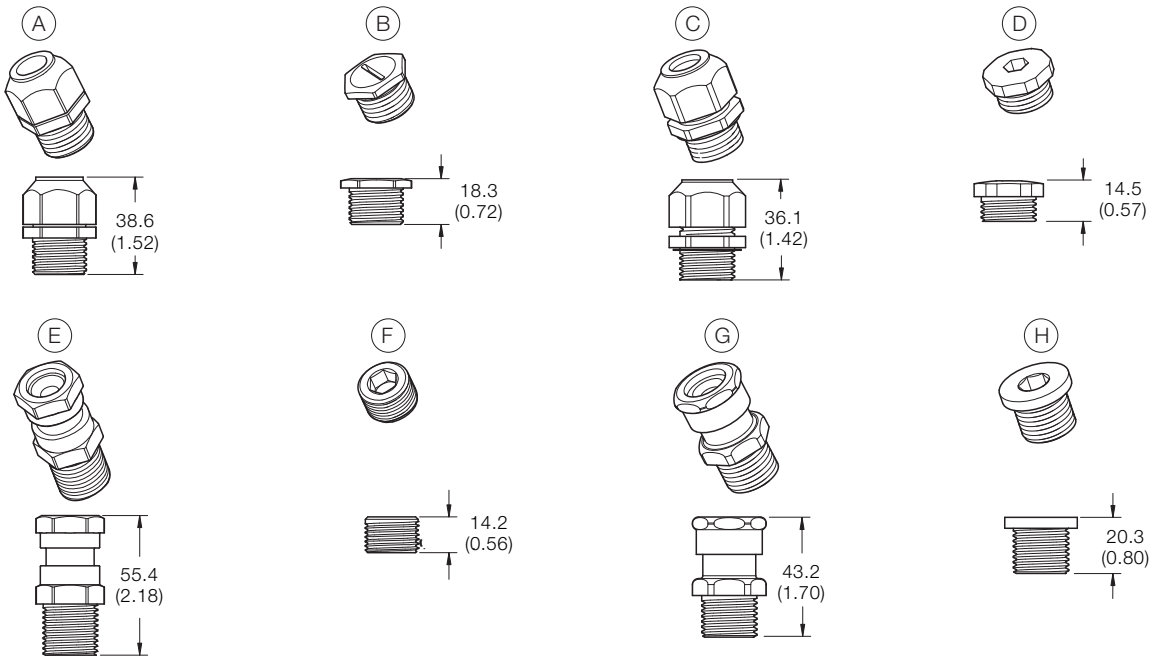


(A) Housing, left side view (display installation facing left) without cable glands (conduit threads NPT ½ in. or M20)
(B) Housing, right side view (display installation facing right) without cable glands (conduit threads NPT ½ in. or M20)
(C) Housing, bottom view (fastening screw thread M8 (depth 10 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)

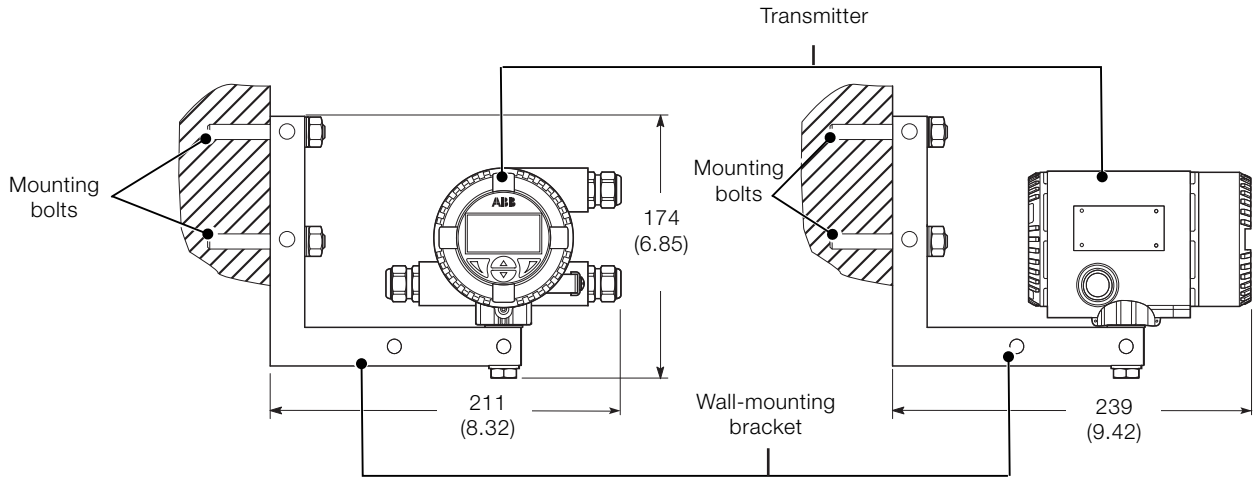
(H) M20 316 stainless steel Ex d (Explosion-proof) conduit plug (supplied when any Ex d options are ordered)

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.

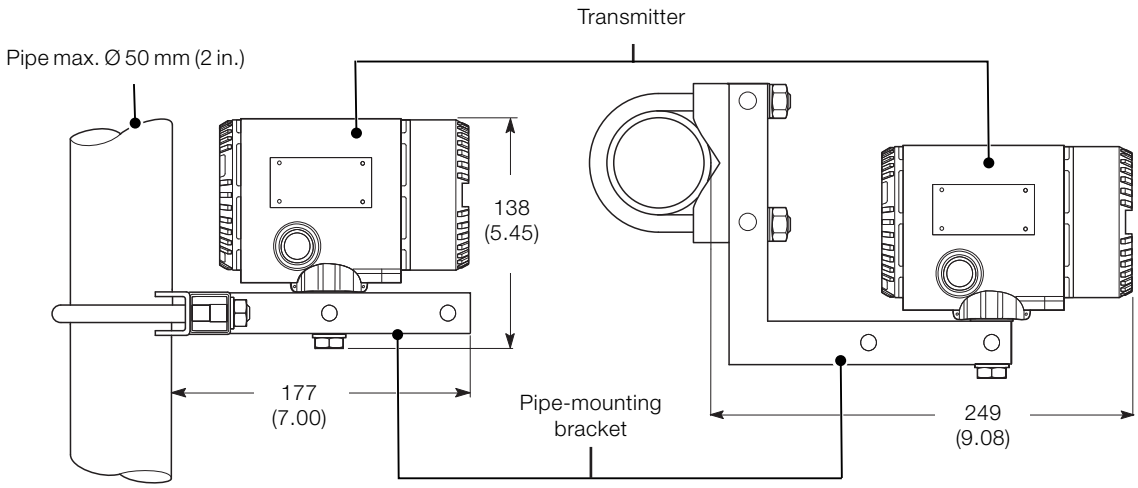
Wall-mounted installation

Dimensions in mm (in.)



Pipe-mounted installation

Dimensions in mm (in.)



Endura ACA592
Conductivity transmitter

Ordering information

Endura transmitter series	ACA592-	X X	X X	X	X	X	Code
Input							
Conductivity 4-electrode		EC					See next page
Conductivity 2-electrode		TE					
Conductivity toroidal		TC					
Explosion protection certification							
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 Exd gland not included)			A 2				
ATEX / IECEx – Type n (non-sparking)			A 3				
Housing							
Powder coated aluminum				A			
Cable conduits							
M20 x 1.5					1		
NPT 1/2 in.					2		
Output signal							
HART digital communication and 4 to 20 mA						H	

Additional ordering information	Code
Mounting hardware	
None	B0
Pipe or wall	B2
Identification tags	
None	T0
Stainless steel	T1
Mylar	T2
Documentation language	
German	M1
Italian	M2
Spanish	M3
French	M4
English (default)	M5
Portuguese	M6
Accessories (order separately)	
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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