

Model 364DS Differential Model 364PS Gauge

ABB 364 model The common sense pressure transmitter



The best in class total performance

- long term stability of 0.15% for 10 years
- base accuracy of 0.06%

The space saver

- the solution for multiple installations in reduced spaces
- the lightest DP transmitter with conventional connections on the market

The innovative approach to DP flow measurement

- bi-directional flow capability with double low flow cut-off
- double totalization, on board

The common sense construction

- all stainless body and housing
- Hastelloy process diaphragms

The common sense approach to leakage prevention

- one piece stainless steel design process chambers
- gasket free sensor coupling with conventional connections

The user friendly transmitter

- user accessible wiring termination with built-in surge protection
- on board LCD display with intuitive menu navigation
- “easy setup” for quick commissioning
- multilanguage menu selection

Functional Specifications

Range and span limits

Sensor Code	Upper Range Limit (URL)	Lower Range Limit (LRL)		Minimum span
		364DS differential	364PS gauge	364DS differential 364PS gauge
A	1kPa 10mbar 4inH ₂ O	-1kPa -10mbar -4inH ₂ O	-1kPa -10mbar -4inH ₂ O	0.05kPa 0.5mbar 0.2inH ₂ O
B	4kPa 40mbar 16inH ₂ O	-4kPa -40mbar -16inH ₂ O	-4kPa -40mbar -16inH ₂ O	0.14kPa 1.4mbar 0.56inH ₂ O
E	16kPa 160mbar 64inH ₂ O	-16kPa -160mbar -64inH ₂ O	-16kPa -160mbar -64inH ₂ O	0.16kPa 1.6mbar 0.65inH ₂ O
G	65kPa 650mbar 260inH ₂ O	-65kPa -650mbar -260inH ₂ O	-65kPa -650mbar -260inH ₂ O	0.65kPa 6.5mbar 2.6inH ₂ O
H	160kPa 1600mbar 642inH ₂ O	-160kPa -1600mbar -642inH ₂ O	1kPa abs 10mbar abs 0.15 psia	1.6kPa 16mbar 6.4inH ₂ O
M	600kPa 6bar 87psi	-600kPa -6bar -87psi	1kPa abs 10mbar abs 0.15 psia	6kPa 0.06bar 0.87psi
P	2400kPa 24bar 348psi	-2400kPa -24bar -348psi	1kPa abs 10mbar abs 0.15 psia	24kPa 0.24bar 3.5psi
Q	8000kPa 80bar 1160psi	-8000kPa -80bar -1160psi	1kPa abs 10mbar abs 0.15 psia	80kPa 0.8bar 11.6psi
S	16000kPa 160bar 2320psi	-16000kPa -160bar -2320psi	1kPa abs 10mbar abs 0.15 psia	160kPa 1.6bar 23.2psi

Span limits

Maximum span = URL
(can be further adjusted up to ± URL (TD = 0.5) for differential models, within the range limits)

IT IS RECOMMENDED TO SELECT THE TRANSMITTER SENSOR CODE PROVIDING THE TURNDOWN VALUE AS LOWEST AS POSSIBLE TO OPTIMIZE PERFORMANCE CHARACTERISTICS.

Zero suppression and elevation

Zero and span can be adjusted to any value within the range limits detailed in the table as long as:

- calibrated span ≥ minimum span

Damping

Selectable time constant : 0 to 32 s
This is in addition to sensor response time

Turn on time

Operation within specification in less than 1s with minimum damping.

Insulation resistance

> 100MΩ at 1000VDC (terminals to earth)

Operative limits

Temperature limits °C (°F) :

Ambient (is the operating temperature)

Lower limit: -40°C (-40°F) for sensor codes E to S;
-25°C (-13°F) for sensor codes A and B;
-20°C (-4°F) for LCD indicator

Upper limit: +85°C (+185°F);
+70°C (+158°F) for LCD indicator

Note : For Hazardous Atmosphere applications see the temperature range specified on the certificate/approval relevant to the aimed type of protection

Process

Lower limit: refer to lower ambient limits

Upper limit: 121°C (250°F);
100°C (212°F) for application below atmospheric pressure

Storage

Lower limit: -50°C (-58°F); -40°C (-40°F) for LCD indicators

Upper limit: +85°C (+185°F)

Pressure limits

Overpressure limits (without damage to the transmitter)

0.07kPa abs, 0.7mbar abs, 0.01psia:

- 2MPa, 20bar, 290psi for sensor code A
- 7MPa, 70bar, 1015psi for sensor code B
- 16MPa, 160bar, 2320psi for sensor code E
- 20MPa, 200bar, 2900psi for sensor codes G to S

Static pressure

Transmitters for differential pressure model 364DS operates within specifications between the following limits

- sensor code A:
1.3kPa abs, 13mbar abs, 0.2psia and 2MPa, 20bar, 290psi
- sensor code B:
1.3kPa abs, 13mbar abs, 0.2psia and 7MPa, 70bar, 1015psi
- sensor code E:
1.3kPa abs, 13mbar abs, 0.2psia and 16MPa, 160bar, 2320psi
- sensor codes G to S:
1.3kPa abs, 13mbar abs, 0.2psia and 20MPa, 200bar, 2900psi

Proof pressure

The transmitter can be exposed without leaking to line pressure of up to 38.5MPa, 385bar, 5585psi. Meet ANSI/ISA-S 82.03 hydrostatic test requirements and SAMA PMC 27.1.

Environmental limits

Electromagnetic compatibility (EMC)

Comply with EN 61000-6-3 for emission and EN 61000-6-2 for immunity requirements and test;

Radiated electromagnetic immunity level: 10V/m
(according to IEC 1000-4-3, EN61000-4-3)

Conducted electromagnetic immunity level : 10V
(according to IEC 1000-4-6, EN 61000-4-6)

Surge immunity level: 4kV
(according to IEC 1000-4-5 EN 61000-4-5)

Fast transient (Burst) immunity level: 4kV
(according to IEC 1000-4-4 EN 61000-4-4)

Humidity

Relative humidity: up to 100% annual average

Condensing, icing: admissible

Vibration resistance

Accelerations up to 2g at frequency up to 1000Hz
(according to IEC 60068-2-6)

Shock resistance

Acceleration: 50g

Duration: 11ms

(according to IEC 60068-2-27)

Wet and dust-laden atmospheres

The transmitter is dust and sand tight and protected against immersion effects as defined by EN 60529 (1989) to IP 67 or by NEMA to 4X.

Hazardous atmospheres

With or without integral display

ATEX/ZELM approval

INTRINSIC SAFETY (Category 1): (code E1)

II 1 GD T50°C, Ex ia IIC T6 (-50°C ≤ Ta ≤ +40°C) respectively

II 1 GD T95°C, Ex ia IIC T4 (-50°C ≤ Ta ≤ +85°C) or

II 1/2 GD T50°C, Ex ia IIC T6 (-50°C ≤ Ta ≤ +40°C) respectively

II 1/2 GD T95°C, Ex ia IIC T4 (-50°C ≤ Ta ≤ +85°C)

EXPLOSION PROOF (Category 2): (code E2)

II 1/2 GD T50°C, Ex d IIC T6 IP67 T85°C (-50°C ≤ Ta ≤ +75°C)

TYPE "N" (Category 3): (included in code EW with E1 and E2)

II 3 GD T50°C, Ex nL IIC T6 IP67 (-50°C ≤ Ta ≤ +40°C) or

II 3 GD T95°C, Ex nL IIC T4 IP67 (-50°C ≤ Ta ≤ +85°C)

IECEX/FM Approval

FLAMEPROOF: (code ER)

Ex d IIC T4 (-50°C ≤ Ta ≤ +85°C), IP67

CANADIAN STANDARDS ASSOCIATION (code E4)

FACTORY MUTUAL (code E6)

– Explosionproof: Class I, Div. 1, Groups A, B, C, D

– Dust ignitionproof : Class II, Div. 1, Groups E, F, G

– Suitable for : Class II, Div. 2, Groups F, G; Class III, Div. 1, 2

– Nonincendive: Class I, Div. 2, Groups A, B, C, D

– Intrinsically safe: Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G

AEx ia IIC T6/T4, Zone 0 (FM)

COMBINED ATEX, FM and CSA (code EN)

combination of E1, E2, E4 and E6

COMBINED ATEX (code E7)

combination of E1 and E2

COMBINED NEPSI (code EP)

NEPSI approval

INTRINSIC SAFETY/CHINA:

Ex ia IIC T4-T6

FLAMEPROOF/CHINA:

Ex d IIC T6

TYPE "N"/CHINA

Ex nL IIC T4-T6

GOST (Russia) and GOST (Kazakhstan) based on ATEX

Electrical Characteristics and Options

HART digital communication and 4 to 20mA output

Power Supply

The transmitter operates from 10.5 to 42VDC with no load and is protected against reverse polarity connection (additional load allows operations over 42VDC).

For EEx ia and other intrinsically safe approval power supply must not exceed 30VDC.

Minimum operating voltage is 15.3VDC if on terminals for external meter neither link nor remote indicator is present.

Ripple

20mV max on a 250Ω load as per HART specifications

Load limitations

4 to 20mA and HART total loop resistance :

$$R(k\Omega) = \frac{\text{Supply voltage} - \text{min. operating voltage (VDC)}}{22.5}$$

A minimum of 250Ω is required for HART communication.

Optional indicators

Integral display

Wide screen LCD, 128 x 64 pixel,
52.5 x 27.2mm (2.06 x 1.07in) dot matrix.

Four keys for configuration and management of device.

Easy setup for quick commissioning.

User selectable application-specific visualizations.

Totalized and instantaneous flow indication.

Display also indicates in/out transfer function, static pressure, sensor temperature and diagnostic messages and provides configuration facilities.

Output signal

Two-wire 4 to 20mA, user-selectable for linear or square root output, power of ³/₂ or ⁵/₂, 5th order or two 2nd order switching point selectable programmable polynomial output.

Low flow cut-off facility.

HART® communication provides digital process variable (% , mA or engineering units) superimposed on 4 to 20mA signal, with protocol based on Bell 202 FSK standard.

Output current limits (to NAMUR standard)

Low saturation: 3.8mA (field configurable from 3.7 to 4mA)

High saturation: 20.5mA (field configurable from 20 to 22.5mA)

Alarm current

Low alarm current: 3.7mA (field configurable from 3.7 to 4mA)

High alarm current: 22mA (field configurable from 20 to 22.5mA)

Factory setting: high alarm current

Performance specifications

Stated at reference condition to IEC 60770 ambient temperature of 20°C (68°F), relative humidity of 65%, atmospheric pressure of 1013hPa (1013mbar), mounting position with vertical diaphragm and zero based range for transmitter with isolating diaphragms in Hastelloy and silicone oil fill and digital trim values equal to span end points, in linear mode.

Unless otherwise specified, errors are quoted as % of span.

Some performance data are affected by the actual turndown (TD) as ratio between Upper Range Limit (URL) and calibrated span.

IT IS RECOMMENDED TO SELECT THE TRANSMITTER SENSOR CODE PROVIDING THE TURNDOWN VALUE AS LOWEST AS POSSIBLE TO OPTIMIZE PERFORMANCE CHARACTERISTICS.

Dynamic performance (according to IEC 61298-1 definition)

Dead time: 75ms

Time constant (63.2% of total step change):

– sensor M to S: ≤ 70ms

– sensor H: 100ms

– sensor G: 130ms

– sensor E: 180ms

Response time (total) = dead time + time constant

Accuracy rating

% of calibrated span, including combined effects of terminal based linearity, hysteresis and repeatability.

– ±0.06% for TD from 1:1 to 15:1

(±0.075% for sensor code Q, S;

±0.075% for sensor code B for TD from 1:1 to 10:1;

±0.075% for sensor code A for TD from 1:1 to 4:1)

– $\pm 0.004\% \times \frac{\text{URL}}{\text{Span}}$ for TD from 15:1 to 60:1

($\pm 0.005\% \times \frac{\text{URL}}{\text{Span}}$ for sensor code Q, S;

$\pm 0.0075\% \times \frac{\text{URL}}{\text{Span}}$ for sensor code B for TD from 10:1 to 20:1;

$\pm 0.01875\% \times \frac{\text{URL}}{\text{Span}}$ for sensor code A for TD from 4:1 to 10:1)

Operating influences

Ambient temperature

per 20K (36°F) change between the limits of –20°C to +65°C (–4 to +150°F):

Sensor Code	for TD	
E to S	15:1	± (0.02% URL + 0.026% span)
B	10:1	± (0.04% URL + 0.05% span)
A	4:1	± (0.06% URL + 0.07% span)

but not greater than total ± 0.10% of URL for sensor codes E to S from –40°C to +85°C.

Static pressure (zero errors can be calibrated out at line pressure)

per 7MPa, 70bar or 1015psi (sensor codes E to S)

per 2MPa, 20bar or 290psi (sensor code B)

per 0.5MPa, 5bar or 72.5psi (sensor code A)

Model 364DS

– zero error: ±0.06% of URL

– span error: ±0.06% of reading

Supply voltage

Within voltage/load specified limits the total effect is less than 0.005% of URL per volt.

Load

Within load/voltage specified limits the total effect is negligible.

Electromagnetic field

Total effect : less than 0.06% of span from 80 to 1000MHz and for field strengths up to 10V/m when tested with unshielded conduit and grounding, with or without meter.

Common mode interference

No effect from 100Vrms @ 50Hz, or 50VDC

Mounting position

Rotations in plane of diaphragm have negligible effect. A tilt to 90° from vertical causes a zero shifts up to 0.6kPa, 6mbar or 2.4inH₂O, which can be corrected with the zero adjustment. No span effect.

Stability

±0.15% of URL over a ten years period

Vibration effect

±0.10% of URL (according to IEC 61298-3)

Physical Specification

(Refer to ordering information sheets for variant availability related to specific model or versions code)

Materials

Process isolating diaphragms (*)

Hastelloy C276™ on AISI 316 L ss seat (NACE)

Process connection, adapters, plugs and drain/vent valves (*)

AISI 316 L ss (NACE)

Bolts (for adapter only if selected) (*)

AISI 316 ss bolts Class A4–50 per UNI 7323 (ISO 3506), in compliance with NACE MR0175 Class II.

Gasket (for adapter only, if selected) (*)

PTFE.

Sensor fill fluid

Silicone oil (DC200™)

Electronic/sensor housing and covers

AISI 304 ss, AISI 316 L ss

Covers O-ring

Buna N

Mounting bracket (**)

AISI 304 ss, AISI 316 L ss.

Tagging

AISI 316ss data/certification plate welded to the electronics housing.

Calibration

Standard: at maximum span, zero based range, P2=HIGH, P1=LOW, at ambient temperature and pressure;

Optional: at specified range and ambient conditions.

Optional extras

Mounting brackets

For vertical and horizontal 60mm. (2in) pipes or wall mounting.

Display

4-position (at 90°) user rotatable

Additional customer plate (option code I2)

AISI 316 ss plate wired-on to the transmitter for customer data up to a maximum of 32 characters and spaces per four lines for customizable details.

Test Certificates (test, design, calibration, material traceability)

Tag and manual language

Electrical connection metal plug

One stainless steel IP67 plug can be supplied on request, replacing one of the temporary plastic plug.

Process connections

direct: 1/4 – 18 NPT on process axis

on adapters: 1/2 – 14 NPT on process axis

centre distance (364DS): 54mm (2.13in) direct;
51, 54 or 57mm (2.01, 2.13 or 2.24in) as per adapters fittings

fixing threads: 7/16 – 20 UNF at 41.3mm centre distance.

Electrical connections

Two 1/2 – 14 NPT or M20x1.5 threaded conduit entries, direct on housing.

Terminal block

Three terminals for signal/external meter wiring up to 2.5mm² (14AWG)

Grounding

Internal and external 6mm² (10AWG) ground termination points are provided.

Mounting position

Transmitter can be mounted in any position.

Mass (without options)

3.2kg approx (7lb)

Add 650g (1.5lb) for packing.

Packing

Carton 26 x 26 x 18cm approx (10 x 10 x 7in).

Configuration

Transmitter with HART communication and 4 to 20 mA

Standard configuration

Transmitters are factory calibrated from 0 to +URL. If required calibrated range and tag number are stamped on the tag plate. If a calibration range and tag data are not specified, the transmitter will be supplied with the plate left blank and configured as follows:

Pressure polarity	P2 set as high pressure side
Engineering Unit	kPa
4 mA	Zero
20 mA	Upper Range Limit (URL)
Output	Linear
Damping	1 sec.
Transmitter failure mode	Upscale
Software tag characters	Blank
Optional LCD integral display	Input pressure (linear) in calibration engineering unit plus analog output after transfer function in percentage on bargraph

Any or all the above configurable parameters, including Lower range–value and Upper range–value which must be the same unit of measure, can be easily changed using the HART hand–held communicator or by a PC running the configuration software SMART VISION with DTM for 2600T. The transmitter database is customized with specified flange type and material, O–ring and drain/vent materials and meter code option. Custom configuration (option).

The following data may be specified in addition to the standard configuration parameters:

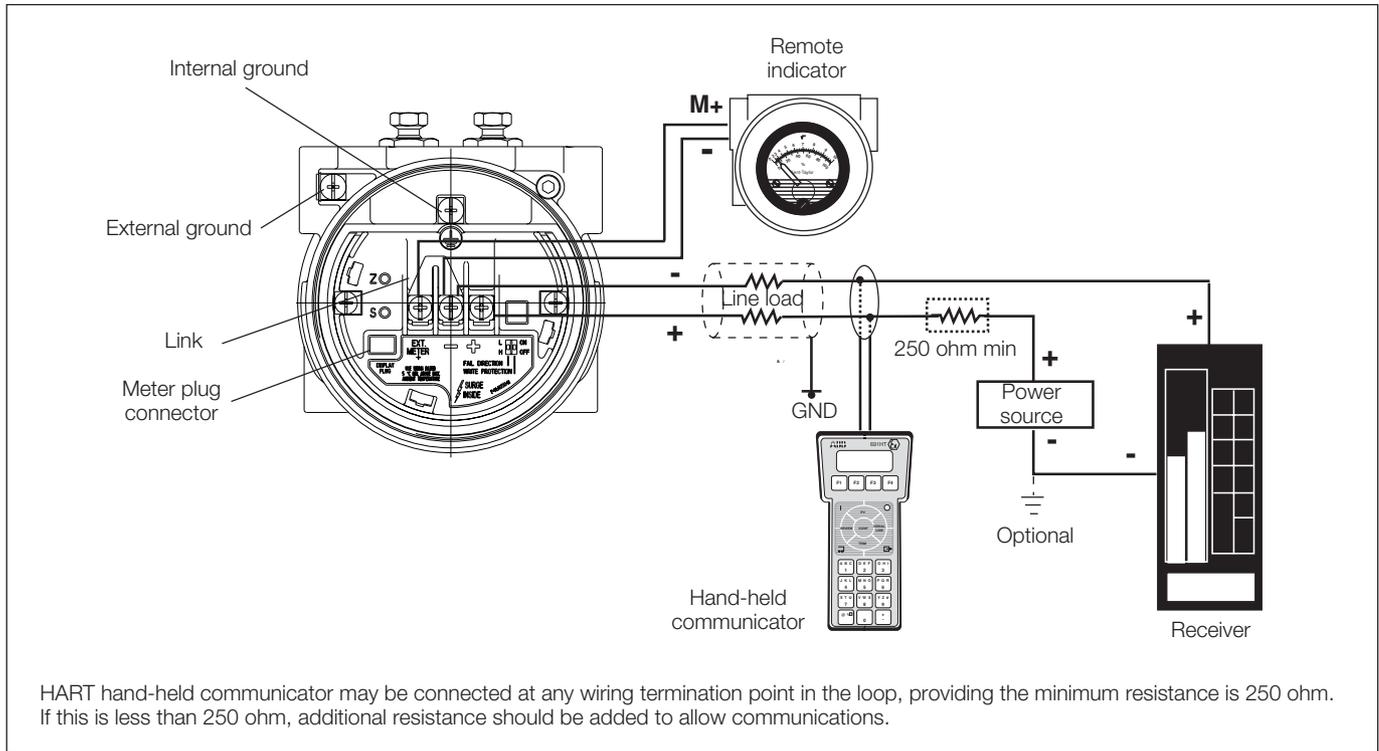
Descriptor	16 alphanumeric characters
Message	32 alphanumeric characters
Date	Day, month, year

(*) Wetted parts of the transmitter

(**) U-bolt material: AISI 400 ss;
screws material: high-strength alloy steel or AISI 316 ss.

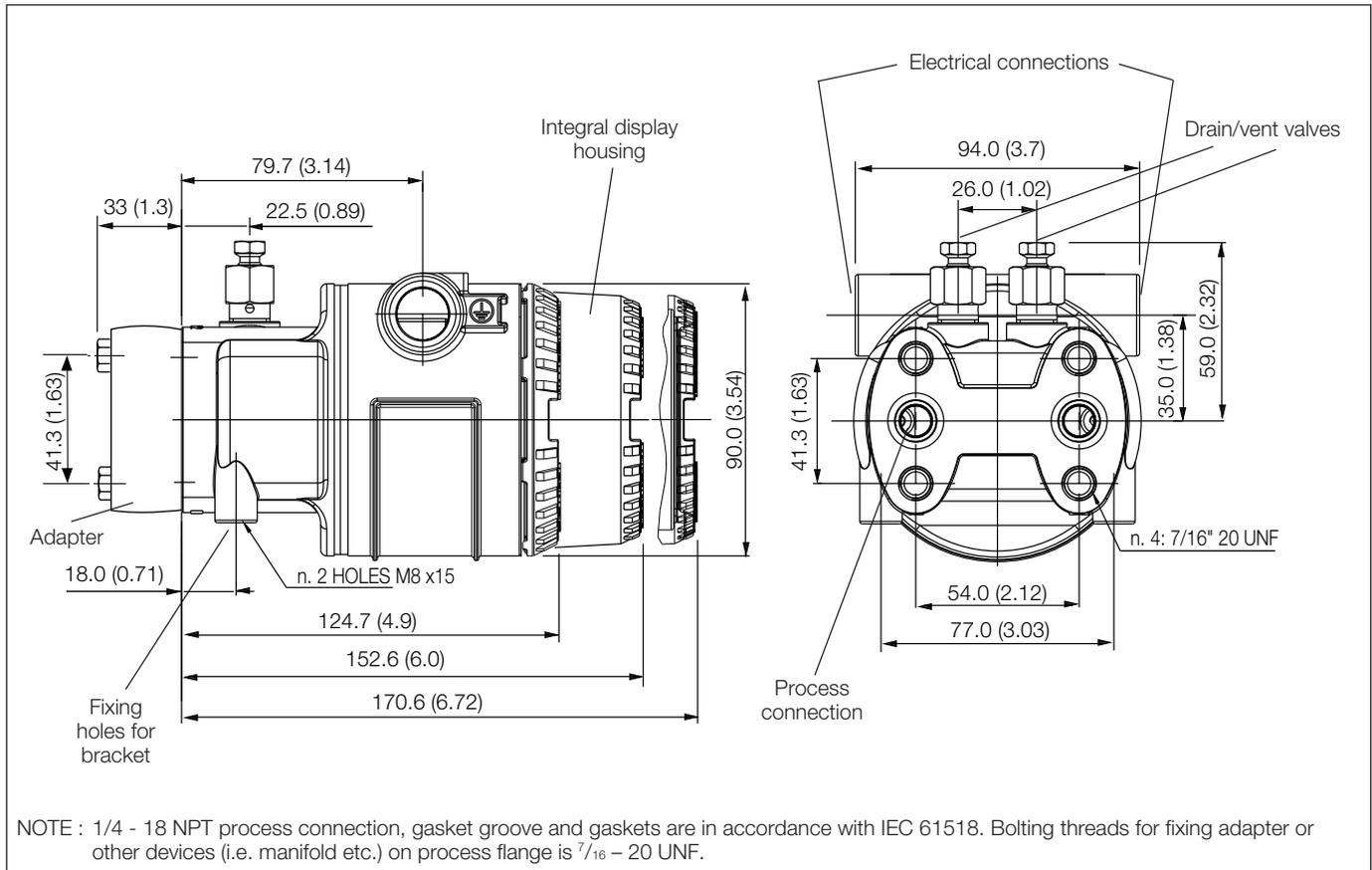
™ DC 200 is a Dow Corning Corporation trademark

Electrical connections

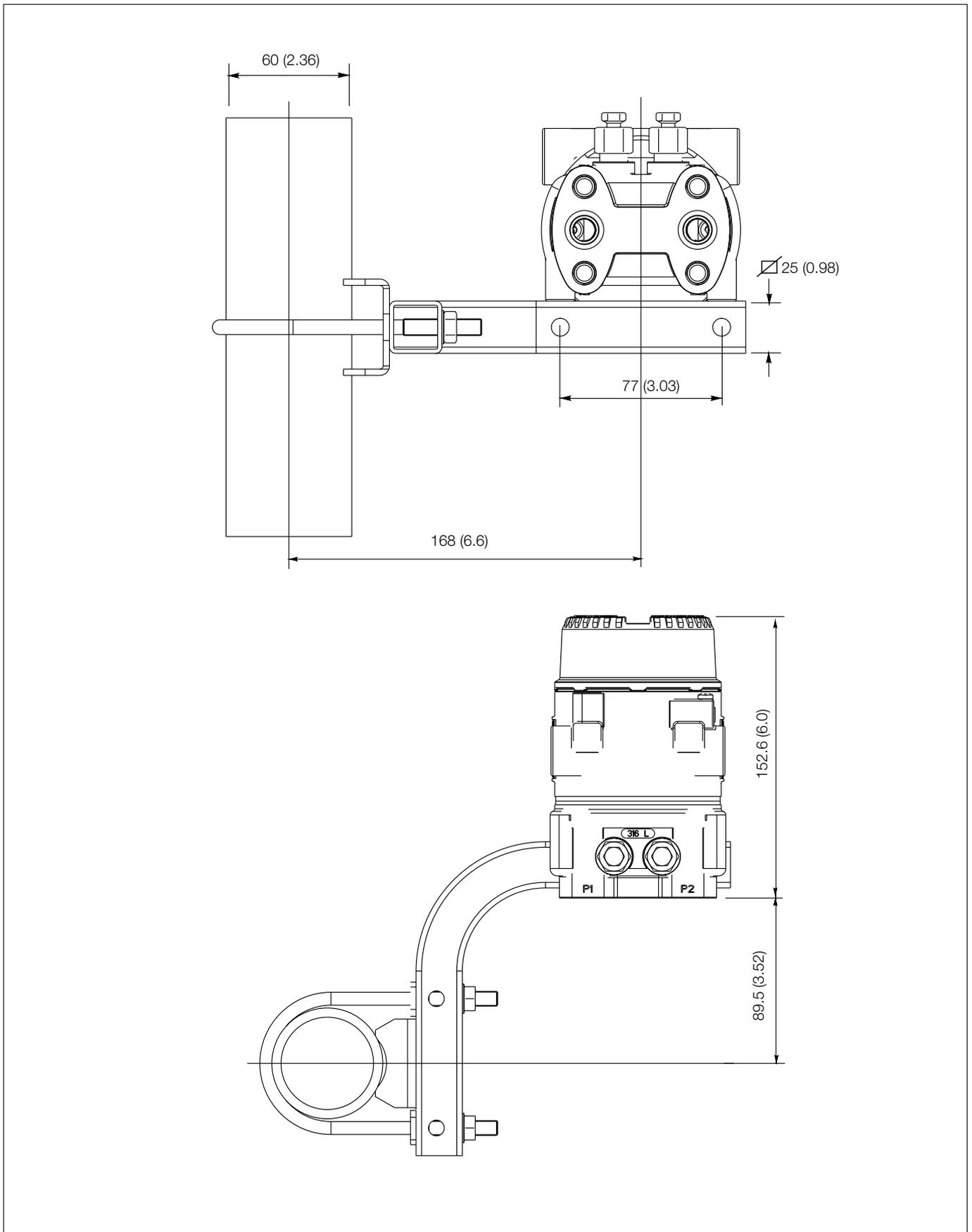


MOUNTING DIMENSIONS (not for construction unless certified) – dimensions in mm (in)

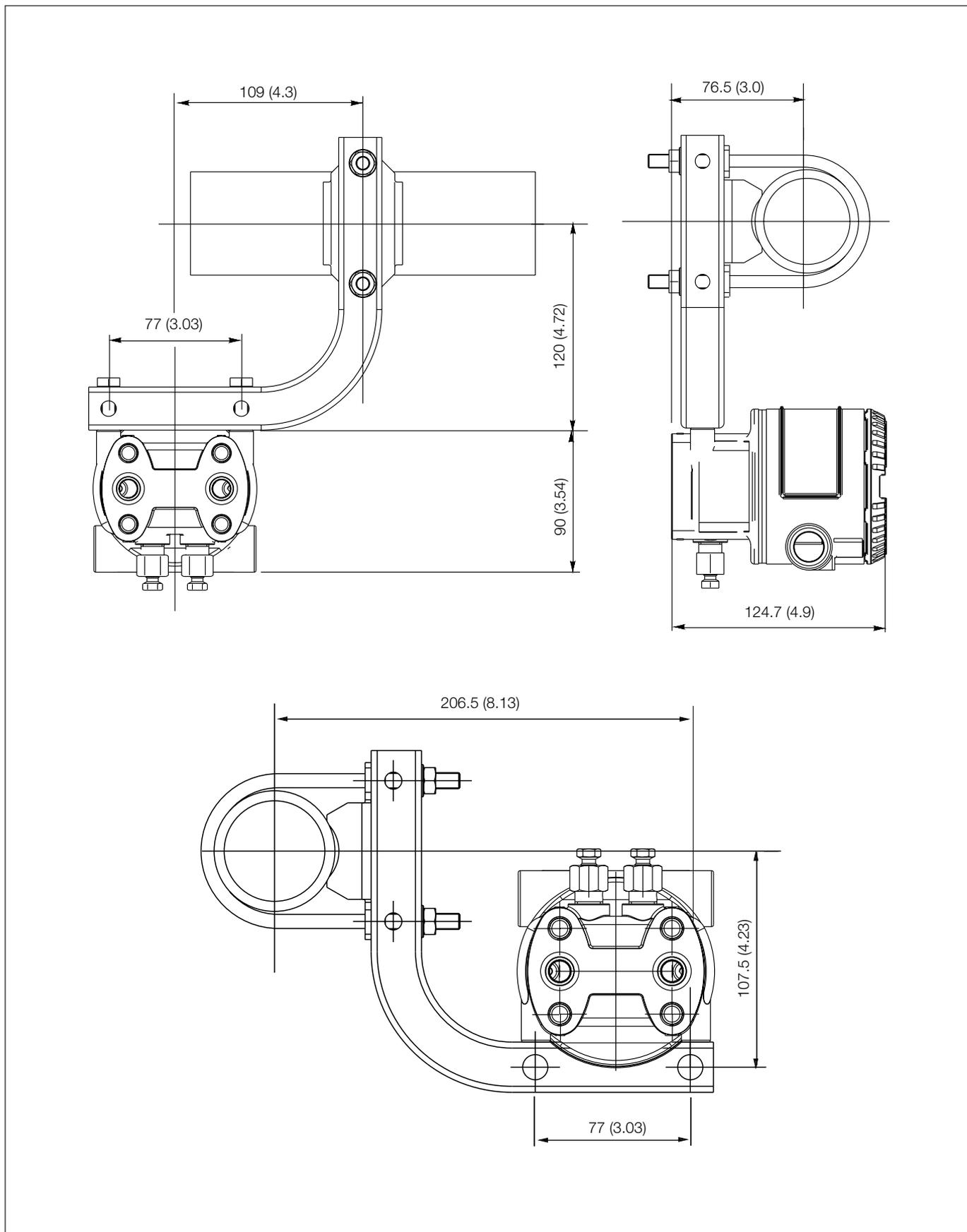
Transmitter with blind/display cover



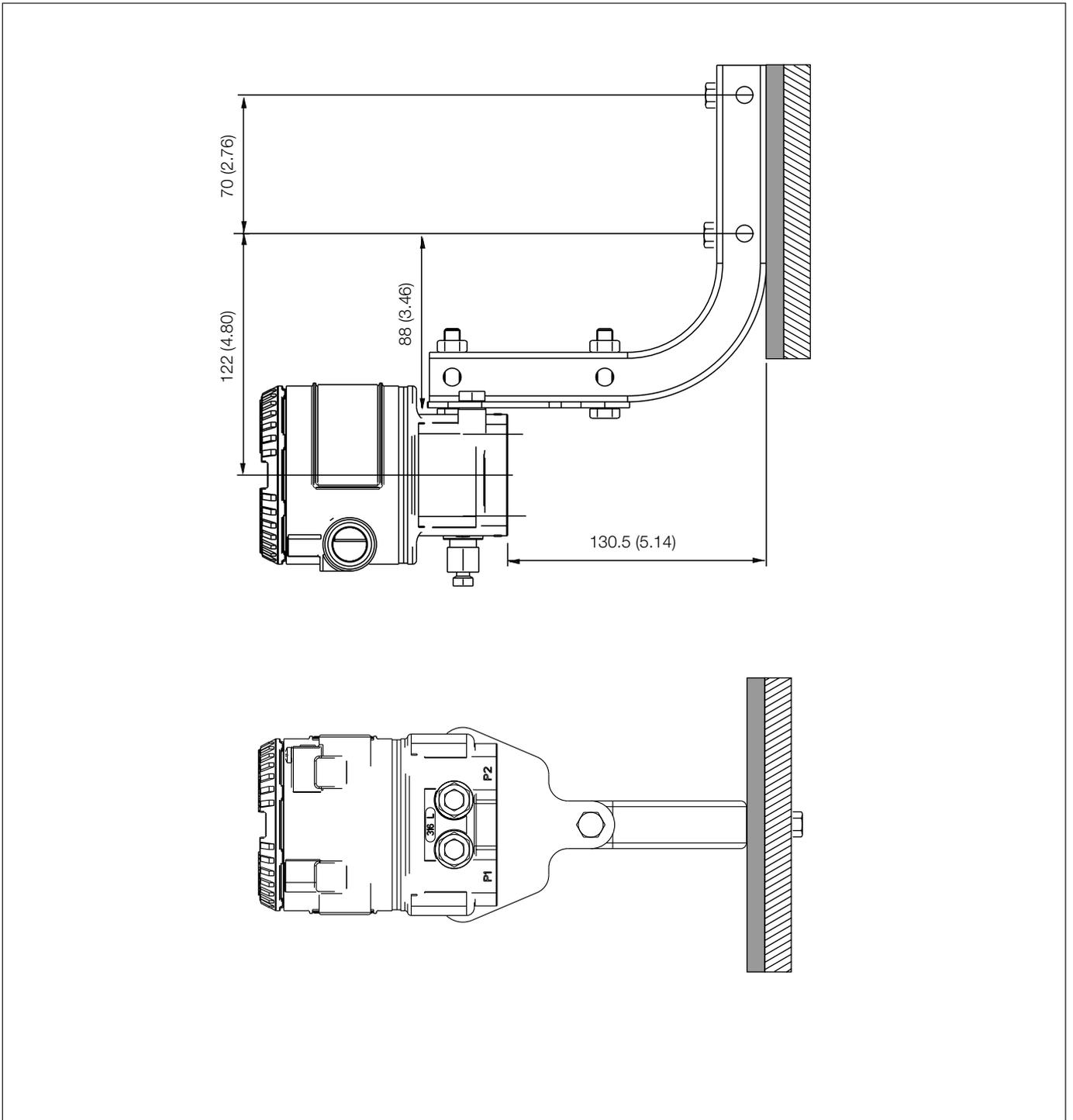
Transmitter with bracket on vertical pipe (mounting example)



Transmitter with bracket on horizontal pipe (mounting examples)



Transmitter with bracket for wall mounting



BASIC ORDERING INFORMATION model 364DS Differential and 364PS Gauge Pressure Transmitters

Select one character or set of characters from each category and specify complete catalog number.

Refer to additional ordering information code and specify one or more codes for each transmitter if additional options are required.

BASE MODEL – 1st to 5th characters			X	S	X	X	0	X	X
Differential Pressure Transmitter – BASE ACCURACY 0.06%		3 6 4 D S							
Gauge Pressure Transmitter – BASE ACCURACY 0.06%		3 6 4 P S							
SENSOR - Span limits – 6th character									
0.05 and 1kPa	0.5 and 10mbar	0.2 and 4inH ₂ O	A						
0.14 and 4kPa	1.4 and 40mbar	0.56 and 16inH ₂ O	B						
0.16 and 16kPa	1.6 and 160mbar	0.64 and 64inH ₂ O	E						
0.65 and 65kPa	6.5 and 650mbar	2.6 and 260inH ₂ O	G						
1.6 and 160kPa	16 and 1600mbar	6.4 and 642inH ₂ O	H						
6 and 600kPa	0.06 and 6bar	0.87 and 87psi	M						
24 and 2400kPa	0.24 and 24bar	3.5 and 348psi	P						
80 and 8000kPa	0.8 and 80bar	11.6 and 1160psi	Q						
160 and 16000kPa	1.6 and 160bar	23.2 and 2320psi	S						
Use code – 7th character				S					
Diaphragm material / Fill fluid (wetted parts) – 8th character									
Hastelloy C276™ (on AISI seat)		Silicone oil	NACE	H					
Process connection material and connection (wetted parts) – 9th character									
AISI 316 L ss (with drain/vent valve)		1/4 – 18 NPT-f direct (7/16 – 20 UNF U.S. drilling)	NACE		Q				
Bolts/Gasket (wetted parts) – 10th character									
None							0		
Housing material and electrical connection – 11th character									
AISI 304 ss		1/2 – 14 NPT						S	
AISI 304 ss		M20 x 1.5 (CM20)						T	
AISI 316 L ss		1/2 – 14 NPT						3	
AISI 316 L ss		M20 x 1.5 (CM20)						4	
Output/Additional options – 12th character									
HART digital communication and 4 to 20mA		No additional options							H
HART digital communication and 4 to 20mA		Options requested (to be ordered by "Additional ordering code")							1

ADDITIONAL ORDERING INFORMATION for models 364DS and 364PS

Add one or more 2-digit code(s) after the basic ordering information to select all required options

	XX											
Adapters material and connection (wetted parts)												
AISI 316 L ss - 1/2 - 14 NPT female	F1											
Electrical certification												
Combined ATEX (Ex ia and Ex d) plus FM plus CSA	EN											
Combined ATEX - Intrinsic Safety and Flameproof	E7											
Combined ATEX - Intrinsic Safety, Flameproof and Type "N"	EW											
Combined NEPSI - Intrinsic Safety, Flameproof and Type "N"	EP											
ATEX Group II Category 1 GD - Intrinsic Safety Ex ia	E1											
ATEX Group II Category 1/2 GD - Flameproof Ex d	E2											
Canadian Standard Association (CSA)	E4											
Factory Mutual (FM) approval	E6											
IECEX Flameproof Ex d IIC T4	ER											
GOST (Russia) Ex ia	W1											
GOST (Russia) Ex d	W2											
GOST (Kazakhstan) Ex ia	W3											
GOST (Kazakhstan) Ex d	W4											
Metrologic (Russia)	WC											
Metrologic (Kazakhstan)	WD											
Integral LCD												
Digital LCD integral display										L1		
Mounting bracket												
AISI 304 ss for pipe mounting											B2	
AISI 304 ss for wall mounting											B4	
AISI 316 L ss for pipe mounting											B8	
AISI 316 L ss for wall mounting											B9	
Operating manual												
German											M1	
Italian											M2	
Labels & tag language												
German												T1
Italian												T2
Additional customer plate												
Laser printing of customer data on wired-on stainless steel plate												I2
Configuration												
Standard - Pressure = inH ₂ O/psi at 20° C; Temperature = deg. F												N2
Standard - Pressure = inH ₂ O/psi at 4° C; Temperature = deg. F												N3
Standard - Pressure = inH ₂ O/psi at 20° C; Temperature = deg. C												N4
Standard - Pressure = inH ₂ O/psi at 4° C; Temperature = deg. C												N5
Custom												N6
Certificates												
Inspection certificate EN 10204-3.1 of calibration (9-point)												C1
Certificate of compliance with the order EN 10204-2.1 of instrument design												C6
Approvals												
Det Norske Veritas naval approval												C7
Bureau Veritas naval approval												CV
Material traceability												
Certificate of compliance with the order EN 10204-2.1 of process wetted parts												H1
Inspection certificate EN 10204-3.1 of process wetted parts												H3
Electrical connection plug												
Stainless steel blind plug (General purpose only)												Z1
Stainless steel blind plug (EEx d)												Z2

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Standard delivery items (can be differently specified by additional ordering code)

- Adapters supplied loose
- AISI 316 L ss drain/vent valve
- General purpose (no electrical certification)
- Temporary plastic electrical connection blind plugs (two no Ex)
- No display, no mounting bracket
- English manual and labels
- Configuration with kPa and deg. C units
- No test, inspection or material traceability certificates

THE SELECTION OF SUITABLE WETTED PARTS AND FILLING FLUID FOR COMPATIBILITY WITH THE PROCESS MEDIA IS A CUSTOMER'S RESPONSIBILITY, IF NOT OTHERWISE NOTIFIED BEFORE MANUFACTURING.

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