

266 DSH DATASHEET

JUNHO 2013

Tel: (+351) 21 843 64 00
Fax: (+351) 21 843 64 09
geral@bhb.pt www.bhb.pt

Model 266DSH Differential
Model 266PSH Gauge
Model 266VSH Absolute

Measurement made easy

Engineered solutions for all applications



Base accuracy

- from 0.06 % of calibrated span (optional 0.04 %)

Reliable sensing system coupled with very latest digital technologies

- provides large turn down ratio up to 100:1

Comprehensive sensor choice

- optimize in-use total performance and stability

10-year stability

- 0.15 % of URL

Flexible configuration facilities

- provided locally via local LCD keypad

New TTG (Through-The-Glass) keypad technology

- allows quick and easy local configuration without opening the cover, even in explosion proof environments

IEC 61508 certification

- version for SIL2 (1oo1) and SIL3 (1oo2) applications

Full compliance with PED Category III

Model 266DSH Differential

Model 266PSH Gauge

Model 266VSH Absolute

Functional Specifications

Range and span limits

Sensor Code	Upper Range Limit (URL)	Lower Range Limit (LRL)			Minimum span	
		266DSH differential	266PSH gauge	266VSH absolute	266DSH differential 266PSH gauge	266VSH absolute
A	1 kPa	-1 kPa	-1 kPa		0.05 kPa	
	10 mbar	-10 mbar	-10 mbar		0.5 mbar	
	4 inH2O	-4inH2O	-4inH2O		0.2 inH2O	
B	4 kPa	-4 kPa	-4 kPa		0.2 kPa	
	40 mbar	-40 mbar	-40 mbar		2 mbar	
	16 inH2O	-16 inH2O	-16 inH2O		0.8 inH2O	
E	16 kPa	-16 kPa	-16 kPa	0.07 kPa abs (§)	0.54 kPa	0.54 kPa
	160 mbar	-160 mbar	-160 mbar	0.7 mbar abs (§)	5.4 mbar	5.4 mbar
	64 inH2O	-64 inH2O	-64 inH2O	0.5 mmHg (§)	2.16 inH2O	4 mmHg
F	40 kPa	-40 kPa	-40 kPa	0.07 kPa abs (§)	0.4 kPa	0.67 kPa
	400 mbar	-400 mbar	-400 mbar	0.7 mbar abs (§)	4 mbar	6.7 mbar
	160 inH2O	-160 inH2O	-160 inH2O	0.5 mmHg (§)	1.6 inH2O	5 mmHg
G	65 kPa	-65 kPa	-65 kPa	0.07 kPa abs (§)	0.65 kPa	1.1 kPa
	650 mbar	-650 mbar	-650 mbar	0.7 mbar abs (§)	6.5 mbar	11 mbar
	260 inH2O	-260 inH2O	-260 inH2O	0.5 mmHg (§)	2.6 inH2O	8 mmHg
H	160 kPa	-160 kPa	1 kPa abs	0.07 kPa abs (§)	1.6 kPa	2.67 kPa
	1600 mbar	-1600 mbar	10 mbar abs	0.7 mbar abs (§)	16 mbar	26.7 mbar
	642 inH2O	-642 inH2O	0.15 psia	0.5 mmHg (§)	6.4 inH2O	20 mmHg
M	600 kPa	-600 kPa	1 kPa abs	0.07 kPa abs (§)	6 kPa	10 kPa
	6 bar	-6 bar	10 mbar abs	0.7 mbar abs (§)	0.06 bar	0.1 bar
	87 psi	-87 psi	0.15 psia	0.5 mmHg (§)	0.87 psi	1.45 psi
P	2400 kPa	-2400 kPa	1 kPa abs	0.07 kPa abs (§)	24 kPa	40 kPa
	24 bar	-24 bar	10 mbar abs	0.7 mbar abs (§)	0.24 bar	0.4 bar
	348 psi	-348 psi	0.15 psia	0.5 mmHg (§)	3.5 psi	5.8 psi
Q	8000 kPa	-8000 kPa	1 kPa abs	0.07 kPa abs (§)	80 kPa	134 kPa
	80 bar	-80 bar	10 mbar abs	0.7 mbar abs (§)	0.8 bar	1.34 bar
	1160 psi	-1160 psi	0.15 psia	0.5 mmHg (§)	11.6 psi	19.4 psi
S	16000 kPa	-16000 kPa	1 kPa abs	0.07 kPa abs (§)	160 kPa	267 kPa
	160 bar	-160 bar	10 mbar abs	0.7 mbar abs (§)	1.6 bar	2.67 bar
	2320 psi	-2320 psi	0.15 psia	0.5 mmHg (§)	23.2 psi	38.7 psi

(§) Lower Range Limit is 0.135 kPa abs, 1.35 mbar abs, 1 mmHg for inert Galden or 0.4 kPa abs, 4 mbar abs, 3 mmHg for inert Halocarbon.

Span limits

Maximum span = URL (can be further adjusted up to \pm 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 \geq minimum span

Recommendation for square root function

At least 10% of Upper Range Limit (URL)

Damping

Selectable time constant : between 0 and 60 s
This is in addition to sensor response time.

Turn on time

Operation within specification in less than 10 s with minimum damping.

Insulation resistance

> 100 M Ω at 500 V DC (terminals to earth)

Operative limits

Pressure limits:

Overpressure limits

Without damage to the transmitter

Sensors	Fill fluid	Overpressure limits
Sensor F to S	Silicone oil	0.07 kPa abs, 0.7 mbar abs, 0.5 mmHg and 21 MPa, 210 bar, 3045 psi ⁽¹⁾ ⁽²⁾
Sensor F to Q 266DSH High Static	Silicone oil	0.07 kPa abs, 0.7 mbar abs, 0.5 mmHg and 42 MPa, 420 bar, 6090 psi
Sensor E	Silicone oil	0.07 kPa abs, 0.7 mbar abs, 0.5 mmHg and 16 MPa, 160 bar, 2320 psi ⁽¹⁾
Sensor B	Silicone oil	0.07 kPa abs, 0.7 mbar abs, 0.5 mmHg and 7 MPa, 70 bar, 1015 psi ⁽¹⁾
Sensor A	Silicone oil	0.07 kPa abs, 0.7 mbar abs, 0.5 mmHg and 2 MPa, 20 bar, 290 psi ⁽¹⁾
Sensor F to S	Inert (Galden)	0.135 kPa abs, 1.35 mbar abs, 1 mmHg and 21 MPa, 210 bar, 3045 psi ⁽¹⁾ ⁽²⁾
Sensor E	Inert (Galden)	0.135 kPa abs, 1.35 mbar abs, 1 mmHg and 16 MPa, 160 bar, 2320 psi ⁽¹⁾
Sensor F to S	Inert (Halocarbon)	0.4 kPa abs, 4 mbar abs, 3 mmHg and 21 MPa, 210 bar, 3045 psi ⁽¹⁾ ⁽²⁾
Sensor F to Q 266DSH High Static	Inert (Halocarbon)	0.4 kPa abs, 4 mbar abs, 3 mmHg and 42 MPa, 420 bar, 6090 psi
Sensor E	Inert (Halocarbon)	0.4 kPa abs, 4 mbar abs, 3 mmHg and 16 MPa, 160 bar, 2320 psi ⁽¹⁾

(1) 1 MPa, 10 bar, 145 psi for Kynar-PVDF

(2) 16 MPa, 160 bar, 2320 psi for AISI 316 ss NACE bolting

Static pressure limits

Transmitters for differential pressure model 266DSH operates within specifications between the following limits:

Sensors	Static pressure limits
Sensor F to S	1.3 kPa abs, 13 mbar abs, 0.2 psia and 21 MPa, 210 bar, 3045 psi ⁽¹⁾ ⁽²⁾
Sensor F to Q 266DSH High Static	1.3 kPa abs, 13 mbar abs, 0.2 psia and 42 MPa, 420 bar, 6090 psi
Sensor E	1.3 kPa abs, 13 mbar abs, 0.2 psia and 16 MPa, 160 bar, 2320 psi ⁽¹⁾
Sensor B	1.3 kPa abs, 13 mbar abs, 0.2 psia and 7 MPa, 70 bar, 1015 psi ⁽¹⁾
Sensor A	1.3 kPa abs, 13 mbar abs, 0.2 psia and 2 MPa, 20 bar, 290 psi ⁽¹⁾

(1) 1 MPa, 10 bar, 145 psi for Kynar-PVDF

(2) 16 MPa, 160 bar, 2320 psi for AISI 316 ss NACE bolting

Proof pressure

The transmitter can be exposed without leaking to line pressure of up to

— 48 MPa, 480 bar, 6960 psi

— 77 MPa, 770 bar, 11165 psi for 266DSH high static version.

Meet ANSI/ISA-S 82.03 hydrostatic test requirements.

Model 266DSH Differential

Model 266PSH Gauge

Model 266VSH Absolute

Temperature limits °C (°F) :

Ambient

is the operating temperature

Models 266DSH - 266PSH	Ambient temperature limits
Silicone oil for sensor F to S	-40 and 85 °C (-40 and 185 °F)
Silicone oil for sensor A to E	-25 and 85 °C (-13 and 185 °F)
Inert (Galden) for sensor F to S	-20 and 85 °C (-4 and 185 °F)
Inert (Galden) for sensor E	-10 and 85 °C (14 and 185 °F)
Inert (Halocarbon) for sensor F to S	-20 and 85 °C (-4 and 185 °F)
Inert (Halocarbon) for sensor E	-10 and 85 °C (14 and 185 °F)

Model 266VSH	Ambient temperature limits
Silicone oil for sensor F to S	-40 and 85 °C (-40 and 185 °F)
Silicone oil for sensor E	-15 and 70 °C (5 and 158 °F)
Inert (Galden) for sensor F to S	-10 and 65 °C (14 and 150 °F)
Inert (Halocarbon) for sensor F to S	-10 and 65 °C (14 and 150 °F)

Models 266DSH - 266PSH - 266VSH	Ambient temperature limits
LCD integral display	-40 and 85 °C (-40 and 185 °F)

LCD display may not be clearly readable below -20 °C (-4 °F) or above +70 °C (+158 °F)

IMPORTANT

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

Process

Models 266DSH - 266PSH	Process temperature limits
Silicone oil for sensor F to S	-40 and 121 °C (-40 and 250 °F) ⁽¹⁾
Silicone oil for sensor A to E	-25 and 121 °C (-13 and 250 °F) ⁽¹⁾
Inert (Galden) for sensor F to S	-20 and 100 °C (-4 and 212 °F) ⁽²⁾
Inert (Galden) for sensor E	-10 and 100 °C (14 and 212 °F) ⁽²⁾
Inert (Halocarbon) for sensor F to S	-20 and 100 °C (-4 and 212 °F) ⁽²⁾
Inert (Halocarbon) for sensor E	-10 and 100 °C (14 and 212 °F) ⁽²⁾

Model 266VSH	Process temperature limits
Silicone oil for sensor F to S	-40 and 121 °C (-40 and 250 °F) ⁽¹⁾
Silicone oil for sensor E	-15 and 121 °C (5 and 250 °F) ⁽¹⁾
Inert (Galden) for sensor F to S	-10 and 100 °C (14 and 212 °F) ⁽²⁾
Inert (Halocarbon) for sensor F to S	-10 and 100 °C (14 and 212 °F) ⁽²⁾

(1) 100 °C (212 °F) for application below atmospheric pressure

(2) 65 °C (150 °F) for application below atmospheric pressure

Models 266DSH - 266PSH - 266VSH	Process temperature limits
Viton gasket	-20 and 121 °C (-4 and 250 °F)

Storage

Models 266DSH - 266PSH - 266VSH	Storage temperature limits
Storage limits	-50 and 85 °C (-58 and 185 °F)
LCD integral display	-40 and 85 °C (-40 and 185 °F)

Environmental limits

Electromagnetic compatibility (EMC)

Comply with EN 61326 and NAMUR NE 21 (option).
Surge immunity level (with surge protector): 4 kV
(according to IEC 1000-4-5 EN 61000-4-5)

Pressure equipment directive (PED)

Comply with 97/23/EEC Category III Module H.

Humidity

Relative humidity: up to 100 %
Condensing, icing: admissible

Vibration resistance

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

Shock resistance

Acceleration: 50 g
Duration: 11 ms
(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 (IP 68 on request) or by NEMA to 4X or by JIS to C0920. IP65 with Harting Han connector.

Hazardous atmospheres

With or without integral display

INTRINSIC SAFETY:

ATEX Europe (code E1) approval

II 1 G Ex ia IIC T6/T5/T4 and II 1/2 G Ex ia IIC T6/T5/T4 and
II 1 D Ex iaD 20 T85 °C and II 1/2 D Ex iaD 21 T85 °C; IP67.

IECEX (code E8) approval

Ex ia IIC T6/T5/T4 and Ex iaD 20 T85 °C and Ex iaD 21 T85 °C; IP67.

NEPSI China (code EY)

Ex ia IIC T4~T6, DIP A20TA, T4~T6.

EXPLOSION PROOF:

ATEX Europe (code E2) approval

II 1/2 G Ex d IIC T6 and II 1/2 D Ex tD A21 IP67 T85 °C (Ta = -50 to +75 °C).

IECEX (code E9) approval

Ex d IIC T6 and Ex tD A21 IP67 T85 °C (Ta = -50 to +75 °C).

NEPSI China (code EZ)

Ex d IIC T6, DIP A21TA, T6.

TYPE "N":

ATEX Europe (code E3) type examination

II 3 G Ex nL IIC T6/T5/T4 and II 3 D Ex tD A22 IP67 T85 °C; IP67.

IECEX (code ER) type examination

Ex nL IIC T6/T5/T4; IP67.

NEPSI China (code ES) type examination

Ex nL IIC T4~T6, DIP A22TA, T6.

FM Approvals US (code E6) and FM Approvals Canada (code E4):

- Explosionproof (US): Class I, Div. 1, Groups A, B, C, D
- Explosionproof (Canada): Class I, Div. 1, Groups 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

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

Class I, Zone 0 Ex ia IIC T6/T4, Zone 0 (FM Canada)

COMBINED ATEX (code EW = E1 + E2 + E3), (code E7 = E1 + E2)

COMBINED ATEX and FM Approvals (code EN = EW + E4 + E6)

COMBINED FM Approvals US and Canada

- Intrinsically safe (code EA)
 - Explosionproof (code EB)
 - Nonincendive (code EC)
-

COMBINED IEC (code EH = E8 + E9), (code EI = E8 + E9 + ER)

COMBINED NEPSI (code EP = EY + EZ), (code EQ = EY + EZ + ES)

GOST (Russia), GOST (Kazakhstan), GOST (Belarus), Inmetro (Brazil),
Kosha (Korea).

REFER TO CERTIFICATES FOR AMBIENT TEMPERATURE RANGES (WITHIN THE LIMITS OF -50 TO 85°C) RELATED TO THE DIFFERENT TEMPERATURE CLASSES

Model 266DSH Differential Model 266PSH Gauge Model 266VSH Absolute

Electrical Characteristics and Options

Optional indicators

Standard integral display

(code L9; only available with Standard HART)

Wide screen LCD, 128 x 64 pixel, 52.5 x 27.2 mm (2.06 x 1.07 in.) dot matrix. Multilanguage. Without keypad. User selectable application-specific visualizations.

Totalized and instantaneous flow indication. Display may also indicate static pressure, sensor temperature and diagnostic messages and provides configuration facilities.



Integral display with integral keypad

(code L1; not available with Standard HART)

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

Four keys for configuration and management of device. Easy setup for quick commissioning. User selectable application-specific visualizations. Totalized and instantaneous flow indication. Display may also indicate static pressure, sensor temperature and diagnostic messages and provides configuration facilities.



Integral display with Through-The-Glass (TTG) activated keypad (code L5; not available with Standard HART)

As above integral display but equipped with the innovative TTG keypad allowing the activation of the configuration and management menus of the device without the need of removing the transmitter housing cover.

TTG keypad is protected against accidental activations.



Standard and Advanced HART digital communication and 4 to 20 mA output

Power supply

The transmitter operates from 10.5 to 42 V DC with no load and is protected against reverse polarity connection (additional load allows operations over 42 V DC). For Ex ia and other intrinsically safe approval power supply must not exceed 30 V DC. Minimum operating voltage increase to 12.3 V DC with optional surge protector

Ripple

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

Load limitations

4 to 20 mA and HART total loop resistance :

$$R \text{ (k}\Omega\text{)} = \frac{\text{Supply voltage} - \text{min. operating voltage (V DC)}}{22 \text{ mA}}$$

A minimum of 250 Ω is required for HART communication.

Optional surge protection

Up to 4kV

- voltage 1.2 μs rise time / 50 μs delay time to half value
- current 8 μs rise time / 20 μs delay time to half value

Output signal

Two-wire 4 to 20 mA, user-selectable for linear or square root output, power of $\sqrt[3]{2}$ or $\sqrt[5]{2}$, square root for bidirectional flow, 22 points linearization table (i.e. for horizontal or spherical tank level measurement).

HART® communication provides digital process variable superimposed on 4 to 20 mA signal, with protocol based on Bell 202 FSK standard.

Output current limits (to NAMUR NE 43 standard)

Overload condition

- Lower limit: 3.8 mA (configurable from 3.8 to 4 mA)
- Upper limit: 20.5 mA (configurable from 20 to 21 mA)

Alarm current

- Lower limit: 3.6 mA (configurable from 3.6 to 4 mA)
 - Upper limit: 21 mA (configurable from 20 to 22 mA)
- Factory setting: high alarm current

Process diagnostics (PILD)

Plugged impulse line detection (PILD) generates a warning via HART communication. The device can also be configured to drive the analog output signal to the "Alarm current".

FOUNDATION Fieldbus output

Device type

LINK MASTER DEVICE

Link Active Scheduler (LAS) capability implemented.

Manufacturer code: 000320 (hex)

Device type code: 0007 (hex)

Power supply

The transmitter operates from 9 to 32 V DC, polarity independent, with or without surge protector.

For Ex ia approval power supply must not exceed 24 V DC (entity certification) or 17.5 V DC (FISCO certification), according to FF-816.

Current consumption

operating (quiescent): 15 mA

fault current limiting: 20 mA max.

Output signal

Physical layer in compliance to IEC 1158-2/EN 61158-2 with transmission to Manchester II modulation, at 31.25 kbit/s.

Function blocks/execution period

3 enhanced Analog Input blocks/25 ms max (each)

1 enhanced PID block/40 ms max.

1 standard ARithmetic block/25 ms

1 standard Input Selector block/25 ms

1 standard Control Selector block/25 ms

1 standard Signal Characterization block/25 ms

1 standard Integrator/Totalizer block/25 ms

Additional blocks

1 enhanced Resource block,

1 custom Pressure with calibration transducer block

1 custom Advanced Diagnostics transducer block including Plugged Input Line Detection

1 custom Local Display transducer block

Number of link objects

35

Number of VCRs

35

Output interface

FOUNDATION fieldbus digital communication protocol to standard H1, compliant to specification V. 1.7.

Transmitter failure mode

The output signal is "frozen" to the last valid value on gross transmitter failure condition, detected by self-diagnostics which also indicate a BAD conditions. If electronic failure or short circuit occur the transmitter consumption is electronically limited at a defined value (20 mA approx), for safety of the network.

Model 266DSH Differential

Model 266PSH Gauge

Model 266VSH Absolute

PROFIBUS PA output

Device type

Pressure transmitter compliant to Profiles 3.0.1
Identification number: 3450 (hex)

Power supply

The transmitter operates from 9 to 32 V DC , polarity independent, with or without surge protector.
For Ex ia approval power supply must not exceed 17.5 V DC.
Intrinsic safety installation according to FISCO model.

Current consumption

operating (quiescent): 15 mA
fault current limiting: 20 mA max.

Output signal

Physical layer in compliance to IEC 1158–2/EN 61158–2 with transmission to Manchester II modulation, at 31.25 kbit/s.

Output interface

PROFIBUS PA communication according to Profibus DP50170 Part 2/DIN 19245 part 1–3.

Output update time

25 ms

Data blocks

3 analog input, 1 physical.

Additional blocks

- 1 Pressure with calibration transducer block
- 1 Advanced Diagnostics transducer block including Plugged Input Line Detection
- 1 Local Display transducer block

Transmitter failure mode

On gross transmitter failure condition, detected by self-diagnostics, the output signal can be driven to defined conditions, selectable by the user as safe, last valid or calculated value.

If electronic failure or short circuit occur the transmitter consumption is electronically limited at a defined value (20 mA approx), for safety of the network.

Performance specifications

Stated at reference condition to IEC 60770 ambient temperature of 20 °C (68 °F), relative humidity of 65 %, atmospheric pressure of 1013 hPa (1013 mbar), mounting position with vertical diaphragm and zero based range for transmitter with isolating diaphragms in AISI 316 L ss or Hastelloy and silicone oil fill and HART digital trim values equal to 4 mA and to 20 mA span end points, in linear mode. Unless otherwise specified, errors are quoted as % of span. Some performance referring to the Upper Range Limit 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)

Sensors	Time constant (63.2 % of total step change)
Sensor M to S	≤ 70 ms
Sensor H	100 ms
Sensor G	130 ms
Sensor F	180 ms
Dead time for all sensors	30 ms

Response time (total) = dead time + time constant

Accuracy rating

% of calibrated span, including combined effects of terminal based linearity, hysteresis and repeatability. For fieldbus versions SPAN refer to analog input function block outscale range

Model	Sensor	for TD	
266DSH standard static and 266PSH	F to P	from 1:1 to 10:1	± 0.06 %
	F to P	from 10:1 to 100:1	± (0.006 x TD) %
	E, Q, S	from 1:1 to 10:1	± 0.075 %
	Q and S	from 10:1 to 100:1	± (0.0075 x TD) %
	E	from 10:1 to 30:1	± (0.0075 x TD) %
	B	from 1:1 to 10:1	± 0.10 %
	B	from 10:1 to 20:1	± (0.01 x TD) %
	A	from 1:1 to 4:1	± 0.10 %
266DSH	A	from 4:1 to 20:1	± (0.025 x TD) %
266DSH	F to Q	from 1:1 to 5:1	± 0.04 %
266PSH (option D2)	F to P	from 5:1 to 100:1	± (0.0105 + 0.0059 x TD) %
	Q	from 5:1 to 100:1	± (0.003 + 0.0074 x TD) %
266DSH	F to Q	from 1:1 to 10:1	± 0.075 %
high static	F to Q	from 10:1 to 100:1	± (0.0075 x TD) %
266VSH	E to S	from 1:1 to 10:1	± 0.075 %
	F to S	from 10:1 to 60:1	± (0.0075 x TD) %
	E	from 10:1 to 30:1	± (0.0075 x TD) %

Ambient temperature

per 20K change between the limits of $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$
(per $36\text{ }^{\circ}\text{F}$ change between the limits of -40 to $+185\text{ }^{\circ}\text{F}$):

Model	Sensor	for TD up to	
266DSH	F to Q	10:1	$\pm (0.03\% \text{ URL} + 0.045\% \text{ span})$
	E and S	10:1	$\pm (0.04\% \text{ URL} + 0.065\% \text{ span})$
266PSH	B	10:1	$\pm (0.06\% \text{ URL} + 0.10\% \text{ span})$
	A	4:1	$\pm (0.10\% \text{ URL} + 0.10\% \text{ span})$
266VSH	F to Q	10:1	$\pm (0.06\% \text{ URL} + 0.09\% \text{ span})$
	E and S	10:1	$\pm (0.08\% \text{ URL} + 0.13\% \text{ span})$

for an ambient temperature change from $-10\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$
($+14$ to $+140\text{ }^{\circ}\text{F}$):

Model	Sensor	for TD up to	
266DSH	F to Q	10:1	$\pm (0.055\% \text{ URL} + 0.08\% \text{ span})$
	E and S	10:1	$\pm (0.075\% \text{ URL} + 0.11\% \text{ span})$
266PSH	B	10:1	$\pm (0.11\% \text{ URL} + 0.18\% \text{ span})$
	A	4:1	$\pm (0.18\% \text{ URL} + 0.18\% \text{ span})$
266VSH	F to Q	10:1	$\pm (0.11\% \text{ URL} + 0.16\% \text{ span})$
	E and S	10:1	$\pm (0.15\% \text{ URL} + 0.22\% \text{ span})$

per 10K change between the limits of $-40\text{ }^{\circ}\text{C}$ to $-10\text{ }^{\circ}\text{C}$ or
 $+60\text{ }^{\circ}$ to $+85\text{ }^{\circ}\text{C}$ (per $18\text{ }^{\circ}\text{F}$ change between the limits of -40
to $+14\text{ }^{\circ}\text{F}$ or $+140\text{ }^{\circ}$ to $+185\text{ }^{\circ}\text{F}$):

Model	Sensor	for TD up to	
266DSH	F to Q	10:1	$\pm (0.03\% \text{ URL} + 0.04\% \text{ span})$
	E and S	10:1	$\pm (0.04\% \text{ URL} + 0.055\% \text{ span})$
266PSH	B	10:1	$\pm (0.055\% \text{ URL} + 0.09\% \text{ span})$
	A	4:1	$\pm (0.09\% \text{ URL} + 0.09\% \text{ span})$
266VSH	F to Q	10:1	$\pm (0.055\% \text{ URL} + 0.08\% \text{ span})$
	E and S	10:1	$\pm (0.075\% \text{ URL} + 0.11\% \text{ span})$

Static pressure

(zero errors can be calibrated out at line pressure)

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

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

per 3.5 MPa, 35 bar or 500 psi (sensor E)

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

Model 266DSH standard static

— zero error: $\pm 0.05\%$ of URL for sensor F to S

$\pm 0.08\%$ of URL for sensor A, B and E

— span error: $\pm 0.08\%$ of reading.

Model 266DSH high static

— zero error: $\pm 0.08\%$ of URL for sensor F to Q

— span error: $\pm 0.20\%$ of reading.

Model 266DSH Differential

Model 266PSH Gauge

Model 266VSH Absolute

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

Meets all the requirements of EN 61326 and NAMUR NE-21 for surge immunity level.

Common mode interference

No effect from 100Vrms @ 50Hz, or 50 V DC

Mounting position

No effect for rotation on diaphragm plane. A tilt up to 90° from vertical causes a zero shifts up to 0.5 kPa, 5 mbar or 2 inH2O, which can be corrected with zero adjustment. No span effect.

Stability

±0.15 % of URL over a ten years period
 (±0.25 % of URL over a ten years period for sensor A and B)
 0.15 % of URL over a five years period for 266DSH high static.

Maximum total performance

For temperature change of 28 °C (50 °F), static pressure change of 5,1 MPa, 51 bar, 740 psi, for model 266DSH with accuracy option code D2 (± 0.04 %)

Sensor	Span	Maximum total performance
F	35 kPa, 350 mbar, 140 inH2O	≤± 0.125 % of calibrated span
H	150 kPa, 1,5 bar, 600 inH2O	
M	550 kPa, 5,5 bar, 80 psi	

$$E_{Mperf} = \sqrt{(E_{\Delta Tz} + E_{\Delta Ts})^2 + E_{\Delta Ps}^2 + E_{lin}^2}$$

E_{Mperf} = Maximum total performance

$E_{\Delta Tz}$ = Effect of the ambient temperature on zero

$E_{\Delta Ts}$ = Effect of the ambient temperature on span

$E_{\Delta Ps}$ = Effect of the static pressure on span

E_{lin} = Accuracy rating (for terminal-based linearity 0.04 %)

Total performance

similar to DIN 16086

Temperature change in the range from -10 to 60 °C (14 to 140 °F), static pressure change (266DSH) 10 MPa, 100 bar, 1450 psi

Model	Sensor	TD	Total performance
266DSH std. static, D2 option	F to Q	1:1	≤± 0.16 % of calibrated span
266PSH, D2 option	F to Q	1:1	≤± 0.14 % of calibrated span
266VSH	F to Q	1:1	≤± 0.28 % of calibrated span

$$E_{perf} = \sqrt{(E_{\Delta Tz} + E_{\Delta Ts})^2 + E_{\Delta Ps}^2 + E_{lin}^2}$$

E_{perf} = Total Performance

$E_{\Delta Tz}$ = Effect of the ambient temperature on zero

$E_{\Delta Ts}$ = Effect of the ambient temperature on span

$E_{\Delta Ps}$ = Effect of the static pressure on span (266DSH only)

E_{lin} = Accuracy rating (for terminal-based linearity 0.04 % or 0.075% as per model/sensor accuracy)

Maximum total performance and Total performance includes the measuring errors of

- non-linearity including hysteresis and non-reproducibility,
- thermal change of the ambient temperature as regards the zero signal and the calibrated span,
- effect of static pressure change on the calibrated span, with transmitter re-zeroed at line pressure

Physical Specification

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

Materials

Process isolating diaphragms (*)

AISI 316 L ss; AISI 316 L ss gold plated; Monel 400™; Tantalum; Hastelloy C-276™; Hastelloy C-276™ on AISI 316L ss gasket seat.

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

AISI 316 L ss; Hastelloy C-276™; Monel 400™. Kynar™ (PVDF insert in AISI 316 ss flange)

Blind flange (reference side of 266PSH, 266VSH)

AISI 316 L ss.

Sensor fill fluid

Silicone oil; Inert fill (Halocarbon™ 4.2 or Galden™).

Mounting bracket (**)

Zinc plated carbon steel with chrome passivation; AISI 316 ss; AISI 316 L ss.

Gaskets (*)

Viton™; PTFE.

Sensor housing

AISI 316 L ss.

Bolts and nuts

AISI 316 ss bolts Class A4–80 and nuts Class A4–70 per UNI 7323 (ISO 3506);

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

Plated alloy steel bolts per ASTM-A-193-77a grade B7M and nuts per ASTM A194/A 194 M-90 grade 2HM, in compliance with NACE MR0175 Class II.

Stainless steel per ASTM-A-453 grade 660D, in compliance with NACE MR0175 Class II (high static only).

Electronic housing and covers

Aluminium alloy (copper content ≤ 0.3 %) with baked epoxy finish (colour RAL9002);

AISI 316 L ss.

Covers O-ring

Buna N.

Local adjustments (zero, span and write protect)

For Standard HART version:

- Internal for zero and span (on communication board)
- External non-intrusive for zero, span and write protect in glass filled polyphenylene oxyde, removable (code R1).

For all other versions:

- External non-intrusive for zero, span and write protect in glass filled polyphenylene oxyde, removable.

Plates

Transmitter nameplate: AISI 316 ss screwed to the electronics housing.

Certification plate and optional tag/calibration plate : self-adhesive attached to the electronics housing or AISI 316 ss fastened to the electronics housing with rivets or screws.

Optional wired-on customer data plate: AISI 316 ss.

Laser printing on metal or thermal printing on self-adhesive.

Calibration

Standard: at maximum span, zero based range, ambient temperature and pressure;

Optional: at specified range and ambient conditions.

(*)Wetted parts of the transmitter.

(**) U-bolt material: high-strength alloy steel or AISI 316 L ss; bolts/nuts material: high-strength alloy steel or AISI 316 ss.

Model 266DSH Differential

Model 266PSH Gauge

Model 266VSH Absolute

Optional extras

Mounting brackets (code Bx)

For vertical and horizontal 60mm. (2in) pipes or wall mounting. (EXCEPT U-BOLT ASSEMBLY WHICH IS NOT SUPPLIED FOR WALL MOUNTING, PARTS ARE THE SAME FOR PIPE AND WALL BRACKET OPTIONS, AS PER RELEVANT MATERIALS).

Display (code Lx)

4-position (at 90°) user orientable.

Optional plates (code Ix)

Code I2: plate for tag (up to 31 characters) and calibration details (up to 31 characters: lower and upper range values and engineering unit) fixed onto transmitter housing.

Code I1: AISI 316 ss wired-on plate with laser printed customized data (4 lines of 32 characters with 4 mm/0.16 in. height).

Surge protection (code S2)

Cleaning procedure for oxygen service (code P1)

Test Certificates (test, design, calibration, material traceability) (codes Cx and Hx)

Tag and manual language (codes Tx and Mx)

Communication connectors (code Ux)

Manifold mounting (code A1)

Factory mounting and pressure test of ABB M26 manifolds.

Process connections

on flanges : $\frac{1}{4}$ – 18 NPT on process axis

on adapters : $\frac{1}{2}$ – 14 NPT on process axis

centre distance (266DSH): 54 mm (2.13 in.) on flange;

51, 54 or 57 mm (2.01, 2.13 or 2.24 in.) as per adapters fittings

fixing threads: $\frac{7}{16}$ – 20 UNF at 41.3 mm centre distance

Electrical connections

Two $\frac{1}{2}$ – 14 NPT or M20x1.5 threaded conduit entries, direct on housing.

Special communication connector (on request)

- HART: straight or angle Harting Han 8D connector and one plug.
- FOUNDATION Fieldbus, PROFIBUS PA: M12x1 or 7/8 in.

Terminal block

HART version: three terminals for signal/external meter wiring up to 2.5 mm² (14 AWG), also connection points for test and communication purposes.

Fieldbus versions: two terminals for signal wiring (bus connection) up to 2.5 mm² (14 AWG)

Grounding

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

Mounting position

Transmitter can be mounted in any position.

Electronics housing may be rotated to any position. A positive stop prevents over travel.

Mass (without options)

4 kg approx (8.8 lb);

4.35 kg approx (9.6 lb) for 266DSH high static version; add 1.5 kg (3.3 lb) for AISI housing.

Add 650 g (1.5 lb) for packing.

Packing

Carton 27 x 24 x 20 cm approx (11 x 10 x 8 in.).

Configuration

Transmitter with HART communication and 4 to 20 mA Standard configuration

Transmitters are factory calibrated to customer's specified range. 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:

Engineering Unit	kPa
4 mA	Zero
20 mA	Upper Range Limit (URL)
Output	Linear
Damping	1 s
Transmitter failure mode	Upscale
Software tag (8 characters max)	Blank
Optional LCD display	PV in kPa; output in mA and 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 with DTM for 266 models. The transmitter database is customized with specified flange type and material, O-ring and drain/vent materials and meter code option.

Custom configuration (option N6)

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

For HART protocol available engineering units of pressure measure are :

Pa, kPa, MPa

inH₂O@4 °C, mmH₂O@4 °C, psi

inH₂O@20 °C, ftH₂O@20 °C, mmH₂O@20 °C

inHg, mmHg, Torr

g/cm², kg/cm², atm

mbar, bar

These and others are available for PROFIBUS and FOUNDATION Fieldbus.

Transmitter with PROFIBUS PA communication Standard configuration

Transmitters are factory calibrated to customer's specified range. 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:

Measure Profile	Pressure
Engineering Unit	kPa
Output scale 0 %	Lower Range Limit (LRL)
Output scale 100 %	Upper Range Limit (URL)
Output	Linear
Hi-Hi Limit	Upper Range Limit (URL)
Hi Limit	Upper Range Limit (URL)
Low Limit	Lower Range Limit (LRL)
Low-Low Limit	Lower Range Limit (LRL)
Limits hysteresis	0.5 % of output scale
PV filter	0 s
Address (set by local key)	126
Tag	32 alphanumeric characters
Optional LCD display	PV in kPa; output in percentage on bargraph

Any or all the above configurable parameters, including the range values which must be the same unit of measure, can be easily changed by a PC running the configuration software with DTM for 266 models. The transmitter database is customized with specified flange type and material, O-ring and drain/vent materials and meter code option.

Custom configuration (option N6)

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

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

Model 266DSH Differential

Model 266PSH Gauge

Model 266VSH Absolute

Transmitter with FOUNDATION Fieldbus communication

Standard configuration

Transmitters are factory calibrated to customer's specified range. 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 the analog input function block FB1 is configured as follows:

Measure Profile	Pressure
Engineering Unit	kPa
Output scale 0 %	Lower Range Limit (LRL)
Output scale 100 %	Upper Range Limit (URL)
Output	Linear
Hi-Hi Limit	Upper Range Limit (URL)
Hi Limit :	Upper Range Limit (URL)
Low Limit	Lower Range Limit (LRL)
Low-Low Limit	Lower Range Limit (LRL)
Limits hysteresis	0.5 % of output scale
PV filter time	0 s
Tag	32 alphanumeric characters
Optional LCD display	PV in kPa; output in percentage on bargraph

The analog input function block FB2 and FB3 are configured respectively for the sensor temperature measured in °C and for the static pressure measured in MPa.

Any or all the above configurable parameters, including the range values, can be changed using any host compliant to FOUNDATION fieldbus. The transmitter database is customized with specified flange type and material, O-ring and drain/vent materials and meter code option.

Custom configuration (option N6)

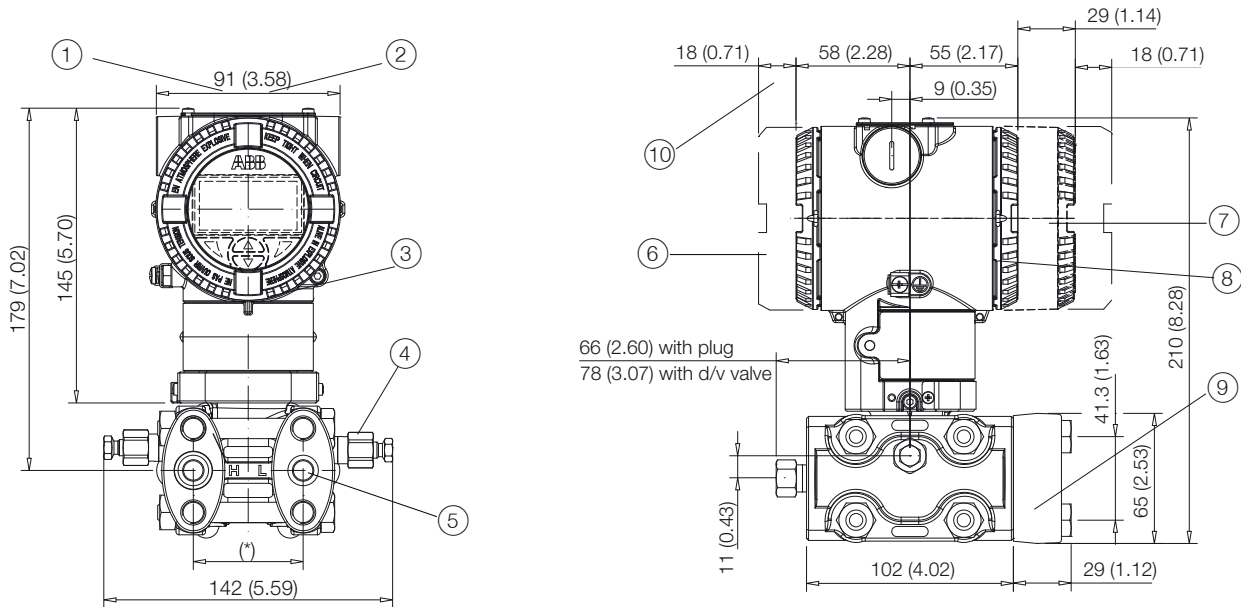
The following data may be specified in addition to the standard configuration parameters:

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

Mounting dimensions

(not for construction unless certified) – dimensions in mm (in.)

Standard static transmitter with barrel housing - horizontal flanges



(*) FOR MODEL 266DSH: 54 (2.13) mm (in) on 1/4 – 18 NPT process flange; 51 (2.01), 54 (2.13) or 57 (2.24) mm (in) according to 1/2 – 14 NPT adapters fitting;
FOR MODEL 266PSH: 54 (2.13) mm (in) with low pressure side flange without process connection (a filter is fitted) and drain/vent valve

- ① Adjustments | ② Identification plate | ③ Certification plate | ④ Drain/vent valve | ⑤ Process connection | ⑥ Terminal side |
⑦ Integral display housing | ⑧ Electronic side | ⑨ Adapter | ⑩ Space for cover removal

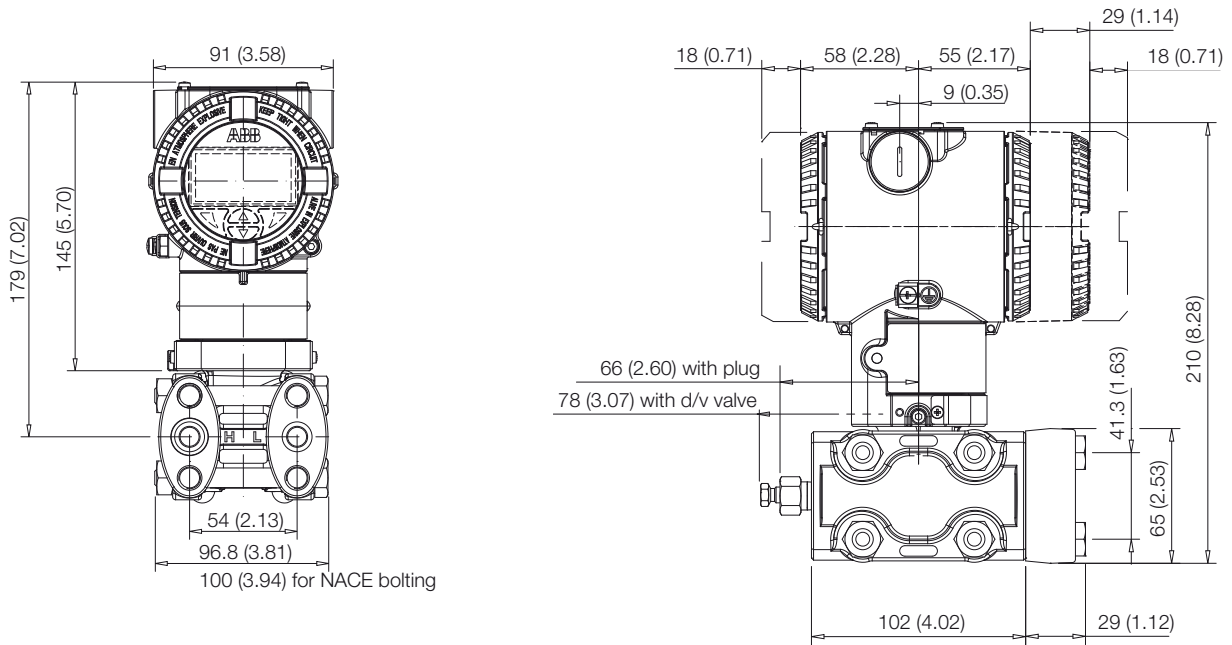
NOTE

Process connection, gasket groove and gaskets are in accordance with IEC 61518.

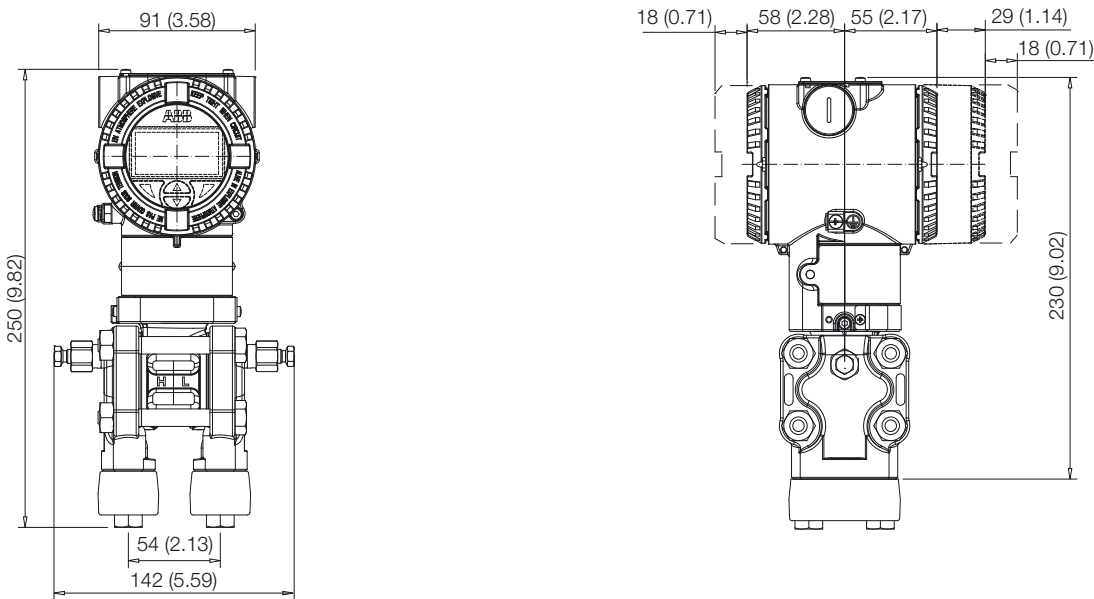
Bolting threads for fixing adapter or other devices (i.e. manifold etc.) on process flange is $7/_{16}$ – 20 UNF.

Model 266DSH Differential
 Model 266PSH Gauge
 Model 266VSH Absolute

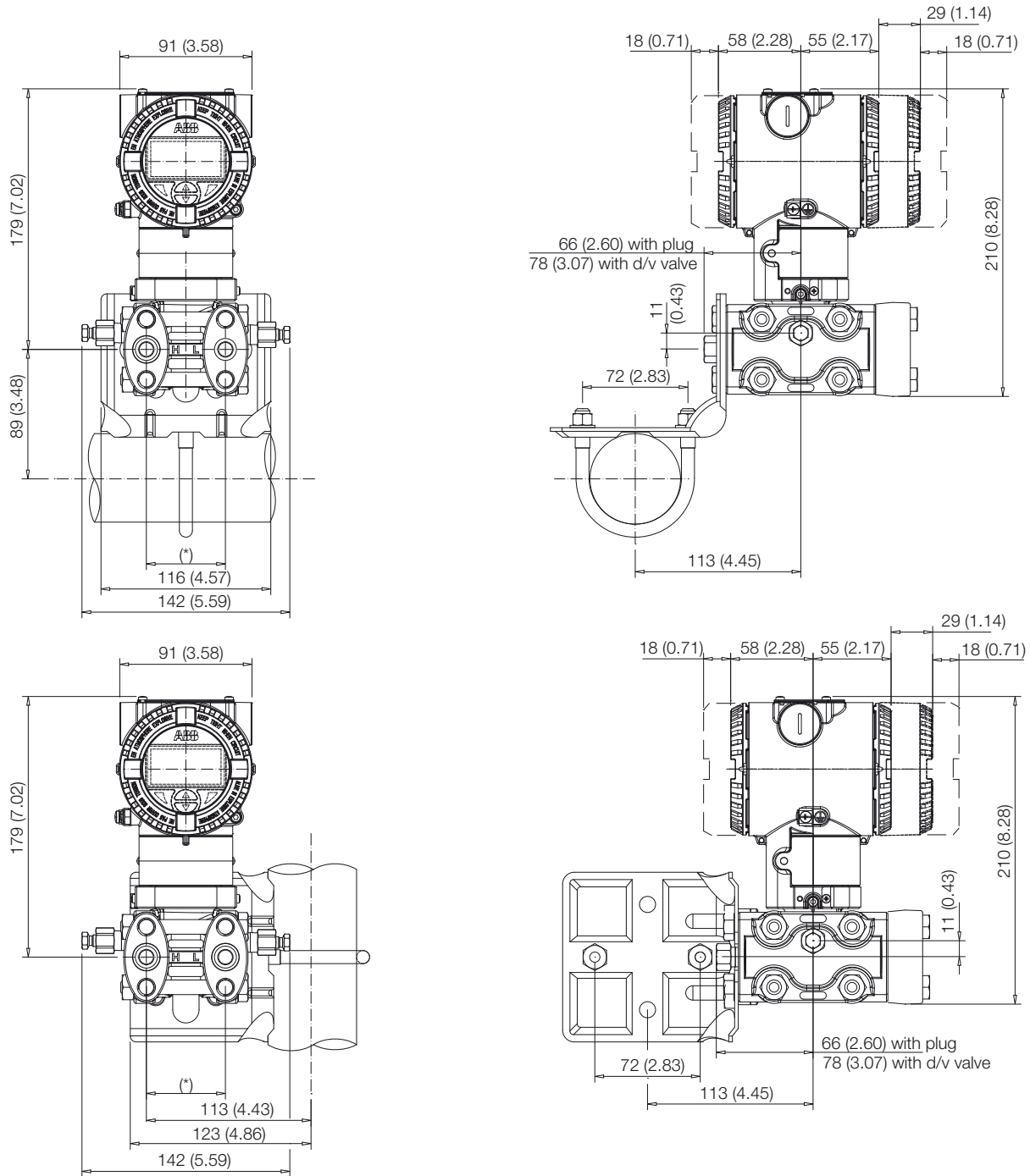
High static transmitter with barrel housing - horizontal flanges



Standard static transmitter with barrel housing - vertical flanges

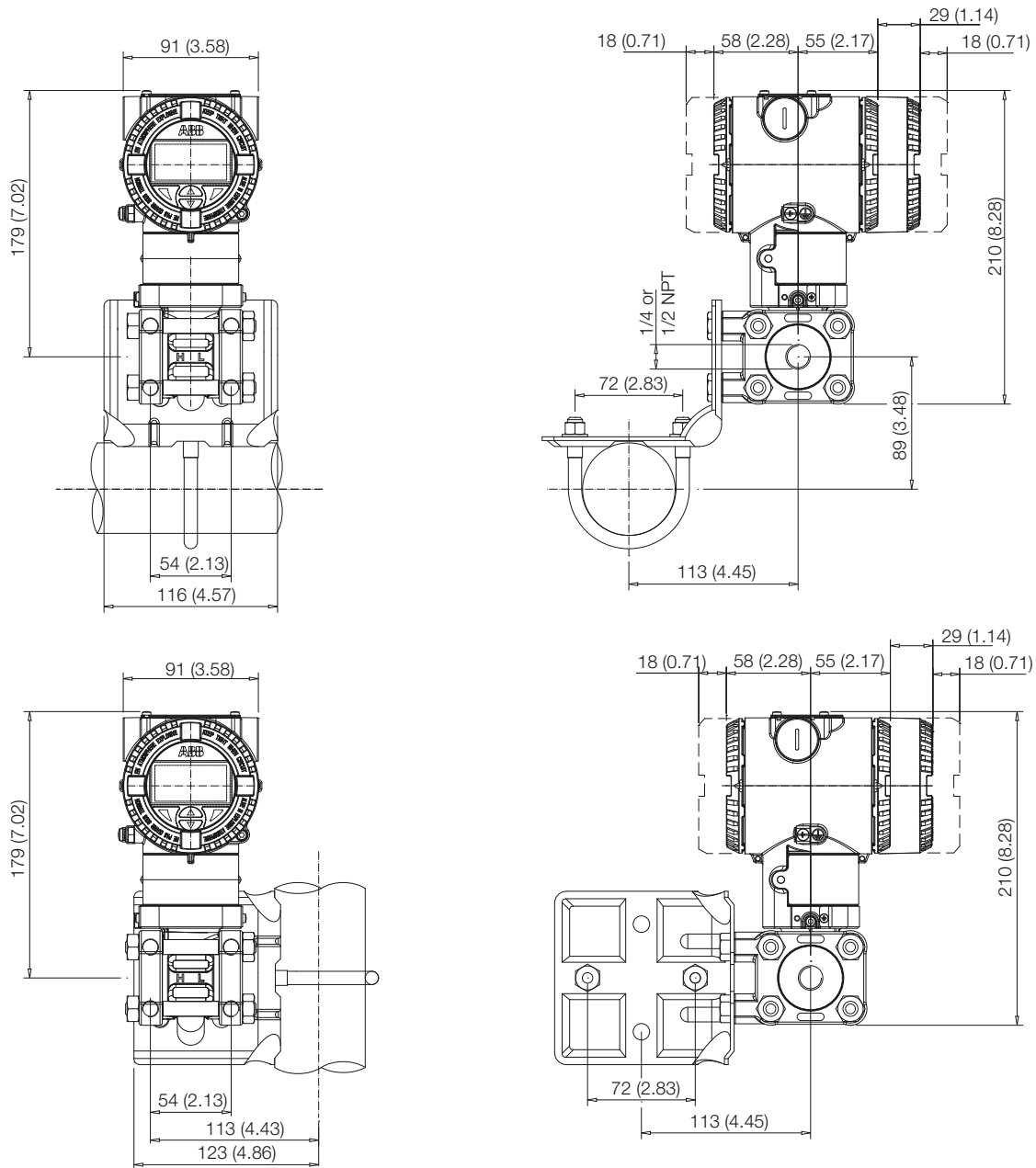


Transmitter on bracket for vertical or horizontal 60 mm (2in) pipe mounting

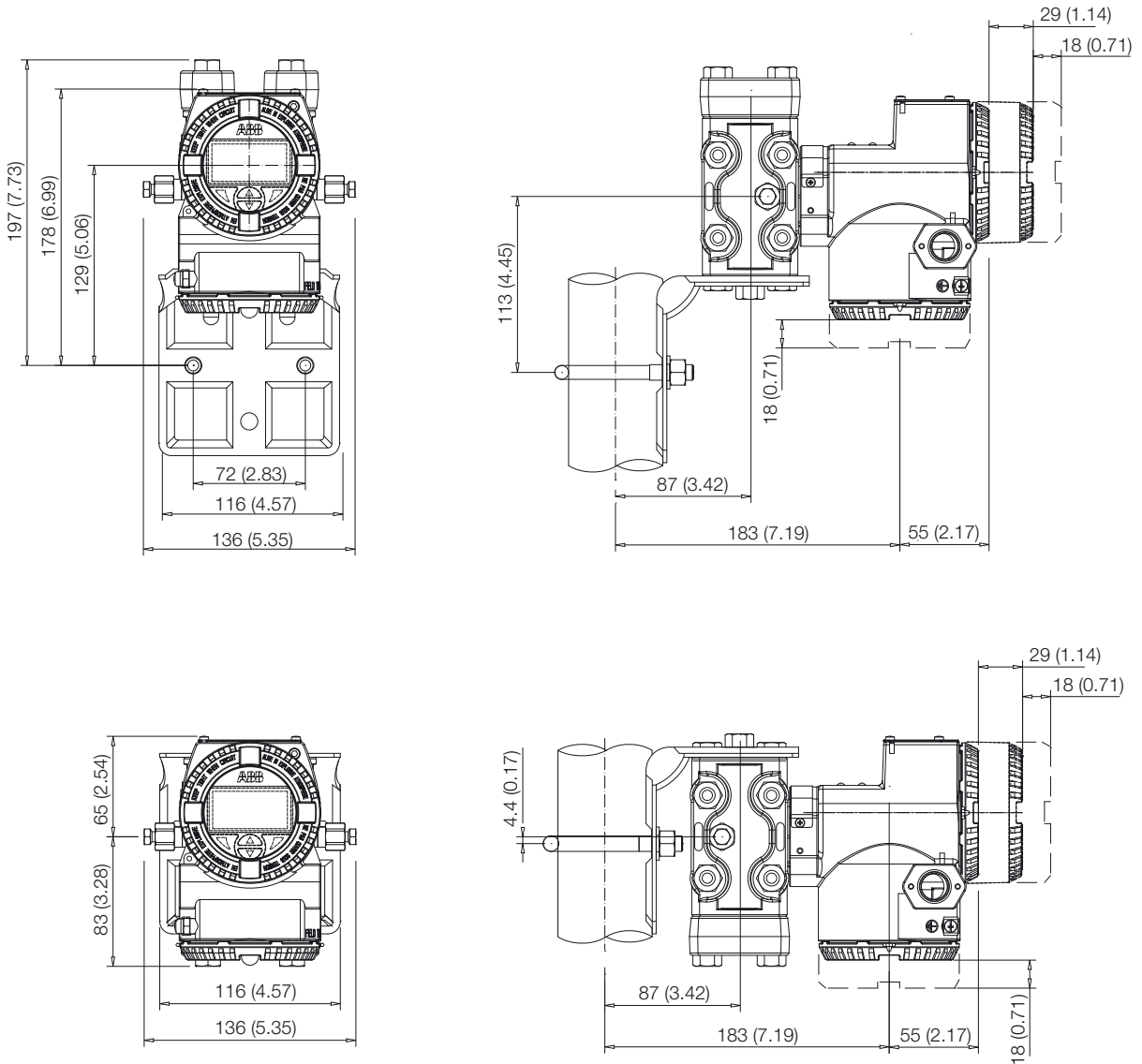


Model 266DSH Differential
 Model 266PSH Gauge
 Model 266VSH Absolute

Transmitter with Kynar flanges on bracket for vertical or horizontal 60 mm (2in) pipe mounting

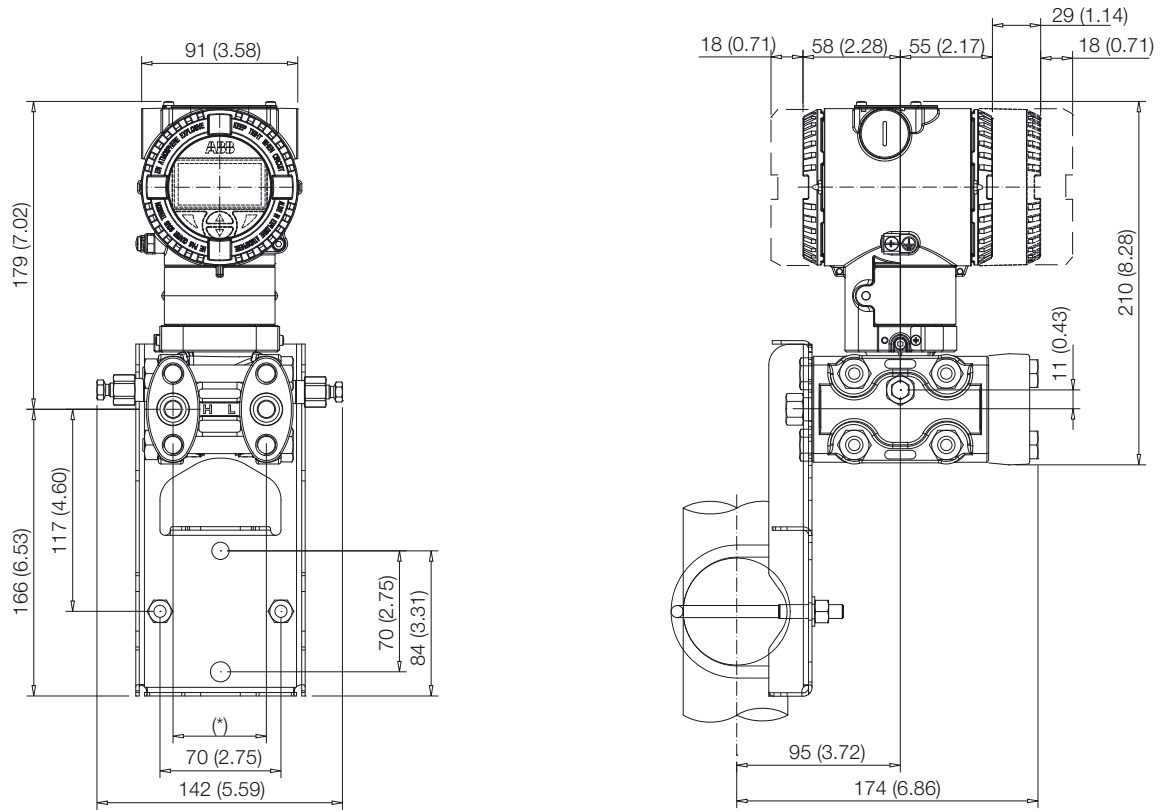


Transmitter with DIN aluminium housing - horizontal flanges on bracket for vertical or horizontal 60 mm (2in) pipe mounting

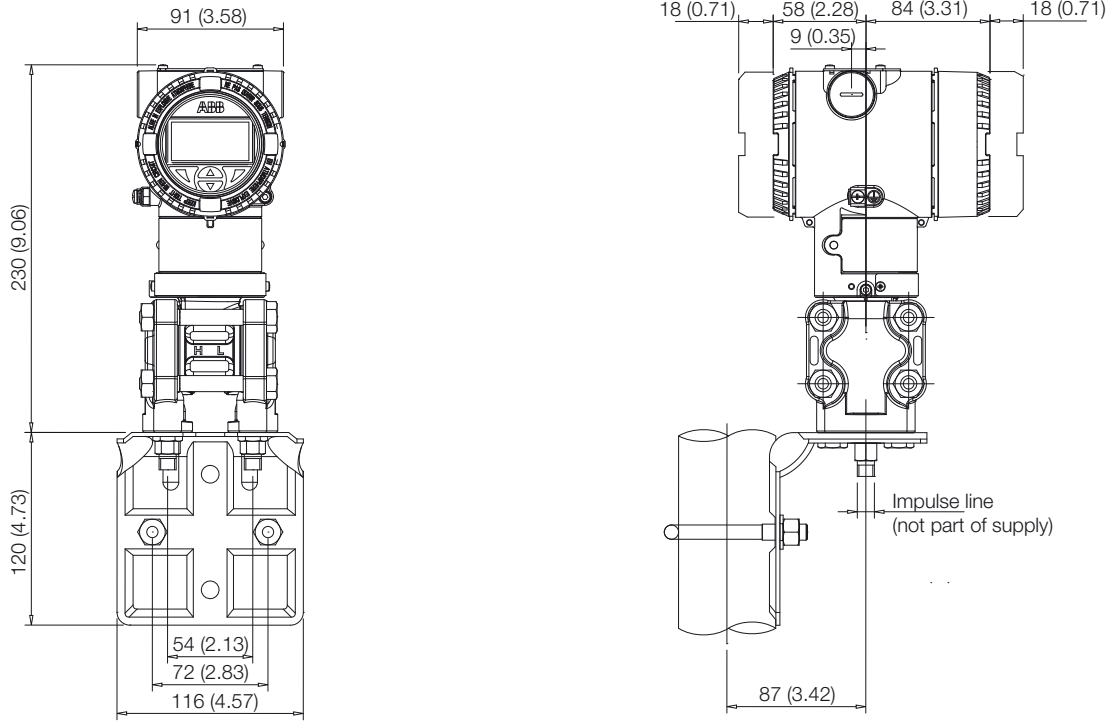


Model 266DSH Differential
 Model 266PSH Gauge
 Model 266VSH Absolute

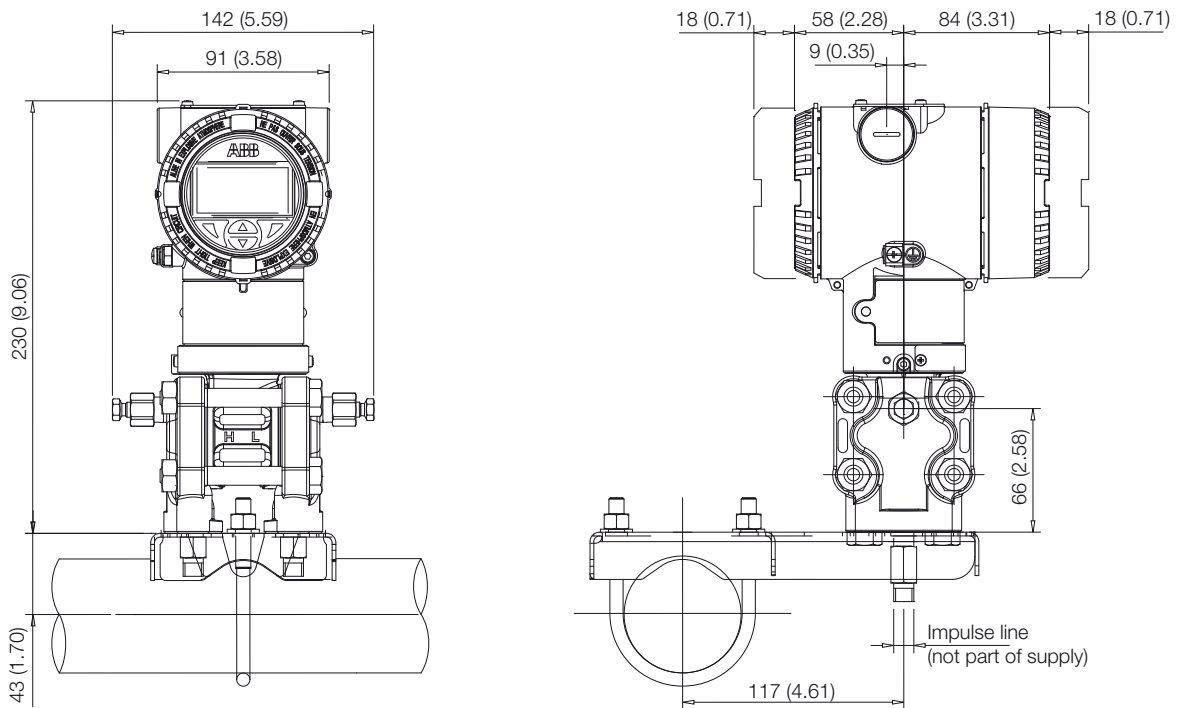
Transmitter with horizontal flanges on flat bracket for vertical or horizontal 60 mm (2in) pipe mounting



Transmitter with vertical flanges on flat bracket for vertical or horizontal 60 mm (2in) pipe mounting



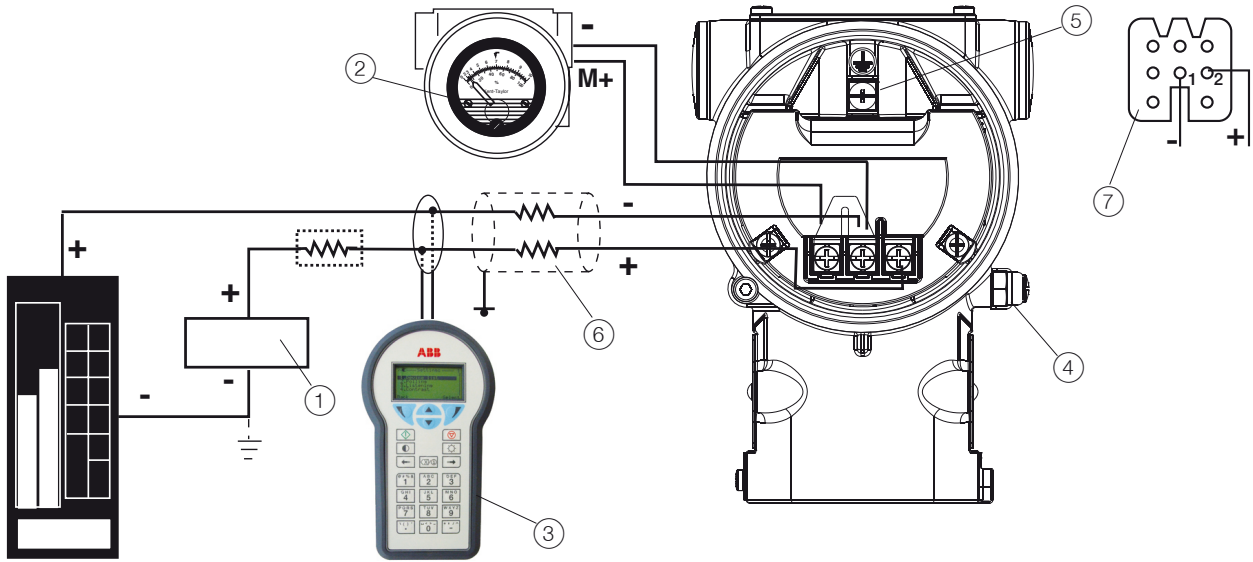
Transmitter with vertical flanges on flat bracket for vertical or horizontal 60 mm (2in) pipe mounting



Model 266DSH Differential Model 266PSH Gauge Model 266VSH Absolute

Electrical connections

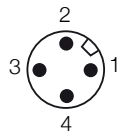
HART Version



HART hand-held communicator may be connected at any wiring termination point in the loop, providing the minimum resistance is 250 ohm. If this is less than 250 ohm, additional resistance should be added to allow communications. Maximum voltage drop on external remote indicator is 0.7 Vdc

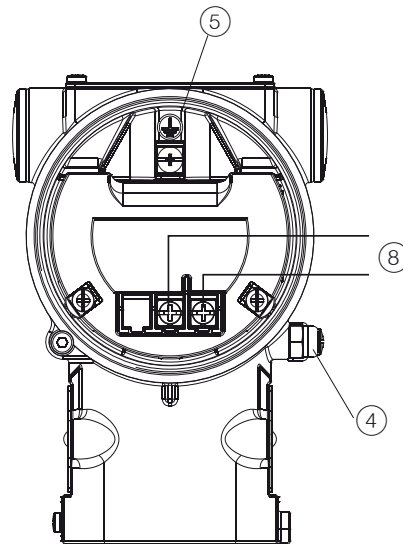
FIELDBUS Versions

7/8 in connector M12 x 1 connector



PIN (male) IDENTIFICATION		
	FOUNDATION Fieldbus	PROFIBUS PA
1	DATA -	DATA +
2	DATA +	GROUND
3	SHIELD	DATA -
4	GROUND	SHIELD

CONNECTOR IS SUPPLIED LOOSE
WITHOUT MATING FEMALE PLUG



- ① Power source | ② Remote indicator | ③ Handheld communicator | ④ External ground termination point | ⑤ Internal ground termination point |
- ⑥ Line load | ⑦ Harting Han 8D socket insert for mating plug (supplied loose) | ⑧ Fieldbus line (polarity independent)

Contactos/Contacts:

Comercial/Commercial:

Fernando Mena Costa
e-mail: fcosta@bhb.pt
Tel: (+351) 21 843 64 00
Fax: (+351) 21 843 64 09

Assistência/Service:

Patricia Costa
e-mail: ppcosta@bhb.pt
Tel: (+351) 21 843 64 00



Note:

ABB the owner of this document, reserves the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

Copyright© 2011

ABB. All rights reserved