

2600T Series Pressure Transmitters

Model 268HS Gauge

Model 268NS Absolute

high overload

maximum working pressure up to 21MPa, 3045psi

Industrial^{IT}
enabled™

- **TÜV SIL2 certified to IEC 61508**
 - the smart solution in Safety loop application

- **Best in Class Safety protection for your plants**
 - Safe Failure Fraction (SFF) : 98.6%
 - Diagnostic Coverage (DC) : 97.7%
 - Undetected Dangerous Failures λ_{DU} : 11 FIT

- **In-situ hardware redundancy (HFT=1)**
 - a guarantee of true protection

- **SIL3 capability in redundant architecture (1oo2)**
 - Software and hardware development process certified by TÜV

- **Reduced maintenance costs thanks to the longest proof test interval of 10 years for SIL2 in 1oo1 architecture**

- **Base accuracy : $\pm 0.075\%$**

- **Span limits**
 - 0.65 to 16000kPa; 2.6inH₂O to 2320psi
 - 1.1 to 16000kPa abs; 8mmHg to 2320psia

- **Hardware and software redundancy with MTBF of over 100 years**

- **5-year stability**

- **Full compliance with PED Category IV**
 - suitable for safety accessory application



ABB 2600T Series
Engineered solutions
for all applications

General Description

Model 268 is the IEC 61508 TÜV certified Safety 2600T transmitter for SIS and critical applications where safety and performances are the main requirement.

The transmitters detailed in this datasheets have been designed and manufactured according to a certified process which lead to a product specifically suitable for critical applications.

Thanks to the internal software and hardware redundancy, the 268 models have got the IEC 61508 certifications which not only allows installation in conformance with SIL2 (1oo1) but also to SIL3 in a 1oo2 architecture.

The 2600T Safety transmitter exceeds the IEC 61508 requirements for SIL2 with a Hardware Fault Tolerance of 1 (HFT = 1) and a Safe Failure Fraction of 98%.

In addition the following requirements of IEC 61508 have been assessed as part of the certification process:

- functional safety (hardware and software) testing;
- electrical safety testing;
- EMC testing;
- environmental testing;
- Quality Assurance in production and product maintenance;
- verification of the product development process.

Furthermore, with a very low Probability of Dangerous Undetected Failures ($\lambda_{DU} = 11 \text{ FIT}$), the 2600T safety transmitters allow to extend the Proof Test Interval reducing maintenance costs by 50%.

Functional Specifications

Range and span limits

Sensor Code	Upper Range Limit (URL)	Lower Range Limit (LRL) for 268HS	Minimum span	
			268HS gauge	268NS absolute
G	65kPa 650mbar 260inH ₂ O	-65kPa -650mbar -260inH ₂ O	0.65kPa 6.5mbar 2.6inH ₂ O	1.1kPa 11mbar 8mmHg
H	160kPa 1600mbar 642inH ₂ O	0.07kPa abs (\$) 0.7mbar abs (\$) 0.5mmHg (\$)	1.6kPa 16mbar 6.4inH ₂ O	2.67kPa 26.7mbar 20mmHg
M	600kPa 6bar 87psi	0.07kPa abs (\$) 0.7mbar abs (\$) 0.5mmHg (\$)	6kPa 0.06bar 0.87psi	10kPa 0.1bar 1.45psi
P	2400kPa 24bar 348psi	0.07kPa abs (\$) 0.7mbar abs (\$) 0.5mmHg (\$)	24kPa 0.24bar 3.5psi	40kPa 0.4bar 5.8psi
Q	8000kPa 80bar 1160psi	0.07kPa abs (\$) 0.7mbar abs (\$) 0.5mmHg (\$)	80kPa 0.8bar 11.6psi	134kPa 1.34bar 19.4psi
S	16000kPa 160bar 2320psi	0.07kPa abs (\$) 0.7mbar abs (\$) 0.5mmHg (\$)	160kPa 1.6bar 23.2psi	267kPa 2.67bar 38.7psi

Lower Range Limit for 268NS is 0.07kPa abs, 0.7mbar abs, 0.5mmHg for all ranges.

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

Span limits

Maximum span = URL

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

Damping

Selectable time constant : 0, 0.25, 0.5, 1, 2, 4, 8 or 16s.
This is in addition to sensor response time

Turn on time

Operation within specification in less than 5s with minimum damping.

Insulation resistance

> 100M Ω at 1000VDC (terminals to earth)

Operative limits

Temperature limits °C (°F) :

Ambient (is the operating temperature)

Filling	Model 268HS	Model 268NS
Silicone oil	-40 and +85 (-40 and +185)	-40 and +85 (-40 and +185)
Inert-Galden	-20 and +85 (-4 and +185)	-10 and +65 (+14 and +150)
Inert-Halocarbon	-20 and +85 (-4 and +185)	-10 and +65 (+14 and +150)

Lower ambient limit for LCD indicators: -20°C (-4°F)

Upper ambient limit for LCD indicators: +70°C (+158°F)

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

- Silicone oil: 121°C (250°F) (1)

- Inert fluid: 100°C (212°F) (2)

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

(2) 65°C (150°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 (0.135kPa abs, 1.35mbar abs, 1mmHg for inert Galden or 0.4kPa abs, 4mbar abs, 3mmHg for inert Halocarbon) to:

- 14MPa, 140bar, 2030psi for sensor codes G, H, M

- 21MPa, 210bar, 3045psi for sensor codes P, Q, S

Proof pressure

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

- 28MPa, 280bar, 4060psi for sensor codes G, H, M

- 40MPa, 400bar, 5800psi for sensor codes P, Q, S

Meet ANSI/ISA-S 82.03 hydrostatic test requirements .

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: 30V/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 (with surge protector): 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)

Pressure equipment directive (PED)

Comply with 97/23/EEC Category IV Modules D and B.

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 (IP 68 on request) or by NEMA to 4X or by JIS to C0920. IP65 with Harting Han connector.

Hazardous atmospheres

With or without output meter

- INTRINSIC SAFETY and EXPLOSION PROOF/EUROPE:

ATEX/ZELM approval

II 1G Ex ia IIC T6 and II 1/2G Ex ia IIC T6 and

II 1D Ex iaD 20 T95°C and II 1/2D Ex iaD 21 T95°C

resp. II 1/2G Ex d IIC T6 and II 1/2D Ex tD A21 IP67 T85°C

- CANADIAN STANDARD ASSOCIATION and FACTORY MUTUAL:

- 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)

- GOST (Russia), GOST (Kazakistan), Inmetro (Brazil - pending)
based on ATEX

Electrical Characteristics and Options

HART digital communication and 4 to 20mA output

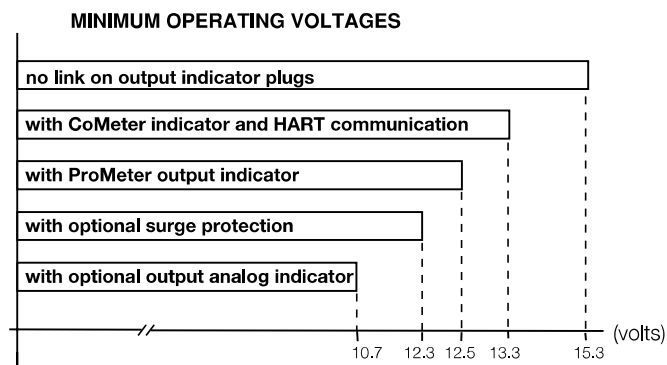
Power Supply

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.

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

Output meter

CoMeter and Prometer LCD :

5-digit (±99999 counts) programmable with 7.6mm, high (3in), 7-segment numeric characters plus sign and digital point for digital indication of output value in percentage, current or engineer unit;

10-segment bargraph display (10% per segment) for analog indication of output in percentage;

7-digit with 6mm, high (2.3in), 14-segment alphanumeric characters, for engineer units and configuration display

Analog : 36mm (1.4in) scale on 90°.

Optional surge protection

Up to 4kV

– voltage 1.2μs rise time / 50μs delay time to half value

– current 8μs rise time / 20μs delay time to half value

Output signal

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

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 3.5 to 4mA)

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

Alarm current

Low alarm current: 3.7mA (field configurable from 3.5 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), zero based range for transmitter with isolating diaphragms in AISI 316 L ss or 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: 40ms
- Time constant (63.2% of total step change):
 - sensors M to S: ≤ 70ms
 - sensor H: 100ms
 - sensor G: 130ms
- Response time (total) = dead time + time constant

Accuracy rating

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

- Model 268HS
- ±0.075% for TD from 1:1 to 15:1
 - ±0.005% x $\frac{URL}{Span}$ for TD from 15:1 to 60:1

- Model 268NS
- ±0.075% for TD from 1:1 to 10:1
 - ±0.0075% x $\frac{URL}{Span}$ for TD from 10:1 to 20:1

Operating influences

Ambient temperature

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

Model	Sensor Code	for TD up to	
268HS	G to S	15:1	± (0.04% URL + 0.065% span)
268NS	G to S	10:1	± (0.04% URL + 0.065% span)

Optional CoMeter and ProMeter ambient temperature

Total reading error per 20K (36°F) change between the ambient limits of –20 and +70°C (-4 and +158°F) :

±0.15% of max span (16mA).

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 0.10% of span from 20 to 1000MHz and for field strengths up to 30V/m when tested with shielded conduit and grounding, with or without meter.

Common mode interference

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

Mounting position

No effect

Stability

- ±0.15% of URL over a ten years period (for 268HS)
- ±0.15% of URL over a five years period (for 268NS)

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 (*)

AISI 316 L ss; AISI 316 L ss gold plated; Monel 400™; Tantalum;
Hastelloy C276™; Hastelloy C276™ on AISI 316 L ss gasket seat.

Process connection (*)

AISI 316 L ss; Hastelloy C276™; Monel 400™.

Sensor fill fluid

Silicone oil (DC200™); inert fill (Halocarbon™ 4.2 or Galden™);.

Mounting bracket (**)

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

Sensor housing

AISI 316 L ss.

Electronic housing and covers (Barrel version)

- Aluminium alloy with baked epoxy finish;
- Copper-free content aluminium alloy with baked epoxy finish;
- AISI 316 L ss.

Covers O-ring

Buna N.

Local zero and span adjustments:

Glass filled polycarbonate plastic (removable).

Tagging

AISI 316ss data plate attached to the electronics housing.

Calibration

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

Optional: at specified range and ambient conditions.

Optional extras

Mounting brackets

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

Output indicator

plug-in rotatable type, LCD or analog.

Supplemental customer tag

AISI 316 ss tag screwed/fastened to the transmitter for customer's tag data up to a maximum of 20 characters and spaces on one line for tag number and tag name, and up to a maximum of 3 spaced strings of 10 characters each for calibration details (lower and upper values plus unit). Special typing evaluated on request for charges.

Surge protection

Cleaning procedure for oxygen service

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

Tag and manual language

Communication connectors

(*) Wetted parts of the transmitter.

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

Process connections

1/2 – 14 NPT female or male; DIN EN837–1 G 1/2 B; adapter straight (180°) entry; adapter angle (90°) entry.

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

Electrical connections

Two 1/2 – 14 NPT or M20x1.5 or PG 13.5 or 1/2 GK threaded conduit entries, direct on housing.

Special communication connector (on request)

– HART : straight or angle Harting Han connector and one plug.

Terminal block

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

Grounding

Internal and external 6mm² (10AWG) 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)

1.7kg approx (4lb); add 1.5kg (3.4lb) for AISI housing.
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 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 sec.
Transmitter failure mode	Upscale
Software tag (8 characters max)	Blank
Optional LCD indicator/display	0 to 100.0% linear

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)

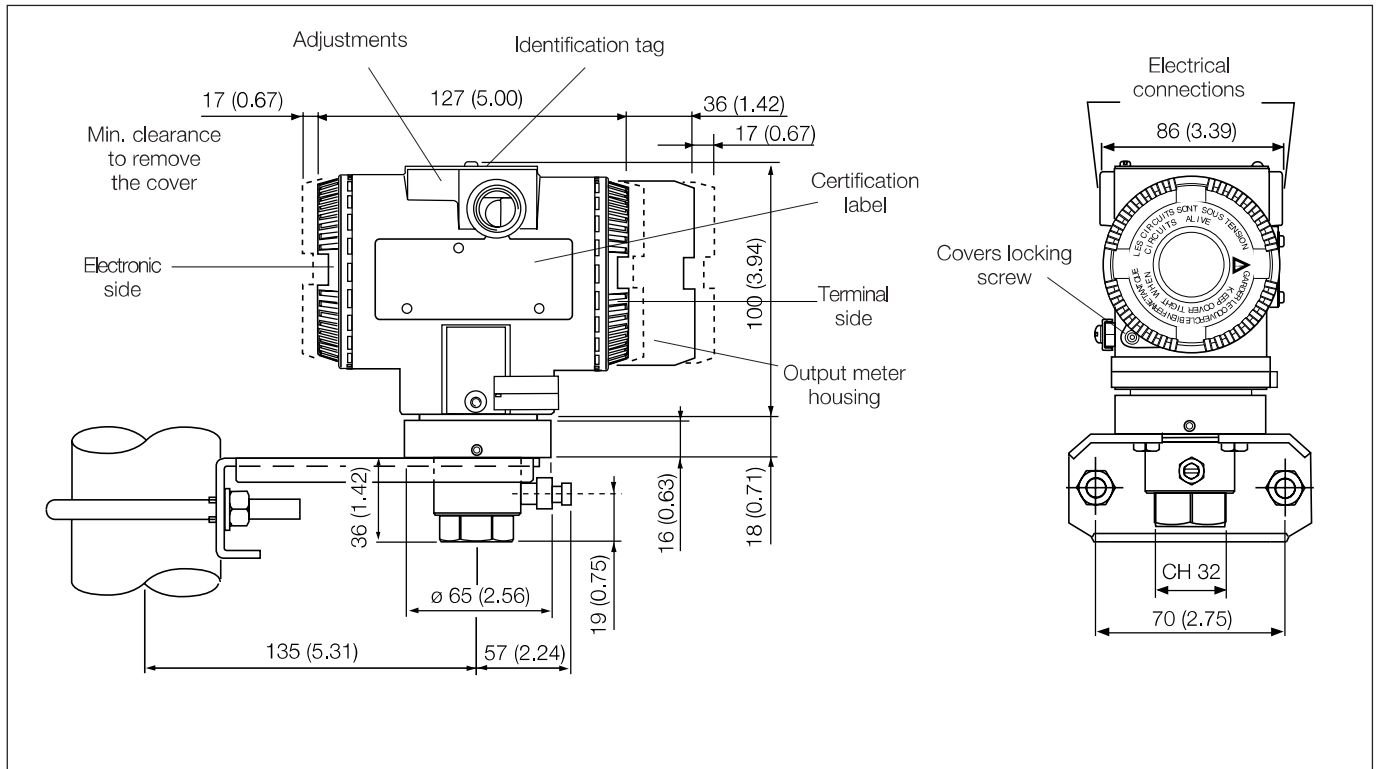
The following data may be specified in addition to the standard configuration parameters:

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

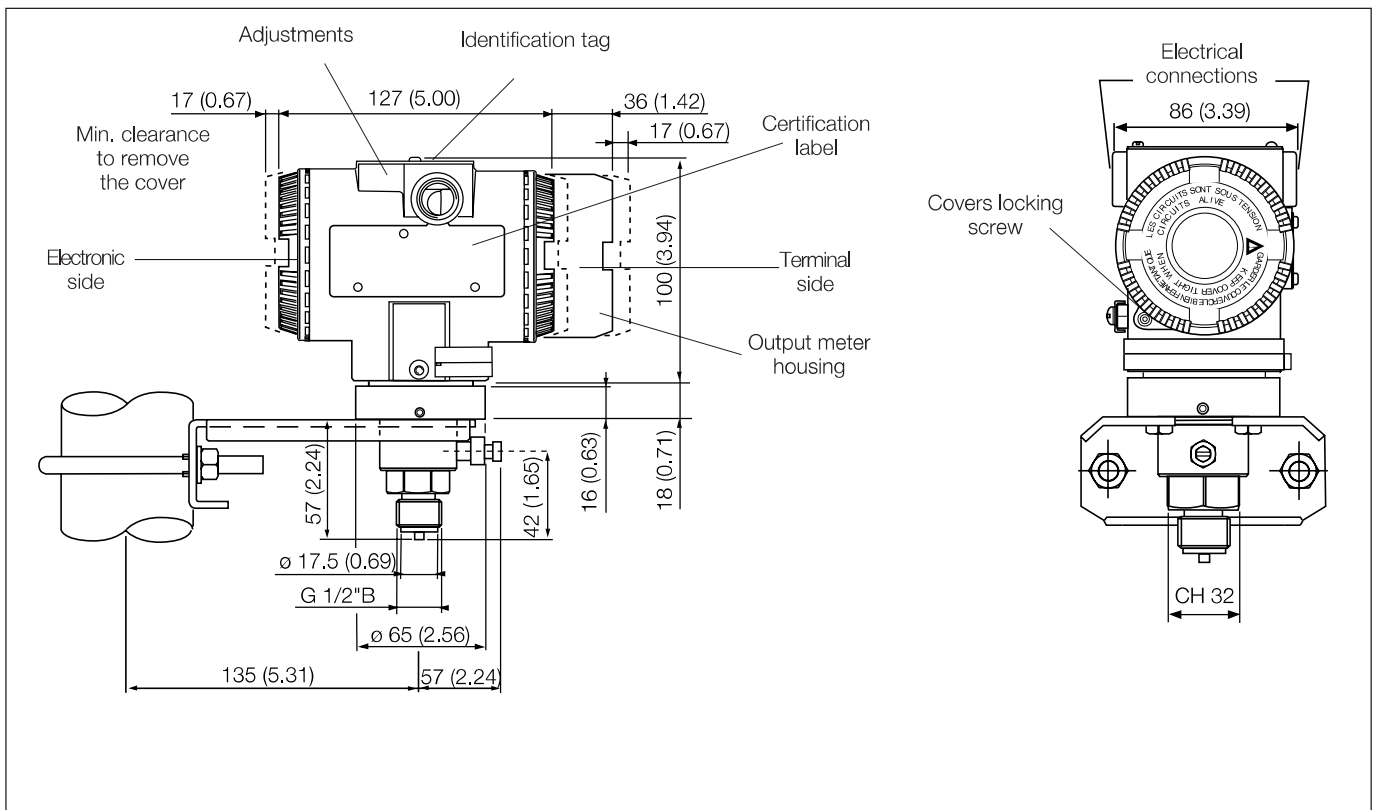
For any protocol available engineering units of pressure measure are :

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

MOUNTING DIMENSIONS (not for construction unless certified) – dimensions in mm (in)
Transmitter with barrel housing on bracket for 60mm (2in) pipe mounting



1/2 – 14 NPT female connection

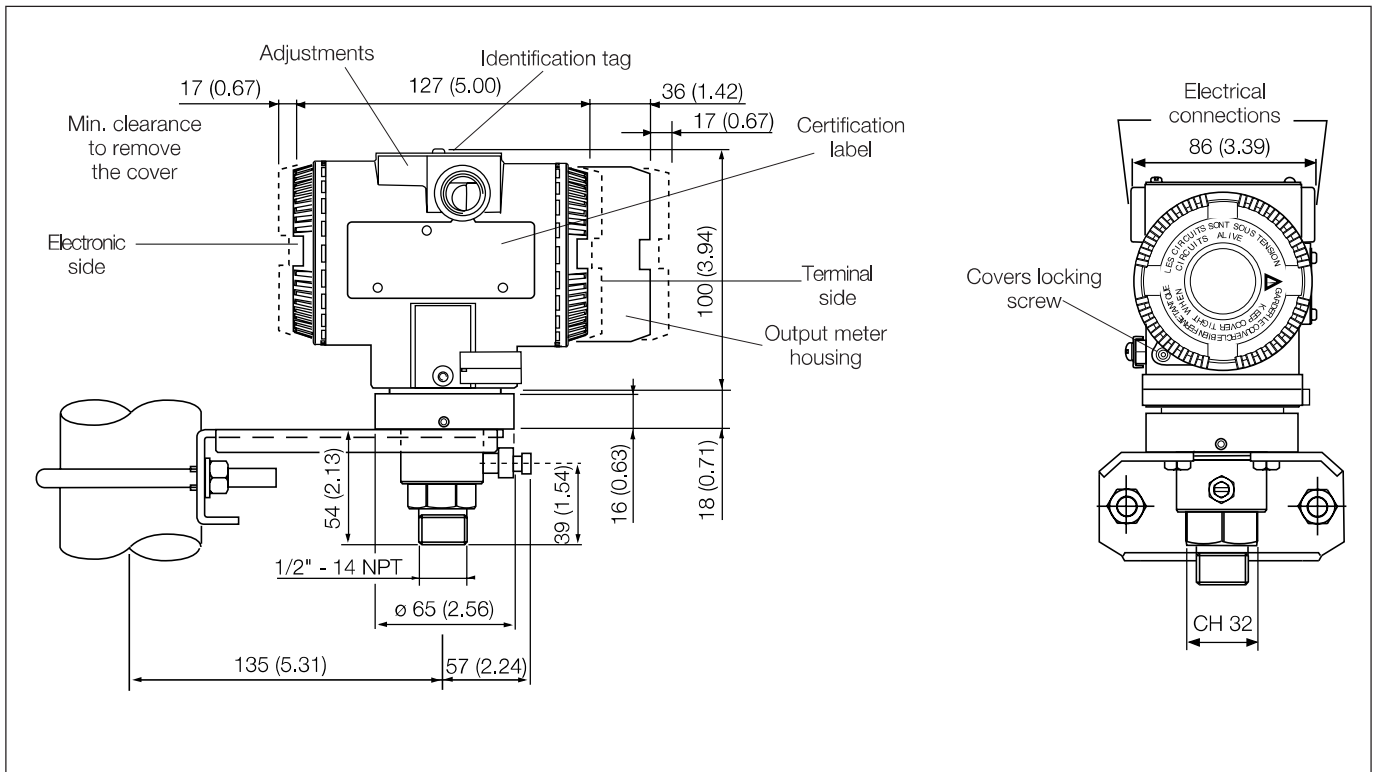


DIN-EN837-1 G 1/2 B connection

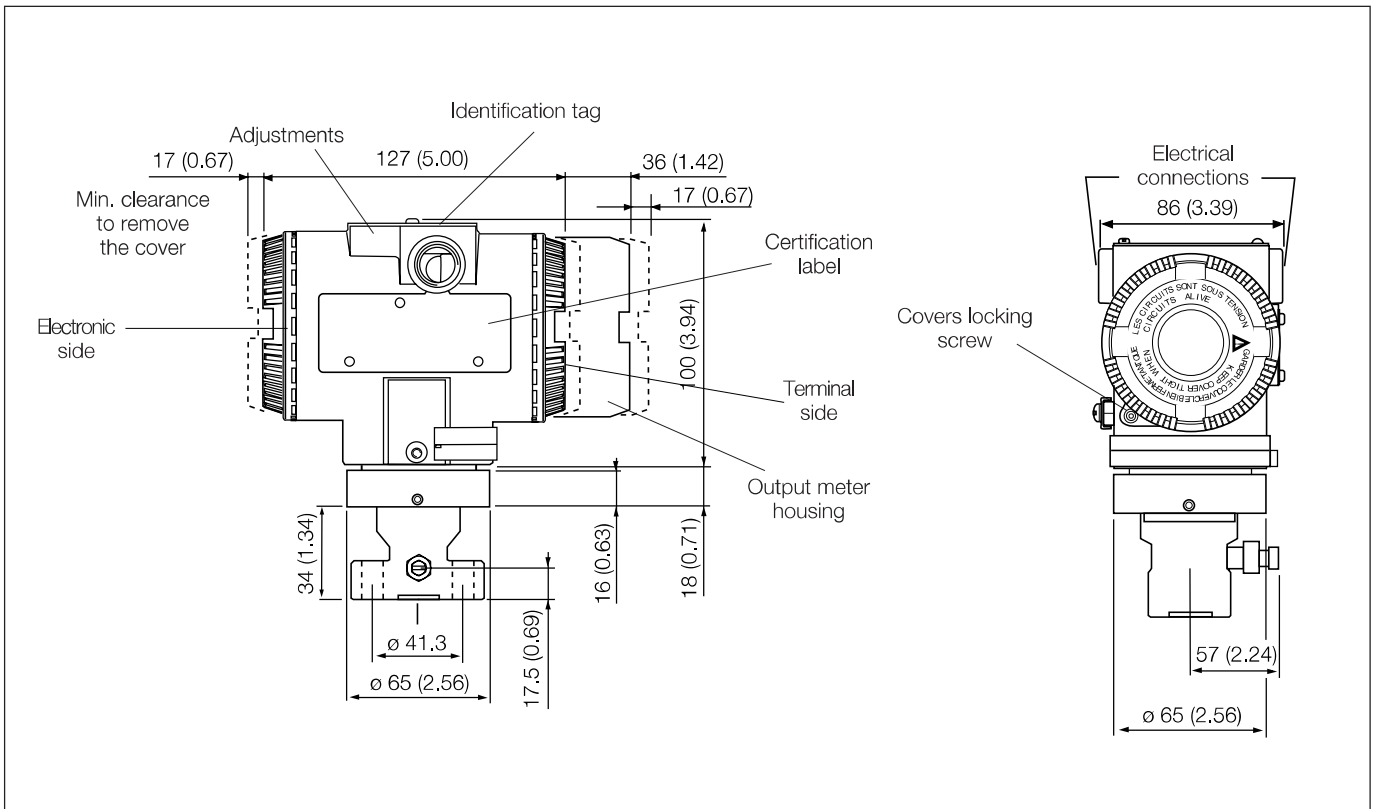
2600T Pressure Transmitters

Model 268HS, 268NS

SS/268HS/NS_7



1/2 - 14 NPT male connection

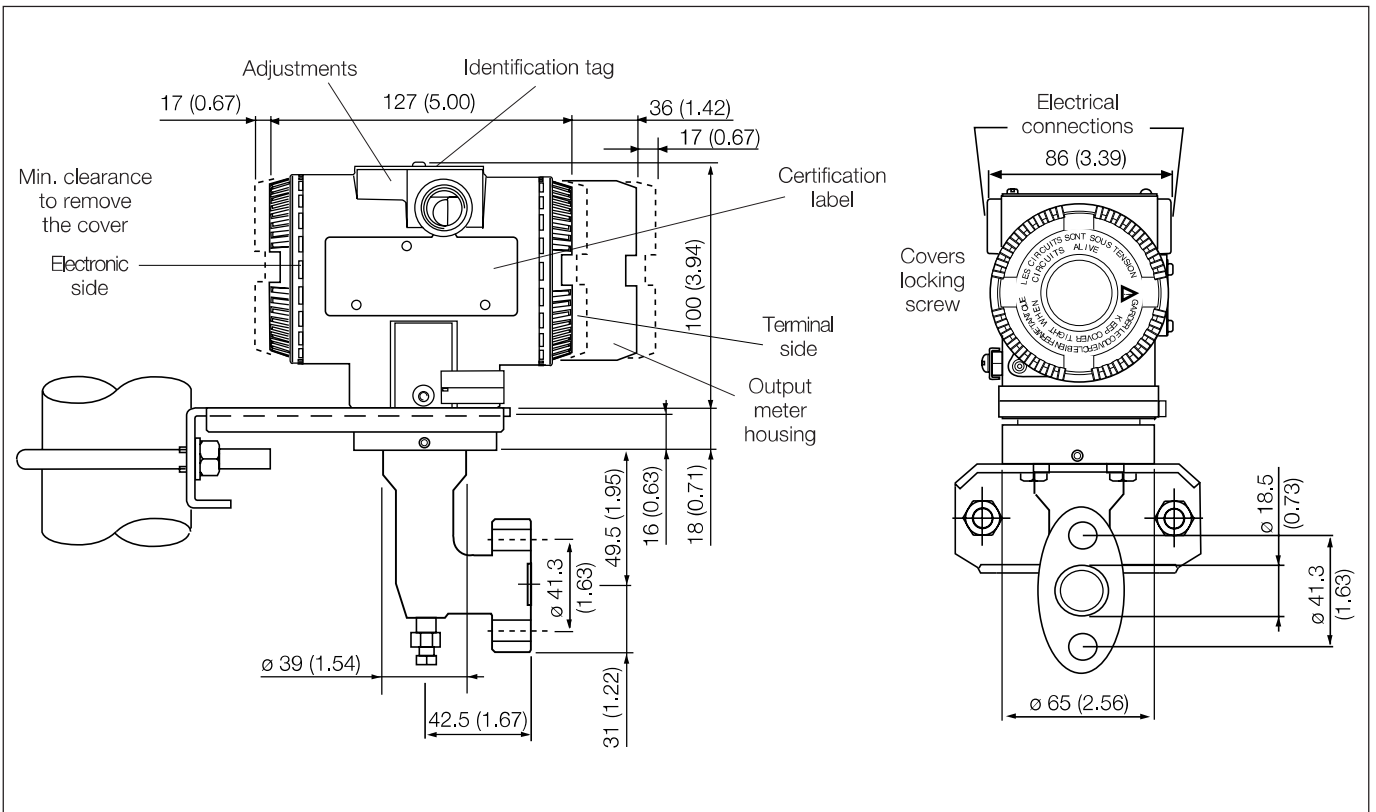


Adapter straight (180°) entry connection (7/16 - 20 UNF drilling)

2600T Pressure Transmitters

Model 268HS, 268NS

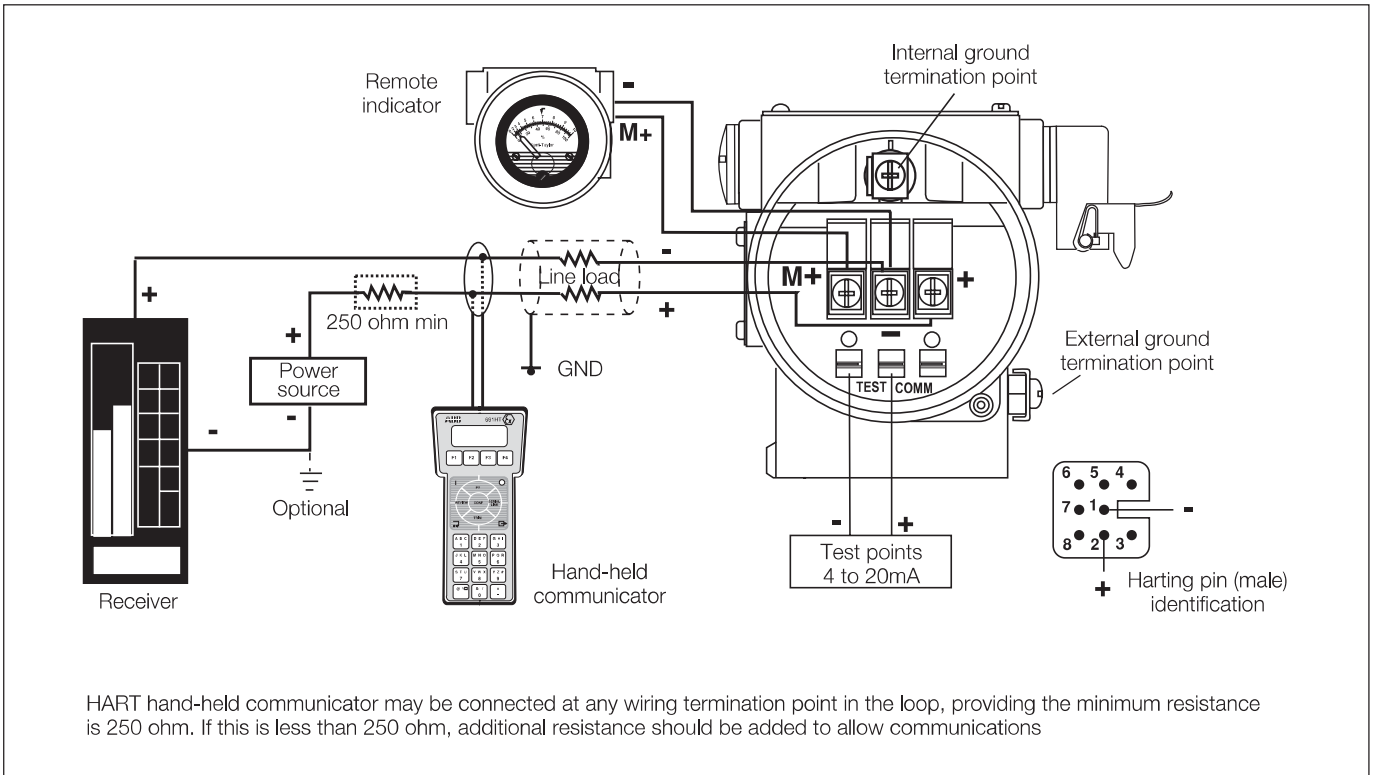
SS/268HS/NS_7



Adapter angle (90°) entry connection (7/16 – 20 UNF drilling)

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

BASIC ORDERING INFORMATION model 268HS Safety Gauge Pressure Transmitter

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 – 1 st to 5 th characters			2	6	8	H	S	X	X	X	X	X
Safety Gauge Pressure Transmitter – BASE ACCURACY 0.075%												
SENSOR - Span limits – 6th character												
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				
Diaphragm material / Fill fluid (wetted parts) – 7th character												
AISI 316 L ss	Silicone oil									S		
Hastelloy C276™ (on AISI seat)	Silicone oil							NACE		H		
Hastelloy C276™	Silicone oil							NACE		K		
Monel 400™	Silicone oil							NACE		M		
AISI 316 L ss gold plated	Silicone oil							NACE		8		
Tantalum	Silicone oil							NACE		T		
AISI 316 L ss	Inert fluid - Galden	(Note 1)								A		
Hastelloy C276™ (on AISI seat)	Inert fluid - Galden	(Note 1)						NACE		B		
Hastelloy C276™	Inert fluid - Galden	(Note 1)						NACE		F		
Monel 400™	Inert fluid - Galden	(Note 1)						NACE		C		
AISI 316 L ss gold plated	Inert fluid - Galden	(Note 1)						NACE		9		
Tantalum	Inert fluid - Galden	(Note 1)						NACE		D		
AISI 316 L ss	Inert fluid - Halocarbon	(Note 1)								L		
Hastelloy C276™ (on AISI seat)	Inert fluid - Halocarbon	(Note 1)						NACE		Q		
Hastelloy C276™	Inert fluid - Halocarbon	(Note 1)						NACE		P		
Monel 400™	Inert fluid - Halocarbon	(Note 1)						NACE		4		
AISI 316 L ss gold plated	Inert fluid - Halocarbon	(Note 1)						NACE		I		
Tantalum	Inert fluid - Halocarbon	(Note 1)						NACE		5		
Process connection material (wetted parts) – 8th character												
AISI 316 L ss	1/2 – 14 NPT female	(Note 2)						NACE		B		
AISI 316 L ss	1/2 – 14 NPT male	(Note 2)						NACE		T		
AISI 316 L ss	DIN EN837-1 G 1/2 B	(Note 2)						NACE		P		
AISI 316 L ss	Adapter straight (180°) entry (Not available with bracket)	(Note 2)						NACE		A		
AISI 316 L ss	Adapter angle (90°) entry	(Note 2)						NACE		N		
Hastelloy C276™	1/2 – 14 NPT female	(Note 3)						NACE		E		
Hastelloy C276™	1/2 – 14 NPT male	(Note 3)						NACE		K		
Hastelloy C276™	DIN EN837-1 G 1/2 B	(Note 3)						NACE		D		
Hastelloy C276™	Adapter straight (180°) entry (Not available with bracket)	(Note 3)						NACE		F		
Hastelloy C276™	Adapter angle (90°) entry	(Note 3)						NACE		C		
Monel 400™	1/2 – 14 NPT female	(Note 4)						NACE		1		
Monel 400™	1/2 – 14 NPT male	(Note 4)						NACE		2		
Monel 400™	DIN EN837-1 G 1/2 B	(Note 4)						NACE		3		
Housing material and electrical connection – 9th character												
Aluminium alloy (Barrel version)	1/2 – 14 NPT											A
Aluminium alloy (Barrel version)	M20 x 1.5 (CM 20)											B
Aluminium alloy (Barrel version)	Pg 13,5											D
Aluminium alloy (Barrel version)	1/2 GK											C
Aluminium alloy (Barrel version)	Harting Han connector	(general purpose only)						(Note 5)				E
Aluminium alloy copper-free (Barrel version)	1/2 – 14 NPT											H
Aluminium alloy copper-free (Barrel version)	M20 x 1.5 (CM 20)											L
Aluminium alloy copper-free (Barrel version)	Pg 13,5											N
Aluminium alloy copper-free (Barrel version)	1/2 GK											M
Aluminium alloy copper-free (Barrel version)	Harting Han connector	(general purpose only)						(Note 5)				P
AISI 316 L ss (Barrel version)	1/2 – 14 NPT											S
AISI 316 L ss (Barrel version)	M20 x 1.5 (CM20)											T
AISI 316 L ss (Barrel version)	Pg 13,5											V
AISI 316 L ss (Barrel version)	1/2 GK											U
Output/Additional options – 10th character												
HART digital communication and 4 to 20mA (SIL 2)	No additional options							(Note 6)				T
HART digital communication and 4 to 20mA (SIL 2)	Options requested (to be ordered by "Additional ordering code")											8