Data Sheet
SS/261GR/AR-EN_03

2600T Series Pressure Transmitter

Model 261GR Gauge
Model 261AR Absolute
with remote seal

- **Base accuracy: ±0.15 %**
- **Span limits**
  6 to 60000kPa; 24inH_2O to 8700ps
  6 to 3000kPa abs; 45mmHg to 435psia
- **Reliable sensing system coupled with the latest digital technologies**
  – provides large turn down ratio up to 20:1
- **Stainless steel housing**
  – optimized for harsh environment
  – extremely robust
- **Flexible configuration facilities**
  – Local zero and span button
  – Local configuration with keys on LCD indicator
  – Remote configuration with hand terminal or PC based software
- **Broad selection of variants, options fill fluids and wetted materials**
  – allows total flexibility for maximizing cost-effectiveness, also providing a solution for applications with critical process media at extended temperature range
- **PED compliance to sound engineering practice (SEP)**

HART® FIELD COMMUNICATIONS PROTOCOL

ABB 2600T Series
Engineered solutions
for all applications

General description

Models detailed in this data sheet apply for those transmitters with one remote seal connected via a capillary to the transmitter sensor. Refer to seal data sheet SS/S261 for all data and details relevant to seal element.

Functional Specifications

Range and span limits

Sensor Code	Upper Range Limit (URL)	Lower Range Limit (LRL)	Overrange Limit	Minimum Span				
				Flush Diaphragm			Extended Diaphragm	
				DN 25/1 in	DN 50/2 in	DN 80/3 in	DN 50/2 in	DN 80/3 in
				max. 250 bar 25 MPa 3625 psi	max. 100 bar 10 MPa 1450 psi	max. 100 bar 10 MPa 1450 psi	max. 100 bar 10 MPa 1450 psi	max. 100 bar 10 MPa 1450 psi
				max. length of capillary tube 6 m	max. length of capillary tube 16 m	max. length of capillary tube 16 m	max. length of capillary tube 16 m	max. length of capillary tube 16 m
C	6kPa 60mbar 24inH_2O	-6kPa -60mbar -24inH_2O	1MPa 10bar 145psi			6kPa 60mbar 24inH_2O		6kPa 60mbar 24in H_2O
F	40kPa 400mbar 160inH_2O	-40kPa -400mbar -160inH_2O	1MPa 10bar 145psi	16kPa 160mbar 64inH_2O	10kPa 100mbar 40inH_2O	6kPa 60mbar 24inH_2O	16kPa 160mbar 64inH_2O	6kPa 60mbar 24inH_2O
L	250kPa 2500mbar 1000inH_2O	0 absolute	500kPa 5bar 72.5psi	16kPa 160mbar 64inH_2O	12.5kPa 125mbar 50inH_2O	12.5kPa 125mbar 50inH_2O	16kPa 160mbar 64inH_2O	12.5kPa 125mbar 50inH_2O
D	1000kPa 10bar 145psi	0 absolute	2MPa 20bar 290psi	50kPa 500mbar 200inH_2O	50kPa 500mbar 200inH_2O	50kPa 500mbar 200inH_2O	50kPa 500mbar 200inH_2O	50kPa 500mbar 200inH_2O
U	3000kPa 30bar 435psi	0 absolute	6MPa 60bar 870psi	150kPa 1.5bar 21.8psi	150kPa 1.5bar 21.8psi	150kPa 1.5bar 21.8psi	150kPa 1.5bar 21.8psi	150kPa 1.5bar 21.8psi
R	10MPa 100bar 1450psi	0 absolute	20MPa 200bar 2900psi	500kPa 5bar 72.5psi	500kPa 5bar 72.5psi	500kPa 5bar 72.5psi	500kPa 5bar 72.5psi	500kPa 5bar 72.5psi
V	60MPa 600bar 8700psi	0 absolute	90MPa 900bar 13050psi	3MPa 30bar 435psi	3MPa 30bar 435psi	3MPa 30bar 435psi	3MPa 30bar 435psi	3MPa 30bar 435psi

Sensor Code	Upper Range Limit (URL)	Lower Range Limit (LRL)	Overrange Limit	Minimum Span			
				Inline remote seal			
				DN 25/1 in	DN 40	DN 50/2 in	DN 80/3 in
				max. 250bar 25MPa 3625psi	max. 100bar 25MPa 3625psi	max. 100bar 25MPa 3625psi	max. 100 bar 25MPa 3625psi
				max. lenght of capillary tube 4 m	max. lenght of capillary tube 6 m	max. lenght of capillary tube 8 m	max. lenght of capillary tube 16 m
C	6kPa 60mbar 24inH_2O	-6kPa -60mbar -24inH_2O	1MPa 10bar 145psi				
F	40kPa 400mbar 160inH_2O	-40kPa -400mbar -160inH_2O	1MPa 10bar 145psi				
L	250kPa 2500mbar 1000inH_2O	0 absolute	500kPa 5bar 72.5psi				
D	1000kPa 10bar 145psi	0 absolute	2MPa 20bar 290psi	0.4MPa 4bar 58psi	0.25MPa 2.5bar 36psi	0.25MPa 2.5bar 36psi	0.25MPa 2.5bar 36psi
U	3000kPa 30bar 435psi	0 absolute	6MPa 60bar 870psi	0.4MPa 4bar 58psi	0.25MPa 2.5bar 36psi	0.25MPa 2.5bar 36psi	0.25MPa 2.5bar 36psi
R	10MPa 100bar 1450psi	0 absolute	20MPa 200bar 2900psi	500kPa 5bar 72.5psi	500kPa 5bar 72.5psi	500kPa 5bar 72.5psi	500kPa 5bar 72.5psi
V	60MPa 600bar 8700psi	0 absolute	90MPa 900bar 13050psi	3MPa 30bar 435psi	3MPa 30bar 435psi	3MPa 30bar 435psi	3MPa 30bar 435psi

Note:

Lower Range Limit (LRL) for 261AR sensor code C, F, L, D and U is 0 absolute.

Span limits

Maximum span = Upper range limit (URL)
Minimum span: see table above and refer to recommended minimum span at dimensional drawings
IN ORDER TO OPTIMISE THE TRANSMITTER PERFORMANCE IT IS ADVISABLE TO SELECT THE TRANSMITTER SENSOR TO PROVIDE THE MINIMUM POSSIBLE TURNDOWN.
Turndown = Upper range limit / Calibrated span

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

Adjustable time constant: 0 to 60s.
This is in addition to sensor response time. Can be adjusted via local indicator, hand terminal or PC based software.

Turn on time

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

Insulation resistance

> 100MΩ at 500VDC (terminals to earth)

Operative limits

Temperature limits °C (°F):

Ambient temperature limits

Silicone oil and inert filling: -40°C and +85°C (-40°F and +185°F)
white oil filling: -6°C and +85°C (+21°F and +185°F)
with LCD indicator: -20°C and +70°C (-4°F and +158°F)

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

Process temperature limits

The following table shows characteristics of capillary/seal fill fluids when used in transmitters with a remote seal.

Filling Liquid	Id	Density at 20 °C in kg/m³	Process temperature in °C (°F)
Silicone oil	IC	1055	-30 and +250 (-22 and +482)
Carbon Fluoride	L	1860	-30 and +150 (-22 and +302)
High-temperature Oil	SH	1070	-10 and +375 (+14 and +707)
White Oil (FDA)	WB	849	-6 and +200 (+21 and +392)
Silicone oil for vacuum applications	IC-V	1055	-30 and +200 (-22 and +392)
White Oil (FDA) for vacuum applications	WB-V	849	-6 and +200 (+21 and +392)

Flush diaphragm DN25 / 1in: max. +250°C (482°F)
Flush diaphragm, material tantalum: max. +220°C (428°F)

Storage temperature limits

Lower limit: -50°C (-58°F), –40°C (-40°F) for LCD indicators
-6°C (+21°F) for white oil filling
Upper limit: +85°C (+185°F)

Pressure limits

For maximum pressure refer to sensor overrange limit and seal working pressure in table “Range and Span limits” in pages above. For minimum pressure refer to the following table.

Filling liqiud	Id	Pressure rating in mbar abs					
		20°C (68°F)	100°C (212°F)	150°C (302°F)	200°C (392°F)	250°C (482°F)	375°C (707°F)
Silicone oil	IC	>500	>500	>500	>750	>1000	–
Carbon Fluoride	L	>1000	>1000	>1000	–	–	–
High-temperature Oil	SH	>500	>500	>500	>75	>1000	>1000
White Oil	WB	>500	>1000	>1000	>1000	>1000	
Silicone oil for vacuum applications	IC-V	>5	>25	>38	>50	–	–
White Oil for vacuum applications	WB-V	>5	>25	>50	>1000	–	–

Overpressure limits
(without damage to the transmitter)

The transmitter can be exposed without leaking to line pressure up to the overrange limit of the sensor or the flange rating of the seal, whichever is less.

Environmental limits

Electromagnetic compatibility (EMC)

Complies with EMC directive 89 / 336 / EEC
as well as with EN 61000-6-3 for emission and
EN 61000-6-2 for immunity requirements and test
Fulfills NAMUR recommendation

Low voltage directive

Complies with 73 / 23 / EEC

Pressure equipment directive (PED)

Complies with 97 / 23 / EEC sound engineering practice (SEP)

Humidity

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

Vibration resistance

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

Shock resistance (according to IEC 60068–2–27)

Acceleration:	50g
Duration:	11ms

Wet and dust-laden atmospheres

The transmitter is dust and sand tight and protected against immersion effects as defined by IEC EN60529 (1989) to IP 67(IP 68, IP 69K on request) or by NEMA to 4X or by JIS to C0920.

Hazardous atmospheres

Transmitters with hazardous area electrical certification "Intrinsically safe EEx ia/ib" comply with the directive 94 / 9 / EC (ATEX)

Transmitter with 4 to 20mA output signal and HART communication

Marking (DIN EN 50 014): II 1/2 G EEx ia IIC T4…T6
II 2 G EEx ib IIC T4…T6

Permissible ambient temperature depending on temperature class:

Ambient Temperature	Temperature class
-40 to +85°C (-40 to +185 °F)	T1 ... T4
-40 to +71°C (-40 to +159 °F)	T5
-40 to +56°C (-40 to +132 °F)	T6

or
Marking (DIN EN 50 014): II 1/2 D IP65 T95°
supplied intrinsically safe Ex ia
II 2 D IP65 T95°
supplied intrinsically safe Ex ib

Permissible ambient temperature:
-40 to +85°C (-40 to +185 °F)

Supply and signal circuit type of protection Intrinsic Safety
EEx ia/ib IIB/IIC with maximum values:
Ui = 30V
Ii = 130mA
Pi = 0.8W

effective internal capacitance: Ci = 10nF
effective internal inductance: Li = 10µH

Factory Mutual (FM) (pending)

Transmitter with 4 to 20mA output signal and HART communication

Intrinsically safe: Class I, II and III; Division 1;
Groups A, B, C, D, E, F, G
Class I; Zone 0; AEx ia Group IIC T6; T4

Non -incentive Class I, II, and III, Division 2, Groups A, B, C, D, F, G

Degree of protection : NEMA Type 4X (indoor or outdoor)

Canadian Standard (CSA) (pending)

Transmitter with 4 to 20mA output signal and HART communication

Intrinsically safe: Class I, II and III; Division 1;
Groups A, B, C, D, E, F, G
Class I; Zone 0; AEx ia Group IIC T6; T4

Non -incentive Class I, II, and III, Division 2, Groups A, B, C, D, F, G

Degree of protection : NEMA Type 4X (indoor or outdoor)

Electrical Characteristics and Options

HART digital communication and 4 to 20mA output

Power Supply

The transmitter operates from 11 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

Maximum permissible voltage ripple of power supply during the communication:
According to HART FSK physical layer specification Rev. 8.1

Load limitations

4 to 20mA and HART total loop resistance:

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

A minimum of 250Ω is required for HART communication.

Integral display (optional)

Digital Graphic LCD display for user-specific indication of:
Gauge pressure / absolute pressure or
percentage of the output current or
output current in mA or
HART output (free choice of initial-, final value and unit)
Diagnostic messages, alarms, errors and measuring range infringements are also displayed.
Furthermore the LCD indicator can be used for configuration and parametrization of the transmitter via four keys.

Output signal

Two-wire, 4 to 20mA 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)

Overload condition

- Lower limit:	3.8mA (configurable down to 3.5mA)
- Upper limit:	20.5mA (configurable up to 22.5mA)

Alarm current

Min. alarm current:	configurable from 3.5mA to 4mA, standard setting: 3.6mA
Max. alarm current:	configurable from 20mA to 22.5mA, standard setting: 21mA
Standard setting:	max. alarm current

SIL – Functional Safety (optional)

according to IEC 61508 / 61511

Device with Declaration of SIL Conformity for use in safety related applications up to SIL 2

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 ceramic or Hastelloy and silicone oil fill.
Mode: linear, 4-20mA

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

The performances based to the Upper Range Limit (URL) are effected by the actual turndown (TD) as ratio between Upper Range Limit (URL) and calibrated span.

IT IS RECOMMENDED THAT THE TRANSMITTER SENSOR CODE IS SELECTED TO PROVIDE A TURNDOWN VALUE AS LOW AS POSSIBLE TO OPTIMIZE PERFORMANCE CHARACTERISTICS.

Accuracy rating

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

- ±0.15% for TD from 1:1 to 10:1
- $\pm\left(0.15\% + 0.005 \times \frac{\text{URL}}{\text{Span}} - 0.05\%\right)$ for TD greater than > 10:1

Operating influences

Ambient temperature

per 10 K (18 °F) change between the limits of -10°C to +60°C (+14°F to +140°F):
±(0.15% URL + 0.15% span)

The total temperature error is the combination of the above transmitter effect with seal errors. Refer to seal data sheets for additional effects of the remote seal.

Supply voltage

Within voltage/load specified limits the total effect is less than 0.001% of URL per volt.

Load

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

Radio frequency interference

Total effect: less than 0.3% of span from 80 to 1000MHz and for field strengths up to 10V/m when tested with unshielded conduit, with or without meter.

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)

Materials

Process isolating diaphragms (*)

refer to ordering information for remote seal

Process connection (*)

refer to ordering information for remote seal

Seal fill fluid

refer to ordering information for remote seal

Sensor fill fluid

Silicone oil; inert fill (Carbon fluoride); white oil (FDA)

Mounting bracket

AISI 316 L ss

Sensor housing

AISI 316 L ss

Electronic housing and covers

AISI 316 C ss

Filter for atmosphere ventilation

plastic (standard), stainless steel

Cover O-ring

Neoprene™ (CR)

Tagging

Plastic data plate attached to the electronic housing

Calibration

Standard: 0 to Upper Range Limit (URL)
Optional: at specified range

Optional extras

Mounting brackets

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

Integral display

graphic display, plug-in rotatable LCD indicator

Supplemental customer tag

AISI 316 ss tag fastened to the transmitter with stainless steel wire for customer's tag data up to a maximum of 30 characters and spaces

Cleaning procedure for oxygen service

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

Manual language

Process connections

refer to ordering information

(*) Wetted parts of the transmitter

Electrical connections

one M16x1.5 threaded conduit entry, direct on housing
or 1/2-14 NPT (without cable gland)
or M20x1.5 (without cable gland)
or Harting Han connector
or Miniature-connector (without plug socket)

Terminal block

HART version: two terminals for signal/supply voltage wiring up to 1.5mm² (16AWG)

Grounding (Option)

External 4mm² (12AWG) ground termination point

Mounting position

Transmitter can be mounted in any position

Mass (without options)

0.7kg approx (1.54lb)

Flange seal
– DN50, PN16/40 with flush diaphragm: approx 3.3kg
– 2in, Class 300 with flush diaphragm: approx 3.7kg
– DN50, PN16/40 with extended diaphragm 100mm: approx 4.0kg
– 2in, Class 300 with extended diaphragm 100mm: approx 5.4kg
– DN80, PN16/40 with flush diaphragm: approx 5.8kg
– 3in, Class 150 with flush diaphragm: approx 5.3kg
– DN80, PN16/40 with extended diaphragm 100mm: approx 7.5kg
– 3in, Class 150 with extended diaphragm 100mm: approx 7.0kg

Flush diaphragm seals DN25/1in, miniature seals, in-line seals andfast coupled seals: see dimensional diagrams

Packing

Carton

Configuration

Transmitter with HART communication and 4 to 20 mA

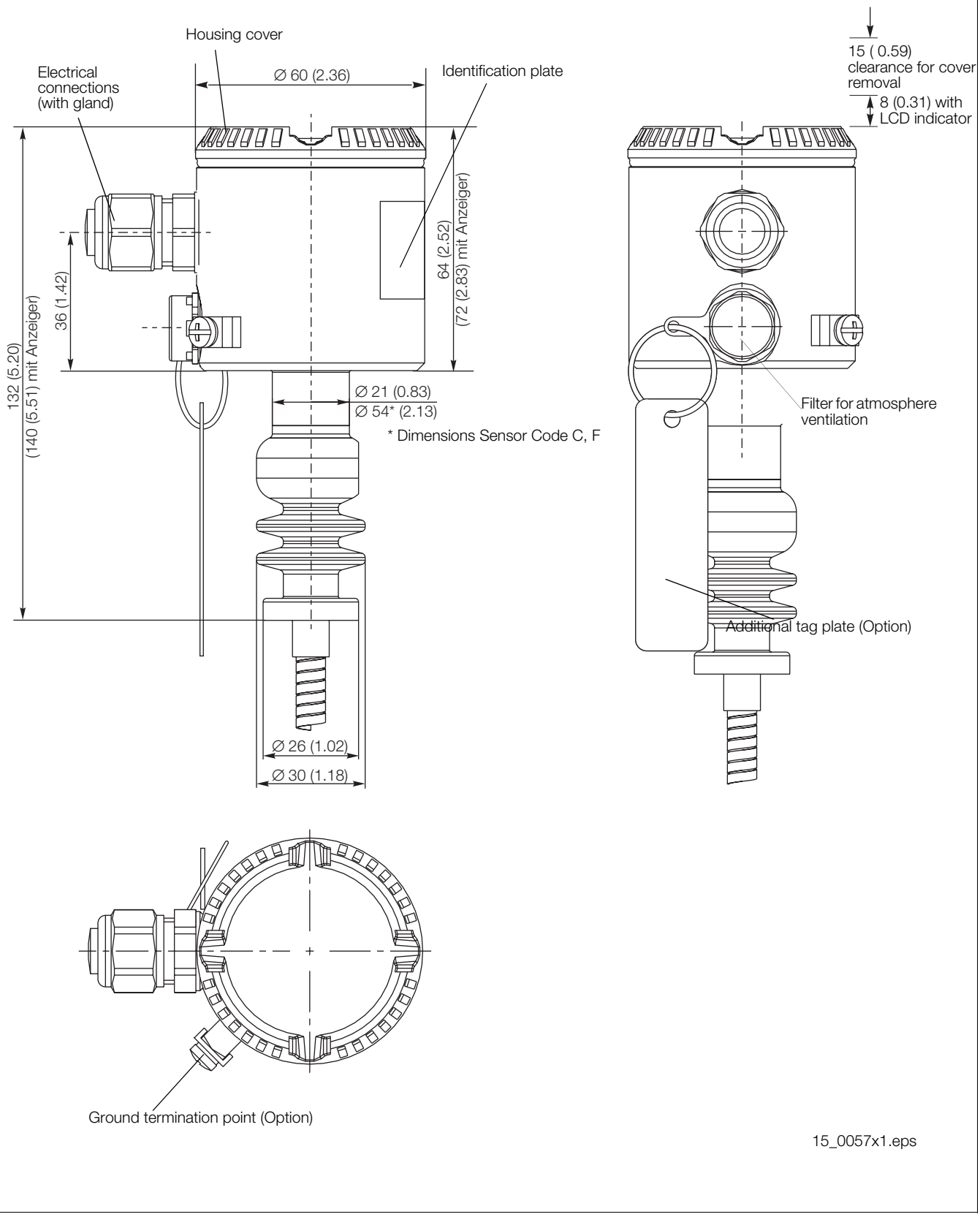
Standard configuration

Transmitters are factory adjusted to customer's specific range. Adjusted range and tag number are marked on the type plate. If calibration range and tag data are not specified, the transmitter will be supplied configured as follows:

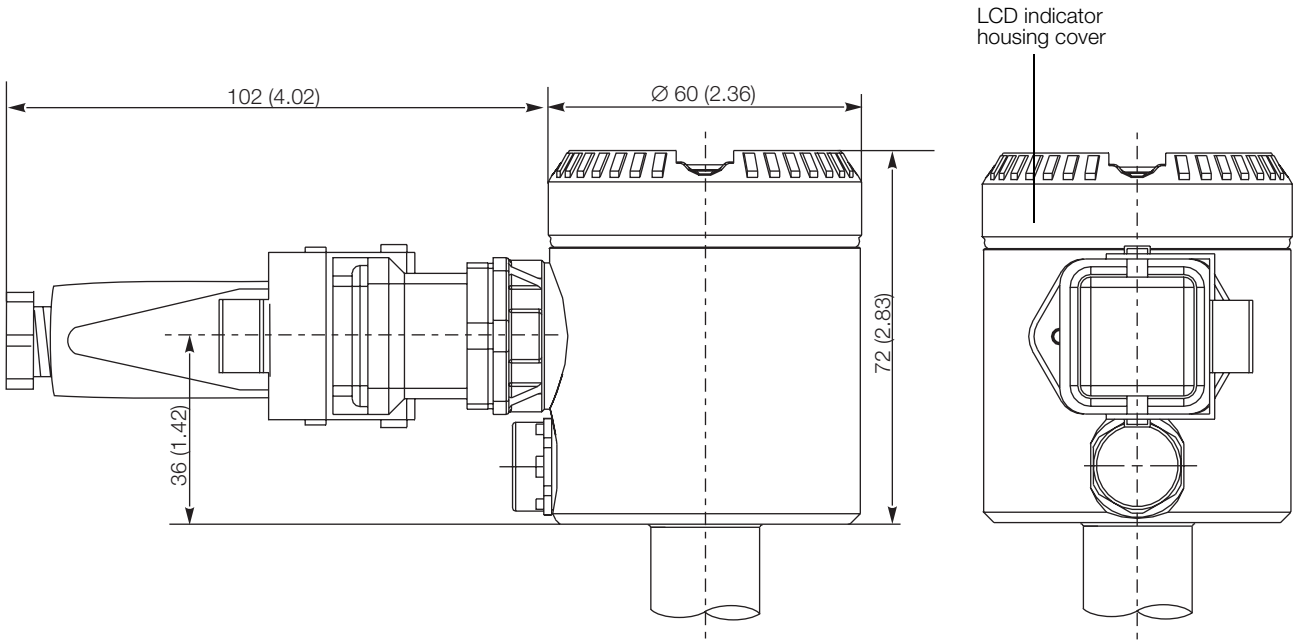
4 mA	Zero
20 mA	Upper Range Limit (URL)
Output	Linear
Damping	0,1s
Transmitter failure mode	21mA
LCD indicator (optional)	0…100%

Any or all the above configurable parameters, including Lower range-value and Upper range-value, can be easily changed with the optional LCD indicator, using a HART hand–held communicator or by a PC, running the configuration software SMART VISION with DTM for 2600T.

Mounting dimensions (not for construction unless certified) – dimensions in mm (inchs)



Design with the options LCD indicator and Harting Han connector



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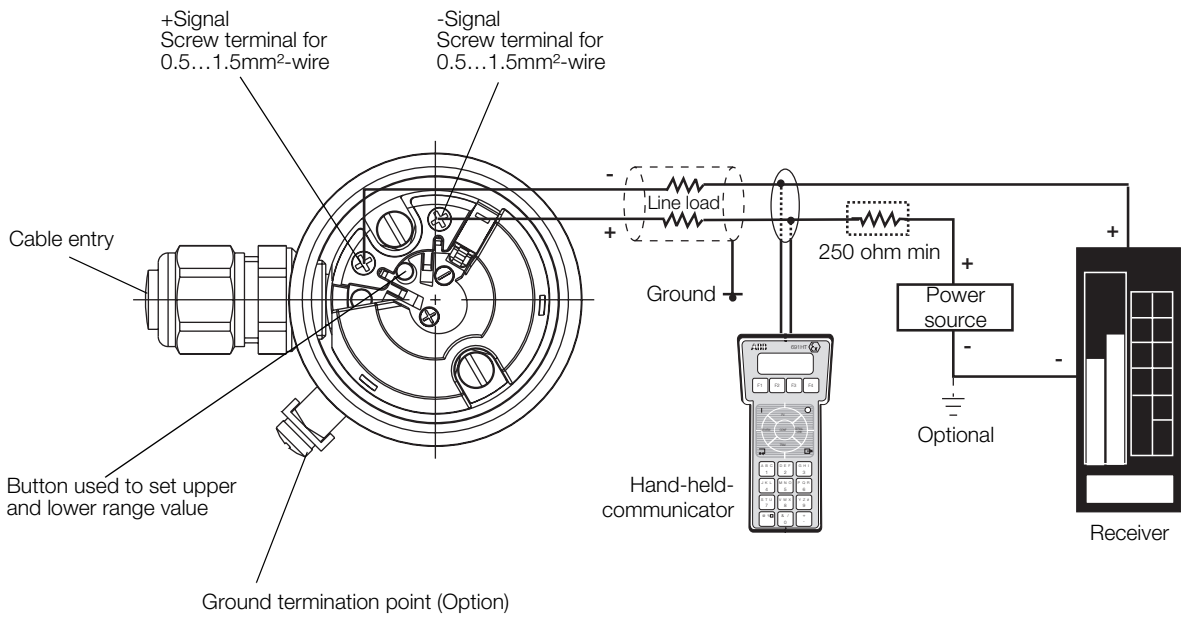
Electrical connections

Standard Terminal block



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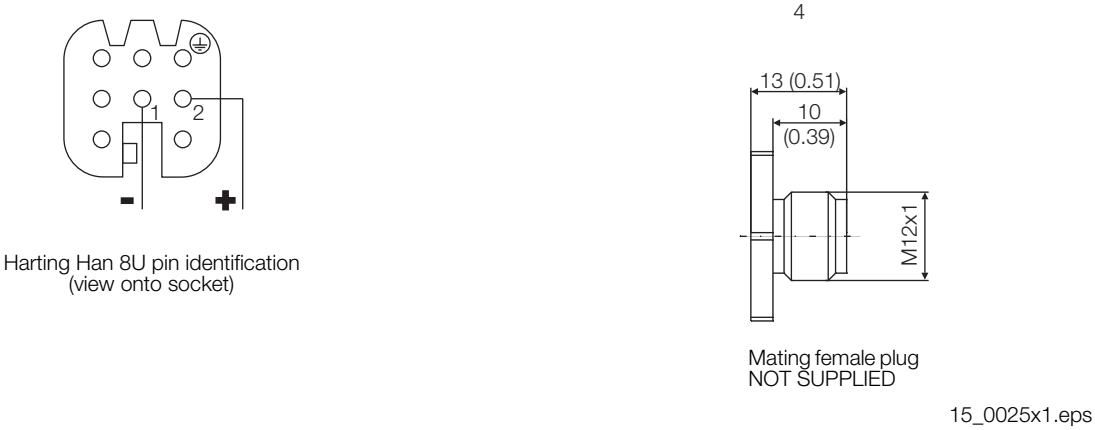
Connector Versions



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Ordering information

			Variant digit No.	1- 5	6	7	8	9	Code		
Gauge Pressure Transmitter 261GR			**Catalog No.**	**261GR**							
Base Accuracy 0.15 %											
Sensor–Span limits			**Overpressure limit**								
0.3...6 kPa	3...60 mbar	1.2 and 24 in H_2O	1 MPa, 145 psi		C						
2...40 kPa	20...400 mbar	8 and 160 in H_2O	1 MPa, 145 psi		F						
12.5...250 kPa	125...2500 mbar	50 and 1000 in H_2O	0.5 MPa, 72.5 psi		L						
50...1000 kPa	0.5...10 bar	7.25...145 psi	2 MPa, 290 psi		D						
150...3000 kPa	1.5...30 bar	21.7...435 psi	6 MPa, 870 psi		U						
500...10000 kPa	5...100 bar	72.5...1450 psi	20 MPa, 2900 psi		R						
3000...60000 kPa	30...600 bar	435...8700 psi	90 MPa, 13050 psi		V						
Absolute Pressure Transmitter 261AR			**Catalog No.**	**261AR**							
Base Accuracy 0.15 %											
Sensor–Span limits			**Overpressure limit**								
0.3...6 kPa	3...60 mbar	2.25...45 mmHg	1 MPa, 145 psi		C						
2...40 kPa	20...400 mbar	15...300 mmHg	1 MPa, 145 psi		F						
12.5...250 kPa	125...2500 mbar	93.8...1875 mmHg	0.5 MPa, 72.5 psi		L						
50...1000 kPa	0.5...10 bar	375...7500 mmHg	2 MPa, 290 psi		D						
150...3000 kPa	1.5...30 bar	21.7...435 psi	6 MPa, 870 psi		U						
Diaphragm material / Fill fluid (sensor)											
with remote seal		Siliconoil		2)		R					
with remote seal		Inert fluid		1,2)		2					
with remote seal		White oil (FDA)		2)		6					
with remote seal		No filling		3)		3					
Electronic housing											
Housing material	**Electrical connection**										
AISI 316 L ss	M16 x 1.5 (with cable gland made of plastic)						2				
AISI 316 L ss	1/2-14 NPT (without cable gland)						S				
AISI 316 L ss	M20 x 1.5 (without cable gland)						T				
AISI 316 L ss	Harting Han connector				4)		3				
AISI 316 L ss	Miniature-connector				4)		Z				
Output / Additional options											
HART digital communication and 4...20 mA		No additional options				5)		H			
HART digital communication and 4...20 mA		Options requested (to be ordered by "Additional ordering code")						1			

1) Suitable for oxygen service (O_2)
2) Not available with sensor range 60 and 400 mbar
3) Only available with sensor range 60 and 400 mbar
4) Select type in additional ordering code
5) Not available for electrical connection with connector

Additional ordering information

	Code		
Electrical certification			
ATEX Group II Category 1/2 G – Intrinsic Safety EEx ia	EH		
ATEX Group II Category 1/2 D – Intrinsic Safety EEx ia (without cable gland)	EL		
Factory Mutual (FM) – Intrinsically Safe	EA		
Canadian Standard Association (CSA) – Intrinsically Safe	ED		
Integral LCD			
Digital LCD integral display	L1		
Electrical housing accessories			
Housing with external earthing/potential equalizing terminal	AA		
M16 x 1.5 cable gland and atmosphere ventilation made of metal	AB		
Mounting bracket (shape and material)			
For pipe mounting AISI 316 L ss	B2		
For wall mounting AISI 316 L ss	B4		
Preparation procedure			
Oxygen service cleaning (O_2) (Only available with inert fill and for sensor code C, F - Viton gasket) P_{max} = 21 MPa/210 bar/3045 psi, T_{max} = 60 °C/140 °F	P1		
Operating manual			
German	M1		
Additional tag plate			
Stainless steel, laser printed	I1		
Certificates/approvals			
Inspection certificate EN 10204-3.1.B of calibration	C1		
Inspection certificate EN 10204-3.1.B of the cleanliness stage according to DIN 25410	C3		
Inspection certificate EN 10204-3.1.B of helium leakage test of the sensor module	C4		
Inspection certificate EN 10204-3.1.B of the pressure test	C5		
Certificate of compliance with the order EN 10204-2.1 of instrument design	C6		
SIL2 - declaration of conformity	CL		
Material traceability			
Certificate of compliance with the order EN 10204-2.1 of process wetted parts	H1		
Inspection certificate EN 10204-3.1.B of the pressure-bearing and process wetted parts with analysis certificates as material verification (minor parts with Factory Certificate acc. to "EN 10 204")	H3		
Test report EN 10204-2.2 of the pressure bearing and process wetted parts	H4		
Connector			
Miniature plug M12x1 (without plug socket)	U2		
Harting Han 8U – straight entry 6)	U3		

6) Only available for electrical connection with Harting Han connector

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

- General purpose (no electrical certification)
- No meter/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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