Temperature Transmitter
ETS 4100 Ex applications

Integrated temperature probe | **Accuracy 0.4 %**

Flameproof enclosure
ATEX, IECEx, CSA, triple approval
HART interface
Optional pressure measurement

Description:

The ETS 4100 with HART interface is an electronic temperature transmitter in the ignition protection type having flameproof enclosure.

The triple approval in accordance with ATEX, CSA and IECEx enables universal, worldwide utilisation of the devices in potentially explosive atmospheres.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures within a range of -25 .. +100 °C.

The sensor has an analogue output signal of 4 .. 20 mA available as standard to enable integration into modern controls. In addition to the analogue output of the measured value, digital communication is possible by means of the HART protocol.

The instrument provides the option of a pressure sensor. The pressure signal is given out as a digital signal via the HART protocol and the temperature signal is still available as an analogue signal (4 .. 20 mA).

The main fields of application are in the oil & gas industry, e.g. in hydraulic power units, drill drives or valve actuation stations. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

$_{c}$CSA$_{us}$

Explosionproof - Seal not required
Class I Group A, B, C, D, T6, T5
Class II Group E, F, G
Class III
Type 4

ATEX

Flameproof
I M2 Ex d I Mb
II 2G Ex d IIC T6, T5 Gb
II 2D Ex tb IIIC T110 .. 120 °C Db

IECEx

Flameproof
Ex d I Mb
Ex d IIC T6, T5 Gb
Ex tb IIIC T110 .. 120 °C Db

Technical data:

Input data		
Measuring range	-25 .. +100 °C	
Probe lengths	10.7; 50; 100; 250; 350 mm	
Probe diameter	8 mm	
Pressure resistance	600 bar (probe length 10.7 mm) 125 bar (probe length ≥ 50 mm)	
Mechanical connection	G¼ A ISO 1179-2	
Tightening torque, recommended	20 Nm	
Parts in contact with fluid	Stainless steel: 1.4571; 1.4301 Seal: FKM	
Conduit- / Housing material	1.4404, 1.4435	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2-conductor, with HART protocol $R_{Lmax.} = (U_B - 12\ V) / 20\ mA\ [k\Omega]$ for HART communication min. 250 Ω	
HART Communication	Acc. to HART 7 specifications	
HART Common Practice Commands i.e.	Altering of measuring range limits (see table)	
Accuracy (at room temperature)	≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max.	
Temperature drift (environment)	≤ ± 0.01 % FS / °C	
Response time acc. to DIN EN 60751	t_{50}: ~ 10 s t_{90}: ~ 15 s	
Environmental conditions		
Operating / ambient temperature range [1) 2)]	T6, T110 T5	Ta = -40 .. +60 °C / -20 .. +60 °C Ta = -40 .. +70 °C / -20 .. +70 °C
Storage temperature range	-40 °C .. +100 °C	
Fluid temperature range [1) 2)]	T6, T110 T5	Ta = -40 .. +60 °C / -20 .. +60 °C Ta = -40 .. +70 °C / -20 .. +70 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 1 / 31	
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz	≤ 10 g	
Protection class acc. to DIN EN 60529 ISO 20653	IP 69 IP 6K9K	
Other data		
Voltage supply	12 .. 30 V DC	
Residual ripple of supply voltage	Acc. to FSK Physical Layer Specification (HCF_SPEC_054)	
Current consumption	≤ 25 mA	
Weight	280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250), 385 g (probe length 350)	

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.
FS (**F**ull **S**cale) = relative to complete measuring range
B.F.S.L. = **B**est **F**it **S**traight **L**ine

1) -25 °C with FKM seal, -40 °C on request
2) T120° with Ta = -40 .. 70 °C/-20 .. 70 °C with electrical connection single leads available

Measuring Range Limits:

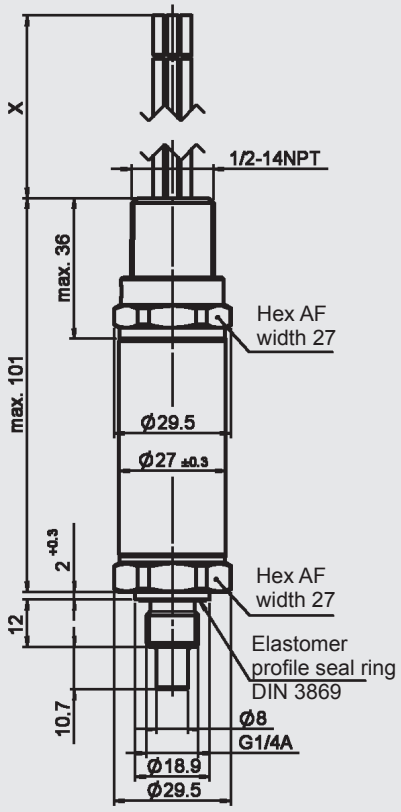
By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits.
Measuring range limits of the primary variable, temperature:

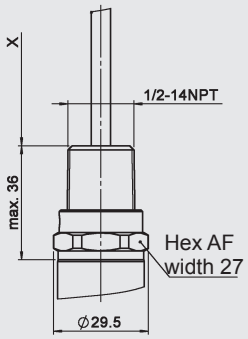
Lower measuring range limit		Upper measuring range limit		Measuring span	
min	max	min	max	min	max
-25 °C	75 °C	0 °C	100 °C	25 °C	125 °C

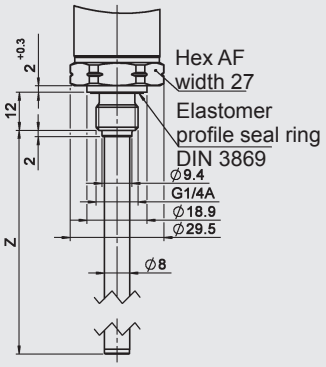
Fields of application:

	Single leads Electrical connection "9"	Jacketed cable Electrical connection "G"
CSA **ATEX** **IECEx**	Explosionproof (seal not required) Flameproof Flameproof	
$_{c}CSA_{us}$	Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4	
ATEX	I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb	
	II 2D Ex tb IIIC T110 .. 120 °C Db	II 2D Ex tb IIIC T110 °C Db
IECEx	Ex d I Mb Ex d IIC T6, T5 Gb	
	Ex tb IIIC T110 .. 120 °C Db	Ex tb IIIC T110 °C Db

Dimensions:







Probe length (Z)
10.7 mm
50 mm
100 mm
250 mm
350 mm

Model code:

ETS 4 1 4 X – F21 – XXX - D – 000 (2m)

Mechanical connection
4 = G1/4 A ISO 1179-2

Electrical connection
9 = 1/2-14 NPT Conduit, single leads
G = 1/2-14 NPT Conduit, jacketed cable

Output signal
F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Probe length
010 = 10.7 mm
050 = 50 mm
100 = 100 mm
250 = 250 mm
350 = 350 mm

Approval
D = **CSA** Explosionproof (seal not required)
ATEX Flameproof
IECEx Flameproof

Modification number:
000 = standard

Cable length in m:
Standard = 2 m

Additional technical data with pressure measurement option:

Input data								
Measuring ranges	bar	16	40	60	100	250	400	600
Overload pressures	bar	32	80	120	200	500	800	1000
Burst pressure	bar	200	200	300	500	1000	2000	2000
Mechanical connection		G1/2 A ISO 1179-2 with probe						
Tightening torque, recommended		45 Nm						
Probe length		7 mm						
Output data								
Output signal Temperature		4 .. 20 mA with HART Protocol						
Output signal Pressure		available via HART protocol as a digital signal						
Accuracy acc. to DIN 16086, terminal based		≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS max.						
Accuracy, B.F.S.L.		≤ ± 0.15 % FS typ. ≤ ± 0.25 % FS max.						
Temperature compensation Zero point		≤ ± 0.008 % / °C typ. ≤ ± 0.015 % / °C max.						
Temperature compensation Span		≤ ± 0.008 % / °C typ. ≤ ± 0.015 % / °C max.						
Non-linearity acc. to DIN 16086, terminal based		≤ ± 0.3 % FS max.						
Hysteresis		≤ ± 0.1 % FS max.						
Repeatability		≤ ± 0.05 % FS						
Long-term drift		≤ ± 0.1 % FS typ. / year						
Environmental conditions								
Compensated temperature range		-25 .. +85 °C						
Protection class acc. to DIN EN 60529 ISO 20653		IP 65 (Vented Gauge), IP 69 (Sealed Gauge) IP 6K9K (Sealed Gauge)						

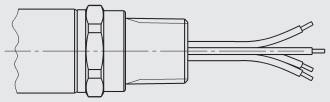
Measuring range limits:

Additional measuring range limits of the secondary variable, pressure:

Lower measuring range limit		Upper measuring range limit		Measuring span	
min	max	min	max	min	max
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS

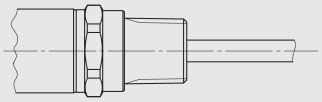
Pin connections:

Conduit (single leads)



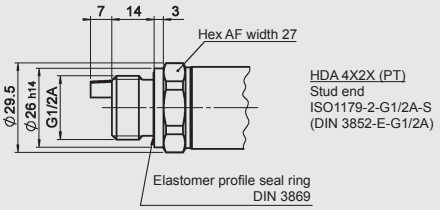
Lead	ETS 41x9
red	Signal +
black	Signal -
green-yellow	Housing

Conduit (jacketed cable)



Lead	ETS 41xG
white	Signal -
brown	Signal +
green	n.c.
yellow	n.c.

Dimensions with pressure measurement option:



Model code with pressure measurement option:

ETS 4 1 2 X – F21 – 007 - P – XXXX - D X - 000 (2m)

Mechanical connection
2 = G1/2 A ISO 1179-2

Electrical connection
9 = 1/2-14 NPT Conduit, single leads
G = 1/2-14 NPT Conduit, jacketed cable

Output signal
F21 = 4 .. 20 mA, 2-conductor with HART protocol

Probe length
007 = 7 mm

With pressure measurement

Measuring ranges in bar
0016; 0040; 0060; 0100; 0250; 0400; 0600

Approval
D = **CSA** Explosionproof (seal not required)
ATEX Flameproof
IECEx Flameproof

Type of measurement cell:
S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar
V = Vented Gauge (vented to atmosphere) < 40 bar

Modification number:
000 = standard

Cable length in m:
Standard = 2 m

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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