

# Temperature Transmitter, field mounted TH202/TH202-Ex

HART programmable,  
Pt 100 (RTD), thermocouples,  
electrical isolation

**IndustrialIT**  
enabled™  
Level 0: Information

## ■ Input

- Resistance thermometer (2, 3, 4 wire circuit)
- Thermocouples
- Resistance remote signalling unit (0...5000 Ω)
- Voltages, mV (–125...+1200 mV)

## ■ Output

- 2 wire technique
- 4...20 mA, HART signal

## ■ Electrical isolation (I/O)

## ■ Measured error 0.1 K

## ■ Customer-specific linearization

- 32 tie points

## ■ Continuous sensor and self-monitoring

- Parameter saved permanently in EEPROM
- Monitoring of data integrity every 10 s
- Wire break monitoring in acc. with NAMUR NE 89

## ■ Substitution strategy in case of error (NE 43)

## ■ Approvals for explosion protection

- Intrinsically safe
  - ⊕ II 2 (1) G EEx [ia] ib IIC T6, mount in zone 1
  - ⊕ II 3 G EEx n A II T6, mount in zone 2
- Pressure-proof
  - ⊕ II 2 G EEx d IIC T6, mount in zone 1

## ■ Input functionality

(absolute, differential, average value)

## ■ EMC acc. to EN 50082-2 and NE 21

## ■ Parameterization

- Device Management Tool: SV401 (SMART VISION)
- Hand held terminals: 691HT, STT04, HHT275
- CoMeter (HART configurator/LC display)

## ■ 5 years warranty



**Excellent long term stability**  
**Temperature linear output signal**  
**Enhanced self diagnostics**

**ABB**

## Technical data

### Output

#### Output signal (temperature linear)

4...20 mA

#### Residual ripple (peak-to-peak)

< 0.3 %

#### Current consumption

< 3.6 mA

#### Maximum output current

23.6 mA

#### Parameterizable current error signal

Underranging 3.6 mA  
Overranging 22 mA  
Default value 3.6...23.6 mA

#### Damping

$t_{63} = 0...30$  s

### Input

#### Resistance

##### Resistance thermometer (IEC 751, JIS, SAMA)

n · Pt 100/Ni 100 to Pt 1000/Ni 1000; Cu  
(n = 0.1, 0.2, 0.5, 1, 1.2, 2, 3...10)  
Min. measuring span 15 K/50 K

#### Resistance

0...500  $\Omega$ /0...5000  $\Omega$   
Min. measuring span 5  $\Omega$ /50  $\Omega$

#### Maximum line resistance ( $R_w$ ) per core

2, 3, 4 wire 7.5  $\Omega$ , 10  $\Omega$ , 50  $\Omega$

#### Measuring current

300  $\mu$ A

#### Sensor short-circuit

< 5  $\Omega$  (for RTD)

#### Sensor break (temperature/resistance measurement 2, 3, 4 wire)

Measuring range 0... 500  $\Omega$  > 530  $\Omega$   
Measuring range 0...5000  $\Omega$  > 5.3 k $\Omega$

#### Sensor wire break monitoring in accordance with NAMUR NE 89

Sensor wire break detection  
3 wire resistance measurement > 35  $\Omega$   
4 wire resistance measurement > 3.7 k $\Omega$

#### Input filter

50/60 Hz

### Thermocouples

#### Types

B, E, J, K, L, N, R, S, T, U

#### Voltages

-125 mV...+ 125 mV  
-125 mV...+1200 mV

#### Minimum measuring span

2 mV/50 mV

#### Sensor wire break monitoring in accordance with NAMUR NE 89

Pulsed with 1  $\mu$ A outside of the measuring interval  
Monitoring disconnectible  
Thermocouple measurement > 5 k $\Omega$   
Voltage measurement > 5 k $\Omega$

#### Input filter

50/60 Hz

#### Internal reference junction

Pt 100, via software switchable (no jumper necessary)

Input element		Measuring range	Min. measuring span
Standard	Sensor		
IEC 584-1	Thermocouple type B	250...+1820 °C (+482...+3308 °F)	235 °C (423 °F)
	Thermocouple type E	-250...+1000 °C (-418...+1832 °F)	30 °C ( 54 °F)
	Thermocouple type J	-210...+1200 °C (-346...+2192 °F)	37 °C ( 67 °F)
	Thermocouple type K	-250...+1372 °C (-418...+2502 °F)	54 °C ( 98 °F)
	Thermocouple type R	- 50...+1768 °C (- 58...+3215 °F)	171 °C (308 °F)
	Thermocouple type S	- 50...+1768 °C (- 58...+3215 °F)	193 °C (348 °F)
	Thermocouple type T	-200...+ 400 °C (-328...+ 752 °F)	50 °C ( 90 °F)
	Thermocouple type N	-200...+1350 °C (-328...+2462 °F)	60 °C (108 °F)
DIN 43710	Thermocouple type L	-200...+ 900 °C (- 76...+ 482 °F)	36 °C ( 65 °F)
	Thermocouple type U	-200...+ 600 °C (-328...+1112 °F)	40 °C ( 72 °F)
IEC 751; JIS; SAMA <sup>1)</sup> 2, 3 and 4 wire	Resistance thermometer Pt 100	-200...+ 850 °C (-328...+1562 °F)	15 °C ( 28 °F)
	Resistance thermometer Pt 1000	-200...+ 850 °C (-328...+1562 °F)	50 °C ( 90 °F)
DIN 43760 <sup>2)</sup> 2, 3 and 4 wire	Resistance thermometer Ni 100	- 60...+ 250 °C (- 76...+ 482 °F)	8 °C ( 15 °F)
	Resistance thermometer Ni 500	- 60...+ 250 °C (- 76...+ 482 °F)	15 °C ( 28 °F)
Resistance	$\Omega$	0...500 $\Omega$ /0...5000 $\Omega$	5 $\Omega$ /50 $\Omega$
Voltage	mV	-125 mV...+ 125 mV	2 mV
		-125 mV...+1200 mV	50 mV

<sup>1)</sup> IEC 751 a = 0.00385, JIS a = 0.003916, SAMA a = 0.003902

<sup>2)</sup> Edison Curve No. 7

## Power supply (poling protected)

### Supply voltage

Non-Ex-application  $U_s = 8.5...30$  V DC  
For Ex-Application, max.  $U_i = 8.5...29.4$  V DC  
2 wire methode: power supply wires = signal wires

### Influence of supply voltage

< 0.05 %/10 V

### maximum residual ripple

$\leq 1\%$   $U_s$  (< 500 Hz)

## Power demand of indicators

(Power demand of transmitter and indicator have to be added)

### Digital indicator

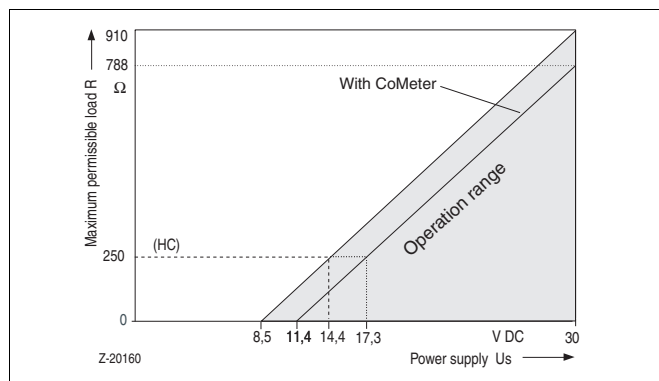
$U_{sd} = 2$  V DC

### CoMeter (HART configurator/LC display)

$U_{sd} = 2.9$  V DC

## Maximum load

$$R(k\Omega) = \frac{(U_{smax} - U_{smin})}{23.6}$$



## General characteristics

### Output signal refreshment rate

Pt 100 0.4 s (Input signal change < 0.25 K/s)  
Thermocouples 0.2 s (Input signal change < 2.5 K/s)

### Vibration resistance

Vibration in operation 2g acc. to DIN IEC 68T.2-6  
Resistance to shock acc. to DIN IEC 68T.2-27

### Electrical isolation (I/O)

1.5 kV AC (60 s)

### Long-term stability

$\leq 0.1\%$  p.a.

## Environment conditions

### Ambient temperature range

-40...85 °C

### Transport and storage temperature

-40...100 °C

### Relative humidity

< 100 %

### Condensation

Permitted

## Mechanical construction

### Dimensions

Confer dimensional drawing

### Weight

1.25 kg (without accesories)

### Housing material

Aluminium epoxy color (RAL 9002)  
stainless steel

### Type of protection

IP 67

## Electrical connection

### Thread (alternatively)

2 x M20 x 1.5, 2 x 1/2" GK, 2 x 1/2" NPT, 2 x 3/4" NPT

### or with cable screw connections

2 x M20 x 1.5 (metal)

### Ground screw external/internal

6 mm<sup>2</sup> M5 / 2.5 mm<sup>2</sup> M4

### Terminals, pluggable

2.5 mm<sup>2</sup>, screw terminals

## Characteristics at rated conditions

According to IEC 770 (related to 25 °C)<sup>1)</sup>

### Digital measured error

Pt 100  $\pm 0.1$  K  
Thermocouples  $\pm 20$   $\mu$ V  
Linear resistance 500  $\Omega$ /5000  $\Omega$   $\pm 40$  m $\Omega$ /200 m $\Omega$   
Linear voltage 120 mV/1200 mV  $\pm 20$   $\mu$ V/50  $\mu$ V

### D/A measured error

$\pm 0.05\%$  of measuring span

### Additional influence of the internal reference junction

Pt 100 DIN IEC 751 Kl. B

## Influences

### Influence of ambient temperature

Pt 100/resistance measurement<sup>2)</sup>

$$< (0.05\% + \frac{ME(\Omega)}{MS(\Omega)} \times 0.008\%) / 10 K$$

Thermocouple/mV<sup>3)</sup>

$$< (0.05\% + \frac{ME(mV)}{MS(mV)} \times 0.01\% + \frac{0.14 K}{MS(K)} \times 100\%) / 10 K$$

Percentage related to measuring span MS = ME - MA  
MA = lower range value, ME = upper range value

<sup>1)</sup> Percentage related to set measuring span

Specified values corresponds to 3  $\sigma$  (Gaussian normal distribution)

<sup>2)</sup> Pt 100 (0...400 °C): Influence of ambient temperature

$< (0.05\% + 0.013\%) / 10 K = 0.063\% / 10 K$

<sup>3)</sup> Type K (0...1000 °C): Influence of ambient temperature

$< (0.05\% + 0.01\% + 0.014\%) / 10 K = 0.074\% / 10 K$

## Explosion protection

### Intrinsically safe

#### Zone 1

Marking  $\text{Ex} \text{II} 2 (1) \text{G EEx [ia] ib IIC T6}$   
EC-Type-Examination certificate PTB 99 ATEX 2139 X  
Temperature class T6/T5/T4 50 °C/65 °C/85 °C

Supply circuit	Output [ib]	Input [ia]
Max. voltage	$U_i = 29.4 \text{ V}$	$U_o = 5.6 \text{ V}$
Short-circuit current	$I_i = 130 \text{ mA}$	$I_o = 1.5 \text{ mA}^{4)}$
Max. power	$P_i = 0.8 \text{ W}$	$P_o = 20 \text{ mW}$
Internal inductance	$L_i = 220 \mu\text{H}$	$L_o = 1 \text{ mH}$
Internal capacitance	$C_i = 15 \text{ nF}$	$C_o = 1.55 \mu\text{F}$

#### Zone 2

Marking  $\text{Ex} \text{II} 3 \text{G EEx n A II T6}$   
Conformity statement PTB 99 ATEX 2216 X  
Temperature class T6/T5/T4 50 °C/65 °C/85 °C

## Dust-explosionproof

### Zone 20: intrinsically safe type

Marking  $\text{Ex} \text{II} 1 \text{D EEx [ia] ib T 120 }^\circ\text{C}$   
EC-Type-Examination certificate According to ATEX

### Zone 20: Non intrinsically safe type

Marking  $\text{Ex} \text{II} \text{D} 1 \text{T } 135 \text{ }^\circ\text{C}^{5)}$   
EC-Type-Examination certificate According to ATEX

## Pressure-proof enclosure

Marking  $\text{Ex} \text{II} 2 \text{G EEx d IIC T6}$   
EC-Type-Examination certificate PTB ATEX 1144 X  
Temperature class T6/T5/T4 50 °C/65 °C/85 °C

## Canadian Standards Association and Factory Mutual

### Intrinsically Safe

FM/CSA Class I, Div. 1/Div. 2, Groups A, B, C, D  
Class II, Div. 1/Div. 2, Groups E, F, G  
Class III  
Class I, Zone 1, AEx [ia] ib IIC T6  
Class I, Zone 1, Ex [ia] ib IIC T6

### Nonincendive

FM Class I, Div. 2, Groups A, B, C, D, T6  
Class II, Div. 1/Div. 2, Groups F, G, T6  
Class III T6

### Explosionsproof

FM/CSA Class I, Div. 1/Div. 2, Groups A, B, C, D, T6  
Class II, Div. 1/Div. 2, Groups E, F, G, T6  
Class III T6

<sup>4)</sup> See 1. supplement PTB 99 ATEX 2139 X

<sup>5)</sup> With this marking, a 63 mA fuse must be inserted in the 4...20 mA circuit before the transmitter

## Electromagnetic compatibility (EMC)

Pt 100: measuring range 0...100 °C, span 100 K

Type of test	Degree	Influence	IEC
Burst to signal/ data lines	3 kV	< 0.1 %	1000-4-4
Static discharge Contact plate (indirect) Terminals for supply <sup>6)</sup> Terminals for sensors <sup>6)</sup>	8 kV 6 kV 4 kV	no influence no influence no influence	1000-4-2
Radiated field 80 MHz...1 GHz	10 V/m	< 1.0 %	1000-4-3
Coupling 150 kHz - 80 MHz	10 V	< 1.0 %	1000-4-6

According to NAMUR NE 21 recommendation.

In case of an input signal change > 0.25 K/s for Pt100 or > 2.5 K/s for thermocouples a measured value plausibility check is performed.

<sup>6)</sup> Air discharge (at 1 mm distance)

## Displays (option)

### Digital display

- Process value, sensor value or loop current value indicator
- Fed through current loop
- LC display:  
3½ digits (± 1999), digit height 10 mm, 7 segments
- Standard scaling 0...100 %  
Linear scaling for measuring ranges and units possible  
Description of the physical unit (labels)

### CoMeter (HART configurator and LC display)

- 4 function keys for request and programming (Code protection)
- Fed through current loop
- LC display:  
5 digits (± 1999), digit height 7,6 mm, 7 segments
- Sign and floating point
- 10 segment bargraph (heading of measuring range)
- 7 digits alphanumeric characters 6 mm, 14 segments

### Dual function

- HART transmitter programming unit (all HART functions except for freely configurable characteristic curve and TAG Number)
- Process value, sensor value or loop current value indicator

### Request function

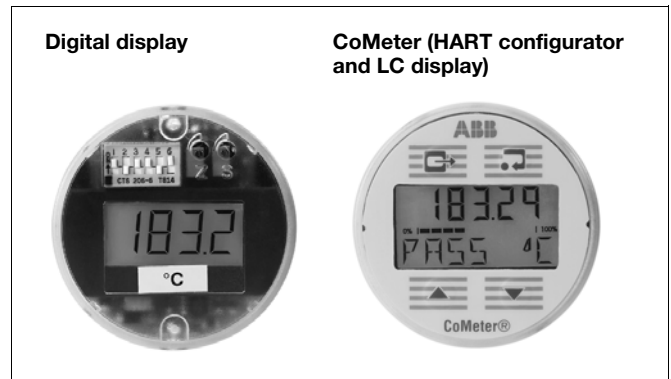
Process variable, analog and display value, description of measuring point, serial number, error behaviour, lower/upper measuring range limit

### Change function

Sensor type, sensor circuit, measuring range, damping, mains filter, error signalling

### Special function

Zero point adjustment, simulation of output signal, adjustment of output signal, wet calibration



Display	Digital display	CoMeter
Response time	0.5 s	1.3 s
Measuring error	± 0.1 %	± 0.15 %
Overvoltage or maximum current	150 % of input range	215 mA
EMC	EN 50082-2	
Temperature	-20...+70 °C	
Humidity	0...100 %, condensating permitted	

Mind limits of application

## Communication/parameterization

### Hand held terminal HHT

691HT, STT04, HHT275

### CoMeter

Hart configurator and LC display

### Device Management Tool

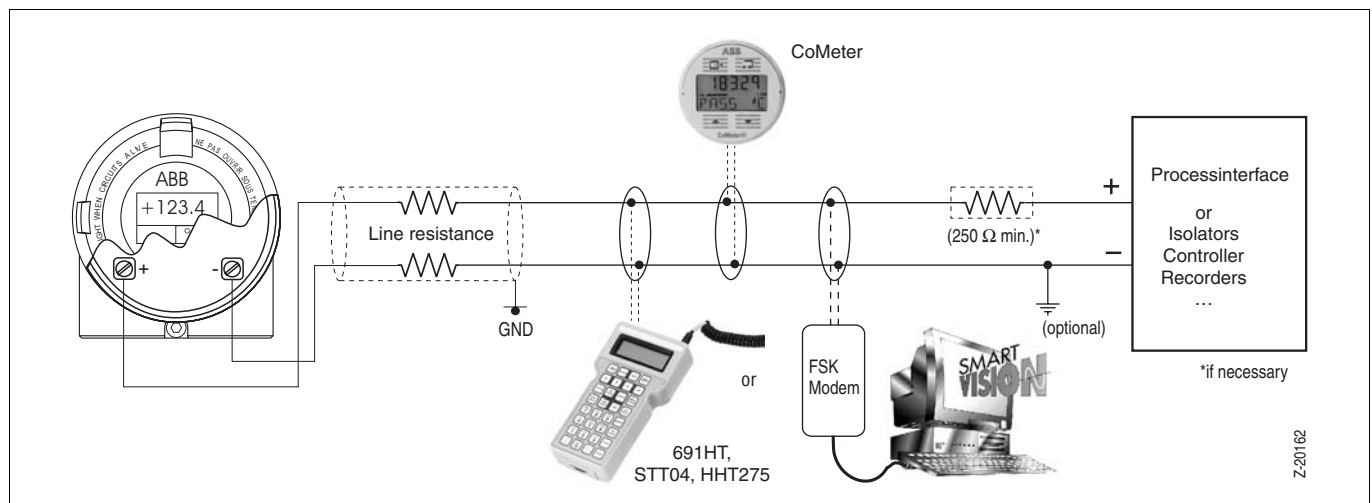
SV401 (SMART VISION)

### Parameter

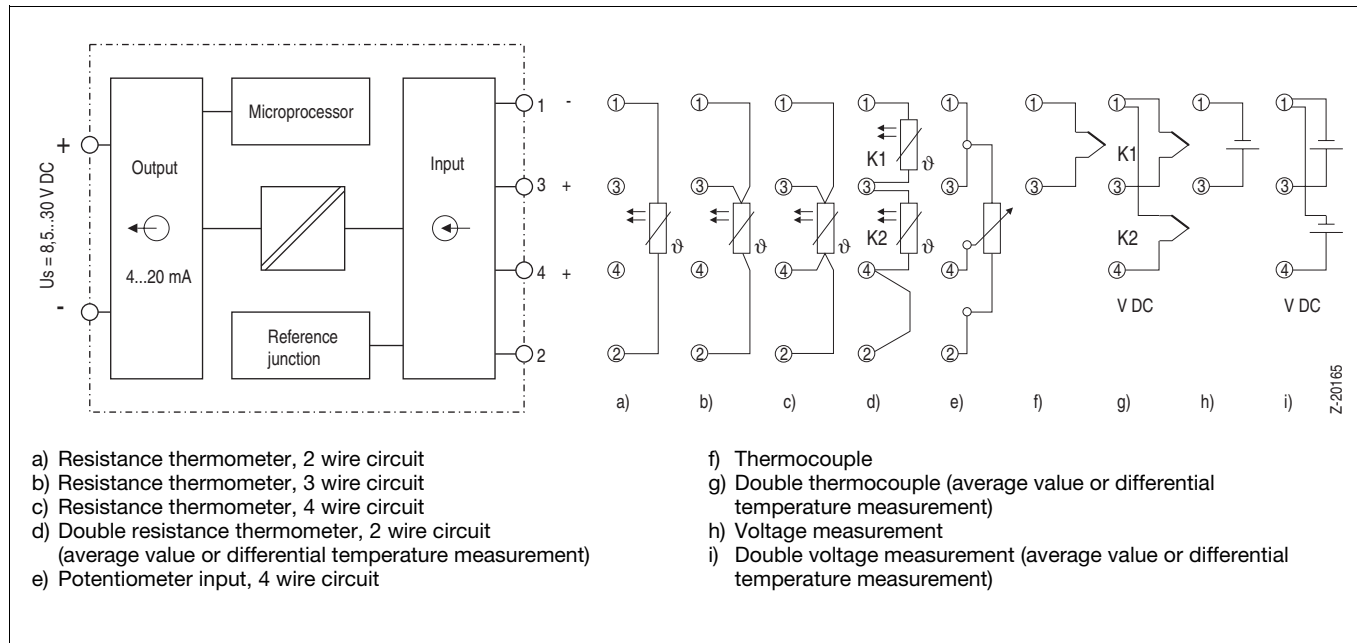
Sensor type, error signalling, measuring range, general characteristics (i. e. TAG number), damping, signal simulation of output

### Software interface

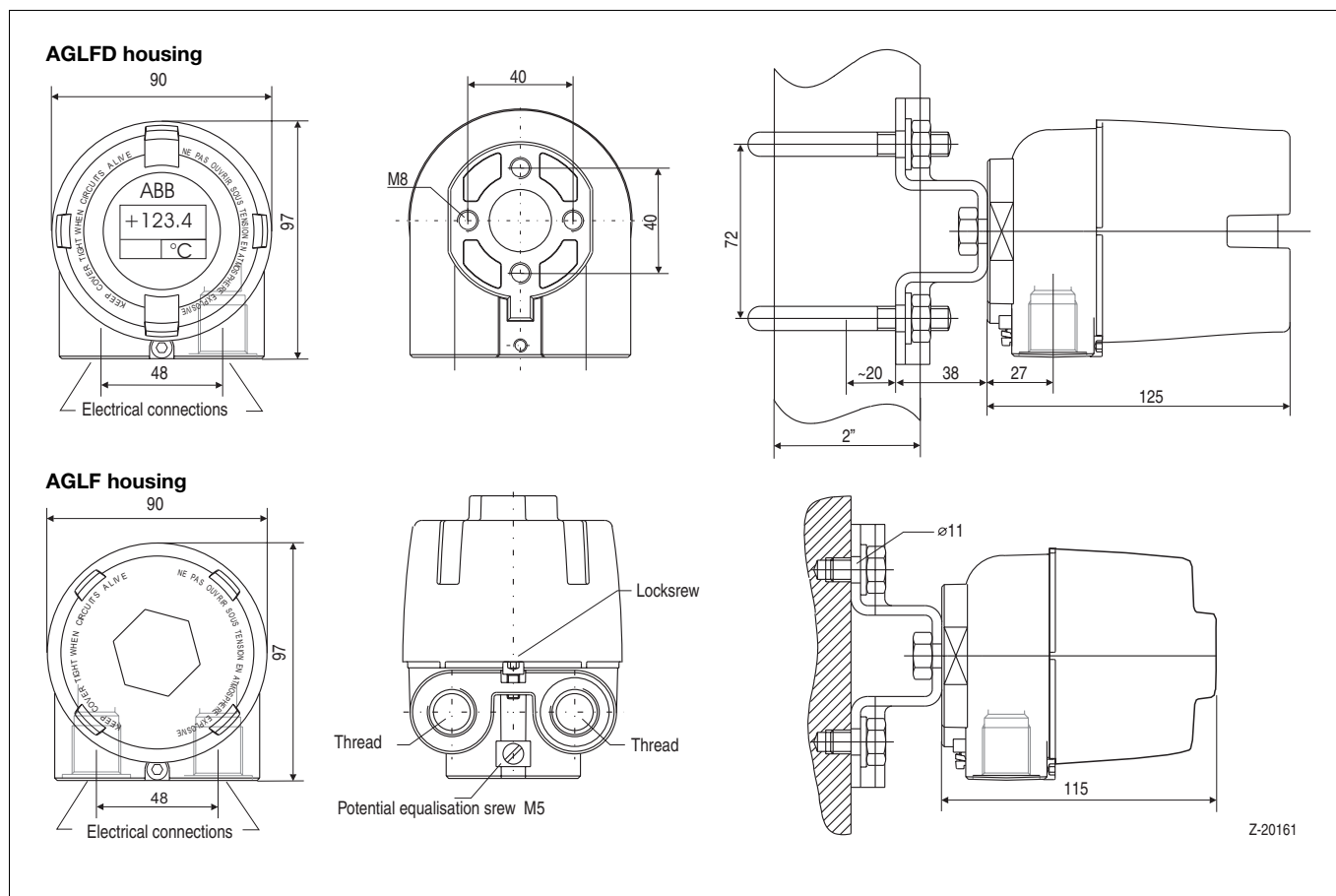
AMS, Cornerstone



**Connection diagram**



**Dimensional diagram** (Dimensions in mm)



**Ordering information**

		Catalog No.							
<b>TH202/TH202-Ex</b>		<b>V11523-</b>							
<b>TH202</b> (without expolsion protection)			1						
<b>With explosion protection:</b>									
<b>Type of protection: intrinsically safe</b>									
<b>TH202-Ex</b>	PTB / ATEX II 2 (1) G EEx [ia] ib IIC T6 (Zone 1)		5						
<b>TH202-Ex</b>	FM / CSA Class I, Div. 1/Div. 2, Groups A, B, C, D Class II, Div. 1/ Div. 2, Groups E, F, G Class III Class I, Zone 1, AEx [ia] ib IIC T6 Class I, Zone 1, Ex [ia] ib IIC T6		7						
<b>TH202-Ex N</b>	PTB / ATEX II 3 G EEx n A II T6 (Zone 2)		N						
<b>TH202-Ex N</b>	FM / CSA Class I, Div. 2, Groups A, B, C, D T6 nonincendive Class II, Div. 2, Groups F, G T6 Class III T6		M						
<b>Type of protection: Dust-explosionproof</b> (Zone 20)									
<b>TH202-Ex</b>	ATEX II 1 D EEx [ia] ib T 120 °C (intrinsically safe type)		S						
<b>TH202</b>	ATEX II 1 D T 135 °C (Non intrinsically safe type)		G						
<b>Type of protection: Pressure-proof enclosure / explosionproof</b>									
<b>TH202-Ex d</b>	PTB / ATEX II 2 G EEx d IIC T6		D						
<b>TH202-Ex d</b>	FM Class I, Div. 1/Div. 2, Groups A, B, C, D T6 Class II, Div. 1/Div. 2, Groups E, F, G T6 Class III T6		E						
<b>Display / construction</b>									
AGLF housing without display			N						
AGLFD housing with digital indicator			D						
AGLFD housing with Cometer			C						
<b>Material</b>	Aluminium		A						
	Stainless steel		E						
<b>Connections</b>									
with cable screw connection	2 pieces M20 x 1,5 cable screw connection <sup>1)</sup>		M						
	2 pieces pressure proof cable screw connection <sup>1)</sup>		D						
Thread	M20 x 1.5		1						
(without cable screw connection)	1/2" NPT		2						
	3/4" NPT		3						
	1/2" GK		4						
<b>Mounting field housing</b>									
without			1						
Wall mounting (carbon steel)			2						
Wall mounting (stainless steel)			3						
2" Pipe mounting (carbon steel)			4						
2" Pipe mounting (stainless steel)			5						
<b>Programming</b>									
Factory standard parameter: Pt 100, 4 wire circuit, damping off, direct action characteristic overranging at sensor or device error (22 mA)			S						
Customer-specified parameter definition			K						
<b>Certificates</b>	without		0						
	2 point calibration certificate		1						
	9 point calibration certificate		2						
<b>Accessories</b>									
		Catalog No.							
ABB FSK modem [EEx ib] IIC (parameter setting in the installation)		see Data Sheet 10/63-6.71 EN							
Device Management Tool SV401 (SMART VISION)		see Data Sheet 10/63-1.20 EN							
TH02/-102 /-202 driver for AMS software 1.4 (Rosemount) <sup>2)</sup>		7957771							

<sup>1)</sup> Metal screw connection EEx e or EEx d (cable-diameter 3.5...8.7 mm)

<sup>2)</sup> already integrated in AMS software version 5.0 or higher

**Notice: For a lokal programming on the desk can used as Hardware the universal FSK-Programming-Set (without Parasoft) (see Data Sheet 10/63-6.71 EN: ordering information) .**

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Printed in the Fed. Rep. of Germany (10.02)

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