

# Field mounted Temperature Transmitter TH202/TH202-Ex

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

## ■ 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: DSV4xx (SMART VISION)
- Hand held terminals:
  - DHH691 (691 HT), STT04, HC275, FC375
- CoMeter (HART configurator/LC display)



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

## 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/underranging value 3.6...4 mA  
OVERRANGING/OVERRANGING value 20...23.6 mA  
Default value (acc. to NE43) 3.6 or > 21 mA

#### Damping

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

### Input

#### Resistance

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

$n \cdot Pt\ 100/Ni\ 100$  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)
DIN 43710	Thermocouple type N	-200...+1350 °C (-328...+2462 °F)	60 °C (108 °F)
	Thermocouple type L	-200...+ 900 °C (- 76...+ 482 °F)	36 °C ( 65 °F)
IEC 751; JIS; SAMA <sup>1)</sup> 2, 3 and 4 wire	Thermocouple type U	-200...+ 600 °C (-328...+1112 °F)	40 °C ( 72 °F)
	Resistance thermometer Pt 100	-200...+ 850 °C (-328...+1562 °F)	15 °C ( 28 °F)
DIN 43760 2, 3 and 4 wire	Resistance thermometer Pt 1000	-200...+ 850 °C (-328...+1562 °F)	50 °C ( 90 °F)
	Resistance thermometer Ni 100	- 60...+ 250 °C (- 76...+ 482 °F)	8 °C ( 15 °F)
Resistance	Resistance thermometer Ni 500	- 60...+ 250 °C (- 76...+ 482 °F)	15 °C ( 28 °F)
	$\Omega$	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

**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**

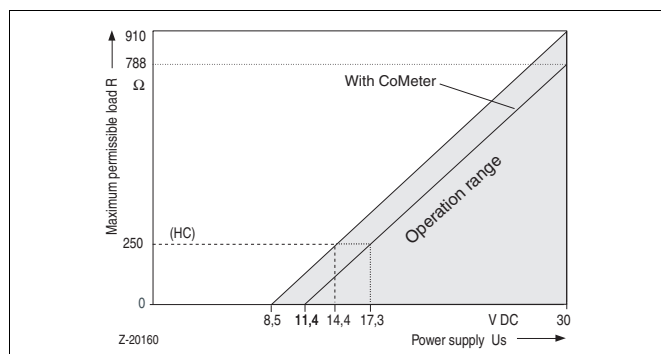
$U_{sd} = 2$  V DC

**CoMeter (HART configuor/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<sup>1)</sup>**

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 drift**

$\leq 0.02\%$  per annum (ambient temperature < 60 °C)  
 $\leq 0.05\%$  per annum (ambient temperature < 85 °C)

**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

<sup>1)</sup> In case of an input signal change > 0.25 K/s for Pt 100 or > 2.5 K/s for thermocouples a measured value plausibility check is performed.

**Characteristics at rated conditions**

According to IEC 770 (related to 25 °C)<sup>2)</sup>

Accuracy:		
General values		
Input type	Absolute accuracy	Temperature coefficient
All	$\leq \pm 0.05\%$ of span	$\leq \pm 0.005\%$ of span / °C
Basic values		
Input type	Absolute accuracy	Temperature coefficient
Pt 100 and Pt 1000	$\leq \pm 0.1\%$	$\leq \pm 0.005\%$ of progr. span / °C
Ni 100	$\leq \pm 0.1\%$	$\leq \pm 0.005\%$ of progr. span / °C
Lin. R: 500 Ω / 5 KΩ	$\leq \pm 0.040\ \Omega / \pm 0.080\ \Omega$	$\leq \pm 0.005\%$ of progr. span / °C
Volt: -125 mV...+125 mV / ....1250 mV	$\leq \pm 20\ \mu\text{V}$	$\leq \pm 0.005\%$ of progr. span / °C
TC type: E, J, K, L, N, T, U	$\leq \pm 0.5\%$	$\leq \pm 0.005\%$ of progr. span / °C
TC type: B, R, S, W3, W5	$\leq \pm 2.5\%$	$\leq \pm 0.005\%$ of progr. span / °C
EMC immunity influence	$\leq \pm 0.1\%$ of span	
Extended EMC immunity: NAMUR NE 21, A criterion, burst	$\leq \pm 1\%$ of span	

<sup>2)</sup> Percentage related to set measuring span, specified values corresponds to 3 σ (Gaussian normal distribution)

**Explosion protection**

**Intrinsically safe**

**Zone 1**

Marking ⊕ II 2 (1) 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	$I_i = 130 \text{ mA}$	$I_o = 1.5 \text{ mA}^{1)}$
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	$C_i = 15 \text{ nF}$	$C_o = 1.55 \mu\text{F}$

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

**Zone 2**

Marking ⊕ II 3 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 ⊕ II 1 D IP 65 T 135 °C and  
⊕ II 2(1) G EEx ia IIC T6  
 EC-Type-Examination certificate DMT 02 ATEX E 248

**Zone 20: Non intrinsically safe type**

Marking ⊕ II 1 D IP 65 T 135 °C<sup>2)</sup>  
 EC-Type-Examination certificate DMT 02 ATEX E 248

**Pressure-proof enclosure**

Marking ⊕ II 2 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>2)</sup> With this marking, a 63 mA fuse must be inserted in the 4...20 mA circuit before the transmitter

**Communication/parameterization**

**Hand held terminal HHT**

DHH691 (691 HT), STT04, HC275, FC375

**CoMeter**

Hart configurator and LC display

**Device Management Tool**

DSV4xx (SMART VISION)

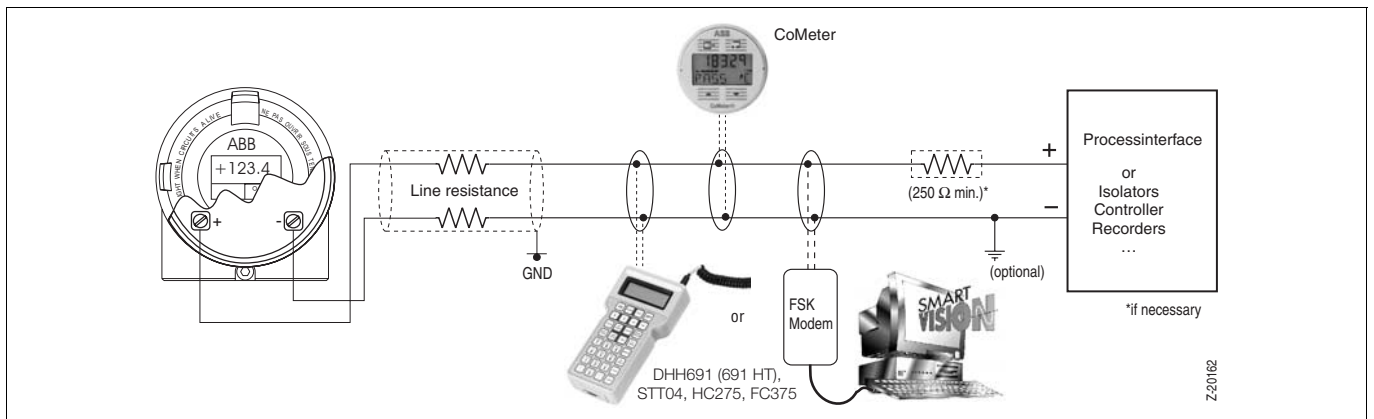
**FDT/DTM technology**

**Software connection**

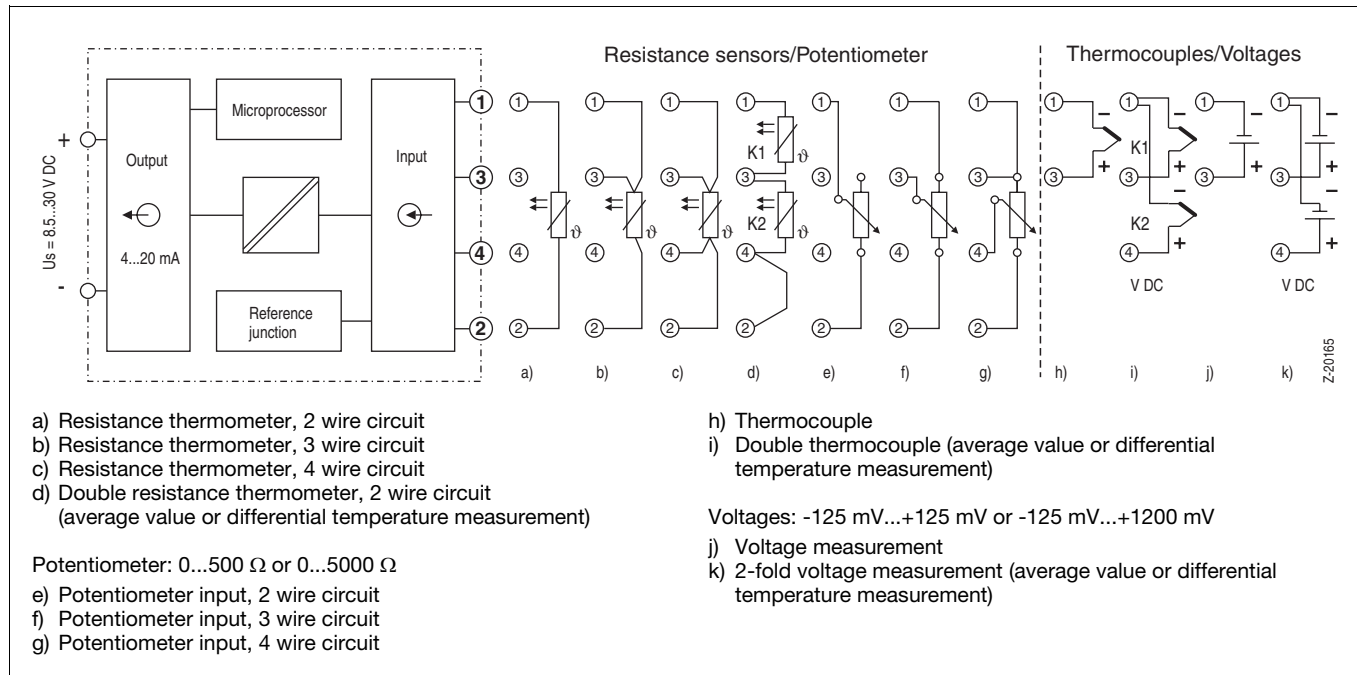
AMS (from version 5 without additional drivers)

**Parameter**

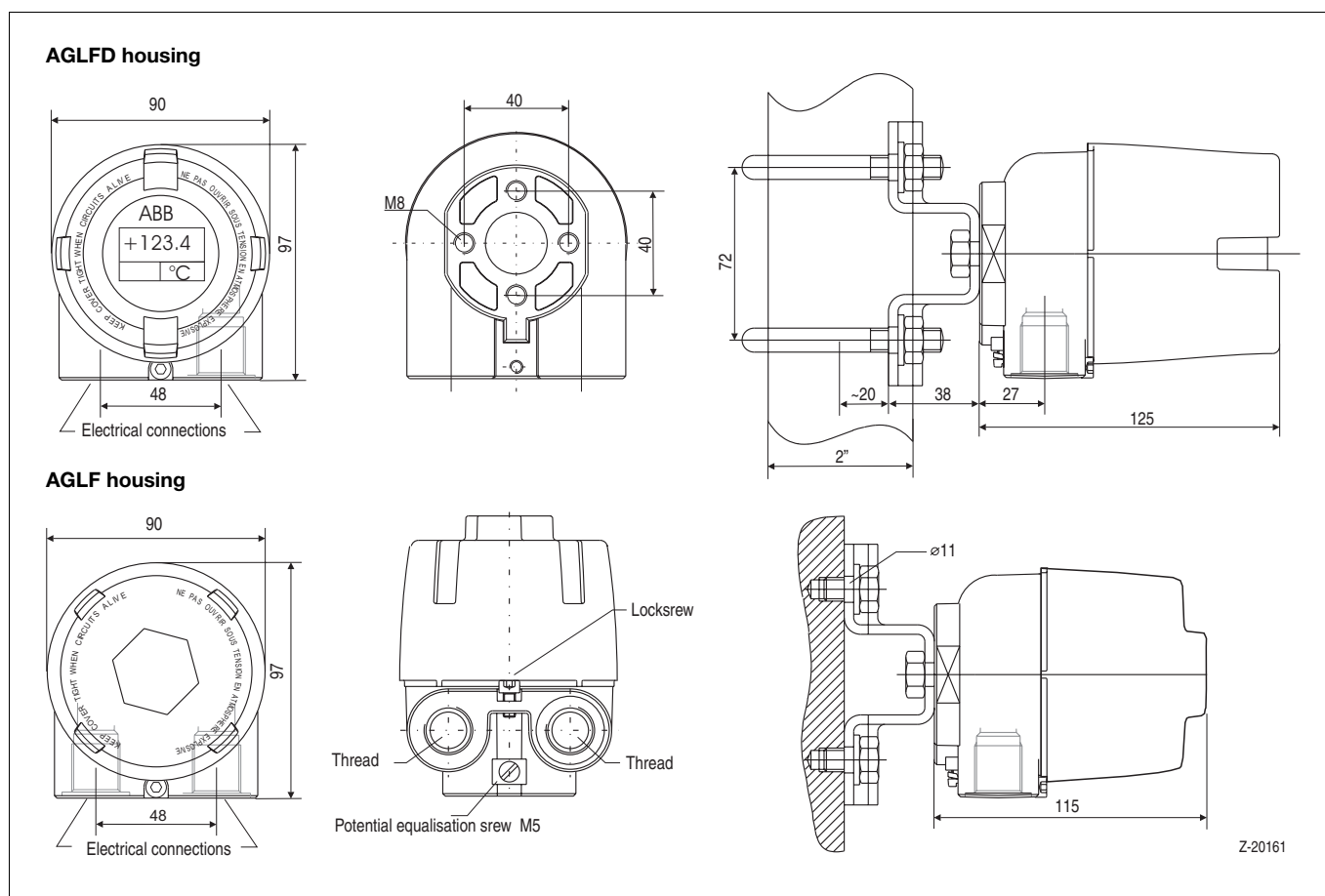
Sensor type, error signalling, measuring range, general characteristics (i. e. TAG number), damping, signal simulation of output



### Connection diagram



### Dimensional diagram (Dimensions in mm)



**Displays (option)**

**ProMeter**

- Programmable LC indicator
- loop-powered (4...20 mA)
- LC display: 5 digits (± 1999), digit height 7,6 mm, 7 segments
- sign and variable decimal place
- 10 segment bargraph (heading of measuring range)
- 7 digits alphanumeric characters 6 mm, 14 segments
- Programmable display variables:  
 process value, sensor value, loop current, percentage
- Password-protected programming acces

**CoMeter**

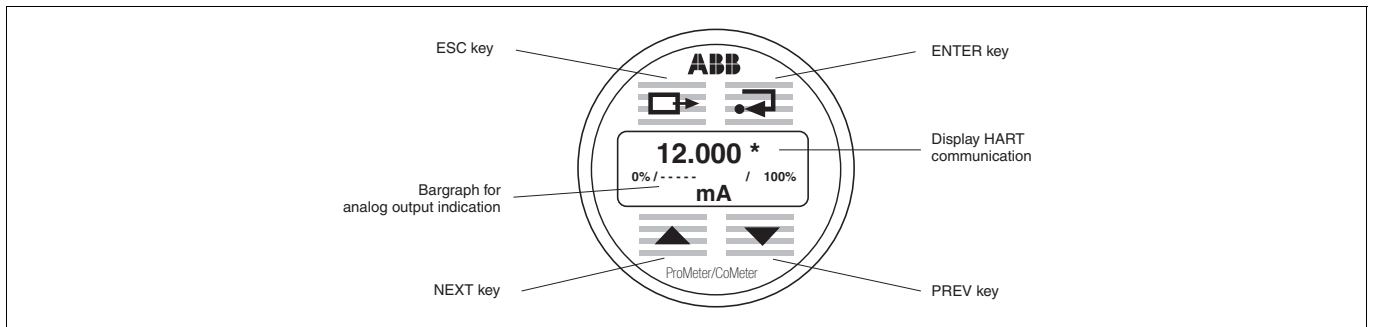
- Dual function (HART configurator and programmable LC display)
- Programmable LC indicator as ProMeter

- 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

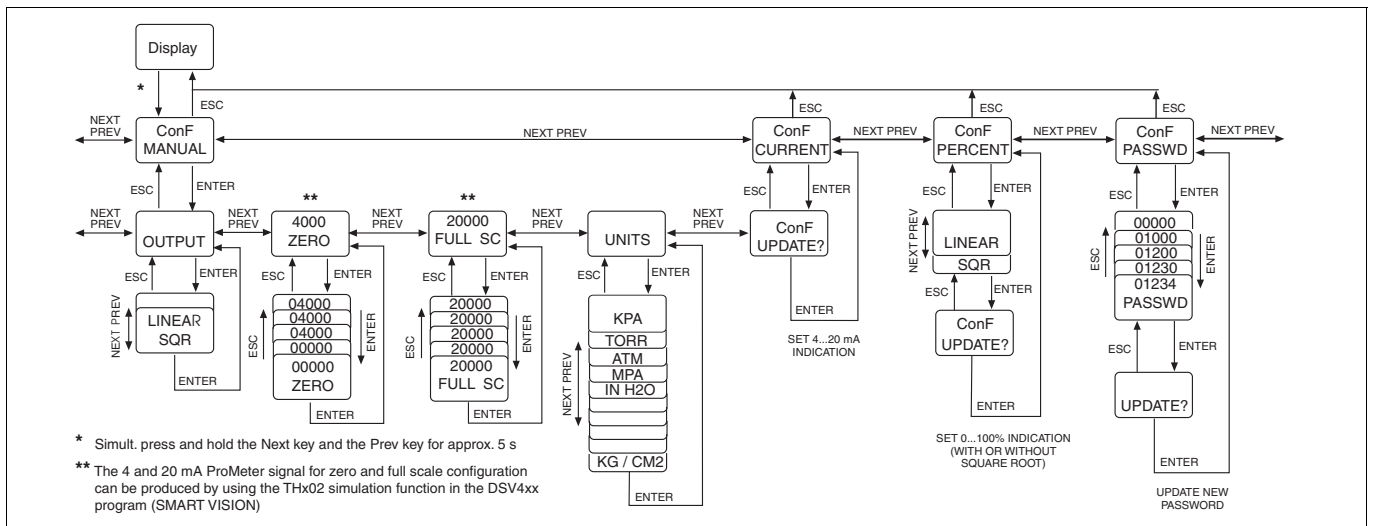
Display	ProMeter	CoMeter
Response time	1.3 s	
Measuring error	± 0.15 %	
Maximum current	130 mA	215 mA
EMC	EN 50082-2	
Temperature operating range	-20...+70 °C (-40...-20 °C without function)	
Humidity	0...100 %, condensating permitted	

**HART configurator**

- HART transmitter programming unit (all HART functions except for freely configurable characteristic curve and TAG Number)



**ProMeter configuration menu**



**Note:**

1. When using the ProMeter for process value or sensor value indication, its zero and full scale configuration must be in accordance with the transmitter temperature range or sensor range.
2. CoMeter configuration menu see 3KDE115040R4501

### Ordering information

Field mounted Temperature Transmitter		Variant digit No.	1-7	8	9	10	11	12			
TH202 / TH202-Ex		Catalog No.	V11523-								
<b>Explosion Protection</b>											
TH202	without explosion protection			1							
TH202	metrological approval Russia			2							
TH202	metrological approval Kazakhstan			3							
<b>Type of protection: intrinsically safe</b>											
TH202-Ex	PTB/ATEX	II 2 (1) G EEx [ia] ib IIC T6 (Zone 1)		5							
TH202-Ex	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							
TH202-Ex N	PTB/ATEX	II 3 G EEx n A II T6 (Zone 2)		N							
TH202-Ex N	FM	Class I, Div. 2, Groups A, B, C, D T6 nonincendive Class II, Div. 2, Groups F, G T6 Class III T6		M							
TH202-Ex	GOST-Ex + metrol. appr. Russia	0 Ex ia IIC T6 (Zone 0)		R							
TH202-Ex N	GOST-Ex + metrol. appr. Russia	2 Ex nA II T6 (Zone 2)		U							
TH202-Ex	GOST-Ex + metrol. appr. Kazakhstan	0 Ex ia IIC T6 (Zone 0)		V							
TH202-Ex	INMETRO	BR-Ex Ex [ia]ib IIC T6 (Zone 1)		I							
<b>Type of protection: Dust explosion proof (Zone 20)</b>											
TH202-Ex	DMT/ATEX	II 1 D IP 67 T 135 °C and II 2 (1) G EEx ia IIC T6 (intrinsically safe type)		S							
TH202-Ex D	DMT/ATEX	II 1 D IP 67 T 135 °C (Non intrinsically safe type)		G							
<b>Type of protection: Pressure proof enclosure / explosion proof</b>											
TH202-Ex d	PTB/ATEX	II 2 G EEx d IIC T6		D							
TH202-Ex d	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		E							
<b>Construction / Display</b>											
AGLF/AGSF housing without display					N						
AGLFD/AGSFD housing with digital display (ProMeter)					D						
AGLFD/AGSFD housing with digital display/HART configurator (CoMeter)					C						
<b>Material</b>											
Aluminum					A						
Stainless steel					E						
<b>Connections</b>											
with cable screw connection	2 pieces M20 x 1.5 cable screw connection		1)	M							
	2 pieces pressure proof cable screw connection		1)	D							
without cable screw connection	M20 x 1.5			1							
	1/2" NPT			2							
	3/4" NPT			3							
	1/2" GK			4							
<b>Mounting of Field Housing</b>											
without					1						
Wall mounting (stainless steel)					3						
2" Pipe mounting (stainless steel)					5						

Continued on next page

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

## Ordering information (continued)

Field mounted Temperature Transmitter TH202 / TH202-Ex	Variant digit No.	1-7	13	14	15	16	17				
	Catalog No.	V11523-									
<b>Programming</b>											
Factory standard parameters							S				
Pt 100, 4 wire circuit, damping off, direct action characteristic, overranging at sensor or device error (22 mA)											
Customer specific parameter settings (e. g. TAG Number)							K				
<b>Calibration Certificate</b>											
without							0				
2 point							1				
9 point							2				
<b>Certificates</b>											
without							0				
SIL2 - Declaration of conformity							2				
<b>Accessories</b>											
Surge / Lightning protection for M20 x 1.5 cable entry glands, Non Ex-Version NGV220-NO											
					see Data Sheet 10/63-6.15 EN						
Surge / Lightning protection for M20 x 1.5 cable entry glands, Ex-Version NGV220-Ex											
					see Data Sheet 10/63-6.15 EN						
ABB FSK modem [EEEx ib] IIC (parameter setting in the installation)											
					see Data Sheet 10/63-6.71 EN						
Device Management Tool DSV4xx (SMART VISION)											
					see Data Sheet 10/63-1.20 EN						

### Notes:

**Surge/lightning protection is permitted only for ATEX intrinsically safe devices which will be installed in zone 1 or 2. Measuring circuit of these devices with surge/lightning protection can also be used for zone 0 if allowed in the ATEX approval of this device type**

**For a local programming on the desk the universal FSK programming set can be used as Hardware (see Data Sheet 10/63-6.71 EN: ordering information)**

ABB has Sales & Customer Support expertise in over 100 countries worldwide.

[www.abb.com/instrumentation](http://www.abb.com/instrumentation)

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

Printed in the Fed. Rep. of Germany (10.2006)

© ABB 2006



#### ABB Ltd.

Salterbeck Trading Estate  
Workington, Cumbria, CA14 5DS  
UK  
Tel: +44(0)1946-830-611  
Fax: +44(0)1946-832-661

#### ABB Inc.

125 E. County Line Road  
Warminster, PA 18974  
USA  
Tel: +1 215-674-6000  
Fax: +1 215-674-7183

#### ABB Automation Products GmbH

Borsigstr. 2  
63755 Alzenau  
Germany  
Tel: +49 551 905-534  
Fax: +49 551 905-555  
CCC-support.deapr@de.abb.com