Data Sheet
10/11-8.69 EN

Field mounted Temperature Transmitter TF202/TF202-Ex

FOUNDATION Fieldbus H1,
Pt 100 (RTD), thermocouples,
1 or 2 independent channels

Industrial IT enabled

- **Input**
  - Resistance thermometer (2-, 3-, 4-wire circuit)
  - Thermocouples
  - Resistance remote signalling unit (0...500 Ω, 0...4000 Ω)
  - Voltages, mV calibrator (-120...+1200 mV)
- **Input functionality**
  - 1 or 2 channels
- **Electrcal isolation (I/O) between input/output**
- **Digital, long-term solid processing of measuring values**
- **Customer-specific linearization**
- **Continuous sensor and self-monitoring**
- **EMC acc. to EN 61326 and NAMUR recommendation NE 21**
- **Parameterization via DD and CFF file**
- **Output**
  - FOUNDATION Fieldbus H1 acc. to specification 1.4
  - Certified with Interoperbility Test Kit 4.1
  - IT Campaign Number: IT 015000
  - Bus design acc. to IEC 61158-2, 31.25 kbit/s
- **Reserve voltage protection and solid bus current limitation**
- **Approvals for explosion protection**
  - intrinsically safe ATEX
  - pressure proof enclosure/flameproof ATEX
  - pressure proof enclosure, explosionproof (acc. divisions) FM, CSA in preparation
  - Suitable for connecting to systems according to:
    - Entity model
    - FISCO model
- **Dust Ex ATEX**



FOUNDATION

ABB

Technical data

Device type

Standard Basic Device

Power supply (at transmitter terminals)

Supply voltage

U_s = 9...32 V DC

for explosion protection application

dependent on the Ex supply unit

Supply voltage, poling protected

Current consumption

Operating (quiescent): 10.5 mA

Fault current limiting: 15 mA

Output

Interface/Protocol

FOUNDATION Fieldbus H1 IEC 61158-2 / FF-H1Version 1.4
31.25 kbit/s
FF Registration: IT015000 Interoperbility Test Kit 4.1

Function blocks

tested function blocks operating time: 25 ms	2 x AI (s)
other function blocks	1 x RB (s) 1 x TB (c)

Input

Resistance

Resistance thermometer

n · Pt100 up to Pt1000 (IEC 751: n = 0.1; 0.5; 1; 2; 5; 10)
(JIS 1604: n = 0.1; 0.5; 1; 2; 10) (SAMA: n = 0.1; 0.5; 1)
Ni50, Ni100, Ni120, Ni1000, Cu10, Cu100

Resistance	Range	Accuracy
	0...500 Ω	2 mΩ
	0...4000 Ω	20 mΩ

Max. line resistance (R_W) per core

2-, 3-, 4-wire 5 Ω, 10 Ω, 50 Ω

Measuring current

300 µA

Sensor short-circuit

< 5 Ω

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

Measuring range 0... 500 Ω > 520 Ω
Measuring range 0...4000 Ω > 4200 Ω

Sensor wire break monitoring in accordance with NAMUR

Sensor wire break detection
3-wire resistance measurement > 35 Ω
4-wire resistance measurement > 3.7 kΩ

Input filter

50/60 Hz

Thermocouples/Voltages

Types

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

Voltages

Range	Accuracy
-120 mV...+1200 mV	10 µV
- 75 mV...+ 75 mV	2 µV

Sensor monitoring current

1 µA between the measuring cycles

Sensor wire break monitoring in accordance with NAMUR

Thermocouple measurement > 5 kΩ
Voltage measurement > 5 kΩ

Input filter

50/60 Hz

Internal reference junction

Pt100, via software switchable (no jumper necessary)

Input element		Measuring range	
Standard	**Sensor**		
IEC 584-1	Thermocouple type B	0...+1820 °C	(+ 32...+3308 °F)
	Thermocouple type E	-270...+1000 °C	(-454...+1832 °F)
	Thermocouple type J	-210...+1200 °C	(-346...+2192 °F)
	Thermocouple type K	-270...+1372 °C	(-454...+2502 °F)
	Thermocouple type R	- 50...+1768 °C	(- 58...+3215 °F)
	Thermocouple type S	- 50...+1768 °C	(- 58...+3215 °F)
	Thermocouple type T	-270...+ 400 °C	(-454...+ 752 °F)
	Thermocouple type N	-270...+1300 °C	(-454...+2372 °F)
W3, ASTME 998	Thermocouple type C	0...+2315 °C	(+ 32...+4200 °F)
	Thermocouple type D	0...+2315 °C	(+ 32...+4200 °F)
DIN 43710	Thermocouple type L	-200...+ 900 °C	(-328...+1652 °F)
	Thermocouple type U	-200...+ 600 °C	(-328...+1112 °F)
IEC 751; JIS; SAMA[1)] 2-, 3- and 4-wire	Resistance thermometer Pt100	-200...+ 850 °C	(-328...+1562 °F)
	Resistance thermometer Pt1000	-200...+ 850 °C	(-328...+1562 °F)
DIN 43760 2-, 3- and 4-wire (a = 0.00618)	Resistance thermometer Ni100	- 60...+ 250 °C	(- 76...+ 482 °F)
	Resistance thermometer Ni1000	- 60...+ 250 °C	(- 76...+ 482 °F)
Resistance, 2-, 3- and 4-wire	Ω	0...500 Ω / 0...4000 Ω	
Voltage	mV	-120 mV...+1200 mV - 75 mV...+ 75 mV	

[1)] IEC 751 a = 0.00385; JIS a = 0.003916; SAMA a = 0.003902

General characteristics

Response time
< 0.5 s

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

Electrical isolation (I/O)
1.5 kV AC

Long-term stability
≤ 0.1 % p. a. or 0.2 K p. a.

Environment conditions

Ambient temperature range
-40...+85 °C

Transport and storage temperature
-40...+100 °C

Relative humidity
< 100 % (100 % humidity with isolated terminals only)

Condensation
permitted

Mechanical construction

Dimensions
cf. dimensional drawing

Weight
1.25 kg (without accessories)

Housing material
Aluminium/stainless steel

Type of protection
IP 66 and IP 67

Color (Epoxy)
light grey (RAL 9002)

Elektrical connection

Thread (alternatively)
2 x M20 x 1.5; 2 x 1/2“ NPT; 2 x 3/4“ NPT; 2 x 1/2“ GK

or with cable screw connections
2 x M20 x 1.5 (metal)

Ground screw external/internal
6 mm^2 M5 / 2.5 mm^2 M4

Terminals, pluggable
2.5 mm^2, screw terminals (stainless steel screws)

Electromagnetic compatibility (EMC)
According to NAMUR NE 21 recommendation

With Pt100 sensor and thermocouple

Type of test	Degree	Standard
Burst to signal/ data lines	1 kV	EN 61000-4-4 EN 61326
Static disgarge contact discharge to: contact plate terminals	8 kV 6 kV	EN 61000-4-2
radiated field 80 MHz...2 GHz	10 V/m	EN 61000-4-3
coupling 150 kHz - 80 MHz	10 V	EN 61000-4-6

Influences

Influence of ambient temperature acc. to IEC 68-2-2

Pt 100		± 0.025 K/10 K
resistance measurement	0...500 W	± 10 mΩ/10 K
	0...4000 Ω	± 100 mΩ/10 K
Thermocouple e. g. type K		± 0.025 K/10 K
voltage measurement	-120 mV...+1200 mV	± 150 µV/10 K
	- 75 mV...+ 75 mV	± 10 µV/10 K

Characteristics at rated conditions
acc. to IEC 770 (related to 25 °C)

Measuring error incl. characteristic deviation

Pt 100		± 0.1 K
resistance measurement	0...500 Ω	± 40 mΩ
	0...4000 Ω	± 320 mΩ
Thermocouple e. g. type K		± 0.25 K
voltage measurement	-120 mV...+1200 mV	± 50 µV
	- 75 mV...+ 75 mV	± 10 µV
Additional influence of the internal ref. junction	Pt100 DIN IEC 751 Cl. B	

Parameterization / structure
Type of input (2 independent channels), measuring range, input filter, damping, alarm function, limit values, safing all data proof against mains failure

Standard parameter (factory settings)

Channel 1
Pt100, 4-wire circuit, 0…+100 °C
damping 0 s, unit °C

Channel 2
disabled

LC display (optional)
pluggable and rotating construction

Explosion protection

Intrinsically safe

EC-Type-Examination certificate
Transmitter: DMT 02 ATEX E 068 X
LC display: PTB 05 ATEX 2079 X

(Intrinsically safe Zone 0/1 and Mine)

Zone 0/1		II 1 G EEx ia IIC T6	
Zone 0	T1…T5	Ambient temperature:	-20…+60 °C
	T6	Ambient temperature:	-20…+50 °C
		with LC display:	-20…+44 °C
Zone 1	T1…T4	Ambient temperature:	-40…+85 °C
	T5	Ambient temperature:	-40…+65 °C
	T6	Ambient temperature:	-40…+50 °C
		with LC display:	-40…+56 °C
Mine		I M 1 EEx ia I	
		Ambient temperature:	-20…+60 °C

Supply circuit	**Supply and communi-cation circuit ia/ib IIC**	**Supply and communi-cation circuit ia/ib IIB**	**Measuring circuit ia/ib**
Max. voltage	$U_i \leq 24$ V	$U_i \leq 24$ V	$U_o = 5.5$ V
Short-circuit current	$I_i = 360$ mA	$I_i = 380$ mA	$I_o < 25$ mA
Max. power	$P_i = 2.52$ W	$P_i = 5.32$ W	$P_o < 35$ mW
Internal inductance	$L_i \leq 10$ µH	$L_i \leq 10$ µH	neglectable
Internal capacitance	$C_i = 5$ nF	$C_i = 5$ nF	$C_i = 60$ nF

The connection values of the LC display have no influence on the values indicated in the table.

Suitable for connceting to systems according to

– Entity model and
– FISCO model

Non sparking "nA" ATEX

EC-Type-Examination certificate BVS 03 E 171 X

Zone 2 (TF202-Ex N)		II 3 G EEx nA [nL] IIC T6	
	T1…T4	Ambient temperature:	-40…+85 °C
	T5	Ambient temperature:	-40…+65 °C
	T6	Ambient temperature:	-40…+50 °C

Dust Ex

EC-Type-Examination certificate DMT 02 ATEX E 248

(TF202-Ex D) II 1 D IP 65 T 135 °C

Pressure proof enclosure/Flameproof

EC-Type-Examination certificate PTB 99 ATEX 1144

(TF 202-Ex d)		II 2 G EEx d IIC T6	
	T1…T4	Ambient temperature:	-40…+85 °C
	T5	Ambient temperature:	-40…+65 °C
	T6	Ambient temperature:	-40…+50 °C

Canadian Standards Association and Factory Mutual

Intrinsically Safe

FM/CSA	Class I	Div. 1/Div. 2, Groups A, B, C, D T6
	Class II	Div. 1/Div. 2, Groups E, F, G
	Class III	Div. 1
FM	Class I	Zone 0, AEx ia IIC T6

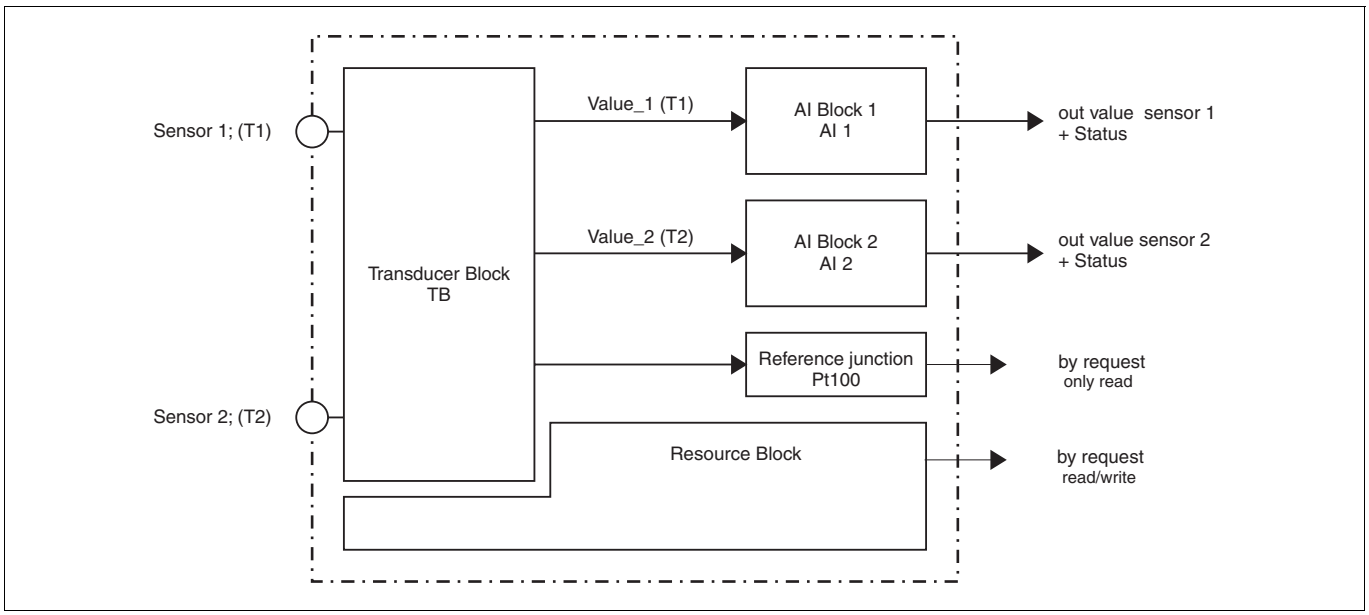
Nonincendive

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

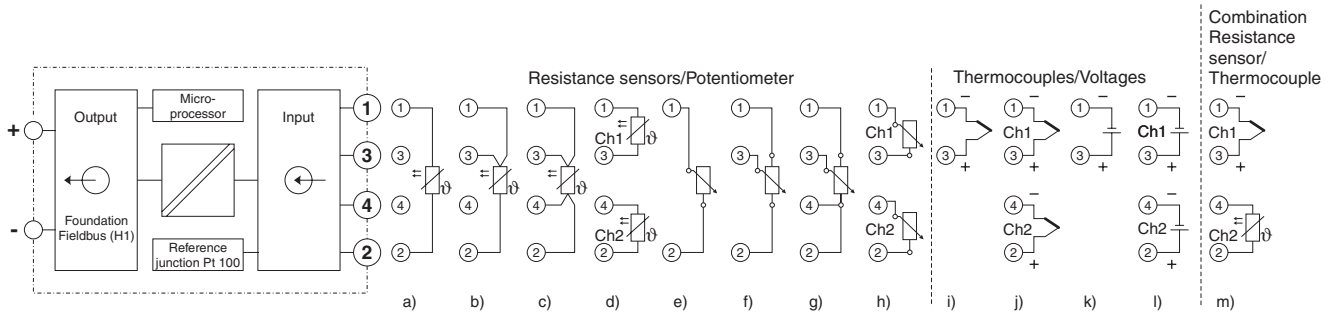
Explosionproof (FM and CSA approvals in preparation)

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

Block diagram



Connection diagram



a) Resistance thermometer, 2-wire circuit
b) Resistance thermometer, 3-wire circuit
c) Resistance thermometer, 4-wire circuit
d) Double resistance thermometer, 2-wire circuit

Potentiometer: 0...500 Ω or 0...4000 Ω

e) Potentiometer, 2-wire circuit
f) Potentiometer, 3-wire circuit
g) Potentiometer, 4-wire circuit
h) 2 Potentiometer, 2-wire circuit

i) Thermocouple
j) Double thermocouple

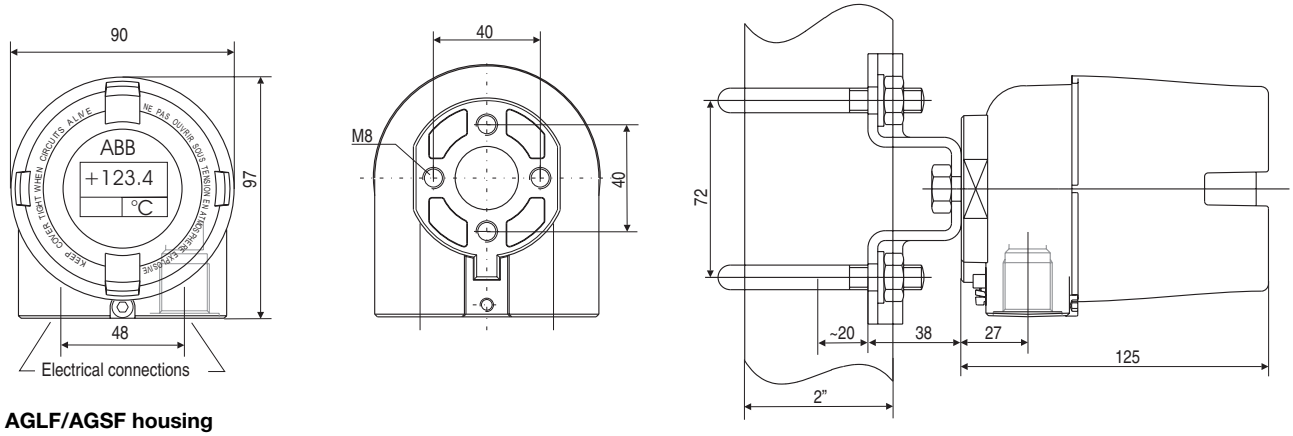
Voltages: -75 mV...+75 mV or -120 mV...+1200 mV

k) Voltage measurement
i) 2-fold voltage measurement

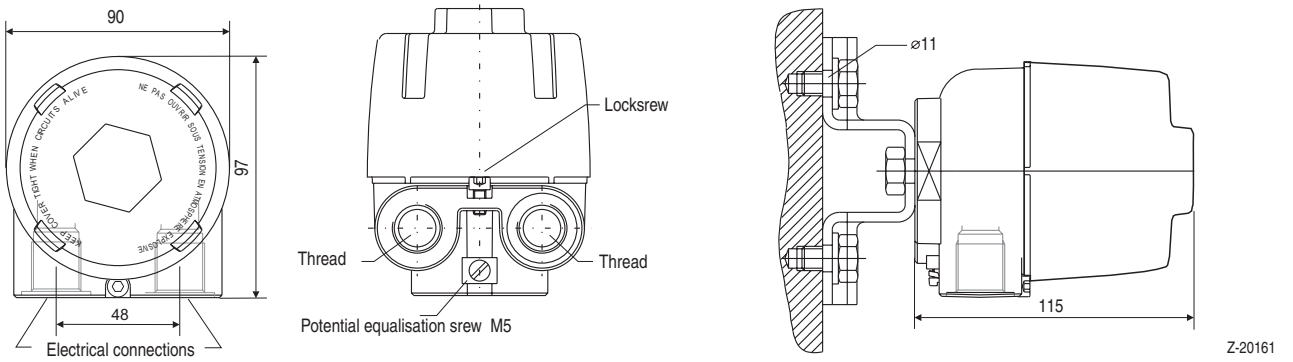
m) Combination thermocouple and resistance thermometer

Dimensional drawing (dimensions in mm)

AGLFD/AGSFD housing (with LC display)



AGLF/AGSF housing



Ordering information

Field mounted Temperature Transmitter	Variant digit No.	1-7	8-9	10	11	12	13			
TF202 / TF202-Ex	Catalog No.	**V11526-**								
Bus system										
FOUNDATION Fieldbus (H1) acc. to Fieldbus standard IEC-61158-2; 31.25 kbit/s										
Standard Basic Device			FR							
Explosion Protection										
TF202 without explosion protection				1						
Type of protection: Non Sparking "nA" ATEX										
TF202-Ex N DMT/ATEX **Zone 2:** II 3 G EEx nA [nL] IIC T6				N						
Type of protection: intrinsically safe ATEX										
TF202-Ex DMT/ATEX **Zone 0:** II 1 G EEx ia IIC T6				5						
Type of protection: intrinsically safe FM & CSA										
TF202-Ex FM **IS:** Class I, Div. 1/Div. 2, Groups A, B, C, D T6				S						
Class II, Div. 1/Div. 2, Groups E, F, G										
Class III, Div. 1										
Class I, Zone 0, AEx ia IIC T6										
nonincendive: Class I, Div. 2, Groups A, B, C, D T6										
Class II, Div. 2, Groups F, G										
Class III, Div. 2										
TF202-Ex CSA **IS:** Class I, Div. 1/Div. 2, Groups A, B, C, D T6				C						
Class II, Div. 1/Div. 2, Groups E, F, G										
Class III, Div. 1/Div. 2										
nonincendive: Class I, Div. 2, Groups A, B, C, D T6										
Class II, Div. 2, Groups E, F, G										
Class III, Div. 2										
Type of protection: intrinsically safe GOST										
TF202-Ex GOST **Zone 0:** 0ExiaIICT6X				R						
Type of protection: Pressure proof enclosure / explosion proof										
TF202-Ex d PTB/ATEX II 2 G EEx d IIC T6				D						
FM/CSA Class I, Div.1/Div.2, Groups A, B, C, D T6										
(in preparation) Class II, Div.1/Div.2, Groups E, F, G										
Class III, Div. 1										
Type of protection: intrinsically safe ATEX for mine applications										
TF202-Ex M DMT/ATEX I M1 EEx ia I				M						
Using the TF 202-Ex M for mining, the AGSF housing in stainless steel is required.										
Type of protection: Dust explosion proof ATEX										
TF202-Ex DMT/ATEX **Zone 20:** II 1 D IP 67 T 135 °C and				E						
II 1 G EEx ia IIC T6 (intrinsically safe type)										
TF202-Ex D DMT/ATEX **Zone 20:** II 1 D IP 67 T 135 °C (Non intrinsically safe type)				G						
Construction / Display										
AGLF/AGSF housing without display					N					
AGLFD/AGSFD housing with digital display			1)		D					
Material										
Aluminum AGLF housing						A				
Stainless steel AGSF housing (Required for TF202-Ex M with intrinsically safe for mine)						E				
Connections										
with cable screw connection 2 pieces M20 x 1.5 cable screw connection					2)		M			
2 pieces pressure proof cable screw connection					2)		D			
Thread 1/2" NPT with 7/8" bus plug							U			
Thread M20 with 7/8" bus plug							Y			
without cable screw connection M20 x 1.5							1			
1/2" NPT							2			
3/4" NPT							3			
1/2" GK							4			

Continued on next page

1) only with the explosion-protection types without explosion protection (Code 1) and explosion protection acc. ATEX (Codes N and 5) possible
2) Metal screw connection EEx e or EEx d (cable diameter 3.5 ... 8.7 mm)

Ordering information (continued)

Field mounted Temperature Transmitter	Variant digit No.	1 - 7	11	12	13	14	15			
TF202 / TF202-Ex	Catalog No.	**V11526-**								
Mounting of Field Housing										
without						1				
Wall mounting (stainless steel)						3				
2" Pipe mounting (stainless steel)						5				
Programming										
Factory standard parameters Pt 100, 4-wire circuit, 1 channel, 0 ... 100 °C, Damping off							S			
Customer specific parameter settings e. g. TAG Number (all parameters except user curve)							K			

Accessories

	Catalog No.			
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			
TF02 / TF202 Simulation plug for bus system FOUNDATION Fieldbus	7957851			

Note:
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

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