TF 202 / TF 202-Ex

Field mounted temperature transmitters, FOUNDATION Fieldbus (H1), Pt 100 (RTD), thermocouples, 1 or 2 independent channels

10/11-8.69 EN

- **Input**
  - Resistance thermometer (2, 3, 4 wire circuit)
  - Thermocouples
  - Resistance remote signalling unit (0...500 Ω, 0...4000 Ω)
  - Voltages, mV calibrator(-125...+1200 mV)
- **Input functionality**
  - 1 or 2 channels
- **Electrcal isolation (I/O)**
- **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) according to specification 1.4
  - Certified with Interoperbility Test Kit 4
  - IT Campaign Number: IT 015000
  - Bus design according to IEC 61158-2, 31.25 kbit/s
- **Backup LAS function**
- **Reserve voltage protection and solid bus current limitation**
- **Approvals for explosion protection**
  - intrinsically safe ATEX (FM, CSA in preparation)
  - 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

Technical data

Output

Digital output signal	FOUNDATION Fieldbus (H1)
Transmission rate (Baude rate)	31.25 kbit/s
Nominal current consumption	10.5 mA
Max.current in case of device failure	15 mA
Damping (programmable)	t_{63} = 0...10^{38} s

Input

Resistance (temperature linear)

Resistance thermometer	n · Pt100 bis 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 measurem.	> 35 Ω
4 wire resistance measurem.	> 3.7 kΩ

Input filter	50/60 Hz

Thermocouples

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

Voltages	Range	Accuracy
	-100 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	Pt 100, via software switchable (no jumper necessary)

Power supply (at transmitter terminals)

Supply voltage	U_s = 9...32 V DC
for explosion protection application	U_i = 9...24 V DC

Supply voltage, poling protected

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)] 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	–100 mV...+1200 mV – 75 mV...+ 75 mV	

[1)] IEC 751 a = 0.00385; JIS a = 0.003916; SAMA a = 0.003902 [2)] Edison Curve No. 7 for Ni120

Technical data

General characteristics

Rise time	< 0.5 s
Vibration resistance	
Vibration in operation	2g acc. to DIN IEC 68T.2-6
Resistance to shock	2g 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 % humidity with isolated terminals only)	< 100 %
condensation	permitted

Mechanical construction

Dimensions	cf. dimensional drawing
Weight	1.25 kg (without accessories)
Housing material	Aluminium/stainless steel
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 M 5 / 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

Pt 100		±0,25 K/10 K
resistance measurement	0...500 Ω	± 10 mΩ/10 K
	0...4000 Ω	±100 mΩ/10 K
Thermocouple e. g. Typ K		±0,25 K/10 K
voltage measurement	-100 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. Typ K		±0,25 K
voltage measurement	-100 mV...+1200 mV	±50 µV
	- 75 mV...+ 75 mV	±10 µV

Additional influence of the internal reference junction: Pt100 DIN IEC 751 Kl. B

Parameterization / structure

Type of input (2 independant 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

Technical data

Explosion protection

Intrinsically safe

Zone 0 ⟨Ex⟩ II 1 G EEx ia IIC T6

Zone 0 T1…T5 Ambient temperature: -20…+60°C
T6 Ambient temperature: -20…+50°C

Zone 1 T1…T4 Ambient temperature: -40…+85°C
T5 Ambient temperature: -40…+65°C
T6 Ambient temperature: -40…+50°C

Mine (TF 202-Ex M) ⟨Ex⟩ I M 1 EEx ia I
Ambient temperature: -20…+60°C

EC Certificate DMT 02 ATEX E068 X

Dust ⟨Ex⟩ II 1 D EEx [ia] ib (proposed)

Supply circuit	**Supply and Communica-tion-circuit ia/ib IIC**	**Supply and Communica-tion-circuit ia/ib IIB**	**Measuring circuit ia/ib**
Max. voltageg	$U_i \leq 24$ 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

Suitable for connceting to systems according to
- Entity model and
- FISCO model

Non sparking „nA“ ATEX

Zone 2 (TF 202-Ex N) ⟨Ex⟩ II 3 G EEx n A II T6 (in preparation)

T1…T4 Ambient temperature: -40…+85°C
T5 Ambient temperature: -40…+65°C
T6 Ambient temperature: -40…+50°C

Pressure proof enclosure/Flameproof

(TF 202-Ex d) ⟨Ex⟩ 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

EC Certificate PTB 99 ATEX 1144 X

Canadian Standards Association and Factory Mutual
(FM and CSA approvals in preparation)

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

FM Class I Zone 0, AEx ia
or Zone 0, AEx ib IIC

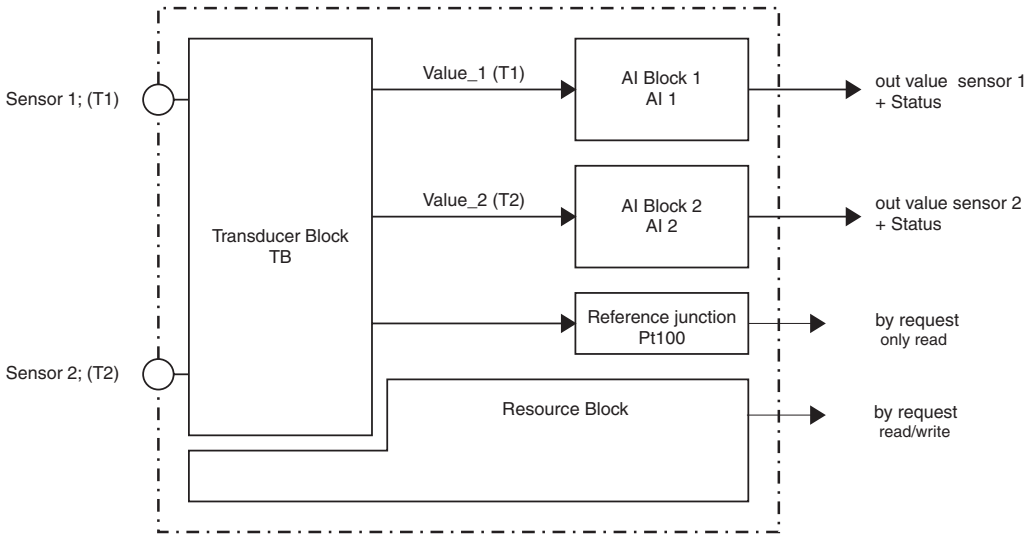
Nonincendive

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

Explosionproof

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

Block diagram



Ordering information

	Catalog No.								
TF 202 / TF 202-Ex	**V11526-**								
Bus system									
FOUNDATION Fieldbus (H1) acc. to Fieldbus standard IEC-61158-2; 31,25 kbit/s									
LAS functionality standard		FR							
LAS functionality among using in combination with FIO100 from ABB		FA							
Explosion protection									
TF 202 (without explosion protection)			1						
Type of protection: Non Sparking "nA" ATEX									
TF 202-Ex N DMT/ATEX **Zone 2:** II 3 G EEx n A II T6 **(Zone 2 in preparation)**			N						
Type of protection: intrinsically safe ATEX									
TF 202-Ex DMT/ATEX **Zone 0:** II 1 G EEx ia IIC T6			5						
Dust: II 1d EEx [ia] ib **(Dust certificate proposed)**									
Type of protection: intrinsically safe FM &CSA **(in preparation)** expected to be available in 3Q 2002									
TF 202-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									
Class I, Zone 0, AEx ia or AEx ib IIC									
nonincendive: Class I, Div. 2, Groups A, B, C, D T6									
Class II, Div. 2, Groups F, G									
Class III									
TF 202-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									
nonincendive: Class I, Div. 2, Groups A, B, C, D T6									
Class II, Div. 2, Groups F, G									
Class III									
Type of protection: pressure-proof enclosure / explosionproof									
TF 202-Ex d ATEX II 2 G EEx d IIC T6			D						
FM/CSA **(in preparation)** Class I, Div.1/Div.2, Groups A, B, C, D T6									
Class II, Div.1/Div.2, Groups E, F, G									
Class III									
Type of protection: intrinsically safe ATEX for mine applications									
TF202-Ex M ATEX I M1 EEx ia I			M						
Using the TF 202-Ex M for mining, the AGSF housing in stainless steel is required.									
Display / construction									
AGLF or AGSF housing without display				N					
Material									
Aluminium AGLF housing					A				
Stainless steel AGSF housing (Required for TF 202-Ex M with intrinsically safe for mine)					E				
Connections									
with cable screw connection 2 pieces M 20 x 1,5 cable screw connection[1)]						M			
2 pieces pressure proof cable screw connection[1)]						D			
M connector M12 (Turck) and M 20 x 1,5						T			
M connector M12 (Weidmüller) and M 20 x 1,5						W			
Thread M 20 x 1,5						1			
(without cable screw connection) 1/2" NPT						2			
3/4" NPT						3			
1/2" GK						4			
Mounting field housing									
without							1		
Wall mounting (carbon steel)							2		
Wall mounting (stainless steel)							3		
2" Pipe mounting (carbon steel)							4		
2" Pipe mounting (stainless steel)							5		
Programming									
Factory standard parameter Pt 100 4 wire circuit, 1 channel, 0…100°C, Damping off								S	
Customer-specified parameter definition (all parameter without user curve)								K	

Accessories

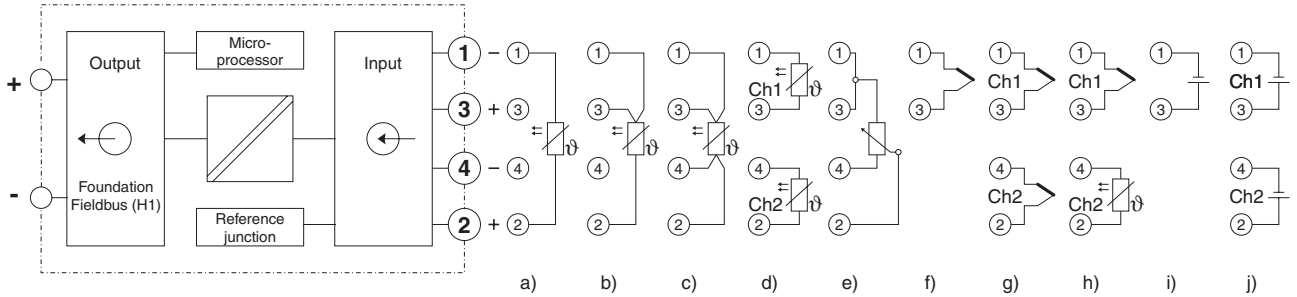
	Catalog No.		
Simulation plug for TF 02 / TF 202 with bus system FOUNDATION Fieldbus	7957851		

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

TF 202 / TF 202-Ex
Field mounted temperature transmitters, FOUNDATION Fieldbus (H1)

10/11-8.69 EN

Connection diagram



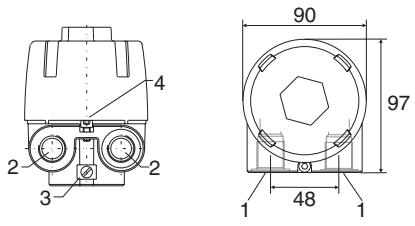
a) Resistance thermometer, 2 wire circuit
b) Resistance thermometer, 3 wire circuit
c) Resistance thermometer, 4 wire circuit
d) Double resistance thermometer, 2 wire circuit
e) Potentiometer input (4 wire circuit)

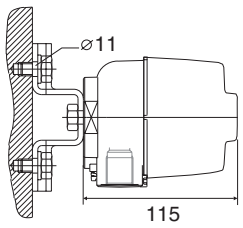
– Resistance measurement analogous zu to Resistance thermometer circuits a) to d)

f) Thermocouple
g) Double thermocouple
h) Combination thermocouple resistance thermometer (Combination Ch1/pin 1-3: RTD und Ch2/pin 2-4: TC also possible)
i) Voltage measurement
j) Double voltage measurement

– Voltage measurement and Resistance Measurement analogous to circuit h) also possible

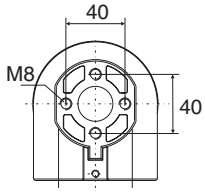
Dimensional diagram (dimensions in mm)

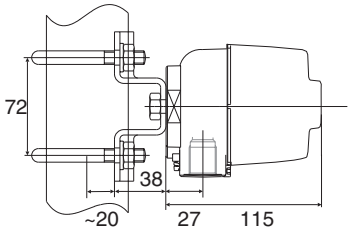




Wall mounting

1 electrical connections
2 thread
3 equipotential bonding screw M5
4 lock screw





Pipe mounting

ABB Automation Products GmbH
Borsigstr. 2
63755 Alzenau
Germany
Tel: +49 6023 92-0
Fax: +49 6023 92-3430
http://www.abb.com

Subject to technical changes.
Printed in the Fed. Rep. of Germany
Data Sheet 10/11-8.69 EN 05.02