

TF 02 / TF 02-Ex

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

10/11-8.25 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

■ Electrical 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 Interoperability 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)
- suitable for connecting to systems according to:
 - Entity model
 - FISCO model

ABB

Technical data

Output

Digital output signal	FOUNDATION Fieldbus (H1)
Transmission rate (Baud 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	

Standard	Input element		Measuring range	
		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 %
(100 % humidity with isolated terminals only)	
condensation	permitted

Mechanical construction

Dimensions	cf. dimensional drawing
Weight	61 g
Housing material	Polycarbonat
Color (Epoxy)	black (Non-Ex type) blue (Ex-type)
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 discharge 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		
voltage measurement	-100 mV...+1200 mV	±0,25 K/10 K
	- 75 mV...+ 75 mV	±150 μV/10 K
		± 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		
voltage measurement	-100 mV...+1200 mV	±0,25 K
	- 75 mV...+ 75 mV	±50 μV
		±10 μV

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

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** Ex I M 1 EEx ia I
Ambient temperature: -20...+60°C
- EC Certificate DMT 02 ATEX E068 X

Non sparking „nA“ ATEX

Zone 2 (TF 02-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

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

Intrinsically Safe

- FM** Class I Div. 1/Div. 2, Groups A, B, C, D T6
Class I Zone 0, AEx ia
or Zone 0, AEx ib IIC
- CSA** Class I Div. 1/Div. 2, Groups A, B, C, D T6

Supply circuit	Supply and Communication-circuit ia/ib IIC	Supply and Communication-circuit ia/ib IIB	Measuring circuit ia/ib
Max. voltage	$U_i \leq 24 \text{ V}$	$U_i \leq 24 \text{ V}$	$U_o = 5,5 \text{ V}$
Short-circuit current	$I_i = 360 \text{ mA}$	$I_i = 380 \text{ mA}$	$I_o < 25 \text{ mA}$
Max. power	$P_i = 2,52 \text{ W}$	$P_i = 5,32 \text{ W}$	$P_o < 35 \text{ mW}$
Internal inductance	$L_i \leq 10 \mu\text{H}$	$L_i \leq 10 \mu\text{H}$	neglectable
Internal capacitance	$C_i = 5 \text{ nF}$	$C_i = 5 \text{ nF}$	$C_i = 60 \text{ nF}$

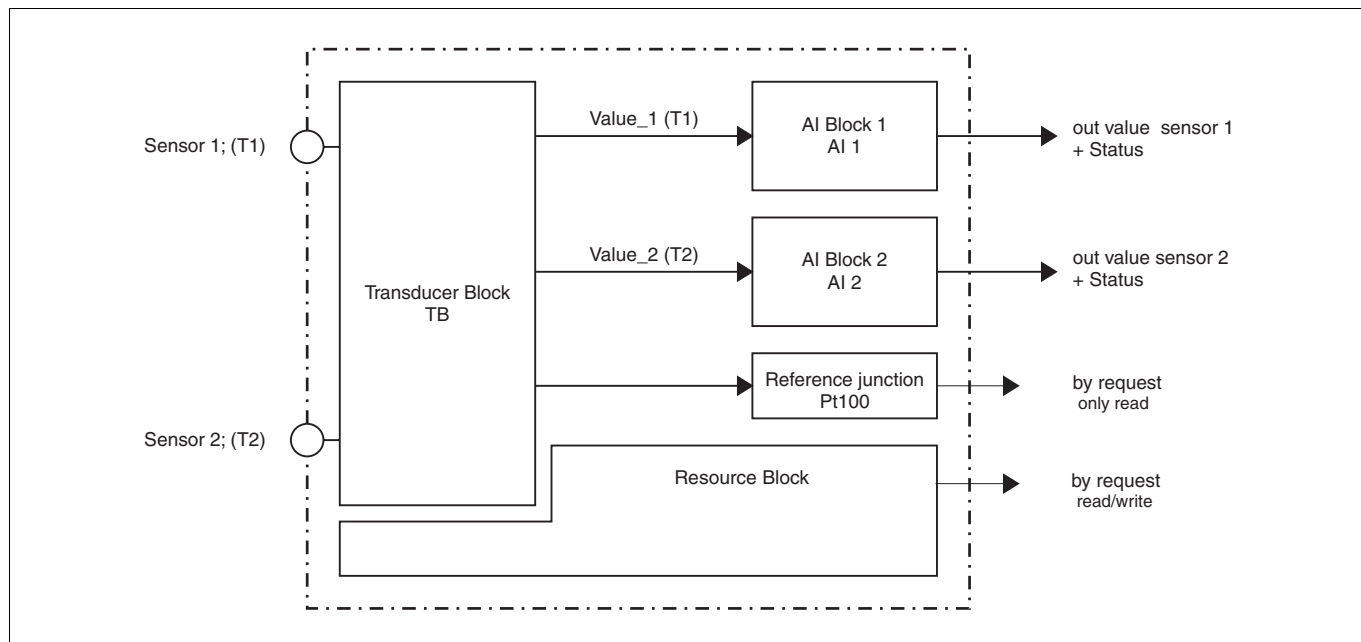
Nonincendive

- FM** Class I Div. 2, Groups A, B, C, D T6
- CSA** Class I Div. 2, Groups A, B, C, D T6

Suitable for connecting to systems according to

- Entity model and
- FISCO model

Block diagram

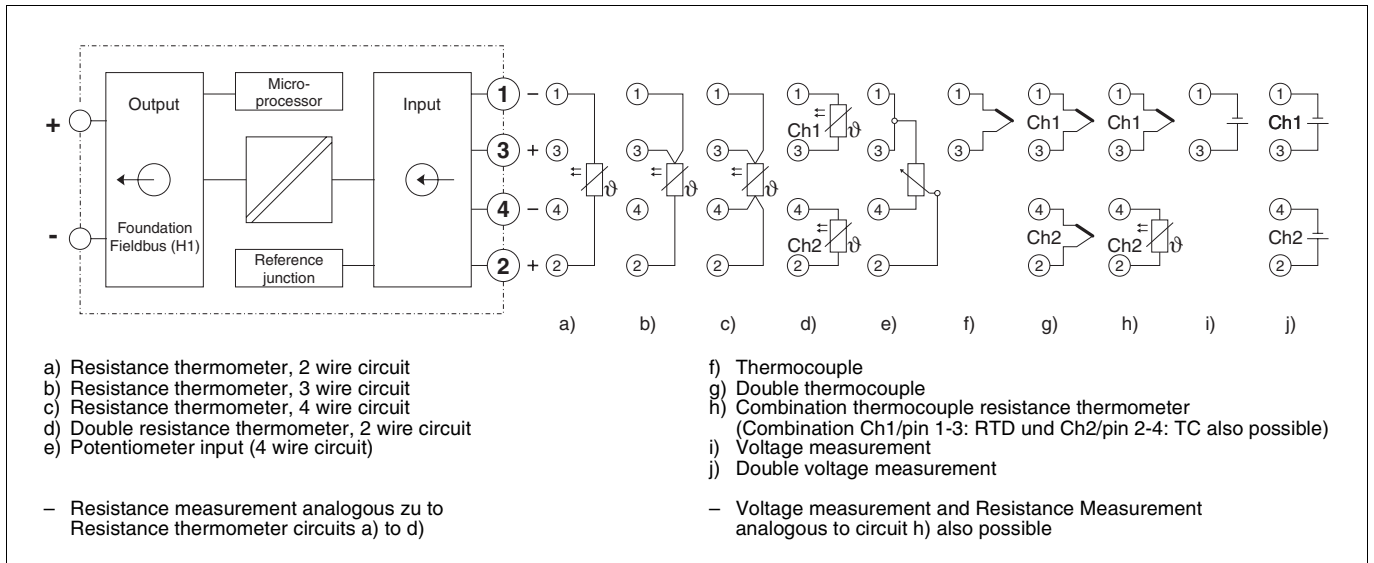


Ordering information		Catalog No.	
TF 02 / TF 02-Ex		V11527-	
Bus system FOUNDATION Fieldbus (H1) acc. to Fieldbus standard IEC-61158-2; 31,25 kbit/s LAS functionality standard LAS functionality among using in combination with FIO100 from ABB		FR FA	
Explosion protection TF 02 (without explosion protection) Type of protection: Non Sparking "nA" ATEX TF 02-Ex N DMT/ATEX Zone 2: II 3 G EEx n A II T6 (Zone 2 in preparation) Type of protection: intrinsically safe ATEX TF 02-Ex DMT/ATEX Zone 0: II 1 G EEx ia IIC T6 (+ Mine: I M 1 EEx ia I) Type of protection: intrinsically safe FM and CSA (in preparation) expected to be available in 3Q 2002 TF 02-Ex FM IS Class I, Div. 1/Div. 2, Groups A, B, C, D T6 Class I, Zone 0, AEx ia oder AEx ib IIC (Class II Groups E, F, G; Class III wenn eingebaut in BUZH- oder AGLH-Kopf) nonincendive , Class I, Div. 2, Groups A, B, C, D T6 (Class II Groups F, G; Class III if built in BUZH head or AGLH head) TF 02-Ex CSA IS Class I, Div. 1 and Div. 2, Groups A, B, C, D T6 (Class II Groups E, F, G; Class III if built in BUZH head or AGLH head) nonincendive , Class I, Div. 2, Groups A,B,C,D T6 (Class II Groups F, G; Class III if built in BUZH head or AGLH head)		1 N 5 7 9	
Construction Module Module with sensor connecting line Module with snap-on fixing Module built into connection head with sensor connecting line BUZH head BUSH head BUKH-Ex head AUZH head AUSH head AGLH-head ¹⁾ without display Attention: The sensor connecting lines correspond to the order for the type of sensor or its type of circuitry		3 1 4 R P N V U X	
Connections no head selected with cable screw connections M20 x 1,5 cable screw connection ²⁾ M connector M12 (Turck) and M 20 x 1,5 M connector M12 (Weidmüller) and M 20 x 1,5		O M T W	
Programming Factory standard parameter Pt 100 4 wire circuit, 1 channel, 0...100°C, Damping off Customer-specified parameter definition (all parameter without user curve)		0 1	
Accessories			
Simulation plug for TF 02 / TF 202 with bus system FOUNDATION Fieldbus		7957851	

¹⁾ protective pipe connection M24 x 1.5 (optional M20 x 1.5; 1/2" NPT; 3/4" NPT)

²⁾ Standard: Aluminium, metal-cable-srew-connection M20 x 1.5 EEx e (cable-diameter 3.5...8.7 mm);
(do not use for EEx d applications, see data sheet 10/10-3.28 EN for EEx d details)

Connection diagram



Dimensional diagram (dimensions in mm)

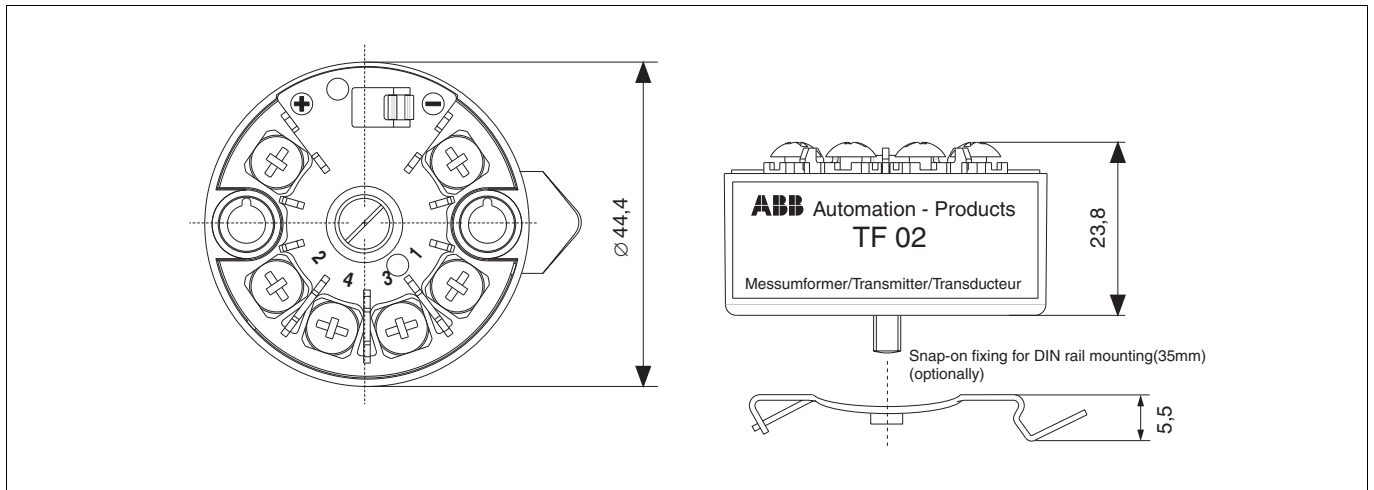


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