

Head mounted Temperature Transmitter TF02/TF02-Ex

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

IndustrialIT
enabled™

■ 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) between input and 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 Interoperability Test Kit 4.1
- IT Campaign Number: IT 015000
- Bus design acc. 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
- Suitable for connecting to systems according to:
 - Entity model
 - FISCO model



ABB

Technical data

Device type

Link Master Device

Link Active Scheduler (LAS) capability implemented

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 Interoperability Test Kit 4.1

Function blocks

tested function blocks 2 x AI (s)

operating time: 25 ms

other function blocks 1 x RB (s)

1 x TB (c)

Input

Resistance (temperature linear)

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

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

Pt100, via software switchable (no jumper necessary)

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

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

61 g

Housing material

Polycarbonat

Color (Epoxy)

black (Non-Ex type), blue (Ex-type)

Terminals, pluggable

2.5 mm², 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 resistance measurement 0...500 W ± 0.025 K/10 K
 0...4000 Ω ± 10 mΩ/10 K
 ± 100 mΩ/10 K

Thermocouple e. g. type K voltage measurement -100 mV...+1200 mV ± 0.025 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 resistance measurement 0...500 Ω ± 0.1 K
 0...4000 Ω ± 40 mΩ
 ± 320 mΩ

Thermocouple e. g. type K voltage measurement -100 mV...+1200 mV ± 0.25 K
 - 75 mV...+ 75 mV ± 50 μV
 ± 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

Explosion protection

Intrinsically safe

EC Certificate DMT 02 ATEX E 068 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
Zone 1	T1...T4	Ambient temperature: -40...+85 °C
	T5	Ambient temperature: -40...+65 °C
	T6	Ambient temperature: -40...+50 °C
Mine		I M 1 EEx ia I Ambient temperature: -20...+60 °C

Non sparking “nA” ATEX

EC Certificate BVS 03 E 171 X

Zone 2 (TF02-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

Canadian Standards Association and Factory Mutual

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

Nonincendive

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

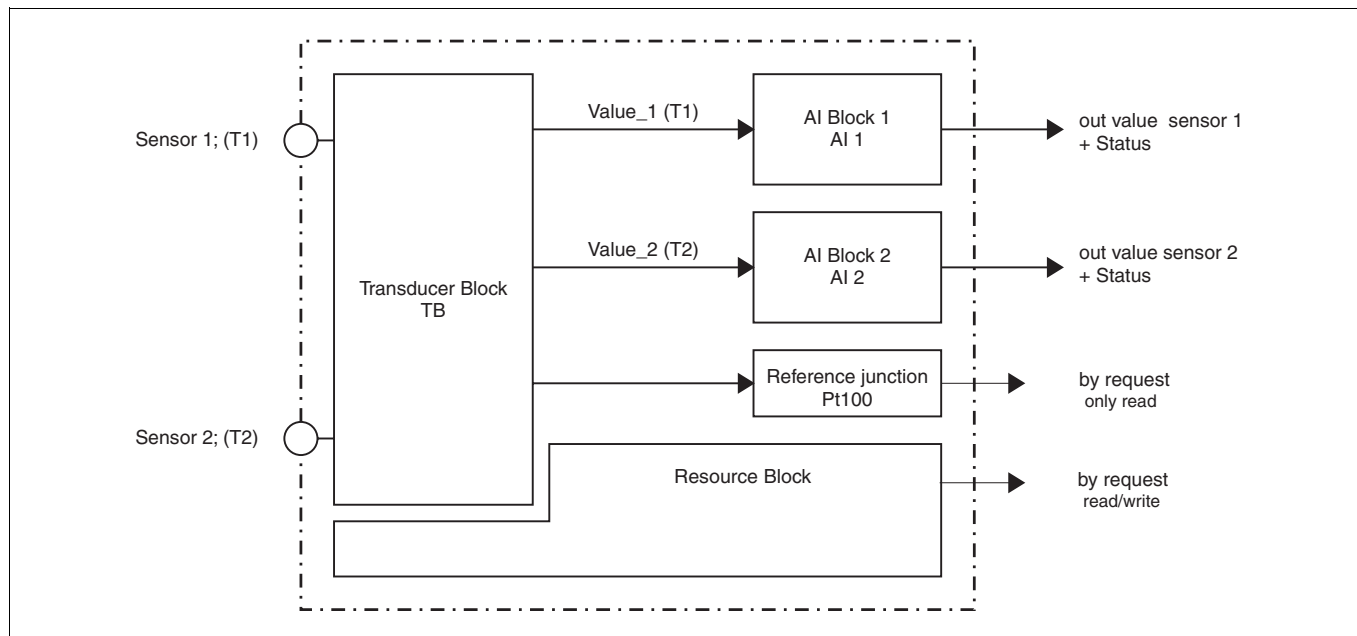
CSA Class I Div. 2, Groups A, B, C, D T6

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	$C_i = 5 \text{ nF}$	$C_i = 5 \text{ nF}$	$C_i = 60 \text{ nF}$

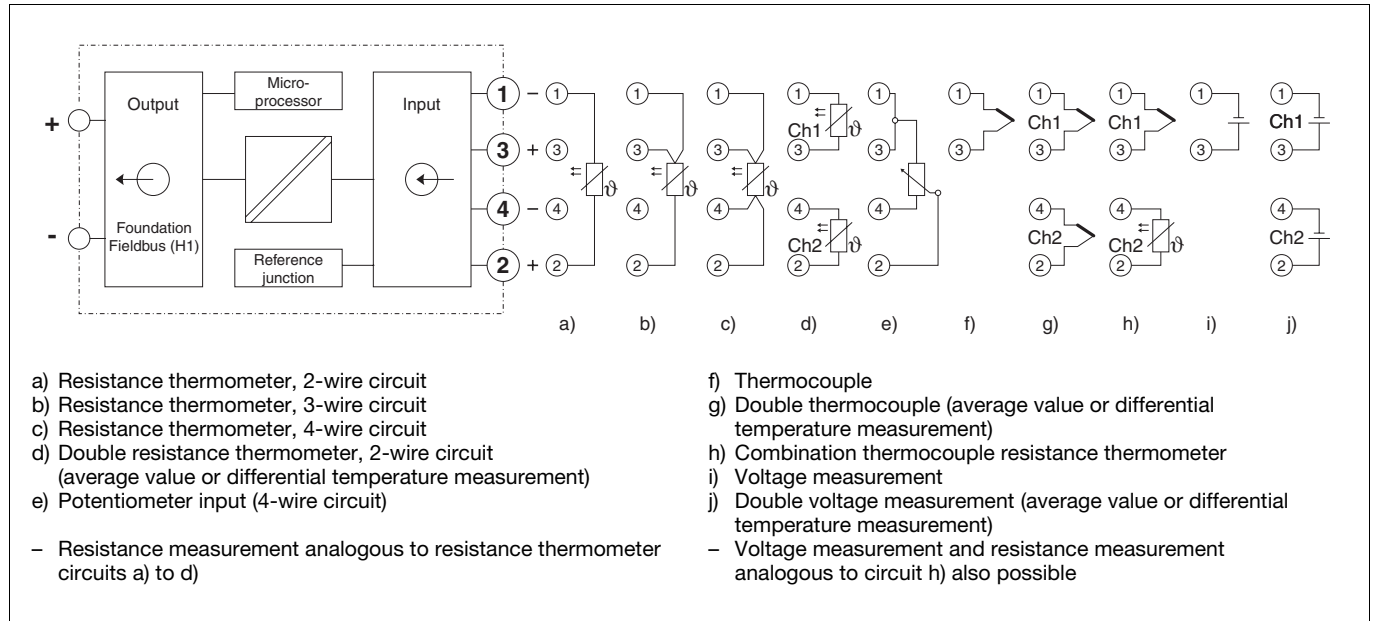
Suitable for connecting to systems according to

- Entity model and
- FISCO model

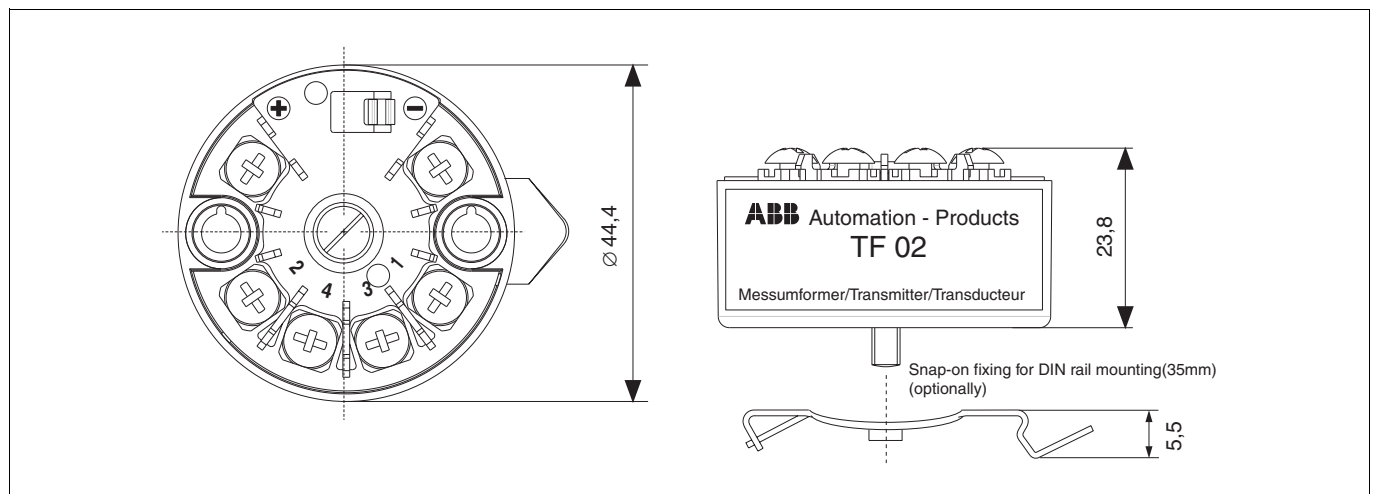
Block diagram



Connection diagram



Dimensional drawing (dimensions in mm)



Ordering information

		Catalog No.					
TF02/TF02-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 or LD 800HSE from ABB		FR					
		FA					
Explosion protection							
TF02 (without explosion protection)			1				
Type of protection: Non Sparking "nA" ATEX							
TF02-Ex N DMT/ATEX Zone 2: II 3 G EEx nA [nL] IIC T6				N			
Type of protection: intrinsically safe ATEX							
TF02-Ex DMT/ATEX Zone 0: II 1 G EEx ia IIC T6 (+ Mine: I M 1 EEx ia I)			5				
Type of protection: intrinsically safe FM and CSA							
TF02-Ex FM IS Class I, Div. 1/Div. 2, Groups A, B, C, D T6			7				
Class I, Zone 0, AEx ia oder AEx ib IIC							
(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)							
TF02-Ex CSA IS Class I, Div. 1 and Div. 2, Groups A, B, C, D T6			9				
(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)							
Construction							
Module			3				
Module with sensor connecting line			1				
Module with snap-on fixing			4				
Module built into connection head with sensor connecting line							
BUZH head				R			
BUSH head				P			
BUKH-Ex head				N			
AUZH head				V			
AUSH head				U			
AGLH-head without display		1)		X			
Attention: The sensor connecting lines correspond to the order for the type of sensor or its type of circuitry							
Connections							
no head selected				0			
with cable screw connections M20 x 1,5 cable screw connection		2)		M			
Programming							
Factory standard parameter Pt 100, 4-wire circuit, 1 channel, 0...100°C, Damping off				0			
Customer-specified parameter definition (all parameter without user curve)				1			
Accessories							
		Catalog No.					
Simulation plug for TF02/TF202 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: Aluminum, metal-cable-screw-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)

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