

# TF 212 / TF 212-Ex

Field mounted  
temperature transmitter,  
Profibus PA,  
Pt 100 (RTD), thermocouples,  
1 or 2 independent channels

10/11-8.70 EN



## ■ Input

- Resistance thermometer (2, 3, 4-wire method)
- Thermocouples
- Resistor remote signalling units (0...400 Ω, 0...4000 Ω)
- Voltages, mV (-15...115 mV)

## ■ Output

- Profibus PA profile 3.0, Type A and B
- Bus design acc. to IEC 1158-2, 31.25 kbit/s

## ■ Electrical isolation (I/O)

## ■ Digital, long-term solid processing of measuring values

## ■ Customer-specific linearization

## ■ Continuous sensor and self-monitoring

## ■ Explosion protection approvals:

- intrinsically safe **Ex** EEx ia IIC T6
- Flameproof version (acc. to zones): ATEX, FM, CSA
- Explosion Proof version (acc. to divisions): FM, CSA

## ■ Input functionality

- 1 or 2 channels
- Redundancy
- Average value
- Differential value

## ■ EMC acc. to EN 50082-2 and NAMUR recommendation NE 21

## ■ Reverse voltage protection and solid bus current limitation

## ■ Parameterization

- Local parameterization allows quick commissioning
- PC software SMART Vision
- FDT/DTM technology

## ■ 5 years warranty

**Technical data**

**Output** 

Digital output signal	Profibus PA profile 3.0 type A and B
Transmission rate (Baud rate)	31.25 kbit/s
Max. current consumption	11.8 mA
Max. current in case of device failure	15 mA
Damping (programmable)	$t_{63} = 0...60$ s

**Input** 

**Resistance (temperature linear)**

Resistance thermometer	Pt 50...Pt 100...Pt 1000
Resistance	0...400 $\Omega$ / 0...4000 $\Omega$
Line resistance ( $R_w$ ) per core	< 5 $\Omega$
Measuring current	200 $\mu$ A
Sensor short-circuit	< 5 $\Omega$ (for RTD)
Sensor break	> 5 M $\Omega$

**Thermocouples**

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

	-15 mV...115 mV
Sensor monitoring current	200 $\mu$ A
Input resistance	5 M $\Omega$
Input filter	50/60 Hz
Internal reference junction	Pt 100, programmable

**Power supply** (at transmitter terminals)

Supply voltage, poling protected  $U_s = 9...32$  V DC  
for explosion protection application  $U_i = ...17.5$  V DC

1) Percentage related to measuring range

**General characteristics**

Rise time	< 0.1...1.25 s
Vibration resistance	
Vibration in operation	2 g acc. to DIN IEC 68 part 2-6
Electrical isolation (I/O)	1.5 kV

**Environment conditions**

Ambient temperature range	-40...85 $^{\circ}$ C
Transport and storage temperature	-40...100 $^{\circ}$ C
Relative humidity	< 100 % (100 % humidity with isolated terminals only)
Condensation	permitted

**Characteristics at rated conditions<sup>1)</sup>**

(acc. to IEC 770, related to 25  $^{\circ}$ C)

Measuring error incl. characteristic deviation	
Pt 100/resistance measurement	typ. < 0.2 % min. < 0.2 K
Thermocouple/mV	typ. < 20 $\mu$ V
Additional influence of the internal reference junction	Pt 100 DIN IEC 751 cl. A

**Mechanical construction**

Housing material	aluminium / stainless steel
Type of protection	IP 66 / IP 67
Color (EPOXY)	light grey (RAL 9002)
Weight	1.25 kg (without accessories)

**Electrical connection**

Thread	M20 x 1.5 1/2" NPT, 3/4" NPT, 1/2" GK
Cable glands (cable $\varnothing$ 3,5...8,7 mm)	cf. ordering information
Ground screw ext./int.	6 mm <sup>2</sup> M5 / 2.5 mm <sup>2</sup> M4
Terminals	2.5 mm <sup>2</sup> , screw terminals

Input element		Measuring range	Basis Measuring error
Standard	Sensor		
IEC 584-1	Thermocouple Type B	400...1820 $^{\circ}$ C (+752...+3308 $^{\circ}$ F)	0.8 K
	Thermocouple Type E	-100...1000 $^{\circ}$ C (-148... 1832 $^{\circ}$ F)	0.2 K
	Thermocouple Type J	-100...1200 $^{\circ}$ C (-148...+2192 $^{\circ}$ F)	0.2 K
	Thermocouple Type K	180...1370 $^{\circ}$ C (-356...+2498 $^{\circ}$ F)	0.2 K
	Thermocouple Type R	- 50...1760 $^{\circ}$ C (- 58...+3200 $^{\circ}$ F)	0.8 K
	Thermocouple Type S	- 50...1760 $^{\circ}$ C (- 58...+3200 $^{\circ}$ F)	0.8 K
	Thermocouple Type T	-200... 400 $^{\circ}$ C (-328...+ 752 $^{\circ}$ F)	0.2 K
	Thermocouple Type N	-180...1300 $^{\circ}$ C (-292...+2372 $^{\circ}$ F)	0.2 K
DIN 43710	Thermocouple Type L	-100... 900 $^{\circ}$ C (-148...+1652 $^{\circ}$ F)	0.2 K
	Thermocouple Type U	-200... 600 $^{\circ}$ C (-328...+1112 $^{\circ}$ F)	0.2 K
W3, ASTM E 998	Thermocouple Type C	0...+ 2300 $^{\circ}$ C ( 32...+4172 $^{\circ}$ F)	0.8 K
	Thermocouple Type D	0...+ 2300 $^{\circ}$ C ( 32...+4172 $^{\circ}$ F)	0.8 K
IEC 751 <sup>1)</sup> / DIN 43760 ( $\alpha = 0,00618$ )	Resistance thermometer Pt 100	-200... 850 $^{\circ}$ C (-328...+1562 $^{\circ}$ F)	0.4 K
	Resistance thermometer Pt 1000	-200... 850 $^{\circ}$ C (-328...+1562 $^{\circ}$ F)	0.4 K
	Resistance thermometer Pt 100/ PT 1000	-100... 250 $^{\circ}$ C (-148...+ 482 $^{\circ}$ F)	0.2 K
DIN 43760 ( $\alpha = 0,00618$ )	Resistance thermometer Ni 100	- 60... 250 $^{\circ}$ C (- 76...+ 482 $^{\circ}$ F)	0.2 K
Resistance	2, 3, 4-wire	0...400 $\Omega$ , 0...4000 $\Omega$	0.10 %
Voltage		-15 mV...115 mV	20 $\mu$ V

**Technical data**

**Explosion protection**

(in preparation)

**Intrinsically safe (ATEX)**       $\text{Ex}$  II 2G EEx ia IIC T6  
 EC certificate                      ZELM 99 ATEX 0021  
 Temperature class T6/T4        < 60°C/85 °C

The data is based on the FISCO model written by PTB

Supply circuit	Output [ib]	Input [ia]
Max. voltage	$U_i < 17.5 \text{ V}$	$U_o < 5.9 \text{ V}$
Short-circuit current	$I_i < 360 \text{ mA}$	$I_o < 17 \text{ mA}$
Max. power	$P_i < 2.52 \text{ W}$	$P_o < 26 \text{ mW}$
Internal inductance	$L_i = 17 \mu\text{H}$	neglectable
Internal capacitance	$C_i = 1.2 \text{ nF}$	neglectable

Pressure-proof encapsulated

**ATEX (PTB)**                               $\text{Ex}$  II 2G EEx d IIC T6  
 Temperature class                      T6/T5/T4 <50 °C/65 °C/85 °C

Flameproof certification acc. to zones

FM:    Class I, Zone 1, AEx d IIC T6  
 CSA:                                        Class I, Zone 1, Ex d IIC T6

Explosion Proof certification (FM/CSA) acc. to divisions

Class I, Div. 1/Div. 2, Group A, B, C, D, T6  
 Class II, Div. 1/Div. 2, Group E, F, G, T5  
 Class III, T6

**Electromagnetic compatibility (EMC)**

Acc. to NAMUR NE 21 recommendation

With Pt 100 sensor

Type of test	Degree	IEC
burst to signal/ data lines	2 kV	EN 61000-4-4 EN 50082-2
static discharge contact discharge to: contact plate terminals for supply	8 kV 6 kV	EN 61000-4-2
radiated field 80 MHz...1 GHz	10 V/m	EN 61000-4-3
coupling 150 kHz - 80 MHz	10 V	EN 61000-4-6

**Parameterization/structure**

Type of inputs (2 independent channels), measuring range, input filter, damping, alarm function, limit values, compensation for ageing, saving of all data proof against mains failure.

**Standard parameters (factory setting)**

Channel 1

Pt 100, 3-wire circuit  
 L-L/L/H/H-H-Lim = -200 °C/200 °C/850 °C/850 °C  
 damping 0 s, unit °C

Channel 2

Pt 100, 3-wire circuit  
 L-L/L/H/H-H-Lim = -200 °C/200 °C/850 °C/850 °C  
 damping 0 s, unit °C

Default address

126  
 126

**Process Control System (PCS)**

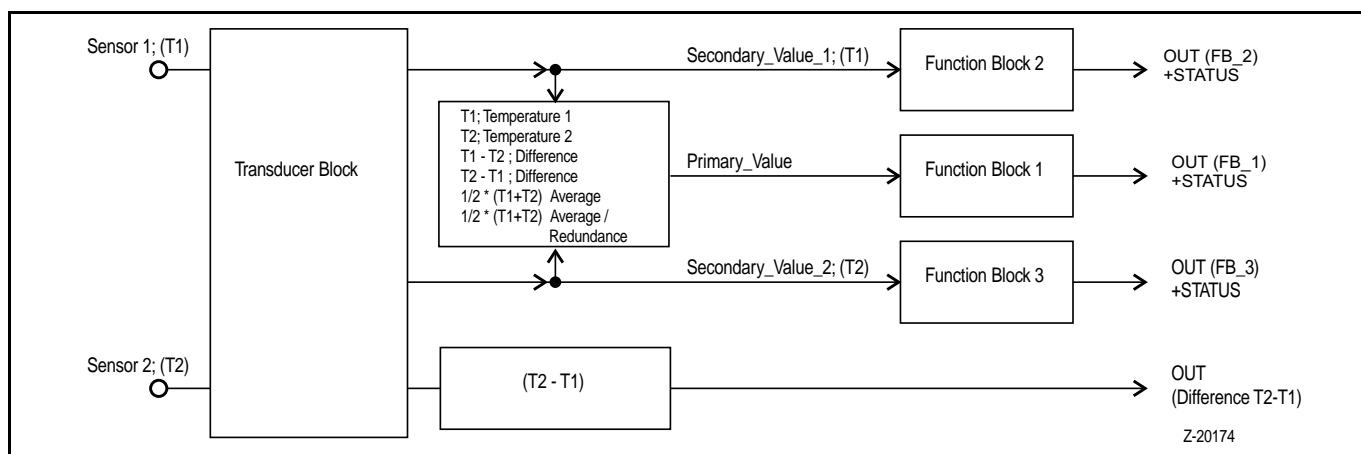
A cyclic communication can be established with all Profibus compatible PCSs. Acyclic communication requires a Master CI. 2, the communication may be established on the basis of the generic slave (to be in acc. to Profile 3.0; only standard parameters) or a TF 12 specific driver. Those drivers are available for following PCSs:

- Freelance 2000 (template)
- Symphony (Composer via DTM)
- Siemens (via PDM; in preparation)

**Configuration-tools**

- SMART VISION 4.0 (DTM; acyclic service)
- Quick Set (local parameter setting)

**Block diagram**



**Configurator/Display (optional)**

**Quickset** (in preparation)

Local configurator and display.

The unit is supplied by the associated transmitter. The integrated rotation mechanism of the QuickSet allows the adjustment to the individual application. The intrinsically safe approval of QuickSet (in preparation) allows the hot plugging of the unit within the hazardous zones.

**Parameter setting**

- Bus address
- Connected sensor

**Copy functionality**

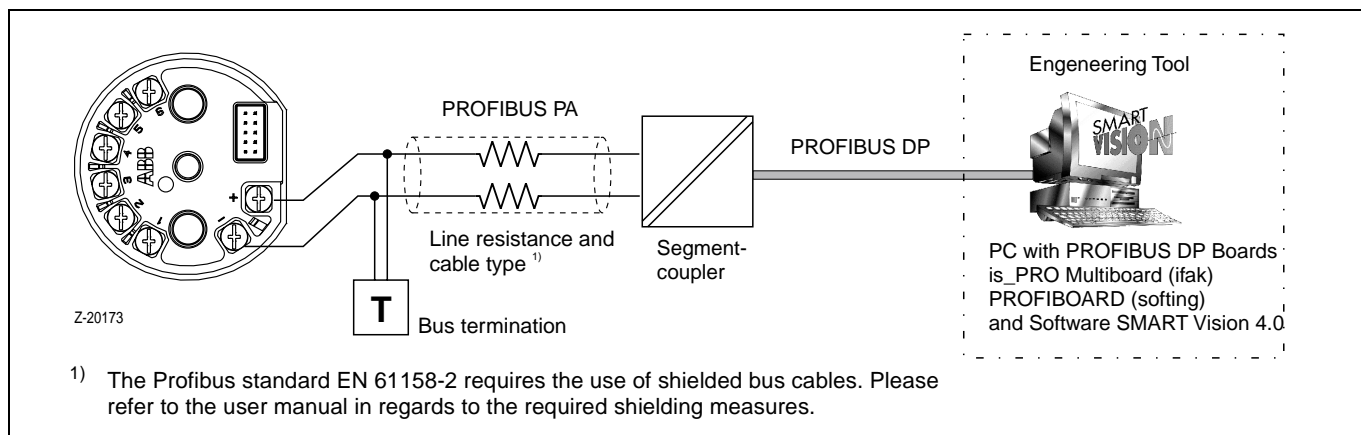
The QuickSet provides an EEPROM for the backup of the configuration data of the associated transmitter. Furthermore, the configuration data can be copied to other transmitter (only TF 12).

**Display functionality**

- Indication of process variables
- Indication of diagnostic messages
- Indication of the current configuration
- Trend-indication via bargraph



**Communication/Parameterization**



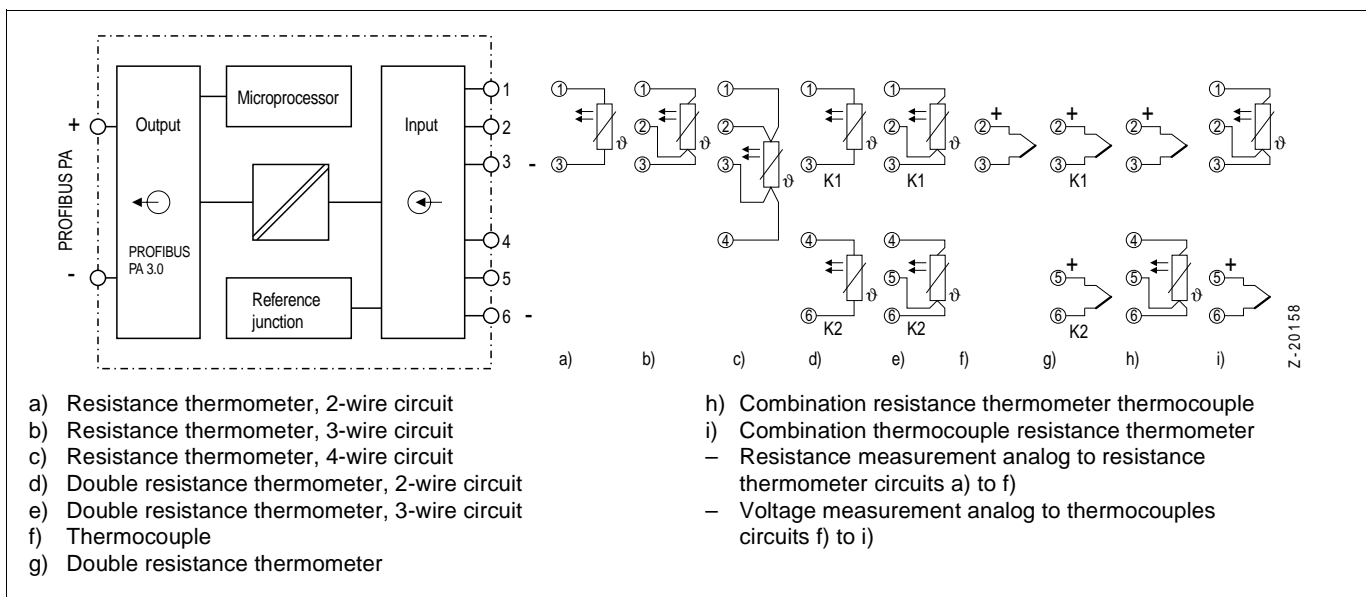
Ordering information										
					Catalog No					
TF 212 / TF 212-Ex					V11524-					
<b>Without explosion protection</b> TF 212 without explosion protection					1					
<b>With explosion protection</b> <b>Type of protection: intrinsically safe</b> TF212-Ex Zelm / ATEX II 2 G EEx ia IIC T6 (Zone 1)					5					
<b>Type of protection: pressure-proof enclosure / explosion-proof</b> TF 212-Ex d PTB / ATEX II 2 G EEx d IIC T6					D					
TF 212-Ex d FM / CSA Class I, Div. 1 / Div. 2, Group A,B,C,D, T6 Class II, Div. 1/ Div. 2, Group E,F,G, T6 Class III T6					E					
<b>Type of protection: Flameproof</b> TF 212-Ex d FM Class 1, Zone 1, AEx d IIC T6					F					
CSA Class 1, Zone 1, Ex d IIC T6										
<b>Display/Construction</b> AGLF-housing without display					N					
AGLFD-housing with Quick Set display (on request)					S					
<b>Material</b> Aluminium					A					
Stainless steel					E					
<b>Connections</b> with cable-screw-connection / PA-connector M20*1,5 or pressure-proof <sup>1</sup> M-connector for Profibus PA (Turck) M-connector for Profibus PA (Weidmüller)					N					
Thread (without cable-screw-connection)					T					
M 20 x 1,5					W					
1/2" NPT					1					
3/4" NPT					2					
1/2" GK					3					
					4					
<b>Mounting field housing</b> without					1					
Wall mounting (STT 37)					2					
Wall mounting (stainless steel)					3					
Pipe mounting (STT 37)					4					
Pipe mounting (stainless steel)					5					
<b>Programming</b> Factory standard parameter default address 126					S					
Channel 1: Pt100, 3-wire circuit, damping off, unit °C L-L // L / H // H-H = -200 °C // 200 °C / 850 °C // 850 °C										
Channel 2: Pt100, 3-wire circuit, damping off, unit °C L-L // L / H // H-H = -200 °C // 200 °C / 850 °C // 850 °C										
Customer-specified parameter definition					K					
<b>Certificates</b> custom-specified certificate (on request)									3	
<b>Accessories</b>										
SMART-Vision <sup>5</sup> Software 4.XX on CD-ROM (German / English)										7957777
SMART-VISION manual German										7957779
English										7957780
Quick Set (indicator + address programming)										7957474

<sup>5</sup> see Data Sheet 63-1.20

Minimum hardware requirements: Intel 80486; 66 MHz, 8MB RAM; free hard-disk capacity; Windows 95, 98, NT ...

<sup>1</sup> metal-screw-connection EEx e or EEx d (cable-diameter 3,5 ... 8,7 mm)

**Connection diagram**



**Dimensional diagram** (all dimensions in mm)

