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

- **0Input**
  - 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**

ABB Instrumentation

Technical data

Output

Digital output signal	Profibus PA profile 3.0 type A and B
Transmission rate (Baude 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 Ω / 0...4000 Ω
Line resistance (R_W) per core	< 5 Ω
Measuring current	200 µA
Sensor short-circuit	< 5 Ω (for RTD)
Sensor break	> 5 MΩ

Thermocouples

Types	B, C, D, E, J, K, L, N, R, S, T, U
Voltages	–15 mV...115 mV
Sensor monitoring current	200 µA
Input resistance	5 MΩ
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) Procentage 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 °C
Transport and storage temperature	–40...100 °C
Relative humidity (100 % humidtiy with isolated terminals only)	< 100 %
Condensation	permitted

Characteristics at rated conditions[1)]

(acc. to IEC 770, related to 25 °C)

Measuring error incl. characteristic deviation	
Pt 100/resistance measurement	typ. < 0.2 % min. < 0.2 K
Thermocouple/mV	typ. < 20 µV
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 ∅ 3,5...8,7 mm)	cf. ordering information
Ground screw ext./int.	6 mm² M5 / 2.5 mm² M4
Terminals	2.5 mm², screw terminals

Input element		Measuring range	Basis Measuring error
Standard	**Sensor**		
IEC 584-1	Thermocouple Type B	400...1820 °C (+752...+3308 °F)	0.8 K
	Thermocouple Type E	–100...1000 °C (–148... 1832 °F)	0.2 K
	Thermocouple Type J	–100...1200 °C (–148...+2192 °F)	0.2 K
	Thermocouple Type K	180...1370 °C (–356...+2498 °F)	0.2 K
	Thermocouple Type R	– 50...1760 °C (– 58...+3200 °F)	0.8 K
	Thermocouple Type S	– 50...1760 °C (– 58...+3200 °F)	0.8 K
	Thermocouple Type T	–200... 400 °C (–328...+ 752 °F)	0.2 K
	Thermocouple Type N	–180...1300 °C (–292...+2372 °F)	0.2 K
DIN 43710	Thermocouple Type L	–100... 900 °C (–148...+1652 °F)	0.2 K
	Thermocouple Type U	–200... 600 °C (–328...+1112 °F)	0.2 K
W3, ASTME 998	Thermocouple Type C	0...+ 2300 °C (32...+4172 °F)	0,8 K
	Thermocouple Type D	0...+ 2300 °C (32...+4172 °F)	0,8 K
IEC 751[1)] / DIN 43760	Resistance thermometer Pt 100	–200... 850 °C (–328...+1562 °F)	0.4 K
	Resistance thermometer Pt 1000	–200... 850 °C (–328...+1562 °F)	0.4 K
(oc = 0,00618)	Resistance thermometer Pt 100/ PT 1000	–100... 250 °C (–148...+ 482 °F)	0.2 K
DIN 43760 (a = 0,00618)	Resistance thermometer Ni 100	– 60... 250 °C (– 76...+ 482 °F)	0.2 K
Resistance	2, 3, 4-wire	0...400 Ω, 0...4000 Ω	0.10 %
Voltage		–15 mV...115 mV	20 µV

Technical data

Explosion protection

(in preparation)

Intrinsically safe (ATEX) ⟨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 V	U_o < 5.9 V
Short-circuit current	I_i < 360 mA	I_o < 17 mA
Max. power	P_i < 2.52 W	P_o < 26 mW
Internal inductance	L_i = 17 µH	neglectable
Internal capacitance	C_i = 1.2 nF	neglectable

Pressure-proof encapsulated

ATEX (PTB) ⟨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
dampingn 0 s, unit °C

Default address
126
126

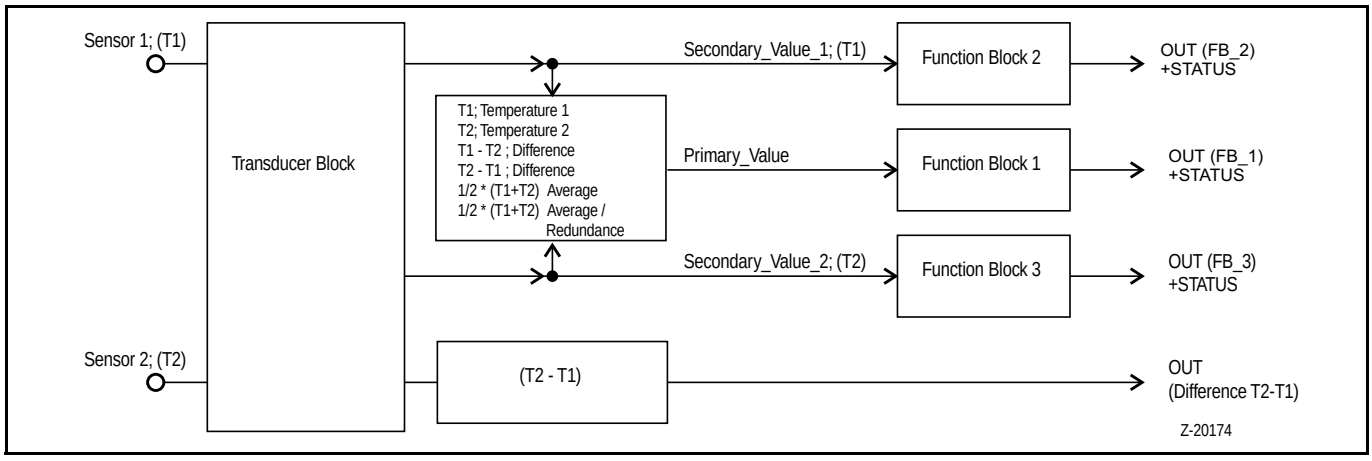
Process Control System (PCS)

A cyclic communication can be established with all Profibus compatible PCSs. Acyclic communication requires a Master Cl. 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 units 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

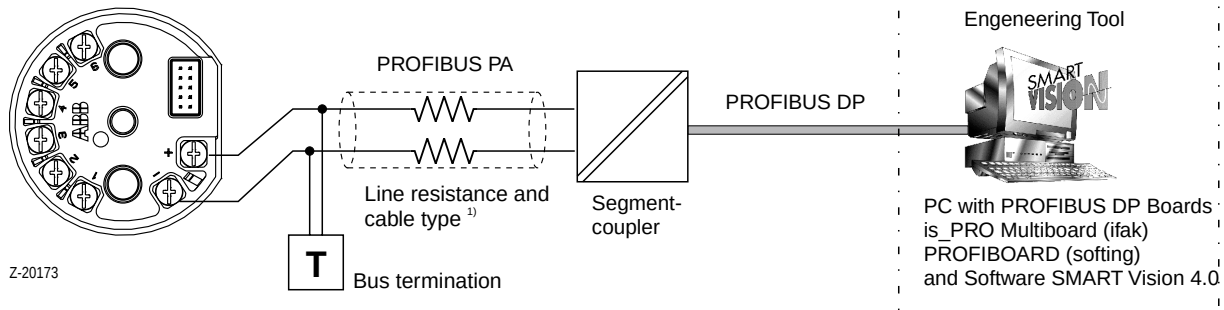
Copy functionality

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



1) The Profibus standard EN 61158-2 requires the use of shielded bus cables. Please refer to the user manual in regards to the required shielding measures.

Ordering information												
			Catalog No									
TF 212 / TF 212-Ex			**V11524-**									
Without explosion protection												
TF 212	without explosion protection			1								
With explosion protection												
Type of protection: intrinsically safe												
TF212-Ex	Zelm / ATEX	II 2 G EEx ia IIC T6 (Zone 1)		5								
Type of protection: pressure-proof enclosure / explosion-proof												
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		E								
		Class II, Div. 1/ Div. 2, Group E,F,G, T6										
		Class III T6										
Type of protection: Flameproof												
TF 212-Ex d	FM	Class 1, Zone 1, AEx d IIC T6		F								
	CSA	Class 1, Zone 1, Ex d IIC T6										
Display/Construction												
AGLF-housing without display					N							
AGLFD-housing with Quick Set display		(on request)			S							
Material												
Aluminium						A						
Stainless steel						E						
Connections												
with cable-screw-connection / PA-connector												
M20*1,5 or pressure-proof[1]							N					
M-connector for Profibus PA (Turck)							T					
M-connector for Profibus PA (Weidmüller)							W					
Thread (without cable-screw-connection)												
M 20 x 1,5							1					
1/2" NPT							2					
3/4" NPT							3					
1/2" GK							4					
Mounting field housing												
without								1				
Wall mounting (STT 37)								2				
Wall mounting (stainless steel)								3				
Pipe mounting (STT 37)								4				
Pipe mounting (stainless steel)								5				
Programming												
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			
Certificates												
custom-specified certificate		(on request)								3		
Accessories												
SMART-Vision[5] Software 4.XX												
on CD-ROM (German / English)			7957777									
SMART-VISION manual		German	7957779									
		English	7957780									
Quick Set (indicator + address programming)			7957474									

[5] see Data Sheet 63-1.20

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

[1] metal-screw-connection EEx e or EEx d (cable-diameter 3,5 ... 8,7 mm)