



# THERMOCONT

## FIELD THERMOMETER



TBJ-521



TBW-520



TBW-500

- ◆ Pt 100 sensor
- ◆ 4 ... 20 mA output
- ◆ HART communication
- ◆ 6-digit LCD display
- ◆ Various mechanical connection
- ◆ Stainless steel and PFA coated sensor tube
- ◆ ATEX certified versions
- ◆ IP 67 ingress protection

## ABOUT THERMOCONT

THERMOCONT field device incorporating Pt 100 sensor is 2-wire temperature transmitter with 4 ... 20 mA analogue output or transmitter/indicator if equipped with plug in display. Intrinsically safe version of each model is available in ordinary or flame-proof housing.

The measured temperature can also be transmitted by Hart communication.

Intelligent electronics and HART communication provides for remote programming, error monitoring and indication.

The instrument is suitable mainly for temperature measurement of liquids in tanks and pipes and free flowing or lumpy solids, but temperature gauge for rooms is also available.

The PFA coated stainless steel probe makes measurement of very aggressive materials also possible.

As special version of the unit a remote transmitter is also available which can be connected to a standard Pt 100 sensor through a simple 4-wire cable.

## MECHANICAL DESIGN

The complete unit consists of the following four parts:

- Probe (incorporating the Pt100 sensor)
- housing
- potted electronics
- plug-in display module

The Pt 100 sensor is built in the probe, which is inside the protection tube (dual tube design). The protection tube is made of stainless steel.

A wide range of tube length and process connections makes proper selection easy. High temperature version unit is equipped with heat dissipation ribs on the protection tube.

Housing of the electronics is either of injection moulded plastic or made of aluminium also in Exd version. The window of the cover provides for the visibility of the plug-in 6-digit LCD display.

Different designs facilitate reading of the measured value i.e. reading from above or from the side and the relevant model should be selected before ordering. Basic design is for reading from above.

Cable for electric connection can reach the screw terminals on the potted electronics through the conduit of the housing.

# TECHNICAL DATA

## GENERAL DATA

TYPE		TR□-□□□-□ TW□-□□□-□	T□□-□□□-□ TB□-□□□-□ T□W-□□□-□ T□W-□□□-□	T□□-□□□-□ T□□-□□□-□ T□W-□□□-□
Range		-50 °C...+200 °C	with types T□W-□□□-□.... -40 °C...+70 °C	-50 °C...+600 °C
Probe		Pt 100 in plastic coated metal protection tube		Pt 100 in metal protection tube
Protection tube		DIN 1.4571 stainless steel + PFA coating		DIN 1.4571 stainless steel
Maximum pressure		2,5 MPa (25 bar) at +20 °C 1,6 MPa (16 bar) at +400 °C		
Output		4...20 mA and/or HART output limit values of 4 ... 20 mA : 3,9 ... 20,5 mA minimum loop resistance of HART: R <sub>tmin</sub> = 250 ohm		
Display	Mode	6 digit LCD, engineering units, bargraph		
	Resolution	0,1 °C		0,4 °C
Accuracy*	Transmitted current	Pt 100 Class,A"	± (0,3+  0,0025 t  ) °C	
		Pt 100 Class,B"	± (0,4+  0,0055 t  ) °C	
		Temperature coefficient	± 0,02 °C / °C	
	Displayed value	Pt 100 Class,A"	± (0,2+  0,0025 t  ) °C	
		Pt 100 Class,B"	± (0,35+  0,0055 t  ) °C	
		Temperature coefficient	± 0,002 °C / °C	
Error indication		Output current = 3,8 mA or 22 mA		
Power supply		10V...36V DC		
Maximum load		R <sub>t</sub> = (U <sub>s</sub> - 10 V) / 0,022 A, U <sub>s</sub> = power supply		
Ambient temperature		- 40 °C ...+70 °C with display - 25 °C ...+70 °C		
Electric protection		Class III		
Ingress protection		IP 65		
Process connection / protrusion**		According to the order codes		
Electric connection		Cable gland: M 20 x1,5 Cable diameter: Ø 6 ... 12 mm Wire cross section: 0,25 ... 1,5 mm <sup>2</sup>		
Housing		Paint coated aluminium (öAlSi12) or glass fibre reinforced plastic		Paint coated aluminium (öAlSi12)
Material of wetted parts <sup>(2)</sup>		PFA, PTFE		Stainless steel: DIN 1.4571
Mass	With aluminium housing	approximately 0,9kg + probe 0,5kg/m (for types T□W .... appr. 0,9 kg)		
	With plastic housing	approximately 0,5kg + probe 0,5kg/m (for types T□W .... appr. 0,5 kg)		

Remark: (1) t = measured temperature  
(2) not a valid value with types of T□W ...

## SPECIAL DATA FOR EX CERTIFIED UNITS

TYPE	T□□ - 5□□ - 6Ex T□□ - 5□□ - 8Ex	T□□ - 5□□-AEx T□□ - 5□□-BEx	T□□ - 5□□-CEx T□□ - 5□□-DEx
Ex protection	Intrinsically safe	Flame proof enclosure	Flame proof enclosure and intrinsically safe
Ex marking	⊕ II 1 G EEx ia IIB T6...T1	⊕ II 2 G EEx d IIB T6...T1	⊕ II 1/2 G EEx d ia IIB T6...T1
Electrical data	U <sub>max</sub> = 30 V I <sub>max</sub> = 140 mA P <sub>max</sub> = 1,0 W C <sub>i</sub> < 20 nF L <sub>i</sub> < 200 μH	-	U <sub>max</sub> = 30 V I <sub>max</sub> = 140 mA P <sub>max</sub> = 1,0 W C <sub>i</sub> < 20 nF L <sub>i</sub> < 200 μH
Cable gland	Metal. M 20 x1,5 Diameter: 6... 12 mm	Metal, M 20 x1,5 Diameter: 9 ... 11 mm	
Ambient temperature	- 40 °C...+70 °C with display - 25 °C...+70 °C	- 40 °C...+70 °C with display - 20 °C...+70 °C	
Housing	Paint coated aluminium (öAlSi10Mg)		

Temperature classes for EEx ia, d and dia devices

Temperature class	T6	T5	T4	T3	T2	T1
T <sub>ambient</sub>	60 °C			70 °C		
T <sub>medium</sub>	80 °C	95 °C	130 °C	195 °C	295 °C	440 °C

# DIMENSIONS

BASIC DESIGN ARRANGEMENT „A”		EX PROOF VERSION OF ARRANGEMENT „A”	
-50 °C... +200 °C	-50 °C... +600 °C	INTRINSICALLY SAFE MODEL	FLAME PROOF MODEL
T□ - □□□ - □	TB□ - □□□ - □	T□□ - 5□□ - 6Ex	T□□ - 5□□ - 8Ex
T□□ - □□□ - □	T□□ - □□□ - □	T□□ - 5□□ - 6Ex	T□□ - 5□□ - 8Ex
		T□□ - 5□□ - AEx	T□□ - 5□□ - BEx
		T□□ - 5□□ - CEx	T□□ - 5□□ - DEx

ARRANGEMENTS	VERSION USED WITH MOUNTING PLATE	
<p>Arrangement if other than „A” should be given with ordering!</p>	<p>Without probe</p> <p>T□W - □□□ - □</p>	<p>With probe</p> <p>T□W - □□□ - □</p>

**TRANSMITTER UP TO 200 °C  
PLASTIC COATED PROBE**

TR□ - □□□ - □  
TW□ - □□□ - □

## EX PROTECTION

Each transmitter has its Ex proof version.

Ex certificates:

ATEX II 1G EExia IIB T6 ... T1  
ATEX II 2G EExd IIB T6 ... T1  
ATEX II 1/2G EExdia IIB T6 ... T1

Find maximum temperatures above.

Ex certificates are for models with aluminium housing.

## CONDITIONS OF EX APPLICATION

- Intrinsically safe units can only be powered by duly certified loops with values according to the technical data.
- Applying transmitters with plastic coated probes flow speed should be selected with taking medium features and tank geometry into consideration to avoid statical charging.
- Intrinsically safe unit should be grounded by connecting its grounding screw to the equipotential system.
- Cable isolation should comply with the maximum temperature (70 °C) allowed for the ambient temperature of the application.
- Transmitters with Ex marking „d” can only be mounted with duly certified conduit with Ex marking of „d”

## INSTALLATION

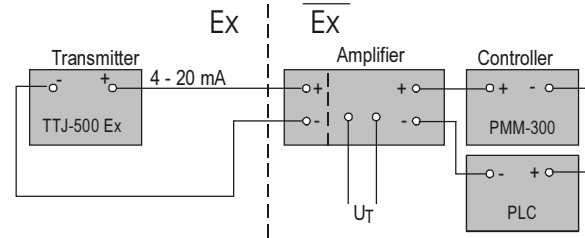
There is a wide choice of process connections as per section Order Codes. The most common process connection is the thread M 20 x 1,5 mm. Triclamp and FI (DIN 11581 pipe coupling for Food Industry) connections are used in the food and the pharmaceutical industry.

Instruments with plastic (PFA) coated protection tubes can only be ordered with DN 50, PN 16 flange having PTFE lining.

Intrusion length of the transmitter is to be selected so that the sensor at the bottom of the probe (and protection tube) should be at the place where the temperature is characteristic for the process. Due to the dual tube design the probe can be replaced even without removing the protection tube opening the process space possibly under pressure.

## WIRING

The unit being a 2-wire transmitter should be powered by 12 ... 36 ACV. The maximum value of the load resistance is  $R_{max} = 600 \text{ Ohm}$  in case of 24 V DC powering. Devices of type TTW / TBW-500 should be connected with four-wire cable.



TYPICAL MEASUREMENT ARRANGEMENT

## PROGRAMMING

The transmitter supports three different way of programming:

- On site programming without SAP-202 display module by changing the medium temperature and measuring the output current
- On site programming with SAP-203 display module without the need for changing the temperature
- Remotely by HART on PC or on the MultiCONT P-100 universal control unit by the use of HART communication software

Sophisticated setting is only offered with by programming the SAP-203 display module or HART programming providing access to all features such as error indication, damping and linearisation.

## ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

THERMOCONT T   -    -

FUNCTION / VERSION	CODE	PROCESS CONNECTION	CODE	HOUSING MATERIAL	CODE	PROBE	CODE	PROTRUSION	CODE	OUTPUT / Ex	CODE
Transmitter up to 200 °C	T	Onto plate or wall	W	Aluminium	5	No probe	0	60 mm	0	4 ... 20 mA	2
Transmitter up to 600 °C	V	1/2" BSP	C	Plastic	6	A op.	1	160 mm	1	4 ... 20 mA / HART	4
Transmitter up to 200 °C plastic coating	W	3/4" BSP	D			B op.	2	250 mm	2	<b>EX MODELS</b>	
Tx + display up to 200 °C	B	1/2" NPT	H					400 mm	3	4 ... 20 mA / EEx ia	6
Tx + display up to 600 °C	L	M 20 x 1,5	J					500 mm	4	4 ... 20 mA / HART / EEx ia	8
Tx + display up to 200 °C plastic coating	R	1" Triclamp	L					1000 mm	5	4 ... 20 mA / EEx d	A
		1 1/2" Triclamp	K					1500 mm	6	4 ... 20 mA / HART / EEx d	B
		2" Triclamp	N					2000 mm	7	4 ... 20 mA / EEx d + EEx ia	C
		FI DN 25	O					2500 mm	8	4 ... 20 mA / HART / EEx d + EEx ia	D
		FI DN 40	P					3000 mm	9		
		FI DN 50	R								
		DN 50, PN 16, DIN 1.4571 + PTFE	F								
		2" ANSI DIN 1.4571 + PTFE RF 150	A								

FI: Food Industry DIN11581, Coupling pipe

Remark:

- For medium temperatures exceeding 200°C aluminium housing should be selected
- Ex certificates apply for devices with aluminium housing
- Plastic coated probes come with flange
- Probes with non standard protrusions (max. 3000 mm) for special request

## ACCESSORIES TO ORDER



HART MODEM SAT-304



DISPLAY MODULE SAP-202