

Programmable 2-wire transmitter

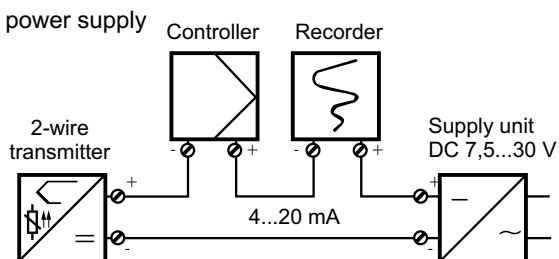
Safety warnings



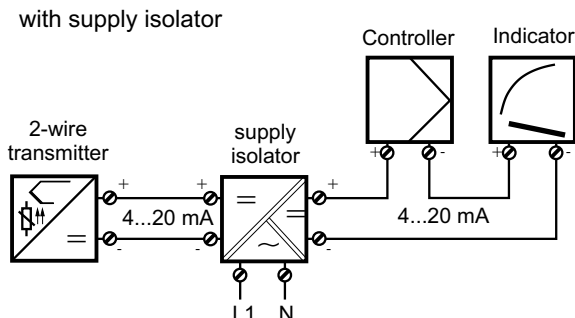
General: When mounting, initiating and operating this transmitter the safety precautions and regulations have to be observed. Only staff with a corresponding qualification should work with the transmitter. A non-observance of the safety regulations may cause serious injuries and / or damages. Check before initial operation the suitability of the transmitter for this area of application. The technical data of this manual have to be followed.

Connection example (Type PT0...)

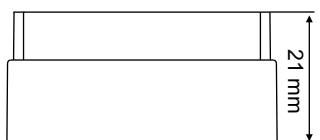
with power supply



with supply isolator



Dimensions, connection diagram



Connection for	Terminals
Supply for type PT0... (DC 8 ... 35 V)	+1 $R_B = (U_b - 8V) : 22mA$
Supply for type PT1... (DC 10 ... 35 V)	-2 $R_B = (U_b - 10V) : 22mA$
Current output 4... 20mA	
	$R_B =$ working resistance $U_b =$ voltage supply

Analog inputs

Thermocouple	+4 -6		4 6
Resistance thermometer in 2-wire circuit	3 6	$R_L \leq 11$ ohms per conductor line resistance	3 6
Resistance thermometer in 3-wire circuit (3W)	3 5 6	$R_L \leq 11$ ohms per conductor line resistance	4 5 6
Resistance thermometer in 4-wire circuit (4W)	3 4 5 6	$R_L \leq 11$ ohms per conductor line resistance	3 4 5 6

Technical data

Input thermocouple

Designation

Fe-CuNi (type L) DIN EN 43 710
 Fe-CuNi (type J) DIN EN 60 594
 Cu-CuNi (type U) DIN 43 710
 Cu-CuNi (type T) DIN EN 60 584
 NiCr-Ni (type K) DIN EN 60 584
 NiCr-CuN (type E) DIN EN 60 584
 NiCrSi-NiSi (type N) DIN EN 60 584
 Pt10Rh-Pt (type S) DIN EN 60 584
 Pt13Rh-Pt (type R) DIN EN 60 584
 Pt30Rh-Pt6Rh (type B) DIN EN 60 584
 MoRe5-MoRe41**
 W3Re-W25Re (type D)
 W5Re-W26Re (type C)

Range limits

-200...+900°C
 -210...+1200°C
 -200...+600°C
 -270...+400°C
 -270...+1372°C
 -270...+1000°C
 -270...+1300°C
 -50...+1768°C
 -50...+1768°C
 0...1820°C
 0...2000°C
 0...2495°C
 0...2320°C

Range

-200...+900°C
 -150...+1200°C
 -200...+600°C
 -270...+400°C
 -140...+1372°C
 -15 ...+1000°C
 -100...+1300°C
 20...1768°C
 50...1768°C
 400...1820°C
 500...2000°C
 500...2495°C
 500...2320°C

Accuracy*

typ. 0,5 K
 typ. 0,5 K
 typ. 0,5 K
 typ. 0,5 K
 typ. 0,5 K
 typ. 0,5 K
 typ. 1 K
 typ. 2 K
 typ. 2 K
 typ. 2 K
 typ. 1 K
 typ. 1 K

Shortest span: type L, J, U, T, K, E, N: 50°C / type S, R, B: 500°C / type MoRe5-MoRe41, D, C: 500°C

Cold junction Pt 100 internal or external cold junction (adjustable 0... 80°C)

Cold junction accuracy ± 1K

Sampling rate

> 1 measurement per second

Sensor current

350 nA

Input filter

1st order digital filter;

filter constant adjustable from 0 ... 125 s (with type PT1... only 0 ... 100 s)

Features

can also programmed in °F;

range limits are freely programmable / input isolated from output

*The accuracy refers to the maximum span.

**not with TP1...

Technical data (continued)

MANUAL

MANUAL

MANUAL

Input resistance thermometer

Designation		Range limits	Range	Accuracy*
Pt 100	DIN EN 60 751	-200 ... +850°C	-100 ... +200°C -200 ... +850°C	±0,2 K ±0,4 K
Pt 100	JIS	-200 ... +649°C	-100 ... +200°C -200 ... +649°C	±0,2 K ±0,4 K
Pt 500	DIN	-200 ... +250°C	-100 ... +200°C -200 ... +250°C	±0,2 K ±0,4 K
Pt 1000	DIN	-200 ... +250°C	-100 ... +200°C -200 ... +250°C	±0,2 K ±0,4 K
Ni 100		-60 ... +250°C	-60 ... +250°C	±0,2 K
Ni 500		-60 ... +150°C	-60 ... +150°C	±0,2 K
Ni 1000		-60 ... +150°C	-60 ... +150°C	±0,2 K
Connection circuit		2-, 3-, 4-wire circuit		
Shortest span	10K			
Sensor lead resistance				
-for 3-, 4-wire connection		<11 ohms per conductor		
-for 2-wire connection		measuring resistance + <22 ohms internal lead resistance		
Sensor current		0,6 mA		
Sampling rate		> 1 measurement per second		
Input filter	1st order digital filter; filter constant adjustable within 0 ... 125s (bei type PT1... 0 ... 100s only)			
Features:	also programmable in °F / freely programmable range limits / input isolated from output			

*The accuracy refers to the maximum range span

Measuring circuit monitoring

Underrange	linear drop to 3,8mA (as per NAMUR recommendation 43)
Overrange	linear rise to 20,5mA (as per NAMUR recommendation 43)
Probe short circuit / probe and lead break	resistance thermometer: <3,5 mA or >21,0 mA (configurable) thermocouple: <3,5mA or >21,0mA (configurable)* <23 mA
Current limiting on probe short circuit or probe break	

*Probe short circuit recognition is not possible for thermocouples

Output

	type PT0...	type PT1...
Output signal	proportional DC current 4... 20mA, 20 ... 4mA	
Electrical insulation	between input and output	between input and output
Test voltage	U = 3,75 kV/50Hz	U = 2,0kV/50Hz
Transfer characteristic	linear with temperature customized linearization reversion of output signal	
Burden (Rb)	Rb = (Ub - 8 V) / 0,022A	Rb = (Ub - 10 V) / 0,022A
Burden error	± 0,02% / 100 ohms*	
Calibration conditions / -accuracy	DC 24 V at approx. 22°C / ± 0,05%* ¹	
1st order digital filter	0 ... 125 s configurable	0 ... 100 s configurable
Step reponse 0 ... 100 %	< 2 s (with filter constant 0 s)	
Switch-on delay	5s	4s
(correct measurement after connecting the supply voltage only after ...)		

¹ All specified values refer to 20mA full scale

Custom linearization*

Number of calibration point	maximum 40
Interpolation	linear

*On TP0... through 4th order polynomial

Supply

Supply voltage (Ub)	type PT0 ...: DC 8 ... 35V	type PT1...: DC 10 ... 35V
(with reverse polarity protection)		
Supply voltage error	± 0,01 % / per V deviation from 24V*	

*All specified values refer to 20 mA full scale

Environmental influences

Operating temperature range	-40 ... +85°C
Storage temperature range	-40 ... +100°C
Temperature error	resistance thermometer: <± 0,005% per °C deviation from 22°C* thermocouple: <± 0,005% per °C deviation from 22°C* plus accuracy of cold junction 0,1 K per year** or 0,005% per year**/****
Long-term stability	rel. humidity <95%, with condensation
Climatic conditions	according to GL characteristics 2
Vibration strength	EN 61 326
EMC	class B
- interference emission	to industrial requirements
- immunity to interference	
IP protection -in terminal head / -open mounting	IP 54 / IP 00
	IP 66 / IP 00

*All specified values refer to 20mA full scale

**under calibration conditions

****% refer to the selected span. The larger value applies.

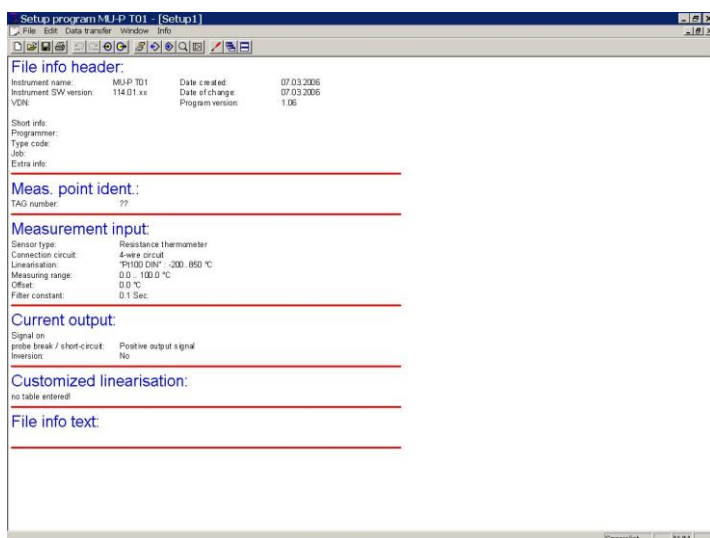
Technical data (continued)

Housing

Material	polycarbonate (encapsulated)
Screw terminal	up to 1,75 mm ² ; maximum tightening torque 0,6 Nm
Mounting	in terminal head form B DIN 43729 in surface-mounting case (on request); in switchgear cabinet (mounting bracket is required)
Operating position	unrestricted
Weight	approx. 40g

Setup program (PT0...)

The setup program is available for configuring the transmitter from a PC. The connection is via the PC interface with TTL/RS232 converter and adaptor and the setup interface of the transmitter. The protective cover must be closed after programming.



Configurable parameter

TAG number (10 characters)
Sensor type
Connection circuit (2-/3-/4-wire)
external and internal could junction
Customized linearization
Range limits
Output signal raising/falling (reversion)
Digital filter
Response to probe break / short circuit
Recalibration / fine calibration
Lead resistance with 2-wire circuit

If no power supply (supply isolator) is available the 2-wire transmitter type TP0... has to be configured using a 9 V block battery as a power source.

Fine calibration (type TP0...)

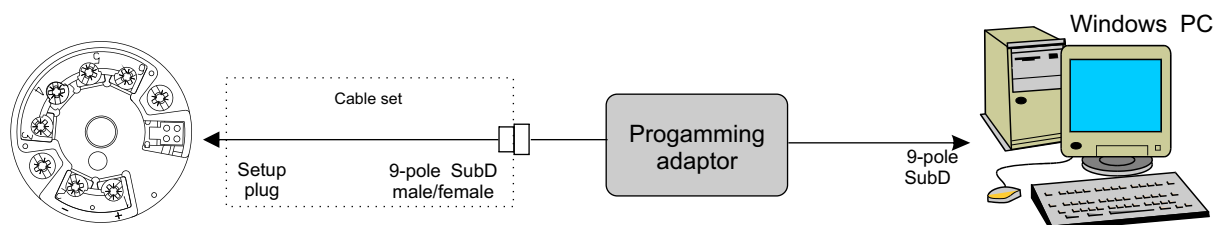
Fine calibration means correction of the output signal. The signal can be adjusted within $\pm 5\%$ of the 20 mA full-scale value. Fine calibration is performed through the setup program. Values for 4 mA (zero), 20 mA (full scale) and offset can be calibrated separately via the setup program..

Hardware and software requirements

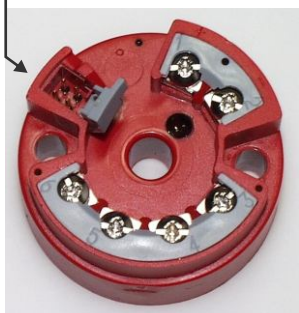
The following hardware and software requirements must be met when installing and operating the setup program:

IBM-PC or compatible PC from 486DX-2-100, 16 MB main memory, 15 MB free space on hard disc, CD-ROM drive, 1 free serial interface, Windows 95 or above, Windows NT 4.0, Windows 2000 or XP.

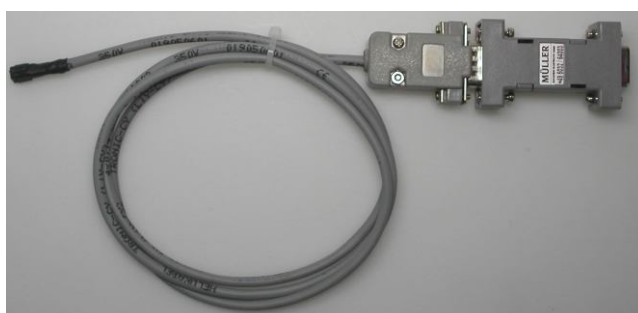
Setup-Schnittstelle (Typ TP0...)



Setup plug

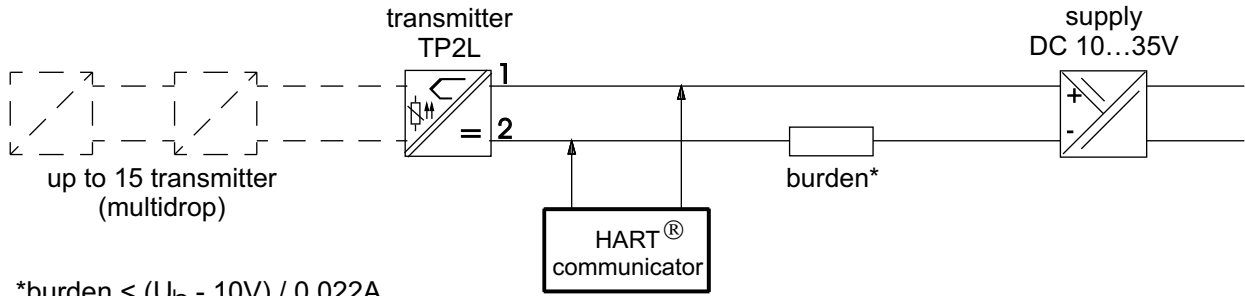


Programming set (adaptor, cable)

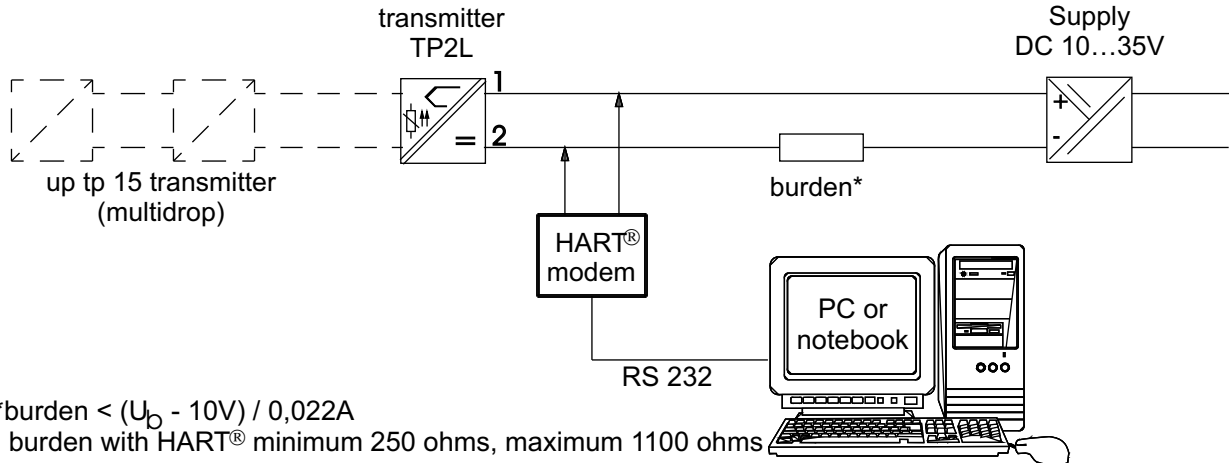


HART® interface (type TP1...)

Connecting a HART® -communicator and a HART®-modem



*burden <math>< U_D - 10V / 0,022A</math>
burden with HART® minimum 250 ohms, maximum 1100 ohms



*burden <math>< U_D - 10V / 0,022A</math>
burden with HART® minimum 250 ohms, maximum 1100 ohms

Setup program (PT1...)

The setup program is available for configuring the transmitter from a PC. The connection is made via the HART® modem.



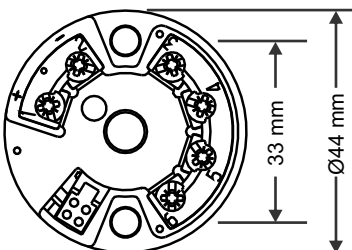
configurable parameter

- TAG number (8 characters)
- description (16 characters)
- message (32 characters)
- sensor type, linearization
- connection circuit (2-/3-/4-wire)
- external or internal cold junction (fixed value)
- custom linearization
- range limits
- output signal rising/falling (reversion)
- digital filter
- response on probe brake/short circuit
- lead resistance for 2-wire circuit
- measurement offset
- unit
- minimum / maximum value
- current simulation

Hardware and software requirements

See page 3

Mounting



Distance mounting holes: 33 mm

Fixing items: 2 screws, 2 compression springs (delivered with)