



Application area

- all process industry fields

Applications

The digital transmitter converts different signal sources to a load-independent current signal commonly found in process control systems. The output is the standard sensor line signal. It is a load-independent, 4 to 20 mA, DC signal which is superimposed with the digital HART® signal. The transmitter has extensive configuration options.

Construction

Dimensions	See "Dimensional drawings"
Material	Molded plastic
Degree of protection	to IEC 60529 <ul style="list-style-type: none"> • Enclosure IP40 • Terminals IP00
Weight	50 g (0.11 lb)

Input

Resistance thermometer

Measured variable	Temperature
Sensor type	
• to IEC 60751	Pt25 ... Pt1000
• To JIS C 1604; a = 0.00392 K-1	Pt25 ... Pt1000
• to IEC 60751	Ni25 ... Ni1000
• Special type	over special characteristic (max. 30 points)
Sensor factor	0.25 ... 10 (adaptation of the basic type, e.g. Pt100 to version Pt25 ... 1000)
Units	°C or °F
Connection	
• Standard connection	1 resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system
• Generation of average	value 2 identical resistance thermo-

Features

- Digital programmable transmitter
- Suitable for installation in connecting heads in accordance with DIN, form B
- Input for
 - Resistance thermometer (2-, 3- or 4-wire technology)
 - Thermocouples
 - Resistance-based sensor and DC voltage sources
- Output signal: 4...20 mA invertible, 2-wire technology
- Configurable via HART®:
 - optional with a handheld communicator
 - optional with a HART® modem and the SIMATIC PDM parameterization software
- Power supply: 8...35 V DC; 8...30 V DC (Ex)
- Electrically isolated
- Test sockets for multimeters for monitoring purposes and plausibility checks without interruption of the current loop.
- Diagnostics LED:
 - Sensor and power supply have been correctly connected (LED displays a green light)
 - Sensor breakage or short-circuit (LED flashes red)
 - Internal device fault (steady red light)
- Sensor monitoring, open circuit and short-circuit
- Self-monitoring

Options

- Explosion protection for gases and dust
- Parameterization via PC Software
- Classification per SIL 2
- Expanded diagnostic functions, such as slave pointer, operating hours counter
- Special characteristic

Input (continued)

• Generation of difference	meters in 2-wire system for generation of average temperature 2 identical resistance thermometers (RTD) in 2-wire system (RTD 1 – RTD 2 or RTD 2 – RTD 1)
Interface	
• Two-wire system	Parameterizable line resistance ≤ 100 Ω (loop resistance)
• Three-wire system	No balancing required
• Four-wire system	No balancing required
Sensor current	≤ 0.45 mA
Response time	≤ 250 ms for 1 sensor with open circuit monitoring
Open-circuit monitoring	Always active (cannot be disabled)
Short-circuit monitoring	can be switched on/off (default value: ON)
Measuring range	parameterizable (see table "Digital measuring errors")
Min. measured span	10 °C (18 °F)
Characteristic curve	Temperature-linear or special characteristic

Resistance-based sensors

Measured variable	Actual resistance
Sensor type	Resistance-based, potentiometers
Units	Ω

Input (continued)		Input (continued)	
Connection		Units	mV
• Normal connection	1 resistance-based sensor (R) in 2-wire, 3-wire or 4-wire system	Response time	≤ 250 ms for 1 sensor with open circuit monitoring
• Generation of average value	2 resistance-based sensors in 2-wire system for generation of average value	Open-circuit monitoring	Can be switched off
• Generation of difference	2 resistance thermometers in 2-wire system (R1 – R2 or R2 – R1)	Measuring range	-10 ... +70 mV -100 ... +1100 mV
Interface		Min. measured span	2 mV or 20 mV
• Two-wire system	Parameterizable line resistance ≤ 100 Ω (loop resistance)	Overload capability of the input	-1.5 ... +3.5 V DC
• Three-wire system	No balancing required	Input resistance	≥ 1 MΩ
• Four-wire system	No balancing required	Characteristic curve	Voltage-linear or special characteristic
Sensor current	≤ 0.45 mA	Output	
Response time	≤ 250 ms for 1 sensor with open circuit monitoring	Output signal	4 ... 20 mA, 2-wire with communication acc. to HART Rev. 5.9
Open-circuit monitoring	Always active (cannot be disabled)	Auxiliary power	11 ... 35 V DC (to 30 V with Ex)
Short-circuit monitoring	can be switched on/off (default value: OFF)	Max. load	(U _{aux} – 11 V)/0.023 A
Measuring range	parameterizable max. 0 ... 2200 Ω (see table "Digital measuring errors")	Overrange	3.6 ... 23 mA, infinitely adjustable (default range: 3.80 mA ... 20.5 mA)
Min. measured span	5 Ω ... 25 Ω (see Table "Digital measuring errors")	Error signal (e.g. following sensor fault) (conforming to NE43)	3.6 ... 23 mA, infinitely adjustable (default value: 22.8 mA)
Characteristic curve	Resistance-linear or special characteristic	Sample cycle	0.25 s nominal
Thermocouples		Damping	Software filter 1st order 0 ... 30 s (parameterizable)
Measured variable	Temperature	Protection	Against reversed polarity
Sensor type (thermocouples)		Electrically isolated	Input against output (1 kVeff)
• Type B	Pt30Rh-Pt6Rh to DIN IEC 584	Measuring accuracy	
• Type C	W5 %-Re acc. to ASTM 988	Digital measuring errors	See Table "Digital measuring errors"
• Type D	W3 %-Re acc. to ASTM 988	Reference conditions	
• Type E	NiCr-CuNi to DIN IEC 584	• Auxiliary power	24 V ± 1 %
• Type J	Fe-CuNi to DIN IEC 584	• Load	500 Ω
• Type K	NiCr-Ni to DIN IEC 584	• Ambient temperature	23 °C
• Type L	Fe-CuNi to DIN 43710	• Warming-up time	> 5 min
• Type N	NiCrSi-NiSi to DIN IEC 584	Error in the analog output (digital/analog converter)	< 0.025 % of span
• Type R	Pt13Rh-Pt to DIN IEC 584	Error due to internal cold junction	< 0.5 °C (0.9 °F)
• Type S	Pt10Rh-Pt to DIN IEC 584	Influence of ambient temperature	
• Type T	Cu-CuNi to DIN IEC 584	• Analog measuring error	0.02 % of span/10°C (18 °F)
• Type U	Cu-CuNi to DIN 43710	• Digital measuring errors	
Units	°C or °F	- with resistance thermometers	0.06 °C (0.11 °F)/10°C (18 °F)
Connection		- with thermocouples	0.6 °C (1.1 °F)/10°C (18 °F)
• Standard connection	1 thermocouple (TC)	Auxiliary power effect	< 0.001 % of span/V
• Generation of average value	2 thermocouples (TC)	Effect of load impedance	< 0.002 % of span/100 Ω
• Generation of difference	2 thermocouples (TC) (TC1 – TC2 or TC2 – TC1)	Long-term drift	
Response time	≤ 250 ms for 1 sensor with open circuit monitoring	• In the first month	< 0.02 % of span
Open-circuit monitoring	Can be switched off	• After one year	< 0.2 % of span
Cold junction compensation		• After 5 years	< 0.3 % of span
• Internal	With integrated Pt100 resistance thermometer		
• External	With external Pt100 IEC 60571 (2-wire or 3-wire connection)		
• External fixed	Cold junction temperature can be set as fixed value		
Measuring range	Parameterizable (see table "Digital measuring errors")		
Min. measured span	Min. 40 ... 100 °C (72 ... 180 °F) (see table "Digital measuring errors")		
Characteristic curve	Temperature-linear or special characteristic		
mV sensor			
Measured	variable DC voltage		
Sensor type	DC voltage source (DC voltage source possible over an externally connected resistor)		

Ambient conditions

Ambient temperature range -40 ... +85 °C (-40 ... +185 °F)
 Storage temperature range -40 ... +85 °C (-40 ... +185 °F)
 Relative humidity < 98 %, with condensation

Electromagnetic compatibility

According to EN 61326 and NE21

Certificates and Approvals

Explosion protection ATEX Siemens SITRANS TH 300

EC type test certificate PTB 05 ATEX 2040X
 • "Intrinsic safety" type of protection II 1 G Ex ia IIC T6/T4
 II 2(1)G Ex ia/ib IIC T6/T4
 II 3(1)G Ex ia/ic IIC T6/T4
 II 1D Ex iaD 20 T115 °C
 $U_i = 30$ VDC
 $I_i = 100$ mA
 $P_i = 750$ mW
 $L_i = 104$ μ H
 $C_i = 11$ nF

• "Operating equipment that is nonignitable and has limited energy" II 3 G Ex nL IIC T6/T4
 type of protection II 3 G Ex nA IIC T6/T4

Software Requirements

PC operating system Windows ME, 2000 und XP

Digital measuring errors**Resistance thermometer**

Input	Measuring range °C / °F	Min. measured span		Digital accuracy	
		°C	°F	°C	°F
to DIN EN 60751					
Pt25	-200 ... +850 (-328 ... +1562)	10	(18)	0,3	(0.54)
Pt50	-200 ... +850 (-328 ... +1562)	10	(18)	0,15	(0.27)
Pt100 ... Pt200	-200 ... +850 (-328 ... +1562)	10	(18)	0,1	(0.18)
Pt500	-200 ... +850 (-328 ... +1562)	10	(18)	0,15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0,15	(0.27)
to JIS C1604-81					
Pt25	-200 ... +649 (-328 ... +1200)	10	(18)	0,3	(0.54)
Pt50	-200 ... +649 (-328 ... +1200)	10	(18)	0,15	(0.27)
Pt100 ... Pt200	-200 ... +649 (-328 ... +1200)	10	(18)	0,1	(0.18)
Pt500	-200 ... +649 (-328 ... +1200)	10	(18)	0,15	(0.27)
Pt1000	-200 ... +350 (-328 ... +662)	10	(18)	0,15	(0.27)
Ni 25 ... Ni1000	-60 ... +250 (-76 ... +482)	10	(18)	0,1	(0.18)

Resistance-based sensors

Input	Measuring range Ω	Min. measured span		Digital accuracy	
		Ω	Ω		
Resistance	0 ... 390	5	0,05		
Resistance	0 ... 2200	25	0,25		

Digital measuring errors**Thermocouples**

Input	Measuring range °C / F	Min. measured span		Digital accuracy	
		°C	°F	°C	°F
Type B	0 ... 182 (32 ... 3308)	100	(180)	2 ¹⁾	(3.60)
Type C (W5)	0 ... 2300 (32 ... 4172)	100	(180)	2	(3.60)
Type D (W3)	0 ... 2300 (32 ... 4172)	100	(180)	1 ²⁾	(1.80)
Type E	-200 ... +1000 (-328 ... +1832)	50	(90)	1	(1.80)
Type J	-210 ... +1200 (-346 ... +2192)	50	(90)	1	(1.80)
Type K	-230 ... +1370 (-382 ... +2498)	50	(90)	1	(1.80)
Input	Measuring range	Min. measured span		Digital accuracy	
Type L	-200 ... +900 (-328 ... +1652)	50	(90)	1	(1.80)
Type N	-200 ... +1300 (-328 ... +2372)	50	(90)	1	(1.80)
Type R	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.60)
Type S	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.60)
Type T	-200 ... +400 (-328 ... +752)	40	(72)	1	(1.80)
Type U	-200 ... +600 (-328 ... +1112)	50	(90)	2	(3.60)

¹⁾ The digital accuracy in the range 0 to 300 °C (32 to 572 °F) is 3 °C (5.4 °F).

²⁾ The digital accuracy in the range 1750 to 2300 °C (3182 to 4172 °F) is 2 °C (3.6 °F).

mV sensor

Input	Measuring range mV	Min. measured span mV	Digital accuracy μ V
mV sensor	-10 ... +70	2	40
mV sensor	-100 ... +1100	20	400

The digital accuracy is the accuracy after the analog/digital conversion including linearization and calculation of the measured value.

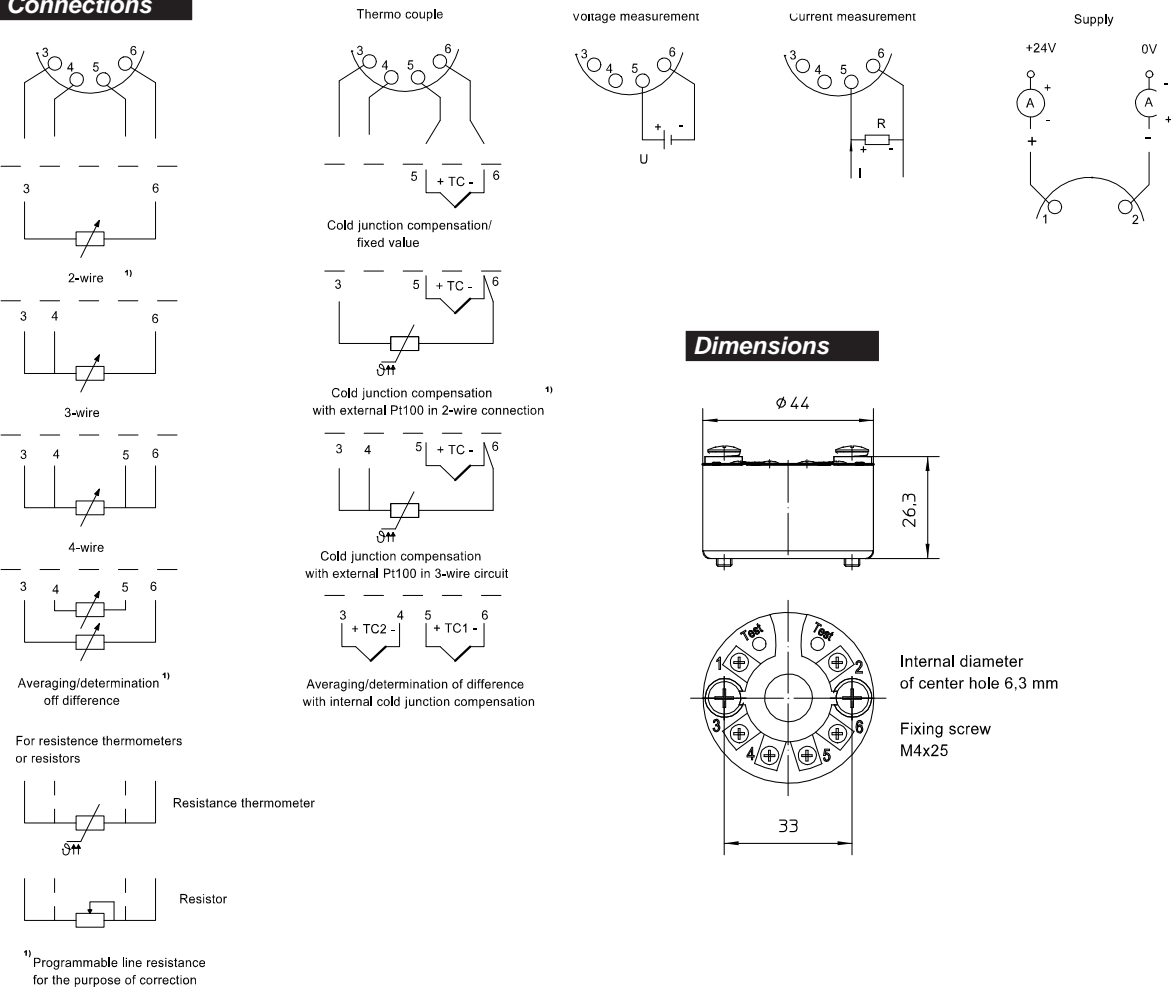
An additional error is generated in the output current 4 to 20 mA as a result of the digital/analog conversion of 0.025 % of the set span (digital-analog error).

The total error under reference conditions at the analog output is the sum from the digital error and the digital-analog error (poss. with the addition of cold junction errors in the case of thermocouple measurements).

Parameterization

The SITRANS TH300 is configured via HART®. This can be done using a handheld communicator or even more conveniently with a HART® modem and the SIMATIC PDM parameterization software.

Connections



Order Details - please give additional specifications for models not listed -

Transmitter for temperature, head mounting for Pt 100, SITRANS TH300		PA230 .
design	· standard	0
	· Ex-protection, type of ex-protection as follows	1
standard range	· input	· Pt 100 in 3-wire technology
	· temperature range	· 0...100 °C
	· error current (following sensor breakage)	· 22,8 mA
	· sensor offset	· 0 °C
	· damping	· 0,0 s
custom-made configuration	· input	as per customers' specification
	· measuring range	
	· error current (following sensor breakage)	
	· sensor offset	
	· damping	
output signal	· 4...20 mA, 2-wire technology, HART®	H21
additional features (to be indicated in case of need, only)		
type of ex-protection (Siemens SITRANS TH300)	· II 1G Ex ia IIC T6/T4	S81
	· II 2(1)G Ex ia/ib IIC T6/T4	
	· II 3(1)G Ex ia/ic IIC T6/T4	
	· II 1D Ex iaD 20 T115 °C	
	· II 3G Ex nL IIC T6/T4	
	· II 3G Ex nA IIC T6/T4	
functional safety per IEC 61508, classification per SIL 2		W2606
order code (example):		PA2300 F11 H1