SITRANS TH100 (4 to 20 mA, Pt100)

Overview

The SITRANS TH100, which represents an economical alternative by dispensing with galvanic isolation and universal sensor connection, is ideally suited for Pt100 measurements.

For the parameterization, the SIPROM T software is used in combination with the modem for SITRANS TH100/TH200.

Its compact design makes the SITRANS TH100 suitable for retrofitting measuring points or replacing analog transmitters.

The transmitter is available in a non-Ex version and in a version suitable for use in hazardous areas.

Benefits

- Transmitter with 2-wire system
- Mounting in connection head, type B or larger or on DIN rail
- Programmable; as a result, the sensor connection, measuring range and much more are programmable
- Intrinsically safe version for use in hazardous areas

Application

The SITRANS TH100 transmitter can be used for temperature measurement with Pt100 resistance thermometers in all industries. Its compact size means that it can be installed in connection heads of type B or larger.

The output signal is a load-independent direct current of 4 to 20 mA which is proportional to the temperature.

Parameterization is implemented over the PC using the parameterization software SIPROM T and the modem for SITRANS TH100/TH200. If you already have a "Modem for SITRANS TK" (article number 7NG3190-6KB), you can continue to use this for parameterization of the SITRANS TH100.

Transmitters of the "intrinsically safe" type of protection can be installed within potentially explosive atmospheres. The devices meet the directive 2014/34/EU (ATEX) as well as the FM and CSA requirements.

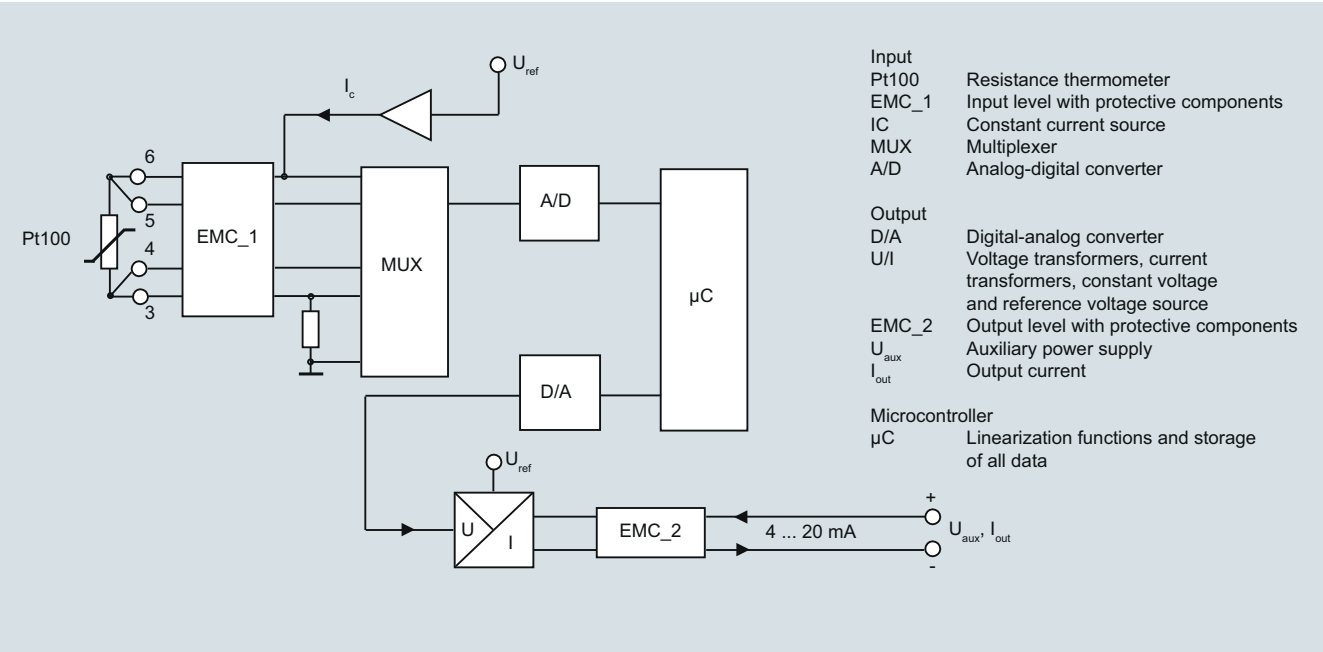
Function

Mode of operation

The measured signal supplied by a Pt100 resistance thermometer (2, 3 or 4-wire connection) is amplified in the input stage. The voltage, which is proportional to the input variable, is then converted into digital signals by a multiplexer in an analog-to-digital converter. They are converted in the microcontroller in accordance with the sensor characteristic and further parameters (measuring range, damping, ambient temperature, etc.).

The signal prepared in this way is converted in an analog-to-digital converter into a load-independent direct current of 4 to 20 mA.

An EMC filter protects the input and output circuits against electromagnetic interferences.



SITRANS TH100, function block diagram

Technical specifications

Input	
Resistance thermometer	
Measured variable	Temperature
Input type	Pt100 according to IEC 60751
Characteristic curve	Temperature-linear
Type of connection	2, 3, 4-wire connection
Resolution	14 bit
Measuring accuracy	
• Span <250 °C (450 °F)	< 0.25 °C (0.45 °F)
• Span >250 °C (450 °F)	< 0.1% of measuring span
Repeatability	< 0.1 °C (0.18 °F)
Measuring current	approx. 0.4 mA
Measuring cycle	< 0.7 s
Measuring range	-200 ... +850 °C (-328 ... +1562 °F)
Measuring span	25 ... 1050 °C (77 ... 1922 °F)
Unit	°C or °F
Offset	Programmable: -100 ... +100 °C (-180 ... +180 °F)
Wire resistance	Max. 20 Ω (total from feeder and return conductor)
Noise rejection	50 and 60 Hz
Output	
Output signal	4 ... 20 mA, 2-wire
Auxiliary power	8.5 ... 36 V DC (30 V with Ex ia and ib; 32 V with Ex nL/ic; 35 V with Ex nA)
Max. load	$(U_{aux} - 8.5\ V)/0.023\ A$
Overrange	3.6 ... 23 mA, infinitely adjustable (default range: 3.84 ... 20.5 mA)
Error signal (following sensor fault) (conforming to NE43)	3.6 ... 23 mA, infinitely adjustable (default range: 3.6 mA or 22.8 mA)
Damping time	0…30 s (default value: 0 s)
Protection	Against reverse polarity
Resolution	12 bit
Accuracy at 23 °C (73.4 °F)	< 0.1% of measuring span
Temperature effect	< 0.1 %/10 °C (0.1 %/18 °F)
Effect of auxiliary power	< 0.01 % of span/V
Effect of load impedance	< 0.025 % of max. span/100 Ω
Long-term drift	• < 0.025% of the max. span in the first month • < 0.035% of the max. span after one year • < 0.05% of the max. span after 5 years
Ambient conditions	
Ambient temperature	-40 ... +85 °C (-40 ... +185 °F)
Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
Relative humidity	< 98 %, with condensation
Electromagnetic compatibility	According to EN 61326 and NAMUR NE21
Design	
Weight	50 g
Dimensions	See dimensional drawing
Material	Molded plastic
Cross-section of cables	Max. 2.5 mm^2 (AWG 13)
Degree of protection according to IEC 60529	
• Enclosure	IP40
• Terminals	IP00

Certificates and approvals	
Explosion protection ATEX	
EC type-examination certificate	PTB 05 ATEX 2049X
• "Intrinsic gas safety" type of protection	II 1 G Ex ia IIC T6/T4 II (1) 2 G Ex ib [ia Ga] IIC T6/T4 Gb II (1) 3 G Ex ic [ia Ga] IIC T6/T4 Gc II 3 G Ex ic IIC T6/T4 Gc
• "Non-sparking" type of protection	II 3 G Ex nA IIC T6/T4 Gc II 3 G Ex nA [ic] IIC T6/T4 Gc
• "Intrinsic dust safety" type of protection	II 1 D Ex ia IIIC T115 °C Da
Explosion protection: FM for USA	
• FM approval	FM 3024169
• Degrees of protection	IS / Cl I, II, III / Div 1 / GP ABCDEFG T6, T5, T4 Cl I / ZN 0 / AEx ia IIC T6, T5, T4 NI / Cl I / Div 2 / GP ABCDFG T6, T5, T4 NI / Cl I / ZN 2 / IIC T6, T5, T4
Explosion protection to FM for Canada ($_cFM_{US}$)	
• FM approval	FM 3024169C
• Degrees of protection	IS / Cl I, II, III / Div 1/ GP ABCDEFG T6, T5, T4 NI / Cl I / DIV 2 / GP ABCD T6, T5, T4 NIFW / Cl I, II, III / DIV 2 / GP ABCDFG T6, T5, T4 DIP / Cl II, III / Div 2 / GP FG T6, T5, T4 Cl I / ZN 0 / Ex ia IIC T6, T5, T4 Cl I / ZN 2 / Ex nA nL IIC T6, T5, T4
Other certificates	EAC Ex(GOST), NEPSI
Software requirements for SIPROM T	
PC operating system	Windows ME, 2000, XP, Win 7 and Win 8; in connection with RS 232 modem, also Windows 95, 98 and 98SE

Factory setting:
- Pt100 (IEC 751) in the 3-wire connection
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current in the event of sensor breakage: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

SITRANS TH100 (4 to 20 mA, Pt100)

Selection and ordering data

	Article No.
SITRANS TH100 Head transmitter for Pt100 For installation in connection head type B, 2-wire system 4 ... 20 mA, programmable, without galvanic isolation	
Without explosion protection	**7NG3211-0NN00**
With explosion protection "Intrinsic safety" type of protection and for zone 2	
• According to ATEX	**7NG3211-0AN00**
• According to FM ($_{C}FM_{US}$)	**7NG3211-0BN00**

Options	Order code
Append suffix "**-Z**" to article no., add order code and plain text, if applicable.	
Test report (5 measuring points)	**C11**
Customer-specific programming	
Measuring range to be set Specify in plain text (max. 5 digits): Y01:... to ... °C, °F	**Y01**[1]
Measuring point number (TAG) max. 8 characters	**Y17**[2]
Measuring point description, max. 16 characters	**Y23**[2]
Pt100 (IEC) 2-wire, R_L = 0 Ω	**U02**[3]
Pt100 (IEC) 3-wire	**U03**[3]
Pt100 (IEC) 4-wire	**U04**[3]
Enter special deviating customer-specific setting in plain text	**Y09**[4]
Fault current 3.6 mA (instead of 22.8 mA)	**U36**[2]

1) For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.

2) For this selection, Y01 or Y09 must also be selected.

3) For this selection, Y01 must also be selected.

4) For customer-specific programming for mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.

Accessories

	Article No.
Additional accessories for assembly, connection and transmitter configuration, see page 2/251.	
Modem Modem with USB interface and SIPROM T software	**7NG3092-8KN**
Mounting rail adapter for head transmitter (Quantity delivered: 5 units)	**7NG3092-8KA**
Connecting cable 4-wire, 200 mm (7.87 inch), for sensor connections when using head transmitters in the high hinged cover (set with 5 units)	**7NG3092-8KC**

For supply units, see Catalog FI01 section "Supplementary components"

Ordering example:

7NG3211-0NN00-Z Y01+Y23+U03

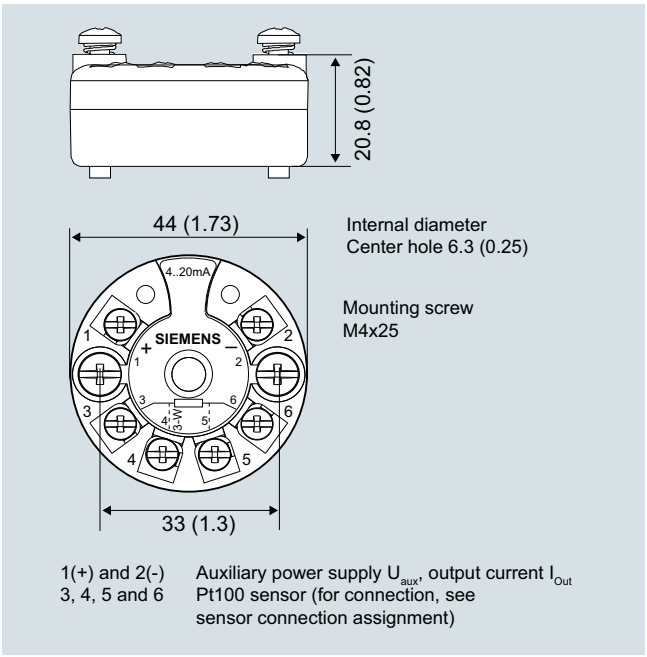
Y01: -10 ... +100 °C

Y23: TICA1234HEAT

Factory setting:

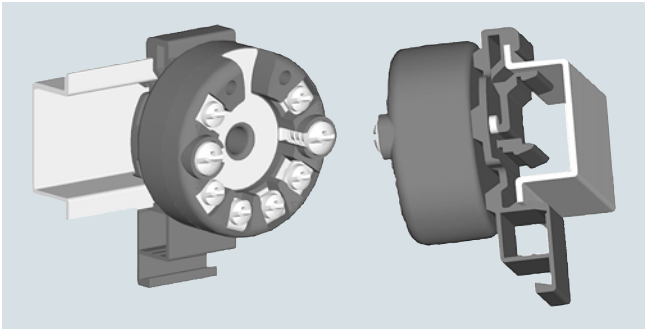
- Pt100 (IEC 751) in the 3-wire connection
- Measuring range: 0 … 100 °C (32 … 212 °C)
- Fault current in the event of sensor breakage: 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

Dimensional drawings

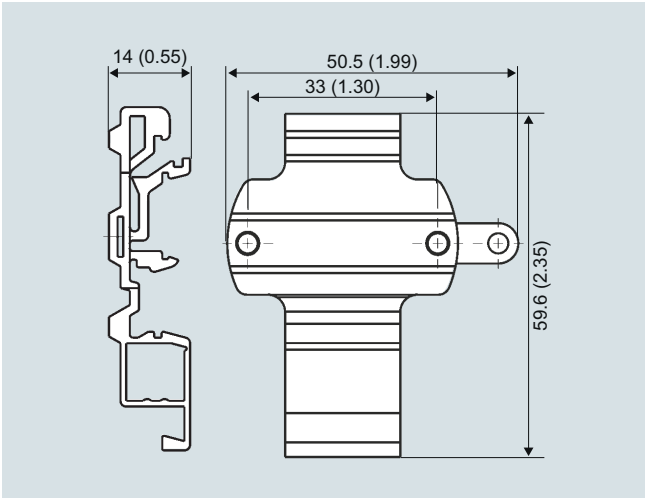


SITRANS TH100, dimensions in mm (inch)

Mounting on DIN rail

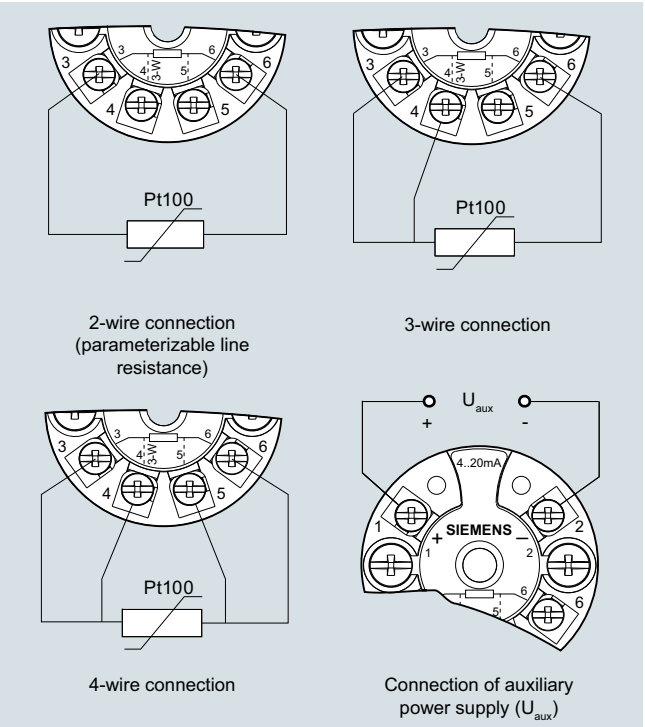


SITRANS TH100, mounting of transmitter on DIN rail



DIN rail adapter, dimensions in mm (inch)

Circuit diagrams



SITRANS TH100, sensor connection assignment