Temperature Measurement

Transmitters for mounting in sensor head

SITRANS TH100 two-wire system (Pt100)

Overview



The SITRANS TH100 dispenses with electrical isolation and universal sensor connection to provide a low-cost alternative for Pt100 measurements.

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

Its extremely compact design makes the SITRANS TH100 ideal for the retrofitting of measuring points or for the use of analog transmitters.

The transmitter is available as a non-Ex version as well as for use in potentially explosive atmospheres.

Benefits

- Two-wire transmitter
- Assembly in connection head type B (DIN 43729) or larger, or on a standard DIN rail
- Can be programmed, which means that the sensor connection, measuring range, etc. can also be programmed
- · Intrinsically-safe version for use in potentially explosive areas

Application

Used in conjunction with Pt100 resistance thermometers, the SITRANS TH100 transmitters are ideal for measuring temperatures in all industries. Due to its compact size it can be installed in the connection head type B (DIN 43729) or larger.

The output signal is a direct current from 4 to 20 mA that 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 No. 7NG3190-6KB), you can continue using this to parameterize the SITRANS TH100.

Transmitters of the "intrinsically-safe" type of protection can be installed within potentially explosive atmospheres. The devices comply with the Directive 94/9/EC (ATEX), as well as FM and CSA regulations.

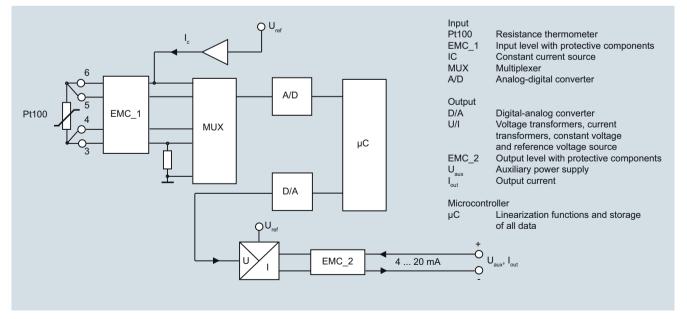
Function

Mode of operation

The measured signal supplied by a Pt100 resistance thermometer (2, 3 or 4-wire system) 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/digital converter. They are converted in the microcontroller in accordance with the sensor characteristics and further parameters (measuring range, damping, ambient temperature etc.).

The signal prepared in this way is converted in a digital/analog 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 diagram

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Input		Construction	
Resistance thermometer		Weight	50 g
Measured variable	Temperature	Dimensions	See dimensional drawing
Sensor type	PT100 to IEC 60751	Material	Molded plastic
Characteristic curve	Temperature-linear	Cross-section of cables	Max. 2.5 mm ² (AWG 13)
Type of connection	2-, 3- or 4-wire circuit	Degree of protection to IEC 60529	
Resolution	14 bit	Enclosure	IP40
Measuring accuracy		Terminals	IP00
• Span <250 °C (450 °F) • Span >250 °C (450 °F)	< 0.25 °C (0.45 °F) < 0.1 % of span	Certificates and approvals Explosion protection ATEX	
Repeatability	< 0.1 °C (0.18 °F)	EC type test certificate	PTB 05 ATEX 2049X
Measuring current	approx. 0.4 mA	 "Intrinsic gas safety" type of pro- 	II 1 G Ex ia IIC T6/T4
Measuring cycle	< 0.7 s	tection	II (1) 2 G Ex ib [ia Ga] IIC T6/T4 (II (1) 3 G Ex ic [ia Ga] IIC T6/T4 (
Measuring range	-200 +850 °C -328 +1562 °F)	 "Non-sparking" type of protection 	II 3 G Ex ic IIC T6/T4 Gc II 3 G Ex nA IIC T6/T4 Gc
Measuring span	25 1050 °C (77 1922 °F)		II 3 G Ex nA[ic] IIC T6/T4 Gc
Unit	°C or °F	 "Intrinsic dust safety" type of pro- tection 	II 1 D Ex ia IIIC T115 °C Da
Offset	programmable: -100 +100 °C (-180 +180 °F)	Explosion protection FM for USA • FM approval	FM 3024169
Line resistance	Max. 20 Ω (total from feeder and return conductor)	Degree of protection	IS / CI I, II, III / Div 1 / GP ABCDE T6, T5, T4
Noise rejection	50 and 60 Hz		CI I / ZN 0 / AEx ia IIC T6, T5, T4 NI / CI I / Div 2 / GP ABCDFG T6
Output			T5, T4
Output signal	4 20 mA, two-wire	Euclosian protection EM for Concide	NI / CI I / ZN 2 / IIC T6, T5, T4
Auxiliary power	8.5 36 V DC (30 V for Ex ia and ib; 32 V for Ex nL/ic; 35 V for Ex nA)	Explosion protection FM for Canada (_c FM _{US}) • FM approval	FM 3024169C
Max. load	(U _{aux} - 8.5 V)/0.023 A	 Degree of protection 	IS / CI I, II, III / Div 1/ GP ABCDEF T6, T5, T4
Overrange	3.6 23 mA, infinitely adjustable (default range: 3.84 20.5 mA)		NI/CII/DIV2/GPABCDT6, T5 T4
Error signal (following sensor fault) (conforming to NE43)	3.6 23 mA, infinitely adjustable (default range: 3.6 mA or 22.8 mA)		NIFW / CI I, II, III / DIV 2 / GP ABCDFG T6, T5, T4 DIP / CI II, III / Div 2 / GP FG T6, ⁻ T4
Damping time	0 30 s (default value: 0 s)		CII/ZN0/Ex ia IIC T6, T5, T4
Protection	Against reversed polarity		CI I / ZN 2 / Ex nA nL IIC T6, T5,
Resolution	12 bit	Other certificates	EAC Ex(GOST), NEPSI
Accuracy at 23 °C (73.4 °F)	< 0.1 % of span	Software requirements for SIPROM T	
Temperature effect	< 0.1 %/10 °C (0.1 %/18 °F)	PC operating system	Windows ME, 2000, XP, Win 7 ar
Effect of auxiliary power	< 0.01 % of span/V		Win 8; can also be used in con-
Effect of load impedance	< 0.025 % of max. span/100 Ω		nection with RS 232 modem under Windows 95, 98 and 98S
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 range	-40 +85 °C (-40 +185 °F)		
Storage temperature range	-40 +85 °C (-40 +185 °F)		
Relative humidity	98 %, with condensation		

Temperature Measurement

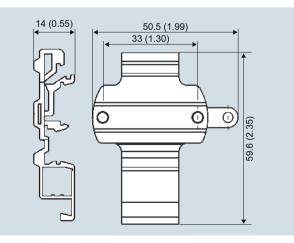
Transmitters for mounting in sensor head

SITRANS TH100 two-wire system (Pt100)

SITRANS TH100 temperature transmitters for Pit100 for installation in connection head, type B (DN 43729), two-wire system, 4 20 mA, programmable, without electrical isolation • 7NG3211-0NN00 • Without explosion protection • Without explosion protection "Intrinsic safety" type of protection and for zone 2 • to ATEX • to FM (_FMujs) • 7NG3211-0NN00 • Without explosion protection "Intrinsic safety" type of protection and for zone 2 • to ATEX • to FM (_FMujs) • 7NG3211-0AN00 7NG3211-0BN00 Further designs Add *2 to Article No. and specify Order code(s) Order code Test report (5 measuring points) C11 Customer-specific programming Add *2 to Article No. and specify Order code(s) Y01 ¹) Measuring point no. (TAG), max. 8 characters Prito0 (EC) 2-wire, R _L = 0 Ω Y02 ³) Pit100 (EC) 2-wire, R _L = 0 Ω U02 ³) Pit100 (EC) 2-wire, R _L = 0 Ω U03 ³) Pit100 (EC) 2-wire, R _L = 0 Ω U03 ³) Pit100 (EC) 2-wire, R _L = 0 Ω U03 ³) Pit100 (EC) 2-wire, R _L = 0 Ω U03 ³) Pit100 (EC) 2-wire Relissafe value 3.6 mA (Instead of 22,8 mA) U36 ³) Accessories Article No. Modem for SITRANS TH100, TH200, TR200 mof TF with H200 Incl. SIFPROM T parameteri- zation software With USB connection NGS00284512	Selection and Ordering data	Article No.	Dimensional drawings	
for PH100 Internal diameter (Center hole 6.3 (0.25)) for Add '27 to Article No. and specify Order code(s) TNG3211-0NN00 Further designs Order code Add '27 to Article No. and specify Order code(s) Internal diameter (Center hole 6.3 (0.25)) Measuring range to be set Y01'1 Specify in plain text (max. 5 digits): Y01'1 Reasuring point no. (TAG), max. 8 characters Y172'1 Measuring point descriptor, max. 16 characters Y172'1 P1100 (IEC) 2-wire, R _L = 0 Ω U02'3 P1100 (IEC) 2-wire, R _L = 0 Ω U02'3 P1100 (IEC) 2-wire, R _L = 0 Ω U03'3 P1100 (IEC) 2-wire, R _L = 0 Ω U03'3 P1100 (IEC) 2-wire U03'3 P1100 (IEC) 2-wire, R _L = 0 Ω U03'3 P1100 (IEC) 2-wire, R _L = 0 Ω U03'3 P1100 (IEC) 2-wire, R _L = 0 Ω U03'3 Special differing c	•	Article No.	Dimensional drawings	
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	for Pt100			
• With explosite protection multise safety type of protection and for zone 2 • to ATEX ▶ ● 7NG3211-0AN00 • to FM (_c FM _{US}) ▶ ● 7NG3211-0BN00 Order code Add *-Z' to Article No. and specify Order code(s) Order code Internal diameter Center hole 6.3 (0.25) Measuring range to be set Y01 ¹¹ Y01 ¹¹ Wouting screw Measuring point descriptor, max. 16 characters Y17 ²¹ Y0100 (IEC) 2-wire, R _L = 0 Ω U02 ³ P1100 (IEC) 3-wire U03 ³ P1100 (IEC) 4-wire U04 ³ Specify in plain text Y09 ⁴¹ Fail-safe value 3.6 mA (instead of 22.8 mA) U36 ²¹ Accessories Article No. Modem for SITRANS TH100, TH200 TR200 * and TF with TH200 incl. SIPROM T parameterization software Article No. Mith USD for temperature measuring instru- ▶ A5E00364512	(DIN 43729), two-wire system, 4 20 mA,		0.08	
• With explosite protection multise safety type of protection and for zone 2 • to ATEX ▶ ● 7NG3211-0AN00 • to FM (_c FM _{US}) ▶ ● 7NG3211-0BN00 Order code Add *-Z' to Article No. and specify Order code(s) Order code Internal diameter Center hole 6.3 (0.25) Measuring range to be set Y01 ¹¹ Y01 ¹¹ Wouting screw Measuring point descriptor, max. 16 characters Y17 ²¹ Y0100 (IEC) 2-wire, R _L = 0 Ω U02 ³ P1100 (IEC) 3-wire U03 ³ P1100 (IEC) 4-wire U04 ³ Specify in plain text Y09 ⁴¹ Fail-safe value 3.6 mA (instead of 22.8 mA) U36 ²¹ Accessories Article No. Modem for SITRANS TH100, TH200 TR200 * and TF with TH200 incl. SIPROM T parameterization software Article No. Mith USD for temperature measuring instru- ▶ A5E00364512	Without explosion protection	7NG3211-0NN00		
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Special differing customer-specific programming, specify in plain text Y09 ⁴) SITRANS TH100, dimensions in mm (inch) Fail-safe value 3.6 mA (instead of 22,8 mA) U36 ²) Modem for SITRANS TH100, TH200, TR200 and TF with TH200 incl. SIPROM T parameterization software Article No. MiniDVD for temperature measuring instru- > A5E00364512 A5E00364512	Pt100 (IEC) 3-wire	U03 ³⁾		
ming, specify in plain text Image: Specify in plain text Fail-safe value 3.6 mA (instead of 22,8 mA) U36 ²) Accessories Article No. Modem for SITRANS TH100, TH200, TR200 and TF with TH200 incl. SIPROM T parameterization software 7NG3092-8KU With USB connection Aste00364512	Pt100 (IEC) 4-wire	U04 ³⁾		
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and TF with TH200 incl. SIPROM T parameteri- zation software With USB connection MiniDVD for temperature measuring instru- > A5E00364512	Accessories	Article No.		
	and TF with TH200 incl. SIPROM T parameteri- zation software			
ilients	MiniDVD for temperature measuring instru-			
With documentation in German, English, French, Spanish, Italian, Portuguese and SIPROM T parameterization software	French, Spanish, Italian, Portuguese and			
DIN rail adapters for head transmitters > 7NG3092-8KA (Quantity delivered: 5 units)		7NG3092-8KA		

7NG3092-8KC

SITRANS TH100, mounting of transmitter on DIN rail



DIN rail adaptor, dimensions in mm (inch)

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.

• We can offer shorter delivery times for configurations designated with the Quick Ship Symbol . For details see page 9/5 in the appendix.

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

4-wire, 150 mm, for sensor connections when using head transmitters in the high hinged

- ⁴⁾ For customer-specific programming, for example mV and ohm, the start value and the end value of the required measuring span and the unit must be entered here.
- Supply units see Chapter "Supplementary Components".

Ordering example

Connecting cable

cover (set with 5 units)

Available ex stock.

7NG3211-0NN00-Z Y01+Y23+U03 Y01: -10 ... +100 °C Y23: TICA1234HEAT Factory setting: • Pt100 (IEC 751) with 3-wire circuit

- Measuring range: 0 ... 100 °C (32 ... 212 °C)
- Error signal in the event of sensor breakage: 22.8 mA
- Sensor offset: 0 C (0 °F)
- Damping 0.0 s

Transmitters for mounting in sensor head

SITRANS TH100 two-wire system (Pt100)

Pt100 Pt100 Two-wire system (parameterizable line Three-wire system resistance) U_{aux} 0 0-68 ..20m/ 0 /= SIEMENS Pt100 Four-wire system Connection of auxiliary power supply (U_{aux}) SITRANS TH100, sensor connection assignment

Schematics