

## Temperature measurement

Temperature transmitters

Field transmitters/field indicator

### SITRANS TF - Transmitter, 2-wire system and SITRANS TF - Field indicator for 4 to 20 mA

#### Overview



#### Our field devices for heavy industrial use

- HART, Universal
- 4 to 20 mA, universal
- Field indicator for 4 to 20 mA signals

The temperature transmitter SITRANS TF works where others feel uncomfortable.

#### Benefits

- Universal use
  - as transmitter for resistance thermometer, thermocouple element,  $\Omega$  or mV signal
  - as field indicator for any 4 to 20 mA signals
- Local sensing of measured values over digital display
- Rugged two-chamber enclosure in die-cast aluminum or stainless steel
- IP66/67/68 degree of protection
- Test terminals for direct read-out of the output signal without breaking the current loop
- Can be mounted elsewhere if the measuring point
  - is difficult to access
  - has high temperatures
  - experiences vibrations due to the process cell
  - is to avoid long neck pipes and thermowells
- Can be mounted directly on American-design sensors
- Wide range of approvals for use in potentially explosive atmospheres. Types of protection "Intrinsically safe, non-sparking and flameproof", for Europe and the USA.
- SIL2 (with order note C20), SIL2/3 (with C23)

#### Application

SITRANS TF can be used everywhere where temperatures need to be measured under particularly adverse conditions, or where a convenient local display is ideal. Which is why users from all industries have opted for this field device. The rugged enclosure protects the electronics. The stainless steel model is almost completely resistant to sea water and other aggressive substances. The inner workings offer high measuring accuracy, universal input and a wide range of diagnostic options.

#### Function

##### Configuration

The communication capability over the HART protocol V 5.9 of the SITRANS TF with an integrated SITRANS TH300 permits parameterization using a PC or HART communicator (hand-held communicator). The SIMATIC PDM makes it easy.

For the SITRANS TF with integrated programmable SITRANS TH200, parameters are assigned with the PC. Available for this purpose are a special modem and the software tool SIPROM T.

##### Mode of operation

##### Mode of operation of SITRANS TF as temperature transmitter

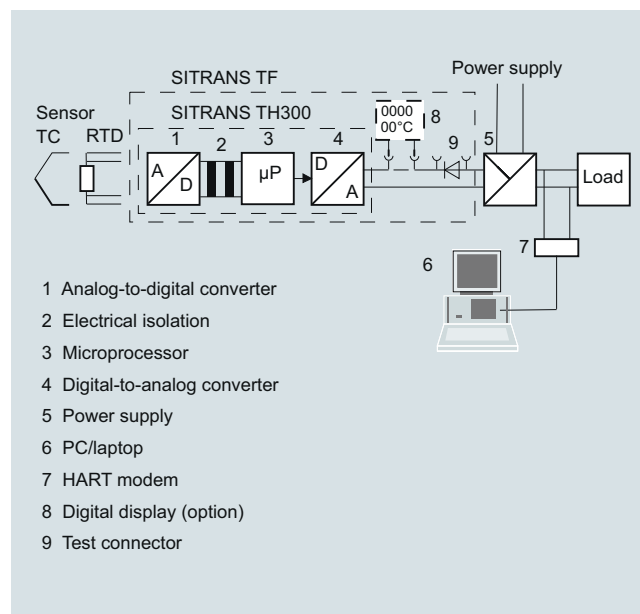
The sensor signal, whether resistance thermometer, thermocouple element or  $\Omega$  or mV signal, is amplified and linearized. Sensor and output side are electrically isolated. An internal cold junction is integrated for measurements with thermocouples.

The device outputs a temperature-linear direct current of 4 to 20 mA. As well as the analog transmission of measured values from 4 to 20 mA, the HART version also supports digital communication for online diagnostics, measured value transmission and configuration.

SITRANS TF automatically detects when a sensor should be interrupted or is indicating a short-circuit. The practical test terminals allow direct measurement of 4 to 20 mA signals over an ammeter without interrupting the output current loop.

##### Mode of operation of SITRANS TF as field indicator

Any 4 to 20 mA signal can be applied to the generous terminal block. As well as a range of predefined measurement units, the adjustable indicator also supports the input of customized units. This means that any 4 to 20 mA signal can be represented in any unit, e.g. pressure, flow rate, level or temperature.



Mode of operation of SITRANS TF with integrated SITRANS TH300 and digital display

## Technical specifications

### Input

#### Resistance thermometer

Measured variable	Temperature
Input type	Pt25 ... Pt1000
• According to IEC 60751	Pt25 ... Pt1000
• Acc. to JIS C 1604; a=0.00392 K-1	Ni25 ... Ni1000
• According to IEC 60751	
Units	°C and °F
Connection	
• Standard connection	1 resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire connection
• Averaging	Series or parallel connection of several resistance thermometers in the 2-wire connection for the generation of average temperatures or for adaptation to other device types
• Differentiation	2 resistance thermometers (RTD) in 2-wire connection (RTD 1 – RTD 2 or RTD 2 – RTD 1)
Connection	
• 2-wire connection	Line resistance can be configured $\leq 100 \Omega$ (loop resistance)
• 3-wire connection	No trim necessary
• 4-wire connection	No trim necessary
Sensor current	$\leq 0.45$ mA
Response time	$\leq 250$ ms for 1 sensor with break monitoring
Break monitoring	Always active (cannot be switched off)
Short-circuit monitoring	Can be switched on/off (default value: ON)
Measuring range	Assignable (see "Digital measuring error" table)
Min. measuring span	10 °C (18 °F)
Characteristic curve	Temperature-linear or special characteristic

#### Resistance-based sensor

Measured variable	Actual resistance
Sensor type	Resistance-based, potentiometers
Units	$\Omega$
Connection	
• Standard connection	1 resistance-based sensor (R) in 2-wire, 3-wire or 4-wire connection
• Averaging	2 resistance-based sensors in 2-wire connection for averaging
• Differentiation	2 resistance-based sensors in 2-wire connection (R 1 – R 2 or R 2 – R 1)
Connection	
• 2-wire connection	Line resistance can be configured $\leq 100 \Omega$ (loop resistance)
• 3-wire connection	No trim necessary
• 4-wire connection	No trim necessary
Sensor current	$\leq 0.45$ mA
Response time	$\leq 250$ ms for 1 sensor with break monitoring
Break monitoring	Can be switched off
Short-circuit monitoring	Can be switched off (value is adjustable)
Measuring range	Assignable max. 0 ... 2200 $\Omega$ (see "Digital measuring error" table)
Min. measuring span	5 ... 25 $\Omega$ (see "Digital measuring error" table)
Characteristic curve	Resistance-linear or special characteristic

### Thermocouples

Measured variable	Temperature
Sensor type (thermocouples)	Pt30Rh-Pt6Rh acc. to IEC 584
• Type B	W5%-Re acc. to ASTM 988
• Type C	W3%-Re acc. to ASTM 988
• Type D	NiCr-CuNi acc. to IEC 584
• Type E	Fe-CuNi acc. to IEC 584
• Type J	NiCr-Ni acc. to IEC 584
• Type K	Fe-CuNi acc. to DIN 43710
• Type L	NiCrSi-NiSi acc. to IEC 584
• Type N	Pt13Rh-Pt acc. to IEC 584
• Type R	Pt10Rh-Pt acc. to IEC 584
• Type S	Cu-CuNi acc. to IEC 584
• Type T	Cu-CuNi acc. to DIN 43710
• Type U	
Units	°C or °F
Connection	
• Standard connection	1 thermocouple (TC)
• Averaging	2 thermocouples (TC)
• Differentiation	2 thermocouples (TC) (TC 1 – TC 2 or TC 2 – TC 1)
Response time	$\leq 250$ ms for 1 sensor with break monitoring
Break monitoring	Can be switched off
Reference junction compensation	
• Internal	With integrated Pt100 resistance thermometer
• External	With external Pt100 IEC 60751 (2-wire or 3-wire connection)
• External fixed	Reference junction temperature can be set as fixed value
Measuring range	Assignable (see "Digital measuring error" table)
Min. measuring span	Min. 40 ... 100 °C (72 ... 180 °F) (see "Digital measuring error" table)
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)
Units	mV
Response time	$\leq 250$ ms for 1 sensor with break monitoring
Break monitoring	Can be switched off
Measuring range	-10 ... +70 mV -100 ... +1100 mV
Min. measuring span	2 mV or 20 mV
Overload capability of the input	-1.5 ... +3.5 V DC
Input resistance	$\geq 1$ M $\Omega$
Characteristic curve	Voltage-linear or special characteristic

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#### SITRANS TF - Transmitter, 2-wire system and SITRANS TF - Field indicator for 4 to 20 mA

<b>Output</b>	Output signal 4 ... 20 mA, 2-wire Communication with SITRANS TH300 According to HART Rev. 5.9	<b>Certificates and approvals</b>	Explosion protection ATEX • "Intrinsic safety" type of protection	With digital display: II 2 (1) G Ex ib [ia Ga] IIC T4 Gb II 2 G Ex ib IIC T4 Gb II 1D Ex ia IIIC T100 °C Da Without digital display: II 2 (1) G Ex ib [ia Ga] IIC T6 Gb II 2 G Ex ib IIC T6 Gb II 1D Ex ia IIIC T100 °C Da ZELM 11 ATEX 0471 X II 3 G Ex ic IIC T6/T4 Gc II 3 G Ex nA IIC T6/T4 Gc II 3 G Ex nA [ic] IIC T6/T4 Gc ZELM 11 ATEX 0471 X II 2 G Ex d IIC T6/T5 Gb II 2 D Ex tb IIIC T100 °C Db ZELM 11 ATEX 0472 X
<b>Digital display</b>	Digital display (optional) In current loop Display Max. 5 digits Digit height 9 mm (0.35") Display range -99 999 ... +99 999 Units Any (max. 5 char.) Setting: Zero point, full-scale value and unit Using 3 buttons Load voltage 2.1 V	• EC type-examination certificate • "Non-sparking and energy-limited equipment for Zone 2" type of protection • EC type-examination certificate • "Flameproof enclosure" type of protection • EC type-examination certificate	Explosion protection acc. to FM • Identification (XP, DIP, NI, S)	Certificate of Compliance 3017742 • XP/II/BCD/T5 Ta = 85 °C (185 °F), T6 Ta = 60 °C (140 °F), Type 4X • DIP/II, III/1/EFG/T5 Ta = 85 °C (185 °F), T6 Ta = 60 °C (140 °F), Type 4X • NI/II/ABCD/T5 Ta = 85 °C (185 °F), T6 Ta = 60 °C (140 °F), Type 4X • S/II, III/2/FG/T5 Ta = 85 °C (185 °F), T6 Ta = 60 °C (140 °F), Type 4X
<b>Measuring accuracy</b>	Digital measuring error See "Digital measuring error" table Reference conditions • Auxiliary power 24 V ± 1 % • Load 500 Ω • Ambient temperature 23 °C (73.4 °F) • Warming-up time > 5 min Error in the analog output (digital/analog converter) < 0.025 % of measuring span Error due to internal reference junction < 0.5 °C (0.9 °F) Effect of ambient temperature • Analog measuring error 0.02 % of meas. span/10 °C (18 °F) • Digital measuring error • with resistance thermometers 0.06 °C (0.11 °F)/10°C (18 °F) • with thermocouples 0.6 °C (1.1 °F)/10°C (18 °F) Auxiliary power effect < 0.001 % of meas. span/V Effect of load impedance < 0.002 % of meas. span/100 Ω Long-term drift • In the first month < 0.02 % of measuring span • After one year < 0.2 % of measuring span • After 5 years < 0.3 % of measuring span	Other certificates IECEX, EAC Ex(GOST), INMETRO, NEPSI, KOSHA	<b>Hardware and software requirements</b> • For the SIPROM T parameterization software for SITRANS TF with TH200 • Personal computer PC with CD-ROM drive and USB interface • PC operating system Windows 98, NT, 2000, XP, 7 and Win 8 • For the SIMATIC PDM parameterization software for SITRANS TH300 See section 8 "Digitalization and communication", "SIMATIC PDM"	
<b>Rated conditions</b>	<u>Ambient conditions</u> Ambient temperature -40 ... +85 °C (-40 ... +185 °F) Condensation Permissible Electromagnetic compatibility According to EN 61326 and NAMUR NE21 Degree of protection acc. to EN 60529 IP66/67/68	<b>Communication</b> Load for HART connection 230 ... 1100 Ω • Two-core shielded ≤ 3.0 km (1.86 mi) • Multi-core shielded ≤ 1.5 km (0.93 mi) Protocol HART protocol, version 5.9		
<b>Design</b>	Weight Approx. 1.5 kg (3.3 lb) without options Dimensions See "Dimensional drawings" Enclosure material Die-cast aluminum, low in copper, GD-AISI 12 or stainless steel, polyester-based lacquer, stainless steel rating plate Electrical connection, sensor connection Screw terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed gland Mounting bracket (optional) Steel, galvanized and chrome-plated or stainless steel			
<b>Auxiliary power</b>	Without digital display 11 ... 35 V DC (30 V with Ex ib; 32 V with Ex ic and Ex nA) With digital display 13.1 ... 35 V DC (30 V with Ex ib; 32 V with Ex ic and Ex nA) Galvanic isolation Between input and output • Test voltage $U_{\text{eff}} = 1 \text{ kV}, 50 \text{ Hz}, 1 \text{ min}$			
			<b>Factory setting of the transmitter:</b> • Pt100 (IEC 751); 3-wire connection • Measuring range: 0 ... 100 °C (32 ... 212 °F) • Fault current: 22.8 mA • Sensor offset: 0 °C (0 °F) • Damping 0.0 s	

#### SITRANS TF - Transmitter, 2-wire system and SITRANS TF - Field indicator for 4 to 20 mA

#### Digital measuring error

##### Resistance thermometer

Input	Measuring range °C (°F)	Minimum measuring span		Digital accuracy	
		°C	(°F)	°C	(°F)
<b>According to IEC 60751</b>					
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)
<b>According to JIS C1604-81</b>					
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 sensor

Input	Measuring range Ω	Minimum measuring span Ω	Digital accuracy Ω
Resistance	0 ... 2200	25	0.25

##### Thermocouples

Input	Measuring range °C (°F)	Minimum measuring span		Digital accuracy	
		°C	(°F)	°C	(°F)
Type B	100 ... 1820 (212 ... 3308)	100	(180)	2 <sup>1)</sup>	(3.6) <sup>1)</sup>
Type C (W5)	0 ... 2300 (32 ... 4172)	100	(180)	2	3.6
Type D (W3)	0 ... 2300 (32 ... 4172)	100	(180)	1 <sup>2)</sup>	(1.8) <sup>2)</sup>
Type E	-200 ... +1000 (-328 ... +1832)	50	(90)	1	(1.8)
Type J	-200 ... +1200 (-328 ... +2192)	50	(90)	1	(1.8)
Type K	-200 ... +1370 (-328 ... +2498)	50	(90)	1	(1.8)
Type L	-200 ... +900 (-328 ... +1652)	50	(90)	1	(1.8)
Type N	-200 ... +1300 (-328 ... +2372)	50	(90)	1	(1.8)
Type R	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.6)
Type S	-50 ... +1760 (-58 ... +3200)	100	(180)	2	(3.6)
Type T	-20 ... +400 (-328 ... +752)	40	(72)	1	(1.8)
Type U	-200 ... +600 (-328 ... +1112)	50	(90)	2	(3.6)

<sup>1)</sup> The digital accuracy in the range 100 to 300 °C (212 to 572 °F) is 3 °C (5.4 °F).

<sup>2)</sup> 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	Minimum measuring span mV	Digital accuracy μV
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 measuring 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 reference junction errors in the case of thermocouple measurements).

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Field transmitters/field indicator

### SITRANS TF - Transmitter, 2-wire system and SITRANS TF - Field indicator for 4 to 20 mA

#### Selection and ordering data

	Article No.	Options	Order code
<b>Temperature transmitter in field enclosure</b> 2-wire system 4 ... 20 mA, with electrical isolation  ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7NG313		
<b>Built-in transmitter</b>  SITRANS TH200, programmable <ul style="list-style-type: none"> <li>Without Ex protection</li> <li>With Ex ia (ATEX + IECEx)</li> <li>With Ex nAL for Zone 2 (ATEX + IECEx)</li> <li>Total device SITRANS TF Ex d (ATEX + IECEx)<sup>1)</sup></li> <li>Total device SITRANS TF according to FM (XP, DIP, NI, S)<sup>1)</sup></li> </ul> SITRANS TH300, communication-capable according to HART V 5.9 <ul style="list-style-type: none"> <li>Without Ex protection</li> <li>With Ex ia (ATEX + IECEx)</li> <li>With Ex nAL for Zone 2 (ATEX + IECEx)</li> <li>Total device SITRANS TF Ex d (ATEX + IECEx)<sup>1)</sup></li> <li>Total device SITRANS TF according to FM (XP, DIP, NI, S)<sup>1)</sup></li> </ul>	5 0 5 1 5 2 5 4 5 5  6 0 6 1 6 2 6 4 6 5		
<b>Enclosure</b>  Die-cast aluminum Stainless steel precision casting			A E
<b>Connections/cable inlet</b>  Screwed glands M20x1.5 ½-14 NPT glands			B C
<b>Digital indicator</b>  Without With			0 1
<b>Mounting bracket and fastening parts</b>  Without Made of steel Made of stainless steel			0 1 2
		Append suffix "-Z" to article no., add order code and plain text, if applicable.  Test report (5 measuring points)  Functional safety SIL2  Functional safety SIL2/3  Explosion protection <ul style="list-style-type: none"> <li>Explosion protection Ex ia according to                INMETRO (Brazil) (only for 7NG313.-1...)</li> <li>Explosion protection Ex d according to                INMETRO (Brazil) (only for 7NG313.-4...)</li> <li>Explosion protection Ex nA according to                INMETRO (Brazil) (only for 7NG313.-2...)</li> <li>Explosion protection Ex i according to NEPSI                (China) (only for 7NG313.-1...)</li> <li>Explosion protection Ex d according to NEPSI                (China) (only for 7NG313.-4...)</li> <li>Explosion protection Ex nA according to                NEPSI (China) (only for 7NG313.-2...)</li> <li>Explosion protection Ex d according to                KOSHA (Korea) (only for 7NG313.-4...)</li> <li>Explosion protection Ex i according to EAC                (Russia/Belarus/Kazakhstan) (only for                7NG313.-1...)</li> <li>Explosion protection Ex d according to EAC                (Russia/Belarus/Kazakhstan) (only for                7NG313.-4...)</li> <li>Explosion protection Ex nA according to EAC                (Russia/Belarus/Kazakhstan) (only for                7NG313.-2...)</li> </ul> Marine approvals <ul style="list-style-type: none"> <li>Det Norske Veritas Germanischer Lloyd                (DNV GL)</li> <li>Bureau Veritas (BV)</li> <li>Lloyd's Register of Shipping (LR)</li> <li>American Bureau of Shipping (ABS)</li> </ul> Two-layer coating of enclosure and cover (PU on epoxy)  Transient protection  Cable gland CAPRI ½ NPT ADE 4F, nickel- plated brass (CAPRI 848694 and 810634) included  Cable gland ½ NPT ADE 1F, cable diameter 6 ... 12 (CAPRI 818694 and 810534) included  Cable gland ½ NPT ADE 4F, Stainless steel (CAPRI 848699 and 810634) included  Cable gland ½ NPT ADE 1F, cable diameter 4 ... 8.5 (CAPRI 818674 and 810534) included	C11 C20 C23  E25 <sup>1)</sup> E26 <sup>1)</sup> E27 <sup>1)</sup> E55 <sup>1)</sup> E56 <sup>1)</sup> E57 <sup>1)</sup> E70 <sup>1)</sup> E81 <sup>1)</sup> E82 <sup>1)</sup> E83 <sup>1)</sup>  D01 D02 D04 D05  G10  J01 D57  D58  D59  D60

<sup>1)</sup> Without cable gland.

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### Field transmitters/field indicator

#### SITRANS TF - Transmitter, 2-wire system and SITRANS TF - Field indicator for 4 to 20 mA

Options	Order code
Append suffix <b>"-Z"</b> to article no., add order code and plain text, if applicable.	
<b>Customer-specific programming</b>	
Measuring range to be set Specify in plain text (max. 5 digits): Y01:... to ... °C, °F	<b>Y01<sup>2)</sup></b>
Measuring point number (TAG) max. 8 characters	<b>Y17<sup>3)</sup></b>
Measuring point description, max. 16 characters	<b>Y23<sup>4)</sup></b>
Measuring point description, max. 32 characters	<b>Y24<sup>4)</sup></b>
Labeling of measuring point plate only, specify in plain text: Measuring range	<b>Y22<sup>4)</sup></b>
Pt100 (IEC) 2-wire, $R_L = 0 \Omega$	<b>U02<sup>5)</sup></b>
Pt100 (IEC) 3-wire	<b>U03<sup>5)</sup></b>
Pt100 (IEC) 4-wire	<b>U04<sup>5)</sup></b>
Type B thermocouple	<b>U20<sup>5)6)</sup></b>
Type C thermocouple (W5)	<b>U21<sup>5)6)</sup></b>
Type D thermocouple (W3) <sup>5)6)</sup>	<b>U22<sup>5)6)</sup></b>
Type E thermocouple	<b>U23<sup>5)6)</sup></b>
Type J thermocouple	<b>U24<sup>5)6)</sup></b>
Type K thermocouple	<b>U25<sup>5)6)</sup></b>
Type L thermocouple	<b>U26<sup>5)6)</sup></b>
Type N thermocouple	<b>U27<sup>5)6)</sup></b>
Type R thermocouple	<b>U28<sup>5)6)</sup></b>
Type S thermocouple	<b>U29<sup>5)6)</sup></b>
Type T thermocouple	<b>U30<sup>5)6)</sup></b>
Type U thermocouple	<b>U31<sup>5)6)</sup></b>
For TC: Cold junction compensation: external (Pt100, 3-wire)	<b>U41</b>
For TC: Reference junction compensation: external with fixed value: specify in plain text	<b>Y50</b>
Enter special deviating customer-specific setting in plain text	<b>Y09<sup>7)</sup></b>
Fault current 3.6 mA (instead of 22.8 mA)	<b>U36<sup>3)</sup></b>

- 1) <sup>1)</sup> Option does not include ATEX/IECEx approval, only country-specific approval.
- 2) For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here. For specification on TAG plate, please select Y22.
- 3) For this selection, Y01 or Y09 must also be selected. For specification on TAG plate, please select Y23.
- 4) If only Y22, Y23 or Y24 is ordered and if the labeling is only noted on the measuring point plate, do not specify Y01.
- 5) For this selection, Y01 must also be selected.
- 6) Internal reference junction compensation is selected as the default for TC.
- 7) 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.

#### Accessories

	Article No.
Additional accessories for assembly, connection and transmitter configuration, see page 2/251.	
<b>Modems</b>	
Modem with USB interface	<b>7MF4997-1DB</b>
Modem with USB interface and SIPROM T software	<b>7NG3092-8KN</b>
<b>SIMATIC PDM parameterization software</b> Also for SITRANS TH300	<b>See section 8</b>
<b>Mounting bracket and fastening parts</b>	
Made of steel for 7NG313-..B..	<b>7MF4997-1AC</b>
Made of steel for 7NG313-..C..	<b>7MF4997-1AB</b>
Made of stainless steel for 7NG313-..B..	<b>7MF4997-1AJ</b>
Made of stainless steel for 7NG313-..C..	<b>7MF4997-1AH</b>
Made of stainless steel 316L for 7NG313-..B..	<b>7MF4997-1AQ</b>
Made of stainless steel 316L for 7NG313-..C..	<b>7MF4997-1AP</b>
<b>Digital display<sup>1)</sup></b>	<b>7MF4997-1BS</b>
<b>Connection board</b>	<b>A5E02226423</b>

For supply units, see Catalog FI 01 section "Supplementary components".

<sup>1)</sup> Retrofitting not possible with Ex devices.

#### Ordering example 1

7NG3135-0AB11-Z Y01+Y23+U03

Y01: -10 ... +100 °C

Y23: TICA1234HEAT

#### Ordering example 2

7NG3136-0AC11-Z Y01+Y23+Y24+U25

Y01: -10 ... +100 °C

Y23: TICA 1234 ABC

Y24: HEATING BOILER 56789

#### Factory setting of the transmitter

- Pt100 (IEC 751); 3-wire connection
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current 22.8 mA
- Sensor offset: 0 °C (0 °F)
- Damping 0.0 s

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### SITRANS TF - Transmitter, 2-wire system and SITRANS TF - Field indicator for 4 to 20 mA

	Article No.
<b>SITRANS TF field indicator</b> For 4 ... 20 mA signals	<b>7NG3130</b> - ■ ■ ■ ■ ■
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Without Ex protection	<b>0</b> 1
With Ex ia (ATEX + IECEx)	<b>1</b> 1
With Ex nAL for Zone 2 (ATEX + IECEx)	<b>2</b> 1
Total device SITRANS TF Ex d (ATEX + IECEx) <sup>1)</sup>	<b>4</b> 1
Total device SITRANS TF according to FM (XP, DIP, NI, S) <sup>1)</sup>	<b>5</b> 1
<b>Enclosure</b>	
Die-cast aluminum	<b>A</b>
Stainless steel precision casting	<b>E</b>
<b>Connections/cable inlet</b>	
Screwed glands M20x1.5	<b>B</b>
½-14 NPT glands	<b>C</b>
<b>Digital indicator</b>	
With	<b>1</b>
<b>Mounting bracket and fastening parts</b>	
Without	<b>0</b>
Made of steel	<b>1</b>
Made of stainless steel	<b>2</b>

<sup>1)</sup> Without cable gland

Options	Order code
Append suffix <b>"-Z"</b> to article no., add order code and plain text, if applicable.	
Test report (5 measuring points)	<b>C11</b>
Explosion protection	
• Explosion protection Ex ia according to INMETRO (Brazil) (only for 7NG313.-1...)	<b>E25<sup>1)</sup></b>
• Explosion protection Ex d according to INMETRO (Brazil) (only for 7NG313.-4...)	<b>E26<sup>1)</sup></b>
• Explosion protection Ex nA according to INMETRO (Brazil) (only for 7NG313.-2...)	<b>E27<sup>1)</sup></b>
• Explosion protection Ex i according to NEPSI (China) (only for 7NG313.-1...)	<b>E55<sup>1)</sup></b>
• Explosion protection Ex d according to NEPSI (China) (only for 7NG313.-4...)	<b>E56<sup>1)</sup></b>
• Explosion protection Ex nA according to NEPSI (China) (only for 7NG313.-2...)	<b>E57<sup>1)</sup></b>
• Explosion protection Ex d according to KOSHA (Korea) (only for 7NG313.-4...)	<b>E70<sup>1)</sup></b>
• Explosion protection Ex i according to EAC (Russia/Belarus/Kazakhstan) (only for 7NG313.-1...)	<b>E81<sup>1)</sup></b>
• Explosion protection Ex d according to EAC (Russia/Belarus/Kazakhstan) (only for 7NG313.-4...)	<b>E82<sup>1)</sup></b>
• Explosion protection Ex nA according to EAC (Russia/Belarus/Kazakhstan) (only for 7NG313.-2...)	<b>E83<sup>1)</sup></b>
Marine approvals	
• Det Norske Veritas Germanischer Lloyd (DNV GL)	<b>D01</b>
• Bureau Veritas (BV)	<b>D02</b>
• Lloyd's Register of Shipping (LR)	<b>D04</b>
• American Bureau of Shipping (ABS)	<b>D05</b>
Two-layer coating of enclosure and cover (PU on epoxy)	<b>G10</b>
Transient protection	<b>J01</b>
Cable gland CAPRI ½ NPT ADE 4F, nickel-plated brass (CAPRI 848694 and 810634) included	<b>D57</b>
Cable gland ½ NPT ADE 1F, cable diameter 6 ... 12 (CAPRI 818694 and 810534) included	<b>D58</b>

Options	Order code
Append suffix <b>"-Z"</b> to article no., add order code and plain text, if applicable.	
Cable gland ½ NPT ADE 4F, Stainless steel (CAPRI 848699 and 810634) included	<b>D59</b>
Cable gland ½ NPT ADE 1F, cable diameter 4 ... 8.5 (CAPRI 818674 and 810534) included	<b>D60</b>
<b>Customer-specific programming</b>	
Measuring range to be set	<b>Y01<sup>2)</sup></b>
Specify in plain text (max. 5 digits): Y01:... to ... °C, °F	
Labeling of measuring point plate only, specify in plain text: Measuring range	<b>Y22<sup>3)</sup></b>
Measuring point description, max. 16 characters	<b>Y23<sup>3)</sup></b>
Measuring point description, max. 32 characters	<b>Y24<sup>3)</sup></b>
Enter special deviating customer-specific setting in plain text	<b>Y09<sup>4)</sup></b>
<sup>1)</sup> Option does not include ATEX/IECEx approval, only country-specific approval.	
<sup>2)</sup> For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here.	
<sup>3)</sup> If only Y22, Y23 or Y24 is ordered and if the labeling is <u>only</u> noted on the measuring point plate, do not specify Y01.	
<sup>4)</sup> 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.	
<sup>5)</sup> Retrofitting not possible with Ex devices.	

#### Accessories

	Article No.
Additional accessories for assembly, connection and transmitter configuration, see page 2/251.	
<b>Mounting bracket and fastening parts</b>	
Made of steel for 7NG313.-.B..	<b>7MF4997-1AC</b>
Made of steel for 7NG313.-.C..	<b>7MF4997-1AB</b>
Made of stainless steel for 7NG313.-.B..	<b>7MF4997-1AJ</b>
Made of stainless steel for 7NG313.-.C..	<b>7MF4997-1AH</b>
Made of stainless steel 316L for 7NG313.-.B..	<b>7MF4997-1AQ</b>
Made of stainless steel 316L for 7NG313.-.C..	<b>7MF4997-1AP</b>
<b>Digital display<sup>1)</sup></b>	<b>7MF4997-1BS</b>
<b>Connection board</b> For supply units, see Catalog FI 01 section "Supplementary components".	<b>A5E02226423</b>

#### Ordering example 1

7NG3130-0AB10-Z Y01+Y23

Y01: -5 ... 100 °C

Y23: TICA1234HEAT

#### Ordering example 2

7NG3130-0AC11-Z Y01+Y23+Y24

Y01: 0 ... 20 BAR

Y23: PICA 1234 ABC

Y24: HEATING BOILER 67890

#### Factory setting of the display

4 ... 20 m

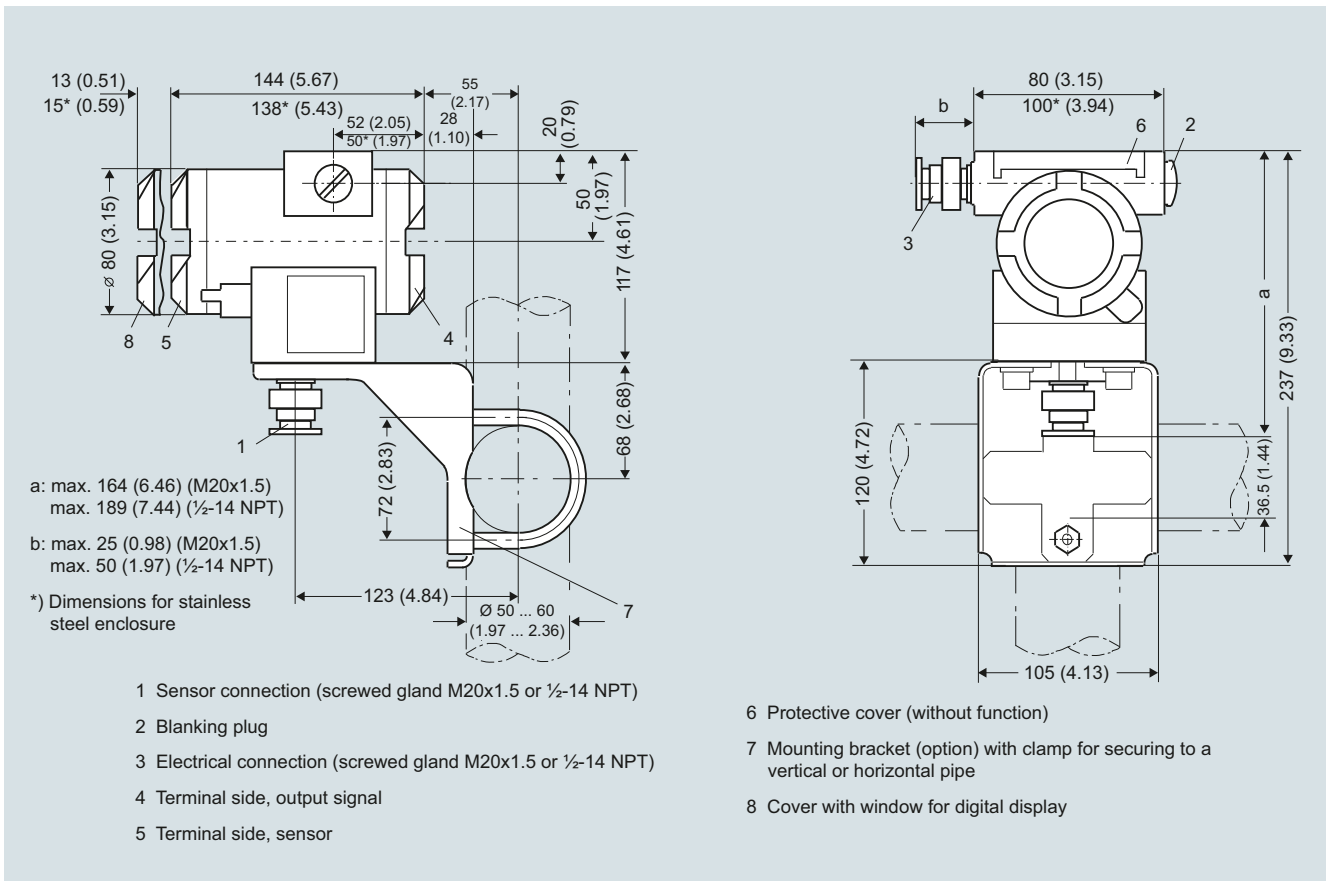
## Temperature measurement

### Temperature transmitters

### Field transmitters/field indicator

#### SITRANS TF - Transmitter, 2-wire system and SITRANS TF - Field indicator for 4 to 20 mA

#### Dimensional drawings



SITRANS TF, dimensions in mm (inches)



# Temperature measurement

Temperature transmitters

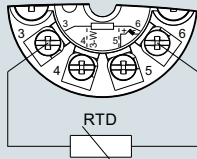
Field transmitters/field indicator

SITRANS TF - Transmitter, 2-wire system and SITRANS TF - Field indicator for 4 to 20 mA

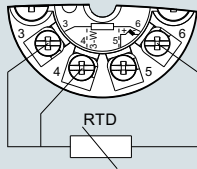
## Circuit diagrams

2

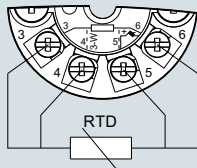
### Resistance thermometer



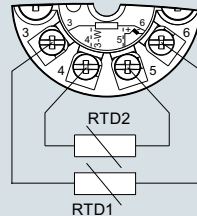
2-wire connection <sup>1)</sup>



3-wire connection



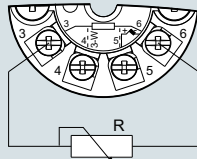
4-wire connection



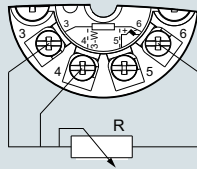
Generation of average value / difference <sup>1)</sup>

<sup>1)</sup> Programmable line resistance for the purpose of correction.

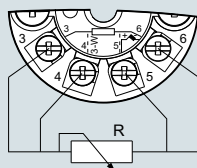
### Resistance



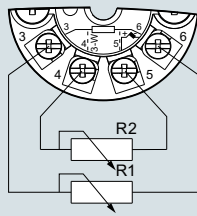
2-wire connection <sup>1)</sup>



3-wire connection

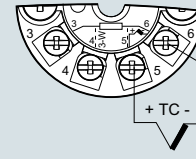


4-wire connection

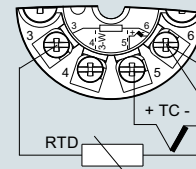


Generation of average value / difference <sup>1)</sup>

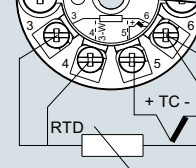
### Thermocouple



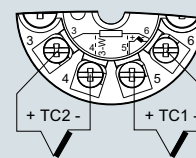
Cold junction compensation  
Internal/fixed value



Cold junction compensation with  
external Pt100 in 2-wire connection <sup>1)</sup>

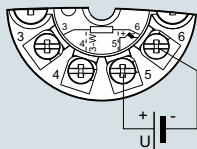


Cold junction compensation with  
external Pt100 in 3-wire connection

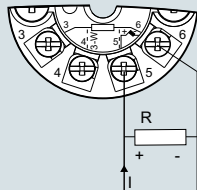


Generation of average value / difference  
with internal cold junction compensation

### Voltage measurement



### Current measurement



SITRANS TF, sensor connection assignment

## Temperature measurement

### Temperature transmitters

### Field transmitters/field indicator

#### SITRANS TF - fieldbus transmitter

#### Overview



#### Our field devices for heavy industrial use

- FOUNDATION fieldbus
- PROFIBUS PA

The SITRANS TF temperature transmitter works where others can't cope.

#### Benefits

- For universal use as a transmitter for resistance thermometers, thermocouple elements,  $\Omega$  or mV signals
- Rugged two-chamber enclosure in die-cast aluminum or stainless steel
- IP66/67/68 degree of protection
- Can be mounted elsewhere if the measuring point
  - is difficult to access
  - has high temperatures
  - experiences vibrations due to the process cell
  - is to avoid long neck pipes and thermowells

- Can be mounted directly on American-design sensors
- Wide range of approvals for use in potentially explosive atmospheres. "Intrinsically safe, non-sparking and flameproof" type of protection, for Europe and USA

#### Application

The SITRANS TF can be used everywhere where temperatures need to be measured under particularly harsh conditions. Which is why users from all industries have opted for this field device. The rugged enclosure protects the electronics. The stainless steel model is almost completely resistant to sea water and other aggressive substances. The inner workings offer high measuring accuracy, universal input and a wide range of diagnostic options.

#### Function

##### Features

##### General

- Polarity-neutral bus connection
- 24-bit analog-digital converter for high resolution
- Galvanic isolation
- Version for use in hazardous areas
- Special characteristic
- Sensor redundancy

##### Transmitter with PROFIBUS PA communication

- Function blocks: 2 x analog

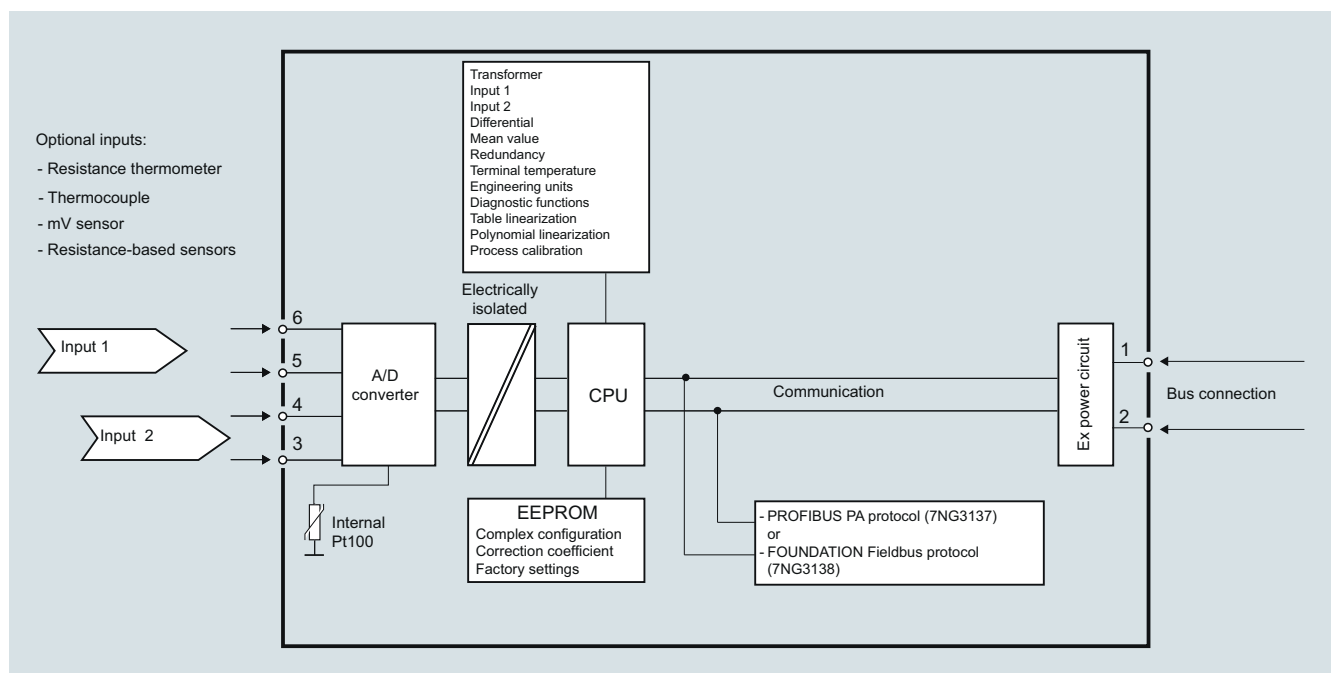
##### Transmitter with FOUNDATION fieldbus communication

- Function blocks: 2 x analog and 1 x PID
- Functionality: Basic or LAS

##### Mode of operation

The following function diagram explains the mode of operation of the transmitter.

The only difference between the two versions of the SITRANS TF (7NG3137-... and 7NG3138-...) is the type of field bus protocol used (PROFIBUS PA or FOUNDATION fieldbus).



SITRANS TF with TH400, function diagram

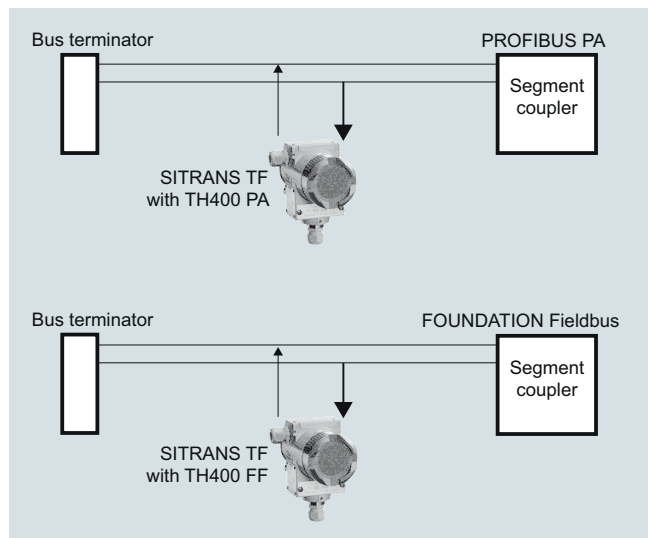
## Temperature measurement

Temperature transmitters

Field transmitters/field indicator

### SITRANS TF - fieldbus transmitter

#### System communication



SITRANS TF with TH400, communication interface

#### Technical specifications

##### Input

- Analog/digital conversion
- Measurement rate < 50 ms
- Resolution 24-bit

##### Resistance thermometer

- Pt25 ... Pt1000 acc. to IEC 60751/JIS C 1604
- Measuring range -200 ... +850 °C (-328 ... +1562 °F)
- Ni25 ... Ni1000 acc. to DIN 43760
- Measuring range -60 ... +250 °C (-76 ... +482 °F)
- Cu10 ... Cu1000,  $\alpha = 0.00427$
- Measuring range -50 ... +200 °C (-58 ... +392 °F)

Line resistance per sensor cable Max. 50  $\Omega$   
 Sensor current Nominal 0.2 mA

- Sensor fault detection
- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 15  $\Omega$

##### Resistance-based sensor

Measuring range 0 ... 10 k $\Omega$   
 Line resistance per sensor cable Max. 50  $\Omega$   
 Sensor current Nominal 0.2 mA

- Sensor fault detection
- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 15  $\Omega$

##### Thermocouple

According to IEC 584

- Type B
- Type E
- Type J
- Type K
- Type N
- Type R
- Type S
- Type T

According to DIN 43710

- Type L
- Type U

According to ASTM E988-90

- Type W3
- Type W5

External reference junction compensation -40 ... +135 °C (-40 ... +275 °F)

Sensor fault detection

- Sensor break detection Yes
- Sensor short-circuit detection Yes, < 3 mV
- Sensor current in the event of open-circuit monitoring 4  $\mu$ A

##### mV sensor - voltage input

Measuring range -800 ... +800 mV  
 Input resistance 10 M $\Omega$

##### Output

Filter time (programmable) 0 ... 60 s  
 Update time < 400 ms

##### Measuring accuracy

Accuracy is defined as the higher value of general values and basic values.

##### General values

Type of input	Absolute accuracy	Temperature coefficient
All	$\leq \pm 0.05$ % of the measured value	$\leq \pm 0.002$ % of the measured value/°C

##### Basic values

Type of input	Basic accuracy	Temperature coefficient
Pt100 and Pt1000	$\leq \pm 0.1$ °C	$\leq \pm 0.002$ °C/°C
Ni100	$\leq \pm 0.15$ °C	$\leq \pm 0.002$ °C/°C
Cu10	$\leq \pm 1.3$ °C	$\leq \pm 0.02$ °C/°C
Resistance-based sensor	$\leq \pm 0.05$ $\Omega$	$\leq \pm 0.002$ $\Omega$ /°C
Voltage source	$\leq \pm 10$ $\mu$ V	$\leq \pm 0.2$ $\mu$ V/°C
Thermocouple, type: E, J, K, L, N, T, U	$\leq \pm 0.5$ °C	$\leq \pm 0.01$ °C/°C
Thermocouple, type: B, R, S, W3, W5	$\leq \pm 1$ °C	$\leq \pm 0.025$ °C/°C
Reference junction compensation	$\leq \pm 0.5$ °C	

##### Reference conditions

Warming-up time 30 s  
 Signal-to-noise ratio Min. 60 dB

<b>Rated conditions</b>		<b>Communication</b>	
<u>Ambient conditions</u>		<u>Parameterization interface</u>	
Ambient temperature	-40 ... +85 °C (-40 ... +185 °F)	• PROFIBUS PA connection	A&D profile, Version 3.0
Storage temperature	-40 ... +85 °C (-40 ... +185 °F)	- Protocol	EN 50170 Volume 2
Relative humidity	≤ 98 %, with condensation	- Protocol standard	126
<u>Insulation strength</u>		- Address (for delivery)	2 x analog
• Test voltage	500 V AC for 60 s	- Function blocks	
• Continuous operation	50 V AC/75 V DC	• FOUNDATION Fieldbus connection	FF protocol
<u>Electromagnetic compatibility</u>		- Protocol standard	FF design specifications
NAMUR	NE21	- Functionality	Basic or LAS
EMC 2014/30/EU Emission and Noise Immunity	EN 61326-1, EN 61326-2-5	- Version	ITK 4.6
<b>Design</b>		- Function blocks	2 x analog and 1 x PID
Weight	Approx. 1.5 kg (3.3 lb) without options	<b>Factory setting</b>	
Dimensions	See "Dimensional drawings"	<u>For SITRANS TH400 PA</u>	
Enclosure materials	<ul style="list-style-type: none"> <li>Die-cast aluminum, low in copper, GD-AISI 12 or stainless steel</li> <li>Polyester-based lacquer for GD AISI 12 enclosure</li> <li>Stainless steel rating plate</li> </ul>	Sensor	Pt100 (IEC)
Electrical connection, sensor connection	<ul style="list-style-type: none"> <li>Screw terminals</li> <li>Cable inlet via M20 x 1.5 or ½-14 NPT screwed gland</li> <li>Bus connection with M12 device plug (optional)</li> </ul>	Type of connection	3-wire connection
Mounting bracket (optional)	Steel, galvanized and chrome-plated or stainless steel	Unit	°C
Degree of protection	IP66/67/68 according to EN 60529	Failure mode	Last valid value
<b>Auxiliary power</b>		Filter time	0 s
Supply voltage		PA address	126
• Standard, Ex "d", Ex "nA", Ex "nL", XP, NI	10.0 ... 32 V DC	PROFIBUS Ident No.	Manufacturer-specific
• Ex "ia", Ex "ib"	10.0 ... 30 V DC	<u>For SITRANS TH400 FF</u>	
• In FISCO/FNICO installations	10.0 ... 17.5 V DC	Sensor	Pt100 (IEC)
Power consumption	< 11 mA	Type of connection	3-wire connection
Max. increase in power consumption in the event of a fault	< 7 mA	Unit	°C
<b>Certificates and approvals</b>		Failure mode	Last valid value
Explosion protection ATEX		Filter time	0 s
EC type-examination certificate	ZELM 11 ATEX 0471 X	Node address	22
• "Intrinsic safety" type of protection (version: 7NG313x-1xxxx)	II 2 (1) G Ex ib [ia Ga] IIC T6 Gb II 2 G Ex ib IIC T6 Gb II 1D Ex ia IIIC T100 °C Da		
Conformity statement	ZELM 11 ATEX 0471 X		
• "Non-sparking and energy-limited equipment" type of protection (version: 7NG313x-2xxxx)	II 3 G Ex ic IIC T6/T4 Gc II 3 G Ex nA IIC T6/T4 Gc II 3 G Ex nA [ic] IIC T6/T4 Gc		
EC type-examination certificate	ZELM 11 ATEX 0472 X		
• "Flame-proof enclosure" type of protection (version: 7NG313x-4xxxx)	II 2 G Ex d IIC T6/T5 Gb II 2 D Ex tb IIIC T100 °C Db		
Explosion protection: FM for USA			
• FM approval	FM 3017742		
• Type of protection XP, DIP, NI and S (version 7NG313x-5xxxx)	<ul style="list-style-type: none"> <li>XP / I / 1 / BCD / T5,T6; Type 4X</li> <li>DIP / II, III / 1 / EFG / T5,T6; Type 4X</li> <li>NI / I / 2 / ABCD / T5,T6; Type 4X</li> <li>S / II, III / 2 / FG T5,T6; Type 4X</li> </ul>		
Other certificates	EAC Ex(GOST), INMETRO, NEPSI, KOSHA		

## Temperature measurement

Temperature transmitters

Field transmitters/field indicator

### SITRANS TF - fieldbus transmitter

#### Selection and ordering data

	Article No.	
<b>Temperature transmitter in field enclosure</b> With fieldbus communication and electrical isolation	<b>7NG313</b>	<b>0</b>
<a href="#">Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</a>		
<b>Built-in transmitter</b>		
SITRANS TH400 with PROFIBUS PA		
• Without Ex protection	7	0
• With Ex ia (ATEX)	7	1
• With Ex nAL for Zone 2 (ATEX)	7	2
• Total device SITRANS TF Ex d (ATEX + IECEx) <sup>1)</sup>	7	4
• Total device SITRANS TF according to FM (XP, DIP, NI, S) <sup>1)</sup>	7	5
SITRANS TH400, with FOUNDATION Fieldbus		
• Without Ex protection	8	0
• With Ex ia (ATEX)	8	1
• With Ex nAL for Zone 2 (ATEX)	8	2
• Total device SITRANS TF Ex d (ATEX + IECEx) <sup>1)</sup>	8	4
• Total device SITRANS TF according to FM (XP, DIP, NI, S) <sup>1)</sup>	8	5
<b>Enclosure</b>		
Die-cast aluminum		A
Stainless steel precision casting		E
<b>Connections/cable inlet</b>		
Screwed glands M20x1.5		B
½-14 NPT glands		C
<b>Mounting bracket and fastening parts</b>		
Without		0
Made of steel		1
Made of stainless steel		2

<sup>1)</sup> Without cable gland

#### Options

	Order code
Append suffix "-Z" to article no., add order code and plain text, if applicable.	
Test report (5 measuring points)	<b>C11</b>
Bus connection	
• M12 device plug (metal) without mating connector	<b>M00<sup>1)</sup></b>
• M12 device plug (metal) with mating connector	<b>M01<sup>1)</sup></b>
Explosion protection	
• Explosion protection Ex ia according to INMETRO (Brazil) (only for 7NG313.-1...)	<b>E25<sup>2)</sup></b>
• Explosion protection Ex d according to INMETRO (Brazil) (only for 7NG313.-4...)	<b>E26<sup>2)</sup></b>
• Explosion protection Ex nA according to INMETRO (Brazil) (only for 7NG313.-2...)	<b>E27<sup>2)</sup></b>
• Explosion protection Ex i according to NEPSI (China) (only for 7NG313.-1...)	<b>E55<sup>2)</sup></b>
• Explosion protection Ex d according to NEPSI (China) (only for 7NG313.-4...)	<b>E56<sup>2)</sup></b>
• Explosion protection Ex nA according to NEPSI (China) (only for 7NG313.-2...)	<b>E57<sup>2)</sup></b>
• Explosion protection Ex d according to KOSHA (Korea) (only for 7NG313.-4...)	<b>E70<sup>2)</sup></b>
• Explosion protection Ex i according to EAC (Russia/Belarus/Kazakhstan) (only for 7NG313.-1...)	<b>E81<sup>2)</sup></b>
• Explosion protection Ex d according to EAC (Russia/Belarus/Kazakhstan) (only for 7NG313.-4...)	<b>E82<sup>2)</sup></b>
• Explosion protection Ex nA according to EAC (Russia/Belarus/Kazakhstan) (only for 7NG313.-2...)	<b>E83<sup>2)</sup></b>
Marine approvals	
• Det Norske Veritas Germanischer Lloyd (DNV GL)	<b>D01</b>
• Bureau Veritas (BV)	<b>D02</b>
• Lloyd's Register of Shipping (LR)	<b>D04</b>
• American Bureau of Shipping (ABS)	<b>D05</b>
Two-layer coating of enclosure and cover (PU on epoxy)	<b>G10</b>
Transient protection	<b>J01</b>
Cable gland CAPRI ½ NPT ADE 4F, nickel-plated brass (CAPRI 848694 and 810634) included	<b>D57</b>
Cable gland ½ NPT ADE 1F, cable diameter 6 ... 12 (CAPRI 818694 and 810534) included	<b>D58</b>
Cable gland ½ NPT ADE 4F, Stainless steel (CAPRI 848699 and 810634) included	<b>D59</b>
Cable gland ½ NPT ADE 1F, cable diameter 4 ... 8.5 (CAPRI 818674 and 810534) included	<b>D60</b>

Options	Order code
Append suffix <b>"-Z"</b> to article no., add order code and plain text, if applicable.	
<b>Customer-specific programming</b>	
Measuring range to be set Specify in plain text (max. 5 digits): Y01:... to ... °C, °F	<b>Y01<sup>3)</sup></b>
Measuring point number (TAG) max. 8 characters	<b>Y15<sup>4)</sup></b>
Measuring point description, max. 16 characters	<b>Y23<sup>4)</sup></b>
Measuring point description, max. 32 characters	<b>Y24<sup>5)</sup></b>
Specify bus address in plain text	<b>Y25<sup>4)</sup></b>
Pt100 (IEC) 2-wire, $R_L = 0 \Omega$	<b>U02<sup>6)</sup></b>
Pt100 (IEC) 3-wire	<b>U03<sup>6)</sup></b>
Pt100 (IEC) 4-wire	<b>U04<sup>6)</sup></b>
Type B thermocouple	<b>U20<sup>6)7)</sup></b>
Type C thermocouple (W5)	<b>U21<sup>6)7)</sup></b>
Type D thermocouple (W3)	<b>U22<sup>6)7)</sup></b>
Type E thermocouple	<b>U23<sup>6)7)</sup></b>
Type J thermocouple	<b>U24<sup>6)7)</sup></b>
Type K thermocouple	<b>U25<sup>6)7)</sup></b>
Type L thermocouple	<b>U26<sup>6)7)</sup></b>
Type N thermocouple	<b>U27<sup>6)7)</sup></b>
Type R thermocouple	<b>U28<sup>6)7)</sup></b>
Type S thermocouple	<b>U29<sup>6)7)</sup></b>
Type T thermocouple	<b>U30<sup>6)7)</sup></b>
Type U thermocouple	<b>U31<sup>6)7)</sup></b>
For TC: Cold junction compensation: external (Pt100, 3-wire)	<b>U41</b>
For TC: Reference junction compensation: external with fixed value: specify in plain text	<b>Y50</b>
Enter special deviating customer-specific setting in plain text	<b>Y09<sup>8)</sup></b>

- 1) Not possible with explosion protection Ex d or XP.
- 2) Option does not include ATEX/IECEx approval, only country-specific approval. For specification on TAG plate, please select Y22.
- 3) For customer-specific programming for RTD and TC, the start value and the end value of the required measuring span must be specified here. For specification on TAG plate, please select Y23.
- 4) If only Y15, Y23 or Y25 is ordered and if the labeling is only noted on the measuring point plate, do not specify Y01.
- 5) For this selection, Y01 or Y09 must also be selected.
- 6) For this selection, Y01 must also be selected.
- 7) Internal reference junction compensation is selected as the default for TC.
- 8) 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.

### Accessories

	Article No.
Additional accessories for assembly, connection and transmitter configuration, see page 2/251.	
<b>SIMATIC PDM parameterization software</b> Also for SITRANS TH300	<b>See section 8</b>
<b>Mounting bracket and fastening parts</b>	
Made of steel for 7NG313-..B..	<b>7MF4997-1AC</b>
Made of steel for 7NG313-..C..	<b>7MF4997-1AB</b>
Made of stainless steel for 7NG313-..B..	<b>7MF4997-1AJ</b>
Made of stainless steel for 7NG313-..C..	<b>7MF4997-1AH</b>
Made of stainless steel 316L for 7NG313-..B..	<b>7MF4997-1AQ</b>
Made of stainless steel 316L for 7NG313-..C..	<b>7MF4997-1AP</b>
<b>Connection board</b>	<b>A5E02226423</b>

For supply units, see Catalog FI 01 section "Supplementary components".

#### Ordering example 1

7NG3137-0AB01-Z Y01+Y15+Y25+U03

Y01: -10 ... +100 °C

Y15: TICA1234HEAT

Y25: 33

#### Ordering example 2

7NG3137-0AC01-Z Y01+Y15+Y25+U25

Y01: -10 ... +100 °C

Y15: TICA 1234 ABC 5678

Y25: 35

#### Factory setting

For SITRANS TH400 PA:

- Pt100 (IEC); 3-wire connection
- Unit: °C
- Failure mode: Last valid value
- Filter time: 0 s - PA address: 126
- PROFIBUS Ident No.: Manufacturer-specific

For SITRANS TH400 FF:

- Pt100 (IEC); 3-wire connection
- Unit: °C
- Failure mode: Last valid value
- Filter time: 0 s
- Node address: 22

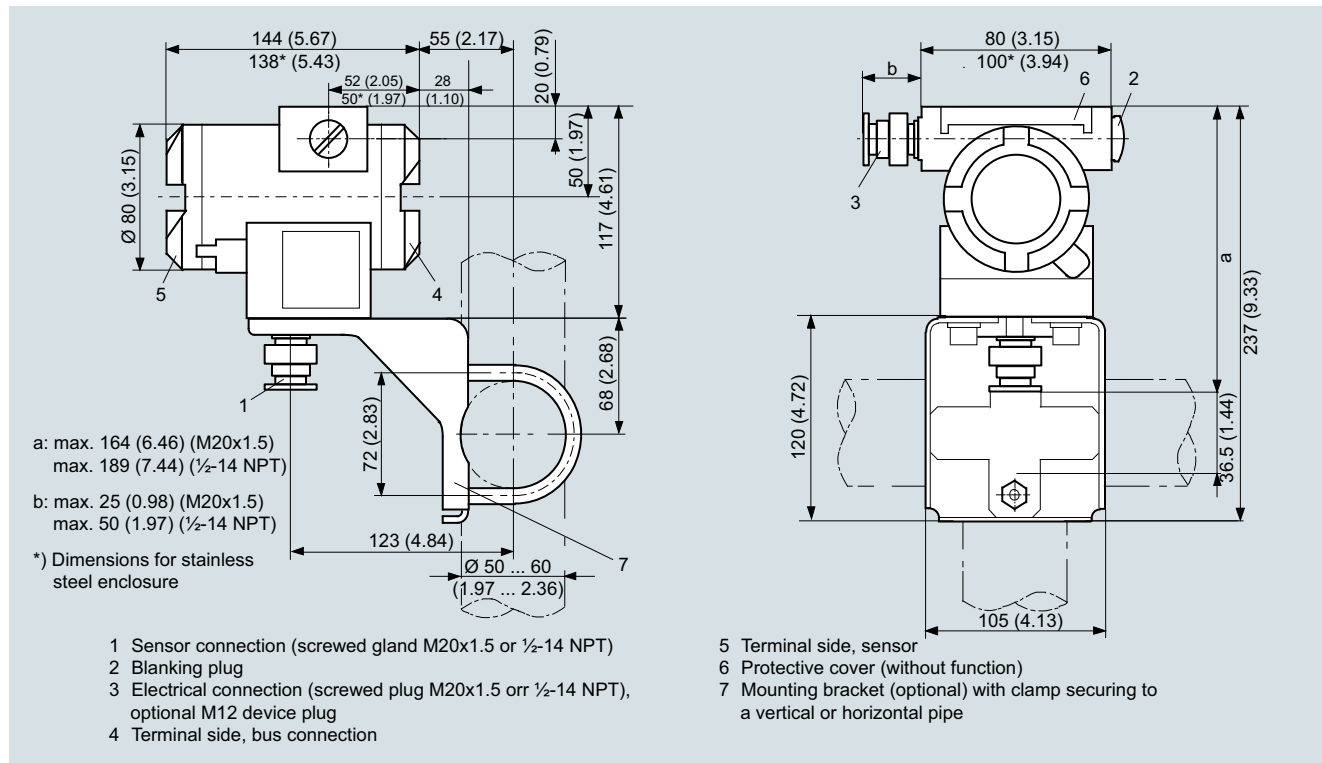
## Temperature measurement

Temperature transmitters

Field transmitters/field indicator

### SITRANS TF - fieldbus transmitter

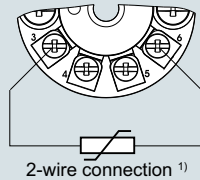
#### Dimensional drawings



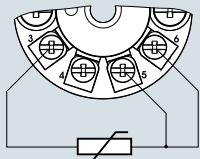
SITRANS TF with TH400, dimensions in mm (inches)

**Circuit diagrams**

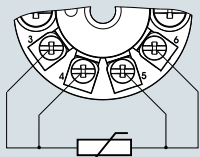
**Resistance thermometer**



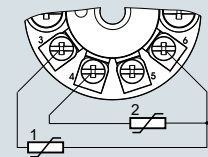
2-wire connection <sup>1)</sup>



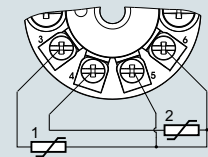
3-wire connection



4-wire connection

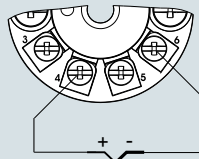


Mean-value/differential or redundancy generation  
 2 x 2-wire connection <sup>1)</sup>

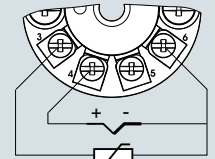


Mean-value/differential or redundancy generation  
 1 sensor in 2-wire connection <sup>1)</sup>  
 1 sensor in 3-wire connection

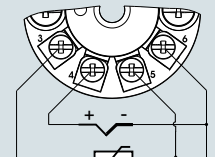
**Thermocouple**



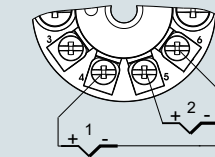
Internal cold junction compensation



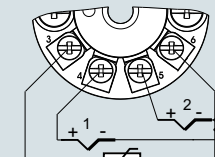
Cold junction compensation with external Pt100 in 2-wire connection <sup>1)</sup>



Cold junction compensation with external Pt100 in 3-wire connection

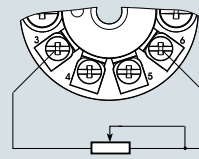


Mean value, differential or redundancy generation with internal cold junction compensation

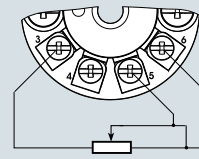


Mean value, differential or redundancy generation and cold junction compensation with internal Pt100 in 2-wire connection <sup>1)</sup>

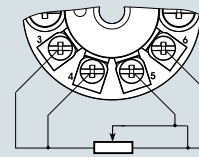
**Resistance**



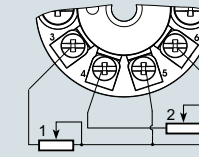
2-wire connection <sup>1)</sup>



3-wire connection

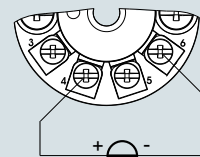


4-wire connection

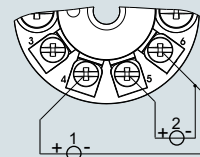


Mean value, differential or redundancy generation  
 1 resistor in 2-wire connection <sup>1)</sup>  
 1 resistor in 3-wire connection

**Voltage measurement**



One voltage source



Measurement of mean value, differential and redundancy with 2 voltage sources

<sup>1)</sup> Programmable line resistance for the purpose of correction.