Transmitter for field mounting/field indicator

#### 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,  $\boldsymbol{\Omega}$  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 aluminium or stainless steel
- Degree of protection IP66/67/68
- Test terminals for direct read-out of the output signal without breaking the current loop
- · Can be mounted elsewhere if the measuring point
- is hard to access,
- is subject to high temperatures,
- is subject to vibrations from the system,
- or if you want to avoid long neck tubes and/or protective tubes.
- · 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 protections, for Europe and USA.
- SIL2 (with Order code 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. For that reasons 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 elements. The inner workings offer high measuring accuracy, universal input and a wide range of diagnostic options.

# Configuration

Function

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.

Parameterization is carried out using a PC for SITRANS TF with the integrated and programmable SITRANS TK. 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

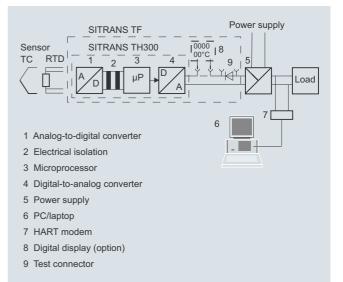
The sensor signal, whether resistance thermometer, thermocouple element or  $\Omega$  or mV signal, is amplified and linearized. Sensor and output side are electrically isolated. An internal cold junction is integrated for measurements with thermocouple elements.

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 as any type of unit, e.g. pressure, flow rate, filling level or temperature.



Mode of operation: SITRANS TF with integrated transmitter and digital display  $% \label{eq:starses}$ 

Transmitter for field mounting/field indicator

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

Technical specifications			
Input		Measuring range	parameterizable max. 0 2200 $\Omega$
Resistance thermometer			(see table "Digital measuring errors")
Measured variable	Temperature	Min. measured span	5 25 $\Omega$ (see Table "Digital mea-
Sensor type			suring errors")
• to IEC 60751	Pt25 Pt1000	Characteristic curve	Resistance-linear or special char-
• to JIS C 1604; a=0.00392 K-1	Pt25 Pt1000	Thermonouples	acteristic
• to IEC 60751	Ni25 Ni1000	Thermocouples Measured variable	Tomporatura
Units	°C and °F	Sensor type (thermocouples)	Temperature
Connection		Type B	Pt30Rh-Pt6Rh to DIN IEC 584
<ul> <li>Normal connection</li> </ul>	1 resistance thermometer (RTD) in 2-wire, 3-wire or 4-wire system	• Type C • Type D	W5 %-Re acc. to ASTM 988 W3 %-Re acc. to ASTM 988
Generation of average value	Series or parallel connection of several resistance thermometers in a two-wire system for the genera- tion of average temperatures or for adaptation to other device types	<ul> <li>Type E</li> <li>Type J</li> <li>Type K</li> <li>Type L</li> <li>Type N</li> </ul>	NiCr-CuNi to DIN IEC 584 Fe-CuNi to DIN IEC 584 NiCr-Ni to DIN IEC 584 Fe-CuNi to DIN 43710 NiCrSi-NiSi to DIN IEC 584
Generation of difference Interface	2 resistance thermometers (RTD) in 2-wire system (RTD 1 – RTD 2 or RTD 2 – RTD 1)	• Type R • Type S • Type T	Pt13Rh-Pt to DIN IEC 584 Pt10Rh-Pt to DIN IEC 584 Cu-CuNi to DIN IEC 584
Two-wire system	Parameterizable line resistance	• Type U	Cu-CuNi to DIN 43710
- Two-wile System	$\leq 100 \Omega$ (loop resistance)	Units	°C or °F
Three-wire system	No balancing required	Connection	
<ul> <li>Four-wire system</li> </ul>	No balancing required	Normal connection	1 thermocouple (TC)
Sensor current	≤ 0.45 mA	Generation of average value	2 thermocouples (TC)
Response time	$\leq$ 250 ms for 1 sensor with open- circuit monitoring	Generation of difference	2 thermocouples (TC) (TC 1 – TC 2 or TC 2 – TC 1)
Open-circuit monitoring	Always active (cannot be dis- abled)	Response time	≤ 250 ms for 1 sensor with open- circuit monitoring
Short-circuit monitoring	can be switched on/off (default	Open-circuit monitoring	Can be switched off
Measuring range	value: ON) parameterizable (see table "Digi-	Cold junction compensation	
	tal measuring errors")	<ul> <li>Internal</li> </ul>	With integrated Pt100 resistance thermometer
Min. measured span Characteristic curve	10 °C (18 °F) Temperature-linear or special	• External	With external Pt100 IEC 60751
	characteristic	External fixed	(2-wire or 3-wire connection) Cold junction temperature can be
Resistance-based sensors			set as fixed value
Measured variable Sensor type	Actual resistance Resistance-based, potentiome-	Measuring range	parameterizable (see table "Digi- tal measuring errors")
Units	ters Ω	Min. measured span	Min. 40 100 °C (72 180 °F) (see table "Digital measuring errors")
Connection		Characteristic curve	· ·
<ul> <li>Normal connection</li> </ul>	1 resistance-based sensor (R) in		Temperature-linear or special characteristic
	2-wire, 3-wire or 4-wire system	mV sensor	
<ul> <li>Generation of average value</li> </ul>	2 resistance-based sensors in 2-wire system for generation of average value	Measured variable	DC voltage
Generation of difference	2 resistance-based sensor in 2-wire system (R 1 – R 2 or R 2 – R 1)	Sensor type	DC voltage source (DC voltage source possible over an exter- nally connected resistor)
Interface		Units	mV
Two-wire system	Parameterizable line resistance $\leq 100 \Omega$ (loop resistance)	Response time	≤ 250 ms for 1 sensor with open- circuit monitoring
Three-wire system	No balancing required	Open-circuit monitoring	Can be switched off
Four-wire system	No balancing required	Measuring range	-10 +70 mV -100 +1100 mV
Sensor current	≤ 0.45 mA	Min. measured span	2 mV or 20 mV
Response time	≤ 250 ms for 1 sensor with open-	Overload capability of the input	-1.5 +3.5 V DC
с	circuit monitoring	Input resistance	$\geq$ 1 MΩ
Open-circuit monitoring	Can be switched off	Characteristic curve	Voltage-linear or special charac-
Short-circuit monitoring	Can be switched off (value is adjustable)		teristic

Can be switched off (value is adjustable)

Temperature Measurement Transmitter for field mounting/field indicator

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

Dubus signal420 mA. 2-wire acto: MHATT Rev 5.9Windust signal1135 Vor Ex k and EX NAN 32 Vor Ex k in and Ex NAN 32 Vor Ex Vor Ex NAN 33 Corr Ex NAN 33 Corr Ex NAN 33 Corr AN	Output			
Domain later with SITRANS         acc. th HART Rev. 5.9         B3 V for SL is and ErrANS           Digital display         in current loco         B3 V for SL is and ErrANS           Digital display         Max. 5 digits         B2 V for SL is and ErrANS           Digital display         99 69 + 99 99 + 99 99.         Bit Status           Digital display         max. 5 digits         Bit Childray is and ErrANS           Digital display         max. 5 digits         Bit Childray is and ErrANS           Digital display         max. 5 digits         Bit Childray is and ErrANS           Digital display         max. 5 digits         Bit Childray is and ErrANS           Digital measuring errors         See table "Digital measuring errors"         See table "Digital measuring errors"           Digital measuring errors         See table "Digital measuring errors"         - EC type test certificate         III DE Ki lin IC TRY 6 Git IS Co. III TRY 10 C (18 °F)           Androin temporature         2.0 °C (0.1 °F)         - EC type test certificate         III A ER VAT X K           Partice display is an other maximg error         0.02 % of spany 10 °C (18 °F)         - EC type test certificate         III A ER VAT X           Partice display is an other maximg error         0.02 % of spany 10 °C (18 °F)         - EC type test certificate         - EC type test certificate           Andine maxin	Output		Auxiliary power	11 25 V DC (20 V for Ev ib.
THe SDIst 1			without digital display	
Jight adapting (spit) Diplat adapting (spit) Diplat adapting (spit) Diplat adapting (spit) Diplat (spit)<	TH300	ACC. IO HANT NEV. 5.9	With digital display	
Jugain Langer (priorial)         In culture (top)           Jugain Langer (priorial)         In culture (top)           Splat was         Set (1)           Splat (splat)         9 mm (0.35 inch)           Jugain Langer (splat)         90 99 + 90 909           Jumin Samp (max 5 shar)         with digital (digital)           Set (splat)         Set (sblat)           With 3 buttors         "Intinsics safely type of protection           Value (struct)         Set (sblat)           Weaking scourcey         Set (sblat)           Digital measuring error         Set (sblat)           Auxiliary power         24 V ± 1 %           Load         Set (sblat)           Vanishing power         24 V ± 1 %           Load         Set (sblat)           Vanishing power         24 V ± 1 %           Load         < 0.025 % of span 10 °C (18 °F)	• • •		Electrically isolated	,
Mail of your with a standard stand	0 1 , (1 )			
By a fraging         9 min (USS mch)           Deploy range         99 999         99 999         99 999         With 3 buttons           Jrits         any (max, 5 char.)         With 3 buttons         III 10 action (D14 Gb)         III 10 action (D14 Gb)           Zero Joint, full-scale value and unit.         2.1 V         With 3 buttons         III 10 action (D14 Gb)         III 10 action (D14 Gb)           With a diplot action (D14 Gb)         2.1 V         Vith a diplot action (D14 Gb)         III 10 action (D14 Gb)           Measuring accuracy         See table 'Digital measuring errors         See table 'Digital measuring acquipment that is non- iprotection of the all limited end all inited end all hinted end end end end end end end end end e		0	0	
with 3       any (max: 5 char.)       with 3 buttons         Setting:       with 3 buttons         with 3 buttons       with 3 buttons         Setting:       L1 V         Weasuring accuracy       Set table "Digital measuring errors"         Digital measuring or ors       Set table "Digital measuring errors"         Auxiliary power       24 V + 1 %         Value       So 0.0         A mbiont temporature       23 °C (73 4 °F)         > frame run to angle optopt (digital display)       II 3 G Ex is III C 100 °C 0.a         There in the angle optopt (digital display)       C 0.02 % of span         - CC type test certificate       "There is a lift T100 °C 0.b         - Printer to angle optopt (digital display)       II 3 G Ex is III C 100 °C 0.b         - The optoptic optopt (digital display)       C 0.02 % of span         - Warming error       0.02 % of span 10 °C (18 °F)         - with resistance thermometers       0.06 °C (11 °F)(10° °C (18 °F)         - with resistance thermometers       0.08 °C (0.01 °F)         - with resistance thermometers       0.08 °C (1.01 °F)(1°C (18 °F)         - with resistance thermometers       0.08 °C (1.01 °F)(1°C (18 °F)         - with resistance thermometers       0.08 °C (1.01 °F)(1°C (18 °F)         - with resistance thermometers       0.08 °C	0 0			
Julis         aity (max, b thele)         with 3 buttoms         III 2 G kx III C T G G B           Seling:         with 3 buttoms         III 2 G kx III C T G G B         III 2 G kx III C T G G B           Seling:         automage         2.1 V         With 3 buttoms         III 2 G kx III C T G G B           Versauring accurrecy         See table 'Digital measuring errors         See table 'Digital measuring errors         See table 'Digital measuring errors         See table 'Digital measuring error         2.1 V           Andiang councy         2.1 V         With 3 buttoms         III C R Kx III C TO G C D a           Withing the analog output (d)- arror the analog output (d)- farror in the anal			<ul> <li>"Intrinsic safety" type of protection</li> </ul>	with digital display:
Zero Jonn, full-scale value and unit       2.1 V       Hit Deck all IC Tri0 2: Data without digital display:         Load voltage       2.1 V       See table 'Digital measuring errors       See table 'Digital measuring errors       Hit Deck all IC Tri0 2: Data without digital display:         Digital measuring errors       See table 'Digital measuring errors       See table 'Digital measuring error 'Digital display:       FEC type test cartificate       ZELM 11 AFEX 0471 X         Variancy power       24 V ± 1 %       Cop and the simeter error 'Digital display:       Trianes proof enclosure' type of protection       ID G Ex all IC Tri0 2: Data without digital display:         • Anation measuring error       2.0 C7 (3.4 °F)       Filames proof enclosure' type of protection       ID G Ex all IC Tri0 4: Difference         • Anatog measuring error       0.02 % of span 10 °C (18 °F)       Filames proof enclosure' type of tride °Ch Tri0 * C (140 °F), Type 44.       Ph/Ph/PRC0TG Ta = 65 °C (140 °F), Type 44.         • With memocouples       0.6 °C (1.1 *F)(10°C (18 °F)       • Obe 'C (1.1 *F)(10°C (18 °F), Top 44.       • Nin////ARCDTG Ta = 65 °C (140 °F), Type 44.         • Anatog measuring error       0.02 % of span 100 °C (18 °F)       • Other certificates       EEEE, FAC Ex (COST), Tri7 * 64 °C (140 °F), Type 44.         • Anatog measuring error       0.02 % of span 100 °C (18 °F)       • Other certificates       EEC (140 °F), Type 44.         • Other certificates       EEC (140 °F), Type				II 2 (1) G Ex ib [ia Ga] IIC T4 Gb
Action Gauge     2.1 °C     If 21 (G. Ex. b) [In G. G. b) [In C. G. G. III 25 (Ex. b) [In C. G. G) III 25 (Ex. b) [In C. G, G) IIII 25 (EX. b) [In C. G, G) IIIII 25 (EX. b) [In C. G, G] IIII 25 (EX. b) [In C. G, G] IIII 25 (EX. b) [In C. G, G] IIIII 25 (EX. b) [In C. G, G] IIIIII 25 (EX. b) [In C. G, G] IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Setting: Zero point, full-scale value and unit	with 3 buttons		
Measuring accuracy         Sole table 'Digital measuring errors'         Sole table 'Digital measuring errors'         In the SE Ex Ib IIC 'Te Gb' III 'D EX Is IIIC 'Te Gb' III 'D EX IS 'D 'D 'D 'D 'D 'D 'D' III 'D EX IS 'D 'D 'D 'D 'D' III 'D EX IS 'D 'D 'D 'D 'D 'D' III 'D EX IS 'D 'D 'D 'D 'D 'D' III 'D EX IS 'D 'D 'D 'D 'D 'D' III 'D EX IS 'D 'D 'D 'D 'D 'D' III 'D EX IS 'D 'D 'D 'D 'D 'D 'D' III 'D EX IS 'D 'D 'D 'D 'D 'D 'D 'D 'D 'D' III 'D EX IS 'D	Load voltage	2.1 V		
Jugital measuring errors         Size table Lugital measuring errors         Size table Lugital measuring errors         ZELM 11 ATEX 0471 X           13 G Ex In (LT GTA GC Warming-up time         24 V ± 1 %         - CC type test certificate         II 3 G Ex In (LT GTA GC III 3 G Ex In (LT GTA GC IIII 3 G Ex In (LT GTA GC III 3 G Ex In (LT GTA GC IIII 3 G Ex In (	Measuring accuracy			
Reference conditions         24 V ± 1 %           • Auxiliary power         23 °C (73 · 4°)           • Auxiliary power         > 5 min           • Auxiliary power         > 5 min           • C type test certificate         II 2 G Ex to III C TRG 76 Gb           II 2 D Ex to III C TRG 76 Gb         II 2 D Ex to III C TRG 76 Gb           II 2 D Ex to III C TRG 76 Gb         II 2 D Ex to III C TRG 76 Gb           • Anadg measuring error         0.02 % of span/10 °C (18 °F)           • Objectime meature         0.06 °C (0.11 °F)/10°C (18 °F)           • Atter 5 years         < 0.03 % of span	Digital measuring errors	See table "Digital measuring		II 1D Ex ia IIIC T100 °C Da
Auxiliary power       24 V ± 1 %       iii 3 G Ex nA lig life TRPTA Ge         Load       500 Ω         Ambient temperature       23 °C (73.4 °F)       iii 3 G Ex nA lig life TRPTA Ge         Veraming-up time       -5 min       iii 2 G Ex nA lig life TRPTA Ge         Prome the analog output (digi- allanalog converter)       c.0.025 % of span       iii 2 G Ex nA lig life TRPTA Ge         Analog measuring error       0.025 % of span (0.02 % of span/10 °C (18 °F)       iiii 2 G Ex nA lig life TRPTA Ge         Analog measuring error       0.02 % of span/10 °C (18 °F)       iiiii 1 FRPTA Ge       2ELM 11 ATEX 0472 X         Starter of the measuring error       0.06 °C (0.11 °F)/10°C (18 °F)       iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii		errors"	- EC type test certificate	ZELM 11 ATEX 0471 X
Auxiliary power       24 V 11 / 3°       for zone 2° type of protection ~       II 3 G Ex AI [C  II C 16/14 Gc         Auxiliary power       50 min       - C Uype test certificate       ZELM 11 ATEX 0471 X         From in the analog output (rdg)- allanalog converter)       < 0.05 °C (0.9 °F)	Reference conditions			
Ambient temperature       23 °C (73 4 °F)       > 5 min       > 23 °C (73 4 °F)         Warming-up time       > 5 min       > 5 min       > 6 0.025 % of span         Janalog converten)       < 0.025 % of span	Auxiliary power	24 V ± 1 %		
• Warming-up time       > 5 min         • Warming-up time       > 5 min         • Analog output (dipi- alanalog converter)       < 0.025 % of span	• Load		- EC type test certificate	ZELM 11 ATEX 0471 X
Tror in the analog output (digl- alanalog converter)       < 0.025 % of span	Ambient temperature	23 °C (73.4 °F)		
al[analog converter]       Carificate of Compliance 3017742         Provide to internal cold junction of ambient temperature       <0.5 °C (0.3 °F)	Warming-up time			
Error due to internal cold junction nfluence of ambient temperature       <0.5 °C (0.9 °F)	Error in the analog output (digi-	< 0.025 % of span	51	
Analog measuring error       0.02 % of span/10 °C (18 °F)         • Night measuring errors       0.02 % of span/10 °C (18 °F)         • with tresistance thermometers       0.06 °C (0.11 °F)/10°C (18 °F)         • with tresistance thermometers       0.66 °C (0.11 °F)/10°C (18 °F)         • with tresistance thermometers       0.66 °C (1.11 °F)/10°C (18 °F)         • with tresistance thermometers       0.66 °C (1.11 °F)/10°C (18 °F)         • with tremocouples       0.66 °C (1.11 °F)/10°C (18 °F)         • Lidentification (XP, DIP, NI, S)       • KPI/1/BCD/T5 Ta = 85 °C         • With persistance thermometers       0.66 °C (1.11 °F)/10°C (18 °F)         • Null/JABCD/T5 Ta = 85 °C       (185 °F), T6 Ta = 60 °C (140 °F), Type 4X         • In the first month       < 0.02 % of span		< 0.5 °C (0.9 °F)	Explosion protection to FM	
A halog measuring error       0.02 % of span/10 °C (18 °F)         • Digital measuring errors       0.06 °C (0.11 °F)/10°C (18 °F)         • with thermocuples       0.6 °C (1.1 °F)/10°C (18 °F)         • with thermocuples       0.6 °C (1.1 °F)/10°C (18 °F)         • with thermocuples       0.6 °C (1.1 °F)/10°C (18 °F)         • with thermocuples       0.6 °C (1.1 °F)/10°C (18 °F)         • with thermocuples       0.02 % of span/100 Ω         • ong-term drift       • 0.02 % of span         • In the first month       < 0.02 % of span			Identification (XP, DIP, NI, S)	
• Digital measuring errors       0.06 °C (0.11 °F)/10°C (18 °F)         • 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 span/V		0.02 % of span/10 °C (18 °E)		(185 °F), T6 Ta = 60 °C (140 °F),
- 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)         - with thermocouples       0.6 °C (1.1 °F)/10°C (18 °F)         - with thermocouples       0.02 % of span/V         - ong-term drift       < 0.022 % of span	0 0	0.02 /0013041/10 0 (10 1)		
- with thermocouples $0.6 \degree C (1.1 \degree F)/10\degree C (18 \degree F)$ Type 4XAuxiliary power effect< 0.001 % of span/V	0 0	0.06 °C (0.11 °E)/10°C (18 °E)		
Auxiliary power effect       < 0.001 % of span/V				Type 4X
Effect of load impedance       < 0.002 % of span/100 Ω				
Long-term driftS/II, III/2/EG/T5 Ta = 85 °C (185 °F), T6 Ta = 60 °C (140 °F), Type 4XAfter one year< 0.3 % of span				
In the first month< 0.02 % of span				
After one year< 0.3 % of spanIECEX, EAC Ex(GOST), INMETRO, NEPSI, KOSHAAfter 5 years< 0.4 % of span	In the first month	< 0.02 % of span		
After 5 years       < 0.4 % of span       INMETRO, NEPSI, KOSHA         Andreight conditions       Hardware and software requirements       INMETRO, NEPSI, KOSHA         Ambient conditions       Hardware and software requirements       INMETRO, NEPSI, KOSHA         Storage temperature       -40 +85 °C (-40 +185 °F)       For the parameterization software siPROM T for SITRANS TF with TH200       PC with CD-ROM drive and USB         Condensation       Permissible       Personal computer       PC with CD-ROM drive and USB         Degree of protection to EN 60529       IP66/67/68       See chapter 8 "Software", SIMATIC PDM for SITRANS TH300       See chapter 8 "Software", SIMATIC PDM"         Dimensions       See "Dimensional drawings"       Die-cast aluminum, low in coopper, GD-AISI 12 or stainless steel, polyester-based lacquer, stain-less steel rating plate       Communication       230 1100 Ω         Electrical connection, sensor conmection       Screw terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed gland       Factory setting (transmitter):       PH100 (IEC 751) with 3-wire circuit         Mounting bracket (optional)       Steel, galwanized and chrome-plated or stainless steel       Steel, galwanized and chrome-plated or stainless steel       Sensor offset: 0 °C (0 °F)			Other certificates	
Conditions of use       Hardware and software requirements         Ambient conditions       Storage temperature       -40 +85 °C (-40 +185 °F)         Condensation       Permissible         Condensation       Permissible         Electromagnetic compatibility       According to EN 61326 and NAMUR NE21         Degree of protection to EN 60529       IP66/67/68         Construction       Approx. 1.5 kg (3.3 lb) without options         See "Dimensional drawings"       See "Dimensional drawings"         Dimensions       See "Dimensional drawings"         Enclosure material       Die-cast aluminum, low in copper, GD-AlSi 12 or stainless steel, polyester-based lacquer, stainless steel land         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				
Ambient conditions-40 +85 °C (-40 +185 °F)-For the parameterization software SIPROM T for SITRANS TF with TH200PC with CD-ROM drive and USBCondensationAccording to EN 61326 and NAMUR NE21- Personal computerPC with CD-ROM drive and USBDegree of protection to EN 60529IP66/67/68- Per operating systemWindows 98, NT, 2000, XP, 7 and Win 8ConstructionApprox. 1.5 kg (3.3 lb) without options- For the parameterization software SIMATIC PDM for SITRANS TH300See chapter 8 'Software', SIMATIC PDM'DimensionsSee "Dimensional drawings" GD-AISi 12 or stainless steel, polyester-based lacquer, stain- less steel rating plate- Multi-core shielded M20 x 1.5 or ½-14 NPT screwed gland≤ 1.5 km (0.93 mi) ProtocolElectrical connection, sensor com- mectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed glandFactory setting (transmitter): • Pt100 (IEC 751) with 3-wire circuit • Measuring range: 0 100 °C (32 212 °F) • Error signal in the event of sensor breakage: 22.8 mA • Sensor offset: 0 °C (0 °F)	Conditions of use			
Storage temperature-40 +85 °C (-40 +185 °F)No for SITRANS TF with TH200PC with CD-ROM drive and USBCondensationPermissible- Personal computerPC with CD-ROM drive and USBDegree of protection to EN 60529IP66/67/68Windows 98, NT, 2000, XP, 7 and Win 8ConstructionApprox. 1.5 kg (3.3 lb) without options- For the parameterization software SIMATIC PDM for SITRANS TH300See chapter 8 "Software", SIMATIC PDM for SITRANS TH300DimensionsSee "Dimensional drawings"Die-cast aluminum, low in copper, GD-AISI 12 or stainless steel, polyester-based lacquer, stain- less steel rating plate230 1100 ΩElectrical connection, sensor con- nectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed glandSteel, galvanized and chrome- plated or stainless steelFactory setting (transmitter): • Pt100 (IEC 751) with 3-wire circuit • Measuring range: 0 100 °C (32 212 °F)Notice of the sensor offset: 0 °C (0 °F)Sensor offset: 0 °C (0 °F)	Ambient conditions			
CondensationPermissiblePermissiblePC with CD-ROM drive and USBElectromagnetic compatibilityAccording to EN 61326 and NAMUR NE21- Personal computerPC with CD-ROM drive and USBDegree of protection to EN 60529IP66/67/68- PC operating systemWindows 98, NT, 2000, XP, 7 and Win 8ConstructionApprox. 1.5 kg (3.3 lb) without options- For the parameterization software SIMATIC PDM for SITRANS TH300See chapter 8 "Software", "SIMATIC PDM"DimensionsSee "Dimensional drawings"Die-cast aluminum, Iow in copper, GD-AISi 12 or stainless steel, polyester-based lacquer, stainless steel, polyester-based lacquer, stainless steel, polyester at and stain less steel rating plateScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed glandMulti-core shielded Factory setting (transmitter): • Pt100 (IEC 751) with 3-wire circuit • Measuring range: 0 100 °C (32 212 °F) • Error signal in the event of sensor breakage: 22.8 mA • Sensor offset: 0 °C (0 °F)	Storage temperature	-40 +85 °C (-40 +185 °F)	SIPROM T for SITRANS TF with	
Electromagnetic compatibilityAccording to EN 61326 and NAMUR NE21- PC operating systemWindows 98, NT, 2000, XP, 7 and Win 8Degree of protection to EN 60529IP66/67/68- PC operating systemWindows 98, NT, 2000, XP, 7 and Win 8ConstructionApprox. 1.5 kg (3.3 lb) without options- For the parameterization software SIMATIC PDM for SITRANS TH300See chapter 8 "Software", "SIMATIC PDM"DimensionsSee "Dimensional drawings"- Die-cast aluminum, low in copper, GD-AISi 12 or stainless steel, polyester-based lacquer, stain- less steel rating plate- Two-core shielded< 3.0 km (1.86 mi)	Condensation	Permissible		
Degree of protection to EN 60529IP66/67/68Win 8Degree of protection to EN 60529IP66/67/68See chapter 8 "Software", "SIMATIC PDM for SITRANS TH300WeightApprox. 1.5 kg (3.3 lb) without optionsSee "Dimensional drawings"See "Dimensional drawings"DimensionsSee "Dimensional drawings"Die-cast aluminum, low in copper, GD-AISi 12 or stainless steel, polyester-based lacquer, stain- less steel rating plateLoad for HART connection230 1100 ΩElectrical connection, sensor con- nectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed glandSteel, galvanized and chrome- plated or stainless steelFactory setting (transmitter): • Pt100 (IEC 751) with 3-wire circuit • Measuring range: 0 100 °C (32 212 °F) • Error signal in the event of sensor breakage: 22.8 mA • Sensor offset: 0 °C (0 °F)	Electromagnetic compatibility	According to EN 61326 and	·	
Degree of protection to EN 60529IP66/67/68See chapter 8 "Software", "SIMATIC PDM"ConstructionApprox. 1.5 kg (3.3 lb) without optionsFor the parameterization software SIMATIC PDM for SITRANS TH300See chapter 8 "Software", "SIMATIC PDM"DimensionsSee "Dimensional drawings"Load for HART connection230 1100 ΩDie-cast aluminum, low in copper, GD-AISi 12 or stainless steel, polyester-based lacquer, stain- less steel rating plateSoftware ", "SIMATIC PDM"Electrical connection, sensor con- nectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed glandMulti-core shielded M20 x 1.5 or ½-14 NPT screwed glandFactory setting (transmitter): • Pt100 (IEC 751) with 3-wire circuit • Measuring range: 0 100 °C (32 212 °F) • Error signal in the event of sensor breakage: 22.8 mA • Sensor offset: 0 °C (0 °F)			- PC operating system	
ConstructionSIMATIC PDM for SITRANS TH300"SIMATIC PDM"WeightApprox. 1.5 kg (3.3 lb) without optionsSimatic PDM for SITRANS TH300"SIMATIC PDM"DimensionsSee "Dimensional drawings"Load for HART connection230 1100 ΩEnclosure materialDie-cast aluminum, low in copper, GD-AISi 12 or stainless steel, polyester-based lacquer, stain- less steel rating plate- Two-core shielded≤ 3.0 km (1.86 mi)Electrical connection, sensor connectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed gland- Multi-core shielded≤ 1.5 km (0.93 mi) HART protocol, version 5.9Mounting bracket (optional)Steel, galvanized and chrome- plated or stainless steel- Measuring range: 0 100 °C (32 212 °F) • Error signal in the event of sensor breakage: 22.8 mA • Sensor offset: 0 °C (0 °F)	Degree of protection to EN 60529	IP66/67/68	For the parameterization software	
optionsoptionsCommunicationDimensionsSee "Dimensional drawings"Load for HART connection230 1100 ΩEnclosure materialDie-cast aluminum, low in copper, GD-AISi 12 or stainless steel, polyester-based lacquer, stain- less steel rating plate- Two-core shielded≤ 3.0 km (1.86 mi)Electrical connection, sensor connectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed gland- Multi-core shielded≤ 1.5 km (0.93 mi)Mounting bracket (optional)Steel, galvanized and chrome- plated or stainless steel- Factory setting (transmitter): • Pt100 (IEC 751) with 3-wire circuit • Measuring range: 0 100 °C (32 212 °F) • Error signal in the event of server breakage: 22.8 mA • Sensor offset: 0 °C (0 °F)	Construction			
DimensionsSee "Dimensional drawings"Load for HART connection $230 \dots 1100 \Omega$ Enclosure materialDie-cast aluminum, low in copper, GD-AISi 12 or stainless steel, polyester-based lacquer, stain- less steel rating plate $\cdot$ Two-core shielded $\leq 3.0 \text{ km} (1.86 \text{ mi})$ Electrical connection, sensor connectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed glandMounting bracket (optional)Steel, galvanized and chrome- plated or stainless steelFactory setting (transmitter): $\cdot$ Pt100 (IEC 751) with 3-wire circuit $\cdot$ Measuring range: $0 \dots 100 ^{\circ}C (32 \dots 212 ^{\circ}F)$ $\cdot$ Error signal in the event of sensor breakage: 22.8 mA $\cdot$ Sensor offset: $0 ^{\circ}C (0 ^{\circ}F)$	Weight		Communication	
Enclosure materialDie-cast aluminum, low in copper, GD-AISi 12 or stainless steel, polyester-based lacquer, stain- less steel rating plate• Two-core shielded  • Multi-core shielded≤ 3.0 km (1.86 mi)Electrical connection, sensor con- nectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed gland• Mounting bracket (optional)• Two-core shielded  • Multi-core shielded≤ 3.0 km (1.86 mi)Wounting bracket (optional)Steel, galvanized and chrome- plated or stainless steel• Two-core shielded • Multi-core shielded 	Dimensions		Load for HART connection	230 1100 Ω
GD-AISi 12 or stainless steel, polyester-based lacquer, stainless steel rating plate       • Multi-core shielded       ≤ 1.5 km (0.93 mi)         Electrical connection, sensor connection       Screw terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed gland       • Multi-core shielded       > 1.5 km (0.93 mi)         Mounting bracket (optional)       Steel, galvanized and chrome-plated or stainless steel       • Multi-core shielded       > 1.5 km (0.93 mi)         HART protocol, version 5.9       • Protocol       • Protocol       • Protocol		0	• Two-core shielded	≤ 3.0 km (1.86 mi)
Electrical connection, sensor connection       Screw terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed gland       Factory setting (transmitter):         Mounting bracket (optional)       Steel, galvanized and chrome-plated or stainless steel       • Measuring range: 0 100 °C (32 212 °F)         • Error signal in the event of sensor breakage: 22.8 mA       • Sensor offset: 0 °C (0 °F)		GD-AlSi 12 or stainless steel,	Multi-core shielded	≤ 1.5 km (0.93 mi)
Electrical connection, sensor con- hectionScrew terminals, cable inlet via M20 x 1.5 or ½-14 NPT screwed glandFactory setting (transmitter): • Pt100 (IEC 751) with 3-wire circuit • Measuring range: 0 100 °C (32 212 °F) • Error signal in the event of sensor breakage: 22.8 mA • Sensor offset: 0 °C (0 °F)			Protocol	HART protocol, version 5.9
M20 x 1.5 or ½-14 NPT screwed gland• Pt100 (IEC 751) with 3-wire circuitMounting bracket (optional)Steel, galvanized and chrome- plated or stainless steel• Pt100 (IEC 751) with 3-wire circuit• Measuring range: 0 100 °C (32 212 °F)• Error signal in the event of sensor breakage: 22.8 mA• Sensor offset: 0 °C (0 °F)	Electrical connection sensor con-		Factory setting (transmitter):	
Mounting bracket (optional)Steel, galvanized and chrome- plated or stainless steel• Measuring range: 0 100 °C (32 212 °F) • Error signal in the event of sensor breakage: 22.8 mA • Sensor offset: 0 °C (0 °F)	nection	M20 x 1.5 or 1/2-14 NPT screwed		rcuit
<ul> <li>Plated or stainless steel</li> <li>Error signal in the event of sensor breakage: 22.8 mA</li> <li>Sensor offset: 0 °C (0 °F)</li> </ul>	Mounting breaket (anti1)	0	• Measuring range: 0 100 °C	(32 212 °F)
	wounting pracket (optional)		Error signal in the event of ser	nsor breakage: 22.8 mA
<ul> <li>Damping 0.0 s</li> </ul>			· · · ,	
			<ul> <li>Damping 0.0 s</li> </ul>	

Transmitter for field mounting/field indicator

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

# Digital measuring errors

Resistance thermometer					
Input	Measuring range				l acy
	°C / (°F)	°C)	(°F)	°C	(°F)
to IEC 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)

Input	Measuring range		Min. mea- Digita sured span accur		
	°C / (°F)	°C	(°F)	°C	(°F)
Туре В	100 1820 (212 3308)	100	(180)	21)	(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)	12)	(1.8) <sup>2)</sup>
Туре Е	-200 +1000 (-328 +1832)	50	(90)	1	(1.8)
Туре Ј	-210 +1200 (-346 +2192)	50	(90)	1	(1.8)
Туре К	-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)
Туре Т	-20 +400 (-328 +752)	40	(72)	1	(1.8)
Type U	-200 +600 (-328 +1112)	50	(90)	2	(3.6)

 $^{1)}$  The digital accuracy in the range 100 to 300 °C (212 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).

Resistance-based sense	ors

Input	Measuring range	Min. mea- sured span	Digital accuracy
	Ω	Ω	Ω
Resistance	0 390	5	0.05
Resistance	0 2200	25	0.25

mV sensor				
		Min. mea- sured span	Digital accuracy	
	mV	mV	μV	
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). 

# **Temperature Measurement**

Transmitter for field mounting/field indicator

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

SITIANS T	- mansimilier, two-w	ire system and SITRANS TF - Field mult	
Selection and Ordering data	Article No.	Further designs	Order code
<b>Temperature transmitter in field housing</b> Two-wire system 4 20 mA, with electrical	7 N G 3 1 3 -	Please add "-Z" to Article No. and specify Order code(s) and plain text.	
isolation, with documentation on MiniDVD		Test protocol (5 measuring points)	C11
↗ Click on the Article No. for the online confi-		Functional safety SIL2	C20
guration in the PIA Life Cycle Portal.		Functional safety SIL2/3	C23
Integrated transmitter		Explosion protection	
SITRANS TH200, programmable • Without Ex protection	5 0	<ul> <li>Explosion protection Ex ia to INMETRO (Brazil) (only with 7NG3131)</li> </ul>	E25
• With Ex ia	5 1	• Explosion protection Ex d to INMETRO (Brazil) (only with 7NG3134)	E26
<ul> <li>With Ex nAL for zone 2</li> <li>Total device SITRANS TF Ex d<sup>1)</sup></li> </ul>	52 54	Explosion protection Ex nA to INMETRO	E27
Total device SITRANS TF according to FM (XP, DIP, NI, S) <sup>1)</sup> SITRANS TF according to FM	5 5	<ul> <li>(Brazil) (only with 7NG3132)</li> <li>Explosion protection Ex i to NEPSI (China) (only with 7NG3131)</li> </ul>	E55
SITRANS TH300, communication capability according to HART V 5.9 • Without Ex-protection	6 0	Explosion protection Ex d to NEPSI (China) (only with 7NG3134)	E56
With Ex ia     With Ex nAL for zone 2	6 1 6 2	<ul> <li>Explosion protection Ex nA to NEPSI (China) (only with 7NG3132)</li> </ul>	E57
<ul> <li>Total device SITRANS TF Ex d<sup>1)</sup></li> <li>Total device SITRANS TF according to FM</li> </ul>	6 4	<ul> <li>Explosion protection Ex d to KOSHA (Korea) (only with 7NG3134)</li> </ul>	E70
(XP, DIP, NI, S) <sup>1)</sup> Enclosure Die-cast aluminium	A	<ul> <li>Explosion protection Ex i according to EAC (Russia/Belarus/Kazahstan) (only for 7NG3131)</li> </ul>	E81
Stainless steel precision casting Connections/cable inlet	Ē	• Explosion protection Ex d according to EAC (Russia/Belarus/Kazahstan) (only for 7NG3134)	E82
Screwed glands M20x1.5 Screwed glands ½-14 NPT Digital indicator	B C	<ul> <li>Explosion protection Ex nA according to EAC (Russia/Belarus/Kazahstan) (only for 7NG3132)</li> </ul>	E83
Without With	0	Marine approvals	
Mounting bracket and securing parts		<ul> <li>Det Norske Veritas Germanischer Lloyd (DNV GL)</li> </ul>	D01
Without	0	• Bureau Veritas (BV)	D02
Made of steel	1	<ul> <li>Lloyd's Register of Shipping (LR)</li> </ul>	D04
Made of stainless steel	2	American Bureau of Shipping (ABS)	D05
		Two coats of lacquer on casing and cover (PU on epoxy)	G10

 Det Norske Veritas Germanischer Lloyd (DNV GL)
 Bureau Veritas (BV)
 Lloyd's Register of Shipping (LR)
 American Bureau of Shipping (ABS)
 Two coats of lacquer on casing and cover (PU on epoxy)
 Transient protection
 Cable gland CAPRI 1/2 NPT ADE 4F, nickle-plated brass (CAPRI 848694 and 810634) included
 Cable gland 1/2 NPT ADE 1F, cable diam. 6 ... 12 (CAPRI 818694 and 810534) included
 Cable gland 1/2 NPT ADE 4F, stainless steel (CAPRI 848699 and 810634) included
 Cable gland 1/2 NPT ADE 1F, cable diam. 4 ... 8.5 (CAPRI 818674 and 810534) included

Transmitter for field mounting/field indicator

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

Selection and Ordering data	Order code	Selection and Ordering data	Article No.
Customer-specific programming Add "-Z" to Article No. and specify Order code(s)	vec 2)	Accessories Further accessories for assembly, connection and transmitter configuration, see page 2/188.	
Measuring range to be set Specify in plain text (max. 5 digits): Y01: to °C, °F Measuring point no. (TAG), max. 8 characters Meas. point descriptor, max. 16 characters Meas. point message, max. 32 characters	Y01 <sup>2)</sup> Y17 <sup>3)</sup> Y23 <sup>4)</sup> Y24 <sup>4)</sup>	Modem for SITRANS TH100, TH200, TR200 > and TF with TH200 incl. parameterization software T with USB interface HART modem With USB interface >	7NG3092-8KU 7MF4997-1DB
Only inscription on measuring point label: specify in plain text: Measuring range Pt100 (IEC) 2-wire, $R_1 = 0 \Omega$	Y22 <sup>4)</sup> U02 <sup>5)</sup>	SIMATIC PDM parameterization software also for SITRANS TH300	see chapter 8
Pt100 (IEC) 2-wire Pt100 (IEC) 3-wire Pt100 (IEC) 4-wire Thermocouple type B Thermocouple type C (W5)	U03 <sup>5)</sup> U04 <sup>5)</sup> U20 <sup>5)6)</sup> U21 <sup>5)6)</sup>	Mounting bracket and securing parts Made of steel for 7NG313B Made of steel for 7NG313C Made of stainless steel for 7NG313B Made of stainless steel for 7NG313C	7MF4997-1AC 7MF4997-1AB 7MF4997-1AJ 7MF4997-1AH
Thermocouple type D (W3)	U22 <sup>5)6)</sup>	Digital indicator <sup>1)</sup>	7MF4997-1BS
Thermocouple type E	U23 <sup>5)6)</sup>	Connection board	A5E02226423
Thermocouple type J	U24 <sup>5)6)</sup>	Available ex stock.	
Thermocouple type K Thermocouple type L	U25 <sup>5)6)</sup> U26 <sup>5)6)</sup>	Supply units see Chapter "Supplementary Compone <sup>1)</sup> It is not possible to upgrade devices with Ex prote	
Thermocouple type N	U27 <sup>5)6)</sup>	Ordering example 1:	
Thermocouple type R	U28 <sup>5)6)</sup>	7NG3135-0AB11-Z Y01+Y23+U03	
Thermocouple type S	U29 <sup>5)6)</sup>	Y01: -10 +100 °C Y23: TICA1234HEAT	
Thermocouple type T	U30 <sup>5)6)</sup> U31 <sup>5)6)</sup>	Ordering example 2:	
Thermocouple type U	U31 <sup>3/3/</sup>	7NG3136-0AC11-Z Y01+Y23+Y24+U25	
With TC: CJC external (Pt100, 3-wire) With TC: CJC external with fixed value, spe- cify in plain text	Y50	Y01: -10 +100 °C Y23: TICA 1234 ABC Y24: HEATING BOILER 56789	
Special differing customer-specific program- ming, specify in plain text	Y09 <sup>7)</sup>	<ul> <li>Factory setting (transmitter):</li> <li>Pt100 (IEC 751) with three-wire circuit</li> </ul>	
Fail-safe value 3.6 mA (instead of 22.8 mA)	U36 <sup>3)</sup>	<ul> <li>Prior (IEC 751) with three-wire circuit</li> <li>Measuring range: 0 100 °C (32 212</li> <li>Fault our root 22.8 mA</li> </ul>	°F)

Supply units see Chapter "Supplementary Components".

1) Without cable gland.

<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> For this selection, Y01 or Y09 must also be selected.
- <sup>4)</sup> If only Y22, Y23 or Y24 are ordered and the label <u>only</u> has to be on the tag plate, Y01 does not have to be specified.
- <sup>5)</sup> For this selection, Y01 must also be selected.
- <sup>6)</sup> Internal cold 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.

Measuring range: 0 ... 100 °C (32 ... 212 °F)
Fault current 22.8 mA
Sensor offset: 0 °C (0 °F)
Damping 0.0 s

## **Temperature Measurement**

Transmitter for field mounting/field indicator

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

Selection and Ordering data	Article No.
SITRANS TF field indicator for 4 20 mA signals	7 N G 3 1 3 0 -
Click on the Article No. for the online confi- guration in the PIA Life Cycle Portal.	
Without Ex-protection With Ex ia With Ex nAL for zone 2 Total device SITRANS TF Ex d <sup>1)</sup> Total device SITRANS TF according to FM (XP, DIP, NI, S) <sup>1)</sup>	0 1 1 1 2 1 4 1 5 1
Enclosure Die-cast aluminium Stainless steel precision casting	A
Connections/cable inlet Screwed glands M20x1.5 Screwed glands ½-14 NPT	B C
<b>Digital indicator</b> With	1
<b>Mounting bracket and securing parts</b> Without Made of steel Made of stainless steel	0 1 2
Further designs	Order code
Please add "- <b>Z</b> " to Article No. and specify Order code(s) and plain text.	
Test protocol (5 measuring points) Explosion protection	C11
Explosion protection Ex ia to INMETRO (Brazil) (only with 7NG3131)	E25
Explosion protection Ex d to INMETRO (Brazil) (only with 7NG3134)	E26
• Explosion protection Ex nA to INMETRO (Brazil) (only with 7NG3132)	E27
<ul> <li>Explosion protection Ex i to NEPSI (China) (only with 7NG3131)</li> </ul>	E55
<ul> <li>Explosion protection Ex d to NEPSI (China) (only with 7NG3134)</li> </ul>	E56
• Explosion protection Ex nA to NEPSI (China) (only with 7NG3132)	E57
<ul> <li>Explosion protection Ex d to KOSHA (Korea) (only with 7NG3134)</li> </ul>	E70
<ul> <li>Explosion protection Ex i according to EAC (Russia/Belarus/Kazahstan) (only for 7NG3131)</li> </ul>	E81
<ul> <li>Explosion protection Ex d according to EAC (Russia/Belarus/Kazahstan) (only for 7NG3134)</li> </ul>	E82
• Explosion protection Ex nA according to EAC (Russia/Belarus/Kazahstan) (only for 7NG3132)	E83
Marine approvals <ul> <li>Det Norske Veritas Germanischer Lloyd (DNV GL)</li> </ul>	D01
Bureau Veritas (BV)	D02
<ul> <li>Lloyd's Register of Shipping (LR)</li> <li>American Bureau of Shipping (ABS)</li> <li>Two coats of lacquer on casing and cover</li> </ul>	D04 D05 G10
(PU on epoxy) Transient protection Cable gland CAPRI 1/2 NPT ADE 4F, nickle-plated brass (CAPRI 848694 and 810634) included	J01 D57
Cable gland 1/2 NPT ADE 1F, cable diam. 6 12 (CAPRI 818694 and 810534) included	D58
Cable gland 1/2 NPT ADE 4F, stainless steel (CAPRI 848699 and 810634) included	D59
Cable gland 1/2 NPT ADE 1F, cable diam. 4 8.5 (CAPRI 818674 and 810534) included	D60

Selection and Ordering data	Order code
Customer-specific programming Add "-Z" to Article No. and specify Order code(s)	
Measuring range to be set Specify in plain text (max. 5 digits): Y01: to °C, °F	Y01 <sup>2)</sup>
Only inscription on TAG plate: specify in plain text: Measuring range	Y22 <sup>3)</sup>
Only inscription on TAG plate: Measuring point descriptor, max. 16 characters	Y23 <sup>3)</sup>
Only inscription on TAG plate: Measuring point message, max. 27 characters	Y24 <sup>3)</sup>
Special differing customer-specific program- ming, specify in plain text	Y09 <sup>4)</sup>
Cupply upits and Chapter "Cupplementary Company	anto"

Supply units see Chapter "Supplementary Components".

1) Without cable gland.

- <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 are ordered and the label <u>only</u> has to be on the tag plate, Y01 does not have to be specified.
- <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.

Selection and Ordering data	Article No.
Accessories Further accessories for assembly, connection and transmitter configuration, see page 2/188.	
Mounting bracket and securing parts	
Made of steel for 7NG313B	7MF4997-1AC
Made of steel for 7NG313C	7MF4997-1AB
Made of stainless steel for 7NG313B	7MF4997-1AJ
Made of stainless steel for 7NG313C	7MF4997-1AH
Digital indicator <sup>1)</sup>	7MF4997-1BS
Connection board	A5E02226423
<ul> <li>Available ex stock.</li> </ul>	

1) It is not possible to upgrade devices with Ex protection

Ordering example 1:

7NG3130-0AB10-Z Y01+Y23 Y01: -5...100 °C Y23: TICA1234HEAT

#### Ordering example 2:

7NG3130-0AC10-Z Y01+Y23+Y24 Y01: 0 ... 20 BAR Y23: PICA 1234 ABC Y29: HEATING BOILER 67890

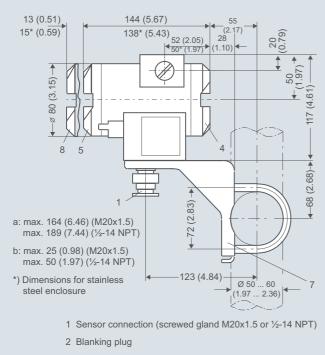
## Factory setting (field indicator):

4 ... 20 mA

Transmitter for field mounting/field indicator

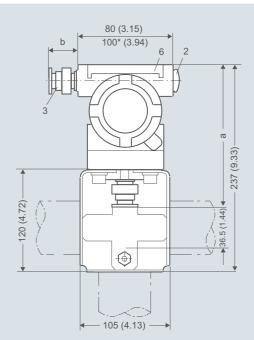
# SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

# Dimensional drawings



- 3 Electrical connection (screwed gland M20x1.5 or 1/2-14 NPT)
- 4 Terminal side, output signal
- 5 Terminal side, sensor

SITRANS TF, dimensions in mm (inches)

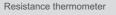


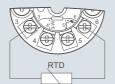
- 6 Protective cover (without function)
- 7 Mounting bracket (option) with clamp for securing to a vertical or horizontal pipe
- 8 Cover with window for digital display

Transmitter for field mounting/field indicator

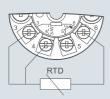
# SITRANS TF - Transmitter, two-wire system and SITRANS TF - Field indicator for 4 to 20 mA

# Schematics

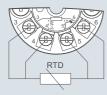




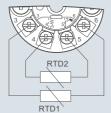
Two-wire system 1)



Three-wire system

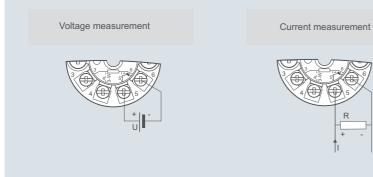


Four-wire system

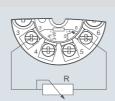


Generation of average value / difference <sup>1)</sup>

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

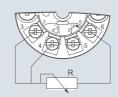


SITRANS TF, sensor connection assignment

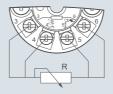


Resistance

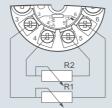
Two-wire system 1)



Three-wire system

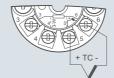


Four-wire system

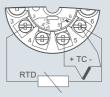


Generation of average value / difference 1)

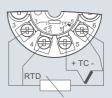
Thermocouple



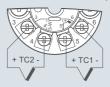
Cold junction compensation Internal/fixed value



Cold junction compensation with external Pt100 in two-wire system <sup>1)</sup>



Cold junction compensation with external Pt100 in three-wire system



Generation of average value / difference with internal cold junction compensation

Transmitters for field mounting

#### 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 aluminium or stainless steel
- Degree of protection IP66/67/68
- Can be mounted elsewhere if the measuring point
- is hard to access,
- is subject to high temperatures,
- is subject to vibrations from the system,
- or if you want to avoid long neck tubes and/or protective tubes.
- 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. For that reasons 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 elements.

The inner workings offer high measuring accuracy, universal input and a wide range of diagnostic options.

## Function

#### Features

- Polarity-neutral bus connection
- 24-bit analog-digital converter for high resolution
- · Electrically isolated
- Version for use in hazardous areas
- Special characteristic
- Sensor redundance

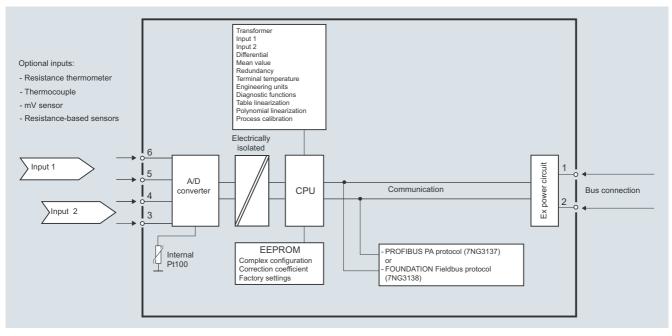
Transmitter with PROFIBUS PA communication

- 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.

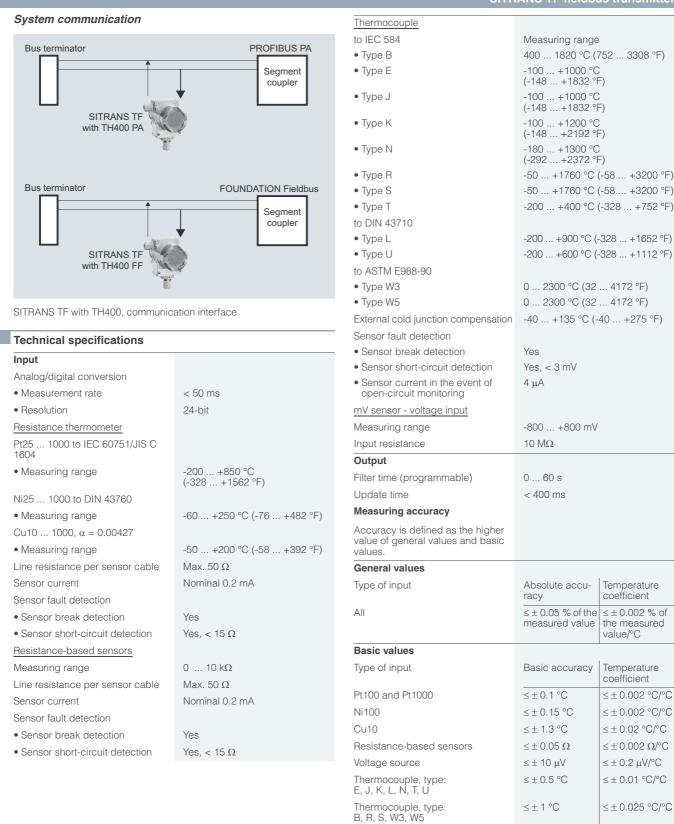
The only difference between the two versions of the SITRANS TF (7NG3137-... and 7NG3138-...) is the type of field bus protocol used (PROFIBUS PA or FOUNDATION fieldbus).



SITRANS TF with TH400, function diagram

## Temperature Measurement Transmitters for field mounting

SITRANS TF fieldbus transmitter



20 ... 28 °C (68 ... 82 °F)

≤ ± 0.5 °C

30 s Min. 60 dB

Cold junction compensation

Reference conditions Warming-up time

Signal-to-noise ratio

Calibration condition

Transmitters for field mounting

## SITRANS TF fieldbus transmitter

Conditions of use		Certificates and approvals	
Ambient conditions		Explosion protection ATEX	
Permissible ambient temperature	-40 +85 °C (-40 +185 °F)	EC type test certificate	ZELM 11 ATEX 0471 X
Permissible storage temperature	-40 +85 °C (-40 +185 °F)	Type of protection "intrinsic safety i"	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
Relative humidity	$\leq$ 98 %, with condensation	(version: 7NG313x-1xxxx)	
Insulation resistance		Conformity statement	ZELM 11 ATEX 0471 X
Test voltage	500 V AC for 60 s	<ul> <li>"Operating equipment that is non-</li> </ul>	II 3 G Ex ic IIC T6/T4 Gc
<ul> <li>Continuous operation</li> </ul>	50 V AC/75 V DC	ignitable and has limited energy" type of protection	II 3 G Ex nA IIC T6/T4 Gc II 3 G Ex nA [ic] IIC T6/T4 Gc
Electromagnetic compatibility		(version: 7NG313x-2xxxx)	
NAMUR	NE21	EC type test certificate	ZELM 11 ATEX 0472 X
EMC 2014/30/EU Emission and Noise Immunity	EN 61326-1, EN 61326-2-5	<ul> <li>"Flame-proof enclosure" type of protection (version: 7NG313x-</li> </ul>	II 2 G Ex d IIC T6/T5 Gb II 2 D Ex tb IIIC T100 °C Db
Construction		4xxxx)	
Weight	Approx. 1.5 kg (3.3 lb) without options	<ul><li>Explosion protection: FM for USA</li><li>FM approval</li></ul>	FM 3017742
Dimensions	See "Dimensional drawings"	<ul> <li>Type of protection XP, DIP, NI and S</li> </ul>	XP / I / 1 / BCD / T5,T6; Type 4X
Enclosure materials	Die-cast aluminum, low in cop- per, GD-AlSi 12 or stainless steel	(version 7NG313x-5xxxx)	DIP / II, III / 1 / EFG / T5,T6; Type 4X
	Polyester-based lacquer for GD AlSi 12 enclosure		NI / I / 2 / ABCD / T5,T6; Type 4X S / II, III / 2 / FG T5,T6; Type 4X
Electrical connection, sensor con- nection	<ul> <li>Stainless steel rating plate</li> </ul>	Other certificates	EAC Ex(GOST), INMETRO,
	<ul> <li>screw terminals</li> </ul>		NEPSI, KOSHÁ
	<ul> <li>Cable inlet via M20 x 1.5 or ½ -14 NPT screwed gland</li> </ul>	Communication	
	Bus connection with M12 plug	Parameterization interface	
	(optional)	<ul> <li>PROFIBUS PA connection</li> </ul>	
Mounting bracket (optional)	Steel, galvanized and chrome- plated or stainless steel	- Protocol	A&D profile, Version 3.0
Degree of protection	IP66/67 to EN 60529	- Protocol	EN 50170 Volume 2
Auxiliary power		- Address (for delivery)	126
Power supply		- Function blocks	2 x analog
<ul> <li>Standard, Ex "d", Ex "nA", Ex "nL", XP, NI</li> </ul>	10.0 32 V DC	<ul> <li>FOUNDATION fieldbus connection</li> </ul>	
• Ex "ia", Ex "ib"	10.0 30 V DC	- Protocol	FF protocol
In FISCO/FNICO installations	10.0 17.5 V DC	- Protocol	FF design specifications
Power consumption	< 11 mA	- Functionality	Basic or LAS
Max. increase in power consump-	< 7 mA	- Version	ITK 4.6
tion in the event of a fault		- Function blocks	2 x analog and 1 x PID
		Factory setting	
		for SITRANS TH400 PA	

Sensor

Unit Failure mode

Filter time

Sensor

Filter time

Node address

Unit Failure mode

PA address

Type of connection

PROFIBUS Ident No.

Type of connection

for SITRANS TH400 FF

Pt100 (IEC)

3-wire circuit °C

Last valid value

Pt100 (IEC)

3-wire circuit

Last valid value

Manufacturer-specific

0 s

126

°C

0 s

22

# **Temperature Measurement**

Transmitters for field mounting

SITRANS TF fieldbus transmitter
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Selection and Ordering data	Article No.	Further designs	Order code
Temperature transmitter in field enclosure A with fieldbus communication and electrical	7 N G 3 1 3 - 0	Please add " <b>-Z</b> " to Article No. and specify Order code(s) and plain text.	
isolation		Test report (5 measuring points)	C11
Click on the Article No. for the online confi- guration in the PIA Life Cycle Portal.		Bus connection	
·		<ul> <li>M12 plug (metal), without mating connector</li> </ul>	M00 <sup>2)</sup>
Integrated transmitter SITRANS TH400 with PROFIBUS PA		<ul> <li>M12 plug (metal), with mating connector</li> </ul>	M01 <sup>2)</sup>
Without Exprotection	7 0	Explosion protection	
<ul> <li>Without Ex protection</li> <li>With Ex ia (ATEX)</li> <li>With Ex nAL for zone 2 (ATEX)</li> <li>Total device SITRANS TF Ex d<sup>1</sup>)</li> <li>Total device SITRANS TF according to FM (XP, DIP, NI, S)<sup>1</sup>)</li> <li>SITRANS TH400, with FOUNDATION fieldbus</li> <li>Without Ex protection</li> <li>With Ex ia (ATEX)</li> <li>With Ex nAL for zone 2 (ATEX)</li> <li>Total device SITRANS TF Ex d<sup>1</sup>)</li> </ul>	7 1 7 2 7 4 7 5 8 0 8 1 8 2 8 4	<ul> <li>Explosion protection Ex ia to INMETRO (Brazil) (only with 7NG3131)</li> </ul>	E25
		<ul> <li>Explosion protection Ex d to INMETRO (Brazil) (only with 7NG3134)</li> </ul>	E26
		<ul> <li>Explosion protection Ex nA to INMETRO (Brazil) (only with 7NG3132)</li> </ul>	E27
		<ul> <li>Explosion protection Ex i to NEPSI (China) (only with 7NG3131)</li> </ul>	E55
		<ul> <li>Explosion protection Ex d to NEPSI (China) (only with 7NG3134)</li> </ul>	E56
<ul> <li>Total device SITRANS TF according to FM (XP, DIP, NI, S)<sup>1)</sup></li> </ul>	8 5	<ul> <li>Explosion protection Ex nA to NEPSI (China) (only with 7NG3132)</li> </ul>	E57
<b>Enclosure</b> Die-cast aluminium	А	<ul> <li>Explosion protection Ex d to KOSHA (Korea) (only with 7NG3134)</li> </ul>	E70
Stainless steel precision casting	Ē	<ul> <li>Explosion protection Ex i according to EAC (Russia/Belarus/Kazahstan)</li> </ul>	E81
Connections/cable inlet		(only for 7NG3131)	
Screwed glands M20x1.5 Screwed gland s ½-14 NPT	B C	<ul> <li>Explosion protection Ex d according to EAC (Russia/Belarus/Kazahstan)</li> </ul>	E82
Mounting bracket and fastening parts		(only for 7NG3134)	
None Made of steel Stainless steel	0 1 2	• Explosion protection Ex nA according to EAC (Russia/Belarus/Kazahstan) (only for 7NG3132)	E83
		Marine approvals <ul> <li>Det Norske Veritas Germanischer Lloyd (DNV GL)</li> </ul>	D01
		Bureau Veritas (BV)	D02
		<ul> <li>Lloyd's Register of Shipping (LR)</li> <li>American Bureau of Shipping (ABS)</li> </ul>	D04 D05

2

D05 G10

J01

D57

D58

D59

D60

Two coats of lacquer on casing and cover (PU

Cable gland CAPRI 1/2 NPT ADE 4F, nickle-plated brass (CAPRI 848694 and 810634) included

Cable gland 1/2 NPT ADE 1F, cable diam. 6 ... 12 (CAPRI 818694 and 810534) included

(CAPRI 848699 and 810634) included

Cable gland 1/2 NPT ADE 1F, cable diam. 4 ... 8.5 (CAPRI 818674 and 810534) included

Cable gland 1/2 NPT ADE 4F, stainless steel

on epoxy)

Transient protection

Transmitters for field mounting

## SITRANS TF fieldbus transmitter

Selection and Ordering data	Order code.	Selection and Ordering data	Article No.	
Customer-specific programming Add "-Z" to Article No. and specify Order code(s)		Accessories Further accessories for assembly, connection and transmitter configuration, see page 2/188.		
Measuring range to be set Specify in plain text (max. 5 digits): Y01: to °C, °F	Y01 <sup>3)</sup>	SIMATIC PDM parameterization software also for SITRANS TF with TH400 PA	see Sec. 8	
Meas. point no. (TAG), max. 8characters	Y15 <sup>4)</sup>	Mounting bracket and fastening parts		
Meas. point descriptor, max. 16 characters	Y23 <sup>4)</sup>	Made of steel for 7NG313B Made of steel for 7NG313C	7MF4997-1AC 7MF4997-1AB	
Meas. point message, max. 32 characters	Y24 <sup>5)</sup>	Made of stainless steel for 7NG313B		
Bus address, specify in plain text	Y25 <sup>4)</sup>	Made of stainless steel for 7NG313C	7MF4997-1AH	
Pt100 (IEC) 2-wire, $R_L = 0 \Omega$	U02 <sup>6)</sup>	Connection board	A5E02391790	
Pt100 (IEC) 3-wire	U03 <sup>6)</sup>	<ul> <li>Available ex stock.</li> </ul>		
Pt100 (IEC) 4-wire	U04 <sup>6)</sup>	Ordering example 1:		
Thermocouple type B	U20 <sup>6)7)</sup>	7NG3137-0AB01-Z Y01+Y15+Y25+U03 Y01: -10 +100 °C Y15: TICA1234HEAT Y25: 33		
Thermocouple type C (W5)	U21 <sup>6)7)</sup>			
Thermocouple type D (W3)	U22 <sup>6)7)</sup>			
Thermocouple type E	U23 <sup>6)7)</sup>	Ordering example 2:		
Thermocouple type J	U24 <sup>6)7)</sup>	7NG3137-0AC01-Z Y01+Y15+Y25+U25		
Thermocouple type K	U25 <sup>6)7)</sup>	Y01: -10 +100 °C Y15: TICA 1234 ABC 5678 Y25: 35		
Thermocouple type L	U26 <sup>6)7)</sup>			
Thermocouple type N	U27 <sup>6)7)</sup>	Factory setting:		
Thermocouple type R	U28 <sup>6)7)</sup>	<ul> <li>for SITRANS TH400 PA:</li> </ul>		
Thermocouple type S	U29 <sup>6)7)</sup>	- Pt100 (IEC) with 3-wire circuit		
Thermocouple type T	U30 <sup>6)7)</sup>	- Unit: °C		
Thermocouple type U	U31 <sup>6)7)</sup>	- Failure mode: last valid value - Filter time: 0 s		
With TC: CJC: external (Pt100, 3-wire)	U41	- PA address: 126		
With TC: CJC: external with fixed value, spe- cify in plain text	Y50	<ul><li>PROFIBUS Ident No.: manufacturer-specific</li><li>for SITRANS TH400 FF:</li></ul>		
Special differing customer-specific program- ming, specify in plain text	Y09 <sup>8)</sup>	- Pt100 (IEC) with 3-wire circuit - Unit: °C - Failure mode: last valid value		
1) M(the sub-selete sub-selet				

1) Without cable gland

<sup>2)</sup> Not available for explosion protection Ex d or XP.

<sup>3)</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>4)</sup> If only Y15, Y23 or Y25 are ordered and the label <u>only</u> has to be on the tag plate, Y01 does not have to be specified.

<sup>5)</sup> For this selection, Y01 or Y09 must also be selected.

 $^{6)}\,$  For this selection, Y01 must also be selected.

 $^{7)}\,$  Internal cold 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.

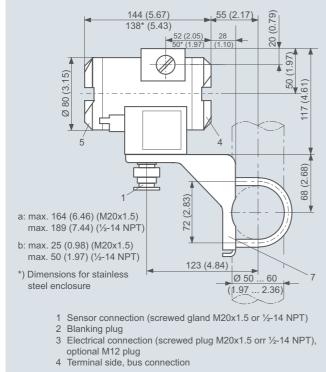
- Filter time: 0 s

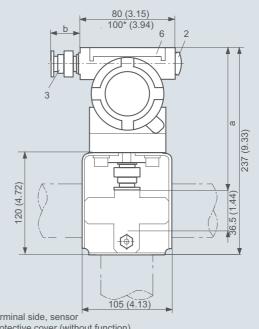
- Node address: 22

Transmitters for field mounting

# SITRANS TF fieldbus transmitter

# Dimensional drawings





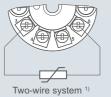
5 Terminal side, sensor
6 Protective cover (without function)
7 Mounting bracket (optional) with clamp securing to a vertical or horizontal pipe

SITRANS TF with TH400, dimensions in mm (inches)

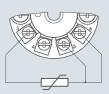
Transmitters for field mounting

## SITRANS TF fieldbus transmitter

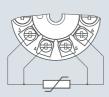
#### Schematics



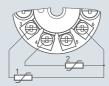
Resistance thermometer



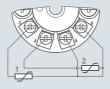
Three-wire system



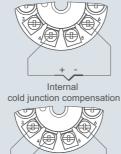
Four-wire system



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



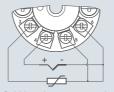
Mean-value/differential or redundancy generation 1 sensor in two-wire system <sup>1)</sup> 1 sensor in three-wire system



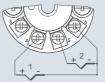
Thermocouple



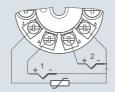
Cold junction compensation with external Pt100 in two-wire system <sup>1)</sup>



Cold junction compensation with external Pt100 in three-wire system

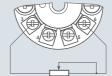


Mean value, differential or redundancy generation with internal cold junction compensation

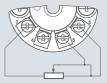


Mean value, differential or redundancy generation and cold junction compensation with internal Pt100 in two-wire system <sup>1)</sup>

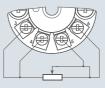




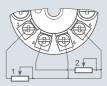
Two-wire system 1)



Three-wire system



Four-wire system



Mean value, differential or redundancy generation 1 resistor in two-wire system <sup>1)</sup> 1 resistor in three-wire system

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.

SITRANS TF with TH400, sensor connection assignment