Overview

SITRANS TF320 in dual chamber enclosure

SITRANS TF320 in single chamber enclosure

- 2-wire temperature transmitter with and without HART communication interface
- Universal input for virtually any type of temperature sensor
- Can be configured via PC, HART 7 or optional local operation

Benefits

- Universally applicable as a temperature transmitter with galvanic isolation for:
  - Resistance thermometer (2-wire, 3-wire, 4-wire connection)
  - Thermocouples
  - Linear resistances, potentiometer and DC voltage sources
- Local operation of the temperature transmitter via display (single chamber enclosure) or control keys accessible from outside (dual chamber enclosure)
- Rugged single or dual chamber enclosure made of die-cast aluminum or stainless steel 316L
- Electronic compartment isolated (watertight) from terminal compartment in dual chamber enclosure
- Degree of protection IP66/67/68 (1.5 m/2 h)
- Electromagnetic compatibility according to DIN EN 61326 and NE21
- Test terminals for direct read-out of the output signal without breaking the current loop
- Remote installation option:
  - Measuring point is difficult to access
  - Measuring point is subjected to high temperatures
  - Measuring point is subjected to vibration through plant
  - Long neck pipes and thermowells must be avoided
- Mounted directly on sensors
- Temperature transmitters of the "intrinsically safe protection type, increased safety for zone 2, flameproof and dust-protected" type of protection can be installed in hazardous areas. The transmitter meets the requirements of the EU Directive 2014/34/EU (ATEX), the FM and CSA regulations as well as other national approvals, e.g. EACEx, NEPSI, KCs, Inmetro.
- SIL2/3 (with order note C20)

Application

SITRANS TF320 can be used everywhere where temperatures need to be measured under particularly adverse conditions and where a user-friendly 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.

2

Function

Configuration

The communication capability over the HART protocol V 7 permits parameterization using a PC or HART communicator (handheld communicator). The SIMATIC PDM makes it easy.

For the SITRANS TF320 without HART functionality, parameters are assigned with the PC. A special modem and the software tool SIPROM T are available for this purpose.

The optional local operation on the device gives you the possibility to configure the device's most important functions very quickly.

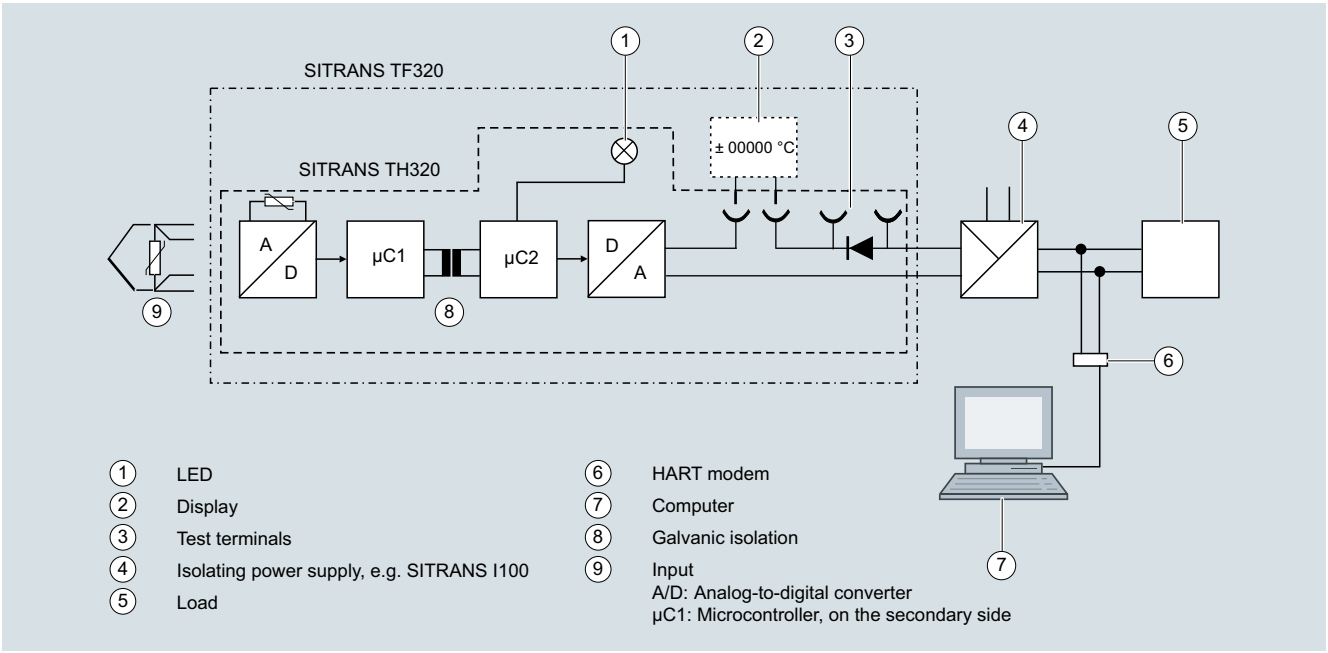
Principle of operation

SITRANS TF320 as temperature transmitter

The input signal, whether resistance thermometer (RTD), thermocouple (TC), Ω or mV signal, is amplified and linearized. Input and output side are galvanically isolated. An internal cold junction is integrated for measurements with thermocouples.

The device outputs a temperature-linear direct current from 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 TF320 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.



Function block diagram SITRANS TF320 with integrated SITRANS TH320

Technical specifications

General	
Supply voltage[1) 2)]	
• Without explosion protection (non-Ex)	10.5 ... 48 V DC
• with explosion protection (Ex i)	10.5 ... 30 V DC
Additional minimum supply voltage when using test terminals	0.8 V
Maximum power loss	≤ 850 mW
Minimum load resistance at supply voltage > 37 V	(V_{supply} - 37 V)/23 mA
Insulation voltage, test/operation	
• Without explosion protection (non-Ex)	2.5 kV AC/55 V AC
• with explosion protection (Ex i)	2.5 kV AC/42 V AC
Polarity protection	All inputs and outputs
Write protection	Wire jumper (transmitter), switch (on display) or software
Warm-up time	< 5 min
Starting time	< 2.75 s
Programming	SIPROM T and HART
Signal-to-noise ratio	> 60 dB
Long-term stability	Better than: • ± 0.05% of measuring span/year • ± 0.18% of measuring span/5 years
Response time	4 ... 20 mA: ≤ 55 ms HART: ≤ 75 ms (typically 70 ms)
Programmable damping	0 ... 60 s
Signal dynamic	
• Input	24 bit
• Output	18 bit
Influence of change in supply voltage	< 0.005% of measuring span/V DC
Input	
Resistance thermometer (RTD)	
Input type	
• Pt10 ... 10000	• IEC 60751 • JIS C 1604-8 • GOST 6651_2009 • Callendar-Van Dusen
• Ni10 ... 10000	• DIN 43760-1987 • GOST 6651-2009/OIML R84:2003
• Cu5 ... 1000	• Edison Copper Winding No. 15 • GOST 6651-2009/OIML R84:2003
Type of connection	2-wire, 3-wire or 4-wire
Line resistance per wire	Max. 50 Ω
Input current	< 0.15 mA
Effect of the line resistance (with 3-wire and 4-wire connections)	< 0.002 Ω/Ω
Cable, wire-wire capacity	
• Pt1000, Pt10000 (IEC 60751 and JIS C 1604-8)	Max. 30 nF
• All other input types	Max. 50 nF
Fault detection, programmable	None, short-circuited, defective, short-circuited or defective
	Note When the low limit for the configured input type is below the constant detection limit for short-circuited inputs, the detection of short circuits is disabled regardless of the configuration of the fault detection.
Detection limit for short-circuited input	15 Ω
Fault detection time (RTD)	≤ 75 ms (typically 70 ms)
Fault detection time (for 3-wire and 4-wire)	≤ 2 000 ms
Thermocouples (TC)	
Input type	
• B	IEC 60584-1
• E	IEC 60584-1
• J	IEC 60584-1
• K	IEC 60584-1
• L	DIN 43710
• Lr	GOST 3044-84
• N	IEC 60584-1
• R	IEC 60584-1
• S	IEC 60584-1
• T	IEC 60584-1
• U	DIN 43710
• W3	ASTM E988-96
• W5	ASTM E988-96
• LR	GOST 3044-84
Cold junction compensation (CJC)	Constant, internal or external over Pt100 or Ni100 RTD
• Temperature range internal CJC	-50 ... +100 °C (-58 ... +212 °F)
• Connection external CJC	2-wire or 3-wire
• External CJC, line resistance per wire (for 3-wire and 4-wire connections)	50 Ω
• Effect of the line resistance (with 3-wire and 4-wire connections)	< 0.002 Ω/Ω
• Input current external CJC	< 0.15 mA
• Temperature range external CJC	-50 ... +135 °C (-58 ... +275 °F)
• Cable, wire-wire capacity	Max. 50 nF
• Total line resistance	Max. 10 kΩ
• Fault detection, programmable	None, short-circuited, defective, short-circuited or defective
	Note The short-circuited fault detection only applies to the CJC input.
• Fault detection time (TC)	≤ 75 ms (typically 70 ms)
• Fault detection time, external CJC (for 3-wire and 4-wire)	≤ 2 000 ms
Linear resistance	
Input range	0 ... 100 kΩ
Minimum measuring span	25 Ω
Type of connection	2-wire, 3-wire or 4-wire
Line resistance per wire	Max. 50 Ω
Input current	< 0.15 mA
Effect of the line resistance (with 3-wire and 4-wire connections)	< 0.002 Ω/Ω
Cable, wire-wire capacity	
• R > 400 Ω	Max. 30 nF
• R ≤ 400 Ω	Max. 50 nF
Fault detection, programmable	None, defective

SITRANS TF320 (HART, universal)

Potentiometers	
Input range	10 Ω ... 100 kΩ
Minimum measuring span	25 Ω
Type of connection	2-wire, 3-wire or 4-wire
Line resistance per wire	Max. 50 Ω
Input current	< 0.15 mA
Effect of the line resistance (with 4-wire and 5-wire connections)	< 0.002 Ω/Ω
Cable, wire-wire capacity	
• R > 400 Ω	Max. 30 nF
• R ≤ 400 Ω	Max. 50 nF
Fault detection, programmable	None, short-circuited, defective, short-circuited or defective
	Note When the configured potentiometer size is below the constant detection limit for short-circuited inputs, the detection of short circuits is disabled regardless of the configuration of the fault detection.
Detection limit for short-circuited input	15 Ω
Fault detection time, wiper arm (no short-circuit detection)	≤ 75 ms (typically 70 ms)
Fault detection time, element	≤ 2 000 ms
Fault detection time (for 4-wire and 5-wire)	≤ 2 000 ms
Supply voltage	
Measuring range	
• Unipolar	-100 ... 1700 mV
• Bipolar	-800 ... +800 mV
Minimum measuring span	2.5 mV
Input resistance	10 MΩ
Cable, wire-wire capacity	
• Input range: -100 ... 1700 mV	Max. 30 nF
• Input range: -20 ... 100 mV	Max. 50 nF
Fault detection, programmable	None, defective
Fault detection time	≤ 75 ms (typically 70 ms)
Output and HART communication	
Normal range, programmable	3.8 ... 20.5 mA/20.5 ... 3.8 mA
Extended range (output limits), programmable	3.5 ... 23 mA/23 ... 3.5 mA
Programmable input/output limits	
• Fault current	Enable/disable
• Fault current setting	3.5 ... 23 mA
Update time	10 ms
Load (with current output)	≤ (V_{Supply} - 10.5)/0.023 Ω
Load stability	< 0.01% of measuring span/100 Ω (measuring span = currently selected range)
Input fault detection, programmable (detection of input short circuits is ignored with TC and voltage inputs)	3.5 ... 23 mA
NAMUR NE43 Upscale	> 21 mA
NAMUR NE43 Downscale	< 3.6 mA
HART protocol versions	HART 7
Measuring accuracy	
Input accuracy	See "Input accuracy" table
Output accuracy	See "Output accuracy" table

Rated conditions	
Ambient temperature	
• Without local operation in single chamber enclosure	-50 ... +85 °C (-58 ... +185 °F)
• With local operation	-40 ... +85 °C (-40 ... +185 °F)
• For transmitters with functional safety	-40 ... +80 °C (-40 ... +176 °F)
Storage temperature	-50 ... +85 °C (-58 ... +185 °F)
Reference temperature for sensor calibration	24 °C ±1.0 °C (75.2 °F ±1.8 °F)
Relative humidity	< 99% (no condensation)
Degree of protection	
• Temperature transmitter enclosure	IP66/IP67/IP68
• Terminals	IP00
Mechanical construction	
Weight	
• Single chamber enclosure	0.85 kg (1.87 lb)
• Dual chamber enclosure	• Aluminum: 1.3 kg (2.87 lb) • Stainless steel: 3.3 kg (7.28 lb)
Maximum core cross-section	
• Single chamber enclosure	1.5 mm² (AWG 16)
• Dual chamber enclosure	2.5 mm² (AWG 14)
Tightening torque for clamping screws	0.5 ... 0.6 Nm
Vibrations	IEC 60068-2-6
• 2 ... 25 Hz	± 1.6 mm (0.07 inch)
• 25 ... 100 Hz	± 4 g
Certificates and approvals	
Explosion protection ATEX/IECEx and others	
Certificates[3)]	IECEx DEK 19.0069X DEKRA 19ATEX0106 X (Category 1) DEKRA 19ATEX0107 X (Category 3)
"Intrinsic safety ia/ib" type of protection	For use in Zone 0, 1, 2
• ATEX	II 1 G Ex ia IIC T6 ... T4 Ga II 2(1) G Ex ib [ia Ga] IIC T6 ... T4 Gb
• IECEx and others	Ex ia IIC T6 ... T4 Ga Ex ib [ia Ga] IIC T6 ... T4 Gb
• EACEx	Ex ia IIC T6 ... T4 Ga Ex ib [ia Ga] IIC T6 ... T4 Gb
"Intrinsic safety ic" type of protection	For use in Zones 2
• ATEX	II 2 G Ex ic IIC T6…T4 Gc
• IECEx and others	Ex ic IIC T6 ... T4 Gc
• EACEx	2Ex ic IIC T6…T4 Gc X
"Non-sparking/increased safety nA/ec" type of protection	For use in Zones 2
• ATEX	II 2 G Ex nA IIC T6…T4 Gc II 2 G Ex ec IIC T6…T4 Gc
• IECEx and others	Ex nA IIC T6 ... T4 Gc Ex ec IIC T6 ... T4 Gc
• EACEx	2Ex nA IIC T6…T4 Gc
• "Flameproof enclosure db" type of protection	For use in Zone 1
• ATEX	II 2 G Ex db IIC T6…T4 Gb
• IECEx and others	Ex db IIC T6 ... T4 Gb
• EACEx	1Ex d IIC T6…T4 Gb X
• "Protection by enclosure tb" type of protection	For use in Zone 21
• ATEX	II 2 D Ex tb IIC T100°C Db
• IECEx and others	Ex tb IIC T100°C Db
• EACEx	Ex tb IIC T100°C Db X

Explosion protection CSA/FM for Canada and USA	
Certificates	FMxxCAxxxx FMxxUSxxxx
"Intrinsic safety ia" type of protection	IS, CL I, Div 1, GP ABCD, T6 ... T4 Ex ia IIC T6 … T4 Ga AEx ia IIC T6 … T4 Ga or: Ex ib [ia Ga] IIC T6…T4 Gb AEx ib [ia Ga] IIC T6…T4 Gb
"Non incendive field wiring NIFW" type of protection	NIFW, CL I, Div 2, GP ABCD T6 ... T4
"Non incendive NI" type of protection	NI, CL I, Div 2, GP ABCD T6...T4 Ex nA IIC T6 ... T4 Gc AEx nA IIC T6 ... T4 Gc
"Explosion-proof XP" type of protection	XP/ CL I / DIV1 / GP ABCD / T6....T4 CL I / Zn1 / AEx/Ex d IIC T6...T4 Gb
"Dust-protected DIP" type of protection	DIP/ CL II, III / DIV 1 / GP EFG / T6...T4 Zn21 / AEx/Ex tb IIIC T100°C Gb

1) Note that the minimum supply voltage must correspond to the value measured at the terminals of the SITRANS TF320.
All external voltage drops must be taken into consideration.

2) Protect the device from overvoltage with the help of a suitable power supply or suitable overvoltage protection equipment.

3) Additional available certificates are listed on the Internet at
http://www.siemens.com/processinstrumentation/certificates

Measuring ranges/Minimum measuring span

RTD

Input type	Standard	Measuring range in °C (°F)	α_0 in $°C^{-1}$ ($°F^{-1}$)	Minimum measuring span in °C (°F)
Pt10 ... 10000	IEC 60751	-200 ... +850 (-328 ... +1 562)	0.003851 (0.002139)	10 (50)
	JIS C 1604-8	-200 ... +649 (-328 ... +1 200)	0.003916 (0.002176)	10 (50)
	GOST 6651_2009	-200 ... +850 (-328 ... +1 562)	0.003910 (0.002172)	10 (50)
	Callendar-Van Dusen	-200 ... +850 (-328 ... +1 562)	-	10 (50)
Ni10 ... 10000	DIN 43760-1987	-60 ... +250 (-76 ... +482)	0.006180 (0.003433)	10 (50)
	GOST 6651-2009/OIML R84:2003	-60 ... +180 (-76 ... +356)	0.006170 (0.003428)	10 (50)
Cu5 ... 1000	Edison Copper Winding No. 15	-200 ... +260 (-328 ... +500)	0.004270 (0.002372)	100 (212)
	GOST 6651-2009/OIML R84:2003	-180 ... +200 (-292 ... +392)	0.004280 (0.002378)	100 (212)
	GOST 6651-94	-50 ... +200 (-58 ... +392)	0.004260 (0.002367)	100 (212)

TC

Input type	Standard	Measuring range in °C (°F)	Minimum measuring span in °C (°F)
B	IEC 60584-1	0 (85) ... 1 820 (32 (185) ... 3 308)	100 (212)
E	IEC 60584-1	-200 ... +1 000 (-392 ... +1 832)	50 (122)
J	IEC 60584-1	-100 ... +1 200 (-212 ... +2 192)	50 (122)
K	IEC 60584-1	-180 ... +1 372 (-356 ... +2 502)	50 (122)
L	DIN 43710	-200 ... +900 (-392 ... +1 652)	50 (122)
Lr	GOST 3044-84	-200 ... +800 (-392 ... +1 472)	50 (122)
N	IEC 60584-1	-180 ... +1 300 (-356 ... +2 372)	50 (122)
R	IEC 60584-1	-50 ... +1 760 (-122 ... +3 200)	100 (212)
S	IEC 60584-1	-50 ... +1 760 (-122 ... +3 200)	100 (212)
T	IEC 60584-1	-200 ... +400 (-392 ... +752)	50 (122)
U	DIN 43710	-200 ... +600 (-392 ... +1 112)	50 (122)
W3	ASTM E988-96	0 ... 2 300 (32 ... 4 172)	100 (212)
W5	ASTM E988-96	0 ... 2 300 (32 ... 4 172)	100 (212)
LR	GOST 3044-84	-200 ... +800 (-392 ... +1472)	50 (122)

SITRANS TF320 (HART, universal)

Input accuracy

Basic values

Input type	Basic accuracy	Temperature coefficient[1)]
RTD		
Pt10	≤ ±0.8 °C (1.44 °F)	≤ ±0.020 °C/°C (°F/°F)
Pt20	≤ ±0.4 °C (0.72 °F)	≤ ±0.010 °C/°C (°F/°F)
Pt50	≤ ±0.16 °C (0.288 °F)	≤ ±0.004 °C/°C (°F/°F)
Pt100	≤ ±0.04 °C (0.072 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt200	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt500	$T_{max.}$ < 180 °C (356 °F) = ≤ ±0.08 °C (0.144 °F) $T_{max.}$ > 180 °C (356 °F) = ≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt1000	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt2000	$T_{max.}$ < 300 °C (572 °F) = ≤ ±0.08 °C (0.144 °F) $T_{max.}$ > 300 °C (572 °F) = ≤ ±0.4 °C (0.72 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt10000	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt x	Largest tolerance of neighboring points	Largest temperature coefficient of neighboring points
Ni10	≤ ±1.6 °C (2.88 °F)	≤ ±0.020 °C/°C (°F/°F)
Ni20	≤ ±0.8 °C (1.44 °F)	≤ ±0.010 °C/°C (°F/°F)
Ni50	≤ ±0.32 °C (0.576 °F)	≤ ±0.004 °C/°C (°F/°F)
Ni100	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni120	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni200	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni500	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni1000	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni2000	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni10000	≤ ±0.32 °C (0.576 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni x	Largest tolerance of neighboring points	Largest temperature coefficient of neighboring points
Cu5	≤ ±1.6 °C (2.88 °F)	≤ ±0.040 °C/°C (°F/°F)
Cu10	≤ ±0.8 °C (1.44 °F)	≤ ±0.020 °C/°C (°F/°F)
Cu20	≤ ±0.4 °C (0.72 °F)	≤ ±0.010 °C/°C (°F/°F)
Cu50	≤ ±0.16 °C (0.288 °F)	≤ ±0.004 °C/°C (°F/°F)
Cu100	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Cu200	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Cu500	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Cu1000	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Cu x	Largest tolerance of neighboring points	Largest temperature coefficient of neighboring points
Linear resistance		
0 ... 400 Ω	≤ ±40 mΩ	≤ ±2 mΩ/°C (1.11 mΩ/°F)
0 ... 100 kΩ	≤ ±4 Ω	≤ ±0.2 Ω/°C (0.11 Ω/°F)
Potentiometers		
0 ... 100%	< 0.05%	< ± 0.005%
Supply voltage		
mV: -20 ... 100 mV	≤ ±5 µV	≤ ±0.2 µV/°C (0.11 µV/°F)
mV: -100 ... 1700 mV	≤ ±0.1 mV	≤ ±36 µV/°C (20 µV/°F)
mV: ± 800 mV	≤ ±0.1 mV	≤ ±32 µV/°C (17.8 µV/°F)
TC		
E	≤ ±0.2 °C (0.36 °F)	≤ ±0.025 °C/°C (°F/°F)
J	≤ ±0.25 °C (0.45 °F)	≤ ±0.025 °C/°C (°F/°F)
K	≤ ±0.25 °C (0.45 °F)	≤ ±0.025 °C/°C (°F/°F)
L	≤ ±0.35 °C (0.63 °F)	≤ ±0.025 °C/°C (°F/°F)
N	≤ ±0.4 °C (0.72 °F)	≤ ±0.025 °C/°C (°F/°F)
T	≤ ±0.25 °C (0.45 °F)	≤ ±0.025 °C/°C (°F/°F)
U	< 0 °C (32 °F) ≤ ±0.8 °C (1.44 °F) ≥ 0 °C (32 °F) ≤ ±0.4 °C (0.72 °F)	≤ ±0.025 °C/°C (°F/°F)
Lr	≤ ±0.2 °C (0.36 °F)	≤ ±0.1 °C/°C (°F/°F)
R	< 200 °C (392 °F) ≤ ±0.5 °C (0.9 °F) ≥ 200 °C (392 °F) ≤ ±1 °C (1.8 °F)	≤ ±0.1 °C/°C (°F/°F)
S	< 200 °C (392 °F) ≤ ±0.5 °C (0.9 °F) ≥ 200 °C (392 °F) ≤ ±1 °C (1.8 °F)	≤ ±0.1 °C/°C (°F/°F)

Input type	Basic accuracy	Temperature coefficient[1]
W3	≤ ±0.6 °C (1.08 °F)	≤ ±0.1 °C/°C (°F/°F)
W5	≤ ±0.4 °C (0.72 °F)	≤ ±0.1 °C/°C (°F/°F)
B[2]	≤ ±1 °C (1.8 °F)	≤ ±0.1 °C/°C (°F/°F)
B[3]	≤ ±3 °C (5.4 °F)	≤ ±0.1 °C/°C (°F/°F)
B[4]	≤ ±8 °C (14.4 °F)	≤ ±0.8 °C/°C (°F/°F)
B[5]	Not specified	Not specified
CJC (internal)	< ±0.5 °C (0.9 °F)	Included in basic accuracy
CJC (external)	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)

1) Temperature coefficients correspond to the specified values or 0.002% of the input span, depending on which value is greater.

2) Accuracy of the specification range > 400 °C (752 °F)

3) Accuracy of the specification range > 160 °C (320 °F) < 400 °C (752 °F)

4) Accuracy of the specification range > 85 °C (185 °F) < 160 °C (320 °F)

5) Accuracy of the specification range < 85 °C (185 °F)

Output accuracy

Output type	Basic accuracy	Temperature coefficient
Analog output	≤ ±1.6 µA (0.01% of the full output span)	≤ ±0.48 µA/K (≤ ±0.003% of the full output span/K)

SITRANS TF320 (HART, universal)

Selection and ordering data

Single chamber enclosure

	Article No.
SITRANS TF320 Temperature transmitter with single chamber enclosure for wall or pipe mounting, one configurable input and a galvanically isolated 2-wire output. ↗	**7NG034** ■ - ■■■■■ - 0 ■■■
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Communication	
With HART (4 ... 20 mA)	**0**
Without HART (4 ... 20 mA)	**7**
Primary value output	
Input 1	**0**
Input 1, type	
RTD	
• Pt100 (IEC 60751), 3-wire	**B**
• Pt100 (IEC 60751), 4-wire	**C**
• Pt1000 (IEC 60751), 3-wire	**D**
• Pt1000 (IEC 60751), 4-wire	**E**
TC	
• Type B	**F**
• Type E	**G**
• Type J	**H**
• Type K	**J**
• Type L	**K**
• Type N	**L**
• Type R	**N**
• Type S	**P**
• Type T	**Q**
Potentiometer, 4-wire	**R**
Input 2, type	
Without input 2	**A**
CJC configuration for TC	
None CJC	**0**
Internal CJC	**1**
External CJC RTD Pt100 (IEC 60751), 3-wire	**3**
External CJC RTD Ni100 (DIN 43760-87), 3-wire	**6**
Material of non-wetted parts	
Die-cast aluminum enclosure	**1**
Type of protection (Ex)	
General purpose	**A**
Intrinsic safety (Ex i) / Non-incendive field wiring (NIFW)	**B**
Flameproof enclosure (Ex d) / Explosion proof (XP)	**C**
Dust ignition protection by enclosure zone 21/22 (Ex t) / Dust ignition proof (DIP) / Increased safety zone 2 (Ex ec) / Non-incendive (NI)	**L**
Flameproof enclosure (Ex d) / Intrinsic safety (Ex i) / Dust ignition protection by enclosure zone 21/22 (Ex t) / Increased safety zone 2 (Ex ec)	**S**
Electrical connection/cable entries	
2x M20 x 1.5	**F**
2x ½'' NPT	**M**
Local operation	
Without local operation	**0**
Local operation (closed lid)	**1**
Local operation (lid with glass window)	**2**

Options	Order Code
Append "**-Z**" to Article No., add order code and, if applicable, free text.	
Cable gland included	
Plastic	**A00**
Metal	**A01**
Stainless steel	**A02**
Stainless steel 316L/1.4404	**A03**
CMP, for XP devices	**A10**
CAPRI ADE 4F, CuZn, cable inner diameter 7 ... 12 mm, cable outer diameter 10 ... 16 mm	**A11**
CAPRI ADE 4F, stainless steel, cable inner diameter 7 ... 12 mm, cable outer diameter 10 ... 16 mm	**A12**
Mounting cable glands/plugs	
Cable gland mounted	**A97**
Device plug for output, mounted right	**A98**
Device options	
Degree of protection IP66 / IP68 (not for device plugs M12 and Han)	**D30**
General approval without Ex approval	
Worldwide (CE, RCM) except EAC, FM, KCC	**E00**
Explosion protection certificates	
ATEX (Europe) and IECEx (world)	**E47**
Mounting system (only single chamber enclosures)	
Pipe mounting kit for single chamber enclosure, stainless steel 316L	**H06**
Wall mounting kit for single chamber enclosure, stainless steel 316L	**H07**

Selection and ordering data

Dual chamber enclosure

	Article No.
SITRANS TF320 Temperature transmitter with dual chamber enclosure for wall or pipe mounting, one configurable input and a galvanically isolated 2-wire output. ↗	**7NG035** - - 0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Communication	
With HART (4 ... 20 mA)	**0**
Without HART (4 ... 20 mA)	**7**
Primary value output	
Input 1	**0**
Input 1, type	
RTD	
• Pt100 (IEC 60751), 3-wire	**B**
• Pt100 (IEC 60751), 4-wire	**C**
• Pt1000 (IEC 60751), 3-wire	**D**
• Pt1000 (IEC 60751), 4-wire	**E**
TC	
• Type B	**F**
• Type E	**G**
• Type J	**H**
• Type K	**J**
• Type L	**K**
• Type N	**L**
• Type R	**N**
• Type S	**P**
• Type T	**Q**
Potentiometer, 4-wire	**R**
Input 2, type	
Without input 2	**A**
CJC configuration for TC	
Without CJC	**0**
Internal CJC	**1**
External CJC RTD Pt100 (IEC 60751), 3-wire	**3**
External CJC RTD Ni100 (DIN 43760-87), 3-wire	**6**
Material of non-wetted parts	
Die-cast aluminum enclosure	**1**
Enclosure made of stainless steel precision casting CF3M/1.4409 (similar to 316L)	**2**
Type of protection (Ex)	
General purpose	**A**
Intrinsic safety (Ex i) / Non-incendive field wiring (NIFW)	**B**
Flameproof enclosure (Ex d) / Explosion proof (XP)	**C**
Dust ignition protection by enclosure zone 21/22 (Ex t) / Dust ignition proof (DIP) / Increased safety zone 2 (Ex ec) / Non-incendive (NI)	**L**
Flameproof enclosure (Ex d) / Intrinsic safety (Ex i) / Dust ignition protection by enclosure zone 21/22 (Ex t) / Increased safety zone 2 (Ex ec)	**S**
Electrical connection/cable entries	
2x M20 x 1.5	**F**
2x ½'' NPT	**M**
Local operation	
Without local operation	**0**
Local operation (closed lid)	**1**
Local operation (lid with glass window)	**2**

Options	Order Code
Append "**-Z**" to Article No., add order code and, if applicable, free text.	
Cable gland included	
Plastic	**A00**
Metal	**A01**
Stainless steel	**A02**
Stainless steel 316L/1.4404	**A03**
CMP, for XP devices	**A10**
CAPRI ADE 4F, CuZn, cable inner diameter 7 ... 12 mm, cable outer diameter 10 ... 16 mm	**A11**
CAPRI ADE 4F, stainless steel, cable inner diameter 7 ... 12 mm, cable outer diameter 10 ... 16 mm	**A12**
Mounting cable glands/plugs	
Cable gland mounted	**A97**
Device plug for output, mounted right	**A98**
Device options	
Double layer coating (epoxy resin and polyurethane) 120 µm of enclosure and lid	**D20**
Degree of protection IP66 / IP68 (not for device plugs M12 and Han)	**D30**
Stainless steel Ex plate 1.4404/316L	**D42**
General approval without Ex approval	
Worldwide (CE, RCM) except EAC, FM, KCC	**E00**
Explosion protection certificates	
ATEX (Europe) and IECEx (world)	**E47**
Mounting brackets (only dual chamber enclosure)	
Wall/pipe mounting bracket for dual chamber enclosure, steel	**H01**
Wall/pipe mounting bracket for dual chamber enclosure, stainless steel 304	**H02**
Wall/pipe mounting bracket for dual chamber enclosure, stainless steel 316L	**H03**

SITRANS TF320 (HART, universal)

Accessories

	Article No.
Additional accessories for assembly, connection and transmitter configuration, see page 2/154.	
Modems	
Modem with USB interface and SIPROM T software	**7NG3092-8KN**
HART modem with USB interface	**7MF4997-1DB**
Thread adapter	
Thread adapter M20x1.5 (male thread) to ½-14 NPT (female thread)	**7MP1990-0BA00**
Thread adapter M20x1.5 (male thread) to G½ (female thread)	**7MP1990-0BB00**
Local operation	
Local operation for temperature transmitter in dual chamber enclosure	**7MF7902-1AD**
Mounting system for local operation 7MF7902-1AD in single chamber enclosure	**7MF7902-1AS**
Mounting brackets (only dual chamber enclosure)	
Wall/pipe mounting bracket for dual chamber enclosure, steel, 5/16-24UNF	**7MF7900-1AB**
Wall/pipe mounting bracket for dual chamber enclosure, steel, M8	**7MF7900-1AC**
Wall/pipe mounting bracket for dual chamber enclosure, stainless steel 316L, 5/16-24UNF	**7MF7900-1AH**
Wall/pipe mounting bracket for dual chamber enclosure, stainless steel 316L, M8	**7MF7900-1AJ**
Mounting system (only single chamber enclosures)	
Pipe mounting kit for single chamber enclosure, stainless steel 316L	**7MF7900-1AK**
Wall mounting kit for single chamber enclosure, stainless steel 316L	**7MF7900-1AL**
Cable gland	
Cable gland, gray, non-Ex, M20	**7MF7906-1AB**
Cable gland, gray, non-Ex, NPT	**7MF7906-1BB**
Cable gland, metal, non-Ex, NPT	**7MF7906-1BD**
Cable gland, metal, non-Ex, M20	**7MF7906-1AD**
Cable gland, metal, Ex-d, NPT	**7MF7906-1BE**
Cable gland, metal, Ex-d, M20	**7MF7906-1AE**
Cable gland, 316L, non-Ex, NPT	**7MF7906-1BH**
Cable gland, 316L, non-Ex, M20	**7MF7906-1AH**
Cable gland, 316L, Ex-d, NPT	**7MF7906-1BJ**
Cable gland, 316L, Ex-d, M20	**7MF7906-1AJ**
Cable gland, E1FX Tri-Star ½-14 NPT, CMP	**7MF7906-1NE**
Cable gland, ½ NPT Capri ADE 4F cpl., CuZn	**7MF7906-1PE**
Cable gland, ½ NPT Capri ADE 4F cpl., stainless steel	**7MF7906-1PJ**

	Article No.
Plug and cable socket	
Plug Han 7D, plastic, straight	**7MF7906-2AB**
Plug Han 7D, plastic, angled	**7MF7906-2AC**
Plug Han 7D, metal, straight, blue	**7MF7906-2AQ**
Plug Han 7D, metal, straight, grey	**7MF7906-2AN**
Plug Han 7D, metal, angled, blue	**7MF7906-2AR**
Plug Han 7D, metal, angled, grey	**7MF7906-2AP**
Plug Han 8D, plastic, straight	**7MF7906-2EB**
Plug Han 8D, plastic, angled	**7MF7906-2EC**
Plug Han 8D, metal, straight, blue	**7MF7906-2EQ**
Plug Han 8D, metal, straight, grey	**7MF7906-2EN**
Plug Han 8D, metal, angled, blue	**7MF7906-2ER**
Plug Han 8D, metal, angled, grey	**7MF7906-2EP**
Cable socket, plastic, for plug Han 7D	**7MF7906-2BB**
Cable socket, plastic, for plug Han 8D	**7MF7906-2FB**
Cable socket, metal, for Han 7D blue	**7MF7906-2BQ**
Cable socket, metal, for Han 8D blue	**7MF7906-2FQ**
Cable socket, metal, for Han 7D grey	**7MF7906-2BN**
Cable socket, metal, for Han 8D grey	**7MF7906-2FN**
Plug M12 with cable socket, stainless steel	**7MF7906-3AB**
Overvoltage protection	
Overvoltage protection up to 20 kV, M20	**7MF7906-3AC**
Overvoltage protection up to 20 kV, NPT	**7MF7906-3AD**
Lid	
Closed lid aluminum, painted 2x, without glass window, with seal NBR	**7MF7901-1BB**
Closed lid aluminum, painted 2x, without glass window, with seal FVMQ	**7MF7901-1BC**
Lid aluminum 2x coated, with glass window, with seal NBR	**7MF7901-1BG**
Lid aluminum 2x coated, with glass window, with seal FVMQ	**7MF7901-1BH**
Closed lid stainless steel precision casting, without glass window, with seal NBR	**7MF7901-2AB**
Closed lid stainless steel precision casting, without glass window, with seal FVMQ	**7MF7901-2AC**
Lid stainless steel precision casting, with glass window, with seal NBR	**7MF7901-2AG**
Lid stainless steel precision casting, with glass window, with seal FVMQ	**7MF7901-2AH**

Ordering example

SITRANS TF320 (single chamber enclosure)

7NG0340-0BA01-0AF2-Z Y01+Y17+P10

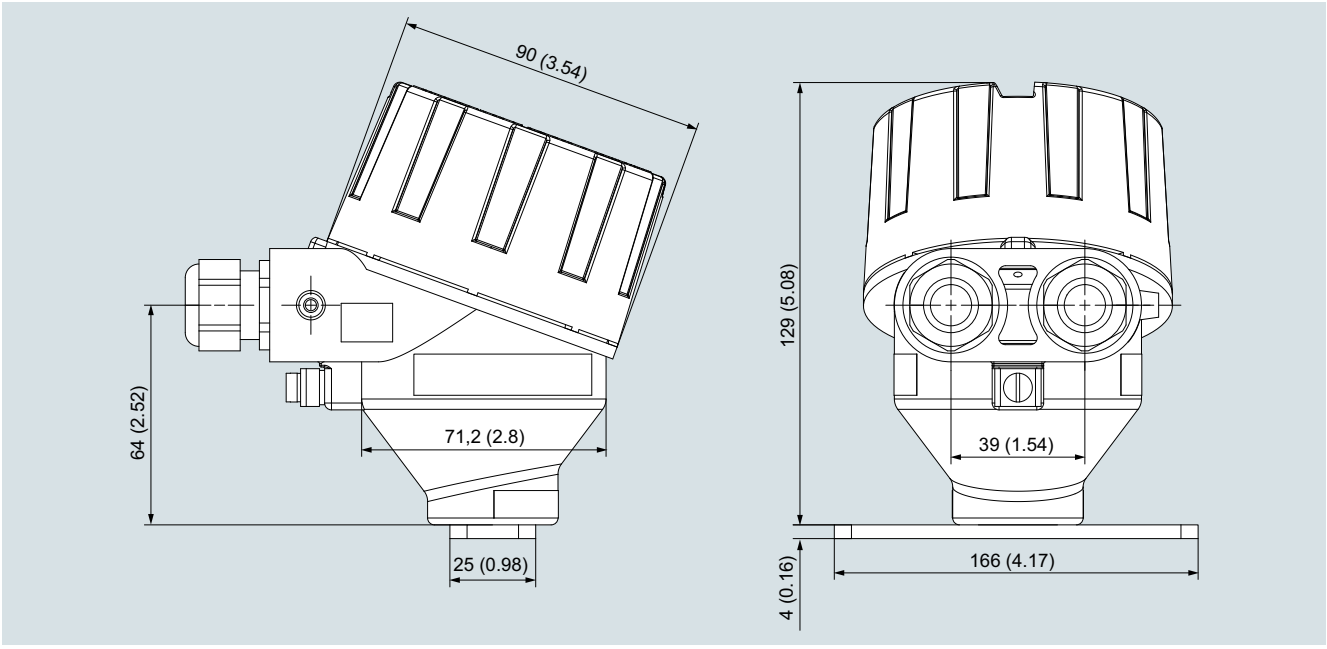
Y01: -10 ... +100 °C

Y17: TICA123

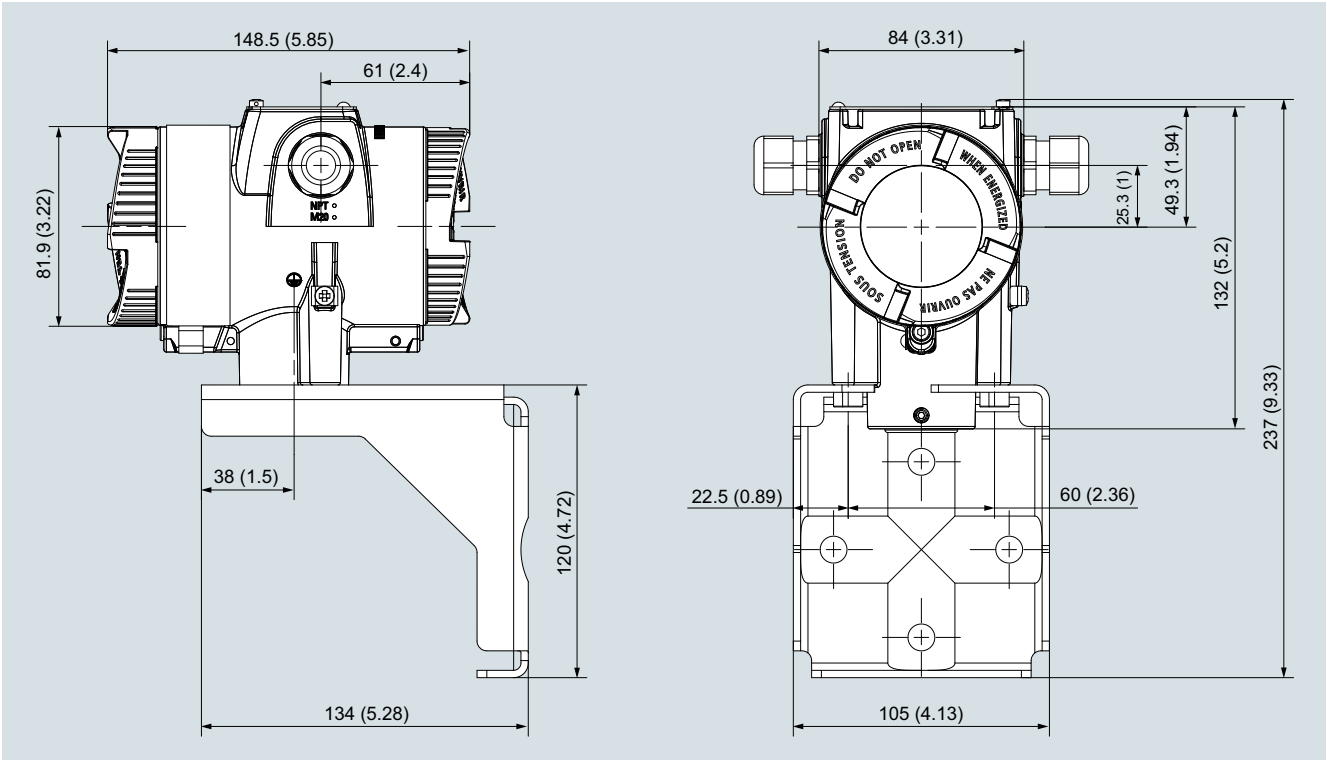
Factory setting

- Pt100 (IEC 60751) in 3-wire connection
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current
  - Input circuit wire break: 22.8 mA
  - Input circuit short circuit: 22.4 mA
  - Input monitoring wire break and short-circuit
- No trimming of input and output (offset)
- Damping 0.0 s

Dimensional drawings



SITRANS TF320, single chamber enclosure, dimensions in mm (inch)



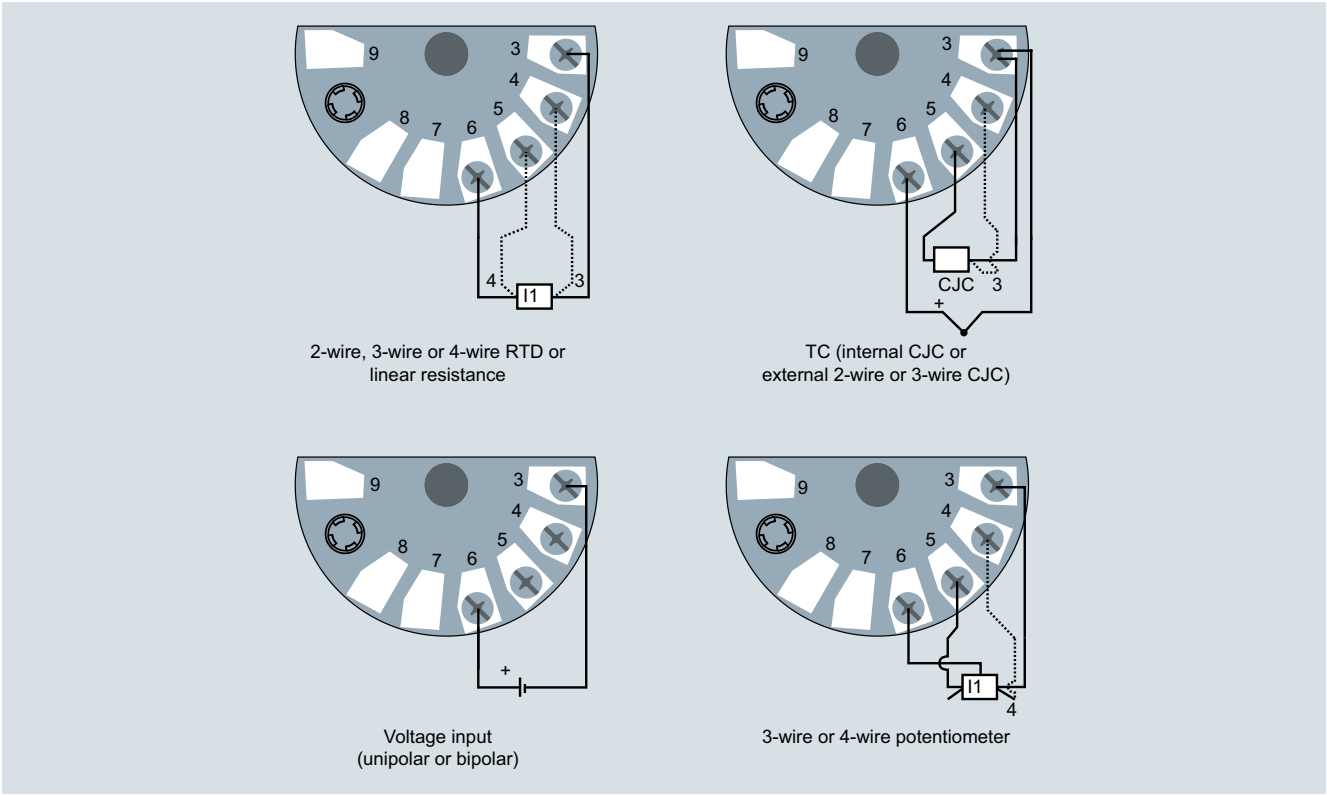
SITRANS TF320, dual chamber enclosure, dimensions in mm (inch)

2

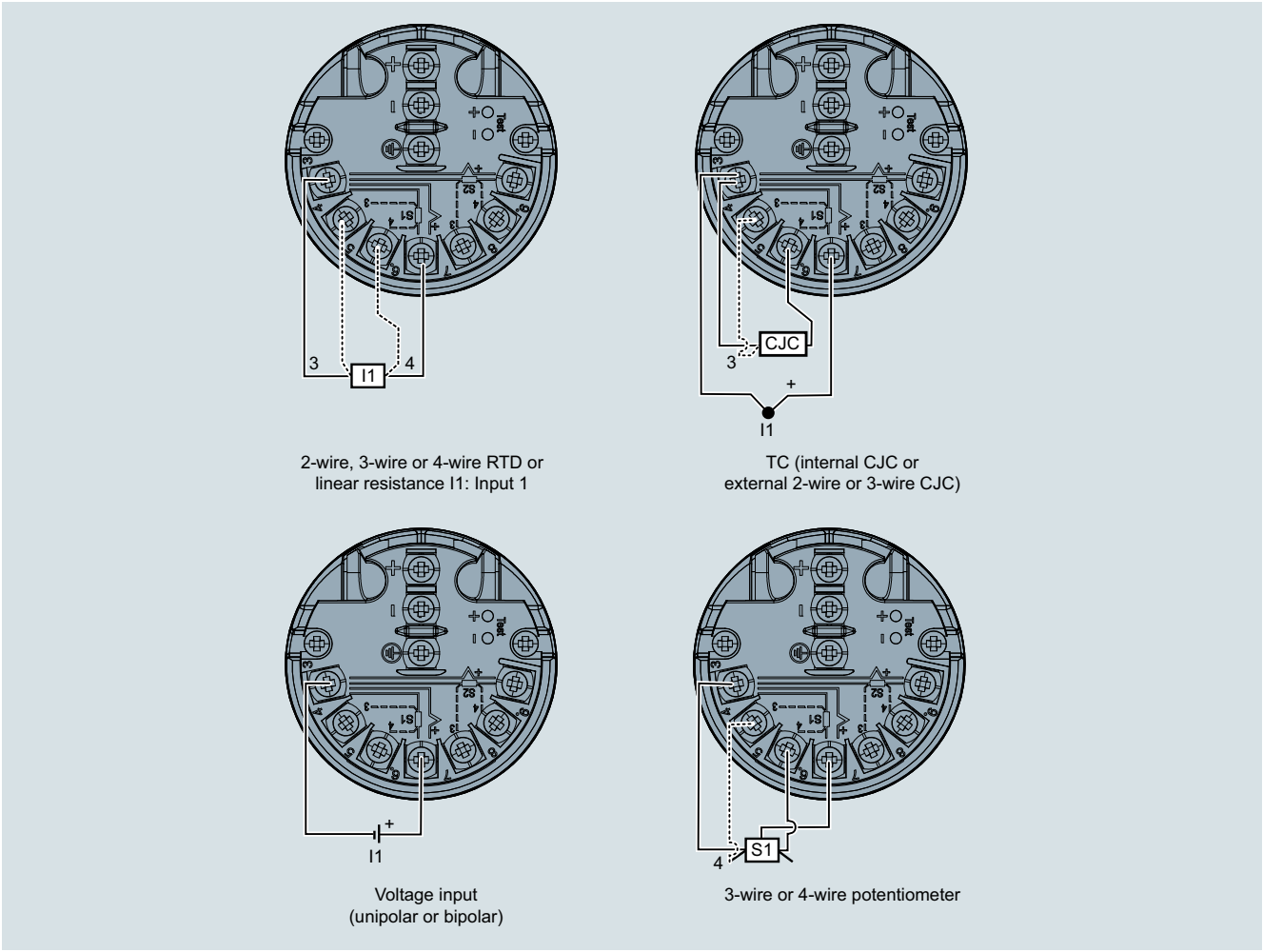
Circuit diagrams

Connections

Input connection

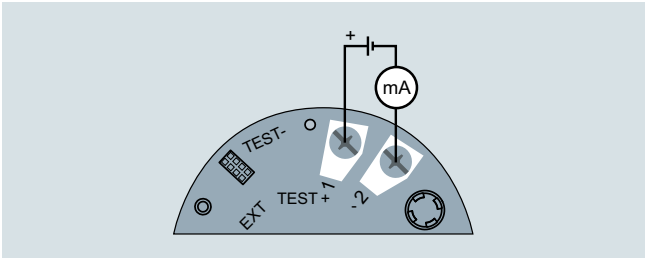


SITRANS TF320 in single chamber enclosure (7NG034*), input connection assignment



SITRANS TF320 in dual chamber enclosure (7NG035*), input connection assignment

Output connection



SITRANS TF320 in single chamber enclosure (7NG034*), output connection assignment

SITRANS TF420 (HART, universal)

Overview

SITRANS TF420 in dual chamber enclosure

SITRANS TF420 in single chamber enclosure

- 2-wire temperature transmitter with HART communication interface
- Universal input for virtually any type of temperature sensor
- Connection of two independent input circuits for redundant operation (high input availability)
- Input drift detection
- Can be configured via PC, HART 7 or optional local operation

Benefits

- Universally applicable as a temperature transmitter with galvanic isolation for:
  - Resistance thermometer (2-wire, 3-wire, 4-wire connection)
  - Thermocouples
  - Linear resistances, potentiometer and DC voltage sources
- Local operation of the temperature transmitter via display (single chamber enclosure) or control keys accessible from outside (dual chamber enclosure)
- Rugged single or dual chamber enclosure made of die-cast aluminum or stainless steel 316/316L
- Electronic compartment isolated (watertight) from terminal compartment in dual chamber enclosure
- Degree of protection IP66/67/68 (1.5 m/2 h)
- Electromagnetic compatibility according to DIN EN 61326 and NE21
- Test terminals for direct read-out of the output signal without breaking the current loop
- Remote installation option:
  - Measuring point is difficult to access
  - Measuring point is subjected to high temperatures
  - Measuring point is subjected to vibration through plant
  - Long neck pipes and thermowells must be avoided
- Mounted directly on sensors
- Temperature transmitters of the "intrinsically safe protection type, increased safety for zone 2, flameproof and dust-protected" type of protection can be installed in hazardous areas. The transmitter meets the requirements of the EU Directive 2014/34/EU (ATEX), the FM and CSA regulations as well as other national approvals, e.g. EACEx, NEPSI, KCs, Inmetro.
- SIL2/3 (with order note C20)

Application

SITRANS TF420 with its two sensor inputs can be used everywhere where temperatures need to be measured without interruption under particularly adverse conditions and 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 7 permits parameterization using a PC or HART communicator (handheld communicator). The SIMATIC PDM makes it easy.

The optional local operation on the device gives you the possibility to configure the device's most important functions very quickly.

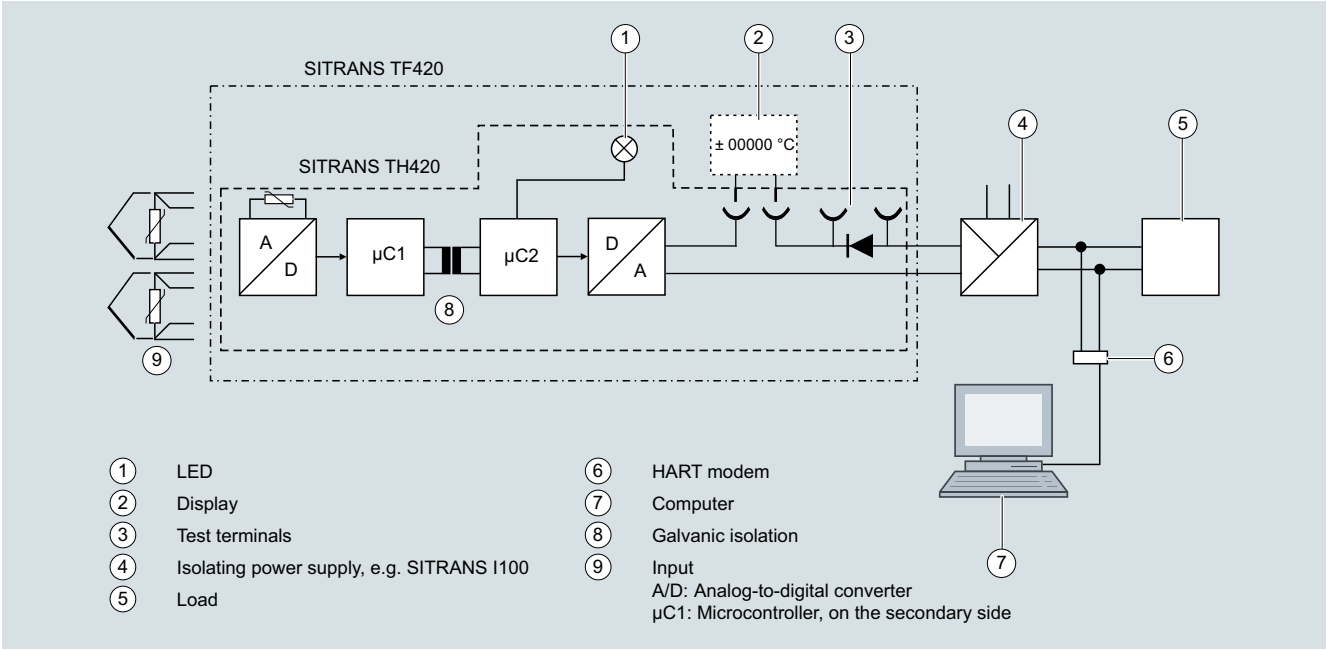
Principle of operation

SITRANS TF420 as temperature transmitter

Two sensor signals, whether resistance thermometers (RTD), thermocouples (TC), Ω or mV signals, are amplified and linearized. Input and output side are galvanically isolated. An internal cold junction is integrated for measurements with thermocouples.

The device outputs a temperature-linear direct current from 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 TF420 automatically detects when a sensor should be interrupted or is indicating a short-circuit. If the back-up functionality has been selected in the primary value display, the SITRANS TF420 automatically switches to the 2nd input without interrupting the measured value; e.g. primary value input 1 with input 2 as backup. The practical test terminals allow direct measurement of 4 to 20 mA signals over an ammeter without interrupting the output current loop.



Function block diagram SITRANS TF420 with integrated SITRANS TH420

2

Technical specifications

General	
Supply voltage[1) 2)]	
• Without explosion protection (non-Ex)	10.5 ... 48 V DC
• with explosion protection (Ex i)	10.5 ... 30 V DC
Additional minimum supply voltage when using test terminals	0.8 V
Maximum power loss	≤ 850 mW
Minimum load resistance at supply voltage > 37 V	(V_{supply} - 37 V)/23 mA
Insulation voltage, test/operation	
• Without explosion protection (non-Ex)	2.5 kV AC/55 V AC
• with explosion protection (Ex i)	2.5 kV AC/42 V AC
Polarity protection	All inputs and outputs
Write protection	Wire jumper (transmitter), switch (on display) or software
Warm-up time	< 5 min
Starting time	< 2.75 s
Programming	HART
Signal-to-noise ratio	> 60 dB
Long-term stability	Better than: • ± 0.05% of measuring span/year • ± 0.18% of measuring span/5 years
Response time	4 ... 20 mA: ≤ 55 ms HART: ≤ 75 ms (typically 70 ms)
Programmable damping	0 ... 60 s
Signal dynamic	
• Input	24 bit
• Output	18 bit
Influence of change in supply voltage	< 0.005% of measuring span/V DC
Input	
Resistance thermometer (RTD)	
Input type	
• Pt10 ... 10000	• IEC 60751 • JIS C 1604-8 • GOST 6651_2009 • Callendar-Van Dusen
• Ni10 ... 10000	• DIN 43760-1987 • GOST 6651-2009/OIML R84:2003
• Cu5 ... 1000	• Edison Copper Winding No. 15 • GOST 6651-2009/OIML R84:2003
Type of connection	2-wire, 3-wire or 4-wire
Line resistance per wire	Max. 50 Ω
Input current	< 0.15 mA
Effect of the line resistance (with 3-wire and 4-wire connections)	< 0.002 Ω/Ω
Cable, wire-wire capacity	
• Pt1000, Pt10000 (IEC 60751 and JIS C 1604-8)	Max. 30 nF
• All other input types	Max. 50 nF
Fault detection, programmable	None, short-circuited, defective, short-circuited or defective
	Note When the low limit for the configured input type is below the constant detection limit for short-circuited inputs, the detection of short circuits is disabled regardless of the configuration of the fault detection.
Detection limit for short-circuited input	15 Ω
Fault detection time (RTD)	≤ 75 ms (typically 70 ms)
Fault detection time (for 3-wire and 4-wire)	≤ 2 000 ms
Thermocouples (TC)	
Input type	
• B	IEC 60584-1
• E	IEC 60584-1
• J	IEC 60584-1
• K	IEC 60584-1
• L	DIN 43710
• Lr	GOST 3044-84
• N	IEC 60584-1
• R	IEC 60584-1
• S	IEC 60584-1
• T	IEC 60584-1
• U	DIN 43710
• W3	ASTM E988-96
• W5	ASTM E988-96
• LR	GOST 3044-84
Cold junction compensation (CJC)	Constant, internal or external over Pt100 or Ni100 RTD
• Temperature range internal CJC	-50 ... +100 °C (-58 ... +212 °F)
• Connection external CJC	2-wire or 3-wire
• External CJC, line resistance per wire (for 3-wire and 4-wire connections)	50 Ω
• Effect of the line resistance (with 3-wire and 4-wire connections)	< 0.002 Ω/Ω
• Input current external CJC	< 0.15 mA
• Temperature range external CJC	-50 ... +135 °C (-58 ... +275 °F)
• Cable, wire-wire capacity	Max. 50 nF
• Total line resistance	Max. 10 kΩ
• Fault detection, programmable	None, short-circuited, defective, short-circuited or defective
	Note The short-circuited fault detection only applies to the CJC input.
• Fault detection time (TC)	≤ 75 ms (typically 70 ms)
• Fault detection time, external CJC (for 3-wire and 4-wire)	≤ 2 000 ms
Linear resistance	
Input range	10 Ω ... 100 kΩ
Minimum measuring span	25 Ω
Type of connection	2-wire, 3-wire or 4-wire
Line resistance per wire	Max. 50 Ω
Input current	< 0.15 mA
Effect of the line resistance (with 3-wire and 4-wire connections)	< 0.002 Ω/Ω
Cable, wire-wire capacity	
• R > 400 Ω	Max. 30 nF
• R ≤ 400 Ω	Max. 50 nF
Fault detection, programmable	None, defective

Potentiometers	
Input range	0 ... 100 kΩ
Minimum measuring span	25 Ω
Type of connection	2-wire, 3-wire or 4-wire
Line resistance per wire	Max. 50 Ω
Input current	< 0.15 mA
Effect of the line resistance (with 4-wire and 5-wire connections)	< 0.002 Ω/Ω
Cable, wire-wire capacity	
• R > 400 Ω	Max. 30 nF
• R ≤ 400 Ω	Max. 50 nF
Fault detection, programmable	None, short-circuited, defective, short-circuited or defective
	Note When the configured potentiometer size is below the constant detection limit for short-circuited inputs, the detection of short circuits is disabled regardless of the configuration of the fault detection.
Detection limit for short-circuited input	15 Ω
Fault detection time, wiper arm (no short-circuit detection)	≤ 75 ms (typically 70 ms)
Fault detection time, element	≤ 2 000 ms
Fault detection time (for 4-wire and 5-wire)	≤ 2 000 ms
Supply voltage	
Measuring range	
• Unipolar	-100 ... 1700 mV
• Bipolar	-800 ... +800 mV
Minimum measuring span	2.5 mV
Input resistance	10 MΩ
Cable, wire-wire capacity	
• Input range: -100 ... 1700 mV	Max. 30 nF
• Input range: -20 ... 100 mV	Max. 50 nF
Fault detection, programmable	None, defective
Fault detection time	≤ 75 ms (typically 70 ms)
Output and HART communication	
Normal range, programmable	3.8 ... 20.5 mA/20.5 ... 3.8 mA
Extended range (output limits), programmable	3.5 ... 23 mA/23 ... 3.5 mA
Programmable input/output limits	
• Fault current	Enable/disable
• Fault current setting	3.5 ... 23 mA
Update time	10 ms
Load (with current output)	≤ (V_{Supply} - 10.5)/0.023 Ω
Load stability	< 0.01% of measuring span/100 Ω (measuring span = currently selected range)
Input fault detection, programmable (detection of input short circuits is ignored with TC and voltage inputs)	3.5 ... 23 mA
NAMUR NE43 Upscale	> 21 mA
NAMUR NE43 Downscale	< 3.6 mA
HART protocol versions	HART 7
Measuring accuracy	
Input accuracy	See "Input accuracy" table
Output accuracy	See "Output accuracy" table

Rated conditions	
Ambient temperature	
• Without local operation in single chamber enclosure	-50 ... +85 °C (-58 ... +185 °F)
• With local operation	-40 ... +85 °C (-40 ... +185 °F)
• For transmitters with functional safety	-40 ... +80 °C (-40 ... +176 °F)
Storage temperature	-50 ... +85 °C (-58 ... +185 °F)
Reference temperature for sensor calibration	24 °C ±1.0 °C (75.2 °F ±1.8 °F)
Relative humidity	< 99% (no condensation)
Degree of protection	
• Temperature transmitter enclosure	IP66/IP67/IP68
• Terminals	IP00
Mechanical construction	
Weight	
• Single chamber enclosure	0.85 kg (1.87 lb)
• Dual chamber enclosure	• Aluminum: 1.3 kg (2.87 lb) • Stainless steel: 3.3 kg (7.28 lb)
Maximum core cross-section	
• Single chamber enclosure	1.5 mm² (AWG 16)
• Dual chamber enclosure	2.5 mm² (AWG 14)
Tightening torque for clamping screws	0.5 ... 0.6 Nm
Vibrations	IEC 60068-2-6
• 2 ... 25 Hz	± 1.6 mm (0.07 inch)
• 25 ... 100 Hz	± 4 g
Certificates and approvals	
Explosion protection ATEX/IECEx and others	
Certificates[3)]	IECEx DEK 19.0069X DEKRA 19ATEX0106 X (Category 1) DEKRA 19ATEX0107 X (Category 3)
"Intrinsic safety ia/ib" type of protection	For use in Zone 0, 1, 2
• ATEX	II 1 G Ex ia IIC T6 ... T4 Ga II 2(1) G Ex ib [ia Ga] IIC T6 ... T4 Gb
• IECEx and others	Ex ia IIC T6 ... T4 Ga Ex ib [ia Ga] IIC T6 ... T4 Gb
• EACEx	Ex ia IIC T6 ... T4 Ga Ex ib [ia Ga] IIC T6 ... T4 Gb
"Intrinsic safety ic" type of protection	For use in Zones 2
• ATEX	II 2 G Ex ic IIC T6…T4 Gc
• IECEx and others	Ex ic IIC T6 ... T4 Gc
• EACEx	2Ex ic IIC T6…T4 Gc X
"Non-sparking/increased safety nA/ec" type of protection	For use in Zones 2
• ATEX	II 2 G Ex nA IIC T6…T4 Gc II 2 G Ex ec IIC T6…T4 Gc
• IECEx and others	Ex nA IIC T6 ... T4 Gc Ex ec IIC T6 ... T4 Gc
• EACEx	2Ex nA IIC T6…T4 Gc
• "Flameproof enclosure db" type of protection	For use in Zone 1
• ATEX	II 2 G Ex db IIC T6…T4 Gb
• IECEx and others	Ex db IIC T6 ... T4 Gb
• EACEx	1Ex d IIC T6…T4 Gb X
• "Protection by enclosure tb" type of protection	For use in Zone 21
• ATEX	II 2 D Ex tb IIC T100°C Db
• IECEx and others	Ex tb IIC T100°C Db
• EACEx	Ex tb IIC T100°C Db X

Explosion protection CSA/FM for Canada and USA	
Certificates	FMxxCAxxxx FMxxUSxxxx
"Intrinsic safety ia" type of protection	IS, CL I, Div 1, GP ABCD, T6 ... T4 Ex ia IIC T6 … T4 Ga AEx ia IIC T6 … T4 Ga or: Ex ib [ia Ga] IIC T6…T4 Gb AEx ib [ia Ga] IIC T6…T4 Gb
"Non incendive field wiring NIFW" type of protection	NIFW, CL I, Div 2, GP ABCD T6 ... T4
"Non incendive NI" type of protection	NI, CL I, Div 2, GP ABCD T6...T4 Ex nA IIC T6 ... T4 Gc AEx nA IIC T6 ... T4 Gc
"Explosion-proof XP" type of protection	XP/ CL I / DIV1 / GP ABCD / T6....T4 CL I / Zn1 / AEx/Ex d IIC T6...T4 Gb
"Dust-protected DIP" type of protection	DIP/ CL II, III / DIV 1 / GP EFG / T6...T4 Zn21 / AEx/Ex tb IIIC T100°C Gb

1) Note that the minimum supply voltage must correspond to the value measured at the terminals of the SITRANS TF420.
All external voltage drops must be taken into consideration.

2) Protect the device from overvoltage with the help of a suitable power supply or suitable overvoltage protection equipment.

3) Additional available certificates are listed on the Internet at
http://www.siemens.com/processinstrumentation/certificates

Measuring ranges/Minimum measuring span

RTD

Input type	Standard	Measuring range in °C (°F)	α_0 in $°C^{-1}$ ($°F^{-1}$)	Minimum measuring span in °C (°F)
Pt10 ... 10000	IEC 60751	-200 ... +850 (-328 ... +1 562)	0.003851 (0.002139)	10 (50)
	JIS C 1604-8	-200 ... +649 (-328 ... +1 200)	0.003916 (0.002176)	10 (50)
	GOST 6651_2009	-200 ... +850 (-328 ... +1 562)	0.003910 (0.002172)	10 (50)
	Callendar-Van Dusen	-200 ... +850 (-328 ... +1 562)	-	10 (50)
Ni10 ... 10000	DIN 43760-1987	-60 ... +250 (-76 ... +482)	0.006180 (0.003433)	10 (50)
	GOST 6651-2009/OIML R84:2003	-60 ... +180 (-76 ... +356)	0.006170 (0.003428)	10 (50)
Cu5 ... 1000	Edison Copper Winding No. 15	-200 ... +260 (-328 ... +500)	0.004270 (0.002372)	100 (212)
	GOST 6651-2009/OIML R84:2003	-180 ... +200 (-292 ... +392)	0.004280 (0.002378)	100 (212)
	GOST 6651-94	-50 ... +200 (-58 ... +392)	0.004260 (0.002367)	100 (212)

TC

Input type	Standard	Measuring range in °C (°F)	Minimum measuring span in °C (°F)
B	IEC 60584-1	0 (85) ... 1 820 (32 (185) ... 3 308)	100 (212)
E	IEC 60584-1	-200 ... +1 000 (-392 ... +1 832)	50 (122)
J	IEC 60584-1	-100 ... +1 200 (-212 ... +2 192)	50 (122)
K	IEC 60584-1	-180 ... +1 372 (-356 ... +2 502)	50 (122)
L	DIN 43710	-200 ... +900 (-392 ... +1 652)	50 (122)
Lr	GOST 3044-84	-200 ... +800 (-392 ... +1 472)	50 (122)
N	IEC 60584-1	-180 ... +1 300 (-356 ... +2 372)	50 (122)
R	IEC 60584-1	-50 ... +1 760 (-122 ... +3 200)	100 (212)
S	IEC 60584-1	-50 ... +1 760 (-122 ... +3 200)	100 (212)
T	IEC 60584-1	-200 ... +400 (-392 ... +752)	50 (122)
U	DIN 43710	-200 ... +600 (-392 ... +1 112)	50 (122)
W3	ASTM E988-96	0 ... 2 300 (32 ... 4 172)	100 (212)
W5	ASTM E988-96	0 ... 2 300 (32 ... 4 172)	100 (212)
LR	GOST 3044-84	-200 ... +800 (-392 ... +1472)	50 (122)

Input accuracy

Basic values

Input type	Basic accuracy	Temperature coefficient[1)]
RTD		
Pt10	≤ ±0.8 °C (1.44 °F)	≤ ±0.020 °C/°C (°F/°F)
Pt20	≤ ±0.4 °C (0.72 °F)	≤ ±0.010 °C/°C (°F/°F)
Pt50	≤ ±0.16 °C (0.288 °F)	≤ ±0.004 °C/°C (°F/°F)
Pt100	≤ ±0.04 °C (0.072 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt200	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt500	$T_{max.}$ < 180 °C (356 °F) = ≤ ±0.08 °C (0.144 °F) $T_{max.}$ > 180 °C (356 °F) = ≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt1000	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt2000	$T_{max.}$ < 300 °C (572 °F) = ≤ ±0.08 °C (0.144 °F) $T_{max.}$ > 300 °C (572 °F) = ≤ ±0.4 °C (0.72 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt10000	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Pt x	Largest tolerance of neighboring points	Largest temperature coefficient of neighboring points
Ni10	≤ ±1.6 °C (2.88 °F)	≤ ±0.020 °C/°C (°F/°F)
Ni20	≤ ±0.8 °C (1.44 °F)	≤ ±0.010 °C/°C (°F/°F)
Ni50	≤ ±0.32 °C (0.576 °F)	≤ ±0.004 °C/°C (°F/°F)
Ni100	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni120	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni200	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni500	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni1000	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni2000	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni10000	≤ ±0.32 °C (0.576 °F)	≤ ±0.002 °C/°C (°F/°F)
Ni x	Largest tolerance of neighboring points	Largest temperature coefficient of neighboring points
Cu5	≤ ±1.6 °C (2.88 °F)	≤ ±0.040 °C/°C (°F/°F)
Cu10	≤ ±0.8 °C (1.44 °F)	≤ ±0.020 °C/°C (°F/°F)
Cu20	≤ ±0.4 °C (0.72 °F)	≤ ±0.010 °C/°C (°F/°F)
Cu50	≤ ±0.16 °C (0.288 °F)	≤ ±0.004 °C/°C (°F/°F)
Cu100	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Cu200	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Cu500	≤ ±0.16 °C (0.288 °F)	≤ ±0.002 °C/°C (°F/°F)
Cu1000	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)
Cu x	Largest tolerance of neighboring points	Largest temperature coefficient of neighboring points
Linear resistance		
0 ... 400 Ω	≤ ±40 mΩ	≤ ±2 mΩ/°C (1.11 mΩ/°F)
0 ... 100 kΩ	≤ ±4 Ω	≤ ±0.2 Ω/°C (0.11 Ω/°F)
Potentiometers		
0 ... 100%	< 0.05%	< ± 0.005%
Supply voltage		
mV: -20 ... 100 mV	≤ ±5 µV	≤ ±0.2 µV/°C (0.11 µV/°F)
mV: -100 ... 1700 mV	≤ ±0.1 mV	≤ ±36 µV/°C (20 µV/°F)
mV: ± 800 mV	≤ ±0.1 mV	≤ ±32 µV/°C (17.8 µV/°F)
TC		
E	≤ ±0.2 °C (0.36 °F)	≤ ±0.025 °C/°C (°F/°F)
J	≤ ±0.25 °C (0.45 °F)	≤ ±0.025 °C/°C (°F/°F)
K	≤ ±0.25 °C (0.45 °F)	≤ ±0.025 °C/°C (°F/°F)
L	≤ ±0.35 °C (0.63 °F)	≤ ±0.025 °C/°C (°F/°F)
N	≤ ±0.4 °C (0.72 °F)	≤ ±0.025 °C/°C (°F/°F)
T	≤ ±0.25 °C (0.45 °F)	≤ ±0.025 °C/°C (°F/°F)
U	< 0 °C (32 °F) ≤ ±0.8 °C (1.44 °F) ≥ 0 °C (32 °F) ≤ ±0.4 °C (0.72 °F)	≤ ±0.025 °C/°C (°F/°F)
Lr	≤ ±0.2 °C (0.36 °F)	≤ ±0.1 °C/°C (°F/°F)
R	< 200 °C (392 °F) ≤ ±0.5 °C (0.9 °F) ≥ 200 °C (392 °F) ≤ ±1 °C (1.8 °F)	≤ ±0.1 °C/°C (°F/°F)
S	< 200 °C (392 °F) ≤ ±0.5 °C (0.9 °F) ≥ 200 °C (392 °F) ≤ ±1 °C (1.8 °F)	≤ ±0.1 °C/°C (°F/°F)

SITRANS TF420 (HART, universal)

Input type	Basic accuracy	Temperature coefficient[1]
W3	≤ ±0.6 °C (1.08 °F)	≤ ±0.1 °C/°C (°F/°F)
W5	≤ ±0.4 °C (0.72 °F)	≤ ±0.1 °C/°C (°F/°F)
B[2]	≤ ±1 °C (1.8 °F)	≤ ±0.1 °C/°C (°F/°F)
B[3]	≤ ±3 °C (5.4 °F)	≤ ±0.1 °C/°C (°F/°F)
B[4]	≤ ±8 °C (14.4 °F)	≤ ±0.8 °C/°C (°F/°F)
B[5]	Not specified	Not specified
CJC (internal)	< ±0.5 °C (0.9 °F)	Included in basic accuracy
CJC (external)	≤ ±0.08 °C (0.144 °F)	≤ ±0.002 °C/°C (°F/°F)

1) Temperature coefficients correspond to the specified values or 0.002% of the input span, depending on which value is greater.

2) Accuracy of the specification range > 400 °C (752 °F)

3) Accuracy of the specification range > 160 °C (320 °F) < 400 °C (752 °F)

4) Accuracy of the specification range > 85 °C (185 °F) < 160 °C (320 °F)

5) Accuracy of the specification range < 85 °C (185 °F)

Output accuracy

Output type	Basic accuracy	Temperature coefficient
Average value measurement	Average of accuracy of input 1 and input 2	Average of temperature coefficient of input 1 and input 2
Differential measurement	Sum of accuracy of input 1 and input 2	Sum of temperature coefficient of input 1 and input 2
Analog output	≤ ±1.6 µA (0.01% of the full output span)	≤ ±0.48 µA/K (≤ ±0.003% of the full output span/K)

Selection and ordering data

Single chamber enclosure

	Article No.
SITRANS TF420 Temperature transmitter with single chamber enclosure for wall or pipe mounting, two separately configurable inputs and a galvanically isolated 2-wire output. ↗	**7NG044** - - 0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Communication	
With HART (4 ... 20 mA)	0
Primary value output	
Input 1	0
Input 1, input 2 as redundancy (hot backup)	1
Input 2, input 1 as redundancy (hot backup)	2
Average input 1 and input 2, both as redundancy (hot backup)	3
Minimum input 1 and input 2, both as redundancy (hot backup)	4
Maximum input 1 and input 2, both as redundancy (hot backup)	5
Difference input 1 - input 2	6
Difference input 2 - input 1	7
Absolute difference	8
Input 1, type	
RTD	
• Pt100 (IEC 60751), 3-wire	B
• Pt100 (IEC 60751), 4-wire	C
• Pt1000 (IEC 60751), 3-wire	D
• Pt1000 (IEC 60751), 4-wire	E
TC	
• Type B	F
• Type E	G
• Type J	H
• Type K	J
• Type L	K
• Type N	L
• Type R	N
• Type S	P
• Type T	Q
Potentiometer, 4-wire	R
RTD	
• Pt100 (IEC 60751), 3-wire	B
• Pt100 (IEC 60751), 4-wire	C
• Pt1000 (IEC 60751), 3-wire	D
• Pt1000 (IEC 60751), 4-wire	E
TC	
• Type B	F
• Type E	G
• Type J	H
• Type K	J
• Type L	K
• Type N	L
• Type R	N
• Type S	P
• Type T	Q
Potentiometer, 4-wire	R

	Article No.
SITRANS TF420 Temperature transmitter with single chamber enclosure for wall or pipe mounting, two separately configurable inputs and a galvanically isolated 2-wire output.	**7NG044** - - 0
CJC configuration for TC	
Input 1: None CJC; Input 2: No CJC	0
Input 1: Internal CJC; Input 2: Internal CJC	1
Input 1: External CJC; input 2: External CJC; define type in option Jxx	2
Input 1: External CJC; define type in option Jxx; input 2: Internal CJC	3
Input 1: Internal CJC; Input 2: External CJC; define type in option Jxx	4
Input 1: Internal CJC; Input 2: No CJC	5
Input 1: External CJC (define type in option Jxx); input 2: No CJC	6
Material of non-wetted parts	
Die-cast aluminum enclosure	1
Type of protection (Ex)	
General purpose	A
Intrinsic safety (Ex i) / Non-incendive field wiring (NIFW)	B
Flameproof enclosure (Ex d) / Explosion proof (XP)	C
Dust ignition protection by enclosure zone 21/22 (Ex t) / Dust ignition proof (DIP) / Increased safety zone 2 (Ex ec) / Non-incendive (NI)	L
Flameproof enclosure (Ex d) / Intrinsic safety (Ex i) / Dust ignition protection by enclosure zone 21/22 (Ex t) / Increased safety zone 2 (Ex ec)	S
Electrical connection/cable entries	
2x M20 x 1.5	F
2x ½" NPT	M
Local operation	
Without local operation	0
Local operation (closed lid)	1
Local operation (lid with glass window)	2

SITRANS TF420 (HART, universal)

Options	Order Code
Append "**-Z**" to Article No., add order code and, if applicable, free text.	
Cable gland included	
Plastic	**A00**
Metal	**A01**
Stainless steel	**A02**
Stainless steel 316L/1.4404	**A03**
CMP, for XP devices	**A10**
CAPRI ADE 4F, CuZn, cable inner diameter 7 ... 12 mm, cable outer diameter 10 ... 16 mm	**A11**
CAPRI ADE 4F, stainless steel, cable inner diameter 7 ... 12 mm, cable outer diameter 10 ... 16 mm	**A12**
Mounting cable glands/plugs	
Cable gland mounted	**A97**
Device plug for output, mounted right	**A98**
Device options	
Degree of protection IP66 / IP68 (not for device plugs M12 and Han)	**D30**
General approval without Ex approval	
Worldwide (CE, RCM) except EAC, FM, KCC	**E00**
Explosion protection certificates	
ATEX (Europe) and IECEx (world)	**E47**
Mounting system (only single chamber enclosures)	
Pipe mounting kit for single chamber enclosure, stainless steel 316L	**H06**
Wall mounting kit for single chamber enclosure, stainless steel 316L	**H07**

Selection and ordering data

Dual chamber enclosure

	Article No.
SITRANS TF420 Temperature transmitter with dual chamber enclosure for wall or pipe mounting, two separately configurable inputs and a galvanically isolated 2-wire output.	**7NG045 - - 0**
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Communication	
With HART (4 ... 20 mA)	**0**
Primary value output	
Input 1	**0**
Input 1, input 2 as redundancy (hot backup)	**1**
Input 2, input 1 as redundancy (hot backup)	**2**
Average input 1 and input 2, both as redundancy (hot backup)	**3**
Minimum input 1 and input 2, both as redundancy (hot backup)	**4**
Maximum input 1 and input 2, both as redundancy (hot backup)	**5**
Difference input 1 - input 2	**6**
Difference input 2 - input 1	**7**
Absolute difference	**8**
Input 1, type	
RTD	
• Pt100 (IEC 60751), 3-wire	**B**
• Pt100 (IEC 60751), 4-wire	**C**
• Pt1000 (IEC 60751), 3-wire	**D**
• Pt1000 (IEC 60751), 4-wire	**E**
TC	
• Type B	**F**
• Type E	**G**
• Type J	**H**
• Type K	**J**
• Type L	**K**
• Type N	**L**
• Type R	**N**
• Type S	**P**
• Type T	**Q**
Potentiometer, 4-wire	**R**
Input 2, type	
Without input 2	**A**
RTD	
• Pt100 (IEC 60751), 3-wire	**B**
• Pt100 (IEC 60751), 4-wire	**C**
• Pt1000 (IEC 60751), 3-wire	**D**
• Pt1000 (IEC 60751), 4-wire	**E**
TC	
• Type B	**F**
• Type E	**G**
• Type J	**H**
• Type K	**J**
• Type L	**K**
• Type N	**L**
• Type R	**N**
• Type S	**P**
• Type T	**Q**
Potentiometer, 4-wire	**R**

	Article No.
SITRANS TF420 Temperature transmitter with dual chamber enclosure for wall or pipe mounting, two separately configurable inputs and a galvanically isolated 2-wire output.	**7NG045 - - 0**
CJC configuration for TC	
Input 1: None CJC; Input 2: No CJC	**0**
Input 1: Internal CJC; Input 2: Internal CJC	**1**
Input 1: External CJC; input 2: External CJC; define type in option Jxx	**2**
Input 1: External CJC; define type in option Jxx; input 2: Internal CJC	**3**
Input 1: Internal CJC; Input 2: External CJC; define type in option Jxx	**4**
Input 1: Internal CJC; Input 2: No CJC	**5**
Input 1: External CJC (define type in option Jxx); input 2: No CJC	**6**
Material of non-wetted parts	
Die-cast aluminum enclosure	**1**
Enclosure made of stainless steel precision casting CF3M/1.4409 (similar to 316L)	**2**
Type of protection (Ex)	
General purpose (non-Ex)	**A**
Intrinsic safety (Ex i) / Non-incendive field wiring (NIFW)	**B**
Flameproof enclosure (Ex d) / Explosion proof (XP)	**C**
Dust ignition protection by enclosure zone 21/22 (Ex t) / Dust ignition proof (DIP) / Increased safety zone 2 (Ex ec) / Non-incendive (NI)	**L**
Flameproof enclosure (Ex d) / Intrinsic safety (Ex i) / Dust ignition protection by enclosure zone 21/22 (Ex t) / Increased safety zone 2 (Ex ec)	**S**
Electrical connection/cable entries	
2x M20 x 1.5	**F**
2x ½" NPT	**M**
Local operation	
Without local operation	**0**
Local operation (closed lid)	**1**
Local operation (lid with glass window)	**2**

SITRANS TF420 (HART, universal)

Options	Order Code
Append "**-Z**" to Article No., add order code and, if applicable, free text.	
Cable gland included	
Plastic	**A00**
Metal	**A01**
Stainless steel	**A02**
Stainless steel 316L/1.4404	**A03**
CMP, for XP devices	**A10**
CAPRI ADE 4F, CuZn, cable inner diameter 7 ... 12 mm, cable outer diameter 10 ... 16 mm	**A11**
CAPRI ADE 4F, stainless steel, cable inner diameter 7 ... 12 mm, cable outer diameter 10 ... 16 mm	**A12**
Cable gland accessories	
Dual hole insert included	**A20**
Mounting cable glands/plugs	
Cable gland mounted	**A97**
Device plug for output, mounted right	**A98**
Device options	
Double layer coating (epoxy resin and polyurethane) 120 µm of enclosure and lid	**D20**
Degree of protection IP66 / IP68 (not for device plugs M12 and Han)	**D30**
Stainless steel Ex plate 1.4404/316L	**D42**
General approval without Ex approval	
Worldwide (CE, RCM) except EAC, FM, KCC	**E00**
Explosion protection certificates	
ATEX (Europe) and IECEx (world)	**E47**
Mounting brackets (only dual chamber enclosure)	
Wall/pipe mounting bracket for dual chamber enclosure, steel	**H01**
Wall/pipe mounting bracket for dual chamber enclosure, stainless steel 304	**H02**
Wall/pipe mounting bracket for dual chamber enclosure, stainless steel 316L	**H03**

Accessories

	Article No.
Additional accessories for assembly, connection and transmitter configuration, see page 2/154.	
Modems	
Modem with USB interface and SIPROM T software	**7NG3092-8KN**
HART modem with USB interface	**7MF4997-1DB**
Thread adapter	
Thread adapter M20x1.5 (male thread) to ½-14 NPT (female thread)	**7MP1990-0BA00**
Thread adapter M20x1.5 (male thread) to G½ (female thread)	**7MP1990-0BB00**
Local operation	
Local operation for temperature transmitter in dual chamber enclosure	**7MF7902-1AD**
Mounting system for local operation 7MF7902-1AD in single chamber enclosure	**7MF7902-1AS**
Mounting brackets (only dual chamber enclosure)	
Wall/pipe mounting bracket for dual chamber enclosure, steel, 5/16-24UNF	**7MF7900-1AB**
Wall/pipe mounting bracket for dual chamber enclosure, steel, M8	**7MF7900-1AC**
Wall/pipe mounting bracket for dual chamber enclosure, stainless steel 316L, 5/16-24UNF	**7MF7900-1AH**
Wall/pipe mounting bracket for dual chamber enclosure, stainless steel 316L, M8	**7MF7900-1AJ**
Mounting system (only single chamber enclosures)	
Pipe mounting kit for single chamber enclosure, stainless steel 316L	**7MF7900-1AK**
Wall mounting kit for single chamber enclosure, stainless steel 316L	**7MF7900-1AL**
Cable gland	
Cable gland, gray, non-Ex, M20	**7MF7906-1AB**
Cable gland, gray, non-Ex, NPT	**7MF7906-1BB**
Cable gland, metal, non-Ex, NPT	**7MF7906-1BD**
Cable gland, metal, non-Ex, M20	**7MF7906-1AD**
Cable gland, metal, Ex-d, NPT	**7MF7906-1BE**
Cable gland, metal, Ex-d, M20	**7MF7906-1AE**
Cable gland, 316L, non-Ex, NPT	**7MF7906-1BH**
Cable gland, 316L, non-Ex, M20	**7MF7906-1AH**
Cable gland, 316L, Ex-d, NPT	**7MF7906-1BJ**
Cable gland, 316L, Ex-d, M20	**7MF7906-1AJ**
Cable gland, E1FX Tri-Star 1/2-14NPT, CMP	**7MF7906-1NE**
Cable gland, ½ NPT Capri ADE 4F cpl., CuZn	**7MF7906-1PE**
Cable gland, ½ NPT Capri ADE 4F cpl., stainless steel	**7MF7906-1PJ**
Dual hole gasket for 2 cables in cable gland	**7MF7906-1WN**

	Article No.
Plug and cable socket	
Plug Han 7D, plastic, straight	**7MF7906-2AB**
Plug Han 7D, plastic, angled	**7MF7906-2AC**
Plug Han 7D, metal, straight, blue	**7MF7906-2AQ**
Plug Han 7D, metal, straight, grey	**7MF7906-2AN**
Plug Han 7D, metal, angled, blue	**7MF7906-2AR**
Plug Han 7D, metal, angled, grey	**7MF7906-2AP**
Plug Han 8D, plastic, straight	**7MF7906-2EB**
Plug Han 8D, plastic, angled	**7MF7906-2EC**
Plug Han 8D, metal, straight, blue	**7MF7906-2EQ**
Plug Han 8D, metal, straight, grey	**7MF7906-2EN**
Plug Han 8D, metal, angled, blue	**7MF7906-2ER**
Plug Han 8D, metal, angled, grey	**7MF7906-2EP**
Cable socket, plastic, for plug Han 7D	**7MF7906-2BB**
Cable socket, plastic, for plug Han 8D	**7MF7906-2FB**
Cable socket, metal, for Han 7D blue	**7MF7906-2BQ**
Cable socket, metal, for Han 8D blue	**7MF7906-2FQ**
Cable socket, metal, for Han 7D grey	**7MF7906-2BN**
Cable socket, metal, for Han 8D grey	**7MF7906-2FN**
Plug M12 with cable socket, stainless steel	**7MF7906-3AB**
Overvoltage protection	
Overvoltage protection up to 20 kV, M20	**7MF7906-3AC**
Overvoltage protection up to 20 kV, NPT	**7MF7906-3AD**
Lid	
Closed lid aluminum, painted 2x, without glass window, with seal NBR	**7MF7901-1BB**
Closed lid aluminum, painted 2x, without glass window, with seal FVMQ	**7MF7901-1BC**
Lid aluminum 2x coated, with glass window, with seal NBR	**7MF7901-1BG**
Lid aluminum 2x coated, with glass window, with seal FVMQ	**7MF7901-1BH**
Closed lid stainless steel precision casting, without glass window, with seal NBR	**7MF7901-2AB**
Closed lid stainless steel precision casting, without glass window, with seal FVMQ	**7MF7901-2AC**
Lid stainless steel precision casting, with glass window, with seal NBR	**7MF7901-2AG**
Lid stainless steel precision casting, with glass window, with seal FVMQ	**7MF7901-2AH**

Ordering example

SITRANS TF420 (single chamber enclosure)

7NG0450-0BA02-0AF2-Z Y01+Y17+P10

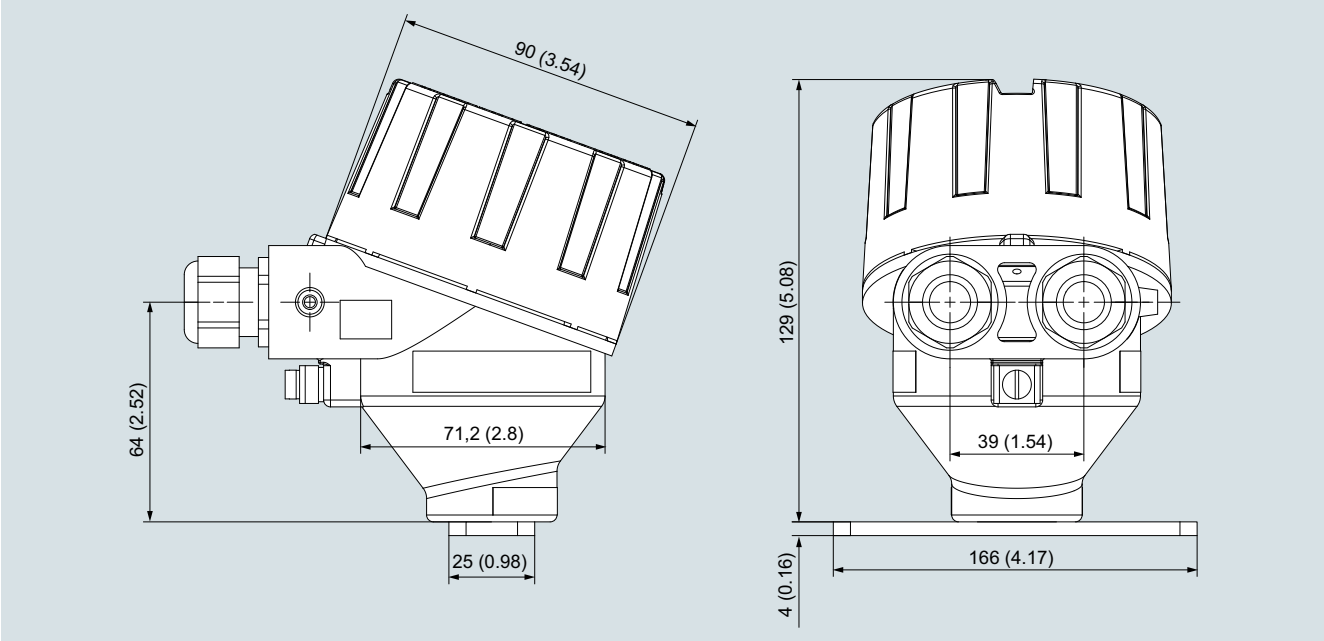
Y01: -10 ... +100 °C (32 ... 212 °F)

Y17: TICA123

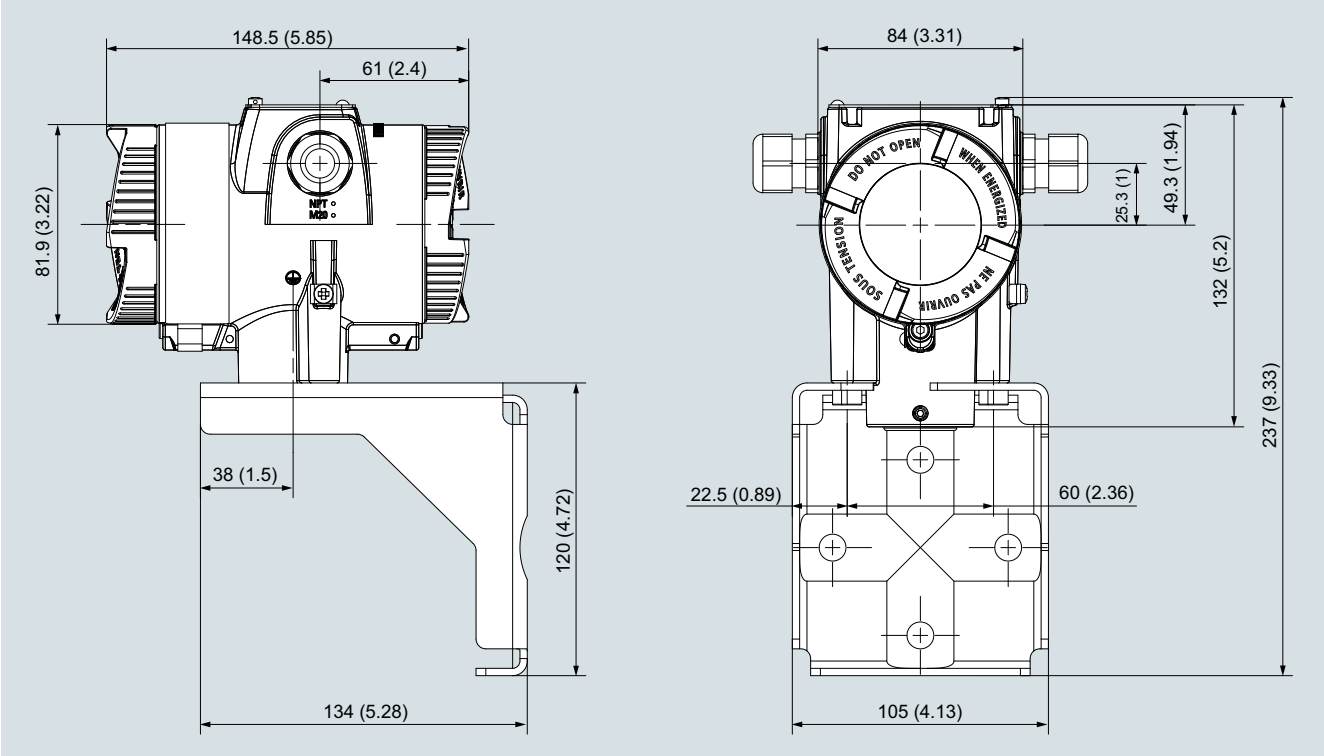
Factory setting

- Input 1: Pt100 (IEC 751); 3-wire connection
- Input 2: not configured (inactive)
- Measuring range: 0 ... 100 °C (32 ... 212 °F)
- Fault current
  - Input circuit wire break: 22.8 mA
  - Input circuit short circuit: 22.4 mA
  - Input circuit drift: 22 mA (active when input 2 is active)
  - Input monitoring wire break and short-circuit
- No trimming of input and output (offset)
- Damping 0.0 s

Dimensional drawings



SITRANS TF420, single chamber enclosure, dimensions in mm (inch)

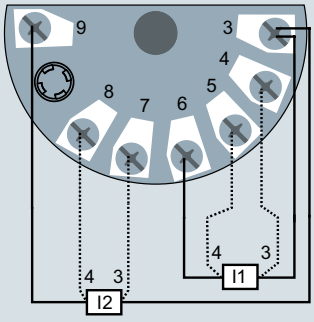


SITRANS TF420, dual chamber enclosure, dimensions in mm (inch)

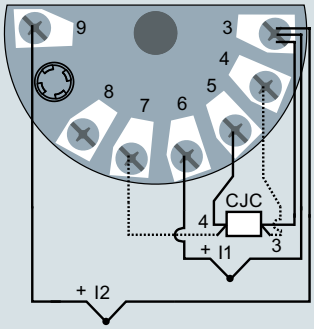
Circuit diagrams

Connections

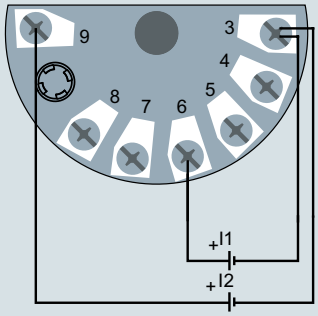
Input connection



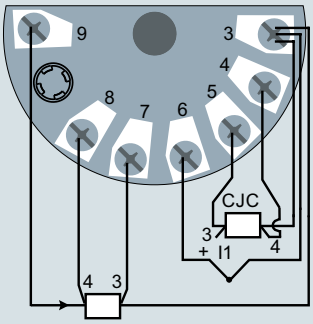
Input 1 and/or input 2:
2-wire, 3-wire or 4-wire RTD or
linear resistance



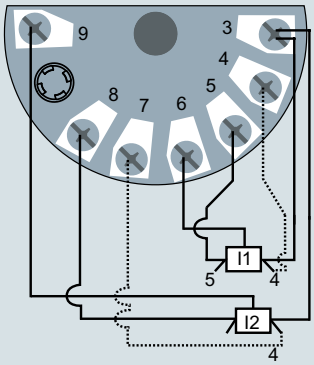
Input 1 and/or input 2:
TC (internal CJC or
external 2-wire, 3-wire or
4-wire CJC)



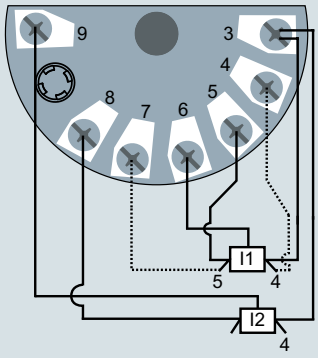
Input 1 and/or input 2:
Voltage input
(unipolar or bipolar)



Input 1: TC (internal CJC or
external 2-wire or 3-wire CJC)
Input 2: 2-wire, 3-wire or 4-wire RTD

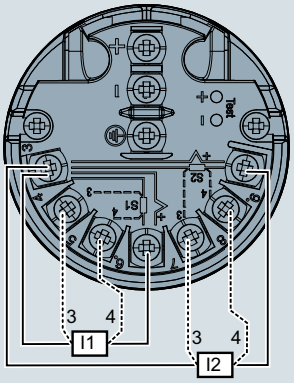


Input 1 and/or Input 2:
3-wire or 4-wire potentiometer

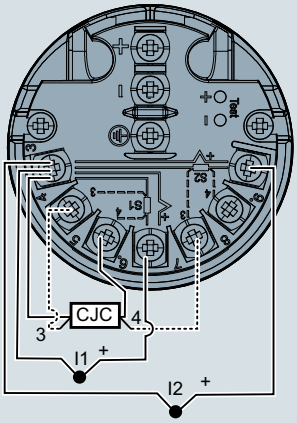


Input 1: 5-wire potentiometer
Input 2: 3-wire potentiometer

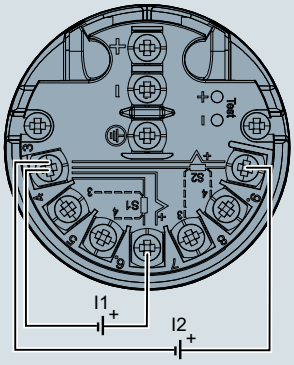
SITRANS TF420 in single chamber enclosure (7NG044*), input connection assignment



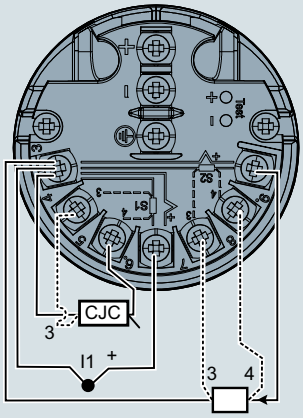
Input 1 (I1) and/or input 2 (I2):
2-wire, 3-wire or 4-wire RTD or
linear resistance



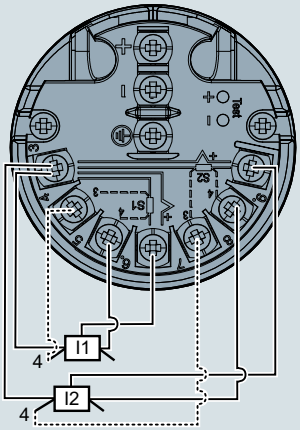
Input 1 (I1) and/or input 2 (I2):
TC (internal CJC or
external 2-wire, 3-wire or
4-wire CJC)



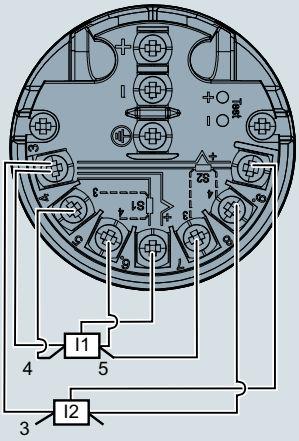
Input 1 (I1) and/or input 2 (I2):
Voltage input
(unipolar or bipolar)



Input 1: TC (internal CJC or
external 2-wire or 3-wire CJC)
Input 2: 2-wire, 3-wire or 4-wire RTD



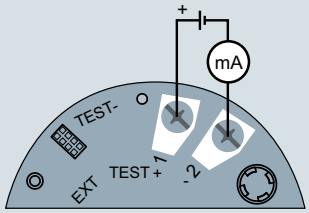
Input 1 (I1) and/or input 2 (I2):
3-wire or 4-wire potentiometer



Input 1 (I1): 5-wire potentiometer
Input 2 (I2): 3-wire potentiometer

SITRANS TF420 in dual chamber enclosure (7NG045*), input connection assignment

Output connection



SITRANS TF420 in single chamber enclosure (7NG044*), output connection assignment

Overview

SITRANS TO500 is a multipoint temperature transmitter for measuring temperatures and temperature profiles with fiber-optic multipoint measuring lances.

Benefits

- Evaluation of a large number of sensors (Fiber Bragg Grating (FBG)) in one temperature transmitter
- Low space requirements of the multipoint measuring lance
- 4 multipoint measuring lance channels per temperature transmitter
- Easy to install
- PROFIBUS DP - Simple integration into control system
- Fast response to temperature changes
- Exact, no recalibration required due to internal reference
- Also suitable for high process temperatures

Application

SITRANS TO500 is used for evaluating a high number of sensors that are arranged on a fiber-optic multipoint measuring lance.

Up to 4 multipoint measuring lances, each with as many as 48 sensors (Fiber Bragg Grating (FBG)), can be simultaneously processed by one SITRANS TO500.

Accurate and fast determination of temperature profiles enables process optimization in terms of service life, quality and output.

Locations of excessive temperature rise are quickly and accurately detected, thereby preventing damage to the process, equipment and environment.

Wherever temperature profiles must be determined and installation space is limited, the SITRANS TO500 with fiber-optic temperature measurement is the right choice.

Design

The SITRANS TO500 multipoint temperature transmitter is located in the control cabinet in a compact aluminum enclosure for mounting onto DIN rails.

The connectors are easy to access on the front:

- 4 x connector for multipoint measuring lances
- 1 x connector for power supply
- 1 x connector PROFIBUS DP
- 1 x connector Ethernet

The status displays are also located on the front.

Mode of operation

In the SITRANS TO500 multipoint temperature transmitter, light with a wavelength from 1 500 to 1 600 nm is generated with a continuously adjustable laser and decoupled to the multipoint measuring lance. Fiber Bragg Gratings (FBG) are mounted at freely defined points on the multipoint measuring lances. Each FBG reflects light of a defined wavelength. The wavelength reflected by the FBG varies depending on the temperature. The reflection at the FBGs is thus a measurement of the temperature at the corresponding measuring point. A maximum of 48 FBGs per channel can be evaluated, depending on the temperature range.

A gas cell with fixed absorption line serves as a reference in the SITRANS TO500 and the wavelength determination is continuously adjusted by it.

Function

The SITRANS TO500 has 4 channels which are evaluated simultaneously. The wavelength reflected at each sensor in the multipoint measuring lance depends on the temperature, and this wavelength is output in the multipoint temperature transmitter. All 4 channels are read at the same time and updated once per second. The temperature can be determined and displayed accurately at up to 48 sensors per channel. The positions of the sensors can be specified by the customer. This leads to a flexible and application-specific solution for the customer.

The measured temperatures are transferred to the control system by PROFIBUS DP. The parameters of the SITRANS TO500 are set via the integrated Ethernet interface.

SITRANS TO500, multipoint temperature transmitter

Technical specifications

Input	
Channels	4
Measured variable	Temperature
Input type	max. 48 sensors (FBGs) per channel
Characteristics	Temperature-linear
Resolution	0.1 K
Measuring accuracy	< 0.5 K
Repeatability	< 0.5 K
Measuring cycle	1 s
Measuring range	-180 ... +800 °C (-292 ... +1472 °F) depending on the multipoint measuring lance
Unit	°C
Power supply	24 V DC + 20%
Power consumption	Max. 15 W
Protection	Against reverse polarity
Measuring velocity	
• Measurement rate	1 Hz independent of the number of APCBs
Output	
Output signal	PROFIBUS DP
Optical power	≤ 1 mW per channel
Laser protection class	Class 1
Rated conditions	
Ambient conditions	
• Ambient temperature	0 ... 50 °C (32 ... 122 °F)
• Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
• Relative humidity	< 80%, non condensing at 50 °C (122 °F)
• Electromagnetic compatibility	According to EN 61326 and NAMUR NE21
Degree of protection to EN 60529	
• Enclosure	IP20
Design	
Weight	2.4 kg (5.3 lb)
Dimensions	See "Dimensional drawings"
DIN rail adapter	Rear-mounted
Material	Aluminum
Displays and control elements	
LEDs	• "Power-on" (continuous light) • "Status" (flashing during startup; otherwise continuous light)
Pushbutton	"Reset" (system restart or address reset)

Selection and Ordering data

	Article No.
SITRANS TO500 **multipoint temperature transmitter** Communication: PROFIBUS DP Channels: 4 Power supply: 24 V DC Optical connection: FC/APC plug Enclosure: Aluminum, IP20	**7NG9551-4AA00-0AA0**