SIEMENS

Ingenuity for life

Top values in precision and reliability

Temperature measurement with SITRANS T

siemens.com/processinstrumentation

Temperatures firmly under control

Top process quality and efficiency are key factors for success in the process industry, and achieving them requires absolutely accurate and reliable process instrumentation. The best example of this is SITRANS T, our comprehensive product family for temperature measurement.

First choice for all requirements in the process industry

Whether as individual components or a complete solution, SITRANS T definitely has the right devices for your requirements. Our product family offers temperature sensors and transmitters for every application in the process industry, even under extreme conditions – including general purpose, intrinsically safe, and explosion-proof, and with globally recognized certificates. Naturally we will support you throughout the entire lifecycle of your devices with expert service and support.

Impressively communicative

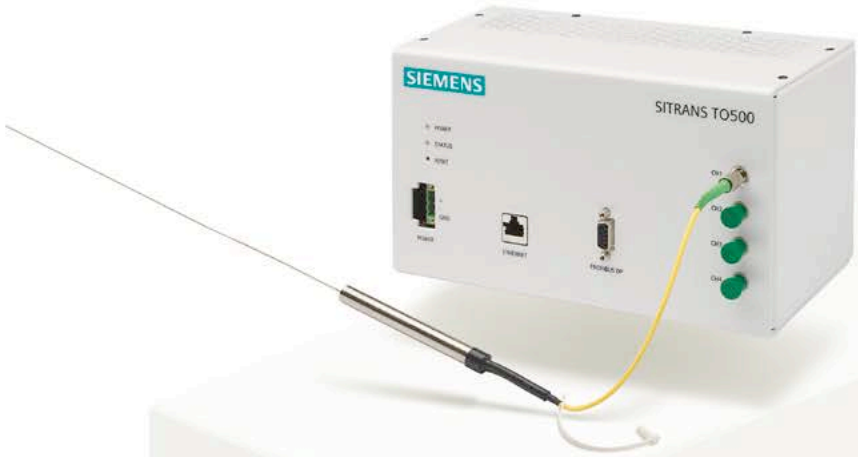
With SITRANS T, you benefit from end-to-end ease of use and the highest transparency. Powerful software and a comprehensive communications capability ensure simple, highly efficient device integration and configuration.

Benefits at a glance

- Highest flexibility because devices are available as a complete measuring point or transmitter for head, rail, or field-mount installation
- Superior communications capability based on industrial standards such as 4 – 20 mA, HART, PROFIBUS PA, and FOUNDATION Fieldbus
- Simple integration into SIMATIC PCS 7 and all common process control systems
- Support for planning, parameterization, commissioning, diagnostics, and maintenance through SIMATIC PDM (Process Device Manager)
- Device operation via HART and PROFIBUS PA through the use of EDDs
- Devices for SIL applications usable up to level 2/3

SITRANS T
temperature measurement

As the perfect basis for highly precise and reliable temperature measurements, the solutions in the SITRANS T family are a good choice for a wide range of applications. They also support operation and monitoring on-site, since the process variables can be comfortably read on an optional display.



SITRANS TO500

SITRANS TR320 / TR420

SITRANS TH320 / TH420

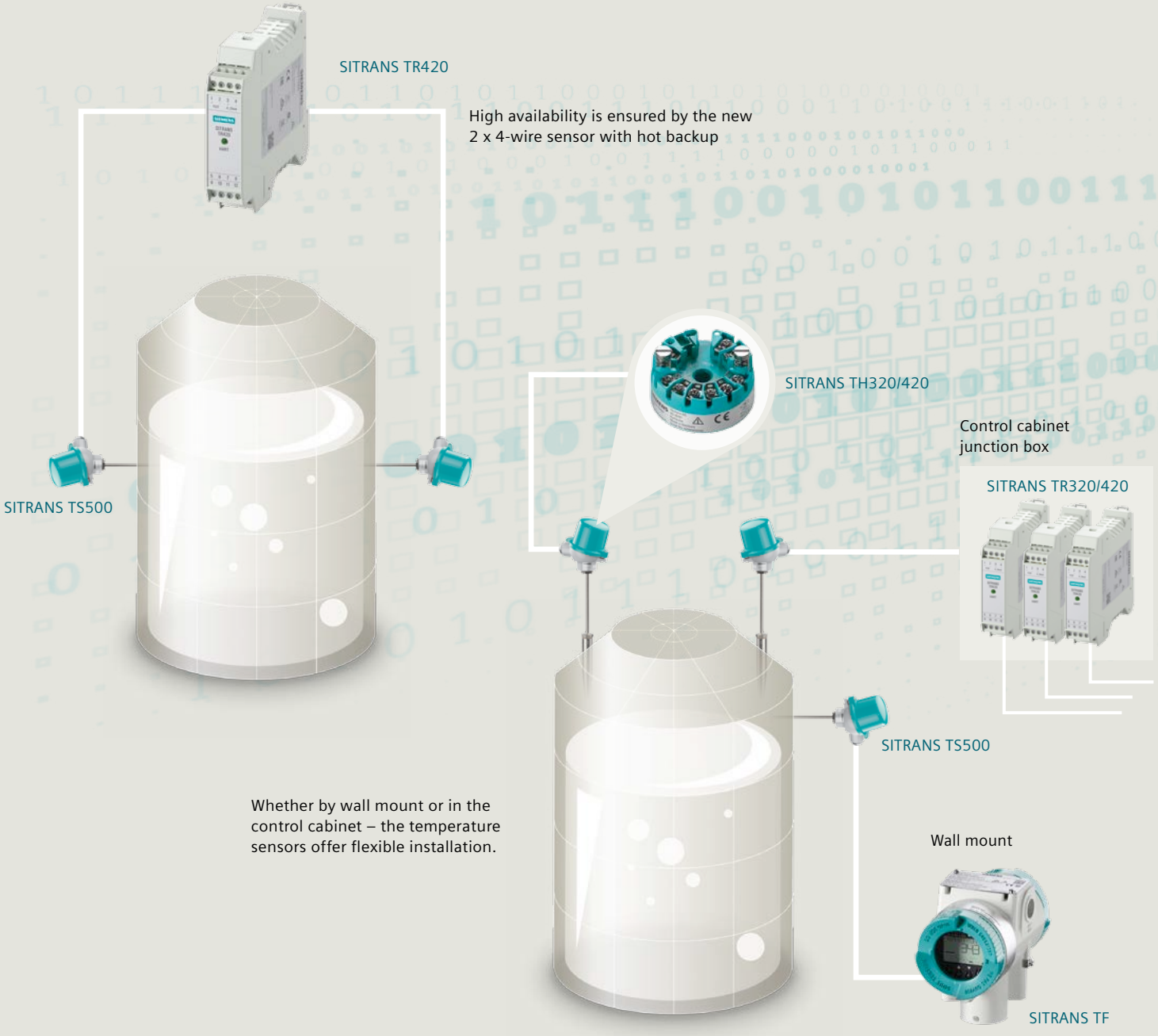
Benefits at a glance

- Broad portfolio support for all main applications
- Secure use in intrinsically safe and Ex d instrumented plants
- Modular system for easy configuration
- Support for 4 – 20 mA, HART, PROFIBUS PA, and FOUNDATION Fieldbus
- Extended diagnostics
- Maintenance benefits

SITRANS T is the first choice wherever intelligent processing of readings is required. The measurement status is easy to monitor remotely or locally. Functional safety permits SIL 2/3 applications. Safety and accuracy have been significantly improved with the option of connecting 2 x 4-wire resistance thermometers, as well as through simple sensor-transmitter matching. As an added benefit, maintenance is supported by a two-color diagnostics LED and test pins: suspect measurements can be detected at a glance – and with one touch, the current loop can be measured without any interruption.

The complete program for a wide range of applications

SITRANS T products are suitable for a variety of applications. Temperature sensors and head transmitters can be integrated directly into the process. Under adverse conditions, head transmitters can be decoupled from the process and easily replaced with sensors, remote field transmitters or rail transmitters.



SITRANS TF
Available in robust die-cast aluminum or long-lasting stainless steel 316 L, the field transmitter in high protection class IP66/67/68 is particularly suitable for use under harsh environmental conditions.

SITRANS TS200
The compact SITRANS TS200 product series offers the same advantages as SITRANS TS100. The only difference is in the design: instead of a flexible cable, the system comes with a fixed connection (M12, Lemo, etc.).

SITRANS TS100
Whether as a basic or mineral-insulated version, SITRANS TS100 supports a wide field of applications and comes with a directly mounted cable. Compression or soldering fittings minimize installation work while the optional adapter simplifies surface measurement. The intrinsically safe version is approved for operation even in zone 0 without an additional thermowell. Here the sensor's excellent response time truly pays off.

SITRANS TR
The rail transmitters offer the same features as SITRANS TH but are deployed close to the process in junction boxes or the control room, thus enabling centralized access to all connected measurement points.

SITRANS TS500
SITRANS TS500 is available in intrinsically safe versions as well as Ex d and supports a wide field of measurements, from simple applications to solutions for harsh environments. It is designed as a modular system of tubular or barstock thermowell, extension, connection head, and optional transmitter and display. This allows standard components to be used for individual applications.

SITRANS TH
Despite their compact design for direct installation in the connection head, the transmitters offer a high degree of comfort and safety – for simple applications as well as for PROFIBUS and FOUNDATION Fieldbus installations.

Special devices for food and pharma
The SITRANS T clamp-on sensors for hygienic applications feature a wide range of appropriate process connections for classic temperature measurement. When it comes to accuracy and response time, they are comparable to built-in sensors. They offer obvious advantages, especially for small pipe diameters: no welding or welding validation, no process disturbance, easy pigging, and easy dismantling for recalibration.

SITRANS TS at a glance:

Type	SITRANS TS insert	SITRANS TS100 / SITRANS TS200	SITRANS TS300
	Measuring insert spares Mineral-insulated execution (MIC)	Temperature sensors in cable version Mineral-insulated execution	Temperature sensors for food & beverage/pharma In-pipe or clamp-on
Application	Spares	Plant and machinery construction, bearing temperature, surface measurement	Advanced hygienic requirements
Process connection		Compression or soldering fittings: G [1/4, 1/2]"; 1/2" NPT; M8x1; M18x1.5 Surface mounting adapter for installation on pipes	In-pipe: Clamp-flange, DIN 11851, Varivent, BioControl, Neumo, Ingold, spherical-welding sleeve Clamp-on: Collar 4 … 57 mm Strap up to 200 mm
Certificates	Europe+IEC EX: • Intrinsic safety "ia", "ic" • Flameproof enclosure "d"; dust protection by enclosure "t"	Europe+IEC EX: • Intrinsic safety "ia", "ic"	
Output	Direct sensor signal 4 … 20 mA (TH100/TH200) HART (TH300) PA (TH400) FF (TH400)	Direct sensor signal	Direct sensor signal 4 … 20 mA (TH100/TH200) HART (TH300) PA (TH400) FF (TH400)
Wetted material	SS similar 1.4404 (RTD), 2.4816 (thermocouple) (SS sim. 316L, INCONEL® Alloy 600)	SS similar 1.4404 (RTD), 2.4816 (thermocouple) (SS sim. 316L, INCONEL® Alloy 600)	In-pipe: 1.4404/316L Clamp-on: No wetted parts
Technical data			
Temperature limits*	PT100 Basic: –30 … +400°C PT100 Extend: –196 … +600°C Thermocouple: –196 … +1100°C (depends on type)	PT100 Basic: –30 … +400°C PT100 Extend: –196 … +600°C Thermocouple: –196 … +1100°C (depends on type)	In-pipe: –30 … +300°C Clamp-on: –20 … +160°C
Minimum response time $t_{0,5}$	2 … 6 s	2 … 6 s	5 s
Degree of protection	IP54	SITRANS TS100: IP54 SITRANS TS200: IP54 (some connectors lower)	IP65 (IP54 for some head types)

* A combination of loads (temperature, flow, vibration, pressure) sometimes lowers these values significantly.
Further temperature limits are the result of the thermowell materials used.
(Example: 1.4571/316Ti is resistant to compression stress up to 450 – 550°C, material limit: 800°C)

** pending

SITRANS TS500	SITRANS TS500	SITRANS TS500	SITRANS TS-Thermowell NEW
Temperature sensors for installation in existing thermowells Suitable for thermowells according to DIN 43772 as well as ASME B40.9-2001	Temperature sensors with tubular thermowell for low to medium process load Thermowell Form 2 or 3 (tapered) according to DIN 43772 and Form 2N with thread, flange, or without process connection	Temperature sensors with barstock thermowell for high process load Thermowell according to DIN 43772, Form 4 for weld-in or Form 4F with flange	Protective tube made from solid material to DIN 43772 and ASME B40.9
Vessel and pipes	Vessel and pipes	Vessel and pipes	Containers and pipelines
Connection to thermowell: M18x1.5; G 1/2", 1/2" NPT	Compression fitting G 1/2", 1/2" NPT Welded thread G 1/2", G1", 1/2" NPT Welded flange DN25PN40, 1RF150, 1.5RF150, 1.5RF300	Form 4 for weld-in Form 4F with flange: DN25PN40, 1RF150, 1RF300, 1.5RF150, 1.5RF300	For welding to DIN/ASME Thread G, R[1/2", ¾", 1"] Thread NPT[1/2", ¾", 1", 1 ½"] Thread M[20×1,5; 27×2; 33×2] Flange ASME ¾"; 1"; 1 ½"; 2"; [150; 300; 600 lbs]
Europe+IEC EX: • Intrinsic safety "ia", "ic" • Flameproof enclosure "d"; dust protection by enclosure "t" • Non-sparking "n"	Europe+IEC EX: • Intrinsic safety "ia", "ic" • Flameproof enclosure "d"; dust protection by enclosure "t" • Non-sparking "n"	Europe+IEC EX: • Intrinsic safety "ia", "ic" • Flameproof enclosure "d"; dust protection by enclosure "t" • Non-sparking "n"	
Direct sensor signal 4 ... 20 mA (TH100/TH200) HART (TH300) PA (TH400) FF (TH400)	Direct sensor signal 4 ... 20 mA (TH100/TH200) HART (TH300) PA (TH400) FF (TH400)	Direct sensor signal 4 ... 20 mA (TH100/TH200) HART (TH300) PA (TH400) FF (TH400)	
No wetted parts	1.4404, 1.4571 (316L, 316TI)	Form 4F: 1.4404, 1.4571 (316L, 316TI) Form 4 additionally 1.7335, 1.5415 (A 182 F11, A 204 Gr. A)	316L; CS; Hastelloy [C276, C22]; 304; 321; Monel; Duplex, Superdup. div. coatings
PT100 Basic: –30 ... +400°C PT100 Extend: –196 ... +600°C Thermocouple: –196 ... +1100°C (depends on type)	PT100 Basic: –30 ... +400°C PT100 Extend: –196 ... +600°C Thermocouple: –196 ... +1100°C (depends on type)	PT100 Basic: –30 ... +400°C PT100 Extend: –196 ... +600°C Thermocouple: –196 ... +1100°C (depends on type)	Depends on material
Depends on type of thermowell	7 ... 45 s	20 ... 45 s	Depends on shape
IP65 (IP54 for some head types)	IP65 (IP54 for some head types)	IP65 (IP54 for some head types)	All can be implemented, depending on installation

SITRANS TH, TR, TW, and TF at a glance:

Type	SITRANS TH100	SITRANS TH320/ SITRANS TH420 NEW	SITRANS TH400
Installation	**In the connection head**		
	Two-wire		
Input (connectable sensors)	PT100 resistance thermometers	Up to 2 sensors: Resistance thermometers Thermocouples Resistance-type sensors DC sources	Resistance thermometers Thermocouples Resistance-type sensors DC sources
Output	4 ... 20 mA	SITRANS TH320: 4 ... 20 mA, HART 7 SITRANS TH420: HART 7	PROFIBUS PA version FOUNDATION Fieldbus version
Local display			
Power supply	DC 8.5 ... 36 V (30 V for Ex)	DC 7.5 ... 48 V	DC 9 ... 32 V (30 V for Ex and 17.5 V for FISCO)
Housing material	Molded plastic, embedded electronics	Molded plastic, embedded electronics	Molded plastic, embedded electronics
Ambient temperature	–40 ... +85°C	–50 ... +85°C	–40 ... +85°C
Degree of protection	Enclosure: IP68 Terminal: IP00	Enclosure: IP68 Terminal: IP00	Enclosure: IP68 Terminal: IP00
Certificates	Europe (ATEX): Ex ia, ib, ic, Ex n USA (cFMus): IS, NI Canada (cFMus): IS, NI Other certificates: GOST, NEPSI, PESO	Ex: ATEX, IECEx, cFMus, cCSAus, EAC/ EACEx, NEPSI, KCC/KCs, Inmetro, SIL 2/3 Ex i, Ex nA/ec, IS, NI, NIFW Zone 0/1/2, Division 1/2 Marine: DNV-GL, ABS, LR, BV	Europe (ATEX): Ex ia, Ex ib, Ex n USA (cFMus): IS, NI Canada (cFMus): IS, NI Other certificates: GOST, PESO
Operator input			
SIMATIC PDM		HART version	PROFIBUS PA FOUNDATION Fieldbus
Handheld 375		HART version	FF version
AMS		HART version	FF version
SIPROM T and special modem	•	4 ... 20 mA version	
Local configuration using 4 push buttons			

SITRANS TR320 / SITRANS TR420 NEW	SITRANS TF	SITRANS TF320 / SITRANS TF420	SITRANS TO NEW
On DIN rail	Field device		
Up to 2 sensors: Resistance thermometers Thermocouples Resistance-type sensors DC sources	Resistance thermometers Thermocouples Resistance sensors Direct current/voltage sources	Up to 2 sensors: Resistance thermometers Thermocouples Resistance sensors DC voltage sources	4-channel transmitters for fiber Bragg grating (FBG) sensors (max. 48 per channel)
SITRANS TH320: 4 … 20 mA, HART 7 SITRANS TH420: HART 7	Field indicators (LCD only) PROFIBUS PA FOUNDATION field bus	SITRANS TF320: 4 … 20 mA, HART 7 SITRANS TF420: HART 7	PROFIBUS DP
		LCD for local operation	
DC 7.5 … 48 V	DC 11/13.5 … 35 V (30 V for Ex and 17.5 V for FISCO)	DC 10.5 … 48 V	DC 24 V ± 20%
Molded plastic, embedded electronics	Die-cast aluminum, coated, or stainless steel	Die-cast aluminum, coated, or stainless steel 316 L**	
–50 … +85°C	–40 … +85°C	–50 … +85°C	0 … +50°C
IP20	IP67	IP66/67/68	IP20
Ex: ATEX, IECEx, cFMus, cCSAus, EAC/ EACEx, NEPSI, KCC/KCs, Inmetro, SIL 2/3 Ex i, Ex nA/ec, IS, NI, NIFW Zone 0/1/2, Division 1/2 Marine: DNV-GL, ABS, LR, BV	Europe (ATEX): Ex ia, Ex d, Ex n USA: XP/DIP/NI/S SIL 2 and SIL 2/3 (4 … 20 mA/HART) Other certificates: GOST, INMETRO, NEPSI, KOSHA	Ex: ATEX, IECEx, cFMus, cCSAus, EAC/ EACEx, NEPSI, KCC/KCs, Inmetro, SIL 2/3 Ex i, Ex nA/ec, IS, NI, NIFW Zone 0/1/2, Division 1/2 Marine: DNV-GL, ABS, LR, BV**	ATEX/IECEx (as per guidelines according to IEC/EN 50079-28-2015) II (1) G [Ex op is IIC T6 Ga] II (1) D [Ex op is IIIC Da] I (M1) [Ex op is I Ma]
HART version	HART / PROFIBUS PA / FOUNDATION Fieldbus	HART version	
HART version	HART / FOUNDATION Fieldbus	HART version	
HART version	HART / FOUNDATION Fieldbus	HART version	
4 … 20 mA version	4 … 20 mA	4 … 20 mA version	
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