Technical Information

Honeywell

STT 3000 Series STT250
Smart Temperature Transmitters Specifications
Models STT25T
EN0I-6091 February 2009

Introduction

Honeywell's STT 3000 family of microprocessor based transmitters covers the full spectrum of temperature measurement. Choose the top-tier STT350 for super Smart performance transmitters, the STT250 for competitive performance in a compact head mount package, or the low-tier PC configurable STT150 for fit-and-forget applications. See Product Specification Sheets :

- EN0I-5222 for STT350
- EN0I-6031 for STT250 (models STT25M/ H/ D)
- EN0I-6063 for STT150 (models STT15R/ U/ S)

This Product Specification Sheet describes the latest addition to the STT250 range – the dual input **STT25T** targeted to provide secure/ redundant measurement and reduced maintenance costs by auto sensor self checking.

Description

The STT25T can accept two independent temperature sensor inputs – either Pt100 or thermocouples Types J, K, T or E. The primary sensor is used to drive the 4-20mA output, while the secondary sensor can be used as a redundant back-up in case the primary sensor fails, or can be used for cross-checking the stability of the primary sensor.

The STT25T supports the HART* communications protocol for ease of configuration and maintenance checking of sensor integrity via any of the listed HART Communication Foundation tools.

The transmitter is 2-wire powered and gives an output 4-20mA signal linearized to temperature over the 2 power wires. Lead wire compensation is provided for RTD (Resistance Temperature Detectors) and internal digital cold junction compensation is provided for thermocouples. MilliVolt and Ohms sensor inputs can also be accepted.

Features

- Direct sensor head mounting in DIN Form A housing. Housing materials include aluminum, 316SS and cast iron.
- Mounting options include wall, pipe, DIN rail, field or direct sensor head mounting.
- Single model accepts input signals from two RTD or thermocouple or mixed sensor types Pt100, J, K, T or E.
- Suitable for 3- or 2-wire Pt100.
- Hard-wired upscale/ downscale failsafe link to ensure secure operation in the event of a failure.
- Open circuit sensor analysis carried out in every measurement cycle.
- Selectable latching/non-latching failsafe operation for open circuit sensor.
- Integral analog or digital indication meter option.
- Analog to Digital converter validated frequently.
- Configuration adjustments and diagnostics checks can be made either locally or remotely over the signal wires from anywhere along their route. This enables major savings in manpower time during commissioning, start-up and maintenance activities.

Use the MC Toolkit Configurator, the HART hand-held communicator, or HART PC tool to configure the transmitter for any of these sensors/ applications.

Accuracies stated overleaf are available merely by selecting the sensor type and range (i.e., without user calibration). Calibration of the LRV/URV end points typically will give accuracy improvements of two times. Sensor errors can be calibrated out by calibrating to the specific sensor either by having it at the LRV/URV temperatures or by simulation of the known values.

In addition, all units pass through Environmental Stress Screening by fast cycling between -40°C and +85°C to ensure maximum product reliability. During this process the ambient temperature coefficients are determined for each unit and burned into memory to ensure temperature compensation over a wide range of operating conditions.

Performance Under Rated Conditions

Sensor	*Digital Accuracy over Normal Range* ℃ (℉)	*D/A Accuracy % of span*	*Digital Accuracy over Maximum Range* ℃ (℉)	*Standards* *(All IEC referenced sensors use the ITS-90 temperature scale)*
Pt100	0.15C for -200 to 450 (-328 to 842)	0.025%	0.25C for -200 to 850C (-328 to 1562)	IEC 60751 (α=0.00385)
E	0.30C for 0 to 1000 (32 to 1832)	0.025%	0.60C for -200 to 1,000C (-328 to 1832)	IEC 60584-1
J	0.30C for 0 to 800 (32 to 1472)	0.025%	0.70C for -200 to 1,200C (-328 to 2192)	IEC 60584-1
K	0.60C for -120 to 1370 (-191 to 2498)	0.025%	0.90C for -200 to 1370C (-328 to 2498)	IEC 60584-1
T	0.30C for -100 to 400 (-148 to 752)	0.025%	0.5C for -250 to 400C (-418 to 752)	IEC 60584-1

Specifications

Operating Conditions

Parameter	Reference Condition	Rated Condition	Operative Limits	Transportation And Storage
Ambient temperature °C	23 °C ± 2	-40 to +85	-40 to +85	-50 to +100
Humidity				
Rack mounted % RH	10 to 55	5 to 95	5 to 100	5 to 100
In field housing % RH	10 to 55	5 to 100	5 to 100	5 to 100
Supply voltage	Voltage range 10.8 to 35 Vdc at the transmitter terminals			
Output current	Current overrange 3.8 to 20.8 mA. Failsafe limits < 3.8 and 21.8 mA			
Load resistance	0 to 1110Ω			
Vibration	Maximum of 4g over 15 to 200Hz (restricted to 3g with indication meter).			
Shock	Maximum of 40g.			

Performance Specifications

Output D/A accuracy: ±0.025% of span

Cold Junction accuracy: ±0.5°C

Total reference accuracy: Analogue 4-20mA mode = Digital accuracy + Output D/A accuracy + CJ accuracy (T/Cs only)

Total reference accuracy: Digital DE mode = Digital accuracy + CJ accuracy (T/Cs only).

(example: transmitter operating in analogue mode with Pt100 sensor and 0 to 200°C range.
Total reference accuracy = 0.15+(200/100)*0.025 = 0.2°C.
Digital ambient temperature effect (per 10°C change from 23°C ref.): RTDs or Ohms : 0.050% of reading in Ohms. : T/Cs or mV : 0.080% of reading in mV.

Output D/A ambient temp. effect (per 10°C change from 23°C ref.): ±0.045% of span.

Cold Junction ambient temperature effect: 40: 1 rejection for ambient temperature changes from 23°C reference.

Total Reference Accuracy (Reference – Includes combined effects of linearity, hysteresis, and repeatability)

Total output ambient temperature effect : Analogue 4-20mA mode = Digital effect + Output D/A effect + CJ effect (T/Cs only).

Total output ambient temperature effect: Digital DE mA mode = Digital effect + CJ effect (T/Cs only).

Power supply voltage effect: 0.005% of Max span per Volt.

Stability/time drift: 0.05% of max span per year.

Additional Parameters

Output: 4-20mA or Honeywell digital DE protocol. HART and DE available with 4-20mA output.

Adjustment range: No limits to adjustments within the Maximum Range except minimum span limit of 1 engineering unit e.g. 1°C

Damping time constant: Adjustable from 0 to 102 seconds digital damping.

Output response time:
1 second to reach 63% of final value with 0 secs damping.

Output update time
0.5 secs approximately.

Input/ output galvanic isolation
Withstands 500Vac dielectric strength test for 1 minute.

Sensor open circuit
Open circuit/ burnout detection is user selectable. Upscale or downscale with critical status message. Latching or non-latching sensor burnout action.

Common mode rejection
120dB (1 million to 1) from 50Hz to 50 kHz.

Series mode rejection
40dB (100 to 1) for 50 or 60Hz ±0.5Hz. (with internal software filter set to local power line frequency).

EMC compliance

In compliance with2004/108/EC, Electromagnetic Compatibility (EMC) Directive.

Radiated RF Immunity: ±0.15% of span at 10V/m over 80 to 1,000MHz.

Physical Mounting and Construction

The STT250 Temperature Transmitter is designed to be mounted in a DIN Form A housing for direct installation with the temperature sensor or can be provided in a remote pipe or wall mount housing. Details for the various housings available are referenced in the table below. The STT250 Temperature Transmitter module can also be DIN rail mounted to a top hat or “G” rail via a clip. Integral meters available

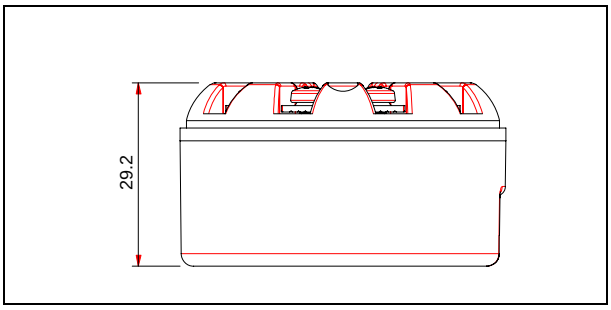
Integral Meters

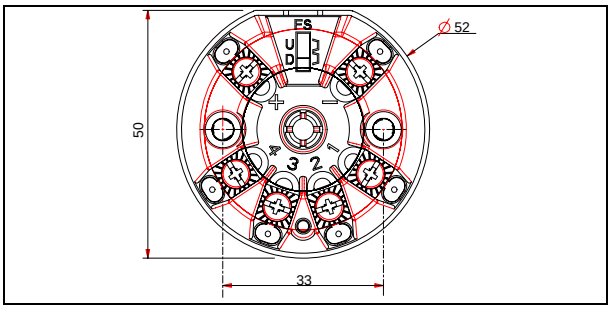
Honeywell’s Series STT250 Temperature Transmitters can be supplied with local or remote indication. An Analogue, Engineering Units or a Smart meter can be mounted integral to the transmitter inside the field mount housing. Order an integral meter as part of the model number; Table II _ _ M, _ _ E and _ _ S, respectively. Order a remote meter as model RMA300. The analogue meter is a 4-20mA moving coil type and displays the temperature in 0 to 100% span.

The E. U. meter displays temperature in engineering units with the STT25H, STT25T and STT25S HART units. Refer to 34-ST-25-08D for more details. The Smart meter accepts 4-20mA or DE protocol and displays temperature on a LCD in engineering units or 0 to 100% span.

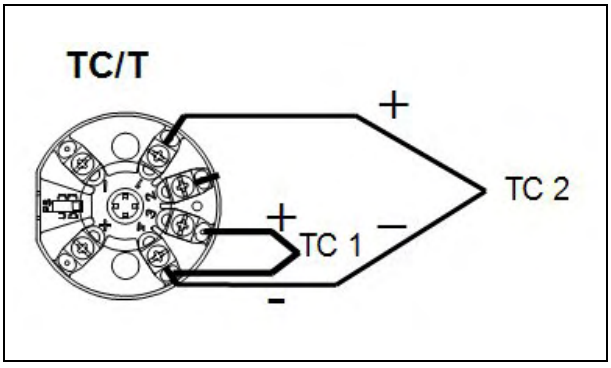
The remote digital meter reads DE protocol and displays temperature on a LCD in 0 to 100% span. Refer to 34-ST-25-07A for details.

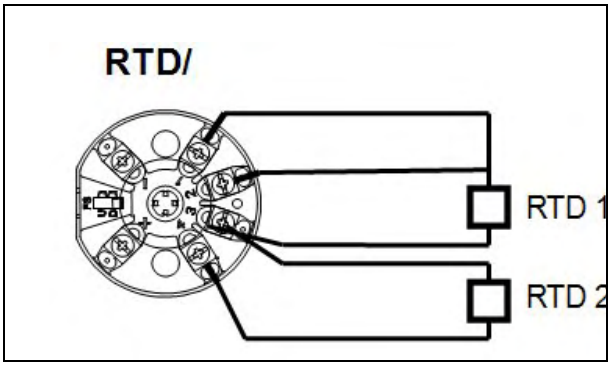
STT250 Module Dimensions (in/mm)

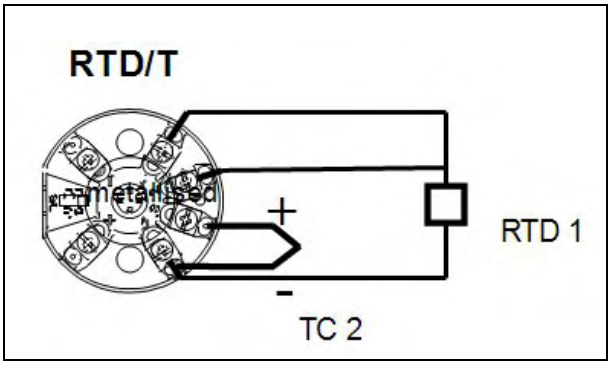




STT250 Connections







Materials of Construction

Terminal Block	Noryl
Connection Screws	M3 Nickel plated brass
Module Housing	Cycoloy (PC/ABS) with metallized interior surface
Weight	0.075 kg (0.2 lbs)

Approvals

The STT250 Temperature Transmitter module is Intrinsically Safe to ATEX, IECEx , FM and CSA standards when used with a suitable safety barrier. It is zone 2 and explosion-proof to ATEX, IECEx, FM and CSA standards when installed in a suitable housing. See the Model Selection Guide Table VII in this Specification Sheet for detailed safety approvals covering both the STT250 module only or for the STT250 module supplied in a housing.

Probe and Thermo well Availability

STT250 can be supplied complete with a wide range of thermo wells, thermocouples or RTD sensors. See documents listed in the table below.

The range of thermo wells available as a total thermal solution cover almost every possible requirement :

STT820 Series	34-44-16-08	Rigid Probe Assemblies.
STT830 Series	34-44-16-09	Threaded and Socket Weld Thermo well Assemblies with Transmitter Option.
STT840 Series	34-44-16-10	Drilled Flange Thermo well Assemblies

Model Selection Guide

Model Selection Guide
34-44-16-03 Issue 32

Instructions

- Choose availability column based on mounting configuration.
- A dot (•) denotes unrestricted availability. A letter denotes restricted availability.
- Blank denotes unavailable - choose alternate mounting. Restrictions follow Table VII.
- Select the desired Key Number based on the desired communications protocol.
- Select options and approvals from Tables.

Key Number	I	II	III	IV	V	VI	VII
STT25_	_	_ _ _	_ _ _	_ _ _	_ _ _	_ _	_ _

HOW WILL THE UNIT BE MOUNTED?

Module only (no housing), to be DIN rail or wall mounted
Module to be "head mounted" directly to the sensor in smaller housing
Module to be "field mounted" in Explosion-Proof housing remotely from or directly to the sensor

Key Number

Description	Selection	Availability		
Smart Temperature Transmitter Module				
4-20mA Output, SFC/SCT Configurable	STT25M	•	•	•
HART 5, Protocol, 4-20mA Output	STT25H	•	•	•
HART 6, Protocol, 4-20mA Output	STT25S	•	•	•
Digital DE/ 4-20mA Output, for Digital Integration	STT25D	•	•	•
Dual input, HART Protocol, 4-20mA output	STT25T	•	•	•
All modules carry the following approvals: CE Mark for compliance to EN 50081-2 and 50082-2 Russian Certificate of Pattern Approval No. 2064 of Jan. 1998 Choose additional safety approvals required in Table VII				

TABLE I - Sensor, Probe and Thermowell Accessories

No Integral Sensor Probe or Thermowell Supplied	0	•	•	•

TABLE II - Transmitter Housing and Integral Meters (Reference EN0I-6032 for details)

Housing	No Housing Supplied		0 _ _			•
	Field Mount (2)	Explosion-Proof Aluminum with Beige Epoxy Coating	E _ _	•		
		Explosion-Proof 316 Stainless Steel	T _ _	•		
	Head Mt	Type 4X housing - Beige	C _ _		•	
Cable/ Conduit Entry	Not Applicable - No Housing Supplied		_ 0 _			•
	1/2" NPT Cable/ Conduit Entry		_ N _	•	•	
	M20 x 1.5 Cable/ Conduit Entry		_ M _		•	
Integral Meter	No Integral Meter Supplied		_ _ 0	•	•	•
	Analog Meter for Field Mount Housing		_ _ M	•		
	E.U. Meter for Field Mount Housing		_ _ E	h		
	Smart Meter for Field Mount Housing (3)		_ _ S	i		

(2) With a Field Mount Housing, 20 characters max. of customer information is available on the nameplate at no charge. (See 13:STT-OE pages for ordering instructions.)

(3) For the STT25D and STT25M transmitters

HOW WILL THE UNIT BE MOUNTED?

Module only (no housing), to be DIN rail or wall mounted
Module to be "head mounted" directly to the sensor in smaller housing
Module to be "field mounted" in Explosion-Proof housing remotely from or directly to the sensor

TABLE III - Configuration, Tagging and Manual

		Selection	Availability		
Configuration	None - Factory Default Configuration Supplied	0 _ _	•	•	•
	Transmitter Configuration (See 13:STT-OE pages for choices	T _ _	•	•	•
Customer Tagging (4)	No Tagging Required	_ 0 _	•	•	•
	316 SS Wired-on Customer I.D. Tag (4 lines, 28 chars. per line, customer specified information)	_ T _	•	•	
	316 SS Wired-on Customer I.D. Tag (blank)	_ B _	•	•	
Operator's Manual (5)	None	_ _ 0	•	•	•
	English Language Version	_ _ E	•	•	•
	French Language Version	_ _ F	•	•	•
	Spanish Language Version	_ _ S	b	b	b
	Chinese Language Version	_ _ C	b	b	b

TABLE IV - Optional Equipment

Mounting Arrangement	No Mounting Arrangment Supplied		0 _ _	•	•	•
	Carbon Steel Mounting Bracket for 2" Pipe		M _ _	•		
	Stainless Steel Mounting Bracket for 2" Pipe		S _ _	•		
	Spring Loading Mounting set		L _ _		•	•
	DIN Rail Mounting via Clip (to Top Hat or "G" Rail)		D _ _			•
316 SS Conduit Adaptor for Wiring Entry	No Adaptor(s) Supplied		_ 0 _	•	•	•
	1/2" NPT to M20 x 1.5 (EEx d IIC approved)	1 Adaptor	_ 1 _	•	•	
		2 Adaptors	_ 2 _	•	•	
	1/2" NPT to 3/4" NPT	1 Adaptor	_ 3 _	•		
Lightning Protection	No Lightning Protection Supplied		_ _ 0	•	•	•
	Externally Mountable to Field Mount Housing		_ _ L	e		
	Internal Surge/ Lightning Protection		_ _ S	•		

TABLE V - Optional Extended Warranty Coverage & Certificates

Optional Extended Warranty	Standard Warranty	0 _ _	•	•	•
	Additional Warranty - 1 year	1 _ _	•	•	•
	Additional Warranty - 2 years	2 _ _	•	•	•
	Additional Warranty - 3 years	3 _ _	•	•	•
Optional Certificate (5)	No Transmitter Configuration/ Calibration Certificate	_ 0 _	•	•	•
	Transmitter Configuration/ Calibration Certificate	_ D _	•	•	•
	FMEDA (SIL) + Config./ Calibration Certificate	_ S _	g	g	g
	No Certificate of Conformance/ Origin	_ _ 0	•	•	•
	Certificate of Conformance/ Origin	_ _ C	•	•	•
	FMEDA (SIL) + Conformance/ Origin Certificate	_ _ S	g	g	g

TABLE VI - Additional Features

SIL2	No SIL2 - TUV Certified Transmitter	00	•	•	•
	SIL2 - TUV Certified Transmitter (requires HART 6)	S2	d	d	d

(4) Full model number does not appear on module or head mount housing. If model number is to appear on unit, order wired on tag.

(5) Chosen Operator's Manuals and chosen Certificates are automatically shipped with unit. See 13:STT-OE pages for additional manuals and alternate shipping.

HOW WILL THE UNIT BE MOUNTED? **Availability**

Module only (no housing), to be DIN rail or wall mounted

Module to be "head mounted" directly to the sensor in smaller housing

Module to be "field mounted" in Explosion-Proof housing remotely from or directly to the sensor

TABLE VII - Safety Approvals (6)

Approval Body	Approval Type	Location or Classification	Selection			
None	No approval body certifications included		00	•	•	•
Factory Mutual	Explosion-Proof	Class I, Div. 1, Groups A,B,C,D	1C	f		
	Dust Ignition-Proof	Class II, III Div. 1, Groups E,F,G				
	Intrinsically Safe	Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G				
	Non-Incendive	Class I, Div. 2, Groups A,B,C,D Suitable for Class II, III, Div. 2, Groups F, G				
	Outdoor Location	Enclosure Rated NEMA 4X				
	Explosion-Proof	Class I, Div. 1, Groups B,C,D	1J	•		
	Dust Ignition-Proof	Class II, III, Div. 1 Groups E,F,G				
	Intrinsically Safe	Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G				
	Non-Incendive	Class I, Div. 2, Groups A,B,C,D Suitable for Class II, III, Div. 2, Groups F, G				
	Outdoor Location	Enclosure Rated NEMA 4X				
	Intrinsically Safe	Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G	1G	•		
	Non-Incendive	Class I, Div. 2, Groups A,B,C,D Suitable for Class II, III, Div. 2, Groups F, G				
	Outdoor Location	Enclosure Rated NEMA 4X				
	Intrinsically Safe	Class I, Div. 1, Groups A,B,C,D	1G		•	•
	Non-Incendive	Class I, Div. 2, Groups A,B,C,D				
CSA	Explosion-Proof	Class I, Div. 1, Groups B,C,D	2J	•		
	Dust Ignition-Proof	Class II, III, Div. 1, Groups E,F,G				
	Intrinsically Safe	Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G				
	Non-Incendive	Class I, Div. 2, Groups A,B,C,D Suitable for Class II, III, Div. 2, Groups F, G				
	Outdoor Location	Enclosure Rated Type 4X				
	Intrinsically Safe	Class I, II, III, Div. 1, Groups A,B,C,D,E,F,G	2G	•		
	Non-Incendive	Class I, Div. 2, Groups A,B,C,D Suitable for Class II, III, Div. 2, Groups F, G				
	Outdoor Location	Enclosure Rated Type 4X				
	Intrinsically Safe	Class I, Div. 1, Groups A,B,C,D	2G		•	•
	Non-Incendive	Class I, Div. 2, Groups A,B,C,D				

continued next page

TABLE VII - Safety Approvals (6) Continued

Approval Body	Approval Type	Location or Classification	Selection			
ATEX*	Intrinsically Safe Zone 0/1	Ⓔx II 1 G Ex ia IIC T6 (Ta = -50ºC to +40ºC) T5 (Ta = -50ºC to +55ºC) T4 (Ta = -50ºC to +85ºC) (Module)	3S	•	•	•
	Flameproof, Zone 1	Ⓔx II 2 G Ex d IIC T6 (Ta = -50ºC to +80ºC) T5 (Ta = -50ºC to +85ºC) Ex tD A21 T80ºC (Ta = 80ºC) T95ºC (Ta = 85ºC) Enclosure rated IP 66/67	3D	p		
	Non-Sparking Zone 2	Ⓔx II 3 G Ex nA, IIC T6*	3N	•	•	•
	Multiple Marking** Int. Safe, Zone 0/1, or Flameproof, Zone 1, or Non-Sparking, Zone 2	Ⓔx II 1 G Ex ia IIC T6 (Ta = -50ºC to +40ºC) T5 (Ta = -50ºC to +55ºC) T4 (Ta = -50ºC to +85ºC) Ⓔx II 2 G Ex d IIC T6 (Ta = -50ºC to +80ºC) T5 (Ta = -50ºC to +85ºC) Ex tD A21 T80ºC (Ta = 80ºC) T95ºC (Ta = 85ºC) Ⓔx II 3 G Ex nA, IIC T6 (Ta = -50ºC to +85ºC) (Honeywell) Enclosure Rated IP 66/67	3H	p		
IECEx	Flameproof, Zone 1 (with IS transmitter)	Ex d IIC; T6 (Ta = –50 to +80ºC) T5 (Ta = –50 to +85ºC) Ex tD A21 IP6X T80ºC (Ta = –50 to +80ºC Ex tD A21 IP6X T95ºC (Ta = –50 to +85ºC	CB	•	•	•
	Intrinsically Safe Zone 0/1	Ex ia IIC; T6 (Ta = –50 to +40ºC) T5 (Ta = –50 to +55ºC) T4 (Ta = –50 to +85ºC)	CS	•	•	•
INMETRO (Brazil)	Flameproof, Zone 1	BR Ex d IIC T6, T5, T4 Enclosure rated IP 66/67	6D	p		
	Intrinsically Safe, Zone 0/1	BR Ex ia IIC T6, T5, T4 (Module)	6S	b	b	b

(6) The module itself is rated intrinsically safe, IP20. An appropriately rated enclosure is required for Outdoor and Dust locations.

* Module must be installed in IP54 or better housig for Zone 2 approval validity.

** The user must determine the type of protection required for installation of the equipment. The user shall then check the box (☑) adjacent to the type of protection used on the equipment certification label. Once a type of protection has been checked on the label, the equipment shall not be reinstalled using any of the other certification type.

RESTRICTIONS

Restriction Letter	Available Only With		Not Available With	
	Table	Selection	Table	Selection
b			Key No.	STT25T
d	Key No.	STT25S		
e			VII	3D
f	II	EN0, TN0,	I	1
g	Key No.	STT25H, STT25M		See Note 6
h	II	STT25H, STT25T, STT25M	Key No.	STT25D
i	II	STT25M, STT25D	Key No.	STT25H, STT25T
p	II	E _ _, T _ _	I	1

Notes: (6) The module itself is rated intrinsically safe, IP20. An appropriately rated enclosure is required for Outdoor and Dust locations.

See 13:STT-9 or Operator's Manual EN1I-6190 for part numbers.

See 13:STT-OE pages for Order Entry Information including tagging, transmitter configuration, manuals, certificates, drawings and SPINS.

To request a quotation for a non-published "special", fax RFQ to Marketing Applications at (1) 602 313-6155.

For More Information

Learn more about how Honeywell's STT3000 Smart Temperature Transmitters can increase performance, reduce downtime and decrease configuration costs, visit our website www.honeywell.com/ps or contact your Honeywell account manager.

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