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ТЕРМОПРЕОБРАЗОВАТЕЛИ

Технические характеристики

на SmartLine STT350,

SmartLine STT35F



STT 3000

SMART TEMPERATURE TRANSMITTER Models STT350 and STT35F

EN01-5222 2/02

PRODUCT SPECIFICATION SHEET

OVERVIEW

Honeywell's microprocessor based STT350/ 35F Smart Temperature Transmitters convert a primary sensor input into a standard 4-20mA or FOUNDATION™ Fieldbus output signal on a 2 wire signal plus power loop connection.

These universal temperature input models readily accept signals from a wide variety of industry standard thermocouples (T/Cs) or resistance temperature detectors (RTDs) as well as basic milliVolt or Ohms sensors. The output signal is either proportional to the measured variable or linearised to temperature.

For the STT350, the output is transmitted in either an analogue 4-20mA format or a digital DE protocol format for direct digital integration to the TPS/ TDC 3000^X® control system. You easily select the analogue or digital format for the output signal transmission through the Smart Field Communicator® (SFC) which is the common hand held operator interface for our Smartline™ Transmitters. All configuration, operation and communication functions are under the control of the STT350's microprocessors and are implemented through the SFC or the PC based Smart Configuration Toolkit (SCT).

For the STT35F, the output conforms to the low speed (H1) of the Fieldbus Physical Layer specification IEC 1158-2 (1993). The other protocol layers conform to the FOUNDATION™ Fieldbus which is supported by all the worldwide instrumentation suppliers and enables multidrop field instruments to be powered down a single wire pair and communicate measurement, control, configuration and diagnostic data at 31.25kbps.

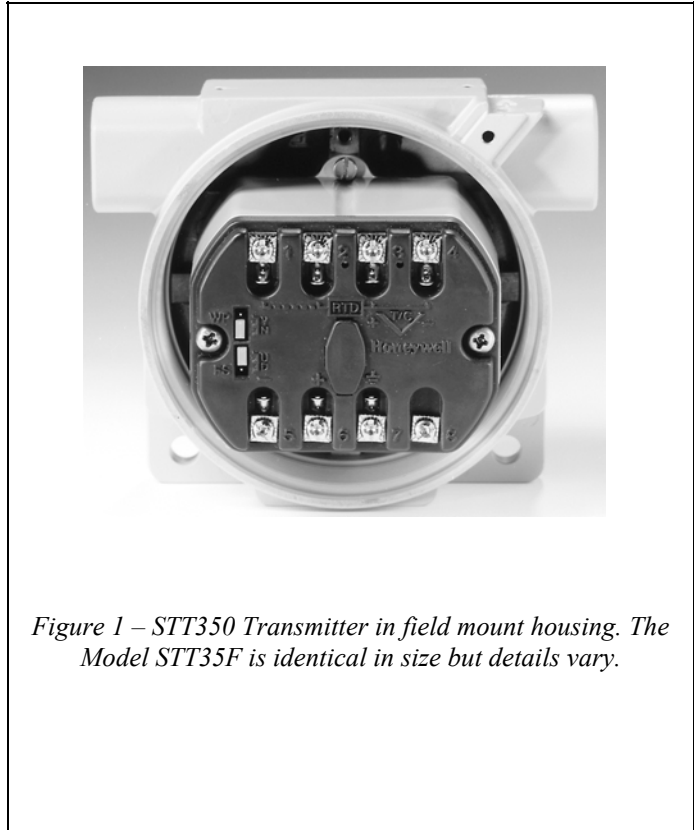


Figure 1 – STT350 Transmitter in field mount housing. The Model STT35F is identical in size but details vary.

COMMON FEATURES

- Single model accepts input signals from a choice of primary sensors to satisfy varying applications requirements with minimum transmitter inventory.
 - Standard digital cold-junction compensation function provides accurate and reliable temperature measurement over a wide ambient operating range.
 - Added Smart features include reading of the highest and lowest inputs, external cold junction compensation temperature at an isothermal block and engineering units displayed in degrees C, F, K, or R plus milliVolt and Ohms.
 - Smart transmitter personality with local or remote interfacing means significant manpower efficiency improvements in commissioning, start-up, and ongoing maintenance functions. Write protect link included to safeguard configuration settings.
 - Includes sensor break detection on all input wires.
 - Post read validation of the measured signal before providing fresh output.
 - Suitable for DIN rail mounting or remote field mounting in a flameproof housing.
 - Provides true differential temperature measurement of thermocouple or RTD inputs by individual linearisation of each sensor reading and then computing the difference.
 - Suitable for true 4-wire Pt100 measurement (or 3- or 2-wire).
 - Write protect link included to safeguard configuration settings.
 - Supports dual thermocouple sensor inputs for redundant sensor operation.
 - Surge/ lightning protection options can be installed internally in housing or externally in conduit.
- #### Added STT350 Features
- Direct digital integration with TDC 3000X system provides local measurement accuracy to the system level without adding typical A/D and D/A converter inaccuracies.
 - Integral analogue or digital indicating meter option

Added STT35F Features

- Includes Fieldbus Foundation standard Function blocks to ensure full interoperable operation - Analog Input (AI), Control Block (PID), Resource Block (RB) and Transducer Block (XB).
- Includes Link Master capability to assume Link Active Scheduler (LAS) role of controlling the deterministic message communications in the event of primary LAS loss.
- Integral Digital Meter available without the need for an additional bus connection or power.
- Fieldbus Simulate link available for loop commissioning/ troubleshooting.
- Includes Flash Memory for ease of software upgrade over the fieldbus for changes or improvements in this emerging technology.
- Configuration of the STT35F Function Blocks and the Fieldbus Application Parameters can be done with the National Instruments Configuration Toolkit or any other Fieldbus Foundation registered configurator.

DESCRIPTION

The STT350 and STT35F transmitters are suitable as a direct replacement for any conventional or Smart temperature transmitter in use today. Their memory contains the characteristics of most commonly used temperature sensors. This means that you can use the configuration tool to configure the transmitter for any of these sensors and it will automatically correct for their associated non-linearity's. The transmitter module can also be installed on a standard DIN rail (to EN50022) or remotely mounted in a flameproof housing designed for either surface or two-inch pipe-stand mounting. Transmitters can be preconfigured at the factory to your exact specifications or they will be shipped with factory default configuration - ready to accept your own configuration.

Model STT350

You make all transmitter adjustments and diagnostic checks through an SFC connected anywhere across the 4-20mA wire route. This lets you initiate configuration and maintenance functions at locations remote from the transmitter itself. The SFC is also fully compatible with all other Honeywell Smartline Transmitters.

When digitally integrated to TPS/ TDC 3000^X the operator or maintenance engineer has access to the transmitter database and diagnostics in addition to the measure signal being transferred as a digital PV in floating point high resolution. The system maintains a copy of the transmitter database for security of verification of any field initiated changes. In the event of unauthorized changes the system treats the PV as a fault condition until the operator restores the original configuration.

Model STT35F

The H1 low speed FOUNDATION Fieldbus protocol is aimed at the replacement of 4-20mA conventional or Smart transmitters by multidrop digital field devices with signal and power carried over a single wire pair and also meeting intrinsic safety requirements.

Configuration of the field devices and the bus operating parameters can be performed from the system console or from Windows 95 or NT PC based configuration tools such as the National Instruments Configurator. The driving force behind fieldbus is increased field intelligence and capabilities and these result in a wide range of available configuration selections such as the gain , integral, derivative settings in the PID control block, or its mode of operation - Manual, Automatic or cascade, or built in alarm settings etc.

Performance under Rated Conditions

Input Type	Digital Accuracy for Maximum Range Limits	Maximum Range Limits		Digital Accuracy for Normal Range Limits	Normal Range Limits		Standards
	% of Max Span	° C	° F	° C	° C	° F	
RTD:							
Pt100	0.01	-200 to 850	-328 to 1562	0.1	-200 to 45	-328 to 842	IEC751:1986($\alpha=0.00385$)
Pt200	0.01	-200 to 850	-328 to 1562	0.1	-200 to 45	-328 to 842	IEC751:1986($\alpha=0.00385$)
Pt500	0.02	-200 to 850	-328 to 1562	0.1	-200 to 45	-328 to 842	IEC751:1986($\alpha=0.00385$)
Pt100J	0.01	-200 to 640	-328 to 1184	0.1	-200 to 45	-328 to 842	JISC 1604-81($\alpha=0.00392$)
Ni500	0.04	-80 to 15	-112 to 30	0.1	-50 to 15	-58 to 30	Honeywell Type A
Cu 10	0.37	-20 to 25	-4 to 48	1.0	-20 to 25	-4 to 48	General Electric
Cu 25	0.19	-20 to 25	-4 to 48	0.5	-20 to 25	-4 to 48	General Electric
T/C:							
B	0.14	200 to	392 to	1.0	550 to	1022 to	IEC 584-1 (ITS-90)
C	0.03	0 to 2300	32 to 4172	0.6	0 to 1650	32 to 3002	IPTS 68
D	0.03	0 to 2300	32 to 4172	0.6	330 to	626 to	IPTS 68
E	0.04	-200 to 1000	-328 to 1832	0.2	0 to 1000	32 to 1832	IEC 584-1 (ITS-90)
J	0.04	-200 to 1200	-328 to 2192	0.2	0 to 800	32 to 1472	IEC 584-1 (ITS-90)
K	0.04	-200 to 1370	-328 to 2498	0.3	-120 to 1370	-191 to 2498	IEC 584-1 (ITS-90)
N	0.06	-200 to 1300	-328 to 2372	0.3	0 to 1300	32 to 2372	IEC 584-1 (ITS-90)
R	0.09	-50 to 176	-58 to 320	0.5	500 to	932 to	IEC 584-1 (ITS-90)
S	0.08	-50 to 176	-58 to 320	0.5	500 to	932 to	IEC 584-1 (ITS-90)
T	0.14	-250 to 40	-418 to 75	0.2	-100 to 40	-148 to 75	IEC 584-1 (ITS-90)
NiNiMoly	0.03	0 to 1300	32 to 2372	0.3	780 to	1436 t	G.E. (IPTS - 68)
Radiamatic	0.6	420 to	788 to	0.7	780 to 1800	1436 t	Honeywell (RH)
milliVolts	0.01	-20 to 120m		8uV	-10 to 45 m		
Ohms	0.01	0 to 2000Ohms		0.15Ohms	0 to 2000Ohms		

Note that the above Accuracy values are available merely by selecting the sensor type and range (i.e. without user calibration). Improvements of up to 2 times can be obtained for the accuracy by calibrating to the required LRV/URV values with simulated inputs from a calibrator box.

All STT350 units pass through 20 hours of Environmental Stress Screening (ESS) by fast cycling between -40 and +85°C to ensure maximum product reliability. During this ESS process, the ambient temperature compensation coefficients are determined for individual units and burned in transmitter memory to provide maximum performance over a wide range of operating conditions.

SPECIFICATIONS

Operating Conditions				
Parameter	Reference conditions	Rated Condition	Operative limits	Transportation and storage
Ambient temperature	23°C ± 2 73°F ± 4	-40 to 85° -40 to 185°F	-40 to 85°C * -40 to 185°F	-50 to 100° -58 to 212°F
Humidity				
Rack Mounting %RH	10 to 55	5 to 95	5 to 100	5 to 100
Mounted in EP housing	10 to 55	5 to 100	5 to 100	5 to 100
Supply Voltage and load Resistance	Model STT350 10.8 to 42.4 Vdc at the transmitter terminals 0 to 1450 Ohms (as shown in Fig 2)		Model T35F 9.0 to 35Vdc at the transmitter terminals Dependent on number of bus devices.	
Vibration	Maximum of 4g over 15 to 200Hz. (restricted to 3g with indication meter)			
Shock	Maximum of 40g			

* = Short term operative limit of -50°C (-58°F)

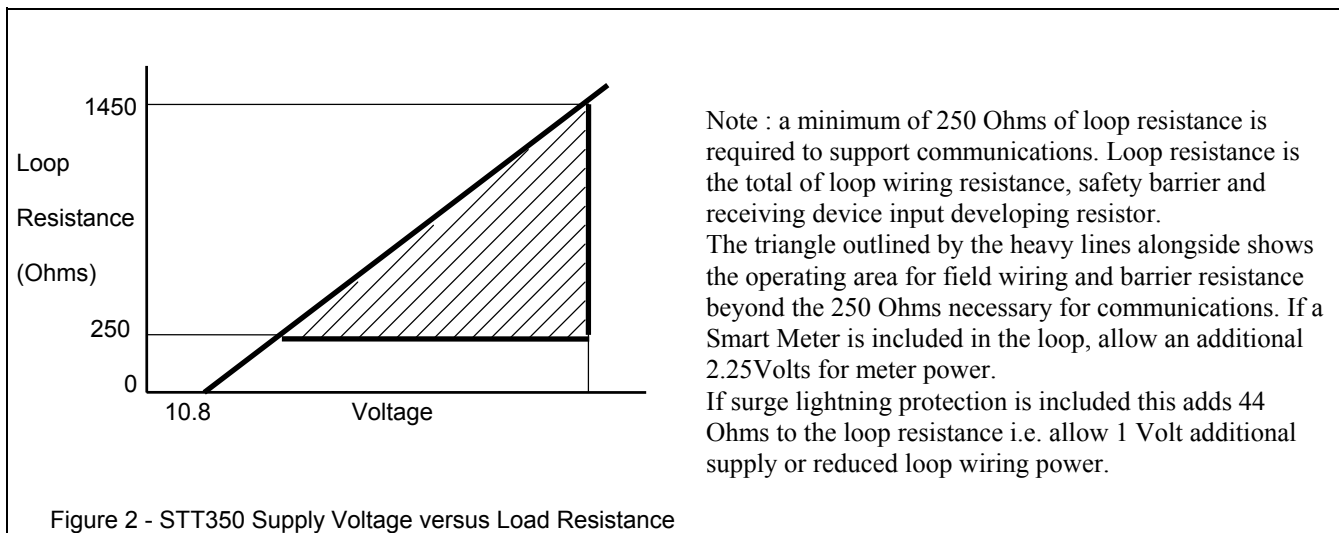
Output D/A Accuracy**		±0.025% of span**
Cold Junction Accuracy		± 0.25°C
Total Reference Accuracy	In Analogue Mode** =	Digital Accuracy of input + Output D/A Accuracy** + CJ Accuracy (T/Cs only)
	In Digital Mode =	Digital Accuracy of input + CJ Accuracy (T/Cs only)
		(example: transmitter operating in Analogue Mode with Pt100 sensor and 0 to 200°C Total Reference Accuracy = $0.1 + \frac{(200 \times 0.025)}{100} = 0.15\%$
Digital Ambient Temperature Effect (per 10°C change from 20°C reference)		RTDs or Ohms : 0.029% of reading T/Cs or mV : 0.042% of reading
Cold Junction Rejection Effect		60:1 for changes from 23°C ambient
Output D/A Ambient Temperature Effect**		0.045% of span per 10°C change**
Total Output Ambient Temperature Effect (ATE)	In Analogue Mode** =	Digital ATE + Output D/A ATE** + CJ ATE (T/Cs only)
	In Digital Mode =	Digital ATE + CJ ATE (T/Cs only)
Power Supply Voltage Effect		0.005% of span per Volt

** = Not applicable for Model STT35F or for STT350 used in digital DE output mode.

Parameter	
Description	
Adjustment Range	No limits to adjustments between the Maximum range and 1 eng. unit e.g. 1°C
Output (2 wire)	T350 4-20mA or Honeywell DE digital protocol Extended range: 3.8-20.8mA. Fail safe modes <3.8mA or 21.8mA STT35F IEC 1158-2 low speed H1 signaling in Manchester bi-phase L at 31.25kbps.
Damping time constant	Adjustable from 0 to 102 seconds digital damping
Thermocouple Burnout	Burnout detection is user selectable Upscale or downscale with critical status message on STT350.
Input to output galvanic isolation Input & output common mode isolation	Meets dielectric strength test of 1400Vac rms (50/60Hz) 2,000Vdc for 1 minute. Withstands dielectric test of 700Vac rms or 1,000 Vdc for 1 minute.
Common Mode Rejection	120dB (1 million to 1) from 50Hz to 50kHz
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 with 89/336/EEC, Electro Magnetic - Compatibility (EMC) Directive
RFI Rejection	±0.1% of span at 30V/m over 20 to 1,000MHz in explosion proof housing with shielded cables
Stability/Time Drift	0.05% of maximum span per year. Autocalibration against internal reference every second

Physical Mounting, Construction and Approvals					
Parameter	Description				
Mounting	DIN rail (top hat or G rail) Explosion Proof/Flame Proof housing with surface mounting or 2-inch pipe mounting (IP 66/NEMA 4X Rating) The FM/CSA explosion proof housing meets the applicable requirements of NEMA 7 and 9				
Wiring	Screw Terminals - M3.5x6.7mm nickel coated brass. Accepts up to 12AWG, 16AWG recommended				
Net Weight	Transmitter for DIN rail mount - 0.5kg (1.1 pounds) Transmitter in EP or XC housing - 1.6kg (3.6 pounds) Transmitter + indicator in housing - 2.4kg (5.2 pounds)				
Materials of construction	Transmitter module - Aluminium housing with baked on polyester paint cover. Noryl terminal block. EP housing – Aluminium housing with baked on epoxy-polyester hybrid paint cover (beige) XC housing - Aluminium housing with baked on 2 coats epoxy resin cover (beige) ST02 housing - Aluminium housing with baked on 2 coats epoxy resin cover (red) 316 Stainless Steel housing available as a special.				
Dimensions	See Fig 3				
Sensor/ cable entry (EP, XC or ST02 housing)	1/2 inch NPT electrical connection with optional adapters for M20x1.5, or 3/4 inch NPT				
Safety Approvals (STT35F Pending)	<table border="0"> <tr> <td>STT350 Module</td> <td> <p>CENELEC Intrinsically Safe EEx ia IIC T4/ T5/ T6 with 30V/100mA/1.2W barrier (T4/ T5/ T6 = -20 to +80/ +50/ + 40 °C ambient)</p> <p>CSA Intrinsically Safe Class I, Div.1, Groups A to D</p> <p>FM Non-Incendive Class I, Div. 2, Groups A to D</p> <p>FM Suitable for Class II, III, Div. 2, Groups F and G</p> <p>GOSSTANDARD Tested and approved by Russian Certificate of pattern Approval No 2064 of January, 1998</p> </td> </tr> <tr> <td>Additional approvals With EP, XC or ST02 housings</td> <td> <p><u>With or without Integral Meter</u></p> <p>Zone 2: T6, 28V/22mA</p> <p>CENELEC Flame Proof EEx d IIC T6</p> <p>CSA Explosion Proof Class I, II, III, Div. 1, Groups B to G</p> <p>FM Explosion Proof Class I, II, III, Div. 1, Groups B to G</p> <p><u>Without Integral Meter</u></p> <p>FM Explosion Proof Class I, II, III, Div. 1, Groups A to G</p> </td> </tr> </table>	STT350 Module	<p>CENELEC Intrinsically Safe EEx ia IIC T4/ T5/ T6 with 30V/100mA/1.2W barrier (T4/ T5/ T6 = -20 to +80/ +50/ + 40 °C ambient)</p> <p>CSA Intrinsically Safe Class I, Div.1, Groups A to D</p> <p>FM Non-Incendive Class I, Div. 2, Groups A to D</p> <p>FM Suitable for Class II, III, Div. 2, Groups F and G</p> <p>GOSSTANDARD Tested and approved by Russian Certificate of pattern Approval No 2064 of January, 1998</p>	Additional approvals With EP, XC or ST02 housings	<p><u>With or without Integral Meter</u></p> <p>Zone 2: T6, 28V/22mA</p> <p>CENELEC Flame Proof EEx d IIC T6</p> <p>CSA Explosion Proof Class I, II, III, Div. 1, Groups B to G</p> <p>FM Explosion Proof Class I, II, III, Div. 1, Groups B to G</p> <p><u>Without Integral Meter</u></p> <p>FM Explosion Proof Class I, II, III, Div. 1, Groups A to G</p>
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Surge/ Lightning protection options	<table border="0"> <tr> <td>Internal SP selection</td> <td>10 kA peak current (8/ 20 μs waveform), 10kV peak Voltage (10/ 50 μs waveform)</td> </tr> <tr> <td>External LP selection</td> <td>10 kA peak current (10/ 20 μs waveform), 500A peak current (10/ 1000 μs waveform)</td> </tr> </table>	Internal SP selection	10 kA peak current (8/ 20 μs waveform), 10kV peak Voltage (10/ 50 μs waveform)	External LP selection	10 kA peak current (10/ 20 μs waveform), 500A peak current (10/ 1000 μs waveform)
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External LP selection	10 kA peak current (10/ 20 μs waveform), 500A peak current (10/ 1000 μs waveform)				

Parameter	Description
Thermowell & Probe Availability	<p>STT350 can be supplied integrally mounted with any of the previously listed standard resistance temperature devices (RTDs) and thermocouple (TCs) elements.</p> <p>Probe Types:</p> <ul style="list-style-type: none"> • 1/4" Rigid or spring loaded RTDs or T/Cs in Inconel or Stainless Steel sheaths in standard lengths from 3" to 24" (other lengths by request). • Standard or heavy duty service. • Locally mounted to the STT350 housing or remotely mounted into explosion-proof mounting heads. • With (or without) probe lag hardware : Hex nipple, Straight nipple or Double lag and Union connections. • Single or dual element availability; grounded or ungrounded • <p>Additionally, the following types of Thermowells can also be provided as an integral thermal solution :</p> <p>Thermowell Materials: Carbon Steel, 304SS, 316SS, 316L SS, 446SS, Hastelloy B, Hastelloy C, Monel, Inconel 600 (other materials by request).</p> <p>Thermowell Types: Threaded well, Flanged well, or Socket well, (with or without thermowell lag extensions).</p> <p>Flange Types: Raised Face, Flat Faced and Ring Type Joint flange availability in 1", 1.5", 2" or 3" sizes.</p> <p>Flange ratings: ANSI 150, 300, 600, 900 and 1500 ratings.</p>



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