

STT 3000

SMART TEMPERATURE TRANSMITTER FOUNDATION™ Fieldbus Model STT35F

EN01-6083 09/00

PRODUCT SPECIFICATION SHEET

OVERVIEW

Honeywell's microprocessor based STT35F Smart Temperature Transmitters convert a primary temperature sensor input into a standard FOUNDATION™ Fieldbus output signal on a 2 wire signal plus power multidrop 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.

The STT35F output conforms to the low speed (H1) of the Fieldbus Physical Layer specification IEC 61158-2 (1993). The other protocol layers conform to the FOUNDATION™ Fieldbus section of the 8 part IEC 61158 standard. This 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 – STT35F module and Transmitter in field mount housing with display indicator.

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.
- Post read validation of the measured signal before providing fresh output.
- Includes sensor break detection on all input wires.
- 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.
- Single model accepts input signals from a choice of primary sensors to satisfy varying applications requirements with minimum transmitter inventory.
- 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.
- Suitable for DIN rail mounting or remote field mounting in a flameproof housing.
- Unique, patented thermocouple tip resistance measurement gives predictive warning of imminent sensor failure for preventative maintenance.
- 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.
- Standard digital cold-junction compensation function provides accurate and reliable temperature measurement over a wide ambient operating range.

DESCRIPTION

The 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 fieldbus 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. 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.

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. 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 |
|-------------|---|----------------------|--------------|--|---------------------|--------------|----------------------------------|
| | | ° C | ° F | | ° C | ° F | |
| RTD: | % of Max Span | ° C | ° F | ° C | ° C | ° F | |
| Pt100 | 0.01 | -200 to 850 | -328 to 1562 | 0.1 | -200 to 450 | -328 to 842 | IEC751:1986($\alpha=0.00385$) |
| Pt200 | 0.01 | -200 to 850 | -328 to 1562 | 0.1 | -200 to 450 | -328 to 842 | IEC751:1986($\alpha=0.00385$) |
| Pt500 | 0.02 | -200 to 850 | -328 to 1562 | 0.1 | -200 to 450 | -328 to 842 | IEC751:1986($\alpha=0.00385$) |
| Pt100J | 0.01 | -200 to 640 | -328 to 1184 | 0.1 | -200 to 450 | -328 to 842 | JISC 1604-81($\alpha=0.00392$) |
| Ni500 | 0.04 | -80 to 150 | -112 to 302 | 0.1 | -50 to 150 | -58 to 302 | Honeywell Type A |
| Cu 10 | 0.37 | -20 to 250 | -4 to 482 | 1.0 | -20 to 250 | -4 to 482 | General Electric |
| Cu 25 | 0.19 | -20 to 250 | -4 to 482 | 0.5 | -20 to 250 | -4 to 482 | General Electric |
| T/C: | | | | | | | |
| B | 0.14 | 200 to 1820 | 392 to 3308 | 1.0 | 550 to 1820 | 1022 to 3308 | 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 1370 | 626 to 2498 | 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 1760 | -58 to 3200 | 0.5 | 500 to 1760 | 932 to 3200 | IEC 584-1 (ITS-90) |
| S | 0.08 | -50 to 1760 | -58 to 3200 | 0.5 | 500 to 1760 | 932 to 3200 | IEC 584-1 (ITS-90) |
| T | 0.14 | -250 to 400 | -418 to 752 | 0.2 | -100 to 400 | -148 to 752 | IEC 584-1 (ITS-90) |
| NiNiMoly | 0.03 | 0 to 1300 | 32 to 2372 | 0.3 | 780 to 1300 | 1436 to 3272 | G.E. (IPTS - 68) |
| Radiamatic | 0.6 | 420 to 1800 | 788 to 3272 | 0.7 | 780 to 1800 | 1436 to 2372 | Honeywell (RH) |
| milliVolts | 0.01 | -20 to 120mV | | 8 μ V | -10 to 45 mV | | |
| Ohms | 0.01 | 0 to 2000 Ω | | 0.15 Ω | 0 to 2000 Ω | | |

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 STT35F 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°C -40 to 185°F | -40 to 85°C * -40 to 185°F | -50 to 100°C -58 to 212°F |
| Humidity | | | | |
| Rack Mounting %RH | 10 to 55 | 5 to 95 | 5 to 100 | 5 to 100 |
| Mounted in EP %RH housing | 10 to 55 | 5 to 100 | 5 to 100 | 5 to 100 |
| Power supply Current draw | 18mA constant current draw. | | | |
| Supply Voltage and load Resistance | 9.0 to 35Vdc at the transmitter terminals Dependent on number/ type 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)

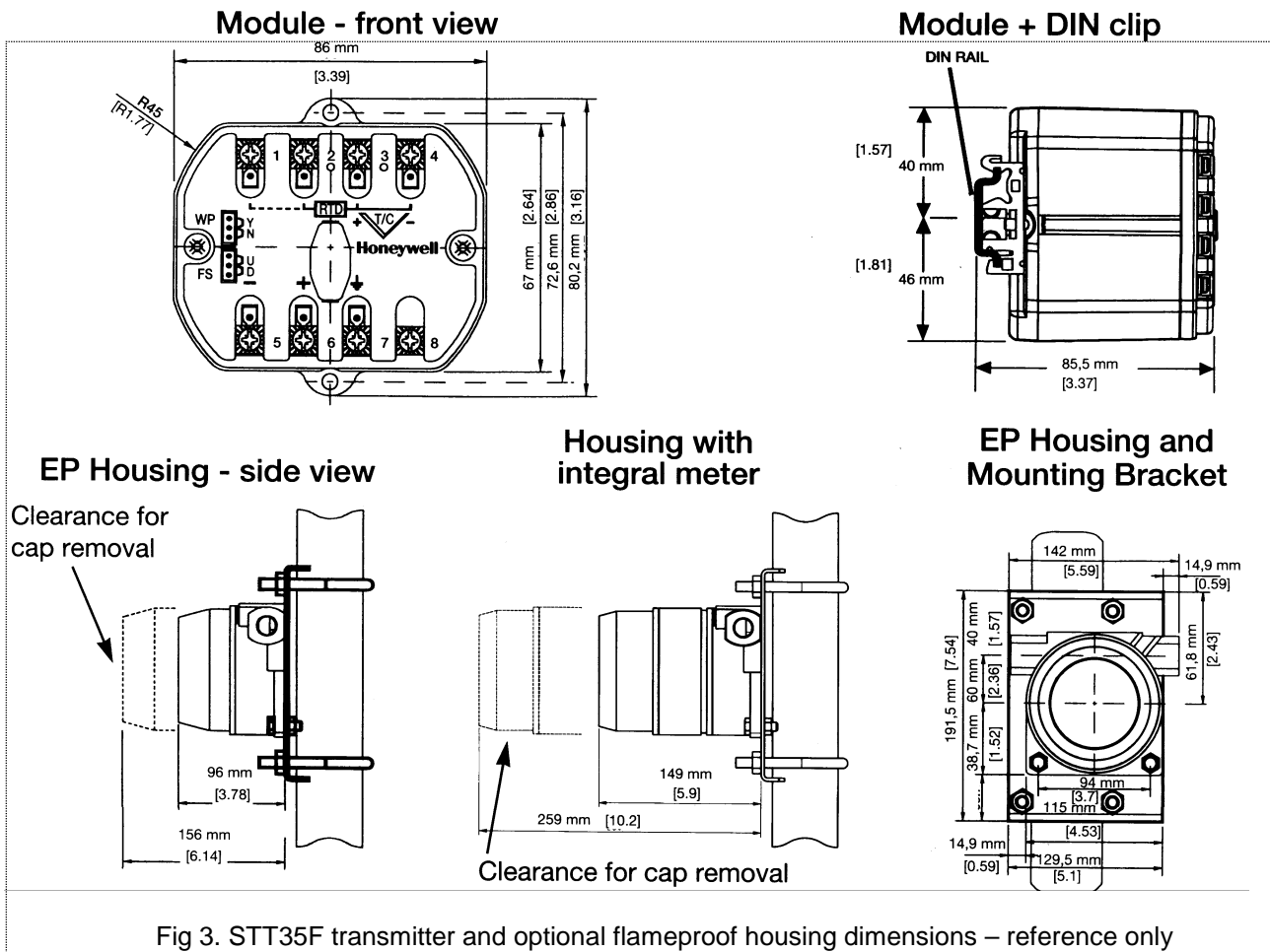
Additional Specifications.

| | |
|---|---|
| Cold Junction Accuracy Total Reference Accuracy | ± 0.25°C Digital Accuracy of input + CJ Accuracy (T/Cs only) (example: transmitter with thermocouple Type J sensor and 0 to 200°C range Total Reference Accuracy = 0.2 + 0.25 = 0.45°C |
| 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 |
| Total Output Ambient Temperature Effect (ATE) | Digital ATE + CJ rejection effect (T/Cs only) |
| Power Supply Voltage Effect | 0.005% of span per Volt |

| Parameter | |
|--------------------------------------|---|
| Description | |
| Adjustment Range | No limits to adjustments between the Maximum range and 1 eng. unit e.g. 1°C |
| Damping time constant | Adjustable from 0 to 102 seconds digital damping |
| Input to output galvanic isolation | Meets dielectric strength test of 1400Vac rms (50/60Hz) 2,000Vdc for 1 minute. |
| Input & output common mode isolation | 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 - Aluminum housing with baked on polyester paint cover. Noryl terminal block. EP housing – Aluminum housing with baked on epoxy-polyester hybrid paint cover (beige) XC housing - Aluminum housing with baked on 2 coats epoxy resin cover (beige) ST02 housing - Aluminum 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 * FM & CSA Pending | STT35F Module 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) Intrinsically Safe Class I, Div.1, Groups A to D CSA * Intrinsically Safe Class I, II, III, Div. 1, Groups A to G. FM * Non-Incendive Class I, Div. 2, Groups A to D FM * Suitable for Class II, III, Div. 2, Groups F and G GOSSTANDARD Tested and approved by Russian Certificate of pattern Approval No 2064 of Jan. 1998 |
| | Additional approvals With EP, XC or ST02 housings <u>With or without Integral Meter</u> CENELEC Zone 2: T6, 28V/22mA Flame Proof EEx d IIC T6 CSA * Explosion Proof Class I, II, III, Div. 1, Groups B to G FM * Explosion Proof Class I, II, III, Div. 1, Groups B to G <u>Without Integral Meter</u> FM Explosion Proof Class I, II, III, Div. 1, Groups A to G |
| Surge/ Lightning protection options | 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) |

| Parameter | Description |
|--|--|
| Thermowell & Probe Availability | <p>STT35F 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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