# ProSense® FTS Series (-1001) Liquid / Air Thermal Flow Sensors

Part No. FTS100-1001

## Overview

AutomationDirect's ProSense FTS series thermal flow sensors offer a very cost-effective solution optimized for monitoring water, glycol solutions, or air flow for applications where high accuracy is not required. With no moving parts, thermal flow sensors are a reliable alternative to other flow sensing technologies and mechanical flow switches. Using the pushbuttons and display the FTS series can be easily set up to measure flow velocity in feet per second (fps) or by entering the internal pipe diameter volumetric flow rate can be measured in gallons per minute (gpm) or cubic feet per minute (cfm). Available with probe lengths of either 100mm or 200mm the FTS can be used in pipes up to 16 inches in internal diameter. Flow velocity measurement in larger pipe sizes or other shapes such as rectangular ducts is also possible using feet per second (fps) operating mode. The FTS (-1001) series offers two separate outputs that can be used either as a flow or temperature limit switch or to monitor continuous flow rate or temperature. The 4-digit, two-color alphanumeric display and LEDs are used during configuration and provide clear indication of the measured variable. Installation is accomplished using the CF08 compression type progressive ring fitting accessory (purchased separately).

## Features

- Cost effective solution for flow switch or flow transmitter measurement where high accuracy is not required
- Optimized for flow measurement of water, glycol solutions or air
- Volumetric flow rate measurement in pipe sizes up to 16 inches ID
- Measure fluid/air temperature in addition to flow
- 4-digit, two color alphanumeric display with pushbutton setup
- 100mm or 200mm probe length
- Two outputs selectable for switch, frequency or analog signals
- 4-pin M12 quick disconnect electrical connection
- 5-year warranty

## Output Function Selections

Output 1: 2 selection options

- Switching signal for flow limit values
- Frequency signal for flow

Output 2: 6 selection options

- Switching signal for flow limit values
- Switching signal for temperature limit values
- Analog signal for flow
- Analog signal for temperature
- Frequency signal for flow
- Frequency signal for temperature


For a variety of cable options see our website www.AutomationDirect.com

| ProSense FTS Series (-1001) Thermal Flow Sensors Specifications | | |
|---|---|---|
| ***Model*** | ***FTS100-1001*** | ***FTS200-1001*** |
| ***Price*** | $047v#: | $047v?: |
| | ***Application*** | |
| ***Media*** | Water, glycol solutions and air | |
| ***Medium Temperature*** | -4°F to 212°F (-20°C to 100°C) | |
| ***Pressure Rating*** | 50bar (725psi) | |
| | ***Electrical Data*** | |
| ***Operating Voltage*** | 18 to 30 VDC | |
| ***Current Consumption*** | < 100mA | |
| ***Protection Class*** | III | |
| ***Reverse Polarity Protection*** | Yes | |
| ***Power-on Delay Time*** | 10s | |
| | ***Outputs*** | |
| ***Outputs*** | OUT1: switch or frequency<br>OUT2: switch, frequency, or analog | |
| ***Switch/Frequency Outputs*** | PNP / NPN Selectable<br>N.O. / N.C. Selectable<br>Max. voltage drop: 2.5 VDC<br>Current rating: 250mA<br>Frequency: 0 to 1000Hz | |

# ProSense® FTS Series (-1001) Liquid / Air Thermal Flow Sensors

| ProSense FTS Series (-1001) Thermal Flow Sensors Specifications Continued | | |
|---|---|---|
| ***Model*** | ***FTS100-1001*** | ***FTS200-1001*** |
| | ***Outputs Continued*** | |
| ***Analog Output*** | 4 to 20 mA (scalable)<br>Max. load: 350Ω | |
| ***Short-Circuit Protection*** | Yes | |
| ***Overload Protection*** | Yes | |
| | ***Measuring Range*** | |
| ***Probe Length (mm)*** | 100mm | 200mm |
| | ***Liquids (Water & Glycol Solutions)*** | |
| ***Measuring Range*** | 0.15 to 9.85 ft/s | |
| ***Setting Range*** | 0 to 9.85 ft/s | |
| ***Glycol Reference Medium**** | 35% Ethylene glycol solution | |
| | ***Gases (Air)*** | |
| ***Measuring Range*** | 6 to 328 ft/s | |
| ***Setting Range*** | 0 to 328 ft/s | |
| | ***Temperature Monitoring*** | |
| ***Measuring Range*** | -4 to 212°F (-20 to 100°C) | |
| ***Resolution*** | 0.5°F | |
| | ***Accuracy / Deviations*** | |
| | ***Flow Monitoring*** | |
| ***Temperature Drift [fps x 1/K]*** | 0.01 fps x 1/K (< 68°F; > 158°F) | |
| ***Max. Temperature Gradient of Medium [K/min]*** | 100 | |
| ***Accuracy (In the Measuring Range)*** | 7% measured value (MW) + 2% measured end value (MEW); water:<br>68 to 158 °F; inlet length: 5 ft; DN25 (DIN 2448); mounting position according to instructions; Accuracy can differ for other media and mounting positions. | |
| ***Repeatability*** | 0.05 m/s; (water; Flow velocity: 0.05 to 3 m/s) | |
| | ***Temperature Monitoring*** | |
| ***Temperature Drift*** | ± 0.003 K/°F | |
| ***Accuracy [K]*** | ± 0.3 / ± 1; (water; Flow velocity: 1 to 9.85 fps / air; Flow velocity: > 32.8 fps) | |
| | ***Reaction Times (per DIN EN 60751)*** | |
| ***Flow Response Time*** | Water; glycol: 0.8 s; air: 7 s (each T09) | |
| ***Temperature Response Time*** | 1.5 s (T09); (water; Flow velocity: 1 to 9.85 fps) | |

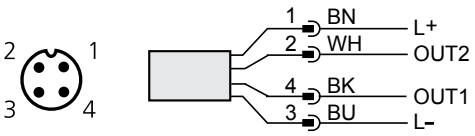
**The glycol medium setting on the sensor is designed for a 35% glycol/water solution. Increasing the glycol concentration decreases the measured value. Likewise, decreasing the concentration increases the measuring value. For a concentration of 50% glycol, there is an estimated decrease in measured value of about -25%. For a concentration of 15% glycol, there is an estimated increase in the measured value of about +25%.*

# ProSense® FTS Series (-1001) Liquid / Air Thermal Flow Sensors

| ProSense FTS Series (-1001) Thermal Flow Sensors Specifications Continued | | |
|---|---|---|
| ***Model*** | ***FTS100-1001*** | ***FTS200-1001*** |
| | ***Operating Conditions*** | |
| ***Ambient temperature*** | -40 to 176°F (-40 to 80°C) | |
| ***Storage temperature*** | -40 to 212°F (-40 to 100°C) | |
| ***Protection*** | IP 65; IP 67 | |
| | ***Tests / Approvals*** | |
| ***EMC*** | DIN EN 60947-5-9 | |
| ***Shock resistance*** | DIN EN 60068-2-27 @ 50 g (11 ms) | |
| ***Vibration resistance*** | DIN EN 60068-2-6 @ 5 g (10 to 2000 Hz) | |
| ***UL approval*** | E320431 | |
| ***CE*** | EMC; RoHS II | |
| | ***Mechanical Data*** | |
| ***Weight*** | 0.65 lb (296.5 g) | |
| ***Material*** | Stainless steel (1.4404 / 316L); PBT-GF20; PBT-GF30 | |
| ***Materials (wetted parts)*** | Stainless steel (1.4404 / 316L) | |
| ***Process Connection*** | Diameter 8mm | |
| | ***Displays / Operating Elements*** | |
| ***Display*** | Display Unit: 5 x LED, green (fps, gpm, cfm, °F, $10^3$) | |
| | Switching status: 2 x LED, yellow | |
| | Measured values: alphanumeric display, red/green 4-digit, 9mm character height | |
| | ***Electrical Connection*** | |
| ***Connector*** | 1 x M12 | |
| ***Contacts*** | Gold plated | |

Note: Check the chemical compatibility of the sensor's wetted parts with the medium to be measured.

## Wiring Diagram




**Cable Assembly Wiring Colors:**
**Pin 1 - Brown**
**Pin 2 - White**
**Pin 3 - Blue**
**Pin 4 - Black**

**Colors to DIN EN 60947-5-2**

**For additional wiring details see individual product manuals.**

Note: Wiring colors are based on AutomationDirect CD12L and CD12M 4-pole cable assemblies.

## Output Function Selections

**Models:**
**FTS100-1001. FTS200-1001**
**Output 1:**
**Switching output Volumetric flow rate monitoring**
**Frequency output Volumetric flow rate monitoring**

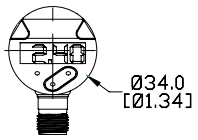
**Output 2:**
**Switching output Volumetric flow rate monitoring**
**Switching output Temperature monitoring**
**Analog output Volumetric flow rate monitoring**
**Analog output Temperature monitoring**
**Frequency output Volumetric flow rate monitoring**
**Frequency output Temperature monitoring**

*Click or scan the above QR code to be taken to the installation insert for the FTSx00-1001 Liquid/ Air Thermal Flow Switches*

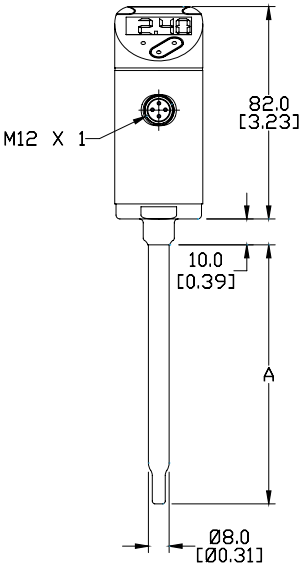
# FTS Series Liquid / Air Thermal Flow Sensors

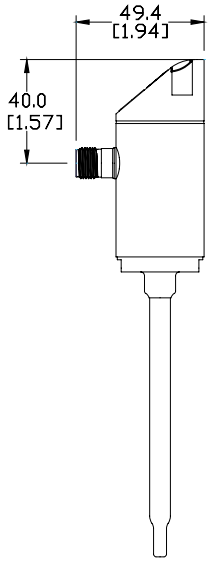
## Dimensions

***mm [inches]***




| Dimensions mm [inches] | |
|---|---|
| ***Part No.*** | ***A*** |
| ***FTS100-100x*** | 100mm [3.94 in] |
| ***FTS200-100x*** | 200mm [7.87 in] |




See our website *www.AutomationDirect.com* for complete Engineering drawings.

# FTS Series Liquid / Air Thermal Flow Sensors

## Liquid Flow Conversions

To convert from flow velocity to flow rate, use the following formula:

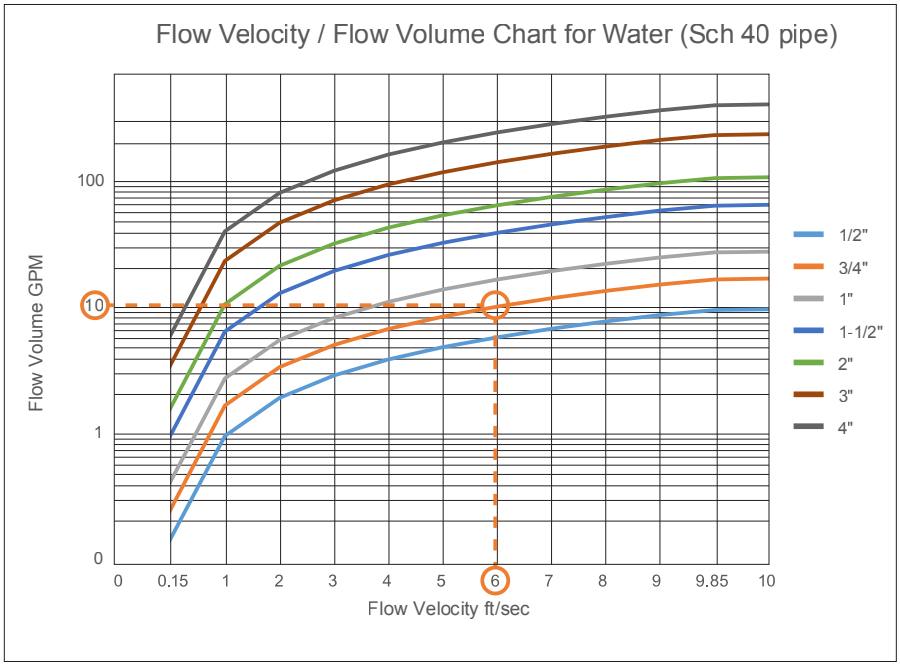
$$V = v \times A$$

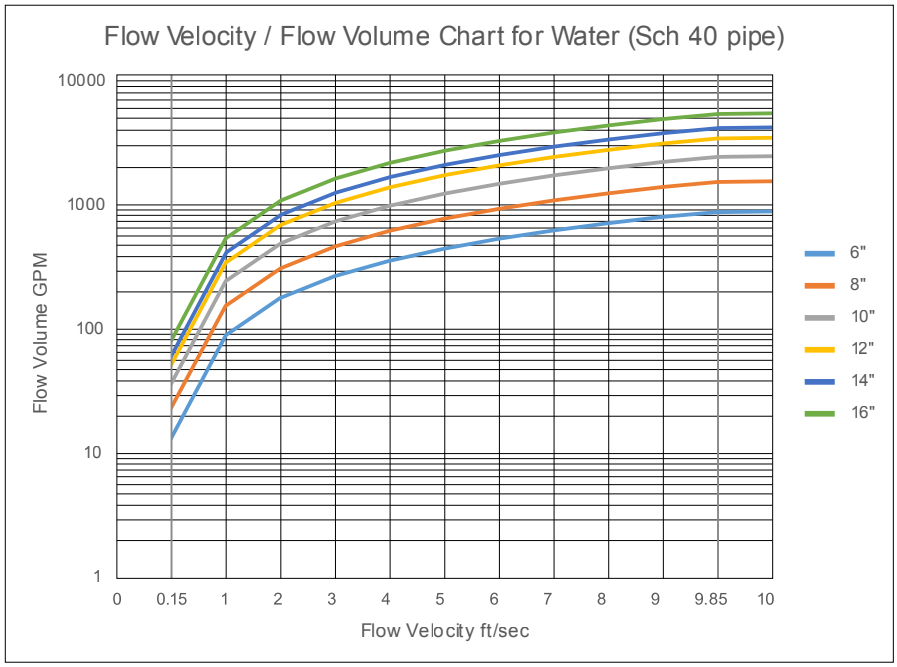
Where V = volumetric flow rate

v = flow velocity

A = cross sectional area of the pipe

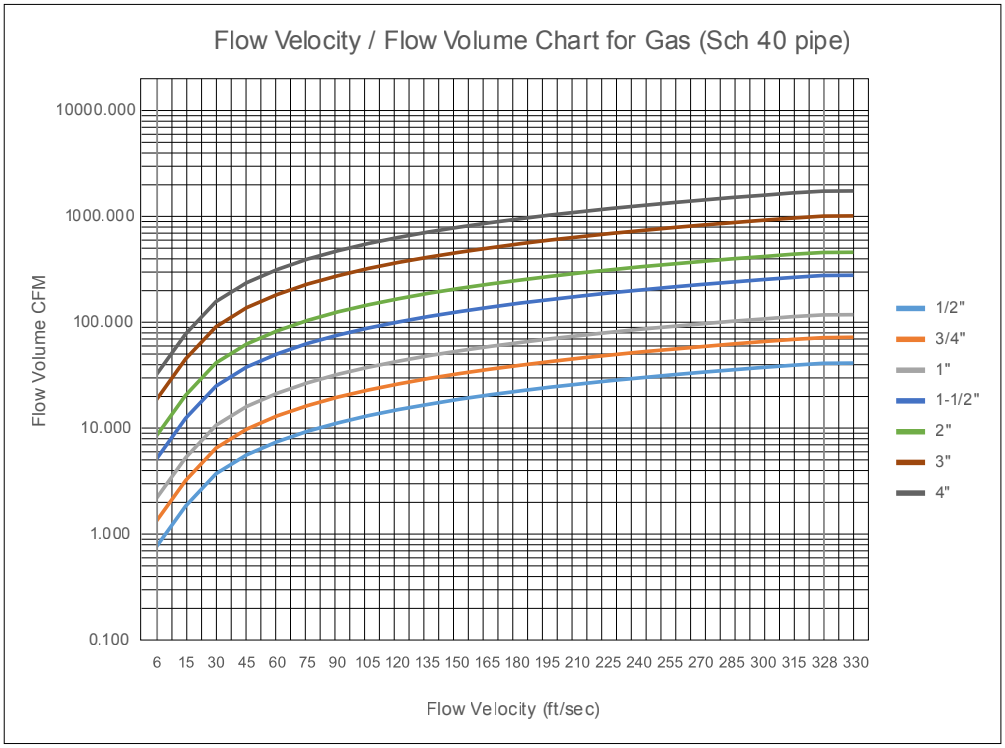
Take care to ensure all the units of measure are consistent. The following charts can be used in lieu of the calculation for round pipes. Find the volumetric flow rate on the y-axis. (Example: 10 GPM) Follow the line horizontally until it intersects the line for pipe diameter. (Example: 3/4" pipe diameter). From the intersection point, drop straight down to read the x-axis to find the given flow velocity. (Example: 6 ft/sec)



# FTS Series Liquid / Air Thermal Flow Sensors

## Gas Flow Conversions



# FTS Series Liquid / Air Thermal Flow Sensor Accessories

## FTS Series Liquid / Air Flow Sensor Accessories

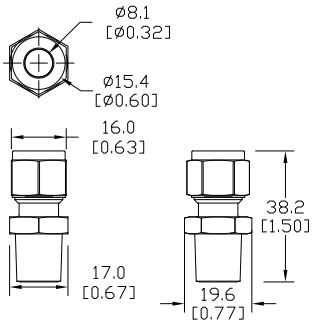
**CF08-25N**

**CF08-50N**

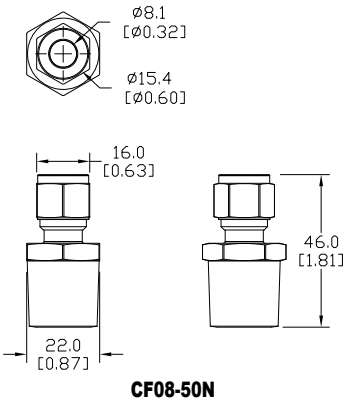
| Part No. | Description | Pcs/Pkg | Weight (lbs) | Price |
|---|---|---|---|---|
| CF08-25N | ProSense compression fitting, stainless steel, 1/4in male NPT process connection. For use with 8mm outside diameter sensor probes. | 1 | 0.1 | $;47v[: |
| CF08-50N | ProSense compression fitting, stainless steel, 1/2in male NPT process connection. For use with 8mm outside diameter sensor probes. | 1 | 0.2 | $47v_: |

## Dimensions

***mm [inches]***




**CF08-25N**



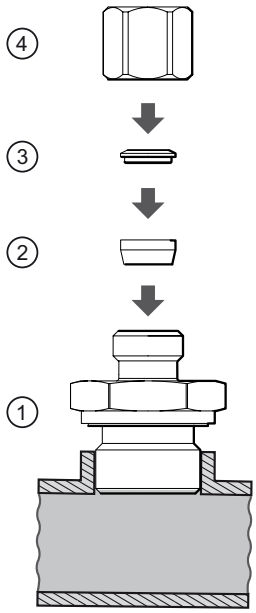

**CF08-50N**

See our website *www.AutomationDirect.com* for complete Engineering drawings.

## Fitting Illustration

The CF compression fittings consist of four parts:

- 1. Screw fitting
- 2. First clamping ring
- 3. Second clamping ring
- 4. Coupling nut




*Note: Once the FTS series unit is inserted to the correct depth and the coupling nut is tightened down, the first and second clamping rings will be joined together, compressed onto to the FTS probe and cannot be removed without damaging the unit probe. The coupling nut however can be loosened after compressing allowing for the FTS probe, clamping rings and coupling nut to be removed for FTS probe cleaning.*

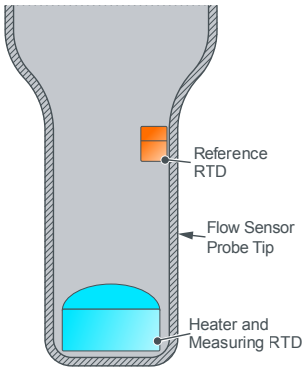
# ProSense® FTS Series Liquid / Air Thermal Flow Sensors

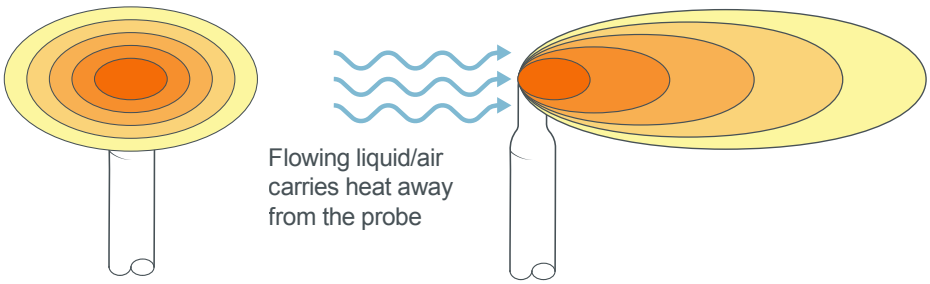
## Thermal Flow Meter Measuring Principle

Thermal dispersion or thermal flow sensing technology is based on the principle of heat transfer and relies on the cooling effect of a flowing fluid or gas to monitor flow rate. The tip of a thermal flow sensor probe typically contains two RTD temperature sensors and a heater element. One RTD sensor located on the inside cylindrical wall of the thermal flow sensor probe measures the temperature of the fluid or gas and is used as a reference temperature. The second RTD sensor is located in the end of the sensor probe with the heater element. Electrical power is applied to the heater element which raises the temperature measured by the second RTD sensor creating a temperature difference with the reference RTD sensor. As fluid or gas flows, heat will be carried away from the sensor probe tip. Faster flow will transfer more heat resulting in a smaller temperature difference between the two RTD sensors. Slower flow will transfer less heat resulting in a greater temperature difference between the two RTD sensors. The difference in temperature between the two RTD sensors is used to determine the velocity or flow rate of the fluid or gas flowing past the sensor probe.

## Applications

- Liquid or gas flow or no flow detection
- Flow rate monitoring for process control
- Pump run dry protection
- Cooling water or air
- Relief valve monitoring
- Combustion air flow
- Compressed air flow




**ProSense FTS Series Thermal Flow Sensors Selection Guide**

| Model | Price | Process Connection | Probe Length | Flow Range | Temperature Range | Display Units | Output 1 | Output 2 |
|---|---|---|---|---|---|---|---|---|
| FTS100-1001 | $047v#: | None Use CF08-25N or CF08-50N for mounting (purchased separately) | 100mm | Liquid: 0.15 to 9.85 ft/sec Air: 6 to 328 ft/sec | -4 to 212°F (-20 to 100°C) | 5 x LED, green (fps, gpm, cfm, °F, 10³) Switching status: 2 x LED, yellow Measured values: alphanumeric display, red/green 4-digit | Flow switch PNP/NPN, N.O./N.C. selectable or flow monitoring frequency signal | Flow / temp. switch PNP/NPN, N.O./N.C. selectable or flow / temp. monitoring 4-20 mA or frequency signal |
| FTS200-1001 | $047v?: | | 200mm | | | | | |
| FTS100-1002 | $;047v!: | | 100mm | | | 5 x LED, green (fps, gpm, cfm, °F, 10³) Measured values: alphanumeric display, red/green 4-digit | Temp. monitoring 4-20 mA | Flow monitoring 4-20 mA |
| FTS200-1002 | $;047v,: | | 200mm | | | | | |