

FCI Aerospace Division

Flow Transmitter Series: Model AS-FT

Aerospace and Military Applications



FCI's Thermal Dispersion Technology Advantage

FCI's unique Thermal Dispersion Technology (TDT) provides exceptional accuracy, high reliability and repeatable indication of flow rate in liquids and gases. The flow element contains two thermowell-protected Resistance Temperature Detectors (platinum RTDs) and a heater adjacent to one of the RTDs. When the flow element is installed in the process, the reference RTD measures the temperature of the surrounding fluid, while the active RTD is maintained at an elevated temperature by the separate heater.

The RTDs are connected to an electronic assembly that supplies power to the heater and uses sensing circuitry and a microprocessor to control a constant temperature difference between the heated and unheated RTDs. The electrical current to the heater is repeatable and proportional to the mass flow of the fluid in the process. The reference RTD is also used as a temperature sensor to provide a temperature output and allow for temperature compensation of the flow measurement. The mass of the active RTD and heater is balanced on the reference RTD through the use of a passive mass equalizing element. This assures that the FCI flow transmitter remains accurate even in the presence of abrupt process temperature changes.

FCI's Flow Transmitter Applications

- » Environmental Cooling Systems
- » PACK Systems
- » Bleed Air
- » Fuel Transfer
- » Lubricating Oils
- » Hydraulic Fluids
- » Ground and In-flight refueling
- » Flight Test Measurements
- » PAO and Other Coolants

FCI Flow Transmitters

FCI provides flow transmitters for military/aerospace applications with a unique set of performance features unavailable in other flow sensing instrumentation. FCI's thermal mass flow transmitters measure mass flow directly in gas or liquid, and do not require the pressure and temperature corrections necessary with volumetric flow metering. The flow meter system typically consists of a flow element that is inserted into the customer's process and a control unit that is mounted remotely. Integrally mounted electronics are available as an option. The wetted portion of the probe is hermetically sealed, made of Stainless Steel parts joined by gas tungsten arc weld or nickel braze. It is also available with optional titanium or alloy construction. The element construction provides excellent corrosion resistance that can withstand up to 2000 psig or more in line pressures. The element is available with either a flanged or threaded mounting and pigtail leads, or a variety of commercial or military connectors. The insertion length is specified by the customer.

The electronics are mounted in an environmentally sealed enclosure with a gasket under the lid. Power input is 22-29VDC per MIL-STD-704. The electronics maintain a temperature difference between the two RTDs by providing a current to the heater adjacent to the active RTD. The electrical current to the heater is repeatable and proportional to the mass flow rate of the process fluid. The relationship between the heater current and the flow rate is linearized by the electronics and converted to a 0-5V or 4-20 mA analog signal. Nonlinear analog outputs are also available. Because the flow induced heat dissipation effect is a logarithmic function, FCI mass flow meters provide remarkably wide turndowns, exceptional low-flow sensitivity, repeatability of $\pm 1\%$ full scale and an accuracy of $\pm 2\%$ full scale maintained over a 100:1 turndown. Each flow meter is factory calibrated at FCI's on-site calibration laboratory to provide the greatest accuracy for the customer's services.

FCI's Thermal Dispersion Technology Advantages

- » No Moving Parts
- » Direct Mass Measurement
- » Simple Installation
- » Switch or Transmitter Output
- » Low Flow Sensitivity
- » Wide Turndown Range [100 to 1 or more]
- » Low Pressure Drop
- » Simultaneous Flow and Temperature Indication
- » Extreme Temperature, Pressure and Vibration Service
- » High Reliability and Maintenance Free
- » Corrosion, Abrasion and Fouling Resistant
- » Low Weight Compact Design

Visit FCI Aerospace Division on the Web: www.fluidcomponents.com

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Flow Switch Series: Model AS-FT

Specifications

Service: Flow measurement for liquid or gas.

Material: Probe: 316 SS with nickel braze per AMS 4777 or all welded construction; Passivation finish per QQ-P-35; special alloys including titanium available.

Remote Control Unit Enclosure: Aluminum Alloy painted lusterless black per MIL-C-83286;
Integral control unit enclosure optionally available.

Electrical Connection:

Probe: Pigtail leads to customer lengths or connector.
Control Unit Enclosure: Military connector.

Process Connection: Flanged or threaded.

Insertion Length: Per customer requirement.

Signal Output: Separate 0 to 5V linear analog temperature and flow signals. 4-20 mA, 600 ohm impedance optionally available.

Power Input: 28VDC nominal per MIL-STD-704.

Electrical Current Consumption: 100 to 200 mA depending on flow rate.

Weight: Flow Element: Flanged- 0.25 to 0.30 lb nominal, 1/4" NPT with 18" pigtail – 0.12 to 0.15 lb nominal, depending on insertion length.
Remote Electronic Enclosure: 0.8 lb nominal.

Proof Pressure: Up to 2000 psig or greater as required by application.

Flow Sensing Range: As specified by customer. See table.

Flow Ranges

Process Fluid	Switch Point Range Standard Feet Per Second
Air	0.25 to 600+ sfps
Fuel (JP4, JP5 or JP8)	0.01 to 6+ sfps
Coolant (PAO)	0.01 to 6+ sfps
Water	0.01 to 3+ sfps

Operating Temperature Range:

Flow Element: -65 to +500°F
Electronics: -40 to +160°F (higher temperatures optionally available).

Calibration: Output calibrated to customer specified range in actual process media.

Accuracy: Flow: ±2% of full scale; higher accuracy optionally available.
Temperature: ±2°F over the specified range.

Repeatability: Flow: ±1% of full scale reading;
Temperature: ±1°F over the specified range.

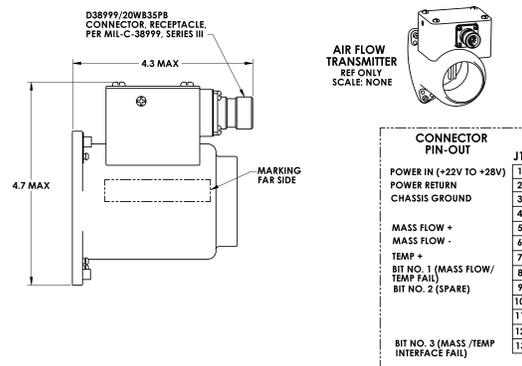
Typical Time Response Constants:

Air: 3 Sec.
Liquid: 2 Sec.

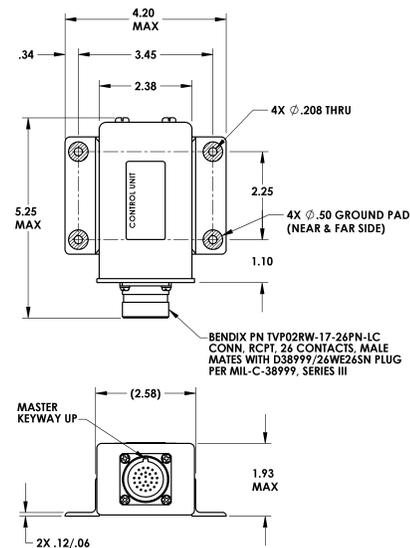
Flow Turndown Ratio: Customer Specified, up to 100:1

Options: In-line flow body with flanged or threaded construction; calibration and/or material certificates.

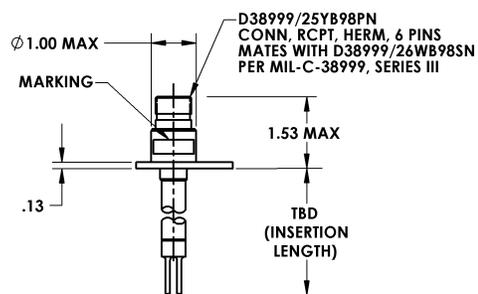
Qualification: MIL-STD 810 and RTCA/DO 160



Typical In-Line, Integral Flow Transmitter



Typical Control Electronics



Typical Flow Element



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