

ST102 Dual-Element Mass Flow Meter

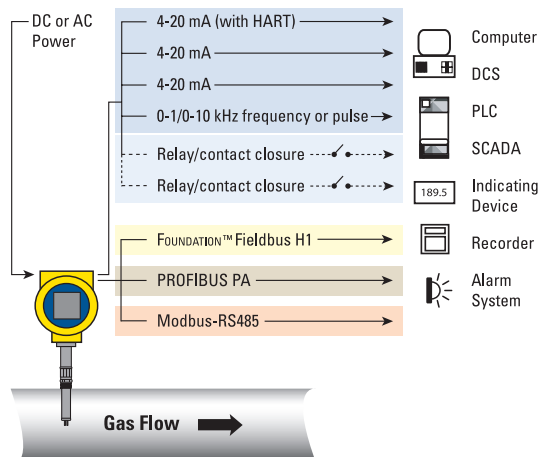
Thermal Dispersion Air/Gas Insertion Flow Meter



Model ST102 is a dual-element system that can be applied in an averaging mode or as two discrete and independent sensors operating through a single transmitter. A single dual-element instrument can result in significant cost and space savings compared to installing and integrating two single-element instruments.

Flow Element and Process Connections

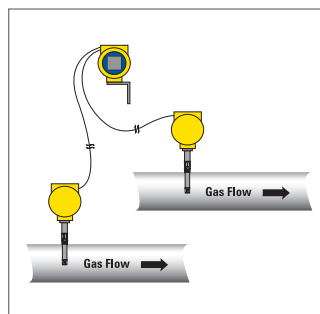
- All welded construction
- 316L stainless steel or Hastelloy-C276
- 350 °F, 500 °F or 850 °F [177 °C, 260 °C or 454 °C]
- Fast response and extra-rugged duty choices
- Variable (adjustable) and fixed insertion depths
- Compression fitting, NPT, flanges, hot-tap retractable packing gland connections



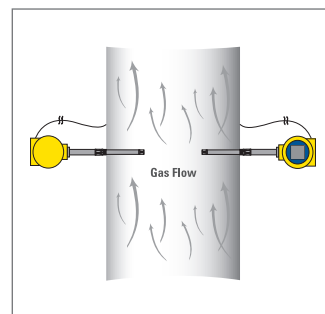
Model ST102 Features

- Compatible with More than 200 Gases
- Direct Mass Flow Measurement
- Dual Function – Flow and Temperature
- Temperature Service to 850 °F [454 °C]
- No Moving Parts, Non-Clogging
- Easy, Low Cost Single Point Insertion
- Best-In-Class Digital / Graphical Readout
- Multiple Analog Outputs
- Extensive Bus Communications Options
- Agency Approvals on Full Instrument
- On-Board Data Logger

Discrete Mode



Averaging System



Transmitter and Electronics

- All metal enclosure
- Four (4) conduit ports
- 2" x 2" [50 mm x 50 mm] backlit LCD readout/display
- Flow, total flow and temperature
- Triple analog outputs with HART
- FOUNDATION™ fieldbus, PROFIBUS PA, Modbus options
- Dual relays/alarms option
- Integral or remote mounting (up to 1000')
- AC or DC power
- FM, FMc, ATEX and IECEx approvals for Division 1, Zone 1 hazardous locations
- Standard and extended range temperature compensation
- Data logging to removable micro-SD card

Calibration

- Calibrated to your installation conditions and gas specifications on one of 18 precision, NIST traceable flow stands
- Up to five (5) unique calibrations stored onboard
- SpectraCal™ – 10 user selectable / changeable gases

Model ST102 Features

Dual flow elements

- Dual remotes or one integral plus one remote
- Averaging or discrete (independent) configurations

Four conduit ports provide greatest signal integrity and separation for power input, analog output lines, digital I/O, relays and/or auxiliary input signals; choice of NPT or M20 threads

AC or DC power supply

Weather-proof, ruggedized, Ex rated enclosures

- Choices for local or remote mounting
- NEMA 4X, IP67

Global agency approvals of entire instrument system for hazardous location installations:

FM, FMc, ATEX, IEC, NEPSI, CPA
NEPSI, CPA, Inmetro, GOST-R, GOST-K pending

Transmitter remote up to 1000' [300 m]

Multiple calibrations

- Up to five independent, separate calibrations
- Multiple gases or mixed gas compositions
- Same gas, different flow range to optimize accuracy and extend turndown up to 1000:1

Precision calibration and calibration choices

- Specific gas and application matched calibration in FCI NIST traceable facility
- Exclusive patented SpectraCal gas equivalency calibration with ten (10) user selectable gases

Extensive selection of process connections

- Simple, adjustable installation with threaded NPT connector
- Teflon or metal ferrule seals
- Fixed connections
- ANSI or DIN flanges
- Retractable assemblies

Stainless steel or Hastelloy-C276 wetted parts

Extensive analog and digital communications output choices

- Triple 4-20 mA with HART
- FOUNDATION™ fieldbus H1
- PROFIBUS PA
- Modbus RS-485
- 0-1 kHz or 0-10 kHz frequency or pulse
- Dual relays
- USB port
- Ethernet

On-board data logger

Multi-function: measures mass flow rate and temperature

Four (4) optical touch buttons

- Proximity activation, no need to open enclosure
- Full instrument programmability
- Protected against unwanted activation

Comprehensive informational display

- Digital readout of all measured parameters; flow rate, total flow, temperature and pressure with engineering units
- Analog flow rate bar graph
- Alarm relay status indication
- Instrument fault indication
- User programmable 17 character field (example: display gas type, tag number or application/location)
- Display orientation rotates in 90° increments electronically
- Backlighted: auto-on activation via proximity sensor or set for always on

Permanent laser-etched depth gauge markings; ensures accurate centering of adjustable-length elements

All welded sensor elements for maximum service life and leak-proofing

Precision, wide-ranging platinum RTD sensors

Exclusive equal mass sensors provide optimum performance in processes with wide temperature swings

Choice of three flow element styles to optimize application performance (— FPC, — FP, — S)



— FPC style



— FP style



— S style

Model ST102 Dual-Element Insertion Mass Flow Meter Specifications

Instrument

- **Measuring Capability:** Flow rate, total flow and temperature
- **Basic Style:** Insertion, dual-element system
- **Flow Measurement Range:** 0.25 SFPS to 600 SFPS [0.07 NMPS to 172 NMPS]
– Air at standard conditions; 70 °F and 14.7 psia [0 °C and 1013,25 bar(a)]
- **Temperature Measurement Range:** Up to 850 °F [454 °C]
commensurate with element; *see operating temperature in flow element specification*
- **Media:** All gases that are compatible with the flow element material
- **Accuracy**
Flow:
Gas Specific Calibration: $\pm 0.75\%$ reading, $\pm 0.5\%$ full scale
SpectraCal™ Gas Equivalency: Typically $\pm 4\%$ reading, $\pm 0.5\%$ full scale; gas conditions specific to application will determine accuracy; *utilize FCI's online tool, AVAL, to evaluate your application and provide expected accuracy*
Temperature: $\pm 2^\circ\text{F}$ [$\pm 1,1^\circ\text{C}$] (display only, flow rate must be greater than 5 AFPS [1,5 m/sec])
- **Repeatability**
Flow: $\pm 0.5\%$ reading
Temperature: $\pm 1^\circ\text{F}$ [$\pm 1^\circ\text{C}$] (flow rate must be greater than 5 AFPS)
- **Temperature Coefficient**
With optional temperature compensation; valid from 10% to 100% of full scale calibration
Flow: Maximum $\pm 0.015\%$ of reading / °F up to 850 °F [$\pm 0.03\%$ of reading / °C up to 454 °C]
- **Turndown Ratio**
Standard: Factory set and field adjustable from 10:1 to 100:1 within calibrated flow range
- **Temperature Compensation**
Standard: $\pm 30^\circ\text{F}$ [$\pm 16^\circ\text{C}$]
Optional: $\pm 100^\circ\text{F}$ [$\pm 55^\circ\text{C}$]
- **Agency Approvals**
FM, FMc (Canadian): Class I, Division 1, Hazardous Locations; Groups B,C,D,E,F,G
ATEX and IECEx: Zone 1, II 2 GD Ex d IIC T4
NEPSI, CPA, Inmetro, GOST-R, GOST-K pending
- **Calibration:** Performed on NIST traceable equipment

Flow Element

- **Material of Construction**
All-welded 316L stainless steel; Hastelloy-C optional
- **Operating Pressure**
Metal ferrule: 1000 psig [69 bar(g)]
Teflon ferrule: 150 psig [10 bar(g)] (200 °F [93 °C] maximum)
Fixed Connection NPT: 1000 psig [69 bar(g)]
Fixed Connection Flanged: per flange rating
- **Operating Temperature (Process)**
All Flow Elements (–FPC, –FP and –S):
–40 °F to 350 °F [–40 °C to 177 °C]
–40 °F to 500 °F [–40 °C to 260 °C]
–40 °F to 850 °F [–40 °C to 454 °C]
- **Process Connection**
Compression Fittings
3/4" or 1" male NPT, stainless steel with adjustable Teflon ferrule or metal ferrule; or flanged tapped and threaded for 3/4" fitting, ANSI or DIN flanges
Compression fittings not available with ultra high temperature version (850 °F [454 °C])
Retractable Packing Glands
Low pressure 50 psig [3,5 bar(g)] or medium pressure (500 psig [34 bar(g)]) with graphite or Teflon packing material; 1 1/4" male NPT or ANSI or DIN flange
Teflon packing required when process media is ozone, chlorine or bromine
Fixed Fittings: 1" male NPT or ANSI or DIN flange
Insertion Length: Field adjustable lengths
1" to 6" [25 mm to 152 mm]
1" to 12" [25 mm to 305 mm]
1" to 21" [25 mm to 533 mm]
1" to 60" [25 mm to 1524 mm]
Fixed lengths from 2.6" to 60" [66 mm to 1524 mm]
- **Remote Transmitter Configurations:** Transmitter may be mounted remotely from flow element using interconnecting cable (up to 1000' [300 m])

Flow Transmitter/Electronics

- **Operating Temperature:** 0 °F to 130 °F [–18 ° to 54 °C]
- **Input Power**
AC: 85 Vac to 265 Vac
DC: 24 Vdc $\pm 20\%$
- **Outputs**
Analog
Standard: Three (3) 4-20 mA*, 0-1kHz, or 0-10 kHz pulse/frequency
4-20 mA outputs are user assignable to flow rate, temperature and/or if so equipped, pressure; outputs are user programmable to full flow range or subsets of full flow range; pulse/frequency output is user selectable as pulse for external counter/flow totalizer, or as 0-1 kHz or 0-10 kHz frequency representing flow rate
* *Outputs are isolated and have fault indication per NAMUR NE43 guidelines, user selectable for high (>21.0 mA) or low (<3.6 mA)*
Optional: Standard output plus two (2) 2A SPDT relays
Relays independently user assignable to flow, temperature or pressure; user programmable for hi/lo trip, hysteresis from 00.0 to 99.9 counts and time delay from 00.0 to 99.9 seconds
Digital
Standard: USB, Ethernet
Optional: HART (comes standard with analog outputs, V7 compliant)
FOUNDATION™ fieldbus H1, PROFIBUS PA or Modbus RS-485
- **Auxiliary Inputs**
Two 4-20 mA input channels; used for FCI administered special configurations to allow ST102 series to accept outputs from external devices such as gas analyzers, gas composition or pressure sensors
- **Enclosures**
Main Transmitter/Electronics:
NEMA 4X, IP67; polyester powder coated aluminum; 4 conduit ports threaded as 1/2" NPT or M20x1.5; 7.74" x 5.40" x 5.00" [196.6 mm x 137.2 mm x 127 mm]; *stainless steel enclosure pending*
Local Enclosure (Remote Configuration):
Without packing gland option:
NEMA 4X, IP67; polyester powder coated aluminum; 2 conduit ports threaded as 1/2" NPT or M20x1.5; 3.75" x 4.00" x 3.24" [95 mm x 102 mm x 82 mm]
With packing gland option:
NEMA 4X, IP67; polyester powder coated aluminum; 1 conduit port threaded as 1" NPT or M20x1.5; 5.40" x 4.82" [137.2 mm x 122 mm]
- **Data Logger**
User programmable for readings per time increment to a maximum of 1 reading/second; removable, circuit board-mountable 2GB micro-SD (secure digital) memory card supplied; stores approximately 21M readings in ASCII comma-separated format
- **Readout/Display and Optical Touch Buttons (Optional):**
 - Large 2" x 2" [50 mm x 50 mm] LCD; digital plus bar graph and engineering units
 - Digital displays of flow rate, total flow, temperature and pressure (with STP models); user selectable for engineering units
 - Analog bar graph of flow rate
 - Relay/alarm status indication
 - User programmable 17 alphanumeric character field associated with each calibration group
 - Set-Up & Service mode displays text and service codes
 - Backlight – backlight activated by proximity motion detection, or user may set for always on
 - Four (4) optical touch buttons for user programming of instrument set-up and service interrogation
 - Optical touch button activation through front window – no need to open enclosure to access or activate
 - Display is electronically rotatable in 90° increments to optimize viewing angle

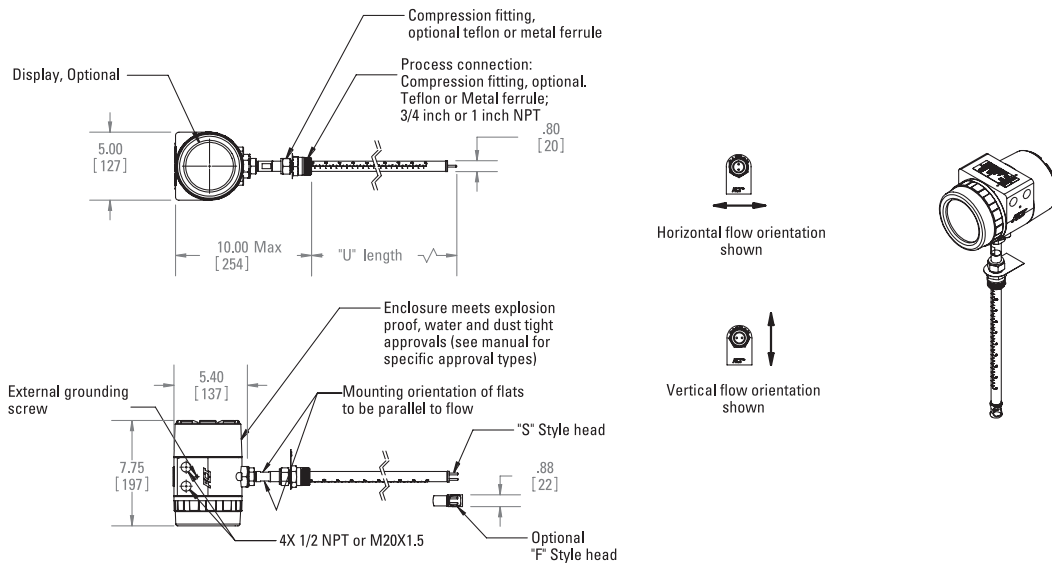
Note: If readout/display not ordered, all user set-up and service interrogation must be done via computer link to bus comm and/or USB port.

Specifications at reference operating conditions of 70 °F, 14.7 psia [21.1 °C, 1.013bar(a)] and straight pipe run 20d upstream, 10d downstream

FCI is a continuous improvement company; specifications subject to change without notice

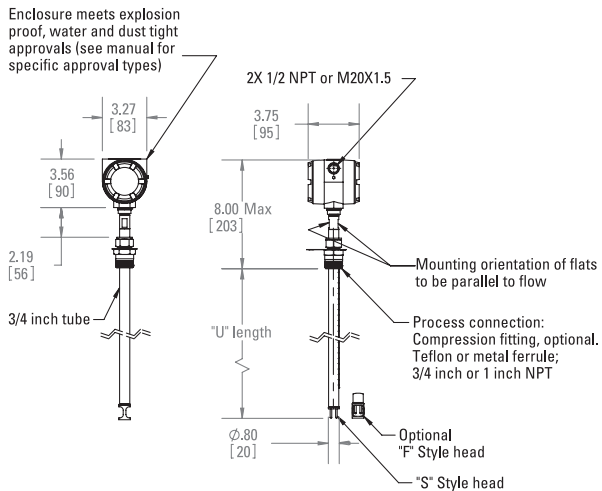
Model ST102 Dual-Element Insertion Mass Flow Meter

Integral Configuration

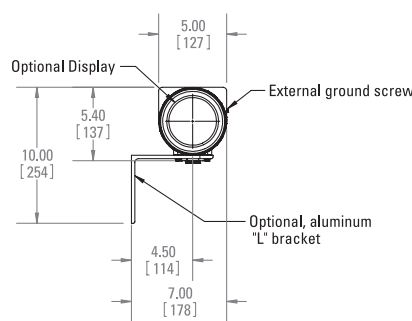
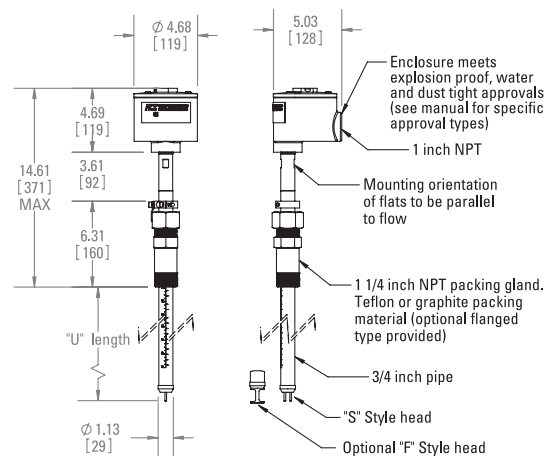


Remote Transmitter

With Ferrule Type Compression Fitting



With Packing Gland



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