ST100 Mass Flow Meter

FLUID COMPONENTS INTERNATIONAL LLC

Thermal Dispersion Air/Gas Insertion Flow Meter

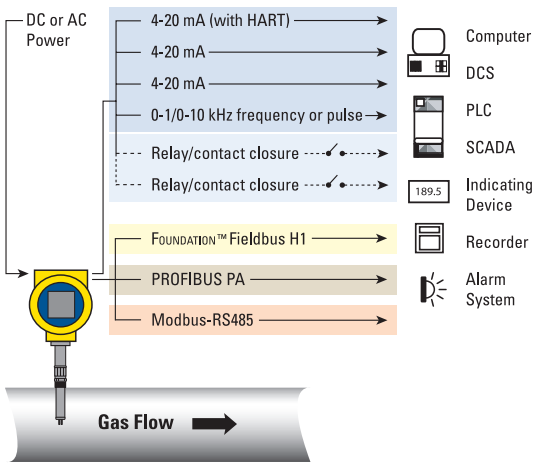
ST100 Features

- **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**

The Model ST100 flow meter combines a broad selection of insertion-type flow elements with best-in-class transmitter/electronics and superior calibration to provide a truly state-of-the-art gas flow meter for industrial process and plant applications.

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



Transmitter and Electronics

- All metal enclosure
- Four (4) conduit ports
- 2″ x 2″ [50 mm x 50 mm] backlighted 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 ST100 Features

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, Inmetro, GOST-R, GOST-K pending

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

Remote up to 1000' [300 m]

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

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

Multi-function: measures mass flow rate and temperature

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 ST100 Mass Flow Meter Specifications

Instrument

- **Measuring Capability:** Flow rate, total flow and temperature
- **Basic Style:** Insertion, single element
- **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: ±0.75% reading, ±0.5% full scale

  SpectraCal™ Gas Equivalency: Typically ±4% reading, ±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: ±2 °F [±1,1 °C] (display only, flow rate must be greater than 5 AFPS [1,5 m/sec])
- **Repeatability**

  Flow: ±0.5% reading
  Temperature: ±1 °F [±1 °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 ±0.015% of reading / °F up to 850 °F [±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: ±30 °F [±16 °C]
  Optional: ±100 °F [±55 °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 150 °F [-18 ° to 65 °C]
- **Input Power**

  AC: 85 Vac to 265 Vac
  DC: 24 Vdc ±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 ST100 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
  - Backlighted – 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

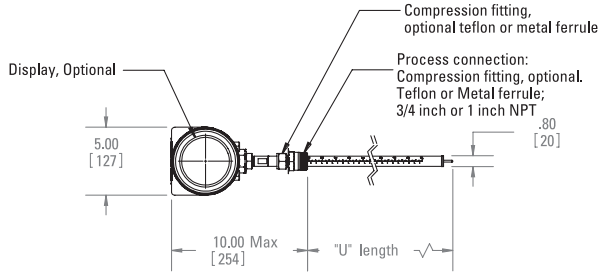
Note: If readout/display not ordered, all user set-up and service interrogation must be done via computer link to bus comm and/or USB port.

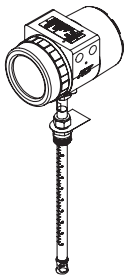
Specifications at reference operating conditions of 70 °F, 14.7 psia [21.1 °C, 1.013bar(a)] and straight pipe run 20d upstream, 10d downstream

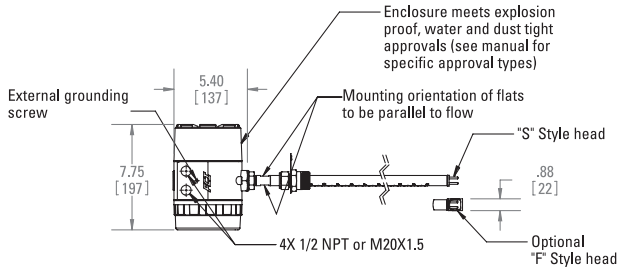
FCI is a continuous improvement company; specifications subject to change without notice

Model ST100 Single-Point Insertion Flow Meter

Integral Configuration

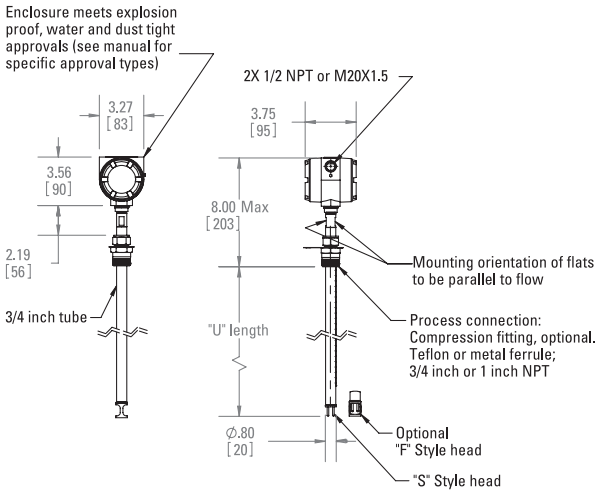


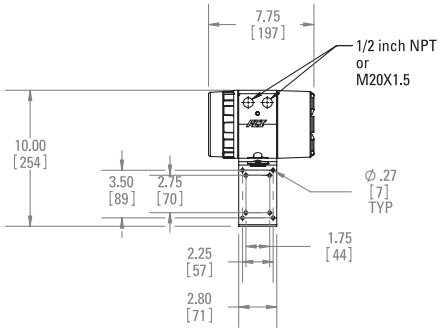




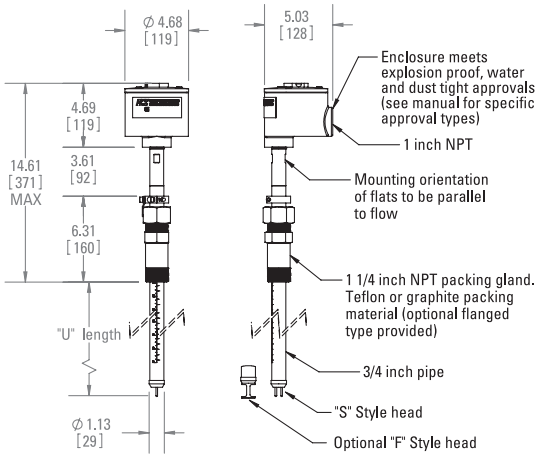
Remote Transmitter

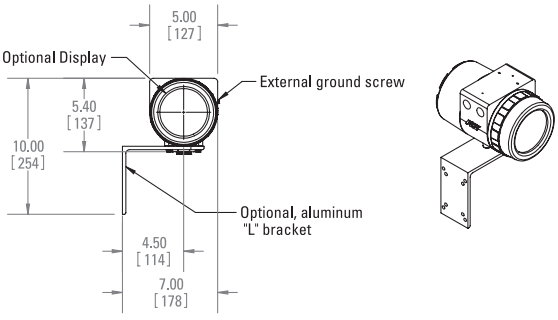
With Ferrule Type Compression Fitting





With Packing Gland





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