Measuring up to the highest standards in flow measurement.

If your process requires precision flow measurement of a liquid, gas, slurry or homogeneous solid, you can depend on Thermal Instrument. Since 1959, industry has learned to count on our extensive experience, proprietary engineering and high quality control to deliver accuracy and reliability.

Whether the challenge is highly corrosive chemicals, extreme pressures, high temperatures or abrasive compositions, the chances are we've already developed a flowmeter design for your process application. If not, our lab will be glad to work with a sample of your media to help develop one.

Thermal Instrument Co.

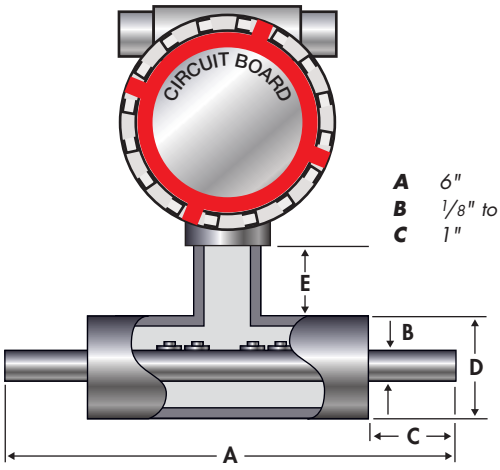
Thermal Mass Flow Meters

Measurements are taken in a spool fitted to the outside of the process line – no obstruction to the actual flow path required. Accurate flow readings can be measured on a process line as small as 1/16" (1.59 mm) in diameter; there's no limit on maximum size. Spools are available in flanged, threaded, Swagelok® or other constructions suitable to your system.

Sanitary and Ultrapure options for Gas & Liquid Service.

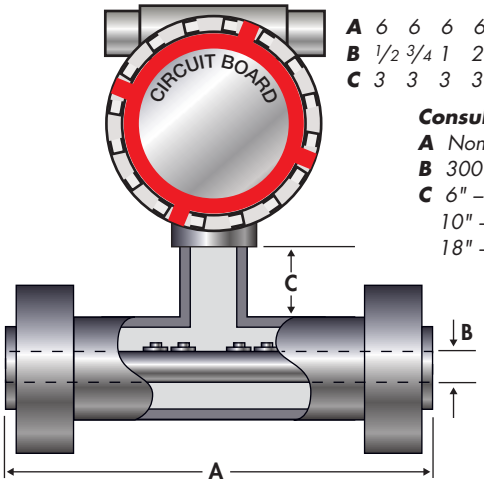
These Thermal Instrument models are constructed of 316L, low sulfur stainless steel down to 10-15 RA finish and offer "CIP/SIP" clean-in-place design. They provide highly reliable service in flow switch applications with field adjustable Form C relay switch points.

Tube End Construction Dimensions



A 6"
B 1/8" to unlimited
C 1"

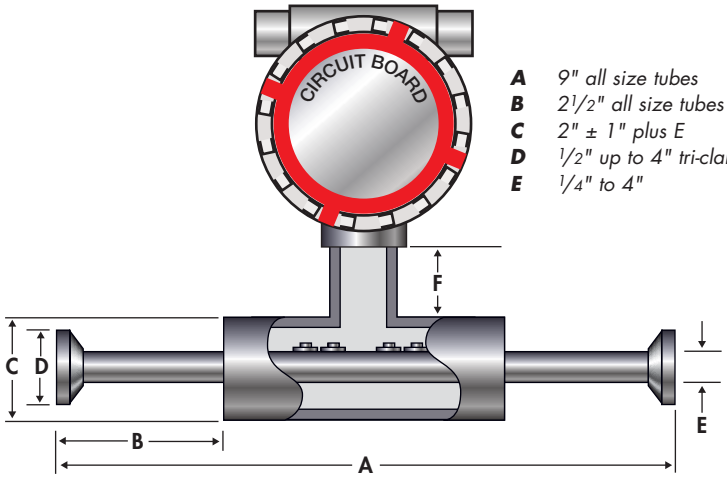
Flanged Construction Dimensions



A	6	6	6	6	6	6	8	8	8	8	150 RF
B	1/2	3/4	1	2	3	4	6	8	10	12	or NPT
C	3	3	3	3	3	3	3	3	3	3	

Consult Factory
A Non-standard length
B 300 lb and higher
C 6" – 200° to 250°F
10" – 250° to 550°F
18" – 550°F to 850°F

Sanitary End Construction Dimensions



A 9" all size tubes
B 2 1/2" all size tubes
C 2" ± 1" plus E
D 1/2" up to 4" tri-clamp
E 1/4" to 4"

While many variables affect flow Nothing should affect its accurate measurement.

Integral microprocessor electronics assure the accuracy of new Thermal Mass Flowmeters from Thermal Instrument.

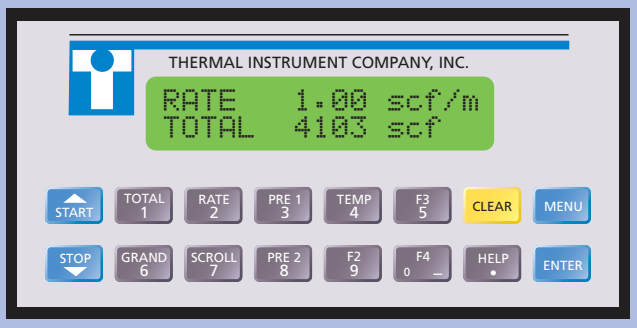
Thermal Instrument 600-9 In-Line and 62-9 Probe Flowmeters provide integral local control and display in an explosion proof housing. Optional remote mounting of the electronics to a distance of 4000 ft. from the flow transducer provides additional versatility.

Thermal Instrument's engineering in the new models integrates flow analyzers, temperature compensators and signal conditioners to electronically produce a linear output directly proportional to mass flow. An optional output provides continual temperature measurement.

Flow signal linearity and temperature effects determined at calibration are corrected by the microprocessor using operating parameter data stored in EEPROM memory. Constant access to the rate of flow and totals from any predetermined point and accuracy within 0.50% of Full Scale (or 2% of reading, whichever is better).

All Thermal Instrument flow measurement equipment is factory calibrated and arrives at your process ready to go. Our versatility means there are very few liquid, gas, slurry, or homogeneous solids applications we can't accommodate.

Unlike competitive flow measurement technology, the RTD sensors for both the Probe and In-Line Flowmeters from Thermal Instrument capture flow information without exposure to adverse process conditions. In addition to protecting sensitive electronics, this means there are no apertures to clog.

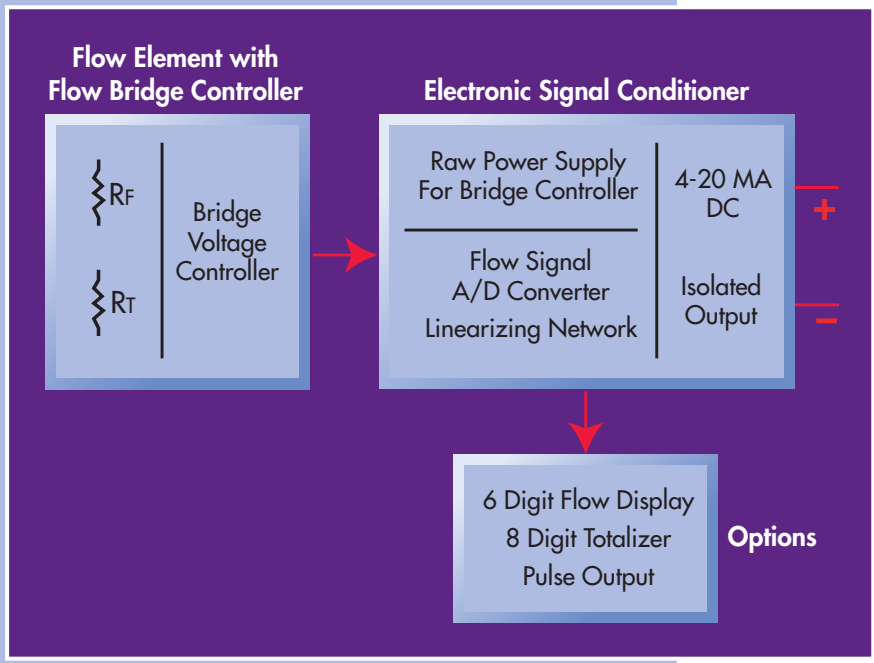


Model 9200B Multi-Function Flow Computer for Thermal Mass Flowmeters

The Thermal Instrument 9200B special purpose flow computer accepts analog input from the thermal mass flowmeter and provides linearization of the sensor and scaling to the Flow Rate and Total indicators. A variety of Pulse Outputs, Analog Outputs, Control Inputs, Relay Alarms and RS-232 Outputs are provided standard. RS-485 Modbus RTU is also an ordering option.

Model 926 Analog/Digital Signal Conductor

Takes the non-linear analog flow signal from one of our probe or in-line flow transducers and converts it to a linear output signal. Unique 12 bit data system assures signal smoothness and optimum accuracy. In order to maximize efficiency and minimize heat generation, switching supplies are used. Options available include: local display of Flow, 8 digit Totalization and HI/LO alarm set points.



Model 62-9FS & 600-9FS Thermal Mass Flow Switches

The durability, accuracy, versatility, and ease of use of this switch make it the economical choice for measuring and controlling flow. The electronics are built into the condulet which mounts on the Model 62-9 and 600-9. A plant technician is able to accurately field set the trip point by adjusting the potentiometer. Using a voltmeter, the technician can then compare trip point voltage with the calibration voltages given on calibration chart provided with each meter. Trip high/trip low function can be field-enabled with a simple jumper change.

On the dual switch model, the second trip point may be either flow or temperature. Also, the temperature circuit can be configured to transmit the flow temperature as a linear voltage. The second trip circuit is independent of the primary trip point circuit. One alarm can be set to trip on a high flow rate while the other is set to trip on a low flow rate.

Operating Principle

The **Model 62-9 Thermal Mass Probe Flowmeter** is inserted directly into the flow stream to measure flow, while the **Model 600-9 Thermal Mass In-Line Flowmeter** employs a spool on the circumference of the tube or pipe. Both, however, employ the same sophisticated micro-electronic technology developed by Thermal Instrument Co.

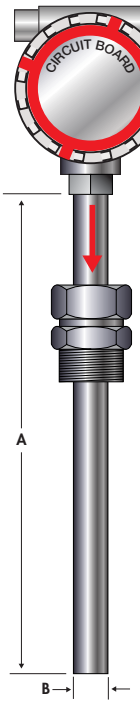
All our flow measurement equipment use two RTD sensors: one for sensing temperature, the other for sensing flow. The temperature sensor measures the heat of the media passing by and instantly corrects for changes in temperature. It then sets the temperature of the flow sensor to a precise temperature above that of the passing media. The accuracy of the flow measurement is based on the fact that all media conduct heat off the sensor in direct proportion to the mass flow rate.

There are two components that make up a Thermal Instrument thermal mass flowmeter: a flow element with a bridge controller and signal conditioner with power supply, flow signal, A/O converter, linearized network and 4-20 MA DC isolated flow output. Operational Flow display, Totalizer, Pulse and Temperature outputs are available options.

Thermal Mass Probe Flowmeter

Sensors are enclosed in a sealed tube which can be inserted or removed through a gate valve or a packing gland while conduit is in use. 316 SS is standard, but corrosion resistant materials such as Hastelloy C, Monel, Inconel, Carpenter 20 as well as carbide and fluorocarbon coatings are also available.

Dimensions of Flow Probe with Packing Gland



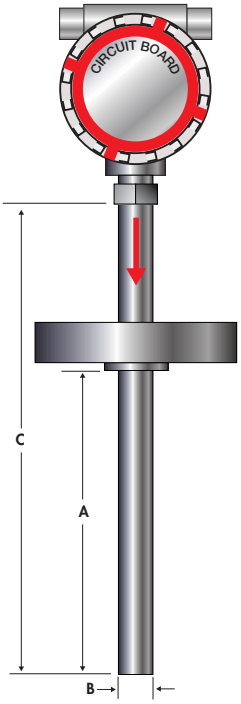
Recommended Insertion Lengths for Gases and Liquids

Line Size ID	Probe Tip
2"	1 3/4"
3"	2 3/4"
4"	3 3/4"
5"	4 3/4"
6"	5 3/4"
7"	6 3/4"
8"	7 1/2"
10"	8 1/2"
12"	9 1/2"
16"	11 1/2"
18"	12 1/2"
24"	15 1/2"
30"	18 1/2"
38"	21 1/2"
48"	27 1/2"

A *Use recommended insertion length chart plus "L" dimension plus 6"*

B *1/2", 3/4", 1", 1 1/2" and 2" OD, application dependent*

Dimensions of Flow Probe with Flanged Connections



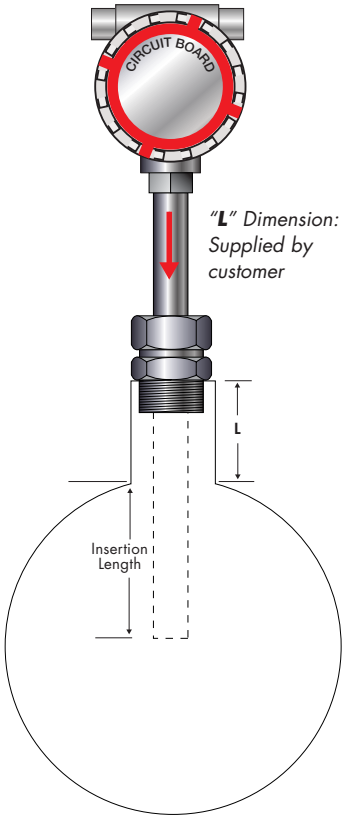
A *Use recommended insertion length chart plus "L" dimension*

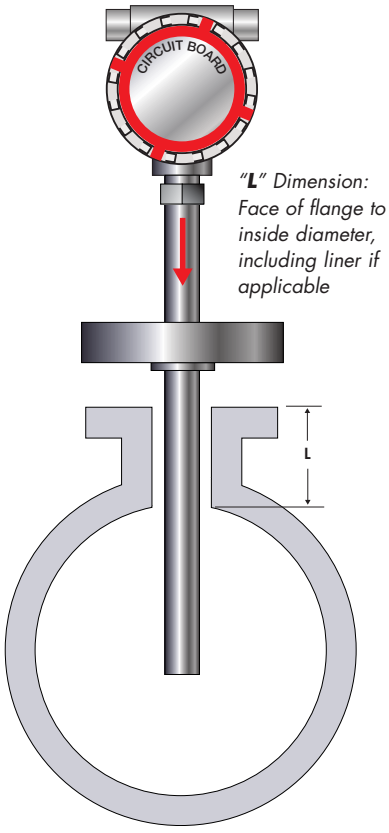
B *1/2", 3/4", 1", 1 1/2" and 2" OD, application dependent*

C *A+5", up to 150°F; A+10", to 250°F; A+15", 250°F to 500°F*

Flange size and rating application dependent

Flow Probe Partially Withdrawn





SPECIFICATIONS

MODEL 600-9 THERMAL MASS IN-LINE FLOWMETER

Accuracy:
± 0.50% of Full Scale, or 2.0% of reading whichever is better. Full Scale over the calibrated range. Process fluid temperature span ± 50°F.

Repeatability: ± 0.2% of Rate

Response Time:
Gas: 1 to 2 sec. Typical
Liquid: Less than 500ms.

Pressure Rating:
0–1200 psig (Std)
0–10,000 psig Dependent on meter size

Mass Flowrates:
Gas, Liquid: Consult factory for your application.
Note: maximum determined by pipe capacity

Flow Range: 100:1 Capability

Wetted Materials: 316SS (Std). Consult factory for other material requirements.

Pressure Drop Typically: Same as equivalent size and length tube or pipe

Mounting: Flange, Tube Fittings, Sanitary, Welded. Many others available

MODEL 62-9 THERMAL MASS PROBE FLOWMETER

Accuracy:
± 0.50% of Full Scale, or 2.0% of reading whichever is better. Full Scale over the calibrated range. Process fluid temperature span ± 50°F.

Repeatability: ± 0.2% of Rate

Response Time:
Gas: 1 to 2 sec. Typical
Liquid: Less than 500ms.

Pressure Rating:
0–1200 psig (Std)
0–10000 psig Dependent on meter size

Mass Flowrates:
Gas: 0.2 to 1000 FPS

MODEL 62-9 (continued)

Liquid: 0.01 to 15 FPS
Note: maximum determined by pipe capacity

Flow Range: 100:1 Std. Multiple ranges available.

Temperature Extremes:
Gas: -40°F to 350°F (-40 to 177°C) Std
-40°F to 500°F (-40 to 260°C) Optional

Liquid: -40°F to 350°F (-40 to 177°C) Std
-40°F to 500°F (-40 to 260°C) Optional

Wetted Materials: 316SS (Std). Consult the factory for other material requirements.

Mounting: Flange, Packing Gland, Triclover, Hot Tap

Calibration Temperature Capability:
-200 to 800°F (-129 to 427°C)

MODEL 9500 INTEGRAL MICROPROCESSOR

EEPROM Memory: 64K

Displays:
8 digit Flowrate and Totalizer (Optional)

Communicator:
Interface: RS-232 via Ribbon Connector
Baud Rate: 9600
Adjustable Variables with RS-232 Communicator:
Zero Cutoff; Zero Offset
Filter Factor, Flow Full Scale, Flow Rate Decimal Point, Flow Totalizer Decimal Point, Flow Totalizer/Flowrate Ratio

Power: 120/240 vac, 50/60 Hz.
24VDC, 1 Amp (Factory Set)

Electrical Connections:
¾" FNPT Power & Signal

Enclosure: Cast Aluminum, Epoxy Painted

Environmental Ratings:
Housing: Explosion Proof, Class 1, Div. 1, Groups, B, C, D Weatherproof: Nema 4
Ambient Temperature:
-25 to 60°C (-13 to 140°F)
Storage Temperature:
-40 to 70 °C (-40 to 158°F)

Mounting:
Integral to the Flow Transducer.
Remote to 4000ft, Wall or Frame mount.

Signal Cable for Remote Design:
18 gauge, 2 pair with cable shield.
Maximum distance, 4000ft.

MODEL 9200B MULTI-FUNCTION FLOW COMPUTER

FEATURES:

- Rate/total and batching functions
- Monitoring and report generation
- Isolated output standard
- RS-232 Port standard, RS-485 optional advanced printing capabilities. Windows™ setup software.
- On board data logging
- Enhanced modern features for remote metering.

Display:
2 lines of 20 characters, backlit LCD

Keypad: Membrane keypad with 16 keys

Real Time Clock

Power Input:
110 VAC Power: 85 to 127 VRMS
50/60 HZ (11.0 VA)
220 VAC Power: 170 to 276 VRMS
50/60 HZ (11.0 VA)

Auxiliary DC Supply with High Current Capacity:
24 VDC, 420 mA (600 mA Peak)
(other voltages on request)

MODEL 926 ELECTRONICS

FEATURES:

- Std. Linearization of all transducer calibration curves to 0.05% FS
- 12 bit linearization – output step size 0.02% FS
- 4-20 MADC isolated output

Power:
110v AC; 220v AC @ ½ Amp;
24v DC @ 1 Amp

Options:
Flow Rate display
Flow Totalizer
8 digit readout
Totalizer with pulse output
Batch counter
Alarm outputs
Hi/Lo set points
Dual range/Dual fluids
Bi-Directional

Housings:
Multiple housings available

Thermal Instrument Co.

217 Sterner Mill Road, Trevose, PA 19053
Tel.: 215-355-8400 Fax: 215-355-1789
Website: www.thermalinstrument.com
Email: office@thermalinstrument.com