

Ultrasonic Flow Meter Optimized For Thermal Energy/BTU

FEATURES

- One meter for a wide range of pipe sizes from 2 to 236 inches (50 to 6000 mm)
- Clamp-on or insertion transducers measure bi-directional flow
- Optional clamp-on or insertion PT 100 temperature inputs for thermal energy/BTU measurement
- Optional current input modules for pressure, temperature, or density
- Accuracy +/- 0.5% of reading from 0.16 to 40 ft/s (0.05 to 12 m/s)
- Repeatability +/- 0.1% of full scale
- Clamp-on transducers operating temperature range: 14°F to 176°F (-10°C to 80°C)
- Clamp-on high-temperature transducers operating temperature range: 14°F to 302°F (-10°C to 150°C)
- 1.5 in (38.1 mm) insertion DIA transducers; operating temperature range: -40°F to 176°F (-40°C to 80°C)
- Key pad with 16 tactile keys with 14 dual-function plus six quick set up keys
- Flow totalizer
- Automatically detects sensor type, calculates optimal mounting
- Internal memory data logger
- Modbus RTU RS-485 output: Sierra Protocol over RS-232, USB, BACnet



www.sierrainstruments.com



InnovaSonic 207i



DESCRIPTION

The InnovaSonic® 207i transit-time ultrasonic flow meter is an innovative clamp-on or insertion transit-time ultrasonic flow meter for general industry use on liquid flows. The 207i is optimized for thermal energy/BTU measurement of liquid flows to give you the critical flow energy data you need to manage costs and improve efficiency.

A critical element in a thermal energy measurement is the amount of heat transferred between the hot flow and cold flow legs. Sierra leads the industry in making these accurate measurements with our advanced thermal mass flow technology.

Our proprietary Raptor II operating system works with our fluid properties database to provide real time density compensation. By accurately measuring the fluid flow, taking into account all fluid properties, and making a precise ΔT measurement, thermal energy/BTU's can be calculated with a high degree of accuracy.

With a robust stainless steel enclosure, the 207i features a large backlit display and dual-function keypad with audible feedback. This makes it simple and convenient to set up and use. Clamp-on sensors mean no pipe cutting or expensive plumbing to install, making the 207i thermal energy/BTU a complete flow metering system in a wide range of applications.

The InnovaSonic 207i features NIST traceable calibration of the entire system and is a complete thermal energy/BTU metering package you can trust for highly accurate flow energy measurement.

PERFORMANCE SPECIFICATIONS TRANSMITTERS & TRANSDUCERS

Fluids

All acoustically conductive fluids with <10% solids or bubbles

Quantities Measured

Volumetric flow totalized mass flow heat energy

Totalized flow density speed heat capacity

Enthalpy

Ambient temperature

Inlet and outlet temperature via PT100 or current inputs

Pressure (optional)

Reynold's number

Pipe Size

2 to 236 inches (50 to 6000 mm)

Accuracy

Accuracy +/- 0.5% of reading from 0.16 to 40 ft/s
(0.05 to 12 m/s)

Repeatability

+/- 0.1% of full scale

Resolution

0.01 ft/s (0.00025 m/s)

Response time

150 ms measuring cycle

OPERATING SPECIFICATIONS

Flow Velocity Range

Bi-directional flows: 0.16 to 40 ft/s (0.05 to 12 m/s)

Note: 0.16 ft/s (0.05 m/s) is the default low flow cut-off

Temperature

Ambient electronics: -4.0 °F to 149°F (-20°C to 65°C)

Clamp-on transducer: 14°F to 176°F (-10°C to 80°C)

High temperature clamp-on transducer 14°F to 302°F
(-10°C to 150°C)

Insertion transducer: -40°F to 176°F (-40°C to 80°C)

Note: insertion pressure limited to 300 psig (20 barg)

Relative Humidity

Up to 99% RH, (non-condensing)

Power Supply

AC powered 100-240 VAC, 50-60 hz, .5 Amps

24 VDC (both are available on each unit)

Power consumption <10W, 5V @2A fused

Analog Output

Analog: active or passive 0/4 to 20 mA current loop

Accuracy: +/- 0.1% of reading

Active loop Rext <750 Ohm

Passive loop V<24 VDC, Rext <1 kOhm

Note: for 0 to 5 VDC output, add 250 Ohm resistor to 0 to 20 mA loop

Digital Output

Pulse output: 0 to 9999 Hz, OCT (min. and max. frequency adjustable)

Relay output: SPST, max. 1 Hz, (1A @ 125 VAC or 2A @ 30 VDC)

Digital communications

Modbus RTU protocol RS-485, RS-232 and USB proprietary

Sierra Protocol, BACnet

Inputs

Upstream and downstream ultrasonic transducers

Standard frequency is 1 Mhz. Two PT 100 RTD inputs (optional)

Two wire or four wire supported

Range: -4.0 °F to 302°F (-20°C to 150°C)

Resolution: 0.018°F (0.01°K)

Accuracy: +/- 0.01% of reading +/- 0.05°F (0.03°K)

Optional configurable current inputs for temperature, pressure, and density

Languages Supported

English (Spanish, French, German, Mandarin, others pending)

SOFTWARE

Software

Smart Interface Program (SIP) (pending)

Allows access to all meter functions via USB or RS-232

Diagnostics

Speed of Sound (SOS)

Transit time (Δt)

Signal strength

Data Logging

Internal data logging

Note: Each record is less than 100 bytes depending on whether flow or flow and energy are logged

PHYSICAL SPECIFICATIONS TRANSMITTERS & TRANSDUCERS

Transmitter

Wall-mounted
NEMA 4X (IP65), stainless steel

Transducer

Clamp-on Transducer: encapsulated design IP68
Standard cable length: 30 ft (9 m)
Maximum cable length: 300 ft (90 m)
Memkey for automatic detection of sensor characteristics

Transducer Mounting Methods

Pipe strap
Chain
Pipe clamps

Keypad

16 tactile keys with 14 dual-function keys

Display

20 by 2 character backlit LCD

Weights

Transmitter: approximately 4.7 lb. (2.2 kg)
Transducer: approximately 2 lb. (0.9 kg)

207i Transmitter Wall Mount with Transducers



OPTIONAL CLAMP-ON OR INSERTION RTDs

Sierra offers clamp-on and insertion RTDs to make the precise delta T measurement, so thermal energy can be calculated with a high degree of accuracy (See page 7 and 8 for dimensional drawings).

PERFORMANCE SPECIFICATIONS

Accuracy

RTD: $\pm 0.12\%$ at 0°C
Complete NIST-traceable calibration records

OPERATING SPECIFICATIONS

Temperature

Measurements up to 450°F (232°C)

Type

Pt 385 RTD; 4-Wire; 100 ohm, $\alpha = 0.00385$ (standard)

Stability

RTD: 0.2°C after 10,000 hours at maximum temperature
(1 year, 51 days, 16 hours continuous)

Response Time

RTD: < 5 seconds
Typical to reach a 63.2% temperature change

Humidity

Excellent moisture resistance for condensing environments

Calibration

NIST traceable test data indicating actual vs. standard temperature is supplied with each RTD

PHYSICAL SPECIFICATIONS

Enclosure

Aluminum body with aluminum cap, explosion-proof and flameproof

Rating

NEMA 4X, IP66
PT100 platinum RTD 4-wire

Electrical Connections

6-position terminal block

Thermowell

Standard-duty threaded, stepped well
Threaded, $\frac{1}{2}$ -inch NPT
2-inch thermowell insertion length, no lagging extension
Sensor sheath material: stainless steel 316NUN nipple union nipple

Lead Wire Materials

Teflon insulated, hermetically sealed

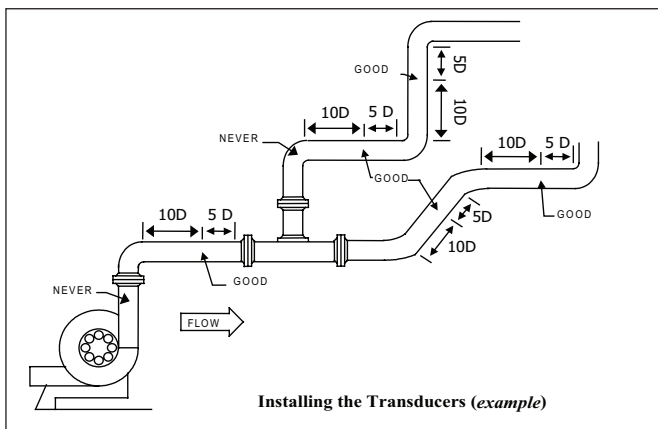
Wire Size

20 gauge wire

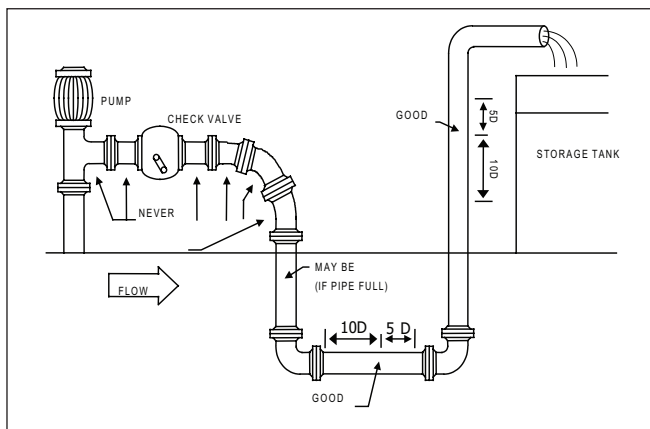
Pull Force

Wires will withstand at least 20 lbs. of pull force before separating from sensor head

Optimal Transducer Installation Examples

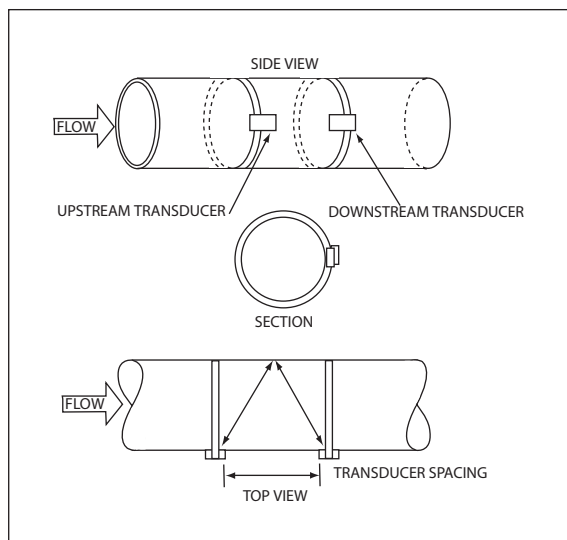


Transducer Installation For Pump Storage Tanks

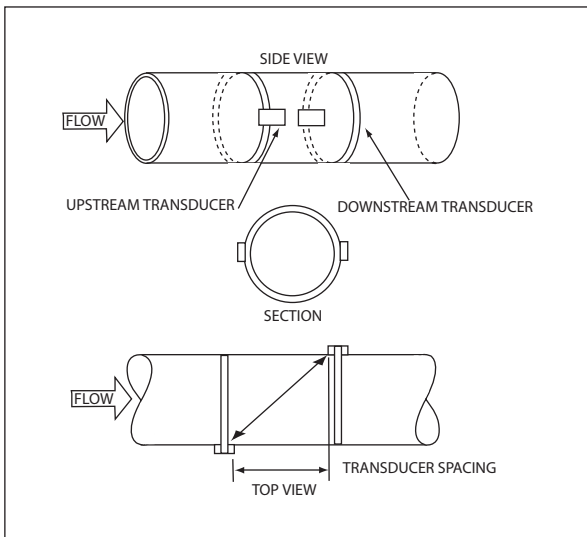


TRANSDUCER SPACING REQUIREMENTS

V Mount



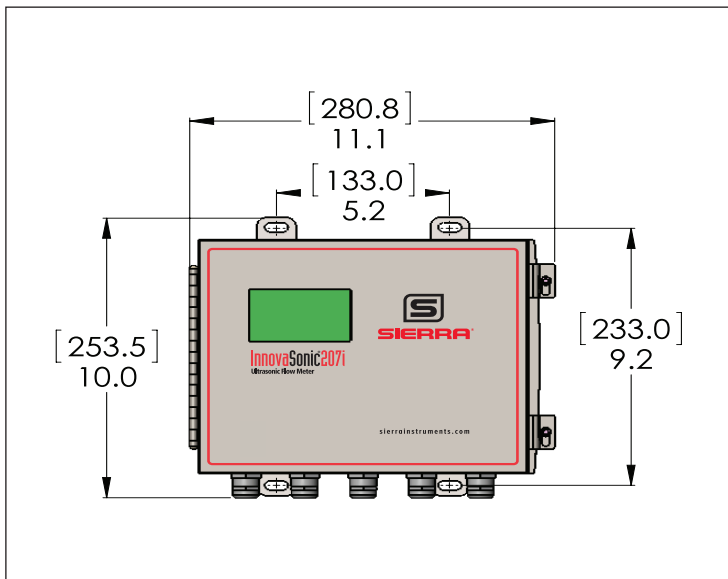
Z Mount



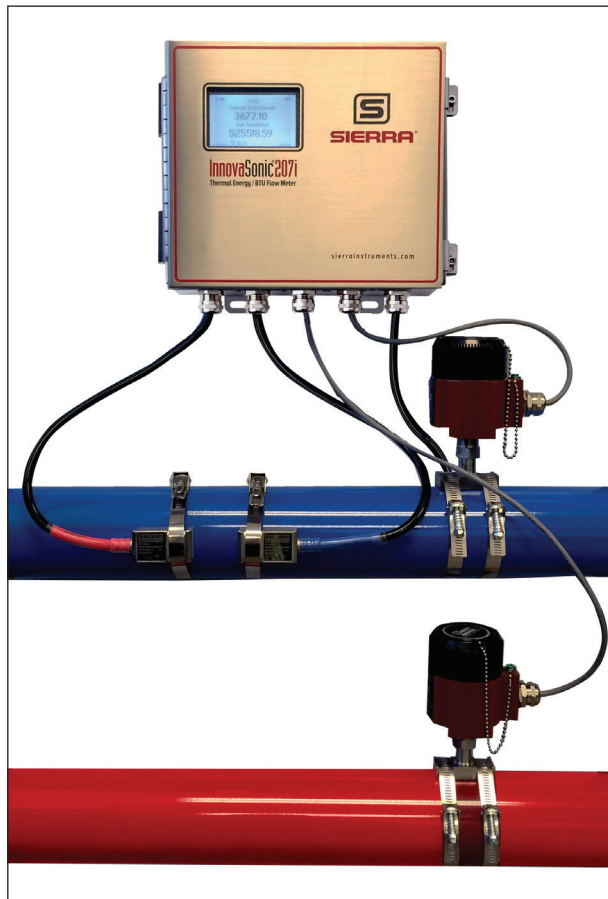
Transmitter Wall Mount with Transducers and RTDs



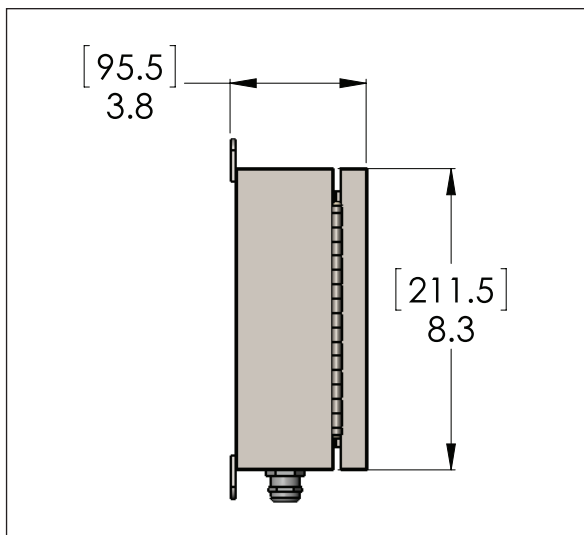
Front View 207i Transmitter Wall Mount



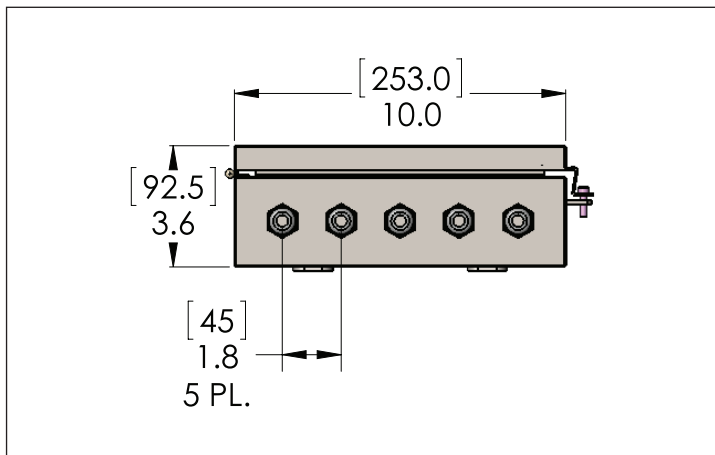
207i Optimized for Thermal Energy/BTU: Clamp-on transducer plus RTDs



Side View 207i Transmitter Wall Mount

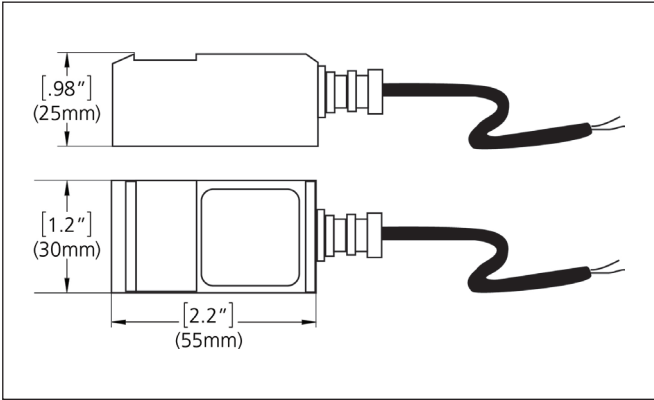


Bottom View 207i Transmitter Wall Mount

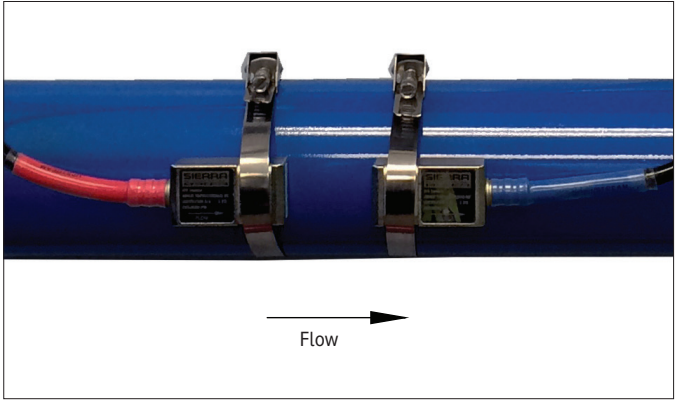


CLAMP-ON TRANSDUCER DIMENSIONS

Side View 207i Clamp-on Transducers



Front View Clamp-on Transducers

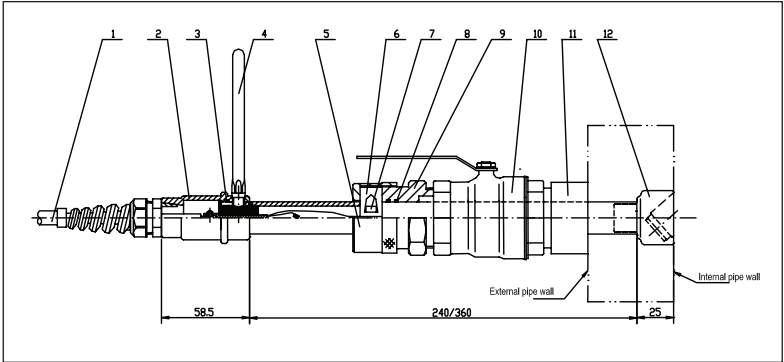


Note: Transducer hazardous area classification: Ex d II BT4

INSERTION TRANSDUCER DIMENSIONS

Dimensional Specification - Standards Insertion Sensor			
No.	Parts	No.	Parts
1	Cable	7	Locking Nut
2	End Connector	8	Locating Sleeve
3	O-Ring	9	Joint Nut
4	Alignment Handle	10	Ball Valve
5	Locking Sleeve	11	Pedestal
6	Locking Collar	12	Sensor

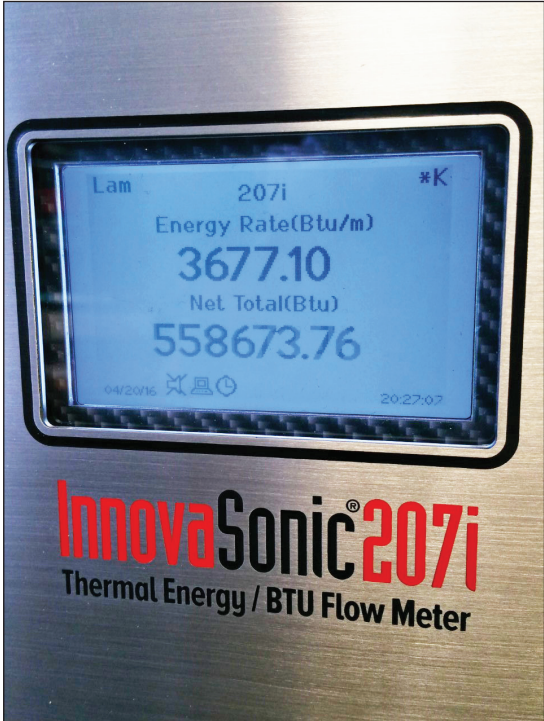
Standard Insertion Transducer



Standard Insertion Transducer

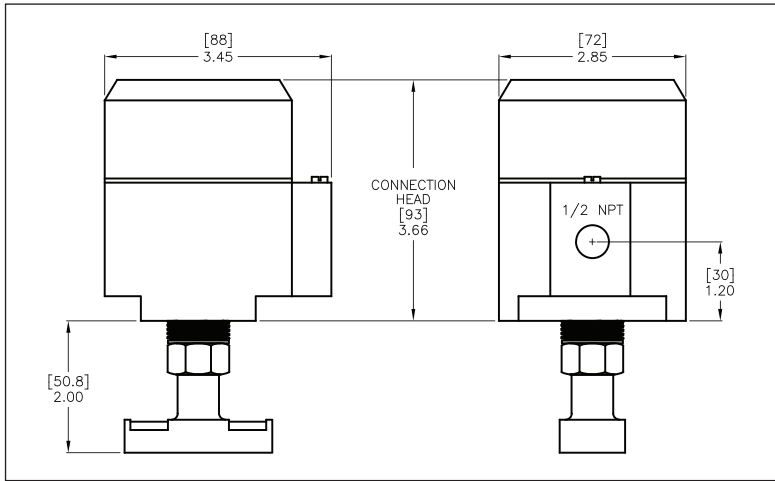


Display For Thermal Energy / BTU

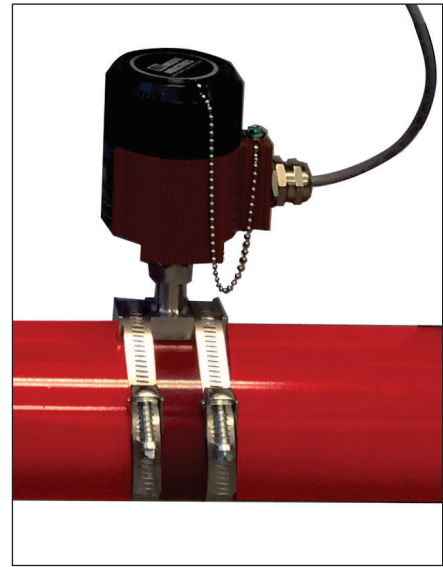


InnovaSonic® 207i
Thermal Energy / BTU Flow Meter

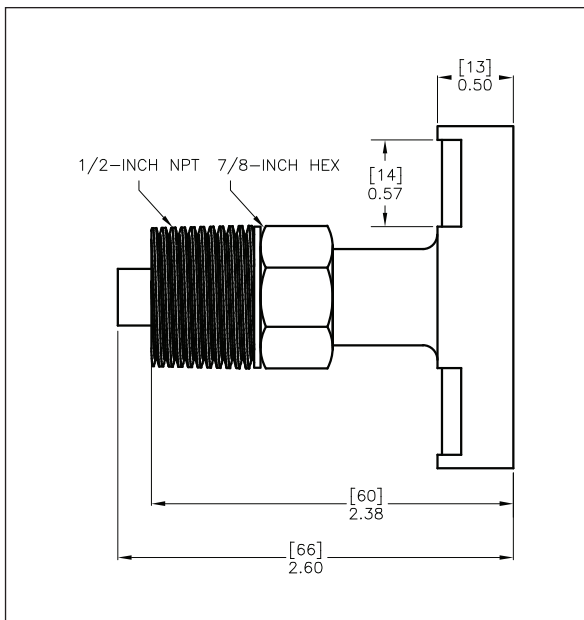
Clamp-on PT 100 RTD Front View



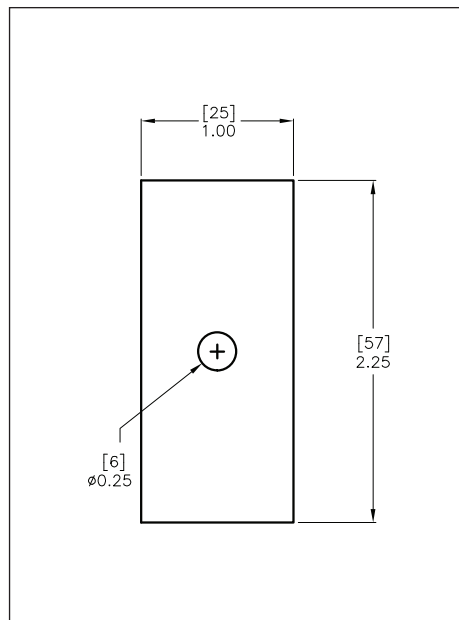
Clamp-on PT 100 RTD



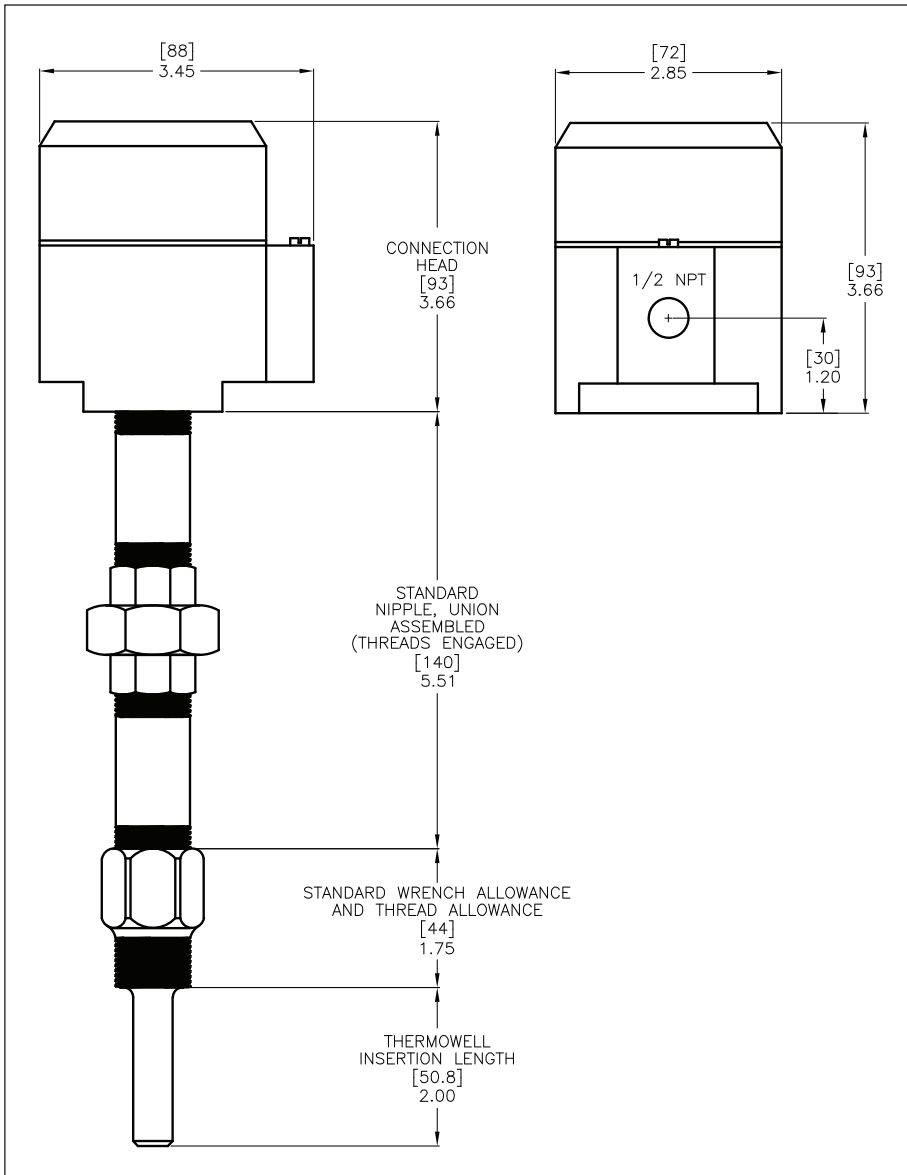
Clamp-on PT 100 RTD Side View



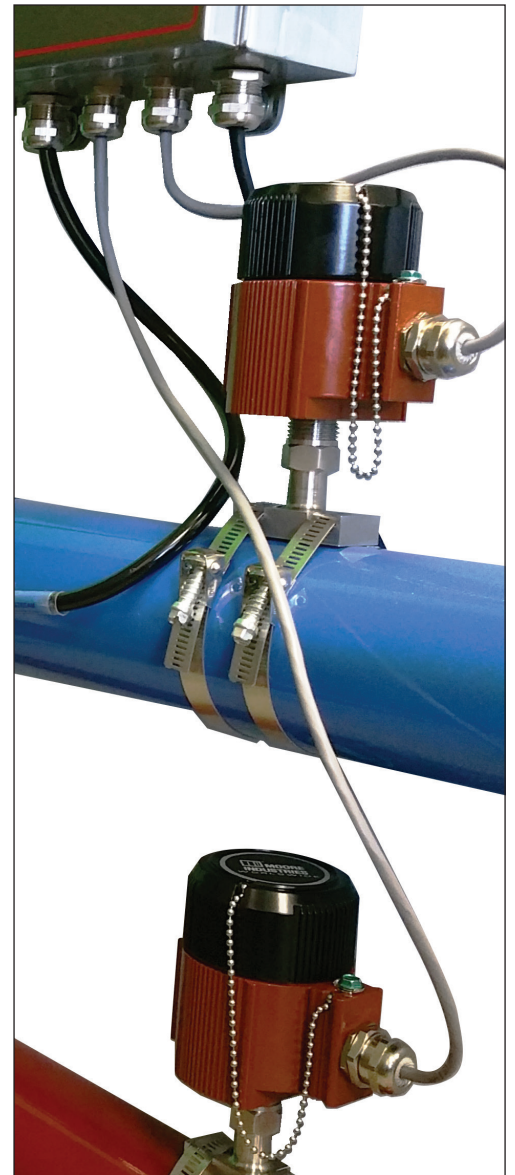
Clamp-on PT 100 RTD Back View

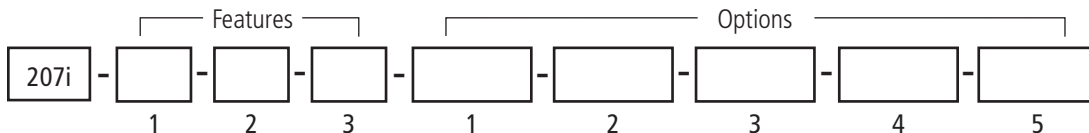


Insertion RTD Front View



Clamp-on PT 100 RTD Installation Example





Instructions: To order the 207i, please fill in each number block by selecting the codes from the corresponding features below.

Parent Number	
207i	InnovaSonic® Ultrasonic Flow Meter Optimized for Thermal Energy/BTU

Feature 1: Power	
P2	24 VDC, .5 Amps
P3	AC powered 100-240 VAC, 50-60 hz, .5 Amps

Feature 2: Transducer	
S	Clamp-on transducer, operating temperature: 14°F to 176°F (-10°C to 80°C) IP 68; transducer hazard area classification Ex d II BT4
H	High-temperature clamp-on transducer, operating temperature: 14°F to 176°F (-10°C to 80°C)
W	Insertion transducer, operating temperature: -40°F to 176°F (-40°C to 80°C). 1.5 inch (38.1 mm) DIA insertion transducer. Suitable for pipes 2 to 236 inches (50 to 6000 mm); IP 68; Note: Insertion pressure limited to 300 psig (20 barg). Insertion transducers include ball valves 1.5-inch (38.1mm); carbon steel installation seat for ball valve (brass), mounting kit (includes 4 screws and four plastic bushings) and seal kits (consult factory for other materials).

Feature 3: Transducer Cable	
30	30 ft. (9m) standard cable length
X (in feet)	Special length up to 300 ft. (90 m)

Note: Note: 207i has six (6) expansion slots. These slots may be used as required for options below:

Option 1: PT100 Inputs	
PT100()	Accepts input from PT100 RTD; specify quantity (typically 2) in parenthesis

Option 2: 4-20mA Inputs	
AI()	Accepts analog current; inputs from any device (typically temp, pressure, or density); specify quantity in parenthesis

Option 3: Modbus RS-485 Output	
Modbus	Modbus RS-485 output; outputs Modbus RTU protocol

Option 4: BacNet Output	
BACnet	BACnet output; outputs BACnet protocol

Option 5: Strain Reliefs	
STRAIN	5 x 3/4 inch strain reliefs in cable (not required for conduit)

Accessories (RTDs)	
RTDC ()	2x clamp on PT 100 RTD, 4- wire. Nema 4x enclosure. Maximum operating temperature: 450°F (232°C). Insert cable length in parenthesis
RTDI ()	2x Insertion PT 100 RTD, 4- wire. Nema 4x enclosure. Maximum operating temperature: 450°F (232°C) Insert cable length in parenthesis.

Accessories (Mounting)	
205-2011	Coupling compound (100 g)
205-2010	Pipe straps 43 inches (1092 mm)

Flexibility And Options.

Learn About Our New Rental Program.

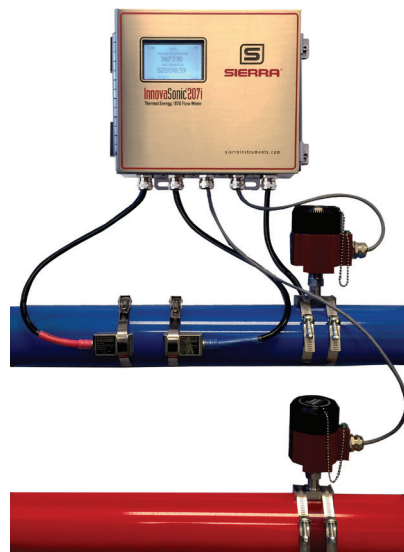
How To Apply For Rental

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