MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Description

The MTI10 insertion thermal mass flowmeter and the MTL10 in-line thermal mass flowmeter provide accurate mass flow measurement of clean, dry gases using constant temperature differential sensing for fast response and low flow accuracy. Constant temperature differential is achieved by changing the power to the sensor. The amount of power applied to the sensor is proportional to the mass flow rate of the gas being measured. The MTI10/MTL10 is virtually immune to changes in temperature and pressure over a wide range of flow.

The unique Cal-V feature allows for in-situ testing of the meter's accuracy by testing the functionality of the sensor and the processing circuitry.

MTI10_MTL10 View software allows the user to adjust the meter configuration, monitor alarm conditions, log data and view data from your PC. The MTI10_MTL10 View software connects the flowmeter to a PC using an USB mini connection.

The MTI10/MTL10 electronics are ideal in environments where high vibration or dirty power may affect meter performance. The transmitter provides a wide range of user outputs including two 4-20mA, pulse or alarm, and Modbus RTU.

Feature	Benefit
Calibrated in actual gas	Better accuracy, surrogate gases are not always linear across entire flow range
Higher power than competitor sensors	Faster response time, wider turndown
Temperature differential sensing	Better low flow accuracy
Cal-V	In-situ validation of sensor and circuitry, no need to return meter to factory
MTI10_MTL10 View	Ability to log data, adjust meter configuration and monitor alarm conditions from a PC
Immune to changes in temperature and pressure	Delivers repeatable, accurate flow measurement under varying flows

Performance Specifications

Specification	Product	Performance
Accuracy	MTL10 In-line MTI10 Insertion	±1.0% of rate ±0.2% full scale ±1.0% of rate ±0.4% full scale
Repeatability	MTI10/MTL10	±0.2% full scale
Straight run requirements	MTL10 In-line MTI10 Insertion	8 diameters upstream, 4 diameters down 15 diameters upstream, 10 diameters down
Flow response time	MTI10/MTL10	0.9 seconds
Temperature accuracy	Standard sensor High temp sensor	±1.0°C (±1.8°F) ±2.0°C (±3.6°F)
Calibration	MTI10/MTL10	NIST standards using actual application gas

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.
In the interests of development and improvement of the product, we reserve the right to change the specification.

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Operating Specifications

Fluid Type

Dry and clean gas or air

Line Size

MTL10 in-line:	8mm to 150mm (0.25" to 6")
MTI10 insertion:	40mm (1.5") and larger

Process Temperature Limit

Standard sensor:	-40 to 121°C (-40 to 250°F)
High temperature sensor:	0 to 343°C (32 to 650°F)

Process Pressure

MTI10 insertion

Compression fitting: 34.5 bar (500 psig)
Retractor assembly : 8.6 bar (125 psig)
High pressure retractor (with crank)
NPT: 41.4 bar (600 psig)
ANSI Class 150 and 300; No valve supplied

MTL10 in-line

NPT: 34.5 bar (500 psig)
ANSI Class 150: 16 bar (230 psig)

Note: Pressure ratings stated for temperatures of 38°C (100°F)

Input Power

DC: 22-26VDC, 24VDC nominal, 0.75 amp. standard
AC: 85 to 264VAC, 47-63Hz, 20 watts optional

Ambient Relative Humidity

0 to 90% RH, non-condensing

Ambient Temperature Limit

DC power: -40 to 70°C (-40 to 158°F)
AC power: -20 to 70°C (-4 to 158°F)
Remote sensor box: -40 to 100°C (-40 to 212°F)

Cable Conduit connection

ANSI 3/4" NPT
M20 x 1.5mm (optional)

Signal cable

5 conductor, 18 AWG , twisted, shielded. Maximum length 100 feet.

Flow range

15 to 60,000 SFPM (0.07 to 280 NMPS)
Turndown: up to 1,000:1; typical 100:1

Typical Flow Range for MTI10 Insertion

Nominal Size	SCFM	NM³/hr
40mm (1.5")	0 - 840	0 - 1,320
50mm (2.0")	0 - 1,400	0 - 2,200
80mm (3.0")	0 - 3,080	0 - 4,860
100mm (4.0")	0 - 5,300	0 - 8,360
150mm (6.0")	0 - 12,000	0 - 18,900
200mm (8.0")	0 - 20,800	0 - 32,800
300mm (12.0")	0 - 46,600	0 - 73,500

Full Scale Range for MTL10 In-line

Nominal Size	SCFM	NM³/hr
8 (0.25)	0 - 20	0 - 32
15 (0.50)	0 - 90	0 - 140
20 (0.75)	0 - 180	0 - 280
25 (1.00)	0 - 320	0 - 500
32 (1.25)	0 - 580	0 - 910
40 (1.50)	0 - 840	0 - 1,320
50 (2.00)	0 - 1,400	0 - 2,200
65 (2.50)	0 - 2,000	0 - 3,150
80 (3.00)	0 - 3,080	0 - 4,860
100 (4.00)	0 - 5,300	0 - 8,360
150 (6.00)	0 - 12,000	0 - 18,900

Note: Standard conditions of air at 70°F and one atmosphere. Consult Spirax Sarco for other gases and flow ranges.

Outputs

Analog

Two isolated 4-20mA output (one for flow rate, second programmable for flow rate or temperature); fault indication per NAMUR NE43

Pulse

Isolated pulse output 0 – 100HZ, 5 – 24 volts p/p for flow.
10 amps max.

Communications

USB - Connect to PC using MTI10_MTL10 View software provides configuration capability, remote process monitoring, and data logging.
Modbus RTU – RS 485

Physical Specifications

Sensor Material

316 stainless steel, Hastelloy C276 (optional)

Probe

316 stainless steel

Compression Fitting

316 stainless steel

Enclosure

NEMA 4X (IP68), aluminum

Agency Approvals

CE Approved - MTI10, 24 VDC power only
FM and FMc: Approved
Class I, Div. 1, Groups B, C, D; Class II, Div.1, Groups E, F, G; Class III, Div. 1; T3C

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Dimensions

MTI10 Insertion with retractor, local and remote

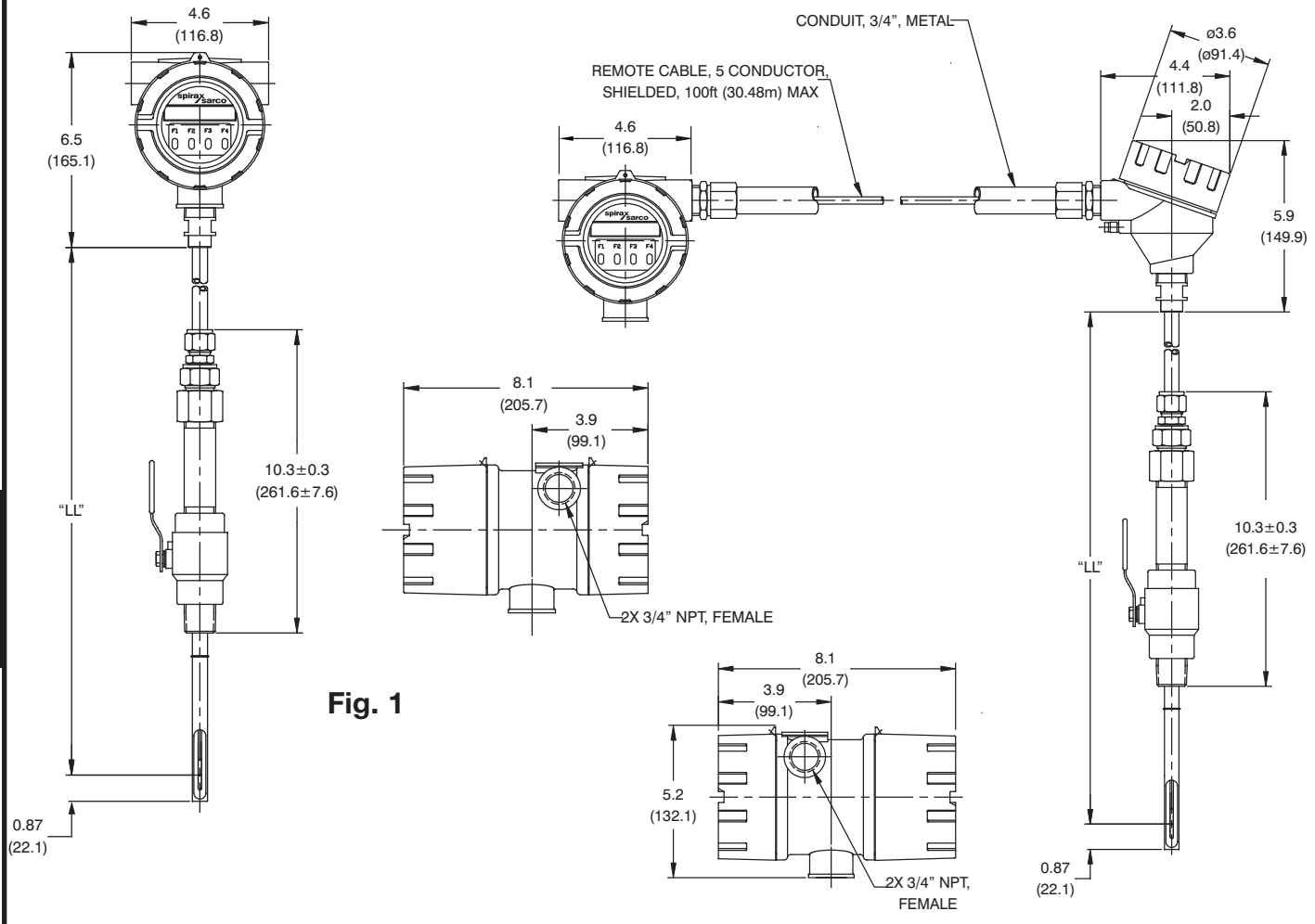


Fig. 1

Fig. 2

MTI10 Insertion Meter With Retractor		
Probe Size	Probe Size	Dimension "LL" ± .01
Model Code	mm (inches)	mm (inches)
375R	375 (15)	375 (15)
450R	450 (18)	450 (18)
600R	600 (24)	600 (24)
750R	750 (30)	750 (30)
900R	900 (36)	900 (36)

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

MTI10 Insertion with stainless steel probe, local and remote

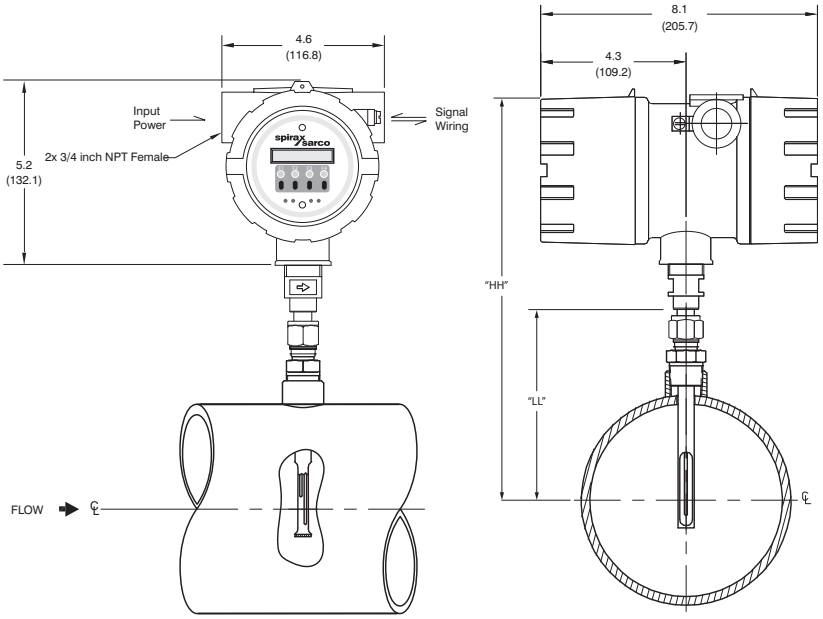


Fig. 3

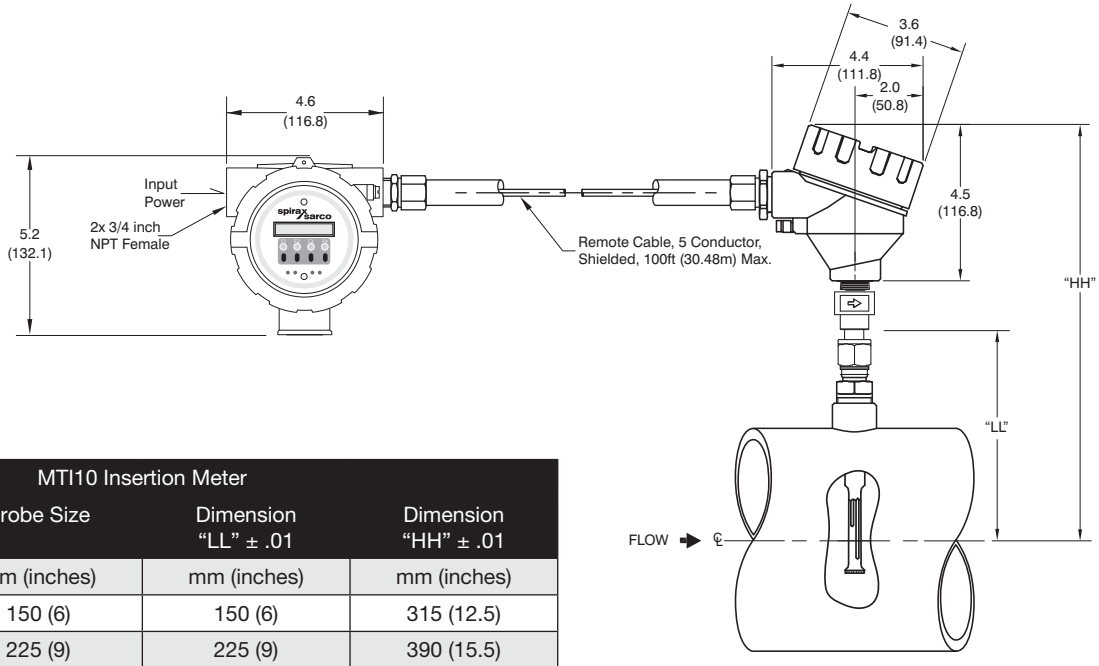


Fig. 4

MTI10 Insertion Meter			
Probe Size	Probe Size	Dimension "LL" ± .01	Dimension "HH" ± .01
Model Code	mm (inches)	mm (inches)	mm (inches)
150I	150 (6)	150 (6)	315 (12.5)
225I	225 (9)	225 (9)	390 (15.5)
300I	300 (12)	300 (12)	470 (18.5)
375I	375 (15)	375 (15)	550 (21.5)
450I	450 (18)	450 (18)	620 (24.5)
600I	600 (24)	600 (24)	770 (30.5)
750I	750 (30)	750 (30)	930 (36.5)
900I	900 (36)	900 (36)	1080 (42.5)

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

MTL10 In-line with NPT connections, local and remote

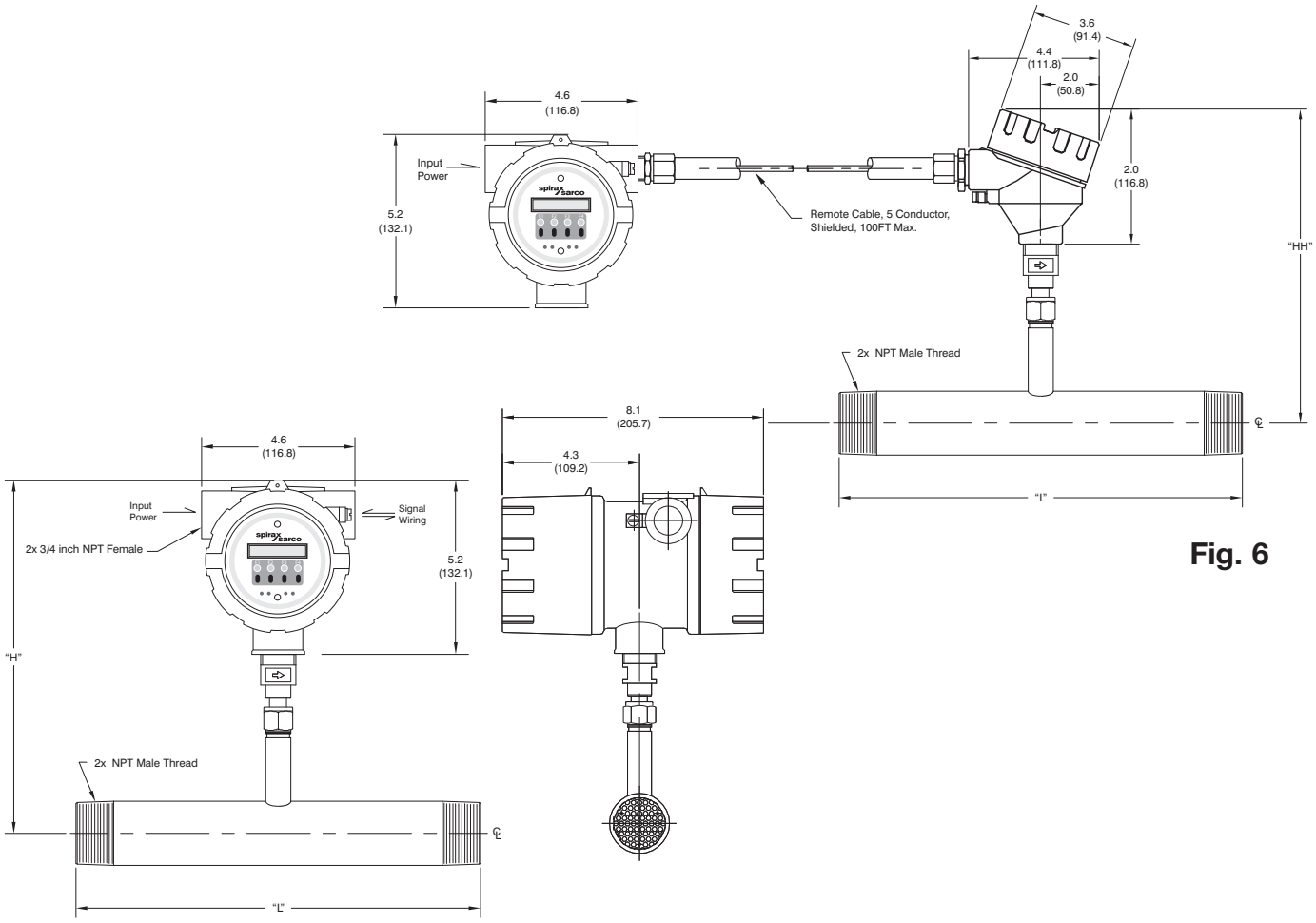


Fig. 6

Fig. 5

In-line Meter With NPT Connections			
Body Size	Body Size	Dimension "L"	Dimension "H"
Model Code	mm (inches)	mm (inches)	mm (inches)
8	8 (0.25)	145 (5.8)	265 (10.5)
15	15 (0.50)	300 (12)	265 (10.5)
20	20 (0.75)	300 (12)	265 (10.5)
25	25 (1.00)	300 (12)	265 (10.5)
32	32 (1.25)	300 (12)	265 (10.5)
40	40 (1.50)	300 (12)	265 (10.5)
50	50 (2.00)	300 (12)	265 (10.5)
65	65 (2.50)	450 (18)	270 (10.6)
80	80 (3.00)	450 (18)	270 (10.6)
100	100 (4.00)	450 (18)	280 (11.1)

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

MTL10 In-line with ANSI 150# RF flange connections, local and remote

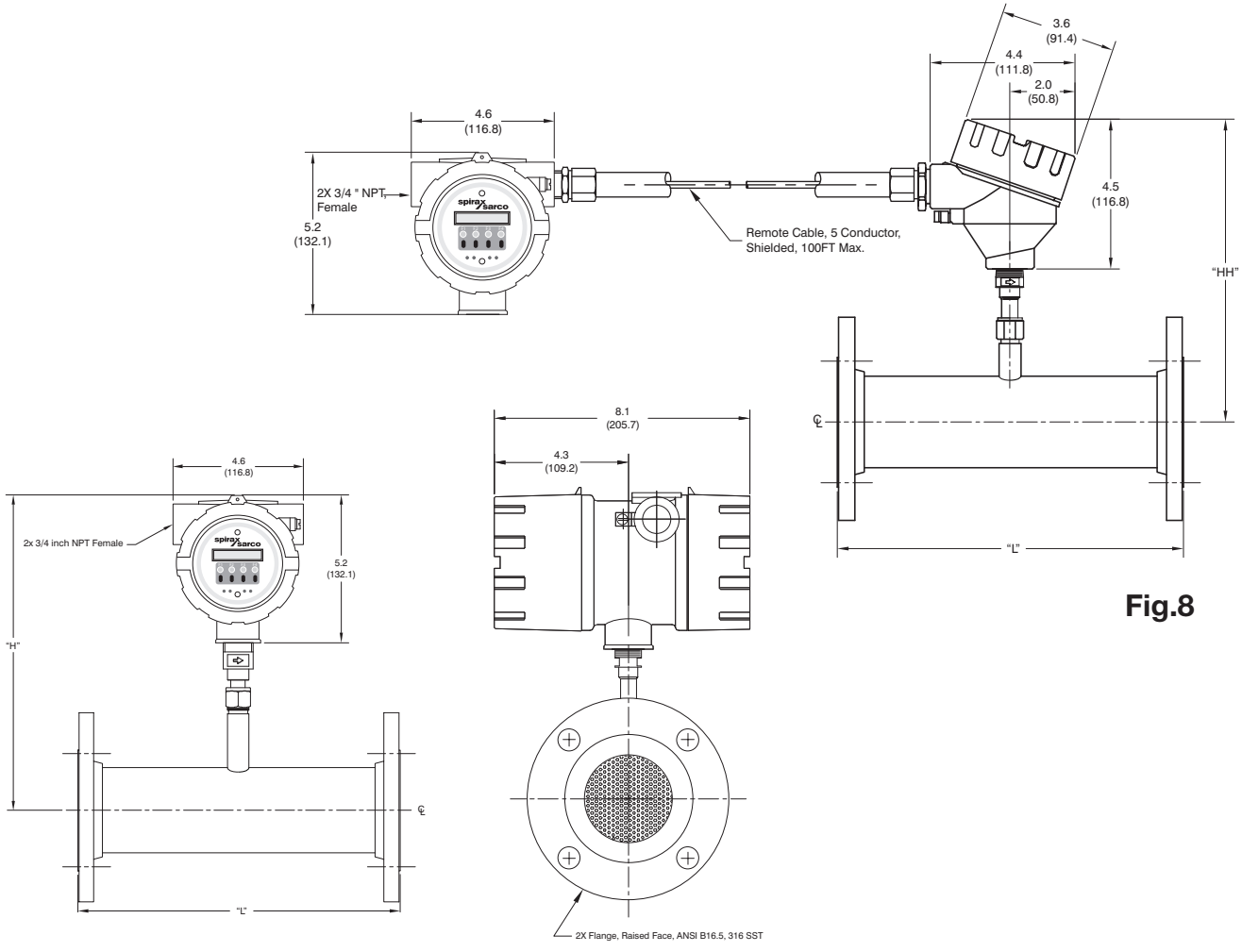


Fig.8

Fig. 7

In-line Meter With Flange Connections			
Body Size	Body Size	Dimension "L"	Dimension "H"
Model Code	mm (inches)	mm (inches)	mm (inches)
15	15 (0.50)	300 (12)	265 (10.5)
20	20 (0.75)	300 (12)	265 (10.5)
25	25 (1.00)	300 (12)	265 (10.5)
32	32 (1.25)	300 (12)	265 (10.5)
40	40 (1.50)	300 (12)	265 (10.5)
50	50 (2.00)	300 (12)	265 (10.5)
65	65 (2.50)	450 (18)	270 (10.6)
80	80 (3.00)	450 (18)	270 (10.6)
100	100 (4.00)	450 (18)	280 (11.1)
150	150 (6.00)	600 (24)	310 (12.2)

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Ordering Information

MTI10 Insertion

Category	Description	Suffix Code							
Model	Mass Thermal Insertion & Temperature Transmitter	MTI10							
Probe	150mm (6") Sensor		150I						
	300mm (12") Sensor		300I						
	375mm (15") Sensor		375I						
	450mm (18") Sensor		450I						
	600mm (24") Sensor		600I						
	750mm (30") Sensor		750I						
	900mm (36") Sensor		900I						
	375mm (15") Sensor, 125 psig retractor with 3/4" NPT full port valve		375R						
	450mm (18") Sensor, 125 psig retractor with 3/4" NPT full port valve		450R						
	600mm (24") Sensor, 125 psig retractor with 3/4" NPT full port valve		600R						
	750mm (30") Sensor, 125 psig retractor with 3/4" NPT full port valve		750R						
	900mm (36") Sensor, 125 psig retractor with 3/4" NPT full port valve		900R						
Sensor Material	316 SS wetted parts: temperature sens\or, probe, compression fitting			SS					
	Hastelloy C-276 sensor & probe, 316 SS compression fitting			SH					
	Hastelloy C-276 sensor & probe, Monel compression fitting			SJ					
	Hastelloy C-276 sensor & probe, Hastelloy C-276 compression fitting			SL					
Temperature Transmitter Type	Standard -40 to 120°C (-40 to 250°F)				ST				
	High Temperature 0 to 343°C (32 to 650°F)[1]				HT				
Enclosure	Local Enclosure, NEMA 4X, 24 VDC					E1			
	Local Enclosure, NEMA 4X, 85 to 250 VAC					E2			
	Remote sensor J-box, 24 VDC, 100 ft max cable, order separately, requires option board[2]					E3			
	Remote sensor J-box, 85 to 250 VAC, 100 ft max cable, order separately, requires option board[2]					E4			
Display[7]	Rate/Total Display & Configuration Panel						DD		
Option Boards	Blank Option Board[3]							B0	
	Isolated 24VDC power & terminal block for remote sensor[4]							B1	
	Modbus RS485, Isolated 24VDC power & terminal block for remote sensor[4]							B2	

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Calibration[5, 6]	Air, Nitrogen, mass flow < than 2040 NM3M (1200 SCFM)								G1
	Air, Nitrogen, mass flow > than 2040 NM3M (1200 SCFM)								G2
	Argon, Carbon Dioxide, Hydrogen, Natural Gas, Oxygen mass flow < 1700 NM3M (1000 SCFM)								G3
	Argon, Carbon Dioxide, Hydrogen, Natural Gas, Oxygen mass flow > 1700 NM3M (1000 SCFM)								G4
	Carbon Monoxide, Helium, Ammonia, Propane <1190 NM3M (700 SCFM)								G5
	Carbon Monoxide, Helium, Ammonia, Propane >1190 NM3M (700 SCFM)								G6
	Biogas, Digester Gas, Flare Gas, Flash Gas, Vent Gas, and all other gases								G7
Example		MTI10	100I	SS	ST	E1	DD	B2	G3

[1] Remote electronics recommended for all high temperature applications.
[2] Cable not included, it must be ordered separately.
[3] Do not select when ordering remote sensor
[4] Option boards needed for power, communications, and remote display options.
[5] Calibration prices are for new flowmeters only. Contact SSI for recalibration prices.
[6] Above 4,250 NM3M (2,500 SCFM) contact SSI for calibration charge.
[7] Use Display Configuration Code to specify the display orientation based on the flow direction.

Note: Insertion meters can be installed on pipes 40mm (1.5") and larger. Use the inline meters for pipes smaller than 40mm (1.5').

Calculating probe length (probe needs to be installed in the middle of the pipe):
Insertion length = 1/2 the pipe diameter + 80mm (3") + insulation + retractor (codes 15R through 36R use 250mm (10")). Round up to the next largest probe.

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

MTL10 In-line

Line size, pipe material/connection matrix

Standard			ASME	
Rating	NPT		150	
Line size / Material	SST	CS	SST	CS
8mm (0.25”)	Avail			
15mm (0.5”)	Avail		Avail	
20mm (0.75”)	Avail		Avail	
25mm (1.0”)	Avail		Avail	
32mm (1.25”)	Avail		Avail	
40mm (1.5”)	Avail		Avail	
50mm (2.0”)	Avail	Avail	Avail	Avail
65mm (2.5”)	Avail	Avail	Avail	Avail
80mm (3.0”)	Avail	Avail	Avail	Avail
100mm (4.0”)			Avail	Avail
150mm (6.0”)			Avail	

MTL10 In-line Model Code

Category	Description	Suffix Code									
Model[7]	Mass Thermal Inline & Temperature Transmitter	MTL10									
Line Size	8mm (0.25”)		008								
	15mm (0.5”)		015								
	20mm (0.75”)		020								
	25mm (1.0”)		025								
	32mm (1.25”)		032								
	40mm (1.5”)		040								
	50mm (2.0”)		050								
	65mm (2.5”)		065								
	80mm (3.0”)		080								
	100mm (4.0”)		100								
	150mm (6.0”)		150								
Connection	NPT Male			1NB							
	ASME 150			3AB							
Flow Tube	316 SS				6C						
	A106B Grade B Carbon steel				4D						
Sensor Material	316 SS wetted parts: temperature sens\or, probe, compression fitting					SS					
	Hastelloy C-276 sensor & probe, 316 SS compression fitting					SH					
Temperature Transmitter Type	Standard -40 to 120°C (-40 to 250°F)						ST				
	High Temperature 0 to 343°C (32 to 650°F)[1]						HT				
Enclosure	Local Enclosure, NEMA 4X, 24 VDC							E1			
	Local Enclosure, NEMA 4X, 85 to 250 VAC							E2			
	Remote sensor J-box, 24 VDC, 100 ft max cable, order separately, requires option board[2]							E3			
	Remote sensor J-box, 85 to 250 VAC, 100 ft max cable, order separately, requires option board[2]							E4			

MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Display[8]	Rate/Total Display & Configuration Panel								DD		
Option Boards	Blank Option Board[3]									B0	
	Isolated 24VDC power & terminal block for remote sensor[4]									B1	
	Modbus RS485, Isolated 24VDC power & terminal block for remote sensor4									B2	
Calibration[5, 6]	Air, Nitrogen, mass flow < than 2040 NM3M (1200 SCFM)										G1
	Air, Nitrogen, mass flow > than 2040 NM3M (1200 SCFM)										G2
	Argon, Carbon Dioxide, Hydrogen, Natural Gas, Oxygen mass flow < 1700 NM3M (1000 SCFM)										G3
	Argon, Carbon Dioxide, Hydrogen, Natural Gas, Oxygen mass flow > 1700 NM3M (1000 SCFM)										G4
	Carbon Monoxide, Helium, Ammonia, Propane <1190 NM3M (700 SCFM)										G5
	Carbon Monoxide, Helium, Ammonia, Propane >1190 NM3M (700 SCFM)										G6
	Biogas, Digester Gas, Flare Gas, Flash Gas, Vent Gas, and all other gases										G7
Example		MTL10	008	1NB	6C	SS	ST	E1	DD	B1	G1

[1] Remote electronics recommended for all high temperature applications.
[2] Cable not included, it must be ordered separately.
[3] Do not select when ordering remote sensor
[4] Option boards needed for power, communications, and remote display options.
[5] Calibration prices are for new flowmeters only. Contact SSI for recalibration prices.
[6] Above 4,250 NM3M (2,500 SCFM) contact SSI for calibration charge.
[7] MTL10 does not have CE approval
[8] Use Display Configuration Code to specify the display orientation based on the flow direction.

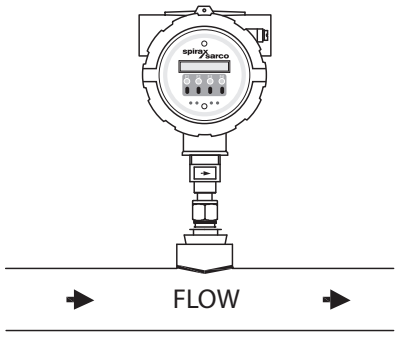
Accessories

Part Number	Description
100657	Stainless Steel Tags
EM000677	Chamber of Commerce Certificate of Origin
101570	5 conductor, 18 AWG PVC shielded cable for remote, specify feet (100' maximum)
SCA00010	Remoted Enclosure Mounting Kit
890000	Flowmeter cleaned and bagged for Oxygen service
102878	Teflon Ferrule Kit (MTI10 only)

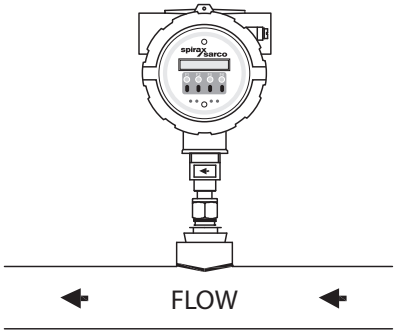
MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Display Configuration Codes

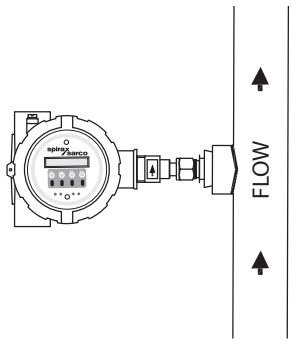
(D1) Display Position



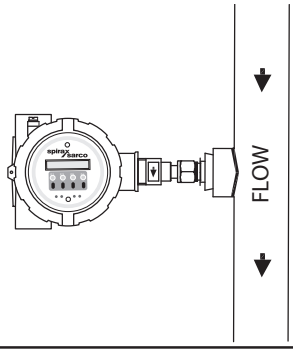
(D2) Display Position



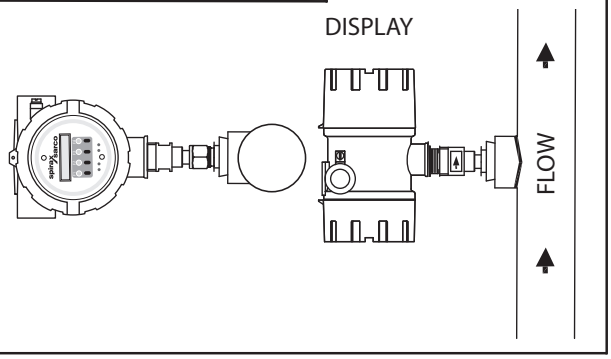
(D3) Display Position



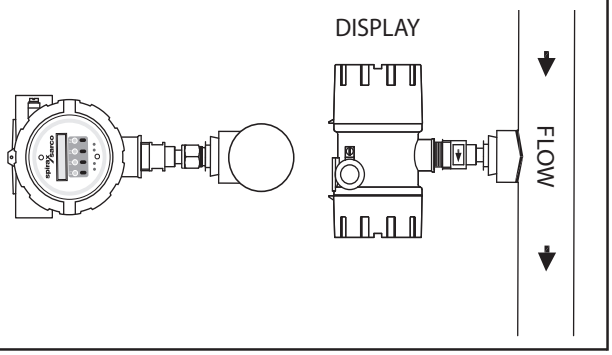
(D4) Display Position



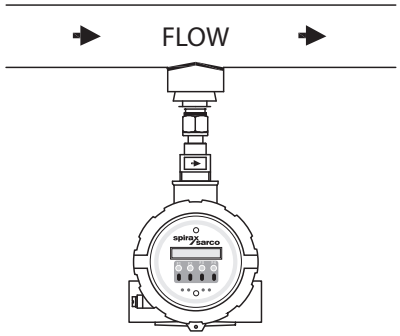
(D5) Display Position



(D6) Display Position



(D7) Display Position



(D8) Display Position