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.

Features	Benefits
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

Operating specifications

Fluid Type	Dry and clean gas or air		
Line Size	MTL10 in-line:		8 mm to 150 mm (0.25" to 6")
	MTI10 insertion:		40 mm (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 psi g)
	Retractor assembly :		8.6 bar (125 psi g)
	High pressure retractor (with crank)		NPT: 41.4 bar (600 psi g)
			ANSI Class 150 and 300; No valve supplied
	MTL10 in-line	NPT:	34.5 bar (500 psi g)
		ANSI Class 150:	16 bar (230 psi g)
Note: Pressure ratings stated for temperatures of 38 °C (100 °F)			
Input Power	DC: 22-26 Vdc, 24 Vdc nominal, 0.75 amp. standard		
	AC: 85 to 264 Vac, 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 ¾" NPT		
	M20 x 1.5 mm (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
40 mm (1.5")	0 - 840	0 - 1,320
50 mm (2.0")	0 - 1,400	0 - 2,200
80 mm (3.0")	0 - 3,080	0 - 4,860
100 mm (4.0")	0 - 5,300	0 - 8,360
150 mm (6.0")	0 - 12,000	0 - 18,900
200 mm (8.0")	0 - 20,800	0 - 32,800
300 mm (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

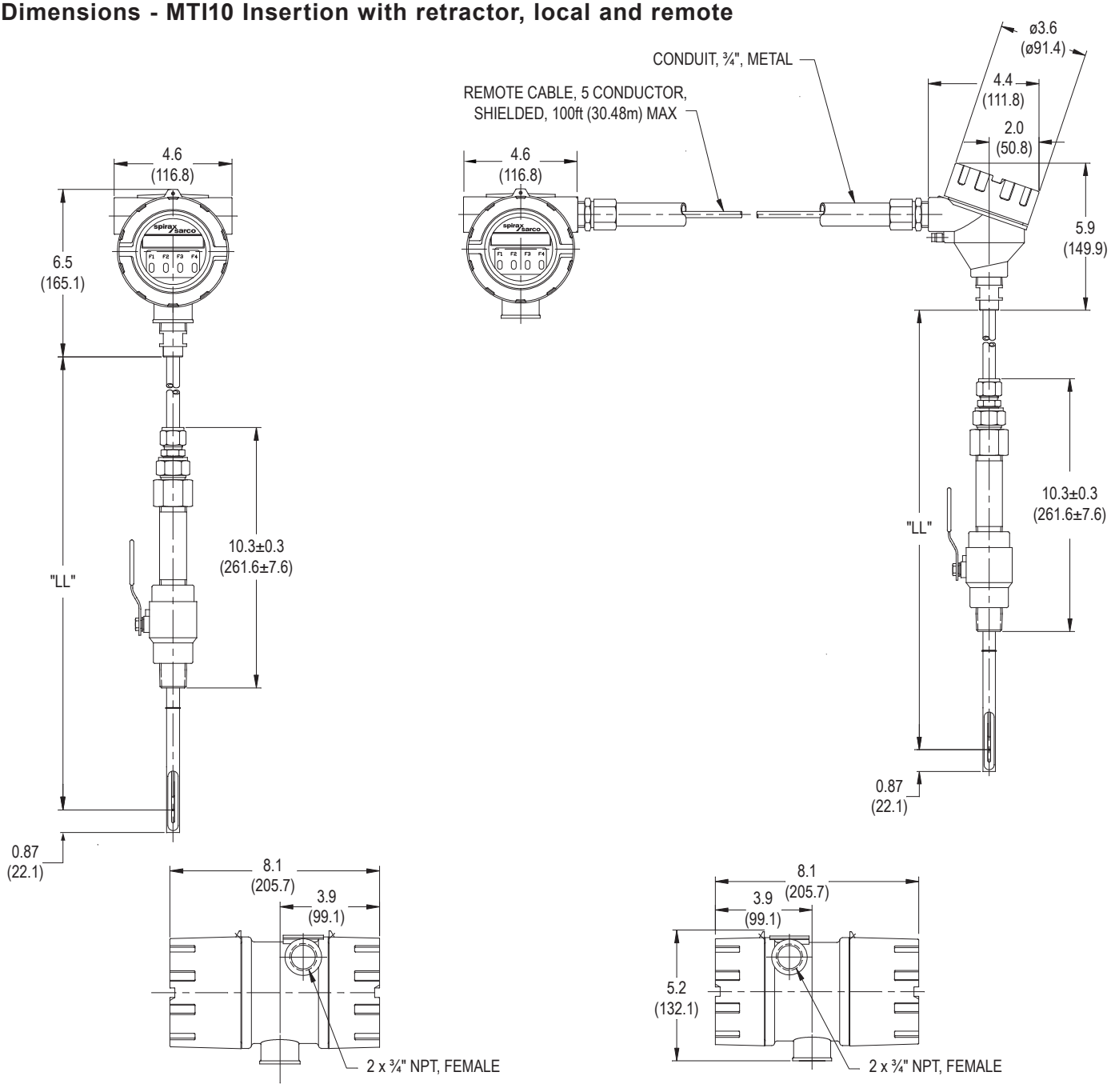
Physical specifications

Sensor Material	316 stainless steel, Hastelloy C276 (optional)
Probe	316 stainless steel
Compression Fitting	316 stainless steel
Enclosure	NEMA 4X (IP68), aluminum

Agency approvals

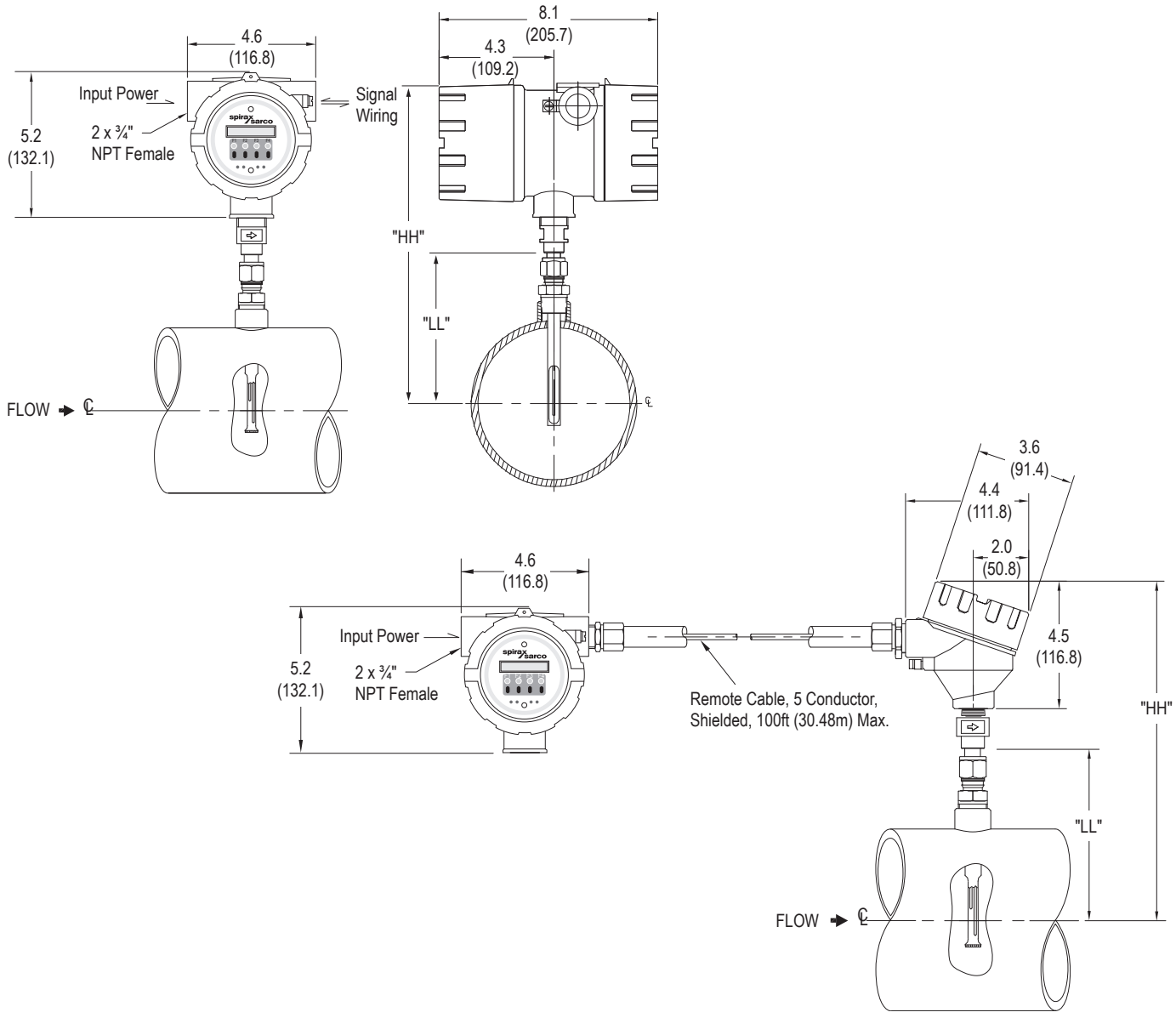
CE Approved - MTI10, 24 Vdc power only

Dimensions - MTI10 Insertion with retractor, local and remote



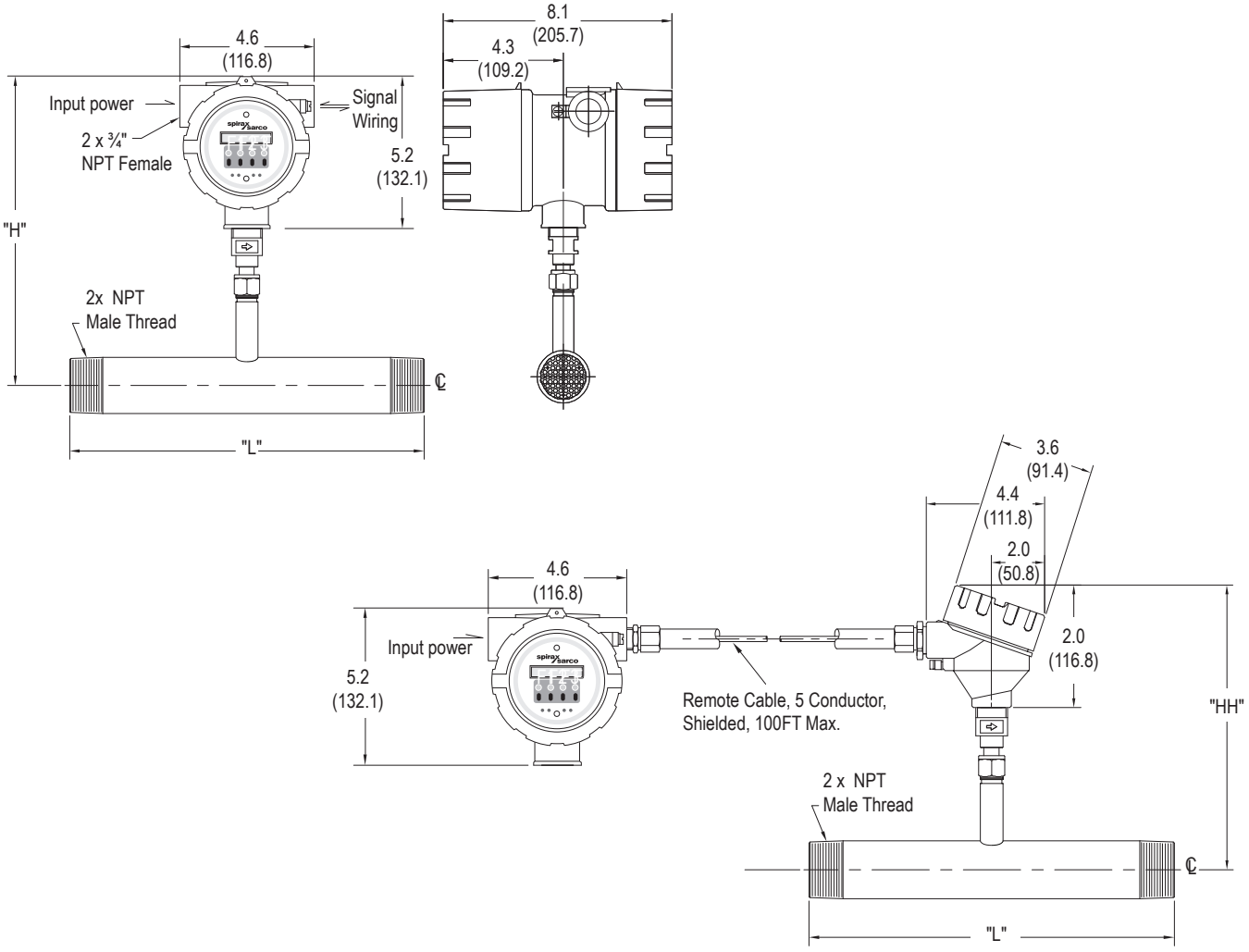
	Probe Size	Probe Size	Dimension "LL" ± .01
	Model Code	mm (inches)	mm (inches)
MTI10 Insertion Meter With Retractor	375R	375 (15)	375 (15)
	450R	450 (18)	450 (18)
	600R	600 (24)	600 (24)
	750R	750 (30)	750 (30)
	900R	900 (36)	900 (36)

Dimensions - MTI10 Insertion with stainless steel probe, local and remote



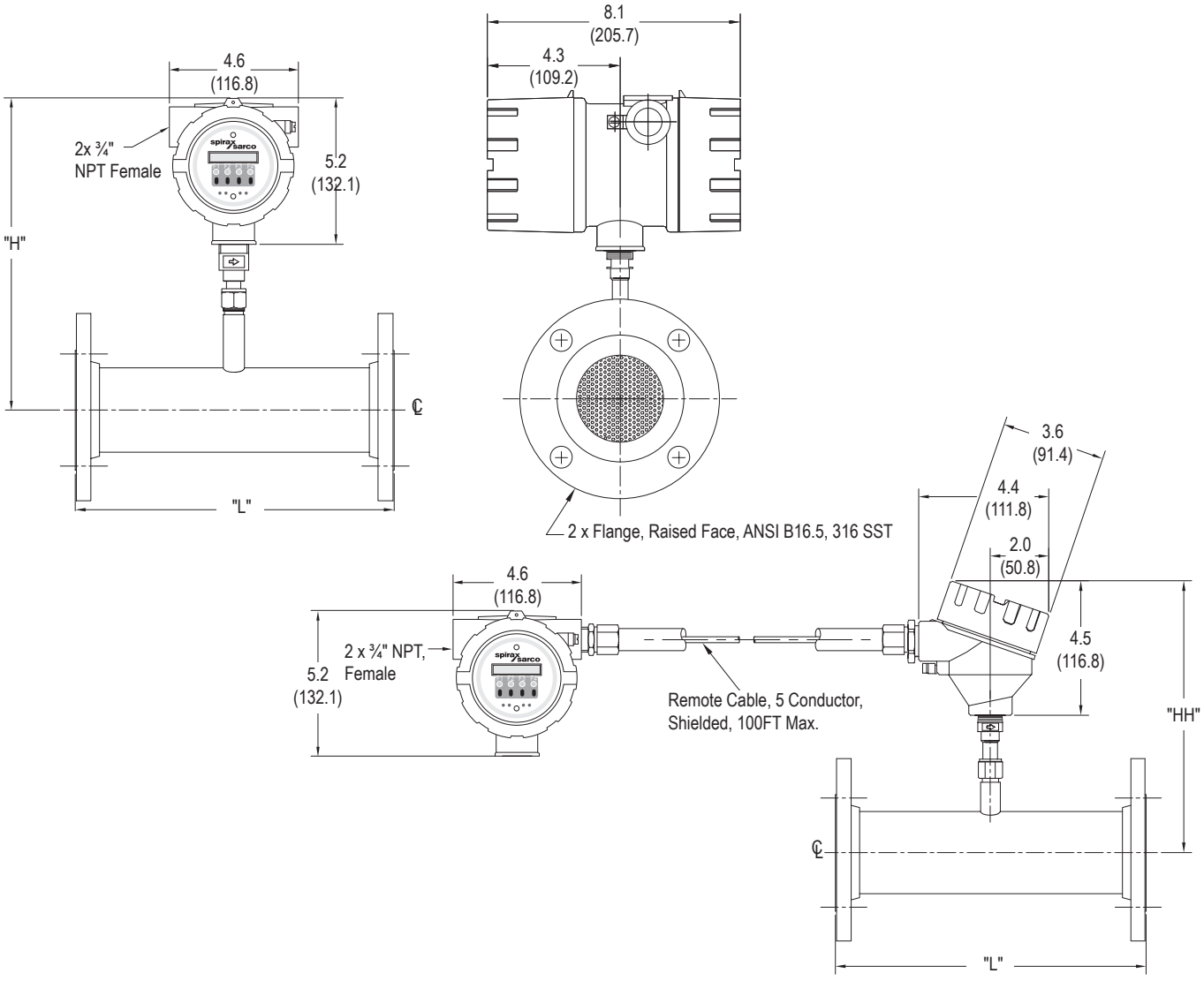
	Probe Size	Probe Size	Dimension "LL" ± .01	Dimension "HH" ± .01
	Model Code	mm (inches)	mm (inches)	mm (inches)
MTI10 Insertion Meter	150I	150 (6)	150 (6)	315 (12.5)
	225I	225 (9)	225 (9)	390 (15.5)
	300I	300 (12)	300 (12)	470 (18.5)
	375I	375 (15)	375 (15)	550 (21.5)
	450I	450 (18)	450 (18)	620 (24.5)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

Dimensions - MTL10 In-line with NPT connections, local and remote



	Body Size	Body Size	Dimension "L"	Dimension "H"
	Model Code	mm (inches)	mm (inches)	mm (inches)
In-line Meter With NPT Connections	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)

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



	Body Size	Body Size	Dimension "L"	Dimension "H"
	Model Code	mm (inches)	mm (inches)	mm (inches)
In-line Meter With Flange Connections	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)

Ordering Information

MTI10 Insertion

Category	Description	Suffix code							
Model	Mass Thermal Insertion and Temperature Transmitter	MTI10							
Probe	150 mm (6") Sensor		150I						
	300 mm (12") Sensor		300I						
	375 mm (15") Sensor		375I						
	450 mm (18") Sensor		450I						
	600 mm (24") Sensor		600I						
	750 mm (30") Sensor		750I						
	900 mm (36") Sensor		900I						
	375 mm (15") Sensor, 125 psi g retractor with ¾" NPT full port valve		375R						
	450 mm (18") Sensor, 125 psi g retractor with ¾" NPT full port valve		450R						
	600 mm (24") Sensor, 125 psi g retractor with ¾" NPT full port valve		600R						
	750 mm (30") Sensor, 125 psi g retractor with ¾" NPT full port valve		750R						
	900 mm (36") Sensor, 125 psi g retractor with ¾" NPT full port valve		900R						
Sensor material	316 SS wetted parts: temperature sens\or, probe, compression fitting			SS					
	Hastelloy C-276 sensor and probe, 316 SS compression fitting			SH					
	Hastelloy C-276 sensor and probe, Monel compression fitting			SJ					
	Hastelloy C-276 sensor and 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				

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Category	Description	Suffix code							
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 and Configuration Panel						DD		
Option boards	Blank Option Board [3]							B0	
	Isolated 24 Vdc power and terminal block for remote sensor [4]							B1	
	Modbus RS485, Isolated 24 Vdc power and terminal block for remote sensor [4]							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		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 40 mm (1.5") and larger. Use the inline meters for pipes smaller than 40 mm (1.5').

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

MTL10 In-line

Line size, pipe material/connection matrix

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

MTL10 In-line Model Code

Category	Description	Suffix code									
Model [7]	Mass Thermal Inline and Temperature Transmitter	MTL10									
Line size	8 mm (0.25")		008								
	15 mm (0.5")		015								
	20 mm (0.75")		020								
	25 mm (1.0")		025								
	32 mm (1.25")		032								
	40 mm (1.5")		040								
	50 mm (2.0")		050								
	65 mm (2.5")		065								
	80 mm (3.0")		080								
	100 mm (4.0")		100								
	150 mm (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 and probe, 316 SS compression fitting					SH					

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Category	Description	Suffix code									
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 [8]	Rate/Total Display and Configuration Panel								DD		
Option Boards	Blank Option Board [3]									B0	
	Isolated 24 Vdc power and terminal block for remote sensor [4]									B1	
	Modbus RS485, Isolated 24 Vdc power and terminal block for remote sensor [4]									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

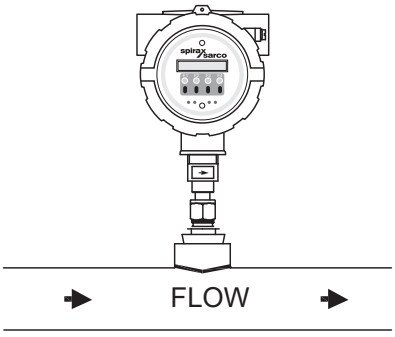
[8] Use Display Configuration Code to specify the display orientation based on the flow direction.

Accessories

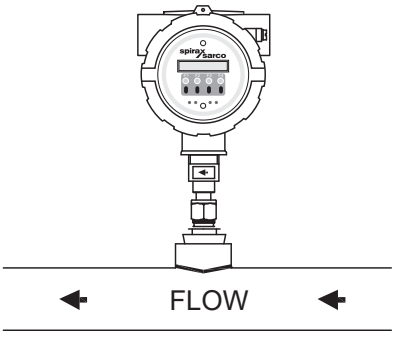
Part Number	Description
100657	Stainless Steel Tags
EM000677	Chamber of Commerce Certificate of Origin
101570	5 conductor, 18 AWG PVC shielded cable for remote, specify feet (100' maximum)
SCA00010	Remoted Enclosure Mounting Kit
890000	Flowmeter cleaned and bagged for Oxygen service
102878	Teflon Ferrule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

Display configuration codes

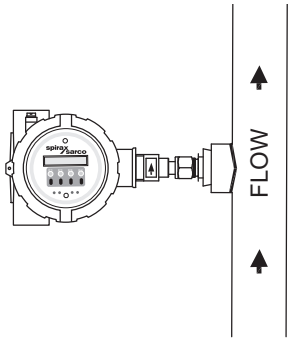
(D1) Display position



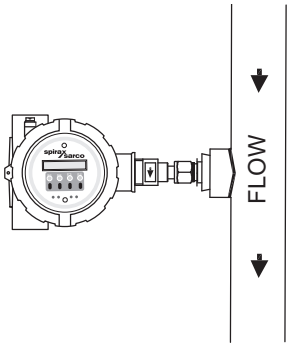
(D2) Display position



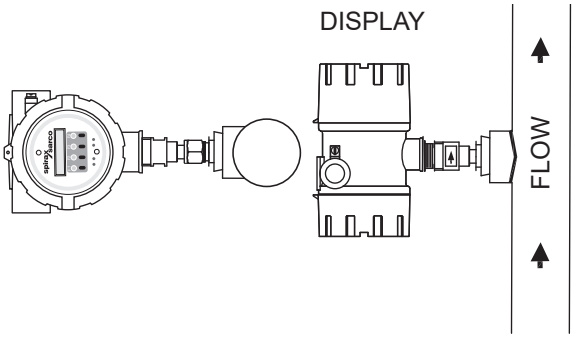
(D3) Display position



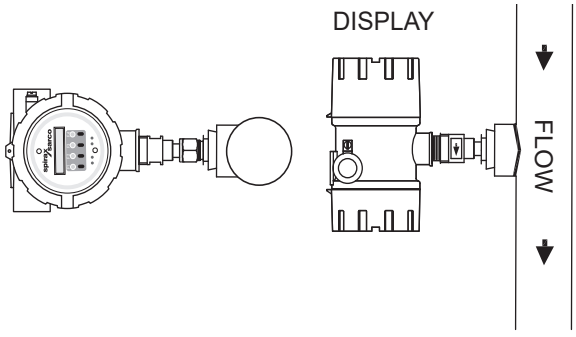
(D4) Display position



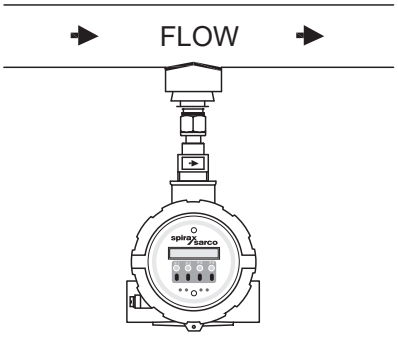
(D5) Display position



(D6) Display position



(D7) Display position



(D8) Display position