



## DESCRIPTION

ONICON FT-3000 Series In-line Electromagnetic Flow Meters are suitable for measuring electrically conductive liquids in a wide variety of applications. The FT-3100 provides analog and digital outputs for flow rate and programmable pulse outputs for flow totalization and/or alarms.

## APPLICATIONS

- HVAC hydronic applications including chilled water, heating hot water and condenser water
- Bi-directional flow for primary/secondary bypass and thermal storage applications
- Domestic cold and hot water applications
- Clean process flow applications with conductivities greater than 5  $\mu\text{S/cm}$

## CALIBRATION

All FT-3000 series flow meters are wet calibrated in a flow laboratory accordance with ISO 9104:1991 and ISO 17025:2005 that are directly traceable to international standards. A certificate of calibration accompanies every meter.

## GENERAL SPECIFICATIONS

<b>PERFORMANCE</b>	
<b>Accuracy</b>	$\pm 0.4\%$ of reading from 3.3 to 33 ft/s $\pm 0.75\%$ of reading from 1.3 to 3.3 ft/s $\pm 0.0075$ ft/s at flow rates less than 1 ft/s
<b>Sensing Method</b>	Electromagnetic sensing (no moving parts)
<b>Minimum Conductivity</b>	5 $\mu\text{S/cm}$
<b>Fluid Temperature</b>	0°F to 266°F - Based on liner material (Refer to Liner Selection Table)
<b>Fluid Pressure</b>	580 psi - Based on flow body and liner material (Refer to Liner Selection Table)
<b>ELECTRONICS ENCLOSURE</b>	IP67 (NEMA 4X) nylon enclosure with display
<b>Display</b>	16-character, 8-line, 128x64 graphic backlit LCD
<b>Ambient Condition</b>	Transmitter: 14°F to 122°F
<b>PROGRAMMING</b>	Menu driven user interface via three (3) programming keys PC user interface via micro USB and downloadable software
<b>ELECTRICAL CONNECTIONS</b>	
<b>Input Power</b>	Removable terminal blocks for use with 14 - 22 gauge wire
<b>I/O Signals</b>	Removable terminal blocks for use with 18 - 24 gauge wire
<b>FLOW SENSOR DESIGN</b>	
<b>Flow Tube</b>	304 SS
<b>Flow Body</b>	Carbon Steel, Stainless Steel or Polypropylene (Refer to Option Selection for additional information)
<b>Electrodes</b>	Qty: Three (3), round, 316 SS
<b>APPROVALS</b>	
<b>CE</b>	Transmitter: 2014/30/EU and 2014/35/EU LVD EMC Directive Flow Body: E97/23/CE PED Directive
<b>NSF</b>	Flow Body: 61

**OPTION SELECTION**

<b>INPUT POWER</b> <b>Available Options</b>	Low Power, 24 VAC/DC, 50/60 Hz, 12 VA  High Power, 120 - 240 VAC, 50/60 Hz, 12 VA
<b>I/O SIGNAL</b> <b>Available Options</b>	Two (2) digital outputs, one (1) digital input, and one (1) analog output  Two (2) digital outputs, one (1) digital input, and one (1) analog output w/ MODBUS RTU (RS485)
<b>ELECTRONICS ENCLOSURE</b> <b>Available Options</b>	Integral mount Remote (wall) mount with 16ft of remote cable* Remote (wall) mount with 32ft of remote cable* Remote (wall) mount with 49ft of remote cable* Remote (wall) mount with 65ft of remote cable* Remote (wall) mount with 100ft of remote cable*  *Up to 164 ft in fluids with conductivity $\geq 200 \mu\text{s/cm}$
<b>FLOW BODY</b> <b>Available Options</b>	Carbon Steel                      Stainless Steel                      Polypropylene
<b>FLOW LINER</b> <b>Available Options</b>	PTFE                                      Ebonite                                      Polypropylene  See Liner Selection Table Below
<b>PROCESS CONNECTIONS</b> <b>Available Options</b>	ANSI Class 150 flanged connections                      Wafer mount  ANSI Class 300 flanged connections                      Threaded (NPT) connections (available for 1" or smaller)

**LINER SELECTION TABLE**

Material	Line Size Flanged and Wafer	Grade	Color	Temperature Range	Pressure Range Based on Liner	Abrasion Resistance (Carbon Steel = 100)
Ebonite	8 - 48"	Food	Amber	32°F - 175°F	580 psi (1)	90 - 118
Polypropylene	1 - 6"	Food	Gray	32°F - 140°F	232 psi	122
PTFE	1 - 48"	Food	White	0°F - 266°F (3)	580 psi (1,2)	78
<b>Notes</b>	<b>Description</b>					
1	Flanged meter pressure rating is the lesser of 580 psi or the flange rating.					
2	Wafer style meters above 6" are limited to 232 psi.					
3	Remote mount electronics option required for application temperature above 212°F.					

METER ORDERING INFORMATION

GG H I JK L BC D E

Model FT-31

FLOW SENSOR CONFIGURATION INFORMATION

GG = Meter Size (inches)				
Flanged and Wafer Models				
01 = 1"	15 = 1½"	02 = 2"	25 = 2½"	03 = 3"
04 = 4"	05 = 5"	06 = 6"	08 = 8"	10 = 10"
nn = Meter Size, 12 - 24"				
Threaded Models				
AA = ¼"	AB = ⅜"	AC = ½"	AD = ¾"	AE = 1"

H = Liner Material
1 = PTFE
2 = Polypropylene <sup>1</sup>
3 = Ebonite <sup>2</sup>

I = Process Connection
0 = Wafer connection <sup>3</sup>
1 = ANSI 150 flanges
3 = ANSI 300 flanges
A = NPT thread <sup>4</sup>

JK = Body Material
11 = Carbon Steel w/ SS Electrodes
41 = 304 SS w/ SS Electrodes
51 = 316 SS w/ SS Electrodes
91 = Polypropylene w/ SS Electrodes <sup>5</sup>

L = Electronics Enclosure Mounting Configuration
1 = Integral
2 = Remote

TRANSMITTER CONFIGURATION INFORMATION

BC = Outputs
10 = One (1) AO, two (2) DO and one (1) DI
11 = One (1) AO, two (2) DO and one (1) DI w/ MODBUS (RS485)

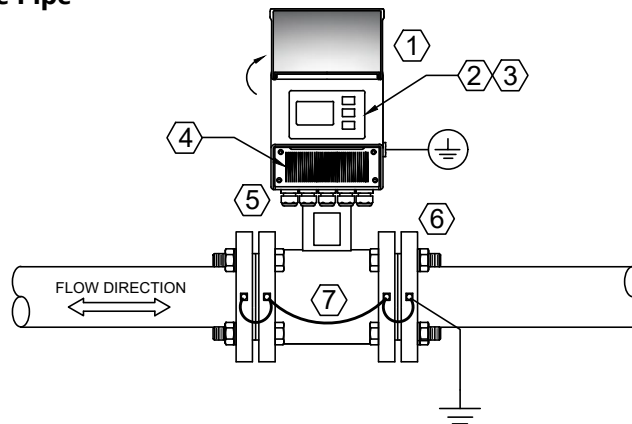
D = Electronics Enclosure
1 = IP67 (NEMA 4X) nylon enclosure w/ display

E = Input Power
1 = Low power, 24 VAC/VDC
2 = High power, 120 - 240 VAC

1. Polypropylene liner available through 6"
2. Ebonite liner available in sizes 8" and larger
3. Wafer connection available for meter sizes 1"-4"
4. NPT threaded connection available for meter sizes AA-AE
5. Polypropylene body available for meter sizes AA-AE

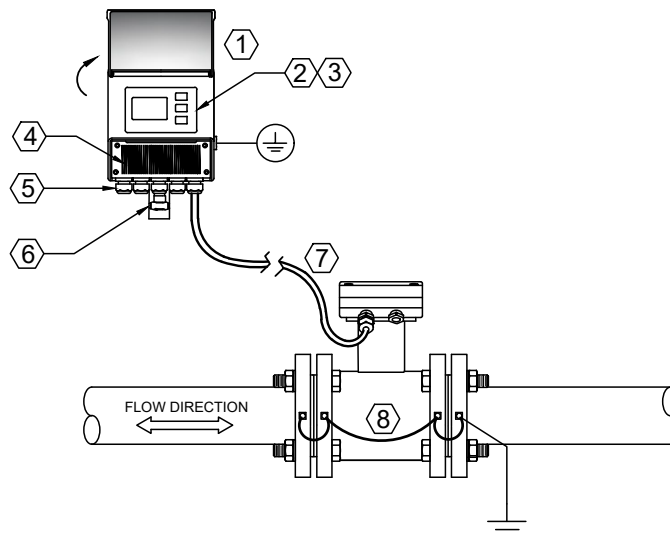
## INSTALLATION DETAILS

### A. Integral Mount in Conductive Pipe



1. IP67 (NEMA 4X) enclosure with protection cover available in integral or remote mount version
2. 16-Character, 8-Line graphic backlit LCD display
3. Menu driven user interface via three (3) programming keys
4. Wiring connections via pluggable terminal blocks located beneath the front access cover
5. Five (5) threaded conduit/ strain relief openings located at the bottom of the enclosure
6. Process connection available in flanged (ANSI 150 or ANSI 300), wafer or threaded models
7. Flange grounding kit for flanged or wafer versions

### B. Remote Mount in Conductive Pipe

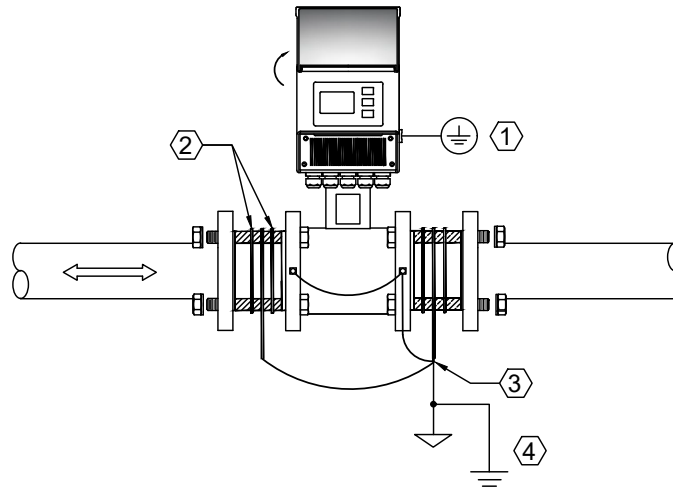


1. IP67 (NEMA 4X) enclosure with protection cover available in integral or remote mount version
2. 16-Character, 8-Line graphic backlit LCD display
3. Menu driven user interface via three (3) programming keys
4. Wiring connections via pluggable terminal blocks located beneath the front access cover
5. Five (5) threaded conduit/ strain relief opening located at the bottom of the enclosure
6. Remote mount hardware kit
7. Remote mount cable
8. Flange grounding kit for flanged or wafer versions

**INSTALLATION DETAILS (CONTINUED)**

**C. Optional Grounding Rings Accessory in Non-Conductive Pipe**

Grounding rings are required whenever meters are installed in non-metallic or lined pipes. Grounding rings placed before and after the meter eliminate electrical noise that will interfere with the proper operation of the meter. ONICON provides grounding rings as an optional accessory.



1. Protection ground connection
2. Required gaskets (4pl) to be provided by installing contractor
3. Grounding rings required for non-conductive (non-metallic) or lined pipes (2pl)
4. Earth ground connection

**MINIMUM STRAIGHT RUN REQUIREMENTS**

The straight run requirements presented below represent the minimum requirements for accurate flow measurement. For optimum performance, provide as much additional straight run as possible.

**RECOMMENDED INSTALLATION**

①

Flow direction

3 Pipe Dia Minimum Upstream Straight Pipe Run

2 Pipe Dia Minimum Downstream Straight Pipe Run

Locate flow meter in a straight run of pipe, free of bends, tees, valves and other obstructions.

②

Flow direction

Installation of flow meter in vertical pipe runs with upward or downward flow is acceptable, provided the system is pressurized (closed loop).

③

Electrode Location

Locate flow meter in horizontal pipe run with electrodes at the 3 and 9 o'clock position.

**INSTALLATION TO BE AVOIDED**

④

Flow direction

Avoid locating flow meter in vertical pipe run with downward flow ending in discharge to atmosphere.

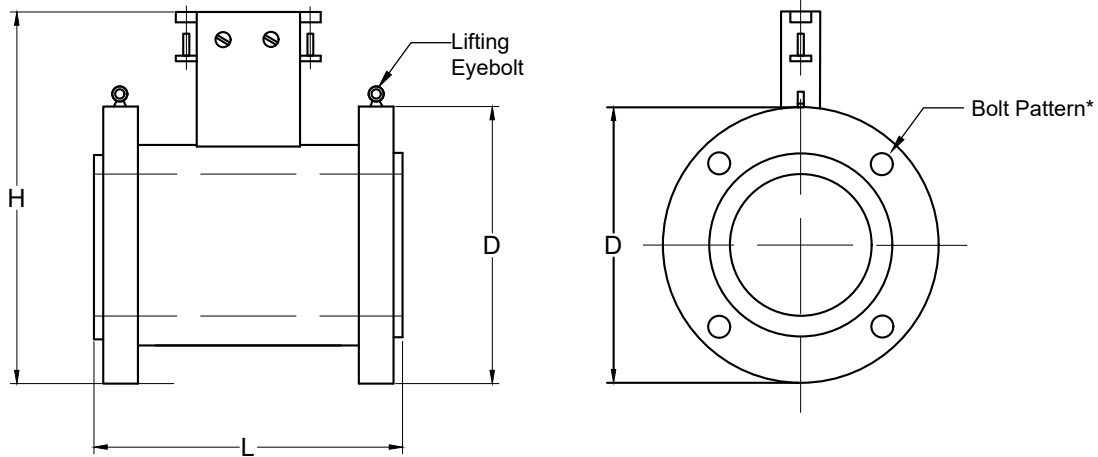
⑤

Electrode Location

Sediment or entrained air can affect the electrodes in the 12 and 6 o'clock position.

**DIMENSIONS**

**A. Flanged Sensor Dimensions and Weights**



\*Bolt pattern is dependent on the type and size of the flanges

ANSI Class 150 Flanged Sensor Size									
Nominal Diameter	1"	1.25"	1.5"	2"	2.5"	3"	4"	5"	6"
Length (L above)	7.87	7.87	7.87	7.87	7.87	7.87	9.84	9.84	11.81
Height (H above)	7.13	7.55	8.15	8.74	9.64	10.2	11.34	12.4	13.43
Flange Dia (D above)	4.24	4.64	5	5.98	7	7.52	9.02	10	10.98
Weight in lbs	6.6	6.6	7.7	13.2	17.6	24.2	35.2	39.6	57.2

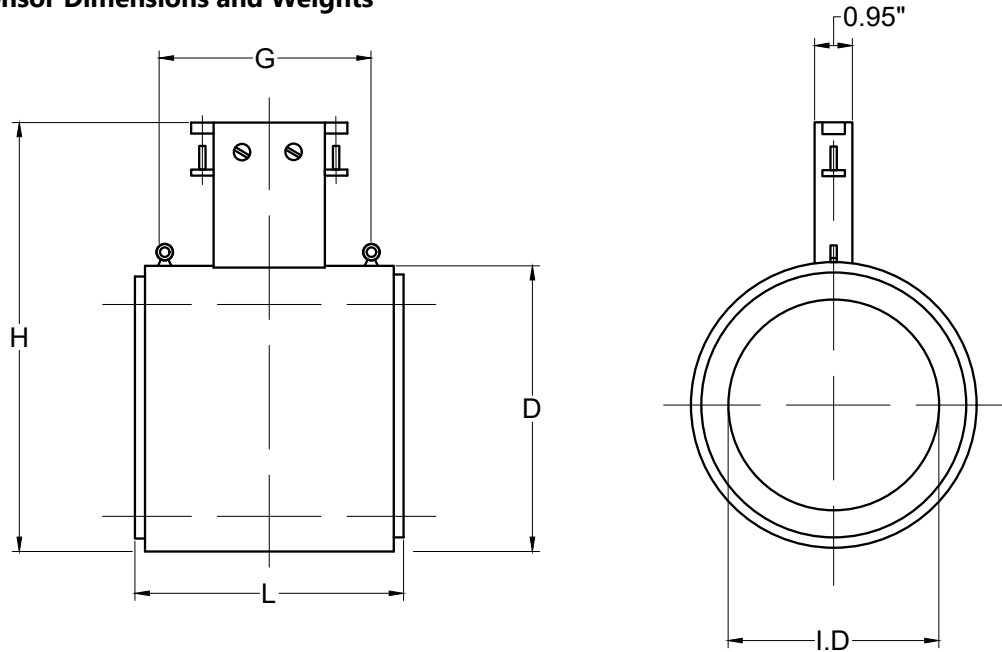
ANSI Class 150 Flanged Sensor Size								
Nominal Diameter	8"	10"	12"	14"	16"	18"	20"	24"
Length (L above)	13.78	17.72	19.68	21.65	23.62	23.62	23.62	23.62
Height (H above)	15.79	18.15	20.75	22.91	25.16	27.08	29.57	34.09
Flange Dia (D above)	13.5	15.98	19.02	20.98	23.5	25	27.52	32.01
Weight in lbs	88	132	220	275	396	484	550	650

ANSI Class 300 Flanged Sensor Size									
Nominal Diameter	1"	1.25"	1.5"	2"	2.5"	3"	4"	5"	6"
Length (L above)	7.87	7.87	7.87	7.87	7.87	7.87	9.84	9.84	11.81
Height (H above)	7.48	7.83	8.7	8.98	9.88	10.55	11.81	12.91	14.17
Flange Dia (D above)	4.88	5.24	6.14	6.5	7.52	8.27	10	10.98	12.52
Weight in lbs	11	11	15.4	19.8	24.2	28.6	44	52.8	66

ANSI Class 300 Flanged Sensor Size								
Nominal Diameter	8"	10"	12"	14"	16"	18"	20"	24"
Length (L above)	13.78	17.72	19.68	21.65	23.62	23.62	23.62	23.62
Height (H above)	16.54	18.9	21.5	23.9	26.14	28.58	30.31	36.06
Flange Dia (D above)	15	17.52	20.51	22.99	25.51	27.99	30.51	35.98
Weight in lbs	154	220	286	396	528	805	970	1489

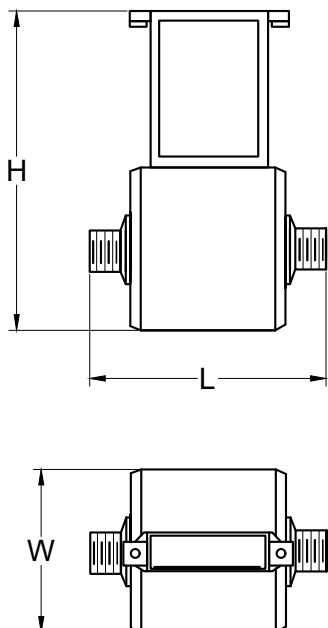
**DIMENSIONS (CONTINUED)**

**B. Wafer Style Sensor Dimensions and Weights**



Wafer Style Sensor Size						
Nominal Dia	1"	1.5"	2"	2.5"	3"	4"
Length (L)	3.94	3.94	3.94	5.90	5.90	5.90
Height (H)	5.79	6.34	6.97	7.83	8.23	9.25
Wafer Dia (D)	2.20	2.76	3.39	4.25	4.65	5.67
Net Weight in lbs	2.60	4	4.40	7.90	8.40	11

**C. Threaded Style Sensor Dimensions and Weights**

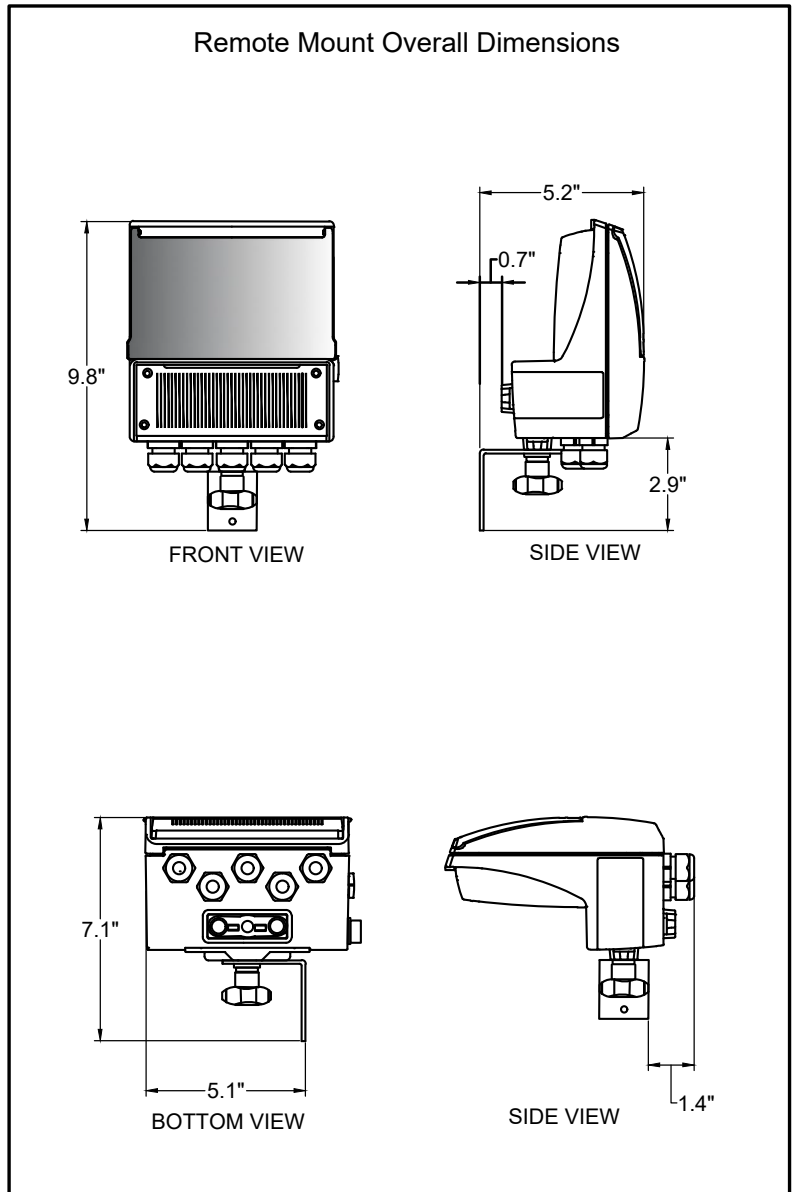
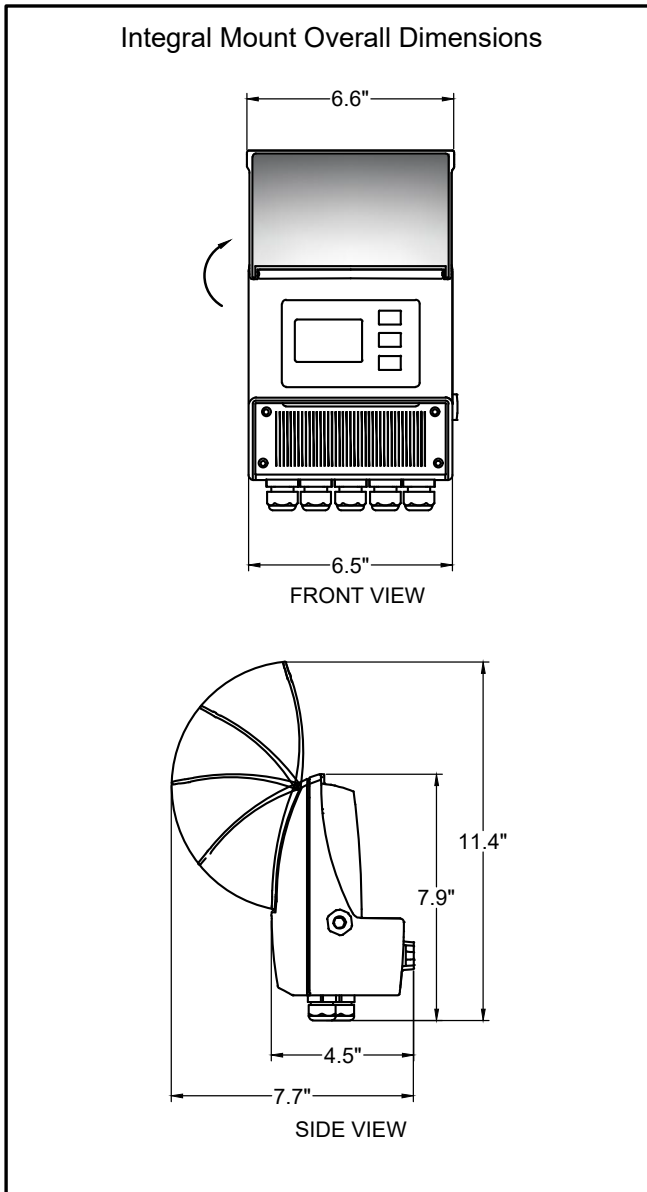


	Polypropylene	Stainless Steel
L	5.50"	4.72"
H	7.40"	6.69"
W	3.80"	3.07"
Weight in lbs	4.85	4.85

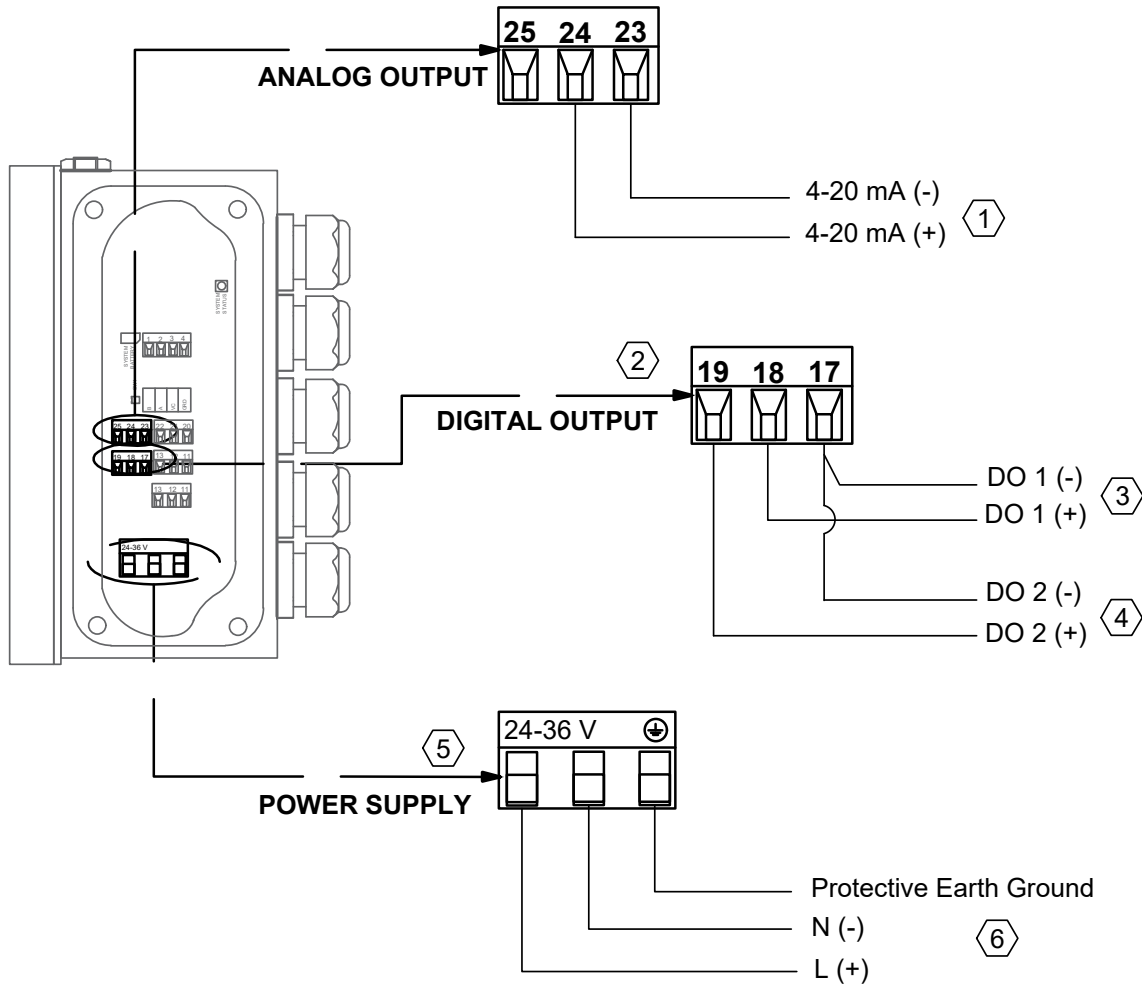


**DIMENSIONS (CONTINUED)**

**D. Overall Dimensions**



WIRING CONNECTIONS



1. Provide two (2) wires for use with one (1) 4-20mA active analog output
2. Open collector switch output with 1250 Hz, 100 mA, 30 VDC max
3. Provide two (2) wires for use with DO 1, typically configured as a frequency output for use with ONICON peripheral equipment
4. Provide two (2) wires for use with DO 2, configured as a scaled pulse for totalizing flow or as a flow direction switch
5. Power supply voltage must be selected at time of order, it cannot be changed in the field. Input power options:
  - Low power, 24 VAC/DC, 50/60 Hz, 12 VA
  - High power, 120-240 VAC, 50/60 Hz, 12 VA
6. Provide a three (3) wire service including one (1) dedicated conductor for protective earth grounding

# FT-3100 SUBMITTAL AND DATA SHEET



ITEM	TAG/QTY	APPLICATION	LIQUID TYPE	DESIGN FLOW	METER MODEL SELECTION	GROUNDING RINGS	REFERENCE SHEET	ASSOCIATED PERIPHERAL	NOTES
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

# FT-3100 SUBMITTAL AND DATA SHEET

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TO:

DATE:

PROJECT NAME:

CONTRACTOR:

ENGINEER:

ONICON REP:

**SUBMITTAL FOR:**

RECORD

APPROVAL

APPROVED BY:

**RELEASED FOR:**

MANUFACTURING AND SHIPMENT

HOLD FOR RELEASE

APPROVED

APPROVED AS NOTED

DISAPPROVED

EXPLANATION:

PLEASE RETURN APPROVED DRAWINGS TO:

ATTENTION:

SUBMITTED BY:

