

FT-3500 SUBMITTAL AND DATA SHEET



DESCRIPTION

ONICON's FT-3500 series is a versatile insertion electromagnetic flow meter and thermal energy measurement system. Designed to measure electrically conductive liquids in a variety of applications, the FT-3500 features a remote touch screen that allows users to interact intuitively with measurement values, application details, and configuration settings. The advanced transmitter comes with native BACnet and MODBUS communication protocol via IP or RS485, as well as a dual analog output for flow rate, energy rate, or delta temperature. Additionally, the FT-3500 boasts a high-resolution frequency and three scalable pulse outputs for totalization or alarm signals. The thermal energy configuration integrates ONICON's high-precision temperature sensors to provide a complete hydronic flow and energy measurement system.

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 25 $\mu\text{S}/\text{cm}$
- Central plant monitoring
- Campus energy monitoring and cost allocation
- Performance/efficiency evaluations
- Energy monitoring for performance contracts
- AHU and CRAC units for commercial office tenant billing
- Solar, geothermal, and ground-source energy monitoring

CALIBRATION

All FT-3500 flow meters are wet calibrated in a flow laboratory against standards that are directly traceable to National Institute of Standards and Technology (N.I.S.T.). A certificate of calibration accompanies every meter.

GENERAL SPECIFICATIONS

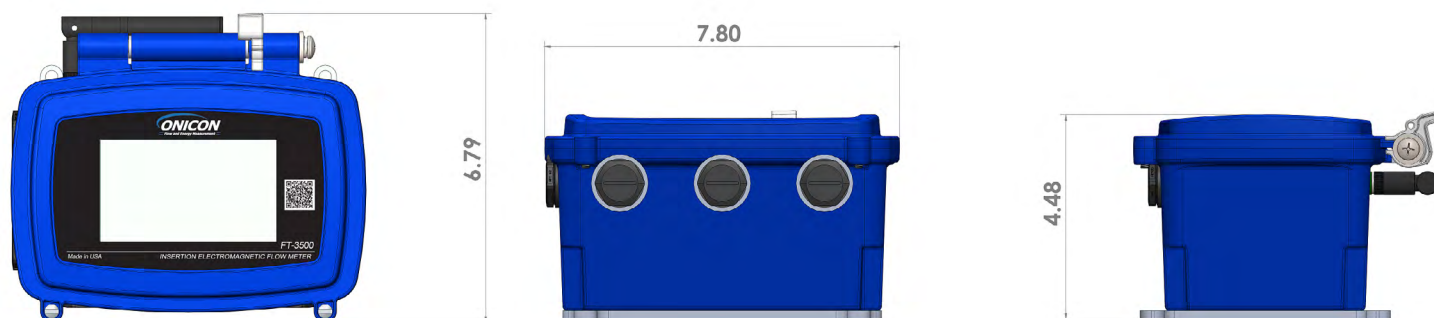
PERFORMANCE	ACCURACY	Standard Sensor $\pm 1.0\%$ of reading from 2 - 20 ft/s ± 0.02 ft/s below 2 ft/s Small Pipe Sensor $\pm 1.0\%$ of reading from 1.6 - 16 ft/s ± 0.016 ft/s below 1.6 ft/s
	FLOW RANGE	Standard sensor: 0.1 ft/s to 20 ft/s Small pipe sensor: 0.08 ft/s to 16 ft/s
	SENSING METHOD	Electromagnetic sensing (no moving parts)
OPERATING CONDITIONS	MINIMUM CONDUCTIVITY	25 $\mu\text{S}/\text{cm}$
	FLUID TEMPERATURE RANGE	15°F to 250°F
	FLUID PRESSURE RANGE	400psi maximum
	AMBIENT CONDITIONS	Board: -20°F to 150°F
PRESSURE DROP	Standard Configuration: 0.1 psi at 12 ft/s in 3" pipe, decreasing as line size increases	
	Small Pipe Configuration: 0.33 psi at 8 ft/s in 1.25" pipe, decreasing as the line size increases	
PIPE SIZE RANGE	Standard Sensor: 3"-72" Nominal Diameter Small Pipe Sensor: 1.25"-2.5" Nominal Diameter	
INPUT POWER	22 - 26 VDC with maximum power draw at 25 Watts 20 - 28 VAC with maximum power draw at 30 VA, 60 Hz	

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GENERAL SPECIFICATIONS (continued)

I/O SIGNALS	Two (2) Analog Outputs. Active 4-20mA, 0-10V, or 0-5V Two (2) Analog Inputs. Passive 4-20mA Two (2) 1000ohms RTD Inputs Three (3) Digital Inputs/Outputs (Field Selectable) One (1) Frequency Output (0-15V peak pulse, 0-1000hz)	
ELECTRONIC ENCLOSURE	FLOW SENSOR RATING	NEMA 6
	REMOTE MOUNT DISPLAY RATING	NEMA 4
	MOUNTING OPTION	Remote mount with kit, up to 200ft.
	DISPLAY	4.3 inch touch screen display. Resolution of 480x272 pixels
MATERIAL	REMOTE MOUNT DISPLAY	Powder Coated Die Cast Aluminum
	FLOW SENSOR	Wetted metal components: 316 Stainless Steel
		Sensor head: XAREC
FACTORY PROVIDED CABLE (SENSOR TO REMOTE DISPLAY)	Up to 200' of three twisted pairs, 22 gauge conductors with individual shields, PVC jacketed, suitable for direct burial with 1/2" NPT conduit connections or strain relief fitting.	
PROGRAMMING	AVAILABLE OPTIONS	Menu-driven user interface via touchscreen PC user interface via micro USB and downloadable software
ELECTRICAL CONNECTIONS	INPUT POWER	Removable orange terminal blocks for use with 18-22 AWG
	I/O SIGNALS	Removable green terminal blocks for use with 18-22 AWG
	RS485	Removable green terminal blocks for use with 18-22 AWG
	IP	RJ45 connector
COMMUNICATION PROTOCOLS	BACnet MS/TP, BACnet UDP/IP, MODBUS RTU, MODBUS TCP/IP	
NETWORK CONFIGURATION & ADDRESSING	BACnet MS/TP	BAUD RATES: 9600, 19200, 38400, 57600, or 76800 (Default: 38400) DEVICE ADDRESS RANGE: 1 – 127 (Default:017) DEVICE INSTANCE RANGE: 1 – 4,194,302 (Default:57017) Max master: 1-127
	BACnet UDP/IP	IPV4 Address: Programmable (Default:192.168.1.24) Instance Number: 1 – 4,194,302 (Default:57017) Subnet Mask: Programmable (Default:255.255.255.0) Gateway Address: Programmable UDP port: Programmable (Default:47808)
	MODBUS RTU	MODBUS Address Range: 1- 247 (Default: 017) BAUD RATES: 9600, 19200, 38400, 57600, or 76800 (Default: 38400) Data format: 8 bit Stop bits: 1 Parity: None, Odd, or Even (Default: None) Byte Order: ABCD
	MODBUS TCP/IP	IPV4 Address: Programmable (Default:192.168.1.24) Subnet Mask: Programmable (Default:255.255.255.0) Gateway Address: Programmable Port: Programmable (Default:502)
APPROVALS	CE	IEC 61000-6-2 Power-Frequency Magnetic Field, Radiated Immunity and Electrostatic Discharge
		IEC 61000-6-4 Radiated Emissions
		EN 301 489-17 Radiated Emission, RF Immunity, and Electrostatic Discharge
		EN 301 328 Wideband transmission systems
	UL	UL 50: Standard for Enclosures for Electrical Equipment
		UL ANSI/NSF 61 & 372 Drinking Water Safety (SENSOR ONLY)
		UL 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
	FCC: Part 15, Subpart B	

TRANSMITTER DIMENSIONS



OPERATING RANGE FOR COMMON PIPE SIZES

OPERATING RANGE FOR COMMON PIPE SIZES*					
PIPE SIZE (inches)	FLOW RATE (GPM) (0.1 ft/s to 16 ft/s)	PIPE SIZE (inches)	FLOW RATE (GPM) (0.1 ft/s to 20 ft/s)	PIPE SIZE (inches)	FLOW RATE (GPM) (0.1 ft/s to 20 ft/s)
1¼	0.4 - 72	3	2.4 - 460	16	55 - 11,400
1½	0.6 - 99	4	4 - 800	18	70 - 14,600
2	1.0 - 164	6	9 - 1,800	20	86 - 18,100
2½	1.1 - 234	8	16 - 3,100	24	125 - 26,500
		10	24 - 4,900	30	223 - 41,900
		12	35 - 7,050	36	304 - 60,900
		14	42 - 8,600	42	416 - 83,300

METER ORDERING INFORMATION

Model FT-3500- **A** **B** **C** - **D** **EE** **F** - **SPC**

Meter Configuration & I/O	
1 = Flow only w/ remote display (2) AO, (3) DO/DIs, (1) Frq Out, & (2) AI	
2 = Flow & thermal energy (BTU) meter w/ remote display (2) AO, (3) DO/DIs, (1) Frq. Out, & (2) AI	

B = Network Communications	
0 = No Communications module	
1 = RS-485 & IP Communications	

C = Reserved for Bluetooth

D = Enclosure Type and Process Connection	
0 = NEMA 4 Transmitter Enclosure and NEMA 6 Wetted Sensor Enclosure, with ½" NPT Weathertight Conduit Adapters . (Default)	
1 = NEMA 4 Transmitter Enclosure and NEMA 6 Wetted Sensor Enclosure, with Strain Relief Cord Grip .	

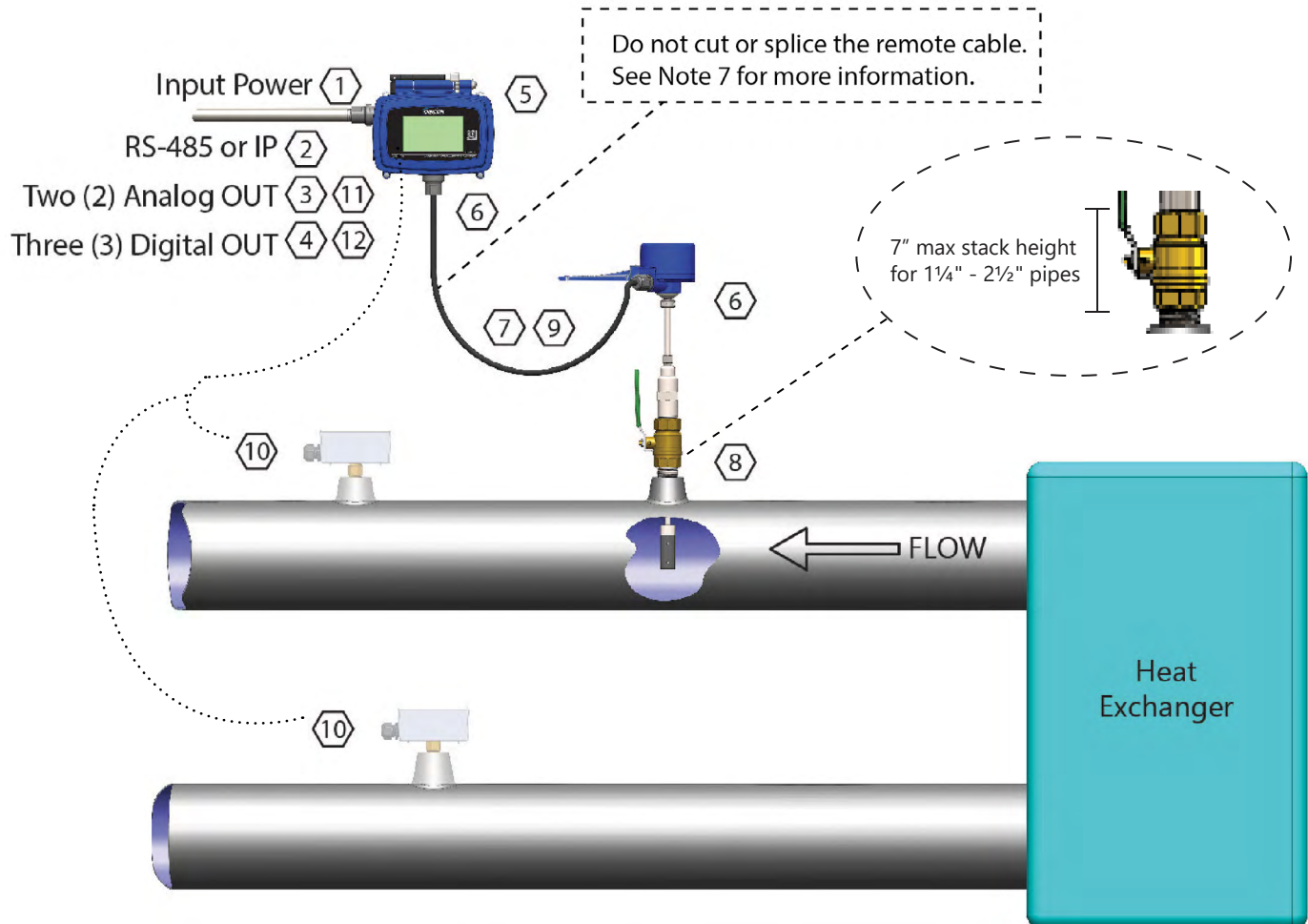
EE = Pipe Size Range and Meter Length	
A2 = for pipes 1.25 - 2.5" (20" stem)	F7 = for pipes 3 - 72" (26" stem)
C3 = for pipes 3 - 10" (18" stem)	F8 = for pipes 3 - 72" (28" stem)
D4 = for pipes 3 - 16" (20" stem)	G1 = for pipes 12 - 72" (30" stem)
E5 = for pipes 3 - 22" (22" stem)	G2 = for pipes 12 - 72" (34" stem)
F6 = for pipes 3 - 72" (24" stem)	

F = Wetted Material	
1 = Temp < 150°F , 316 SS, XAREC, Viton	
2 = Temp ≤ 250°F , 316 SS, XAREC, FKM, Viton	
3 = Temp < 180°F , 316 SS, XAREC, EPDM, NSF rated	

SPC = Special Configurations

INSTALLATION DETAILS

(New construction or scheduled shutdown)



Notes:

1. Provide a Class II Input Power 20-28V AC/DC, 60 Hz.
2. BACnet MSTP, IP or MODBUS RTU, TCP/IP.
3. Active Analog outputs, do not provide power.
4. Digital Outputs are available for flow totals, operating modes, and alarms.
5. Remote wall mount aluminum cast NEMA 4 Touch screen display.
6. Optional 1/2" FNPT waterproof conduit connectors.
7. ONICON provided cable up to 200ft. Direct burial rated.
8. Order ONICON Installation kits separately. Installation kits vary based on pipe material and application. For installations in pressurized (live) systems, use "Hot Tap Installation Kit" and drill hole using a 1" wet tap drill.
9. Allow enough slack in the flexible conduit to permit the meter to be removed from the valve.

When ordered as a thermal energy (BTU) meter:

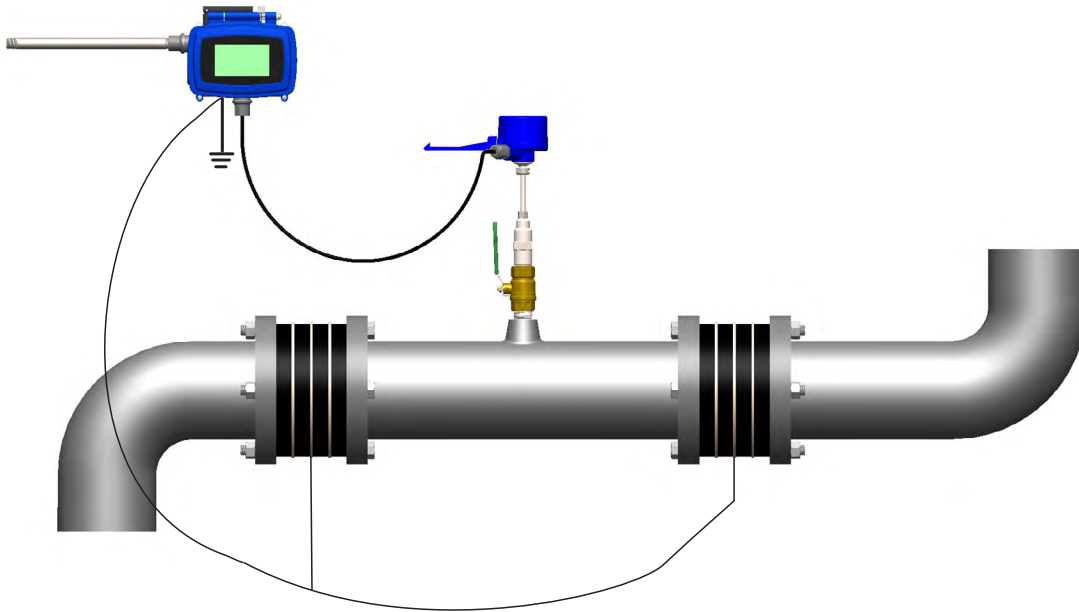
10. ONICON temperature sensors and thermowell kits ordered separately.
11. Analog outputs are available for energy rate, flow rate, supply, return, or delta temperature.
12. Digital outputs are available for energy totals, flow totals, operating modes, and alarms.

INSTALLATION DETAILS (CONTINUED)

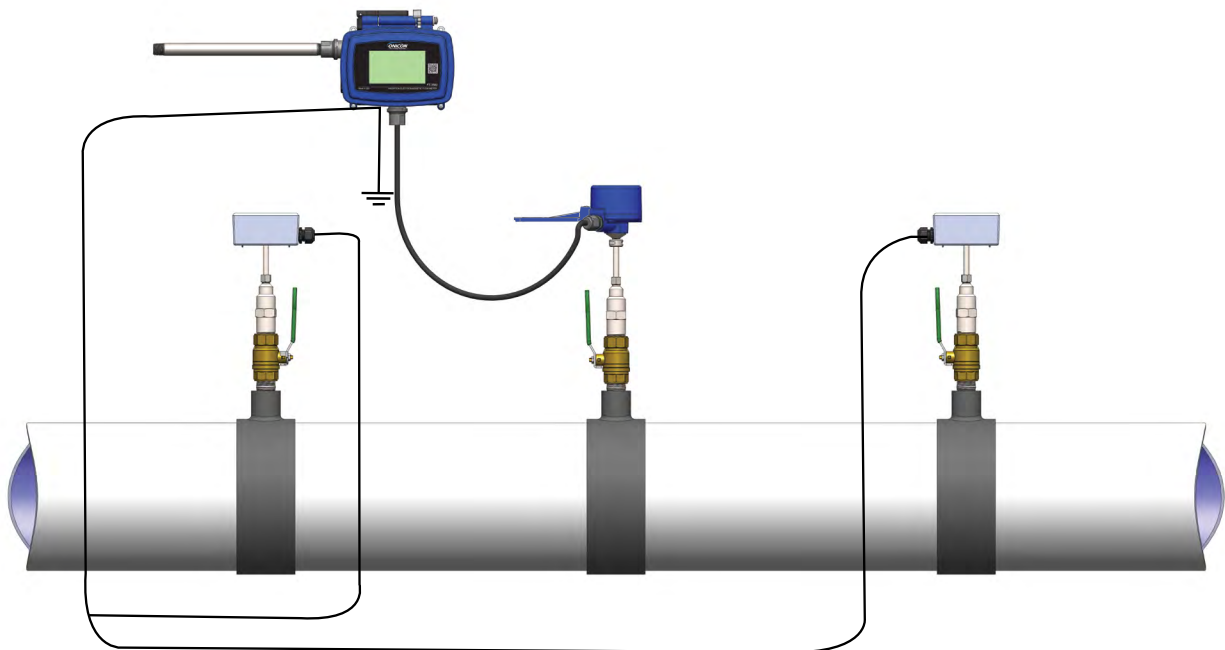
Optional Grounding Rings or Probes Accessory in Non-Conductive Pipe

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

Grounding Rings Installation



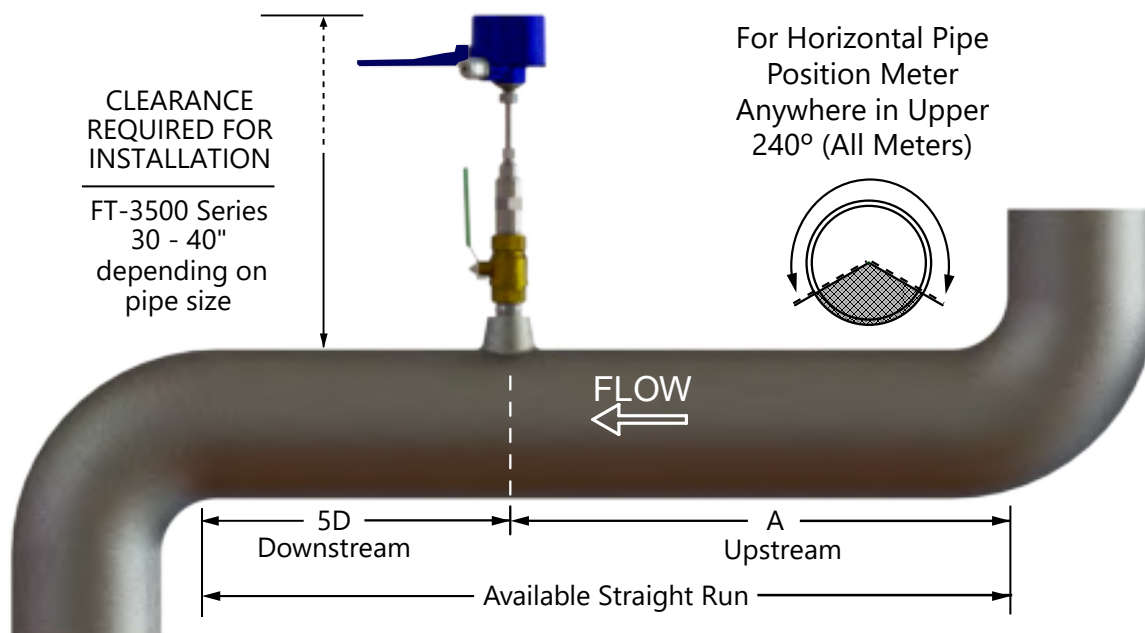
Grounding Probes Installation



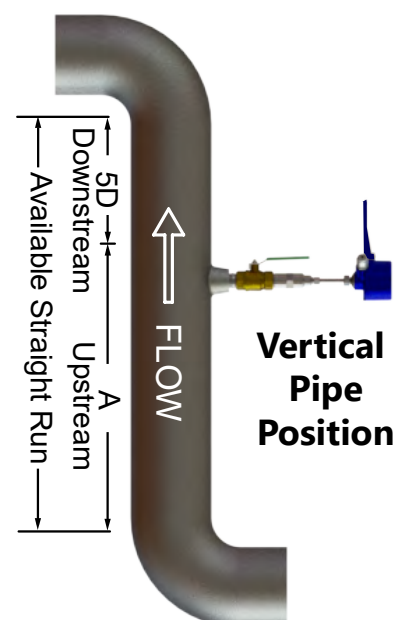
*** Additional straight run may be required upstream of the upstream grounding ring/probe based on the nature of the upstream obstruction. Refer to the chart on the next page to determine how much straight run is required.**

MINIMUM STRAIGHT RUN REQUIREMENTS

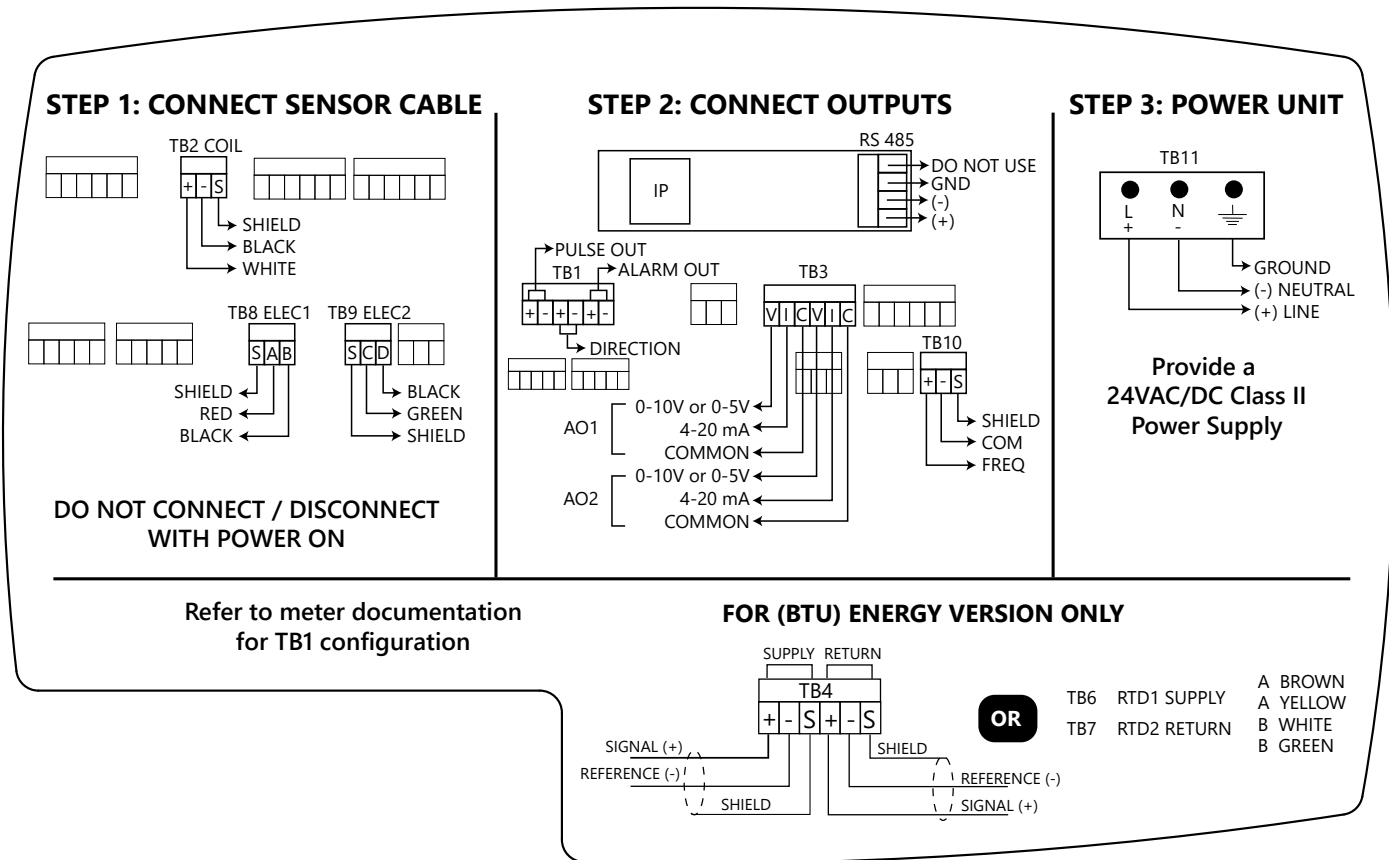
The straight run requirements presented below represent the minimum requirements for accurate flow measurement. For optimum performance, provide as much additional straight run as possible.



Upstream obstruction	(A) Minimum straight run required upstream of meter location
Single bend preceded by ≥ 9 diameters of straight pipe	10 Diameters
Pipe size reduction / expansion in straight pipe run	10 Diameters
Single bend preceded by ≤ 9 diameters of straight pipe	15 Diameters
Outflowing tee / Pump outflow	20 Diameters
Multiple bends out of plane	30 Diameters
Inflowing tee	30 Diameters
Control / Modulating valve	30 Diameters



WIRING CONNECTIONS



Available outputs to peripherals and controllers:

- TB1-1 Pulse Out 1 (Default: Scaled Pulse Out for Totalization)
- TB1-2 Pulse Out 2 (Default: Master Alarm)
- TB1-3 Pulse Out 3 (Default: Mode Status)
- TB3-1 Analog Out 1 (Default: Flow Rate)
- TB3-2 Analog Out 2 (Flow Rate or Energy Rate for (BTU) Thermal Energy Version)
- TB10 Frequency Out (for connection to other ONICON peripherals)

Communication Outputs:

- RS-485 for BACnet MS/TP and Modbus RTU
- IP for BACnet IP or Modbus TCP/IP

Note: TB9 Terminal is not used for small pipe installations (1.25"-2.5")

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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-3500 SUBMITTAL AND DATA SHEET

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:

