FT-3500 SERIES

INSERTION ELECTROMAGNETIC FLOW METER / THERMAL ENERGY MEASUREMENT SYSTEM

FT-3500 series flow meters combine the convenience of an insertion style design with the reliability of electromagnetic flow measurement. They are ideal for measuring flow in a wide variety of applications.

When provided with the thermal energy (BTU) meter option, the FT-3500 becomes a complete hydronic energy measurement system.

We believe in our products, so should you.
1 YEAR NO FAULT WARRANTY
3 YEAR MANUFACTURER WARRANTY

ONICON
Flow and Energy Measurement

Mode: Forward
456.7 GPM x100
17.000 ft/s
18765211648.0 Gallons x1k
03/19/2024, 09:02:38 AM
Made in USA
INSERTION ELECTROMAGNETIC FLOW METER
FT-3500

FACTORY CONFIGURED   ON TIME DELIVERY   BEST CUSTOMER SERVICE

• Chilled Water • Heating Hot Water •
• Domestic/Municipal Water • Condenser Water •

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INSERTION ELECTROMAGNETIC FLOW METER / THERMAL ENERGY MEASUREMENT SYSTEM

ONICON
Flow and Energy Measurement

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 display that allows users to interact intuitively with measurement values, application details, and configuration settings. The advanced FT-3500 transmitter features a native BACnet and MODBUS communication protocol via IP or RS485, as well as a dual analog output for flow or energy rate. Additionally, the FT-3500 boasts a high-resolution frequency and three scalable pulse outputs for totalization or alarm signals.

The standard configuration of the FT-3500 is ideal for volume rate and totals, while the thermal energy configuration integrates ONICON's high-precision temperature sensors to provide a complete hydronic energy measurement system. Whether you need to measure flow rate or energy consumption, the FT-3500 series is a reliable and accurate choice.

APPLICATIONS

- Chilled water
- Heating hot water
- Condenser water
- Domestic/municpal water
- Water/glycol
- Bi-directional flow for primary/secondary by-pass and thermal storage applications.

FEATURES

Simple Installation and Commissioning - Factory configured and ready for use upon delivery.

Exceptional Performance & Value - Insertion style design provides cost-effective solution for accurate and reliable flow measurement in larger pipe sizes.

Excellent Long Term Reliability - Low maintenance, no-moving-parts flow sensing technology works well in difficult flow measurement applications such as open loop condenser water flow.

Highly Accurate Over a Wide Flow Range - Highly efficient sensor design with high accuracy and sensitivity, particularly at low flow rates.

Simplified Hot Tap Insertion Design - Standard on every insertion flow meter, this feature allows for insertion and removal by hand without a system shutdown.

Ideal Solution for Retrofits - The innovative hot tap adapter design allows for wet tapping pipes without interrupting flow.

Touch Screen Remote Display - All process data and programming functions are accessible via user friendly display. Advanced diagnostics are available to confirm wiring connections, noise detection via waveforms, and built-in verification for accurate system performance. Color coded interconnecting cabling and installation instructions are provided to ensure error-free installation.

Network Communication and Output - All data is reported via BACnet or MODBUS directly to the BMS/BAS via IP or RS485 connection. The FT-3500 is provided with: three (3) pulse outputs for totalization, alarm, and system status; two (2) analog outputs for energy, flow, and temperature; and one (1) frequency output for flow rate.

BTU (Energy) Meter Option - When ordered with the thermal energy (BTU) meter option, the FT-3500 becomes a complete thermal energy measurement system providing accurate flow, energy, and temperature data.

CALIBRATION

Every ONICON FT-3500 flow meter is 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.

DESIGNED FOR NETWORKING

The FT-3500 provides the user with a single point of communication for BACnet MS/TP, BACnet IP, MODBUS RTU, or MODBUS TCP/IP. Interval data for energy and volume are provided along with operating status and diagnostic data.

FT-3500 alarms can be configured to the upper and lower limits of specific BACnet objects and provide custom alarm states at the meter display. The new BACnet stack includes:

- **Change of Value:** Traditional polling methods of data acquisition are supported and Change-of-Value (COV) notifications report changes to the network on an interrupt basis (without polling)

- **Intrinsic Reporting:** Provides detailed control for customers to specify when notifications should occur, and additional metrics that can be used for quick diagnosis

- **Network Time Synchronization:** Network time synchronization for troubleshooting and isolating meters from other facility issues.

- **Event Logs:** Network-accessible event logs provide a record of changes and power events for further aid in troubleshooting

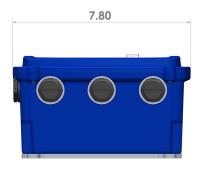The following information and more are available over the network:

BACnet / Modbus Data	
Data	**Available Data Object**
Energy	Instantaneous Rate / Total / YTD Total / Prev. Yr. Total/ User Resettable Totals
Volume	Instantaneous Rate / Total / YTD Total / Prev. Yr. Total/ User Resettable Totals
Temperature	Supply Temperature / Return Temperature / Delta Temperature
Status	Operating Status / Mode Status (Heating/Cooling) / Alarms (On/Off)

Available Units over BACnet/Modbus Include:

Flow Rate	GPM, L/S, L/M, CM, H, CFT/S, CM/S
Volume	Gallons, Liters, CM
Velocity	ft/s, m/s
Energy	KBTU, BTU, TonsHr, KWH
Energy Rate	KBTU/hr, BTU/hr, Ton, KW
Temperature	°F, °C

TRANSMITTER DIMENSIONS

SPECIFICATIONS*

PERFORMANCE	ACCURACY	Standard Sensor ±1.0% of reading from 2 - 20 ft/s ±0.02 ft/s below 2 ft/s
		Small Pipe Sensor ±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 µS/cm
	FLUID TEMPERATURE RANGE	15°F to 250°F
	FLUID PRESSURE RANGE	400psi maximum
	AMBIENT CONDITIONS	Transmitter: -4°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, 50/60 Hz	
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 ½" 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	

*Specifications subject to change without notice.

SPECIFICATIONS (cont.)*

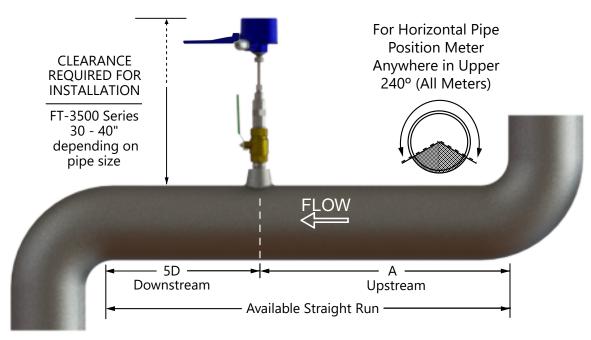|		
NETWORK CONFIGURATION & ADDRESSING	BACnet MS/TP	BAUD RATES: 9600, 19200, 38400, 57600, or 76800 (Default: 38400) DEVICE ADDRESS RANGE: 1 – 127 (Default:017) DEVICE INSTANCE RANGE: 1 – 4,194,302 (Default:57017) Max master: 1-127
	BACnet UDP/IP	IPV4 Address: Programmable (Default:192.168.1.24) Instance Number: 1 – 4,194,302 (Default:57017) Subnet Mask: Programmable (Default:255.255.255.0) Gateway Address: Programmable UDP port: Programmable (Default:47808) DHCP Available
	MODBUS RTU	MODBUS Address Range: 1- 247 (Default: 017) BAUD RATES: 9600, 19200, 38400, 57600, or 76800 (Default: 19200) Data format: 8 bit Stop bits: 1 Parity: None, Odd, or Even (Default: Even) 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) DHCP Available
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	

*Specifications subject to change without notice.

OPERATING RANGE FOR COMMON PIPE SIZES

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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

STRAIGHT RUN INFORMATION

CLEARANCE REQUIRED FOR INSTALLATION

FT-3500 Series 30 - 40" depending on pipe size

For Horizontal Pipe Position Meter Anywhere in Upper 240º (All Meters)

FLOW

5D
Downstream

A
Upstream

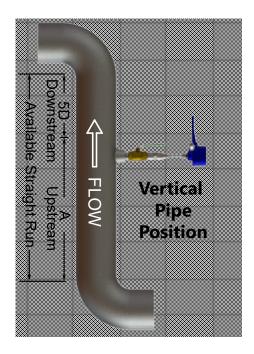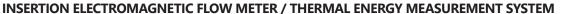Available Straight Run

NOTE: This is a recommendation to meet the published accuracy. The meter can still perform with less. Reach out to your local rep or ONICON for more details.

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

5D Downstream
A Upstream
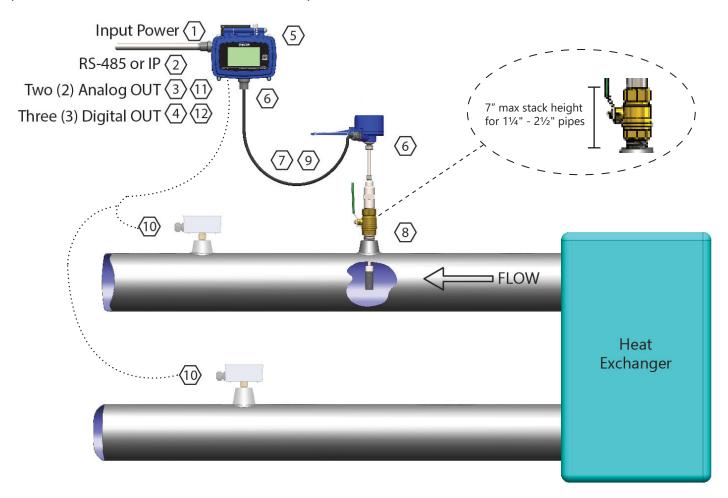Available Straight Run
FLOW

Vertical Pipe Position

TYPICAL METER INSTALLATION
(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 (flow direction), and alarms.
5. Remote wall mount aluminum cast NEMA 4 Touch screen display.
6. Optional ½" FNPT waterproof conduit connectors.
7. ONICON provided cable, direct burial rated. The remote cable is available in 25ft, 50ft, 100ft, 150ft, or 200ft.
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.

METER ORDERING INFORMATION
FT-3500 Meter Model Number Codification = FT-3500-ABC-DEEF-SPC

FT-3500-ABC-DEEF-SPC

A = 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**.

NOTE: Remote Cable is available in 25ft, 50ft, 100ft, 150ft, or 200ft.

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