



High Performance TURBINE FLOW METERS

**Individually configured
and wet calibrated for
your application . . .**

**. . . to provide accurate,
reliable and cost effective
flow measurement**

ONICON
— Flow and Energy Measurement —

ONICON Insertion Turbine Flow Meters

Provide an accurate, cost effective option for flow measurement of relatively clean liquids such as those found in closed loop HVAC systems. Each meter is built to order and individually wet-calibrated. And yet, the innovative insertion style design makes it affordable to fully instrument the entire plant providing the real-time flow data critical to improving performance and efficiency. In addition, these meters can be installed with no interruption to existing services during installation.



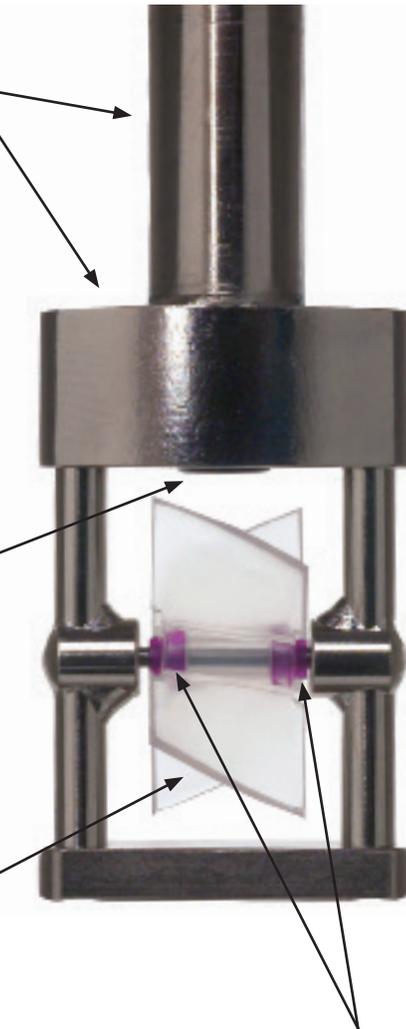
F-1100 Series Single Turbine Meters

Suitable for pipe sizes 1 1/4" and larger.

STREAMLINED SENSOR HEAD AND SLENDER STEM allow for hand insertion of the meter while under pressure.

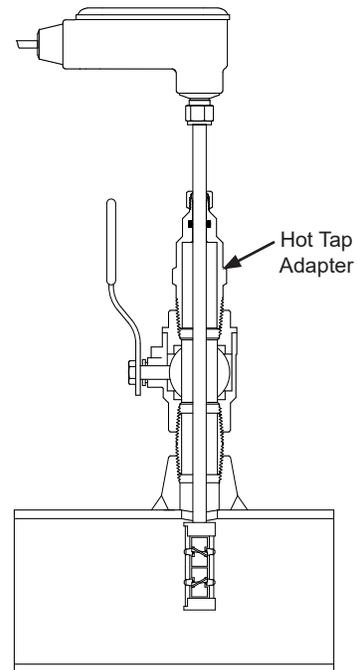
PATENTED TURBINE ROTATION SENSING SYSTEM translates turbine rotation into electronic impulses without the need for magnets that impede rotation and attract rust.

LOW MASS TURBINES require very little energy to rotate. This makes them responsive to small changes in flow and significantly enhances their low flow performance.

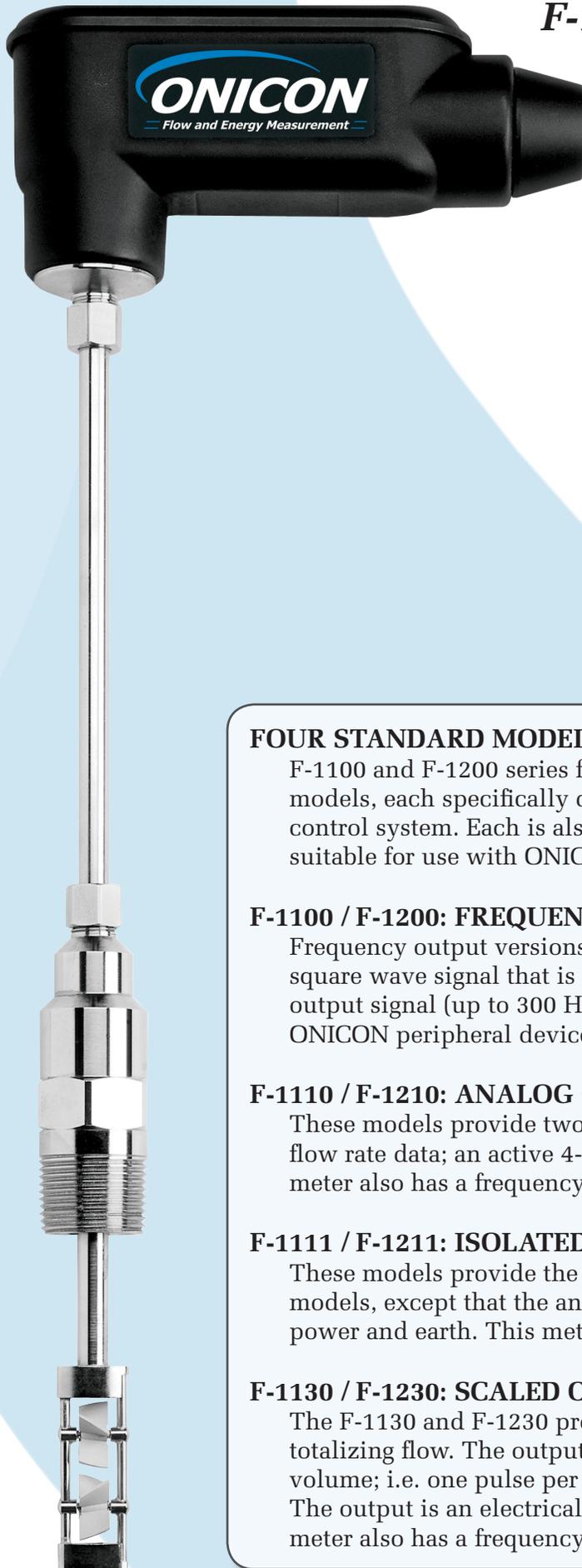


INTEGRAL HOT-TAP DESIGN

is standard for all insertion flow meters and allows insertion and removal without interrupting flow. Meters are hand-insertable. No special installation tools are required.



PRECISION SHAFT & BEARING SYSTEM incorporates sapphire thrust and axial bearings installed on highly polished tungsten carbide shafts. When coupled with the low mass turbines, this system virtually eliminates shaft and bearing wear even after many years of continuous service.



F-1200 Series Dual Turbine Meters

Provide all the features of the F-1100 series single turbine meters, plus significantly improved accuracy in limited straight pipe runs. By averaging the speed of rotation of two turbines with opposite helixes, the F-1200 minimizes the effect of swirl, the most common flow distortion caused by pipe bends and elbows. This makes the F-1200 more forgiving when installed in cramped central plant piping systems.

Suitable for pipe sizes 2 ½" and larger.

FOUR STANDARD MODELS TO MEET YOUR NEEDS

F-1100 and F-1200 series flow meters are available in four different models, each specifically designed to interface with your building control system. Each is also provided with a dedicated output signal suitable for use with ONICON display modules or BTU meters.

F-1100 / F-1200: FREQUENCY OUTPUT

Frequency output versions of the meter provide a single linear 0-15 VDC square wave signal that is proportional to flow. This high resolution output signal (up to 300 Hz) is specifically designed to interface with ONICON peripheral devices such as BTU meters and displays.

F-1110 / F-1210: ANALOG OUTPUT

These models provide two factory calibrated analog signals for reporting flow rate data; an active 4-20 mA output and a 0-10 VDC output. This meter also has a frequency output.

F-1111 / F-1211: ISOLATED ANALOG OUTPUT

These models provide the same output signals as the F-1110 / F-1210 models, except that the analog signals are electrically isolated from input power and earth. This meter also has a frequency output.

F-1130 / F-1230: SCALED OUTPUT

The F-1130 and F-1230 provide a precision scaled pulse output for totalizing flow. The output is scaled to one pulse per a specific unit volume; i.e. one pulse per 10 gallons, or one pulse per 100 liters, etc. The output is an electrically isolated solid state dry contact switch. This meter also has a frequency output.

APPLICATIONS

- Chilled water, hot water and closed loop condenser water for HVAC
- Pumped steam condensate
- Domestic / municipal water
- Process water and water mixtures



GENERAL SPECIFICATIONS

SENSING METHOD

Electronic impedance sensing
(non-magnetic and non-photoelectric)

ACCURACY

- ± 0.5% of reading at calibrated velocity
- ± 1% of reading from 3 to 30 ft/s (10:1 range)
- ± 2% of reading from 0.4 to 20 ft/s (50:1 range)

PRESSURE DROP

Less than 1 psi at 20 ft/s in 1 ½” pipe,
decreasing in larger pipes and lower
velocities

MAXIMUM OPERATING PRESSURE

400 psi

MAXIMUM LIQUID OPERATION TEMPERATURE

Standard - 180° F continuous, 200° F peak
Optional - 280° F continuous, 300° F peak

SUPPLY VOLTAGE

24 ± 4 VAC / VDC

OPERATING RANGE FOR COMMON PIPE SIZES F-1100 / F-1200 SERIES

0.17 to 20 ft/s, ±2% accuracy
begins at 0.4 ft/s

Pipe Diameter	Flow Rate GPM	Nominal Pulses Per Gallon
1 ¼”	0.8 - 95	191
1 ½”	1 - 130	155
2”	2 - 210	79
2 ½”	2.5 - 230	57
3”	4 - 460	37
4”	8 - 800	21
6”	15 - 1,800	8.8
8”	26 - 3,100	5.1
10”	42 - 4,900	3.2
12”	60 - 7,050	2.3
14”	72 - 8,600	1.8
16”	98 - 11,400	1.4
18”	120 - 14,600	1.1
20”	150 - 18,100	0.86
24”	230 - 26,500	0.58
30”	360 - 41,900	0.37
36”	510 - 60,900	0.25



Turbine Flow Meter Application Guide

APPLICATION	LOCATION & PIPE SIZE	MODEL(SIGNALTYPE)	REQUIRED OPTIONS	DISPLAY
HVAC APPLICATIONS				
Chilled Water	¾" - 1" (0.8 to 38 gpm)	F-1310 (analog)*	None	System-10
	1 ¼" - 2"	F-1110 (analog)	316 SS for HW over 250° F	
Hot Water (280° F)	2 ½" and up with developed flow (long pipe runs)	F-1110 (analog)	316 SS for non-metallic pipe	
Condenser Water (closed loop)	2 ½" and up with undeveloped flow due to short pipe runs	F-1210 (analog)	Check project specifications for required features.	
Make-up Water	1 ¼" - 2"	F-1130 (pulse)	316 SS wetted metal components are required for insertion type meters in these applications.	D-100
Domestic Hot Water	Choose single or dual based on straight pipe run	F-1130 or F-1230 (pulse)		
Domestic Cold Water				
Steam Condensate	Typically small pipes	F-1130 or F-1330 (pulse)		
Boiler Feed Water (to 280° F)	Typically small pipes	F-1130 (pulse)		
MUNICIPAL WATER				
Municipal Water	1 ¼" and up with developed flow (long pipe runs)	F-1111 (iso-analog)	NSF61 Version	D-100
	2 ½" and up with undeveloped flow due to short pipe runs	F-1211 (iso-analog)		
PROCESS APPLICATIONS				
Process Water	1 ¼" - 2"	F-1111 (iso-analog)	316 SS wetted metal components typically required.	D-100
	2 ½" and up with developed flow (long pipe runs)	F-1111 (iso-analog)		
Process Cooling	2 ½" and up with undeveloped flow due to short pipe runs	F-1211 (iso-analog)		
Process Cooling Low Conductivity	1 ¼" and up with developed flow (long pipe runs)	F-1111 (iso-analog)	Requires 316 SS welded construction and low conductivity option.	

* F-1300 series are inline turbine meters.

Available Peripheral Equipment

Accurate energy measurement is essential for managing complex central energy plants, and ONICON System-10 BTU Meters provide that accuracy. ONICON displays turn any flow meter into a complete flow measurement station. Options range from simple wall mounted indicators to sophisticated network interface options like the D-100.



System-10



D-100



D-1200

Flow Meter Specifications for Central Energy Plant Applications



FLOW METER SPECIFICATION FOR: Chilled Water, Heating HW, Closed Loop Condenser Water

PROVIDE AN ONICON MODEL F-1210 DUAL TURBINE FLOW METER complete with all installation hardware necessary to enable insertion and removal of the meter without system shutdown. The flow meter shall be hand-insertable up to 400 psi. The flow meter shall have two contra-rotating axial turbines, with electronic impedance-based sensing and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion. Wetted metal components shall be nickel-plated brass (unless optional 316 SS is otherwise specified). Optional 316 SS construction is required for HW applications operating over 250° F, and for any application in non-metallic pipe. The maximum operating temperature shall be 280° F, 300° F peak. Each flow meter shall be individually wet-calibrated against a primary volumetric standard that is accurate to within $\pm 0.1\%$ and traceable to N.I.S.T.*. The manufacturer's certificate of calibration shall be provided with each flow meter. Accuracy shall be within $\pm 0.5\%$ of rate at the calibrated velocity, within $\pm 1\%$ of rate over a 10:1 turndown (3.0 to 30 ft/s) and within $\pm 2\%$ of rate over a 50:1 turndown (from 0.4 to 20 ft/s). The flow meter shall include two integral analog output(s), 4-20 mA, 0-10 V, (Optional 0-5 V). The flow meter shall be covered by the manufacturer's two-year warranty.

Optional Btu Meter: Provide an ONICON System-10 BTU Meter. The Btu meter shall provide the following points both at the integral LCD and as outputs to the building control system: energy total, energy rate, flow rate, supply temperature and return temperature.

Note to engineer regarding open loop condenser water applications:

ONICON recommends the model F-3500 insertion electromagnetic type flow meter for open loop applications.

FLOW METER SPECIFICATION FOR: Make-up Water, Pumped Condensate, Boiler Feed, Boiler Blow-down

PROVIDE AN ONICON MODEL F-1130 TURBINE FLOW METER complete with all installation hardware necessary to enable insertion and removal of the meter without system shutdown. The flow meter shall be hand-insertable up to 400 psi. Turbine rotation shall be detected by electronic impedance-based sensing (non-magnetic). For pipe sizes 2 ½" and larger with less than 30 straight pipe diameters available, provide an ONICON Model F-1230 flow meter, with two contra-rotating axial turbines, and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion. Wetted metal components shall be 316 SS. The meter shall be rated for maximum operating temperature of 280° F, 300° F peak. Each flow meter shall be individually wet-calibrated against a primary volumetric standard that is accurate to within $\pm 0.1\%$ and traceable to N.I.S.T.*. The manufacturer's certificate of calibration shall be provided with each flow meter. Accuracy shall be within $\pm 0.5\%$ of rate at the calibrated velocity, within $\pm 1\%$ of rate over a 10:1 turndown (3.0 to 30 ft/s) and within $\pm 2\%$ of rate over a 50:1 turndown (from 0.4 to 20 ft/s). The flow meter shall include an integral isolated dry-contact switch output that is factory scaled to meet the frequency requirements of the building management system based on application-specific flow rates. The flow meter shall be covered by the manufacturer's two-year warranty.

Optional Flow Display: Provide a D-100 Flow Display with network interface for local or remote indication of flow rate and total. Note: When optional flow display is specified, use flow meter models F-1100 and F-1200 in lieu of F-1130 and F-1230.

Note to engineer regarding pumped condensate and boiler blow-down:

Pipe must be equipped with back-flow prevention, and it must be completely filled. This technology is not suitable for gravity flow condensate return systems.

* National Institute of Standards and Technology