F-2600

INLINE VORTEX FLOW METER

ONICON F-2600 Series Inline Vortex Flow Meter is designed to deliver accurate and reliable flow measurement in steam applications.

Saturated Steam • Superheated Steam • High Temperature Hot Water

Vortex flow meters detect the frequency of alternating low pressure vortices that are formed as flow is diverted around a bluff body. These swirling low pressure zones cause the sensors to vibrate. The frequency of this vibration is directly proportional to the flow velocity.

DESCRIPTION

The ONICON F-2600 Series Inline Vortex Flow Meter incorporates a robust sensing system designed to provide accurate and reliable flow measurements in a wide variety of applications. It is designed with a two stage all welded bluff body/sensor design that enhances signal sensitivity and extends the operating range of the meter. This innovative feature also protects the sensors from pressure shocks and solids suspended in the flow stream.

In many applications seasonal steam loads are difficult to measure due to the low demand. An innovative solution to this problem is the reduced bore option available with the F-2600. This option allows for a one step size reduction significantly improving low flow performance. It eliminates the expense of re-piping the system with reducers and spool pieces.

The F-2600, available in a loop powered configuration, employs an integral temperature sensor allowing a true mass flow measurement of saturated steam up to 500°F. Incorporating an integral pressure sensor enables mass flow measurement of superheated steam up to 500°F.

*NIST - National Institute of Standards and Technology

APPLICATIONS

- Saturated steam
- Hot water to 500°F (260°C)

Applications with optional pressure sensor

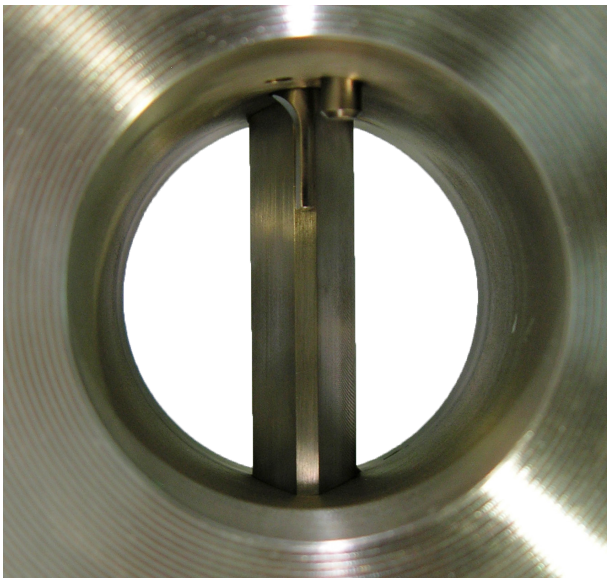
- Superheated steam to 500°F (260°C)
- Compressed air

FEATURES

- Mass flow measurement from a single instrument
- Optional steam energy flow measurement
- Integral 1,000 Ω platinum RTD for precise temperature measurement
- Power Over Ethernet (POE)
- Optional pressure transducer for accurate pressure readings at the meter location
- Maintenance free non-moving parts design
- Wear resistant bluff body/sensor design
- Advanced signal processing algorithms ensure stable flow readings and reject noise
- Easy-to-install meter arrives fully programmed and ready to use
- One-step reduced bore option enhances low flow performance without changing the piping system
- BACnet MS/TP, BACnet IP, MODBUS RTU or MODBUS TCP/IP serial communication available

CALIBRATION

Every ONICON flow meter is wet calibrated in a flow laboratory against standards that are directly traceable to NIST.* A certificate of calibration accompanies every meter.



SPECIFICATIONS*

F-2600 TRANSMITTER		
PERFORMANCE	STEAM and GAS ACCURACY (Reynolds number ≥10,000)	±1% of reading volumetric flow rate ±1.5% of reading mass flow rate
	LIQUIDS ACCURACY	±0.7% of reading volumetric flow rate
	REPEATBILITY	±0.2%
	LONG TERM STABILITY	±0.2% over a period of 1 year
OPERATING CONDITIONS	AMBIENT TEMPERATURE	-40°F to 185°F
	PROCESS TEMPERATURE	-330°F to 500°F
INPUT POWER	AVAILABLE OPTIONS	• Loop Power: 12-36 VDC, 25 mA max • External DC Power: 12-36 VDC, 300 mA max • External AC Power: 100-240 VAC, 50/60 Hz, 5W max • Power Over Ethernet (POE) or External 12-28 VDC
I/O SIGNAL	DC LOOP POWER	One (1) 2-wire, 4-20 mA output
		One (1) 2-wire scaled pulse, 50 ms duration, 5 - 36 VDC @ 40 mA maximum
	EXTERNAL DC or EXTERNAL AC	Up to three (3) 2-wire, 4-20 mA outputs One (1) 2-wire scaled pulse output, 50 ms duration, 5-36 VDC @ 40 mA maximum Up to three (3) opto-coupled relay alarm outputs MODBUS RTU or BACnet MS/TP serial communications
	POWER OVER ETHERNET (POE) or EXTERNAL 12-28 VDC	Up to three (3) 2-wire, 4-20 mA outputs One (1) 2-wire scaled pulse output, 50 ms duration, 5-36 VDC @ 40 mA maximum Up to three (3) opto-coupled relay alarm outputs MODBUS TCP/IP or BACnet IP serial communications
ELECTRONICS ENCLOSURE	NEMA 4X (IP 66) epoxy painted aluminum	
	AVAILABLE OPTIONS	• Integral mount • Remote mount (standard cable length 50 ft, max. 100 ft)
	DISPLAY	2-line, 16 character alphanumeic LCD with backlighting option.
APPROVALS	FM/FMC	Class I, Division 1, Group B, C, D
		Class II, Division 1, Group E, F, G
		Type 4X and IP66, Ta = -40 to 60°C
	CRN APPROVAL	All Providences, Class F - Instrumentation
F-2000 SERIES FLOW SENSOR		
PERFORMANCE	SENSING METHOD	Vortex shedding with integral piezoelectric sensors
	AVAILABLE OPTIONS	• Integral 1,000 Ω platinum RTD provides instantaneous temperature • Integral pressure transducer (optional) provides instantaneous pressure.
OPERATING CONDITIONS	MAXIMUM OPERATING PRESSURE	≤ Flange rating
	PRESSURE LOSS	Pressure loss varies with meter size and flow rate. Please contact ONICON for detailed information
FLOW SENSOR DESIGN	316L SS	
PROCESS CONNECTIONS	AVAILABLE OPTIONS	• ANSI Class 150 Flanges • ANSI Class 300 Flanges

*SPECIFICATIONS subject to change without notice.

FLOW METER OPERATING RANGES FOR SATURATED STEAM

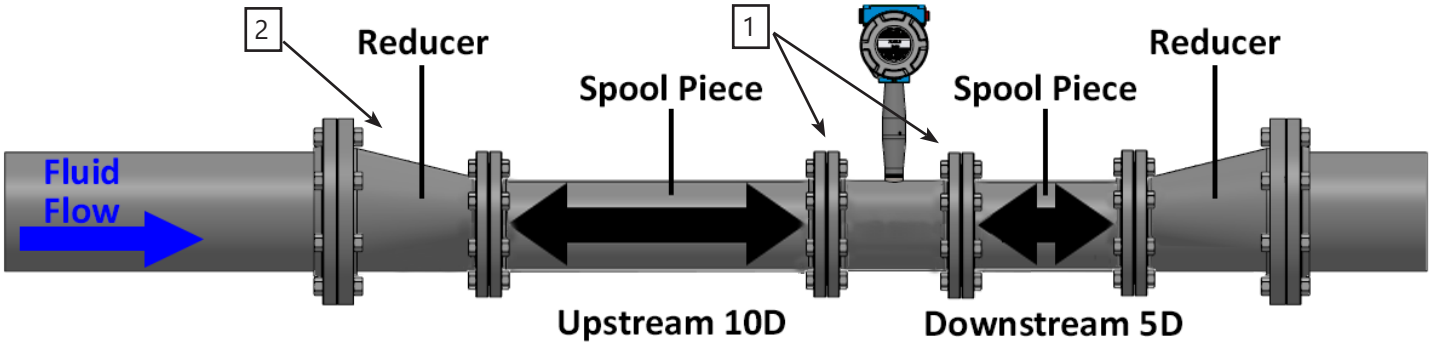
Saturated Steam Minimum and Maximum Flow Rates (lb/hr)									
Pressure (psig)	**5**	**15**	**50**	**75**	**100**	**150**	**200**	**300**	**Pressure (psig)**
Density (lb/ft³)	**0.0479**	**0.071**	**0.1497**	**0.2042**	**0.2578**	**0.3633**	**0.4680**	**0.6784**	**Density (lb/ft³)**
Sched 40 Steel Pipe Size	**FLOW RATE (lbs/hr)**								
½″	6.5 52	7.8 74	11.3 153	13.2 209	15 271	18 372	20 493	24 716	Minimum Maximum
¾″	12 122	14.5 195	21 404	24.4 550	27 639	33 980	37 1163	45 1688	Minimum Maximum
1″	20 265	24 324	35 673	41 915	46 1386	54 1631	62 2525	74 3664	Minimum Maximum
1 ½″	49 650	59 955	85 1983	100 2698	112 3402	133 4807	151 6203	182 9000	Minimum Maximum
2″	82 1087	99 1596	143 3313	167 4509	187 5690	222 8033	253 10365	304 15040	Minimum Maximum
3″	183 2431	222 3570	319 7412	373 10085	419 12729	497 17969	565 23184	680 33642	Minimum Maximum
4″	318 4231	386 6214	556 12901	648 17554	728 22156	866 31276	983 40354	1184 58556	Minimum Maximum
6″	722 9594	875 14088	1260 29249	1470 39801	1652 50233	1962 70911	2229 91494	2685 132763	Minimum Maximum
8″	1264 16806	1532 24680	2208 51239	2575 69723	2893 87998	3438 124222	3905 160279	4704 232575	Minimum Maximum

FLOW METER OPERATING RANGE FOR WATER SERVICE

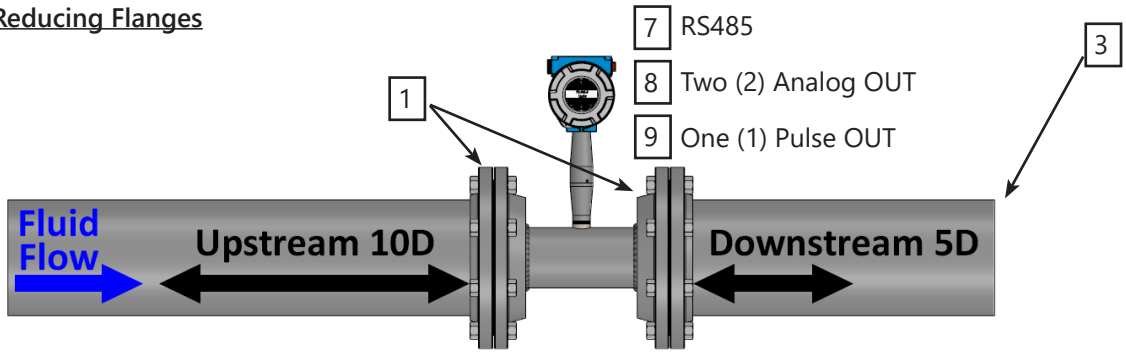
Water Minimum and Maximum Flow Rates (GPM)									
Rate	**Sched 40 Steel Pipe Size (inches)**								
	½″	**¾″**	**1″**	**1 ½″**	**2″**	**3″**	**4″**	**6″**	**8″**
Min GPM	0.9	1.4	2.2	5.5	9.2	21	36	81	142
Max GPM	22	40	67	166	276	618	1076	2437	4270

TYPICAL METER INSTALLATIONS

Using Reducers and Spool Pieces



Using Integrated Reducing Flanges



Note: Refer to the F-2600 & F-2700 IOM for detailed information about minimum upstream straight pipe run to first obstruction.

1. ANSI flanges
2. Upstream obstruction. Note: Pipe reductions in steam systems require eccentric reducers
3. Downstream obstruction. Note: Pipe expansions in steam systems require eccentric expanders
4. Minimum upstream straight pipe run from first obstruction to flow meter
5. Flow straightener location if provided. Flow straighteners reduce the amount of straight pipe run required, refer to IOM for additional information.
6. Minimum downstream straight pipe run ≥ 5 diameters
7. BACnet MS/TP or MODBUS RTU
8. Active Analog outputs, do not provide power. Analog outputs are available for mass flow rate, volumetric flow rate, temperature, pressure or fluid density.
9. Pulse output signal for remote totalization.

METER ORDERING INFORMATION
Meter Model Number Coding = F-26BB-CDE-FGHI-SPC

F-2ABB = Inline Vortex Flow Meter

A = Flow Meter Type
6 = Inline Vortex Meter

BB = Meter Size (Inches)

05 = ½″	15 = 1½″	04 = 4″	10 = 10″
34 = ¾″	02 = 2″	06 = 6″	12 = 12″
01 = 1″	03 = 3″	08 = 8″	

C = Process Connection
1 = ANSI Class 150 Flange
3 = ANSI Class 300 Flange

D = Electronics Enclosure Mounting Configuration
1 = Integral mount, NEMA 4X Enclosure
2 = Remote mount transmitter with 50′ of cable
3 = Remote mount transmitter with 100′ of cable

E = Temperature/Pressure Compensation
0 = Integral temperature compensation
2 = Integral temp and pressure compensation, 100 psia max
3 = Integral temp and pressure compensation, 300 psia max
4 = Integral temp and pressure compensation, 500 psia max

F = Input Power
0 = Loop power (G=0 only)
1 = External 12-36 VDC
2 = External 100-240 VAC
3 = Power Over Ethernet (POE) or External 12-28 VDC

G = Output Signals
0 = Loop powered 4-20 mA and scaled pulse (F=0 only)
1 = (1) 4-20mA, (1) scaled pulse, (1) alarm contact and MODBUS (Requires F=1 or 2)
2 = (1) 4-20mA, (1) scaled pulse, (1) alarm contacts and BACnet (Requires F=1 or 2)
3 = (3) 4-20mA, (1) scaled pulse, (3) alarm contacts and MODBUS (Requires F=1 or 2)
4 = (3) 4-20mA, (1) scaled pulse, (3) alarm contacts and BACnet (Requires F=1 or 2)
5 = (1) 4-20mA, (1) scaled pulse, (1) alarm contact and MODBUS TCP/IP (Requires F=3)
6 = (1) 4-20mA, (1) scaled pulse, (1) alarm contacts and BACnet IP (Requires F=3)
7 = (3) 4-20mA, (1) scaled pulse, (3) alarm contacts and MODBUS TCP/IP (Requires F=3)
8 = (3) 4-20mA, (1) scaled pulse, (3) alarm contacts and BACnet IP (Requires F=3)

H = Max Operating Temperature
0 = 500°F

I = Energy Meter Configuration
0 = None
1 = Gross energy
2 = Net energy (requires remote temperature sensor and installation kit)

SPC = Special Configuration
R05 = Reduced bore meter to 0.5″, Meter size BB = 34 or 01
R01 = Reduced bore meter to 1″, Meter size BB = 15
R15 = Reduced bore meter to 1.5″, Meter size BB = 02
R02 = Reduced bore meter to 2″, Meter size BB = 03
R03 = Reduced bore meter to 3″, Meter size BB = 04
R04 = Reduced bore meter to 4″, Meter size BB = 06
R06 = Reduced bore meter to 6″, Meter size BB = 08
R08 = Reduced bore meter to 8″, Meter size BB = 10
R10 = Reduced bore meter to 10″, Meter size BB = 12

REMOTE TEMPERATURE SENSOR AND THERMOWELL INSTALLATION KIT

(Required for Net Energy Meter)

Model Number	Description
TSI-RKP-1461	4 wire 1000 Ω RTD Sensor, 0.25" X 2.8", 32 - 250°F temperature range with 10" leads
INSTL204S-TSI	Temperature sensor installation kit for pipe size range from 1.5"- 8". Wetted materials are SS, for use in carbon steel piping systems

Note: Net energy meter requires one temperature sensor and one thermowell installation kit sized to pipe.