

• **F-2600 SERIES** •
INLINE VORTEX
FLOW METER



MADE IN THE USA

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 apply lateral pressure first to one side and then to the other of sensors located downstream of the bluff body. This causes the sensors to vibrate. The frequency of this vibration is directly proportional to the flow velocity.

DESCRIPTION

The ONICON F-2600 Series Vortex Flow Meter is a flexible design that provides accurate, reliable flow measurement in steam and high temperature water applications. The F-2600 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.

The basic loop powered model provides volumetric flow measurement for water at temperatures up to 500° F. Adding the integral temperature sensor option allows for mass flow measurement of saturated steam. Meters provided with integral pressure and temperature sensors are capable of measuring mass flow of superheated steam. Optional versions of the meter are also available that include serial communications and multiple analog outputs.

APPLICATIONS

- Saturated steam
- Hot water to 500° F (260° C) standard
750° F (400° C) optional

Applications with optional pressure sensor

- Superheated steam to 500° F (260° C) standard
750° F (400° C) optional
- Compressed air
- Industrial gases

CALIBRATION

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

FEATURES

- Mass flow measurement from a single instrument
- Optional steam energy flow measurement
- Integral 1,000 Ω platinum RTD for precise temperature measurement
- 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

GENERAL SPECIFICATIONS

ACCURACY

Percent of reading accuracy to within:

- ± 0.7% for liquids (volumetric)
- ± 1% for steam and gases (volumetric)
- ± 1.5% for steam and gases (mass)

For Reynolds Number $\geq 10,000$

Repeatability: $\pm 0.2\%$

Long term stability: $\pm 0.2\%$ over a period of 1 year

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SENSING METHOD

- Vortex shedding with integral piezoelectric sensors
- Integral 1,000 Ω platinum RTD (optional) provides instantaneous temperature
- Integral pressure transducer (optional) provides instantaneous pressure

OPERATING TEMPERATURE RANGE

Ambient: -40° F (-40° C) to +185° F (+85° C)
 Process: -330° F (-200° C) to +500° F (+260° C)
 Optional high temperature limit
 +750° F (+400° C)

MAXIMUM OPERATING PRESSURE

≤ Flange rating or 1500 psi (103 bar)

PRESSURE LOSS

Pressure loss varies with meter size and flow rate. Please contact ONICON for detailed information.

CONNECTION TYPE

- ANSI Class 150, 300 or 600 flanges
- Wafer style

MATERIALS

- Sensor Body: 316L Stainless Steel
- Bluff/Sensor Body: 316L Stainless Steel
- Electronics Enclosure: Epoxy painted aluminum

ENCLOSURE

NEMA 4X (IP66)

INPUT POWER OPTIONS

- Loop power: 14-36 VDC, 22 mA maximum current
- External DC power: 18-36 VDC, 300 mA maximum current
- External AC power: 100-240 VAC 50/60 Hz, 5 W maximum power

DISPLAY

2-line, 16 character alphanumeric LCD with backlighting option. Standard saturated steam display menu provides: Mass Flow Rate, Temperature, Pressure (calculated), Mass Total and Alarms (if active).

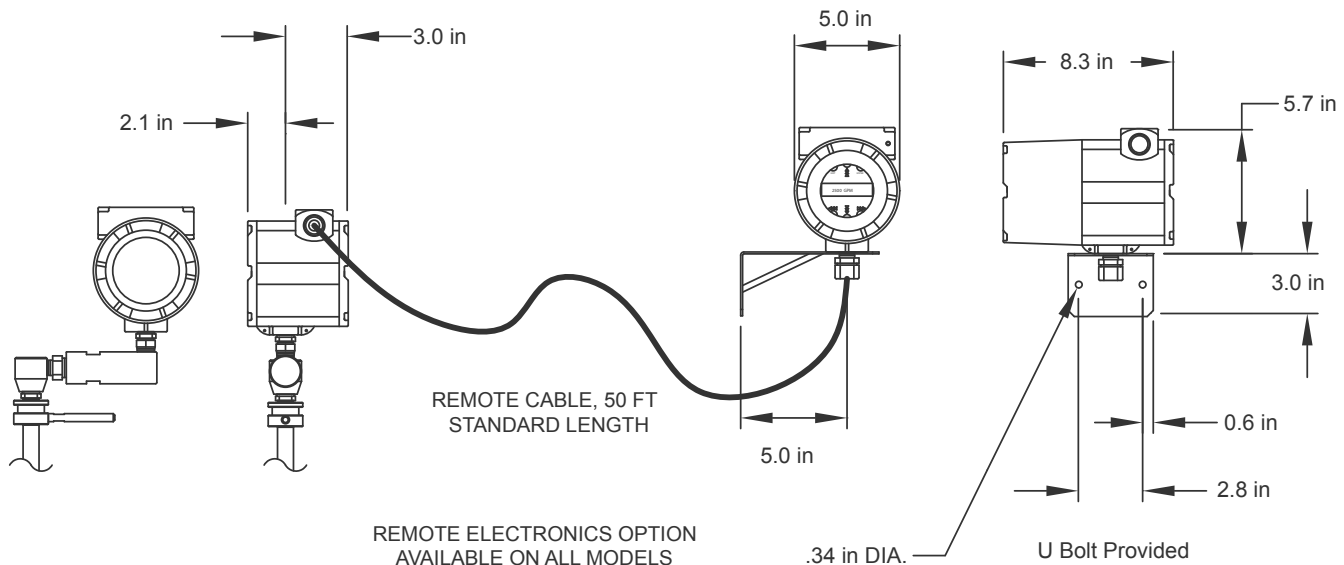
Optional remote mount transmitter version available (Standard cable length 50 ft., maximum 150 ft.)

OUTPUT SIGNALS PROVIDED

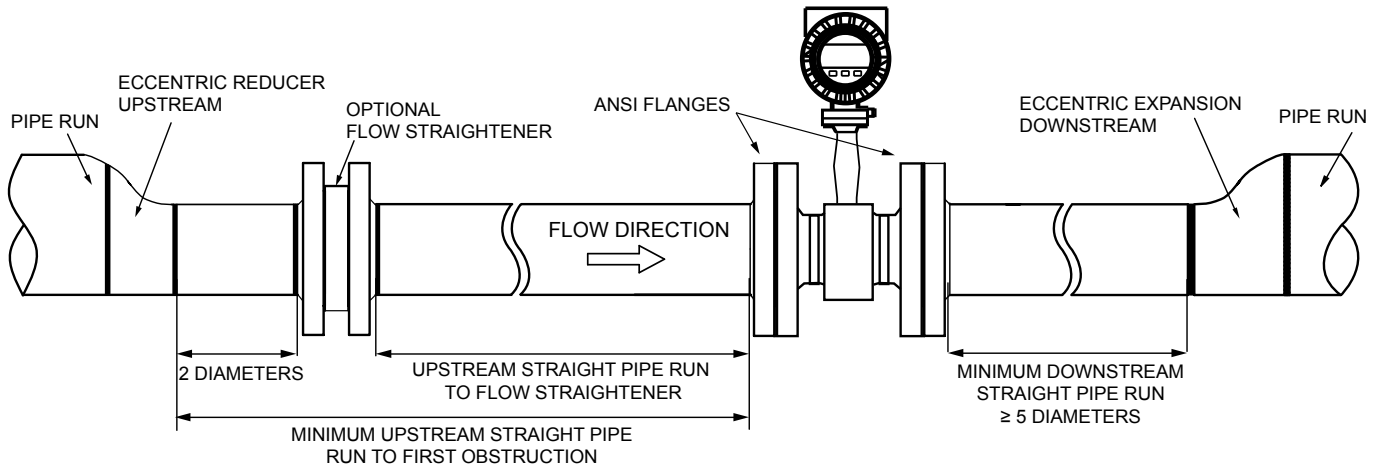
- DC loop powered version (Standard version of meter)
 - Analog Rate: 2-wire, 4-20 mA
 - Totalization: 2-wire scaled pulse, 50 ms duration, 5-36 VDC @ 40 mA maximum
 - Frequency: 2-wire, open collector, 10 kHz maximum, 5-36 VDC @ 40 mA maximum
 - Digital: HART® serial communications
- Optional external DC or AC powered version
 - Analog Rate: Up to (3) 2-wire, 4-20 mA outputs
 - Totalization: (1) 2-wire scaled pulse output, 50 ms duration, 5-36 VDC @ 40 mA maximum
 - Frequency: (1) 2-wire, 10 kHz maximum, 5-36 VDC @ 40 mA maximum
 - Digital: HART® serial communications
 - Alarm: Up to (3) opto-coupled relay alarm outputs
- Optional on DC or AC powered version
 - MODBUS RTU RS485 serial communications in place of HART®

Specifications subject to change without notice.

REMOTE MOUNT INSTALLATION



Inline Vortex Flow Meter



Obstruction	*Minimum Upstream Straight Pipe Run Requirements	
	Straight pipe run without flow straightener	Straight pipe run to flow straightener
Single 90	20 Dia	10 Dia
Tee	20 Dia	10 Dia
RDCR/EXPNDR	20 Dia	10 Dia
Two 90's Same Plane	30 Dia	15 Dia
Ball/Gate Valve Fully Open	30 Dia	15 Dia
Two 90's Out of Plane	40 Dia	20 Dia
Control Valve	50 Dia	25 Dia
P.R.V.	50 Dia	25 Dia



Meter Flow Rates for Saturated Steam

Minimum and Maximum Saturated Steam Flow Rates @ Specific Operating Pressures									
Pressure (psig)	5	15	50	75	100	150	200	300	Pressure (psig)
Density (lb/ft ³)	0.0479	0.071	0.1497	0.2042	0.2578	0.3633	0.4680	0.6784	Density (lb/ft ³)
Meter Size in Inches	FLOW RATE (lbs / hr)								
1/2"	6.5 52	7.8 74	11.3 153	13.2 209	15 271	18 372	20 493	24 716	Minimum Maximum
3/4"	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 1/2"	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 Rates for Water

Water Minimum and Maximum Flow Rates (GPM)									
Rate	Meter Size (in)								
	1/2	3/4	1	1 1/2	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

METER ORDERING INFORMATION



Vortex Meter Codification = F-26AA-BCD-EFGH

AA = Meter Size in Inches

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

B = Connection Type

0 = Wafer
1 = ANSI Class 150 flange
3 = ANSI Class 300 flange
6 = ANSI Class 600 flange

C = Integral or Remote Mount Transmitter

1 = Integral Mount
2 = Remote Mount

D = Temperature / Pressure Compensation

0 = Integral temperature compensation
1 = Integral temperature & pressure sensor, 30 psia maximum
2 = Integral temperature & pressure sensor, 100 psia maximum
3 = Integral temperature & pressure sensor, 300 psia maximum
4 = Integral temperature & pressure sensor, 500 psia maximum
9 = None

E = Input Power

0 = Loop powered (Only available with output signals option F=0)
1 = External 12-36 VDC powered
2 = External 85-240 VAC powered

F = Output Signals

0 = 4-20 mA output*, pulse output & frequency output
1 = 4-20 mA output, pulse output, frequency output, alarm output & MODBUS
3 = (3) 4-20 mA outputs, (3) alarm outputs, (1) pulse output (1) frequency output & MODBUS
5 = (3) 4-20 mA outputs*, (3) alarm outputs, (1) pulse output & (1) frequency output

G = Maximum Operating Temperature

0 = 500° F
1 = 750° F

H = Energy Meter

0 = None
1 = Gross energy meter
2 = Net energy meter (requires additional remote temperature sensor)

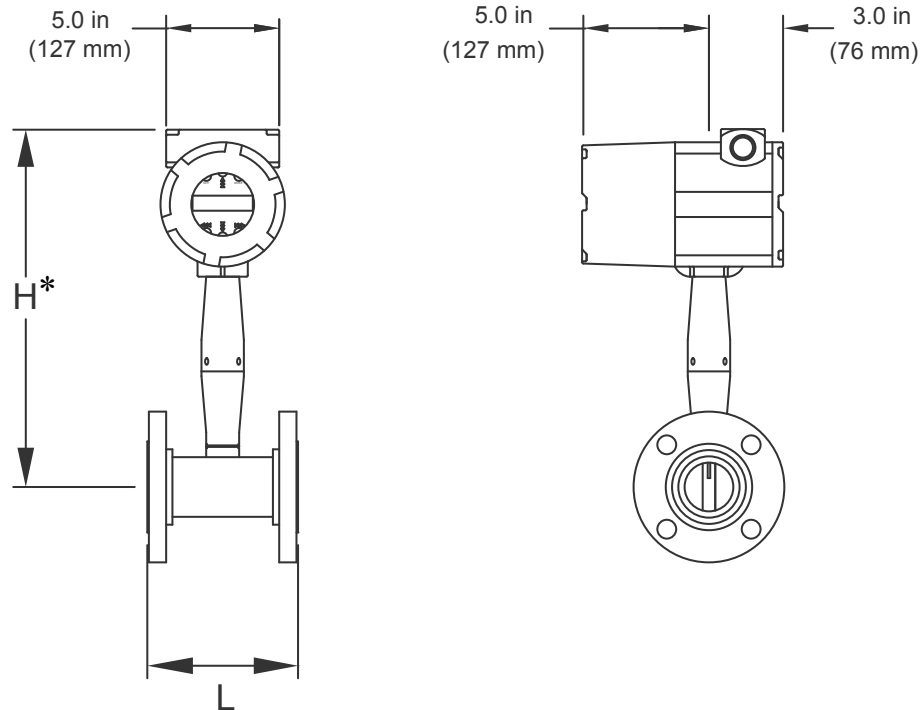
* Available with HART® serial communications

Remote Temperature Sensor and Thermowell Installation Kit

(Required for net energy meter)

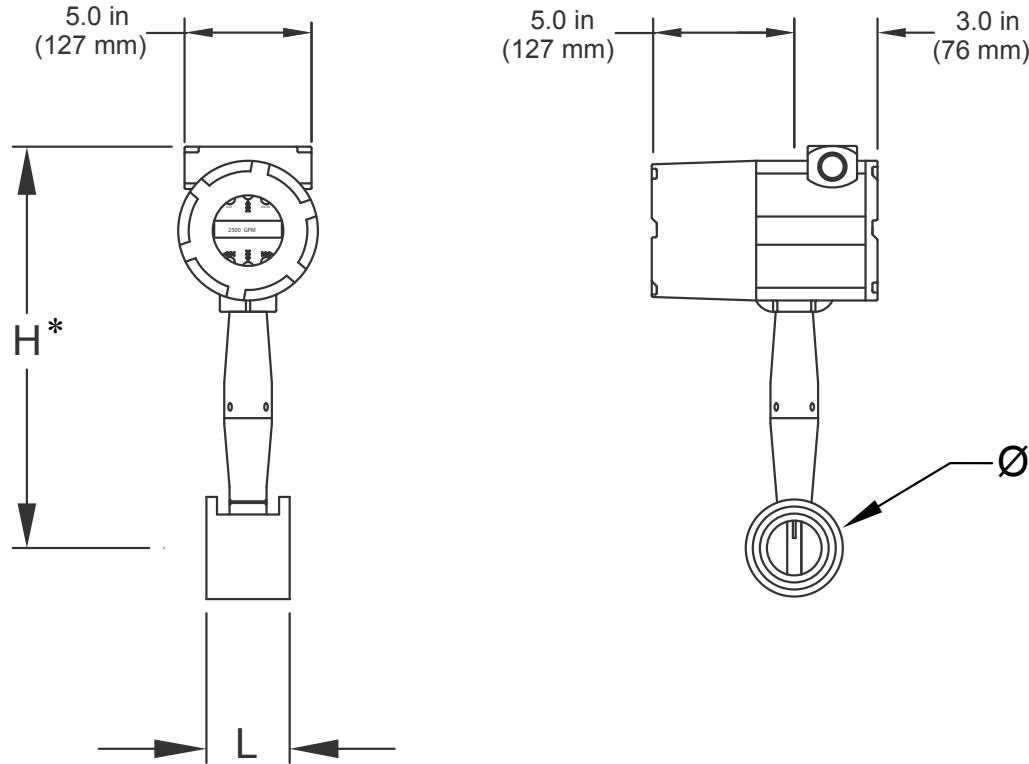
Part Number	Description
20100	Remote Temperature Sensor, 1,000 Ω 4-wire Class A Platinum RTD
20101	Remote Thermowell Kit for 1½" Welded Steel Pipe
20102	Remote Thermowell Kit for 2" - 5" Welded Steel Pipe
20103	Remote Thermowell Kit for 6" - 14" Welded Steel Pipe

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



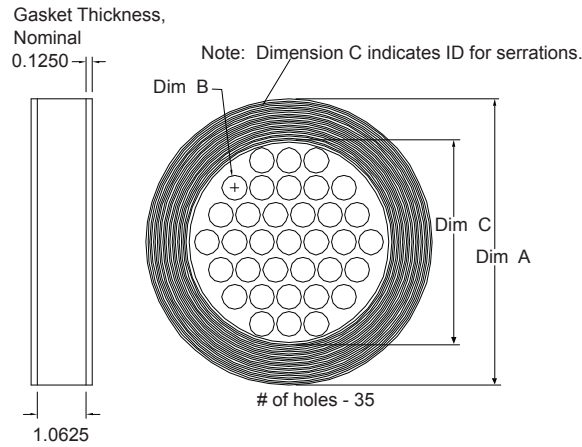
Flow Meter Size	L	H*	Weight		
			ANSI 150 (PN 16)	ANSI 300 (PN 40)	ANSI 600 (PN 64)
½" (15 mm)	7.90 in (200 mm)	13.3 in (338 mm)	13.6 Lb (6.2 Kg)	14.6 Lb (6.6 Kg)	15.2 Lb (6.9 Kg)
¾" (20 mm)	7.9 in (200 mm)	13.4 in (340 mm)	14.7 Lb (6.7 Kg)	17.1 Lb (7.8 Kg)	17.7 Lb (8.0 Kg)
1" (25 mm)	7.9 in (200 mm)	13.5 in (343 mm)	15.6 Lb (7.1 Kg)	18.0 Lb (8.2 Kg)	18.8 Lb (8.5 Kg)
1½" (40 mm)	7.9 in (200 mm)	13.8 in (351 mm)	19.0 Lb (8.6 Kg)	24.2 Lb (11.0 Kg)	26.2 Lb (11.9 Kg)
2" (50 mm)	7.9 in (200 mm)	14.0 in (356 mm)	23.2 Lb (10.5 Kg)	26.8 Lb (12.2 Kg)	30.2 Lb (13.7 Kg)
3" (80 mm)	7.9 in (200 mm)	14.5 in (368 mm)	34.8 Lb (15.8 Kg)	43.4 Lb (19.7 Kg)	48.6 Lb (22.1 Kg)
4" (100 mm)	9.84 in (250 mm)	15.0 in (381 mm)	47.3 Lb (21.5 Kg)	66.5 Lb (30.2 Kg)	88.5 Lb (40.2 Kg)
6" (150 mm)	11.81 in (300 mm)	15.9 in (404 mm)	73.7 Lb (33.5 Kg)	110.5 Lb (50.2 Kg)	169.1 Lb (78.8 Kg)
8" (200 mm)	11.81 in (300 mm)	16.8 in (427 mm)	113.2 Lb (51.4 Kg)	167.2 Lb (75.9 Kg)	253.6 Lb (115.1 Kg)
10" (200 mm)	15.0 in (380 mm)	18.1 in (460 mm)	177.5 Lb (80.6 Kg)	256.7 Lb (116.5 Kg)	418.9 Lb (190.2 Kg)
12" (200 mm)	17.7 in (450 mm)	19.1 in (485 mm)	278.8 Lb (126.6 Kg)	385.6 Lb (175.1 Kg)	526.2 Lb (238.9 Kg)

*This Dimension is the same for integral and remote mount meters.



Flow Meter Size	L	H*	Ø	Weight
1/2" (15 mm)	2.6 in (65 mm)	13.3 in (338 mm)	1.38 in (35 mm)	11.5 Lb (5.2 Kg)
3/4" (20 mm)	2.6 in (65 mm)	13.4 in (340 mm)	1.69 in (42.9 mm)	11.9 Lb (5.4 Kg)
1" (25 mm)	2.6 in (65 mm)	13.5 in (343 mm)	2.00 in (50.8 mm)	12.2 Lb (5.5 Kg)
1 1/2" (40 mm)	2.6 in (65 mm)	13.8 in (351 mm)	2.88 in (73.2 mm)	13.8 Lb (6.3 Kg)
2" (50 mm)	2.6 in (65 mm)	14.0 in (356 mm)	3.62 in (91.9 mm)	15.5 Lb (7.0 Kg)
3" (80 mm)	2.6 in (65 mm)	14.5 in (368 mm)	5.00 in (127.0 mm)	20.6 Lb (9.4 Kg)
4" (100 mm)	2.6 in (65 mm)	15.0 in (381 mm)	6.19 in (157.0 mm)	25.3 Lb (11.5 Kg)

*This Dimension is the same for integral and remote mount meters.



Diameter	Dim A	Dim B	Dim C	Part # Each
2" (50mm)	3.93	.28	2.14	14382
3" (80mm)	5.31	.43	3.24	14383
4" (100mm)	6.26	.55	4.22	14384
6" (150mm)	8.50	.78	6.07	14385
8" (200mm)	10.62	1.02	7.98	14386

PRE-CUT GASKETS



Pre-cut 1/8" gaskets for use with class 300 raised face flanges. Gaskets are suitable for use with water, inert gases and saturated steam up to 150 psig. For saturated steam applications above 150 psig, contact ONICON for assistance.

Diameter	Part # Each
1/2" (15mm)	18830
3/4" (20mm)	18831
1" (25mm)	16811
1 1/2" (40mm)	16812
2" (50mm)	16813
3" (80mm)	16814
4" (100mm)	16815
6" (150mm)	13816
8" (200mm)	16817

PRESSURE TRANSDUCER OPTIONS

Full Scale Operating Pressure	Maximum Overage Pressure
PSIa	PSIa
30	60
100	200
300	600
500	1000
1500	2500