



• F-2700 SERIES • INSERTION VORTEX FLOW METER



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-2700 Series Insertion Vortex Flow Meter is a flexible design that delivers accurate, reliable flow measurement in a wide variety of applications. The integral temperature sensor and optional integral pressure sensor allow for direct mass flow measurement in steam and compensated flow measurement in compressed air and gases. A volumetric flow version of the meter is also available for liquid flow applications.

ONICON insertion style vortex meters can be installed without disrupting flow making them ideal for retrofit applications. They are also a cost effective option in larger pipes as they are priced independent of the pipe diameter.

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 W platinum RTD for precise temperature measurement
- Optional integral pressure transducer for accurate pressure readings at the meter location
- DC loop powered operation
- 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.
- Optional multi-analog output versions available.
- HART® serial communication
- Optional BACnet MS/TP or MODBUS RTU RS485 serial communication

GENERAL SPECIFICATIONS

ACCURACY

Steam and gases (Reynolds Number $\geq 10,000$)

Percent of reading accuracy to within:

± 1.0% for steam and gases (volumetric)

± 1.5% for steam and gases (mass)

Repeatability: ± 0.2%

Long term stability: ±0.2% over a period of 1 year

Liquids

± 0.7% for liquids (volumetric)

Repeatability: ± 0.2%

Long term stability: ±0.2% over a period of 1 year

SENSING METHOD

- Vortex shedding with integral piezoelectric sensors
- Integral 1,000 W 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)

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GENERAL SPECIFICATIONS CONT.



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

- 2" ANSI Class 150 Flange with Packing Gland
- 2" ANSI Class 300 Flange with Packing Gland

MATERIALS

- Wetted Metal Parts: 316L Stainless Steel
- Electronics Enclosure: Epoxy painted aluminum

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, 5W. maximum power

ENCLOSURE

NEMA 4X (IP66)

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 100 ft.)

OUTPUT SIGNALS PROVIDED

- DC loop powered version

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 and 40 mA maximum

Digital: HART® serial communications

- Optional outputs (requires External Input Power Options)
Analog Rate: Up to three (3) 2-wire, 4-20 mA outputs

Totalization: One (1) 2-wire scaled pulse output, 50 ms
duration, 5 - 36 VDC and 40 mA maximum

Alarm: Up to three (3) opto-coupled relay alarm outputs

- MODBUS RTU RS485 or BACnet MS/TP serial
communications in place of HART®

APPROVALS

FM/FMC Approvals

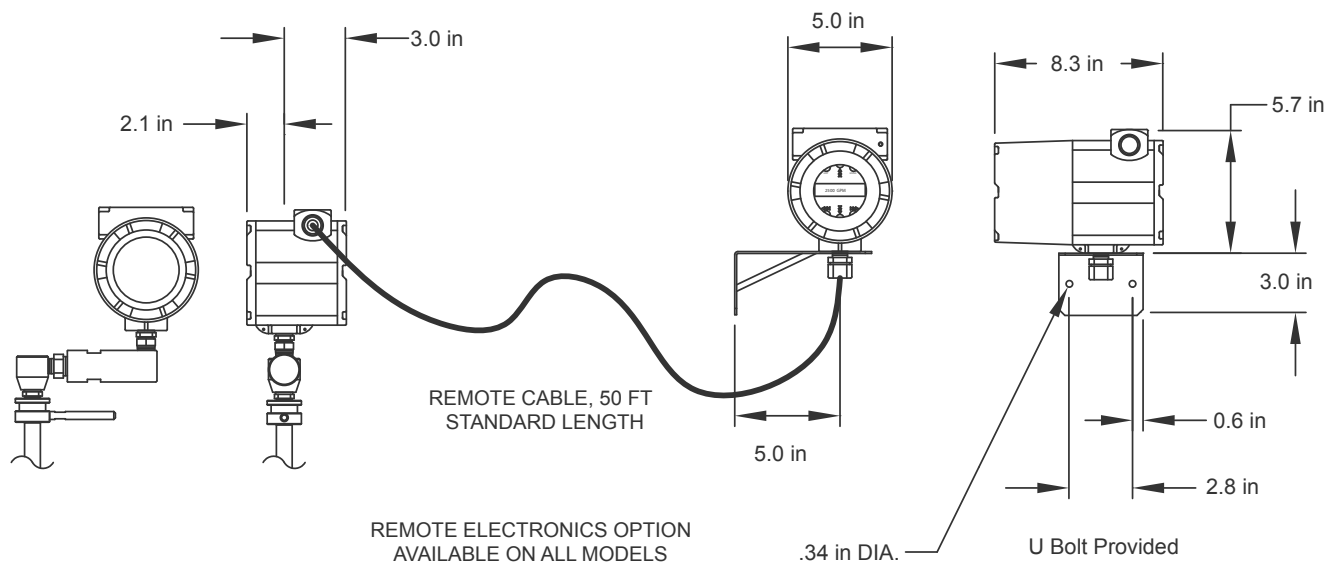
Class I, Division 1, Groups B, C, & D

Class II/III, Division 1, Groups E, F, & G

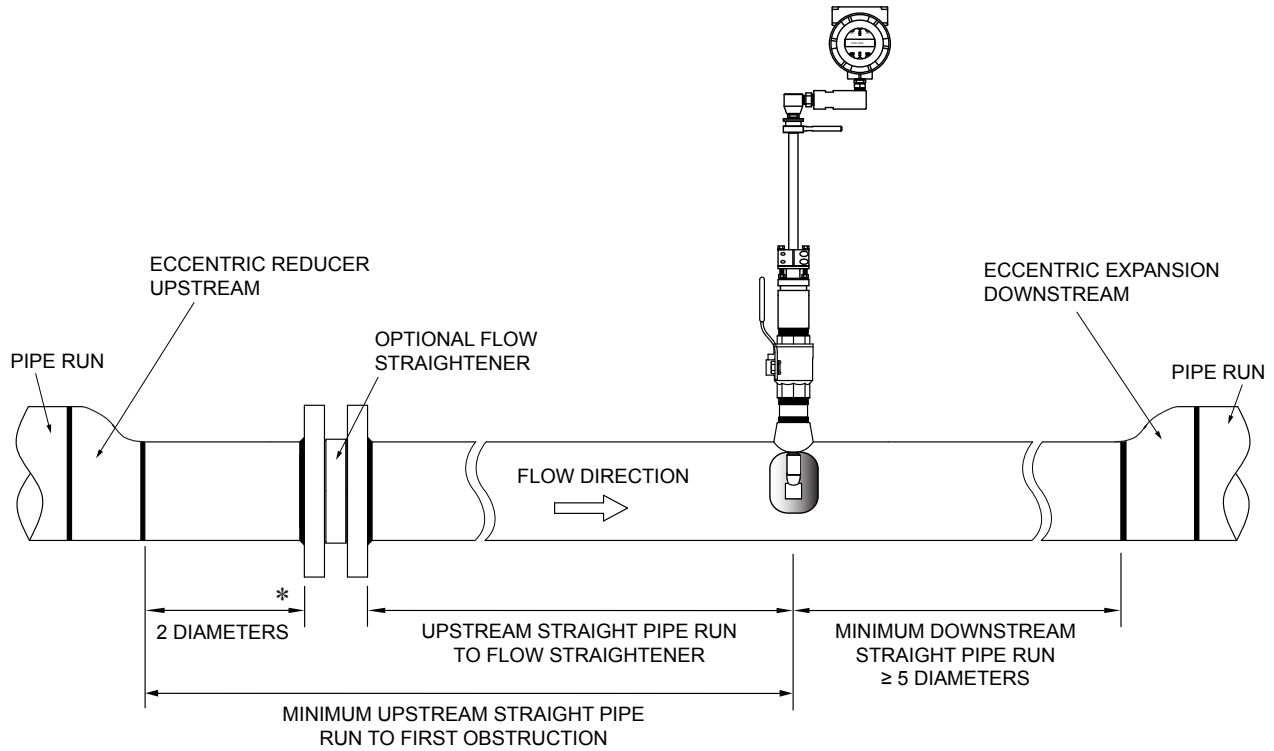
Type 4X and IP66, T6, Ta = -40 to 60°C

Note: Specifications subject to change without notice.

REMOTE MOUNT INSTALLATION



Insertion Vortex Flow Meter
(for pipes $\geq 2''$ in diameter)



Obstruction	*Minimum Upstream Straight Pipe Run Requirements	
	Straight pipe run without flow straightener	Straight pipe run to flow straightener
Single bend preceded by ≥ 9 diameters of straight pipe	10 Dia	NA
Outflowing tee	10 Dia	NA
Pipe size reduction before meter	10 Dia	NA
Single bend preceded by ≤ 9 diameters of straight pipe	15 Dia	8 Dia
Expansion before meter	20 Dia	8 Dia
Multiple bends out of plane	30 Dia	13 Dia
Partially open valve	30 Dia	13 Dia
Control valve / P.R.V.	50 Dia	23 Dia

FLOW METER OPERATING RANGES



Insertion Meter Flow Rates for Saturated Steam

Minimum and Maximum Saturated Steam Flow Rates @ Specific Operating Pressures									
Insertion Meter Flow Rates in lb/hr Nominal Diameter (in), Schedule 40									
	Pressure (psig)	5	15	50	75	100	150	200	300
Nominal diameter in inches	Density (lb/ft ³)	0.0479	0.071	0.1497	0.2042	0.2578	0.3633	0.4680	0.6784
		lbs / hr							
3"	Minimum Maximum	205 2721	248 3995	357 8295	417 11288	468 14246	557 20111	632 25948	762 37652
4"	Minimum Maximum	353 4685	427 6880	616 14284	718 19438	807 24532	958 34631	1089 44683	1311 64838
6"	Minimum Maximum	800 10633	969 15614	1397 32417	1629 44112	1831 55674	2175 78592	2470 101405	2976 147145
8"	Minimum Maximum	1385 18412	1679 27038	2419 56135	2822 76385	3170 96407	3766 136092	4278 175595	5153 254799
10	Minimum Maximum	2184 29022	2646 42618	3813 88481	4447 120401	4996 151960	5936 214513	6743 276779	8123 401623
12"	Minimum Maximum	3099 41196	3756 60495	5412 125597	6313 170907	7092 215703	8426 304495	9572 392880	11530 570093
14"	Minimum Maximum	3746 49788	4539 73112	6541 151792	7630 206551	8571 260691	10184 368001	11568 474820	13935 688994
16	Minimum Maximum	4893 65039	5930 95508	9967 269822	1470 39801	11197 340546	13303 480728	15111 620268	18203 900047

Flow Rates for Water

Water Minimum and Maximum Flow Rates (GPM)									
Rate	Nominal Diameter (in)								
	3	4	6	8	10	12	14	16	24
Min GPM	20.6	35.9	81.3	142	224	317	383	502	1140
Max GPM	618	1076	2440	4274	6724	9514	11486	15062	34184

METER ORDERING INFORMATION
Meter Model Number Coding = F-27BB-CDE-FGHI(-SPC)



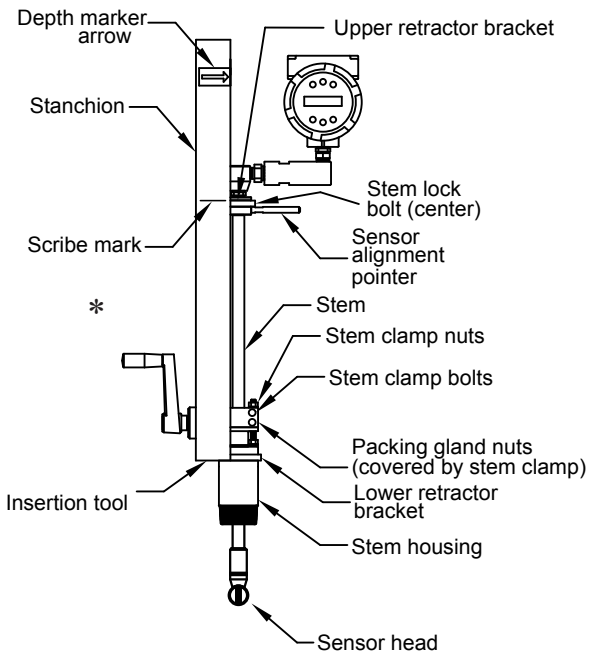
F-2ABB= Inertion Vortex Flow Meter	
A = Flow Meter Type	F = Input Power
7 Insertion Vortex Meter	0 Loop power
BB = Meter Size	1 External 12-36 VDC
00 Insertion Style	2 External 85 - 240 VAC
C = Process Connection	G = Output Signals
4 Packing gland with 2" ANSI class 150 flange and retractor	0 Loop powered 4-20mA and scaled pulse (<i>only available for input signal selection F = 0</i>)
5 Packing gland with 2" ANSI class 300 flange and retractor	1 (1) 4-20mA, (1) scaled pulse, (1) alarm contact and MODBUS
D = Electronics Enclosure Mounting Configuration	2 (1) 4-20mA, (1) scaled pulse, (1) alarm contacts and BACnet
1 Integral mount, NEMA 4 enclosure, Class 1 Div 1	3 (3) 4-20mA, (1) scaled pulse, (3) alarm contacts and MODBUS
2 Remote mount transmitter with 50' of cable	4 (3) 4-20mA, (1) scaled pulse, (3) alarm contacts and BACnet
3 Remote mount transmitter with 100' of cable	H = Max Operating Temperature
E = Temperature / Pressure Compensation	0 500°F
0 Integral temperature compensation	1 750°F
1 Integral temperature and pressure compensation, 30 psia max	I = Energy Meter Configuration
2 Integral temperature and pressure compensation, 100 psia max	0 None
3 Integral temperature and pressure compensation, 300 psia max	1 Gross energy
4 Integral temperature and pressure compensation, 500 psia max	2 Net Energy
9 No compensation, volume only	SPC = Special Configuration

REMOTE TEMPERATURE SENSOR AND THERMOWELL INSTALLATION KIT
(Required for Net Energy Meter)

Model Number	Description
TSI-RKP-1461	4 wire 1000 OHM RTD Sensor, .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 1 temperature sensor and 1 thermowell installation kit sized to pipe.

INSERTION METER DIMENSIONS & WEIGHTS



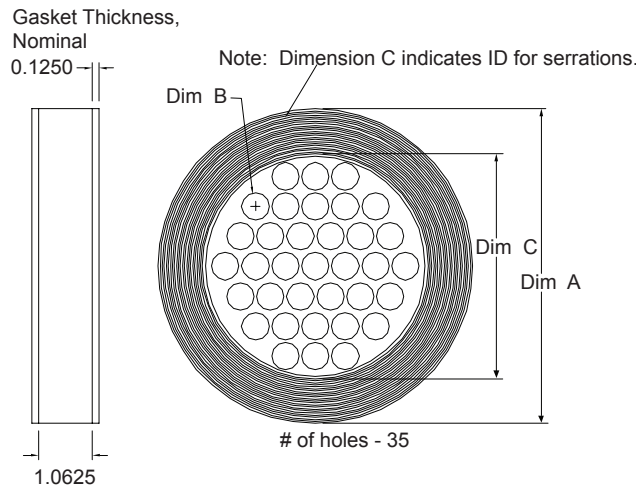
Mounting Option in (mm)	Standard Length		Extended Length	
	A	B	A	B
Male NPT	40.5 (1029)	21.5 (546)	52.5 (1334)	33.5 (851)
ANSI Class 150 Flange	40.5 (1029)	21.1 (536)	52.5 (1334)	33.1 (841)
ANSI Class 300 Flange	40.5 (1029)	21.1 (536)	52.5 (1334)	33.1 (841)

APPROXIMATE WEIGHT, LB (KG)

	SL	EL
NPT	16 (7.1)	17 (7.6)
Class 150	21 (9.4)	22 (9.9)
Class 300	25 (11.3)	26 (11.8)

Add 11 LB (5 KG) for remote electronics

FLOW STRAIGHTENER



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