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Product Data Sheet
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Rosemount™ 8600 Series Utility™ Vortex Flowmeter



The Rosemount 8600 Vortex delivers superior reliability for general purpose applications.

- Rosemount reliability—the Rosemount 8600 Vortex improves reliability over traditional flow metering technology.
- Vibration immunity—mass balancing of the sensor system, and Adaptive Digital Signal Processing (ADSP) provide vibration immunity.
- Simplified Troubleshooting - Device Diagnostics enable field verification of Meter Electronics and meter verification.

ROSEMOUNT™

EMERSON™

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Rosemount™ 8600 MultiVariable™ Vortex reduces installation costs, simplifies installation, and improves performance in saturated steam

Multivariable vortex design

Incorporates temperature sensor into the vortex meter using the shedder bar as a thermowell, which keeps the temperature sensor isolated from process for easy verification and replacement.

Temperature compensated capability for saturated steam

Calculates density from measured process temperature and uses the calculated density to provide a temperature compensated mass flow.

Increased performance in saturated steam

Performance in saturated steam is improved due to the fact that the electronics will be compensating for changes in the process temperature.

Reduces installed costs

MultiVariable vortex eliminates the need for an external thermowell and temperature sensor.

Output options

Can map independent variables to analog output, pulse output, or HART® burst variables.

Available with flow computer for additional functionality

Integrate the Multivariable vortex with a pressure transmitter for full pressure and temperature compensation of superheated steam and various gases.

Remote mount electronics

Also available with remote mounted electronics up to 75 ft. (23 m).

When you integrate the Multivariable vortex with a Rosemount Flow Computer, you get:

- Remote communications
- Heat calculations
- Remote totalization
- Peak demand calculation
- Datalogging capabilities

For more information on the Rosemount Flow Computer, see the Rosemount Flow Computer Product Data Sheet.



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Specifications

The following specifications are for the Rosemount 8600 except where noted.

Functional specifications

Process fluids

Liquid, gas, and steam applications. Fluids must be homogeneous and single-phase.

Line sizes

Flanged style

1, 1 1/2, 2, 3, 4, 6, and 8 inches
(DN 25, 40, 50, 80, 100, 150, and 200)

Pipe schedules

Process piping Schedules 10, 40, 80, and 160.

Note
The appropriate bore diameter of the process piping must be entered using the Field Communicator or AMS™ Device Manager. Meters will be shipped from the factory at the Schedule 40 default value unless otherwise specified.

Measurable flow rates

Capable of processing signals from flow applications which meet the sizing requirements below.

To determine the appropriate flowmeter size for an application, process conditions must be within the Reynolds number and velocity limitations for the desired line size provided in Table 1, Table 2, and Table 3.

Note
Consult your local sales representative to obtain a computer sizing program that describes in greater detail how to specify the correct flowmeter size for an application.

The Reynolds number equation shown below combines the effects of density (r), viscosity (m_{cp}), pipe inside diameter (D), and flow velocity (V).

$$R_D = \frac{VD\rho}{\mu_{cp}}$$

Table 1. Minimum Measurable Meter Reynolds Numbers

Meter sizes (Inches/DN)	Reynolds number limitations
1 through 4/25 through 100	5000 minimum
6 through 8/150 through 200	

Table 2. Minimum Measurable Meter Velocities(1)

	Feet per second	Meters per second
Liquids	$\sqrt{36/\rho}$	$\sqrt{54/\rho}$
Gases	$\sqrt{36/\rho}$	$\sqrt{54/\rho}$
The ρ is the process fluid density at flowing conditions in lb/ft³ for ft/s and kg/m³ for m/s		

1. Velocities are referenced to schedule 40 pipe.

Table 3. Maximum Measurable Meter Velocities(1) (Use the smaller of the two values)

	Feet per second	Meters per second
Liquids	$\sqrt{90{,}000/\rho}$ or 25	$\sqrt{134{,}000/\rho}$ or 7.6
Gases	$\sqrt{90{,}000/\rho}$ or 250	$\sqrt{134{,}000/\rho}$ or 76
The ρ is the process fluid density at flowing conditions in lb/ft³ for ft/s and kg/m³ for m/s		

1. Velocities are referenced to schedule 40 pipe.

Process temperature limits

Standard

-58 to 482 °F (–50 to 250 °C)

Output signals

4–20 mA HART digital signal

Superimposed on 4–20 mA signal

Optional scalable pulse output

0 to 10000 Hz; transistor switch closure with adjustable scaling via HART communications; capable of switching up to 30 Vdc, 120 mA maximum.

Analog output adjustment

Engineering units and lower and upper range values are user-selected. Output is automatically scaled to provide 4 mA at the selected lower range value, 20 mA at the selected upper range value. No frequency input is required to adjust the range values.

Scalable frequency adjustment

The scalable pulse output can be set to a specific velocity, volume, or mass (i.e. 1 pulse = 1 lb). The scalable pulse output can also be scaled to a specific rate of volume, mass, or velocity (i.e. 100 Hz = 500 lb/hr).

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Ambient temperature limits

Operating

–58 to 185 °F (–50 to 85 °C)
–4 to 185 °F (–20 to 85 °C) for flowmeters with local indicator

Storage

–58 to 250 °F (–50 to 121 °C)
–50 to 185 °F (–46 to 85 °C) for flowmeters with local indicator

Pressure limits

Flange style meter

Rated for ASME B16.5 (ANSI) Class 150, 300, EN 1092-1 PN 16 and 40.

Power supply

HART analog

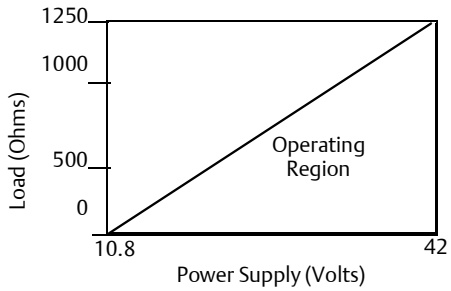
External power supply required. Flowmeter operates on 10.8 to 42 Vdc terminal voltage (with 250-ohm minimum load required for HART communications, 16.8 Vdc power supply is required).

Power consumption

One watt maximum

Load limitations (HART analog)

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:



R_{max} = $41.7(V_{ps} - 10.8)$
V_{ps} = Power Supply Voltage (Volts)
R_{max} = Maximum Loop Resistance (Ohms)

Note
HART communication requires a minimum loop resistance of 250 ohms.

Optional LCD display

The optional LCD display is capable of displaying:

- Primary Variable
- Velocity Flow
- Volumetric Flow
- Mass Flow
- Percent of Range
- Analog Output
- Totalizer
- Shedding Frequency
- Pulse Output Frequency (if applicable)
- Electronics Temperature
- Process Temperature (MTA Option Only)
- Calculated Process Density (MTA Option Only)

If more than one item is selected, the display will scroll through all items selected.

Enclosure rating

FM Type 4X; IP66

Permanent pressure loss

The approximate permanent pressure loss (PPL) from the Rosemount 8600 Flowmeter is calculated for each application in the Vortex sizing software available from your local Rosemount representative. The PPL is determined using the equation:

$$PPL = \frac{A \times \rho_f \times Q^2}{D^4}$$

where:

PPL = Permanent Pressure loss (psi or kPa)

Where:

r_f = Density at operating conditions (lb/ft^3 or kg/m^3)

Q = Actual volumetric flow rate (Gas = ft^3/min or m^3/hr; Liquid = gal/min or l/min)

D = Flowmeter bore diameter (in. or mm)

A = Constant depending on meter style, fluid type, and flow units. Determined per the following table:

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Table 4. Determining the PPL

Meter style	English units		SI units	
	A_{Liquid}	A_{Gas}	A_{Liquid}	A_{Gas}
8600 F	3.4 3 10^{-5}	1.9 3 10^{-3}	0.425	118

Minimum upstream pressure (liquids)

Flow metering conditions that would allow cavitation, the release of vapor from a liquid, should be avoided. This flow condition can be avoided by remaining within the proper flow range of the meter and by following appropriate system design.

For some liquid applications, incorporation of a back pressure valve should be considered. To prevent cavitation, the minimum upstream pressure should be:

$P = 2.9*\Delta P + 1.3*p_v$ or $P = 2.9*\Delta P + p_v + 0.5$ psia (3.45 kPa) (use the smaller of the two results)

P = Line pressure five pipe diameters downstream of the meter (psia or kPa abs)

ΔP = Pressure loss across the meter (psi or kPa)

p_v = Liquid vapor pressure at operating conditions (psia or kPa abs)

Failure mode alarm

HART analog

If self-diagnostics detect a gross flowmeter failure, the analog signal will be driven to the following values:

Signal	Value
Low	3.75
High	21.75
NAMUR Low	3.60
NAMUR High	22.6

High or low alarm signal is user-selectable through the fail mode alarm jumper on the electronics. NAMUR-compliant alarm limits are available through the C4 or CN Option. Alarm type is field configurable also.

Saturation output values

When the operating flow is outside the range points, the analog output continues to track the operating flow until reaching the saturation value listed below; the output does not exceed the listed saturation value regardless of the operating flow.

The NAMUR-Compliant Saturation Values are available through the C4 or CN option. Saturation type is field configurable.

Saturation	Value
Low	3.9
High	20.8
NAMUR Low	3.8
NAMUR High	20.5

Damping

Flow Damping adjustable between 0.2 and 255 seconds.

Process Temperature Damping adjustable between 0.4 and 32.0 seconds (MTA Option Only).

Response time

Three vortex shedding cycles or 300 ms, whichever is greater, maximum required to reach 63.2% of actual input with the minimum damping (0.2 seconds).

Turn-on time

HART analog

Less than four (4) seconds plus the response time to rated accuracy from power up (less than 7 seconds with the MTA Option).

Transient protection

The optional transient terminal block prevents damage to the flowmeter from transients induced by lightning, welding, heavy electrical equipment, or switch gears. The transient protection electronics are located in the terminal block.

The transient terminal block meets the following specifications:
IEEE C62.41 - 2002 Category B
3 kA crest (8 3 20 µs)
6 kV crest (1.2 3 50 µs)
6 kV/0.5 kA (0.5 µs, 100 kHz, ring wave)

Security lockout

When the security lockout jumper is enabled, the electronics will not allow you to modify parameters that affect flowmeter output.

Output testing

Current source

Flowmeter may be commanded to set the current to a specified value between 4 and 20 mA.

Frequency source

Flowmeter may be commanded to set the frequency to a specified value between 0 and 10000 Hz.

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Low flow cutoff

Adjustable over entire flow range. Below selected value, output is driven to 4 mA and zero pulse output frequency.

Humidity limits

Operates in 0–95% relative humidity under noncondensing conditions (tested to IEC 60770, Section 6.2.11).

Overrange capability

HART analog

Analog signal output continues to 105 percent of span, then remains constant with increasing flow. The digital and pulse outputs will continue to indicate flow up to the upper sensor limit of the flowmeter and a maximum pulse output frequency of 10400 Hz.

Flow calibration

Meter bodies are flow-calibrated and assigned a unique calibration factor (K-factor) at the factory. The calibration factor is entered into the electronics, enabling interchangeability of electronics and/or sensors without calculations or compromise in accuracy of the calibrated meter body.

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Typical flow ranges

Tables 5 through 9 show typical flow ranges for some common process fluids with default filter settings. Consult your local sales representative to obtain a computer sizing program that describes in greater detail the flow range for an application.

Table 5. Typical pipe velocity ranges for 8600(1)

Process line size		Liquid velocity ranges		Gas velocity ranges	
(Inches/ DN)	Vortex meter	(ft/s)	(m/s)	(ft/s)	(m/s)
1/ 25	8600F010	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
1 1/2 / 40	8600F015	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
2/ 50	8600F020	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
3/ 80	8600F030	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
4/ 100	8600F040	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
6/ 150	8600F060	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
8/ 200	8600F080	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2

1. Table 5 is a reference of pipe velocities that can be measured for the standard Rosemount 8600. It does not consider density limitations, as described in Table 2 and 3. Velocities are referenced in schedule 40 pipe.

Table 6. Water Flow Rate Limits for the Rosemount 8600(1)

Process line size	Vortex meter	Minimum and maximum measurable water flow rates*	
(Inches/ DN)		Gallons/Minute	Cubic Meters/Hour
1/ 25	8600F010	2.96 to 67.3	0.67 to 15.3
1 1/2 / 40	8600F015	4.83 to 158	1.10 to 35.9
2/ 50	8600F020	7.96 to 261	1.81 to 59.4
3/ 80	8600F030	17.5 to 576	4.00 to 130
4/ 100	8600F040	30.2 to 992	6.86 to 225
6/ 150	8600F060	68.5 to 2251	15.6 to 511
8/ 200	8600F080	119 to 3898	27.0 to 885
*Conditions: 77 °F (25 °C) and 14.7 psia (1.01 bar absolute)			

1. Table 6 is a reference of flow rates that can be measured for the standard Rosemount 8600. It does not consider density limitations, as described in Table 2 and 3.

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Table 7. Air Flow Rate Limits at 59 °F (15 °C)

Process pressure	Flow rate limits	Minimum and maximum air flow rates for line sizes 1-in./DN 25 through 2-in./DN 50					
		1-in./DN 25		1 1/2-in./DN 40		2-in./DN 50	
		Rosemount 8600		Rosemount 8600		Rosemount 8600	
		ACFM	ACMH	ACFM	ACMH	ACFM	ACMH
0 psig (0 bar G)	max min	79.2 9.71	134 16.5	212 18.4	360 31.2	349 30.3	593 51.5
50 psig (3.45 bar G)	max min	79.2 3.72	134 6.32	212 8.76	360 14.9	349 14.5	593 24.6
100 psig (6.89 bar G)	max min	79.2 2.80	134 4.75	212 6.58	360 11.2	349 10.8	593 18.3
150 psig (10.3 bar G)	max min	79.2 2.34	134 3.98	212 5.51	360 9.36	349 9.09	593 15.4
200 psig (13.8 bar G)	max min	79.2 2.34	134 3.98	212 5.51	360 9.36	349 9.09	593 15.4
300 psig (20.7 bar G)	max min	79.2 2.34	134 3.98	198 5.51	337 9.36	326 9.09	554 15.4
400 psig (27.6 bar G)	max min	73.0 2.34	124 3.98	172 5.51	293 9.36	284 9.09	483 15.4
500 psig (34.5 bar G)	max min	66.0 2.34	112 3.98	154 5.51	262 9.36	254 9.09	432 15.4

Table 8. Air Flow Rate Limits at 59 °F (15 °C)

Process pressure	Flow rate limits	Minimum and maximum air flow rates for line sizes 3-in./DN 80 through 4-in./DN 100			
		3-in./DN 80		4-in./DN 100	
		Rosemount 8600		Rosemount 8600	
		ACFM	ACMH	ACFM	ACMH
0 psig (0 bar G)	max min	770 66.8	1308 114	1326 115	2253 195
50 psig (3.45 bar G)	max min	770 31.8	1308 54.1	1326 54.8	2253 93.2
100 psig (6.89 bar G)	max min	770 23.9	1308 40.6	1326 41.1	2253 69.8
150 psig (10.3 bar G)	max min	770 20.0	1308 34.0	1326 34.5	2253 58.6
200 psig (13.8 bar G)	max min	770 20.0	1308 34.0	1326 34.5	2253 58.6
300 psig (20.7 bar G)	max min	718 20.0	1220 34.0	1237 34.5	2102 58.6
400 psig (27.6 bar G)	max min	625 20.0	1062 34.0	1076 34.5	1828 58.6
500 psig (34.5 bar G)	max min	560 20.0	951 34.0	964 34.5	1638 58.6

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Table 9. Air Flow Rate Limits at 59 °F (15 °C)

Process pressure	Flow rate limits	Minimum and maximum air flow rates for line sizes 6-in./DN 150 through 8-in./DN 200			
		6-in./DN 150		8-in./DN 200	
		Rosemount 8600		Rosemount 8600	
		ACFM	ACMH	ACFM	ACMH
0 psig (0 bar G)	max min	3009 261	5112 443	5211 452	8853 768
50 psig (3.45 bar G)	max min	3009 124	5112 211	5211 215	8853 365
100 psig (6.89 bar G)	max min	3009 93.3	5112 159	5211 162	8853 276
150 psig (10.3 bar G)	max min	3009 78.2	5112 133	5211 135	8853 229
200 psig (13.8 bar G)	max min	3009 78.2	5112 133	5211 135	8853 229
300 psig (20.7 bar G)	max min	2807 78.2	4769 133	4862 135	8260 229
400 psig (27.6 bar G)	max min	2442 78.2	4149 133	4228 136	7183 229
500 psig (34.5 bar G)	max min	2188 78.2	3717 133	3789 136	6437 229

Notes

The Rosemount 8600 measures the volumetric flow under operating conditions (i.e. the actual volume at the operating pressure and temperature—acfm or acmh), as shown above. However, gas volumes are strongly dependent on pressure and temperature. Therefore, gas quantities are typically stated in standard or normal conditions (for example: SCFM or NCMH). (Standard conditions are typically 59 °F and 14.7 psia. Normal conditions are typically 0 °C and 1 bar abs.)

The flow rate limits in standard conditions are found using the equations below:

Standard Flow Rate = Actual Flow Rate X Density Ratio

Density Ratio = Density at Actual (Operating) Conditions/Density at Standard Conditions

Table 10. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process pressure	Flow rate limits	Minimum and maximum saturated steam flow rates for line sizes 1-in./DN 25 through 2-in./DN 50					
		1-in./DN 25		1 1/2-in./DN 40		2-in./DN 50	
		Rosemount 8600		Rosemount 8600		Rosemount 8600	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15 psig (1.03 bar G)	max min	342 34.8	155 15.8	917 82.0	416 37.2	1511 135	685 61.2
25 psig (1.72 bar G)	max min	449 39.9	203 18.1	1204 93.9	546 42.6	1983 155	899 70.2
50 psig (3.45 bar G)	max min	711 50.1	322 22.7	1904 118	864 53.4	3138 195	1423 88.3
100 psig (6.89 bar G)	max min	1221 65.7	554 29.8	3270 155	1483 70.1	5389 255	2444 116

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Table 10. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process pressure	Flow rate limits	Minimum and maximum saturated steam flow rates for line sizes 1-in./DN 25 through 2-in./DN 50					
		1-in./DN 25		1 1/2-in./DN 40		2-in./DN 50	
		Rosemount 8600		Rosemount 8600		Rosemount 8600	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
150 psig (10.3 bar G)	max min	1724 78.1	782 35.4	4616 184	2094 83.2	7609 303	3451 137
200 psig (13.8 bar G)	max min	2225 88.7	1009 40.2	5956 209	2702 94.5	9818 344	4453 156
300 psig (20.7 bar G)	max min	3229 107	1464 48.5	8644 252	3921 114	14248 415	6463 189
400 psig (27.6 bar G)	max min	4244 125	1925 56.7	11362 295	5154 134	18727 487	8494 221
500 psig (34.5 bar G)	max min	5277 156	2393 70.7	14126 367	6407 167	23284 605	10561 274

Table 11. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process pressure	Flow rate limits	Minimum and maximum saturated steam flow rates for line sizes 3-in./DN 80 through 4-in./DN 100			
		3-in./DN 80		4-in./DN 100	
		Rosemount 8600		Rosemount 8600	
		lb/hr	kg/hr	lb/hr	kg/hr
15 psig (1.03 bar G)	max min	3330 298	1510 135	5734 513	2601 233
25 psig (1.72 bar G)	max min	4370 341	1982 155	7526 587	3414 267
50 psig (3.45 bar G)	max min	6914 429	3136 195	11905 739	5400 335
100 psig (6.89 bar G)	max min	11874 562	5386 255	20448 968	9275 439
150 psig (10.3 bar G)	max min	16763 668	7603 303	28866 1150	13093 522
200 psig (13.8 bar G)	max min	21630 759	9811 344	37247 1307	16895 593
300 psig (20.7 bar G)	max min	31389 914	14237 415	54052 1574	24517 714
400 psig (27.6 bar G)	max min	41258 1073	18714 487	71047 1847	32226 838
500 psig (34.5 bar G)	max min	51297 1334	23267 605	88334 2297	40068 1042

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Table 12. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process Pressure	Flow rate limits	Minimum and maximum saturated steam flow rates for line sizes 6-in./DN 150 through 8-in./DN 200			
		6-in./DN 150		8-in./DN 200	
		Rosemount 8600		Rosemount 8600	
		lb/hr	kg/hr	lb/hr	kg/hr
15 psig (1.03 bar G)	max min	13013 1163	5903 528	22534 2015	10221 914
25 psig (1.72 bar G)	max min	17080 1333	7747 605	29575 2308	13415 1047
50 psig (3.45 bar G)	max min	27019 1676	12255 760	46787 2903	21222 1317
100 psig (6.89 bar G)	max min	46405 2197	21049 996	80356 3804	36449 1725
150 psig (10.3 bar G)	max min	65611 2610	29761 1184	113440 4520	51455 2050
200 psig (13.8 bar G)	max min	84530 2965	38342 1345	146375 5134	66395 2329
300 psig (20.7 bar G)	max min	122666 3572	55640 1620	212411 6185	96348 2805
400 psig (27.6 bar G)	max min	161236 4192	73135 1901	279200 7259	126643 3293
500 psig (34.5 bar G)	max min	200468 5212	90931 2364	347134 9025	157457 4094

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Performance specifications

The following performance specifications are for all Rosemount models except where noted. Digital performance specifications applicable to Digital HART output.

Flow accuracy

Includes linearity, hysteresis, and repeatability.

Liquids - for Reynolds numbers over 20,000

Digital and pulse output

±0.75% of rate

Analog output

Same as pulse output plus an additional 0.025% of span

Gas and steam—for Reynolds numbers over 15,000

Digital and pulse output

±1% of rate

Analog output

Same as pulse output plus an additional 0.025% of span.

Note
As the meter maximum velocity exceeds 125ft/sec (38m/sec) the accuracy error band will increase linearly to ±1.5% up to 250ft/sec (76m/sec).

Note
As the meter Reynolds numbers decrease below the stated limit to 10,000, the accuracy error band will increase linearly to ±3.0%. For Reynolds numbers down to 5,000, the accuracy error band will increase linearly from ± 3.0% to ±10.0%.

Process Temperature Accuracy

2.2 °F (1.2 °C)

Note
For remote mount installations, add ±0.018 °F/ft. (±0.03 °C/m) of uncertainty to the temperature measurement.

Mass flow accuracy for temperature compensated mass flow

Digital and Pulse Output

±2.0% of rate (Nominal)

Nominal conditions include temperature variation in saturation and superheat at 150 psig (10 bar-g) and above.

For pressure below 150 psig (10 bar-g), add 0.08% of uncertainty for every 15 psi (1 bar) below 150 psig (10 bar-g).

Analog output

Same as pulse output plus an additional 0.025% of span

Repeatability

± 0.2% of actual flow rate

Stability

± 0.2% of rate over one year

Process temperature effect

Automatic K-factor correction with user-entered process temperature.

Table 13 indicates the percent change in K-factor per 100 °F (55.5 °C) in process temperature from reference temperature of 77 °F (25 °C).

Table 13. Process Temperature Effect

Percent change in K-Factor per 100 °F (55.5 °C)	
< 77 °F (25 °C)	+ 0.23
> 77 °F (25 °C)	- 0.27

Ambient temperature effect

Digital and pulse outputs

No effect

Analog output

±0.1% of span from –58 to 185 °F (–50 to 85 °C)

Vibration effect

An output with no process flow may be detected if sufficiently high vibration is present.

The meter design will minimize this effect and the factory settings for signal processing are selected to eliminate these errors for most applications.

If an output error at zero flow is still detected, it can be eliminated by adjusting the low flow cutoff, trigger level, or low-pass filter.

As the process begins to flow through the meter, most vibration effects are quickly overcome by the flow signal.

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Vibration specifications

Integral aluminum housings and remote aluminum housings

At or near the minimum liquid flow rate in a normal pipe mounted installation, the maximum vibration should be 0.087-in. (2.21 mm) double amplitude displacement or 1 g acceleration, whichever is smaller. At or near the minimum gas flow rate in a normal pipe mounted installation, the maximum vibration should be 0.043-in. (1.09 mm) double amplitude displacement or 1/2 g acceleration, whichever is smaller.

Mounting position effect

Meter will meet accuracy specifications when mounted in horizontal, vertical, or inclined pipelines. Best practice for mounting in a horizontal pipe is to orient the shedder bar in the horizontal plane. This will prevent solids in liquid applications and liquid in gas/steam applications from disrupting the shedding frequency.

EMI/RFI effect

Meets EMC requirements to EU Directive 2004/108/EC.

HART analog

Output error less than ±0.025% of span with twisted pair from 80-1000 MHz for radiated field strength of 10 V/m; 1.4 - 2.0 GHz for radiated field strength of 3 V/m; 2.0 - 2.7 GHz for radiated field strength of 1 V/m. Tested per EN61326.

HART digital

No effect on the values that are being given if using HART digital signal.
Tested per EN61326.

Magnetic-field interference

HART analog

Output error less than ±0.025% of span at 30 A/m (rms). Tested per EN61326.

Series mode noise rejection

HART analog

Output error less than ±0.025% of span at 1 V rms, 60 Hz.

Common mode noise rejection

HART analog

Output error less than ±0.025% of span at 30 V rms, 60 Hz.

Power supply effect

HART analog

Less than 0.005% of span per volt

Physical specifications

Note
Certificate of compliance for MR0175/ISO15156 requires Q15 as a separate line item.

Electrical connections

1/2–14 NPT or M20 3 1.5 conduit threads; screw terminals provided for 4–20 mA and pulse output connections; communicator connections permanently fixed to terminal block.

Non-wetted materials

Housing

Low-copper aluminum (FM Type 4X, CSA Type 4X, IP66)

Paint

Polyurethane

Cover O-rings

Buna-N

Temperature sensor (MTA option)

Type-N Thermocouple

Process-wetted materials

Meter body and flanges

CF-8M cast stainless steel.

Sensor material

CF-3M cast stainless steel.

Gasket

Graphite with 316 stainless steel insert

Process connections

Mounts between the following flange configurations:

ASME B16.5 (ANSI): Class 150, 300

EN 1092-1 PN16, 40 Type B1

Mounting

Integral (standard)

Electronics are mounted on meter body.

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Remote (optional)

Electronics may be mounted remote from the meter body. Interconnecting coaxial cable available in nonadjustable 10, 20, and 30 ft (3.0, 6.1, and 9.1 m) lengths. Consult factory for non-standard lengths up to 75 ft (22.9 m). Remote mounting hardware includes a pipe mount bracket with one u-bolt.

Temperature limitations for integral mounting

The maximum process temperature for integral mount electronics is dependent on the ambient temperature where the meter is installed. The electronics must not exceed 185 °F (85 °C).

Pipe length requirements

The vortex meter may be installed with a minimum of ten diameters (D) of straight pipe length upstream and five diameters (D) of straight pipe length downstream.

Rated Accuracy is based on the number of pipe diameter from an upstream disturbance. No K-factor correction is required if the meter is installed with 35 D upstream and 10 D downstream.

Tagging

The flowmeter will be tagged at no charge. All tags are stainless steel. The standard tag is permanently attached to the flowmeter. Character height is 1/16-in. (1.6 mm). A wired-on tag is available on request. Wire on tags can contain five lines with up to 28 characters per line.

Flow calibration information

Flowmeter calibration and configuration information is provided with every flowmeter. For a certified copy of flow calibration data, Option Q4 must be ordered in the model number.

Product Certifications

For detailed approval certification information and installation drawings, please see document number 00825-VA00-0011: *Rosemount™ 8600 Series Vortex Flowmeter Approval Document*.

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Dimensional drawings

Figure 1. Flanged-Style Flowmeter—Line Sizes 1- through 8-in. (25 through 200 mm)

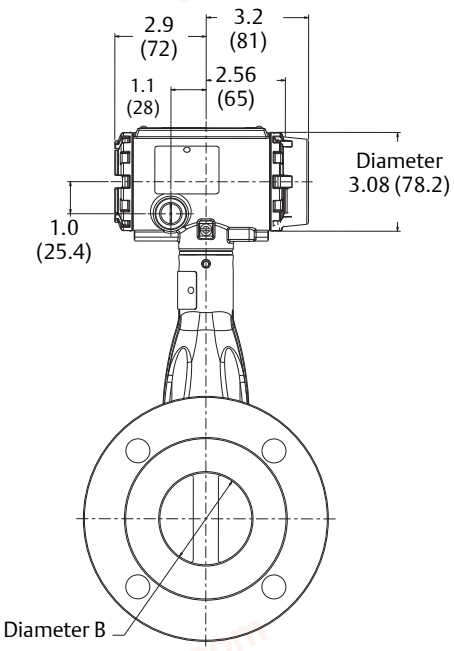


Diagram illustrated without MTA Option

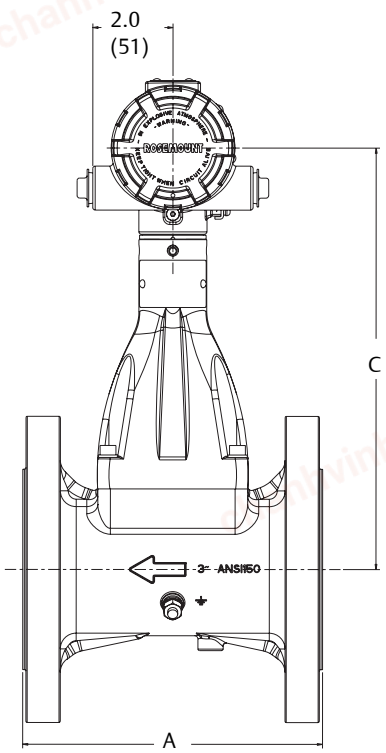
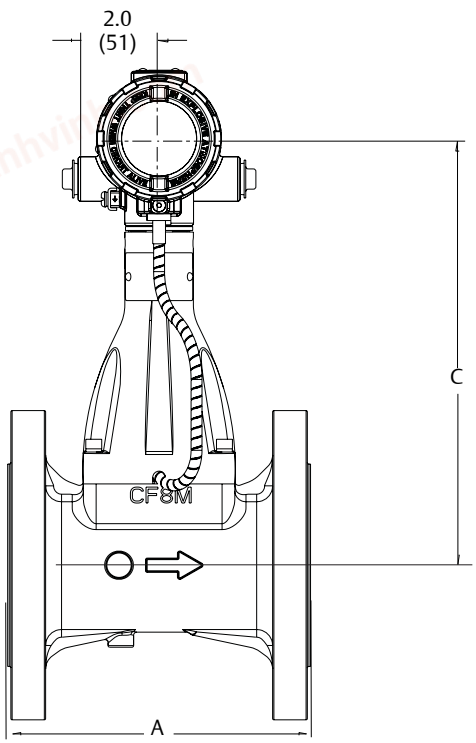


Diagram illustrated with MTA Option



Note: Dimensions are in inches (millimeters).

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Table 14. Flanged-Style Flowmeter—Line Sizes 1- through 2-in. (25 through 50 mm)

Nominal size in. (mm)	Flange rating	Face-to-face A in. (mm)	Diameter B in. (mm)	C in. (mm)	Weight(1) lb (kg)
1 (25)	ANSI 150 ANSI 300	5.9 (150) 6.7 (170)	0.95 (24,1) 0.95 (24,1)	9.6 (244) 9.6 (244)	13 (5.9) 15.4 (7,0)
	PN 16/40	6.1 (156)	0.95 (24,1)	9.6 (244)	14.8 (6.7)
1 1/2 (40)	ANSI 150 ANSI 300	5.9 (150) 7.1 (180)	1.49 (37,8) 1.49 (37,8)	8.1 (250) 8.1 (250)	15.7 (7.1) 21.4 (9.7)
	PN 16/40	7.1 (180)	1.49 (37,8)	8.1 (250)	18.7 (8.5)
2 (50)	ANSI 150 ANSI 300	6.7 (170) 7.1 (180)	1.92 (48,8) 1.92 (48,8)	10 (254) 10 (254)	20.5 (9.3) 24.5 (11.1)
	PN 16/40	6.7 (170)	1.92 (48,8)	10 (254)	22.7 (10.3)

1. Add 0.2 lb (0,1 kg) for display option.

Table 15. Flanged-Style Flowmeter—Line Sizes 3- to 6-in. (80 mm to 150 mm) (Refer to Figure 1)

Nominal size in. (mm)	Flange rating	Face-to-face A in. (mm)	Diameter B in. (mm)	C in. (mm)	Weight(1) lb (kg)
3 (80)	ANSI 150 ANSI 300	7.5 (190) 8.8 (224)	2.87 (72,9) 2.87 (72,9)	10.7 (271) 10.6 (268)	33.1 (15,0) 41.4 (18,8)
	PN 16/40	7.9 (200)	2.87 (72,9)	10.6 (268)	34.4 (15.6)
4 (100)	ANSI 150 ANSI 300	7.5 (190) 8.7 (220)	3.79 (96,3) 3.79 (96,3)	11.1 (281) 11.1 (281)	42.8 (19.6) 63.1 (28.6)
	PN 16 PN 40	7.5 (190) 8.7 (220)	3.79 (96,3) 3.79 (96,3)	11.1 (281) 11.1 (281)	42.8 (19,6) 43.4 (19.7)
6 (150)	ANSI 150 ANSI 300	9.8 (250) 10.6 (270)	5.7 (144,8) 5.7 (144,8)	12.1 (307) 12.1 (307)	69.9 (31.7) 161.8 (73.4)
	PN 16 PN 40	9.8 (250) 10.6 (270)	5.7 (144,8) 5.7 (144,8)	12.1 (307) 12.1 (307)	69.9 (31.7) 130.5 (59.2)

1. Add 0.2 lb (0,1 kg) for display option.

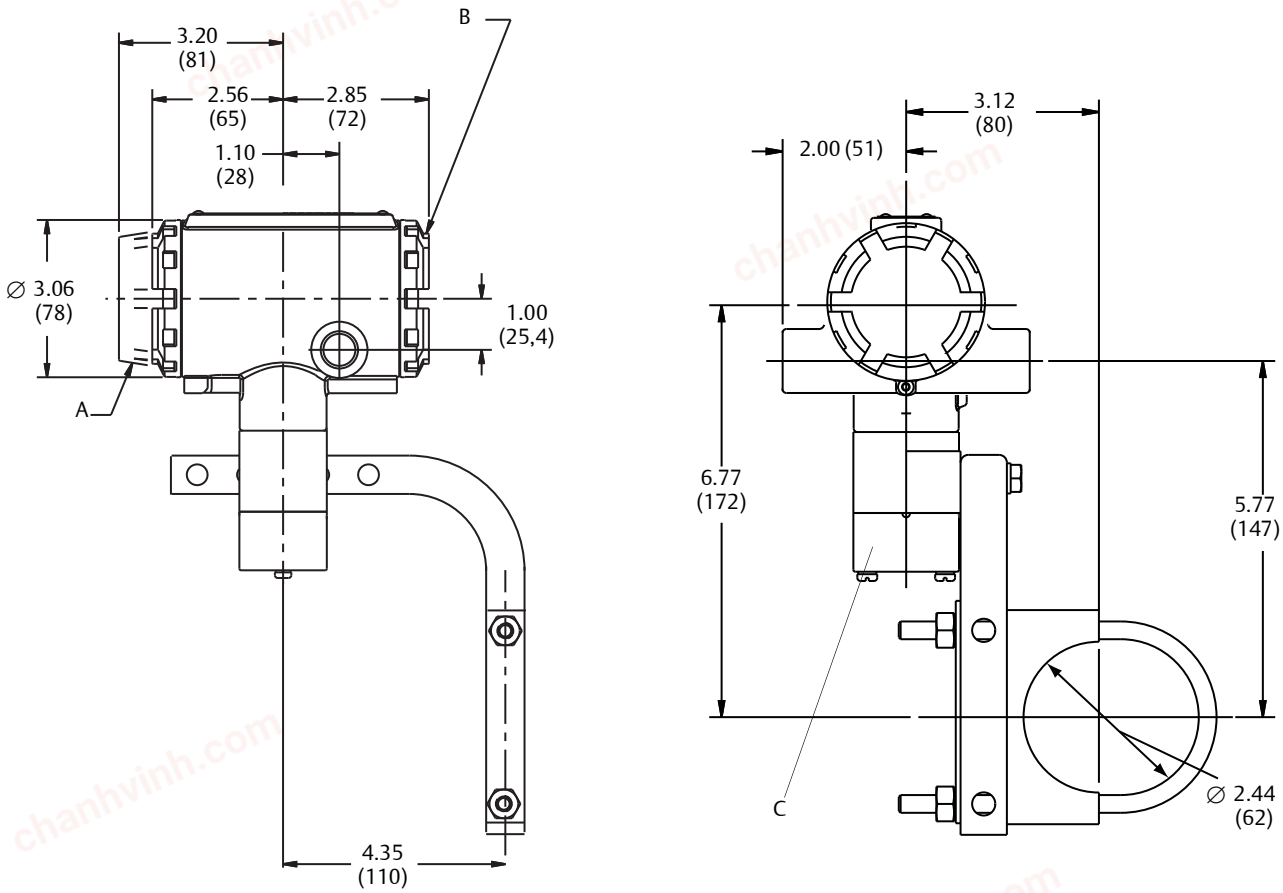
Table 16. Flanged-Style Flowmeter—Line Size 8-in. (200 mm) (Refer to Figure 3)

Nominal size in. (mm)	Flange rating	Face-to-face A in. (mm)	Diameter B in. (mm)	C in. (mm)	Weight(1) lb (kg)
8 (200)	ANSI 150 ANSI 300	9.8 (250) 11.4 (290)	7.55 (191,8) 7.55 (191,8)	13.1 (332) 13.1 (332)	104.9 (47.6) 161.8 (73.4)
	PN 16 PN 40	9.8 (250) 12.2 (310)	7.55 (191,8) 7.55 (191,8)	13.1 (332) 13.1 (332)	104.9 (47.6) 130.5 (59.2)

1. Add 0.2 lb (0,1 kg) for display option.

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Figure 2. Remote Mount Transmitters

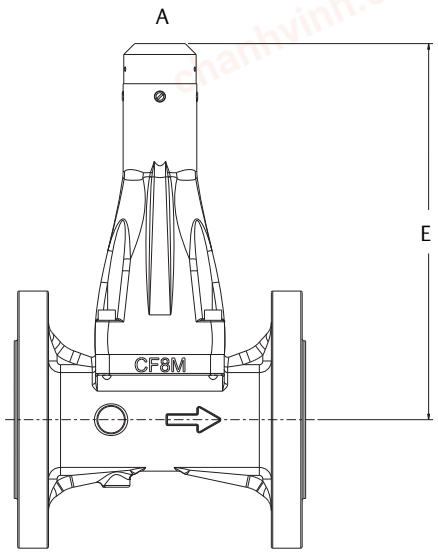


Note:
Consult factory for SST installation. Dimensions are in inches (millimeters).

A. Display option
B. Terminal cover
C. 1/2-14 NPT (for remote cable conduit)

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Figure 3. Flanged Style Remote Mount Flowmeters—Line Sizes 1- to 8-in. (25 mm to 200 mm)



Note:
Dimensions are in inches (millimeters).

A. 1/2-14 NPT (for remote cable conduit)

Table 17. Remote Mount, Flanged Style Sensor Flowmeter Dimensions

Nominal size in. (mm)	E flange style in. (mm)
1 (25)	8.3 (210)
1? (40)	8.5 (216)
2 (50)	8.7 (220)
3 (80)	9.3 (237) - ANSI150/PN16 9.1 (234) - ANSI300/PN40
4 (100)	9.7 (247)
6 (150)	10.8 (273)
8 (200)	11.7 (298)

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Ordering information

Table 18. Rosemount 8600 Vortex Flowmeter Ordering Information

The Standard offering represents the most common models and options. These options should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product description	
8600D	Vortex Flowmeter	
Meter style		
F	Flanged style	
Line size		
010	1-in. (25 mm)	
015	1 1/2-in. (40 mm)	
020	2-in. (50 mm)	
030	3-in. (80 mm)	
040	4-in. (100 mm)	
060	6-in. (150 mm)	
080	8-in. (200 mm)	
Wetted materials		
S	CF-8M cast stainless/CF-3M and Graphite Gasket Note: Material of construction is 316/316L	
Flange or alignment ring size		
A1	ASME B16.5 (ANSI) RF Class 150	
A3	ASME B16.5 (ANSI) RF Class 300	
K1[(1)]	EN 1092-1 PN 16 Type B1	
K3	EN 1092-1 PN 40 Type B1	
Sensor process temperature range		
N	Standard: -58 to 482 °F (-50 to 250 °C)	

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Table 18. Rosemount 8600 Vortex Flowmeter Ordering Information

The Standard offering represents the most common models and options. These options should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Conduit entry and housing material		
1	1/2-14 NPT – Aluminum Housing	
2	M20 3 1.5 – Aluminum Housing	
Transmitter output		
D	4-20 mA digital electronics (HART protocol)	
P	4-20 mA digital electronics (HART protocol) with scaled pulse	
Calibration		
1	7 Point Flow Calibration	

Options

MultiVariable options		
MTA	MultiVariable output with Integral Temperature Sensor	
Hazardous locations certifications		
E3	NEPSI Flameproof	
I3	NEPSI Intrinsic Safety	
N3	NEPSI Type N	
K3	NEPSI Flameproof, Intrinsic Safety, Type N	
E1	ATEX Flameproof	
I1	ATEX Intrinsic Safety	
N1	ATEX Type-n	
K1	ATEX Flameproof, Intrinsic Safety	
E7	IECEx Flameproof	
I7	IECEx Intrinsic Safety	
N7	IECEx Type n	
E6	CSA (C/US) Explosion-proof, Dust Ignition-Proof, and Division 2	
I6	CSA (C/US) Intrinsically Safe	
K6	CSA (C/US) Explosion-proof, Dust Ignition-Proof, Intrinsically Safe, and Division 2	
Display type		
M5	LCD display	
Other options		
PD	Pressure Equipment Directive (PED)	

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Table 18. Rosemount 8600 Vortex Flowmeter Ordering Information

The Standard offering represents the most common models and options. These options should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Remote electronics		
R10	Remote electronics with 10 ft (3,0 m) cable	
R20	Remote electronics with 20 ft (6,1 m) cable	
R30	Remote electronics with 30 ft (9,1 m) cable	
R33	Remote electronics with 33 ft. (10 m) cable	
R50	Remote electronics with 50 ft (15,2 m) cable	
RXX[2]	Remote electronics with customer-specified cable length (up to 75 ft (23 m) maximum)	
Transient protection		
T1	Transient protection terminal block	
Alarm mode		
C4	NAMUR alarm and saturation values, high alarm	
CN	NAMUR alarm and saturation values, low alarm	
Ground screw assembly		
V5	External ground screw assembly	
Advanced PlantWeb™ Diagnostics		
DS1	Internal Flow Simulation	
Certification options		
Q4	Calibration data sheet per ISO 10474 3.1B and EN 10204 3.1	
Q8	Material traceability certification per ISO 10474 3.1B and EN 10204 3.1	
Q76	Certification of Positive Material Identification	
QBR	India Boiler Regulation (IBR)	
MC certification		
CM	China Metrology Cert	
RM	Russian Metrology Cert	

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Table 18. Rosemount 8600 Vortex Flowmeter Ordering Information

The Standard offering represents the most common models and options. These options should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Quick Start Guide (QSG) language options (default is English)		
YM	Chinese (Mandarin)	
YR	Russian	
YA	Danish	
YC	Czech	
YD	Dutch	
YF	French	
YG	German	
YB	Hungarian	
YI	Italian	
YW	Swedish	
YS	Spanish	
YP	Portuguese	
Typical Model Number: 8600 F 020 S A1 N 1 D 1 M5		

1. On 1-in. (25 mm) to 3-in. (80 mm) line sizes the dimensions for PN16 and PN40 flanges are identical and therefore all flanges are marked PN40
2. XX is a customer specified length in feet.

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