

## Specifications

The following specifications are for the Rosemount 8800C, Rosemount 8800CR, and Rosemount 8800CD, except where noted.

### FUNCTIONAL SPECIFICATIONS

#### Service

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

#### Line Sizes

##### Wafer

1/2, 1, 1 1/2, 2, 3, 4, 6, and 8 inches  
 (DN 15, 25, 40, 50, 80, 100, 150, and 200)

##### Flanged and Dual-Sensor Style

1/2, 1, 1 1/2, 2, 3, 4, 6, 8, 10, and 12 inches  
 (DN 15, 25, 40, 50, 80, 100, 150, 200, 250, and 300)

##### Reducer

1, 1 1/2, 2, 3, 4, 6, 8, 10, and 12 inches  
 (DN 25, 40, 50, 80, 100, 150, 200, 250, and 300)

#### Pipe Schedules

Process piping Schedules 10, 40, and 80.

#### NOTE

The appropriate bore diameter of the process piping must be entered using the HART Communicator or AMS. 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, Table 3, and Table 4.

#### 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 ( $\rho$ ), viscosity ( $\mu_{cp}$ ), 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
1/2 through 4/15 through 100	10000 minimum
6 through 12 /150 through 300	20000 minimum

TABLE 2. Minimum Measurable Meter Velocities (Use the larger of the two values)

	Feet per Second	Meters per Second
Liquids <sup>(1)</sup>	$\sqrt{36/\rho}$ or 0.7	$\sqrt{54/\rho}$ or 0.22
Gases	$\sqrt{36/\rho}$ or 6.5	$\sqrt{54/\rho}$ or 2.0

The  $\rho$  is the process fluid density at flowing conditions in lb/ft<sup>3</sup> for ft/s and kg/m<sup>3</sup> for m/s

(1) The minimum measurable velocity for the 10in. line size is 0.94 ft/s (.27m/s) and 1.11 ft/s (.34m/s) for the 12in. line size.

(2) Velocities are referenced to schedule 40 pipe.

TABLE 3. Maximum Measurable Meter Velocities (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 <sup>(1)</sup>	$\sqrt{90,000/\rho}$ or 250	$\sqrt{134,000/\rho}$ or 76

The  $\rho$  is the process fluid density at flowing conditions in lb/ft<sup>3</sup> for ft/s and kg/m<sup>3</sup> for m/s

(1) Accuracy limitations for gas and steam for Dual-style meters (all sizes): max velocity of 100 ft/s (30.5 m/s).

(2) Velocities are referenced to schedule 40 pipe.

#### Process Temperature Limits

##### Standard

-40 to 450 °F (-40 to 232 °C)

##### Extended

-330 to 800 °F (-200 to 427 °C)

## Output Signals

### 4–20 mA Digital HART 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 V dc, 120 mA maximum

### Digital Foundation fieldbus signal

Manchester-encoded digital signal that conforms to IEC 1158-2 and ISA 50.02.

## 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

Value of one pulse can be set to equal desired volume in selected engineering units.

## 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, 600, 900, and 1500, DIN PN 10, 16, 25, 40, 64, 100, and 160, and JIS 10K, 20K, and 40K

### Reducer Style Meter

Rated for ASME B16.5 (ANSI) Class 150, 300, 600, and 900, DIN PN 10, 16, 25, 40, 64, 100, and 160.

### Dual Sensor Style Meter

Rated for ASME B16.5 (ANSI) Class 150, 300, 600, 900, and 1500, DIN PN 10, 16, 25, 40, 64, 100, and 160, and JIS 10K, 20K, and 40K

### Wafer Style Meter

Rated for ASME B16.5 (ANSI) Class 150, 300, and 600, DIN PN 10, 16, 25, 40, 64, and 100, and JIS 10K, 20K, and 40K

## Power Supply

### HART Analog

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

### Foundation fieldbus

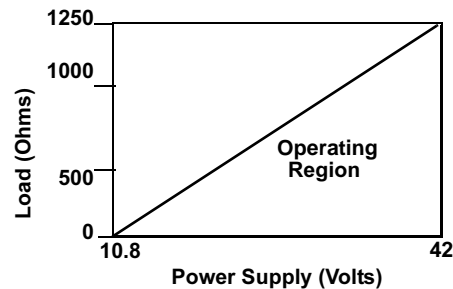
External power supply required. Flowmeter operates on 9 to 32 V dc, 17.8 mA nominal, 20.0 mA maximum.

## 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 Indicator

Displays flow variable, percent of range, current output, and/or totalized flow. (Totalized Flow only available on Digital or Pulse Electronics)

## Enclosure Rating

FM Type 4X; CSA Type 4X; IP66

**Permanent Pressure Loss**

The approximate permanent pressure loss (PPL) from the Rosemount 8800C 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:

- $\rho_f$  = Density at operating conditions (lb/ft<sup>3</sup> or kg/m<sup>3</sup>)
- Q = Actual volumetric flow rate (Gas = ft<sup>3</sup>/min or m<sup>3</sup>/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 following table:

TABLE 4. Determining the PPL

Meter Style	English Units		SI Units			
	A <sub>Liquid</sub>	A <sub>Gas</sub>	A <sub>Liquid</sub>	A <sub>Gas</sub>		
8800CF/W	3.4	10 <sup>-5</sup>	1.9	10 <sup>-3</sup>	0.425	118
8800CR	3.91	10 <sup>-5</sup>	2.19	10 <sup>-3</sup>	0.489	136
8800CD <sup>(1)</sup>	6.12	10 <sup>-5</sup>	3.42	10 <sup>-3</sup>	0.765	212

(1) For all 10 and 12 in (250 and 300 mm) line sizes and 6 and 8 in (150 and 200 mm) with 900# or 1500# Flanges, A for Rosemount 8800CD is the same as Rosemount 8800CF.

**Minimum Back 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 back pressure should be:

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

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

$\Delta P$  = 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 values below.

Low	3.75
High	21.75
NAMUR Low	3.60
NAMUR High	22.50

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.

**Foundation fieldbus**

The AI block allows the user to configure the alarm to HI-HI, HI, LO, or LO-LO with a variety of priority levels.

**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.

Low	3.9
High	20.8
NAMUR Low	3.8
NAMUR High	20.5

**Damping**

Adjustable between 0.2 and 255 seconds

**Response Time**

Three vortex shedding cycles or 0.2 seconds, 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.

**Foundation fieldbus**

Performance within specifications no greater than 10.0 seconds after power is applied.

**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:

- ASME B16.5 (ANSI)/IEEE C62.41 - 1980 (IEEE 587) Categories A, B
- 3 kA crest (8 × 20 μs)
- 6 kV crest (1.2 × 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 functions 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.

## Low Flow Cutoff

Adjustable over entire flow range. Below selected value, output is driven to 4 mA and zero pulse output frequency (in the scaled pulse mode only).

## Humidity Limits

Operates in 0–95% relative humidity under noncondensing conditions (tested to IEC 770, 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.

### Foundation fieldbus

For liquid service type, the transducer block digital output will continue to a nominal value of 25 ft/s. After that, the status associated with the transducer block output will go to UNCERTAIN. Above a nominal value of 30 ft/s, the status will go to BAD.

For gas/steam service, the transducer block digital output will continue to a nominal value of 220 ft/s for 0.5 and 1.0 in. line sizes and a nominal value of 250 ft/s for 1.5–12 in. line sizes. After that, the status associated with the transducer block output will go to UNCERTAIN. Above a nominal value of 300 ft/s for all line sizes, the status will go to BAD.

## 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.

## Status (FOUNDATION fieldbus only)

If self-diagnostics detect a transmitter failure, the status of the measurement will inform the control system. Status may also set the PID output to a safe value.

## Schedule Entries (FOUNDATION fieldbus only)

Six (6)

## Links (FOUNDATION fieldbus only)

Twelve (12)

## Virtual Communications Relationships (VCRs) (FOUNDATION fieldbus only)

Two (2) predefined (F6, F7)

Four (4) configured (see Table 5)

TABLE 5. Block Information.

Block	Base Index	Execution Time (Milliseconds)
Resource (RB)	300	—
Transducer (TB)	400	—
Analog Input (AI)	1,000	15
Proportional/Integral/Derivative (PID)	10,000	25
Integrator (INT)	12,000	20

TABLE 6. Typical pipe velocity ranges for 8800C and 8800CR<sup>(1)</sup>

Process Line Size		Liquid Velocity Ranges		Gas Velocity Ranges	
(Inches/ DN)	Vortex Meter <sup>(2)</sup>	(ft/s)	(m/s)	(ft/s)	(m/s)
0.5/ 15	8800CF005	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
1/ 25	8800CF010	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR010	0.25 to 8.8	0.08 to 2.7	2.29 to 87.9	0.70 to 26.8
1.5/ 40	8800CF015	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR015	0.30 to 10.6	0.09 to 3.2	2.76 to 106.1	0.84 to 32.3
2/ 50	8800CF020	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR020	0.42 to 15.2	0.13 to 4.6	3.94 to 151.7	1.20 to 46.2
3/ 80	8800CF030	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR030	0.32 to 11.3	0.10 to 3.5	2.95 to 113.5	0.90 to 34.6
4/ 100	8800CF040	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR040	0.41 to 14.5	0.12 to 4.4	3.77 to 145.2	1.15 to 44.3
6/ 150	8800CF060	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR060	0.31 to 11.0	0.09 to 3.4	2.86 to 110.2	0.87 to 33.6
8/ 200	8800CF080	0.70 to 25.0	0.21 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR080	0.40 to 14.4	0.12 to 4.4	3.75 to 144.4	1.14 to 44.0
10/ 250	8800CF100	0.90 to 25.0	0.27 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR100	0.44 to 15.9	0.13 to 4.8	4.12 to 158.6	1.26 to 48.3
12/ 300	8800CF120	1.10 to 25.0	0.34 to 7.6	6.50 to 250.0	1.98 to 76.2
	8800CR120	0.63 to 17.6	0.19 to 5.4	4.58 to 176.1	1.40 to 53.7

(1) Table 6 is a reference of pipe velocities that can be measured for the standard Rosemount 8800C and the reducer Rosemount 8800CR Vortex Meters. It does not consider density limitations, as described in tables 2 and 3. Velocities are referenced in schedule 40 pipe.

(2) Velocity range of the Rosemount 8800CW is the same as Rosemount 8800CF.

TABLE 7. Water Flow Rate Limits for the Rosemount 8800C and 8800CR<sup>(1)</sup>

Process Line Size (Inches/ DN)	Vortex Meter <sup>(2)</sup>	Minimum and Maximum Measurable Water Flow Rates*	
		Gallons/Minute	Cubic Meters/Hour
0.5/ 15	8800CF005	1.76 to 23.7	0.40 to 5.4
1/ 25	8800CF010	2.96 to 67.3	0.67 to 15.3
	8800CR010	1.76 to 23.7	0.40 to 5.4
1.5/ 40	8800CF015	4.83 to 158	1.10 to 35.9
	8800CR015	2.96 to 67.3	0.67 to 15.3
2/ 50	8800CF020	7.96 to 261	1.81 to 59.4
	8800CR020	4.83 to 158.0	1.10 to 35.9
3/ 80	8800CF030	17.5 to 576	4.00 to 130
	8800CR030	7.96 to 261.0	1.81 to 59.3
4/ 100	8800CF040	30.2 to 992	6.86 to 225
	8800CR040	17.5 to 576	4.00 to 130
6/ 150	8800CF060	68.5 to 2251	15.6 to 511
	8800CR060	30.2 to 992	6.86 to 225
8/ 200	8800CF080	119 to 3898	27.0 to 885
	8800CR080	68.5 to 2251	15.6 to 511
10/ 250	8800CF100	231 to 6144	52.2 to 1395
	8800CR100	119 to 3898	27.0 to 885
12/ 300	8800CF120	391 to 8813	88.8 to 2002
	8800CR120	231 to 6144	52.2 to 1395

**\*Conditions: 77 °F (25 °C) and 14.7 psia (1.01 bar absolute)**

(1) Table 7 is a reference of flow rates that can be measured for the standard Rosemount 8800C and the reducer 8800CR Vortex Meters. It does not consider density limitations, as described in tables 2 and 3.

(2) Velocity range of the 8800CW is the same as 8800CF.

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 1/2 inch/DN 15 through 1 inch/DN 25							
		1/2 Inch/DN 15				1 Inch/DN 25			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		ACFM	ACMH	ACFM	ACMH	ACFM	ACMH	ACFM	ACMH
0 psig (0 bar G)	max	27.9	47.3	Not Available	Not Available	79.2	134	27.9	47.3
	min	3.86	6.56	Available	Available	7.81	13.3	3.86	6.56
50 psig (3,45 bar G)	max	27.9	47.3	Not Available	Not Available	79.2	134	27.9	47.3
	min	1.31	2.22	Available	Available	3.72	6.32	1.31	2.22
100 psig (6,89 bar G)	max	27.9	47.3	Not Available	Not Available	79.2	134	27.9	47.3
	min	0.98	1.66	Available	Available	2.80	4.75	0.98	1.66
150 psig (10,3 bar G)	max	27.9	47.3	Not Available	Not Available	79.2	134	27.9	47.3
	min	0.82	1.41	Available	Available	2.34	3.98	0.82	1.41
200 psig (13,8 bar G)	max	27.9	47.3	Not Available	Not Available	79.2	134	27.9	47.3
	min	0.82	1.41	Available	Available	2.34	3.98	0.82	1.41
300 psig (20,7 bar G)	max	27.9	47.3	Not Available	Not Available	79.2	134	27.9	47.3
	min	0.82	1.41	Available	Available	2.34	3.98	0.82	1.41
400 psig (27,6 bar G)	max	25.7	43.9	Not Available	Not Available	73.0	124	25.7	43.9
	min	0.82	1.41	Available	Available	2.34	3.98	0.82	1.41
500 psig (34,5 bar G)	max	23.0	39.4	Not Available	Not Available	66.0	112	23.0	39.4
	min	0.82	1.41	Available	Available	2.34	3.98	0.82	1.41

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 1 1/2 inch/DN 40 through 2 inch/DN 50							
		1 1/2 Inch/DN 40				2 Inch/DN 50			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		ACFM	ACMH	ACFM	ACMH	ACFM	ACMH	ACFM	ACMH
0 psig (0 bar G)	max	212	360	79.2	134	349	593	212	360
	min	18.4	31.2	7.81	13.3	30.3	51.5	18.4	31.2
50 psig (3,45 bar G)	max	212	360	79.2	134	349	593	212	360
	min	8.76	14.9	3.72	6.32	14.5	24.6	8.76	14.9
100 psig (6,89 bar G)	max	212	360	79.2	134	349	593	212	360
	min	6.58	11.2	2.80	4.75	10.8	18.3	6.58	11.2
150 psig (10,3 bar G)	max	212	360	79.2	134	349	593	212	360
	min	5.51	9.36	2.34	3.98	9.09	15.4	5.51	9.36
200 psig (13,8 bar G)	max	212	360	79.2	134	349	593	212	360
	min	5.51	9.36	2.34	3.98	9.09	15.4	5.51	9.36
300 psig (20,7 bar G)	max	198	337	79.2	134	326	554	198	337
	min	5.51	9.36	2.34	3.98	9.09	15.4	5.51	9.36
400 psig (27,6 bar G)	max	172	293	73.0	124	284	483	172	293
	min	5.51	9.36	2.34	3.98	9.09	15.4	5.51	9.36
500 psig (34,5 bar G)	max	154	262	66.0	112	254	432	154	262
	min	5.51	9.36	2.34	3.98	9.09	15.4	5.51	9.36

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TABLE 10. Air Flow Rate Limits at 59 °F (15 °C)

Process Pressure	Flow Rate Limits	Minimum and Maximum Air Flow Rates for line sizes 3 inch/DN 80 through 4 inch/DN 100							
		3 Inch/DN 80				4 Inch/DN 100			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		ACFM	ACMH	ACFM	ACMH	ACFM	ACMH	ACFM	ACMH
0 psig (0 bar G)	max	770	1308	349	593	1326	2253	770	1308
	min	66.8	114	30.3	51.5	115	195	66.8	114
50 psig (3,45 bar G)	max	770	1308	349	593	1326	2253	770	1308
	min	31.8	54.1	14.5	24.6	54.8	93.2	31.8	54.1
100 psig (6,89 bar G)	max	770	1308	349	593	1326	2253	770	1308
	min	23.9	40.6	10.8	18.3	41.1	69.8	23.9	40.6
150 psig (10,3 bar G)	max	770	1308	349	593	1326	2253	770	1308
	min	20.0	34.0	9.09	15.4	34.5	58.6	20.0	34.0
200 psig (13,8 bar G)	max	770	1308	349	593	1326	2253	770	1308
	min	20.0	34.0	9.09	15.4	34.5	58.6	20.0	34.0
300 psig (20,7 bar G)	max	718	1220	326	554	1237	2102	718	1220
	min	20.0	34.0	9.09	15.4	34.5	58.6	20.0	34.0
400 psig (27,6 bar G)	max	625	1062	284	483	1076	1828	625	1062
	min	20.0	34.0	9.09	15.4	34.5	58.6	20.0	34.0
500 psig (34,5 bar G)	max	560	951	254	432	964	1638	560	951
	min	20.0	34.0	9.09	15.4	34.5	58.6	20.0	34.0

TABLE 11. Air Flow Rate Limits at 59 °F (15 °C)

Process Pressure	Flow Rate Limits	Minimum and Maximum Air Flow Rates for line sizes 6 inch/DN 150 through 8 inch/DN 200							
		6 Inch/DN 150				8 Inch/DN 200			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		ACFM	ACMH	ACFM	ACMH	ACFM	ACMH	ACFM	ACMH
0 psig (0 bar G)	max	3009	5112	1326	2253	5211	8853	3009	5112
	min	261	443	115	195	452	768	261	443
50 psig (3,45 bar G)	max	3009	5112	1326	2253	5211	8853	3009	5112
	min	124	211	54.8	93.2	215	365	124	211
100 psig (6,89 bar G)	max	3009	5112	1326	2253	5211	8853	3009	5112
	min	93.3	159	41.1	69.8	162	276	93.3	159
150 psig (10,3 bar G)	max	3009	5112	1326	2253	5211	8853	3009	5112
	min	78.2	133	34.5	58.6	135	229	78.2	133
200 psig (13,8 bar G)	max	3009	5112	1326	2253	5211	8853	3009	5112
	min	78.2	133	34.5	58.6	135	229	78.2	133
300 psig (20,7 bar G)	max	2807	4769	1237	2102	4862	8260	2807	4769
	min	78.2	133	34.5	58.6	135	229	78.2	133
400 psig (27,6 bar G)	max	2442	4149	1076	1828	4228	7183	2442	4149
	min	78.2	133	34.5	58.6	136	229	78.2	133
500 psig (34,5 bar G)	max	2188	3717	964	1638	3789	6437	2188	3717
	min	78.2	133	34.5	58.6	136	229	78.2	133

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TABLE 12. Air Flow Rate Limits at 59 °F (15 °C)

Process Pressure	Flow Rate Limits	Minimum and Maximum Air Flow Rates for line sizes 10 inch/DN 250 through 12 inch/DN 300							
		10 Inch/DN 250				12 Inch/DN 300			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		ACFM	ACMH	ACFM	ACMH	ACFM	ACMH	ACFM	ACMH
0 psig (0 bar G)	max	8214	13956	5211	8853	11781	20016	8214	13956
	min	712.9	1211	452	768	1022	1736	712.9	1211
50 psig (3,45 bar G)	max	8214	13956	5211	8853	11781	20016	8214	13956
	min	339.5	577	215	365	486.9	827	339.5	577
100 psig (6,89 bar G)	max	8214	13956	5211	8853	11781	20016	8214	13956
	min	254.7	433	162	276	365.4	621	254.7	433
150 psig (10,3 bar G)	max	8214	13956	5211	8853	11781	20016	8214	13956
	min	213.6	363	135	229	306.3	520	213.6	363
200 psig (13,8 bar G)	max	8214	13956	5211	8853	11781	20016	8214	13956
	min	213.6	363	135	229	306.3	520	213.6	363
300 psig (20,7 bar G)	max	7664	13021	4862	8260	10992	18675	7664	13021
	min	213.6	363	135	229	306.3	520	213.6	363
400 psig (27,6 bar G)	max	6664	11322	4228	7183	9559	16241	6664	11322
	min	213.6	363	136	229	306.3	520	213.6	363
500 psig (34,5 bar G)	max	5972	10146	3789	6437	8565	14552	5972	10146
	min	213.6	363	136	229	306.3	520	213.6	363

## NOTES

The Rosemount 8800C 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 (e.g. 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:

$$\text{Standard Flow Rate} = \text{Actual Flow Rate} \times \text{Density Ratio}$$

$$\text{Density Ratio} = \frac{\text{Density at Actual (Operating) Conditions}}{\text{Density at Standard Conditions}}$$

TABLE 13. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process Pressure	Flow Rate Limits	Minimum and Maximum Saturated Steam <sup>(1)</sup> Flow Rates for line sizes 1/2 inch/DN 15 through 1 inch/DN 25							
		1/2 Inch/DN 15				1 Inch/DN 25			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15 psig (1,03 bar G)	max	120	54.6	Not	Not	342	155	120	54.6
	min	12.8	5.81	Available	Available	34.8	15.8	12.8	5.81
25 psig (1,72 bar G)	max	158	71.7	Not	Not	449	203	158	71.7
	min	14.0	6.35	Available	Available	39.9	18.1	14.0	6.35
50 psig (3,45 bar G)	max	250	113	Not	Not	711	322	250	113
	min	17.6	8.00	Available	Available	50.1	22.7	17.6	8.00
100 psig (6,89 bar G)	max	429	194	Not	Not	1221	554	429	194
	min	23.1	10.5	Available	Available	65.7	29.8	23.1	10.5
150 psig (10,3 bar G)	max	606	275	Not	Not	1724	782	606	275
	min	27.4	12.5	Available	Available	78.1	35.4	27.4	12.5
200 psig (13,8 bar G)	max	782	354	Not	Not	2225	1009	782	354
	min	31.2	14.1	Available	Available	88.7	40.2	31.2	14.1
300 psig (20,7 bar G)	max	1135	515	Not	Not	3229	1464	1135	515
	min	37.6	17.0	Available	Available	107	48.5	37.6	17.0
400 psig (27,6 bar G)	max	1492	676	Not	Not	4244	1925	1492	676
	min	44.1	20.0	Available	Available	125	56.7	44.1	20.0
500 psig (34,5 bar G)	max	1855	841	Not	Not	5277	2393	1855	841
	min	54.8	24.9	Available	Available	156	70.7	54.8	24.9

(1) Assumes steam quality is 100%

TABLE 14. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process Pressure	Flow Rate Limits	Minimum and Maximum Saturated Steam <sup>(1)</sup> Flow Rates for line sizes 1 1/2 inch/DN 40 through 2 inch/DN 50							
		1 1/2 Inch/DN 40				2 Inch/DN 50			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15 psig (1,03 bar G)	max	917	416	342	155	1511	685	917	416
	min	82.0	37.2	34.8	15.8	135	61.2	82.0	37.2
25 psig (1,72 bar G)	max	1204	546	449	203	1983	899	1204	546
	min	93.9	42.6	39.9	18.1	155	70.2	93.9	42.6
50 psig (3,45 bar G)	max	1904	864	711	322	3138	1423	1904	864
	min	118	53.4	50.1	22.7	195	88.3	118	53.4
100 psig (6,89 bar G)	max	3270	1483	1221	554	5389	2444	3270	1483
	min	155	70.1	65.7	29.8	255	116	155	70.1
150 psig (10,3 bar G)	max	4616	2094	1724	782	7609	3451	4616	2094
	min	184	83.2	78.1	35.4	303	137	184	83.2
200 psig (13,8 bar G)	max	5956	2702	2225	1009	9818	4453	5956	2702
	min	209	94.5	88.7	40.2	344	156	209	94.5
300 psig (20,7 bar G)	max	8644	3921	3229	1464	14248	6463	8644	3921
	min	252	114	107	48.5	415	189	252	114
400 psig (27,6 bar G)	max	11362	5154	4244	1925	18727	8494	11362	5154
	min	295	134	125	56.7	487	221	295	134
500 psig (34,5 bar G)	max	14126	6407	5277	2393	23284	10561	14126	6407
	min	367	167	156	70.7	605	274	367	167

(1) Assumes steam quality is 100%

TABLE 15. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process Pressure	Flow Rate Limits	Minimum and Maximum Saturated Steam <sup>(1)</sup> Flow Rates for line sizes 3 inch/DN 80 through 4 inch/DN 100							
		3 Inch/DN 80				4 Inch/DN 100			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15 psig (1,03 bar G)	max	3330	1510	1511	685	5734	2601	3330	1510
	min	298	135	135	61.2	513	233	298	135
25 psig (1,72 bar G)	max	4370	1982	1983	899	7526	3414	4370	1982
	min	341	155	155	70.2	587	267	341	155
50 psig (3,45 bar G)	max	6914	3136	3138	1423	11905	5400	6914	3136
	min	429	195	195	88.3	739	335	429	195
100 psig (6,89 bar G)	max	11874	5386	5389	2444	20448	9275	11874	5386
	min	562	255	255	116	968	439	562	255
150 psig (10,3 bar G)	max	16763	7603	7609	3451	28866	13093	16763	7603
	min	668	303	303	137	1150	522	668	303
200 psig (13,8 bar G)	max	21630	9811	9818	4453	37247	16895	21630	9811
	min	759	344	344	156	1307	593	759	344
300 psig (20,7 bar G)	max	31389	14237	14248	6463	54052	24517	31389	14237
	min	914	415	415	189	1574	714	914	415
400 psig (27,6 bar G)	max	41258	18714	18727	8494	71047	32226	41258	18714
	min	1073	487	487	221	1847	838	1073	487
500 psig (34,5 bar G)	max	51297	23267	23284	10561	88334	40068	51297	23267
	min	1334	605	605	274	2297	1042	1334	605

(1) Assumes steam quality is 100%

TABLE 16. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process Pressure	Flow Rate Limits	Minimum and Maximum Saturated Steam <sup>(1)</sup> Flow Rates for line sizes 6 inch/DN 150 through 8 inch/DN 200							
		6 Inch/DN 150				8 Inch/DN 200			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15 psig (1,03 bar G)	max	13013	5903	5734	2601	22534	10221	13013	5903
	min	1163	528	513	233	2015	914	1163	528
25 psig (1,72 bar G)	max	17080	7747	7526	3414	29575	13415	17080	7747
	min	1333	605	587	267	2308	1047	1333	605
50 psig (3,45 bar G)	max	27019	12255	11905	5400	46787	21222	27019	12255
	min	1676	760	739	335	2903	1317	1676	760
100 psig (6,89 bar G)	max	46405	21049	20448	9275	80356	36449	46405	21049
	min	2197	996	968	439	3804	1725	2197	996
150 psig (10,3 bar G)	max	65611	29761	28866	13093	113440	51455	65611	29761
	min	2610	1184	1150	522	4520	2050	2610	1184
200 psig (13,8 bar G)	max	84530	38342	37247	16895	146375	66395	84530	38342
	min	2965	1345	1307	593	5134	2329	2965	1345
300 psig (20,7 bar G)	max	122666	55640	54052	24517	212411	96348	122666	55640
	min	3572	1620	1574	714	6185	2805	3572	1620
400 psig (27,6 bar G)	max	161236	73135	71047	32226	279200	126643	161236	73135
	min	4192	1901	1847	838	7259	3293	4192	1901
500 psig (34,5 bar G)	max	200468	90931	88334	40068	347134	157457	200468	90931
	min	5212	2364	2297	1042	9025	4094	5212	2364

(1) Assumes steam quality is 100%

TABLE 17. Saturated Steam Flow Rate Limits (Assumes Steam Quality is 100%)

Process Pressure	Flow Rate Limits	Minimum and Maximum Saturated Steam <sup>(1)</sup> Flow Rates for line sizes 10 inch/DN 250 through 12 inch/DN 300							
		10 Inch/DN 250				12 Inch/DN 300			
		Rosemount 8800C		Rosemount 8800CR		Rosemount 8800C		Rosemount 8800CR	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
15 psig (1,03 bar G)	max	35519	16111	22534	10221	50994	23130	35519	16111
	min	3175	1440	2015	914	4554	2066	3175	1440
25 psig (1,72 bar G)	max	46618	21146	29575	13415	66862	30328	46618	21146
	min	4570	2073	2308	1047	5218	2367	4570	2073
50 psig (3,45 bar G)	max	73748	33452	46787	21222	105774	47978	73748	33452
	min	4575	2075	2903	1317	6562	2976	4575	2075
100 psig (6,89 bar G)	max	126660	57452	80356	36449	181663	82401	126660	57452
	min	5996	2720	3804	1725	8600	3901	5996	2720
150 psig (10,3 bar G)	max	178808	81106	113440	51455	256457	116327	178808	81106
	min	7125	3232	4520	2050	10218	4635	7125	3232
200 psig (13,8 bar G)	max	230722	104654	146375	66395	330915	150101	230722	104654
	min	8092	3670	5134	2329	11607	5265	8092	3670
300 psig (20,7 bar G)	max	334810	151867	212411	96348	480203	217816	334810	151867
	min	9749	4422	6185	2805	13983	6343	9749	4422
400 psig (27,6 bar G)	max	440085	199619	279200	126643	631195	286305	440085	199619
	min	11442	5190	7259	3293	16411	7444	11442	5190
500 psig (34,5 bar G)	max	547165	248190	347134	157457	784775	355968	547165	248190
	min	14226	6453	9025	4094	20404	9255	14226	6453

(1) Assumes steam quality is 100%

## PERFORMANCE SPECIFICATIONS

The following performance specifications are for the Rosemount 8800C, 8800CR, and 8800CD, except where noted. Digital performance specifications applicable to both Digital HART and FOUNDATION fieldbus output.

### Accuracy

Includes linearity, hysteresis, and repeatability.

#### Liquids—for Reynolds Numbers over 20000

##### Digital and Pulse Output

±0.65% of rate

Note: The accuracy for the 8800CR, line sizes 6 to 12 inch (150 to 300mm), is ±1.0% 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

±1.35% of rate

Note: The accuracy for the 8800CR, line sizes 6 to 12 inch (150 to 300mm), is ±1.50% of rate.

##### Analog Output

Same as pulse output plus an additional 0.025% of span

Accuracy limitations for gas and steam:

- for 1/2- and 1-in. (DN 15 and DN 25):  
max velocity of 220 ft/s (67.06 m/s)
- for Dual-style meters (all sizes):  
max velocity of 100 ft/s (30.5 m/s)

### NOTE

For 1/2-in. through 4-in. (15 mm through 100 mm) line sizes, as the meter Reynolds number decreases below the stated limit to 10000, the positive limit of the accuracy error band will increase to 2.1% for the pulse output. Example: +2.1% to -0.65% for liquids.

### Repeatability

± 0.1% of actual flow rate

### Stability

±0.1% of rate over one year

### Process Temperature Effect

Automatic K-factor correction with user-entered process temperature

Table 18 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 18. Process Temperature Effect

Material	Percent Change in K-Factor per 100 °F (55.5 °C)
316L @ < 77 °F (25 °C)	+ 0.23
316L @ > 77 °F (25 °C)	- 0.27
Nickel Alloy C < 77 °F (25 °C)	+ 0.22
Nickel Alloy C > 77 °F (25 °C)	- 0.22

## Ambient Temperature Effect

### Digital and Pulse Outputs

No effect

### Analog Output

$\pm 0.1\%$  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. At or near the minimum liquid flow rate in a normal pipe mounted installation, the maximum vibration should be 0.087-inch (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-inch (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

### HART Analog

Output error less than  $\pm 0.025\%$  of span with twisted pair from 80-1000 MHz for radiated field strength of 10 V/m and from 0.15-80 MHz for conducted RF of 3V (tested per EN61326).

### Foundation fieldbus and Digital HART

No effect on the values that are being given if using HART digital signal or FOUNDATION fieldbus.

## Magnetic-Field Interference

### HART Analog

Output error less than  $\pm 0.025\%$  of span at 30 A/m (rms); meets IEC 60770-1984, Section 6.2.9.

### Foundation fieldbus

No effect on digital output accuracy at 30 A/m (rms). Tested per EN 61326.

## Series Mode Noise Rejection

### HART Analog

Output error less than  $\pm 0.025\%$  of span at 1 V rms, 60 Hz; meets IEC 60770-1984, Section 6.2.4.2.

## Foundation fieldbus

No effect on digital output accuracy at 1 V rms 60 Hz. Meets IEC 60770-1984, Section 6.2.4.2

## Common Mode Noise Rejection

### HART Analog

Output error less than  $\pm 0.025\%$  of span at 30 V rms, 60 Hz; meets IEC 60770-1984, Section 6.2.4.1.

### Foundation fieldbus

No effect on digital output accuracy at 250 V rms, 60 Hz. According to FF-830-PS-2.0 test case 8.2.

## Power Supply Effect

### HART Analog

Less than 0.005% of span per volt

### Foundation fieldbus

No effect on accuracy.

**PHYSICAL SPECIFICATIONS**

**NACE Compliance**

Materials of Construction meet NACE material recommendations per MR0175 for sour oilfield production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for refining environments.

**Electrical Connections**

1/2 -14 NPT, PG 13.5, or M20 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

**Flanges**

316/316L lap joint

**Process-Wetted Materials**

**Meter Body**

316L wrought stainless and CF-3M cast stainless or N06022 wrought Nickel Alloy CW2M cast Nickel Alloy. Other material grades available. Consult factory.

**Flanges**

316/316L stainless steel  
 Nickel Alloy N06022 Weld Neck

**Collars**

Nickel Alloy N06022

**Surface Finish of Flanges and Collars**

Standard: 125 to 250 μ inches  
 (3.1 to 6.3 μ meters) Ra roughness

Smooth: 63 to 125 μ inches  
 (1.6 to 3.1 μ meters) Ra roughness

**Process Connections**

Mounts between the following flange configurations:  
 ASME B16.5 (ANSI): Class 150, 300, 600, 900, 1500  
 DIN: PN 10, 16, 25, 40, 64, 100, 160  
 JIS: 10K, 20K, and 40K

**Mounting**

**Integral (Standard)**

Electronics are mounted on meter body

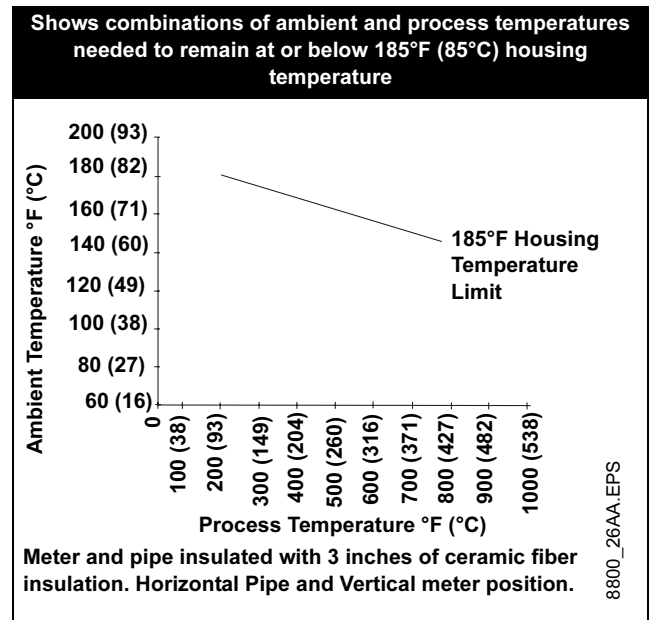
**Remote (Optional)**

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 polyurethane painted, carbon steel pipe mount bracket with one carbon steel 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). The following is for reference, please note that the pipe was insulated with 3 inches of ceramic fiber insulator.

FIGURE 1. Rosemount 8800 Vortex Flowmeter Ambient/process temperature limits



**Pipe Length Requirements**

The vortex meter may be installed with a minimum of ten straight pipe diameters (D) upstream and five straight pipe diameters (D) downstream by following the K-factor corrections as described in the Technical Data Sheet (00816-0100-3250) on Installation Effects. No K-factor correction is required if 35 diameters upstream (35D) and 10 diameters downstream (10D) are available.

**Tagging**

The flowmeter will be tagged at no charge, according to customer requirements. All tags are stainless steel. The standard tag is permanently attached to the flowmeter. Character height is 1/16-inch (1,6 mm). A wired-in tag is available on request.

**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.