

Coriolis Coriolis Flow Meters

RCT1000 with RCS018...300 Sensors

DESCRIPTION

The RCT1000 Coriolis mass flow meter identifies flow rate by directly measuring mass flow and density of fluids over a wide range of process temperatures with a high degree of accuracy. For homogenous fluids consisting of two components like sugar and water, the RCT1000 Coriolis system can derive the concentration and mass of each component based on fluid properties and density measurement. Furthermore, the unobstructed, open flow design makes it suitable for a variety of fluids such as slurries and other viscous, nonconductive fluids that are difficult to measure with other technologies.

APPLICATIONS

The Coriolis design and measurement principle allows the meter to be an exceptional device in measuring:

- Oil and fuels
- Homogeneous suspensions and slurries
- Adhesives, glues or binding materials
- Coatings and hardeners
- Dyes, fragrances, vitamins and other additives
- Vegetable oils and fats

OPERATION

Coriolis flow meters simultaneously measure mass flow rate, density and temperature. As fluid flows through the vibrating sensor tube, forces induced by the flow cause the tube to twist slightly. These small deflections are measured by carefully placed detectors. A phase shift occurs between detector signals that is directly proportional to mass flow rate. As the fluid density varies, the resonant frequency at which the tube vibrates changes, which is also measured by the detectors. These larger sensors have two tubes that are vibrated in opposing directions in order to reduce the effect of process vibration on the flow measurement. Temperature is measured by an internal RTD in order to calculate thermal effects on the tube vibrating frequency and can be used as a measurement output.

CONTROLS SYSTEM INTEGRATION

RCT1000 transmitters provide a variety of means to integrate the meter's output into new and existing operations. The batch and PID functionality enables direct control of devices, such as valves, by use of digital or analog outputs. Additionally, programmable digital outputs can indicate low and high alarm conditions. Network options are available including EtherNet/IP, Modbus TCP/IP and Modbus RTU.



MAINTENANCE

With no internal moving parts, the vibrating tube design has little impact on mechanical wear, resulting in a longer life expectancy and in fewer repairs than many other flow technologies.

FLUID DIAGNOSTICS

RCT Console software offers much more than configuration features. Users can obtain advanced data logging and performance trending analysis, as well as system verification provided by the unique HealthTrack feature, which captures critical operation parameters.

ADVANTAGES

- Highly accurate direct measurement of:
 - ♦ Mass flow
 - ♦ Density
- Derive concentration of homogenous liquids containing two components
- Open flow path
- No straight-run requirements
- Low maintenance operation
- Flexible integration options
- Advanced fluid diagnostic software



Product Data Sheet

SPECIFICATIONS

The complete remote mount metering system consists of the following; each component must be purchased separately:

- Sensor
- Transmitter
- Cable assembly

System Specifications

		RCS018, RCS025, RCS0	50 (option 2)	$\pm 0.2\%$ of reading $\pm 0.05\%$ of full scale		
Uncertainty	Mass Flow Rate (Liquids)	RCS100, RCS200, RCS3	00 (option 1)	$\pm 0.1\%$ of reading $\pm 0.025\%$ of full scale		
		RCS018300 (option	6)	±0.1% of reading*		
Densites	RCS018, RCS025, RCS050	±0.12486 lb/ft3 (0.002 g	g/cm³)			
Density	RCS100, RCS200, RCS300	±0.03121 lb/ft ³ (0.0005 g/cm ³)				
Repeatability	RCS018, RCS025, RCS050, RCS100, RCS200, RCS300	±0.05% of reading ± zero stability				
	RCS018, RCS025, RCS050	±0.05% of full scale				
	RCS100, RCS200, RCS300 (option 1)	±0.025% of full scale				
Zero Stability	RCS100 (option 6)	±0.123 lb/min (3.35 kg/hr)				
	RCS200 (option 6)	±0.360 lb/min (9.79 kg/hr)				
	RCS300 (option 6)	±0.356 lb/min (9.68 kg/hr)				
	Ordinary Location	Remote mount	CAN/CSA C22.2 No. 61010-1-12			
		Integral mount	Explosion-p	x/Ex db ia IIB T4 Gb proof for CI I Div 1 Grp CD with Safe Sensor for CI I Div 1 Grp CD		
Safety Certifications	cCSAus	Remote transmitter		x/Ex db [ia Ga] IIB T6T3 Gb proof for CI I Div 1 Grp CD		
		Remote sensor		x/Ex ia IIB T6T3 Ga Safe for CI I Div 1 Grp CD		
		Integral mount	ll 2 G Ex db	ia IIB T4 Gb		
	ATEX / IECEx	Remote transmitter	II 2 (1) G Ex	db [ia Ga] IIB T6T3 Gb		
		Remote sensor	ll 1 G Ex ia ll	B T6T3 Ga		
Density Measurement	Flowing, referenced, API, Brix, Baume	and net oil				

* When flow rate is less than zero stability (lb/min) * 1000, accuracy = zero stability / flow rate.

Flow Rate Specifications

Model	Nominal Line and	Number of Flow	Flow	Range	Volumetric Equivalent 1g/cm ³		
	EquivalentPipe Size	Tubes	lb/min	kg/hr	gal/min	l/h	
RCS018	1/2 in., 3/16 in.	2	020	0544	2.4	544	
RCS025	1/2 in., 1/4 in.	2	040	01088	4.8	1088	
RCS050	1/2 in., 1/2 in.	2	0220	05987	26	5987	
RCS100	1 in.	2	01000	027,216	120	27,716	
RCS200	2 in.	2	01700	046,266	204	46,266	
RCS300	3 in.	2	05200	0141,520	623	141,520	

Sensor Specifications	Sensor Specifications			Maximum Allowable Pressure (by Connection Type					
	Model	NPT	Class 150 Flange	Class 300 Flange	DN PN40	Tri-Clamp			
	RCS018	3450 psi (238 bar)	275 psi (19 bar)	720 psi (49.6 bar)	40 bar (580 psi)	200 psi (14 bar)			
	RCS025	3450 psi (238 bar)	275 psi (19 bar)	720 psi (49.6 bar)	40 bar (580 psi)	200 psi (14 bar)			
Pressure	RCS050	3320 psi (229 bar)	275 psi (19 bar)	720 psi (49.6 bar)	40 bar (580 psi)	200 psi (14 bar)			
	RCS100	2150 psi (148 bar)	275 psi (19 bar)	720 psi (49.6 bar)	40 bar (580 psi)	200 psi (14 bar)			
	RCS200	2200 psi (152 bar)	275 psi (19 bar)	720 psi (49.6 bar)	40 bar (580 psi)	200 psi (14 bar)			
	RCS300	—	275 psi (19 bar)	720 psi (49.6 bar)	40 bar (580 psi)	200 psi (14 bar)			
Wetted Materials	Standard	316L stainless steel							
Temperature	Fluid Range	General Safety: -40392° F (-40200° C) Hazardous Location Sensor with Integral Mount Transmitter: -4140° F (-2060° Hazardous Location Sensor with Remote Mount Transmitter: -4359° F (-20182° C) as TEMP CODE FLUID TEMP (MAX) T6 (85° C) 67° C T5 (100° C) 82° C T4 (135° C) 117° C T3 (200° C) 182° C							
	Accuracy	±1.8° F (1° C)							
	Repeatability	y ±0.54° F (0.3° C)							
Process Connections	NPT (RCS0182	200), Class 150 Flange	, Class 300 Flange, DI	N PN40, Tri-Clamp					
Conformance	NACE MR0175/I	SO 15156							
Pressure Standards/Approvals	Pressure Equipn	nent Directive (PED);	Canadian Registratior	n Number (CRN)					

Transmitters

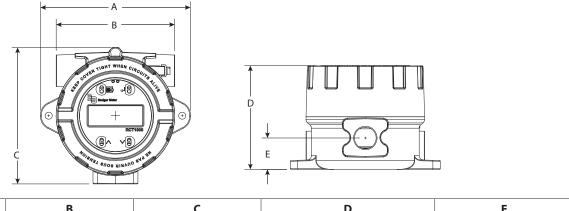
			Model			
Feature		RCTN	RCTX	RCTX with Display		
Enclosure		NEMA 4 (IP65); powder coated aluminum, polycarbonate, urethane and stainless steel	NEMA 4X (IP66); powder coated aluminum, polycarbonate, urethane and stainless steel without glass window	NEMA 4X (IP66); powder coated aluminum, polycarbonate, urethane and stainless steel with glass window		
Power Requirements		115/230V AC; ±15% 50/60 Hz 25W maximum 2028V DC; 15W maximum				
Ambient Tempera	ture	14158° F (–1070° C)	- 4140° F (-2060° C)	– 4…140° F (–20…60° C)		
Configuration		Four-button HMI or RCT Console configuration	RCT Console configuration	Four–Optical button HMI or RCT Console configuration		
Display		4 line × 20 character; alpha-numeric; dot matrix; LED backlighting		4 line × 20 character; alpha-numeric; dot matrix; LED backlighting		
	Standard (1 input)	Built-in 100 Ohm Platinum RTD within the	sensor body			
RTD Input	Optional (1 auxiliary input)	Additional 100 Ohm 3-wire Platinum RTD input for the secondary RTD is used by customers who want to be able to calibrate their RTD	_	_		
Outputs Analog I/O		Three 420 mA (022 mA capable), maximum load 500 Ohms, approximately 16 bit resolution outputs; assignable to mass flow, volume, density, temperature, concentration, PID and similar measurements. User defined fault condition output value anywhere in the 022 mA range	Two (three with HART Option) 420 mA (022 mA capable), maximum load 500 Ohms, approximately 16 bit resolution outputs; assignable to mass flow, volume, density, temperature, concentration, PID and similar measurements. User defined fault condition output value anywhere in the 022 mA range			
	Inputs	Two 05V DC inputs. 20k Ohms input impedance, approximately 12 bit resolution	One 05V DC input. 20k Ohms input impedance, approximately 12 b resolution			
Auxiliary Power		Internal 24V DC supply, 100 mA max. (for batching functions, frequency output channel and like applications)	_	_		
Frequency/Pulse (Dutput	One open collector transistor, user configurable as rate (3 kHz max output), accumulator 010 Hz; PWM with 1 kHz 528V DC carrier. User assignable to rate, any totalizer, PID, temperature, density, concentration or other similar measurements				
Digital I/O	Outputs	Four 528V DC, 50 mA maximum current draw (external pullup resistor required)	required)	m current draw (external pullup resistor		
	Inputs	Four 524V DC, 1k Ohms impedance	Three 524V DC, 1k Ohm impe	dance		
Industrial	Standard	Modbus RTU (EIA-485/RS485)				
		Modbus TCP/IP & EtherNet/IP	1			
Modular Port Optional Module			HART 7			
Standard Configu	ration Port	USB 2.0 interface (through a Mini–B recept	acle) for RCT Console software			
Alarms		Six Hi/Lo Alarms; Alarm status on display by default, assignable to digital Output 2 or 4 and available via digital communications	Six Hi/Lo Alarms; Alarm status or Output 2 and available via digita	n display by default, assignable to digital al communications		
Transmission Dist	ance	Up to 100 ft (30 meters); contact factory if I	onger length is needed			
Measurements		Forward and reverse mass flow and total, d		on, volumetric flow and total (derived)		
Other Functions		Batch control, PID control. User configuration		,		
Calci ranctions		Batch control, the control. Oser configurati				

CABLE KITS

The kits include	the cable assembly, cable prote	ector and sensor cab	le connection cover.
RC820476-XX	Kit, PVC jacketed cable XX =length in ft; 20, 35, 50, 70, 100	Temp range: -40176° F (-4080° C)	
RC820477-XX	Kit, FEP jacketed cable XX =length in ft; 20, 35, 50, 70, 100	Temp range: -94392° F (-70200° C)	General Safety Kit
RC830054-XX	TFE jacketed cable XX =length in ft; 20, 35, 50, 70, 100	Temp range: -4140° F (-2060° C)	Hazardous Location Cable

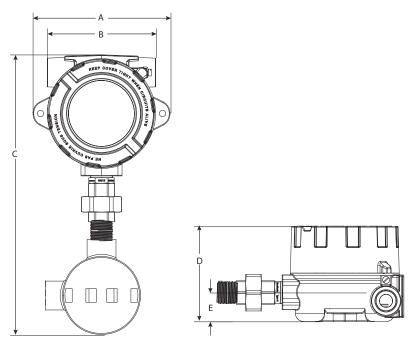
DIMENSIONS

RCTX Transmitter, Integral Mount Electronics Enclosure Dimensions



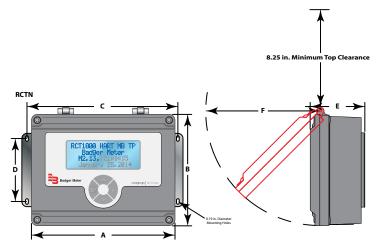
Α	В	с	D	E
6.57 in. (167 mm)	5.20 in. (132 mm)	5.98 in. (152 mm)	4.57 in. \pm 0.12 in. (116 mm \pm 3 mm)	1.37 in. (35 mm)

RCTX Transmitter, Remote Mount Electronics Enclosure Dimensions



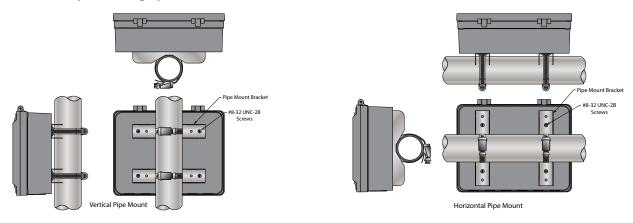
A	В	С	D	E
6.57 in. (167 mm)	5.20 in. (132 mm)	13.43 in. (341 mm)	4.57 in. \pm 0.12 in. (116 mm \pm 3 mm)	1.37 in. (35 mm)

RCTN Transmitter Electronics Enclosure Dimensions

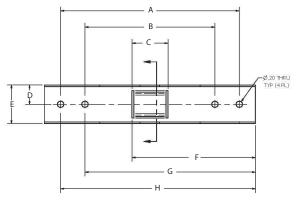


A	В	С	D	E	F
9.80 in. (249.9 mm)	8.00 in. (203.2 mm)	10.30 in. (261.6 mm)	4.30 in. (109.2 mm)	3.66 in. (93.0 mm)	8.32 in. (211.2 mm)

RCTN Transmitter, Pipe Mounting Options

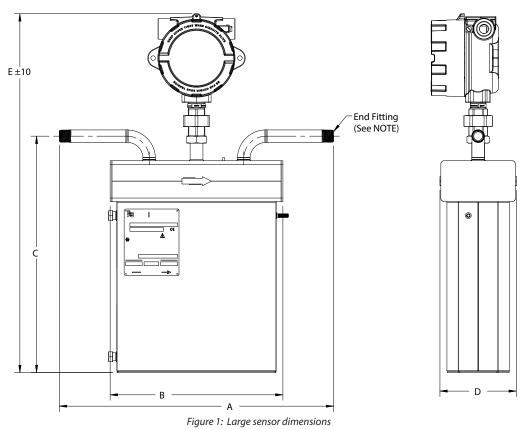


RCTN Transmitter Only, Pipe Bracket Dimensions



А	В	с	D	E	F	G	н
5.50 in.	4.00 in.	1.11 in.	0.625 in.	1.25 in.	3.80 in.	5.25 in.	6.00 in.
(139.7 mm)	(101.6 mm)	(28.2 mm)	(15.9 mm)	(31.8 mm)	(96.5 mm)	(133.6 mm)	(152.4 mm)

Sensor Dimensions, RCS018...RCS300



Sensor	Nominal Size	A ¹	В	С	D	E (Standard)	E (Remote)
RCS018	1/2 in.	13.6 in. (346 mm) 1	7.1 in. (180 mm)	8.5 in. (217 mm) ²	4.4 in. (113 mm) ²	19.3 in. (489 mm)	18.3 in. (464 mm)
RCS025	1/2 in.	16.0 in. (406 mm) 1	9.0 in. (228 mm) 1	9.9 in. (253 mm) ²	4.4 in. (113 mm) ²	20.7 in. (525 mm)	19.7 in. (500 mm)
RCS050	1/2 in.	18.5 in. (470 mm) 1	11.6 in. (296 mm) 1	15.9 in. (405 mm) ²	5.1 in. (131 mm) ²	24.2 in. (615 mm)	23.2 in. (590 mm)
RCS100	1 in.	23.2 in. (590 mm) 1	16.8 in. (426 mm) 1	27.6 in. (700 mm) ²	6.4 in. (163 mm) ²	34.3 in. (870 mm)	33.3 in. (845 mm)
RCS200	2 in.	26.4 in. (670 mm) ²	18.5 in. (472 mm) ²	28.6 in. (726 mm) ³	7.9 in. (203 mm) ³	33.4 in. (848 mm)	32.4 in. (823 mm)
RCS300	3 in.	40.9 in. (1040 mm) ²	28.7 in. (728 mm) ²	40.4 in. (1028 mm) ³	9.5 in. (243 mm) ³	45.3 in. (1150 mm)	44.3 in. (1125 mm)

 $^{\scriptscriptstyle 1}\pm 0.12$ in (3 mm)

 $^{\scriptscriptstyle 2}\pm$ 0.15 in (4 mm)

 $^3\pm$ 0.24 in (6 mm)

NOTE: End fittings can be NPT (shown), Class 150 or Class 300 ANSI flanges, or other; dimensions A and C do not change.

APPROXIMATE SHIPPING WEIGHTS

	Sensor On	ly	Transmitter Only			Cables Only		
RCS018	15 lb	6.8 kg	RCTN	6.4 lb	2.9 kg	RC820***-20	6 lb	2.7 kg
RCS025	16 lb	7.3 kg	RCTX	3.4 lb	1.8 kg	RC820***-35	8 lb	3.6 kg
RCS050	26 lb	11.8 kg	RCTX-K Integral	4.9 lb	2.2 kg	RC820***-50	10 lb	4.5 kg
RCS100	47 lb	21.3 kg	RCTX-K Remote	8.2 lb	3.7 kg	RC820***-70	13 lb	5.9 kg
RCS200	90 lb	40.8 kg				RC820***-100	17 lb	7.7 kg
RCS300	219 lb	99.3 kg						

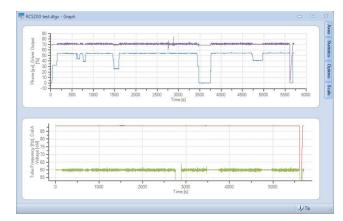
NETWORK OPTIONS

RS-485 Network All RCT1000 meters come equipped an EIA-485 port with Modbus RTU	
Ethernet An optional Ethernet module allows communications via Modbus TCP/IP or EtherNet/IP	
HART	An optional HART module, integral mount transmitter

SOFTWARE UTILITY

RCT Console software is a PC-based software that can be used to configure, operate and diagnose the RCT1000 Coriolis meter. Additionally, the software can log and graph fluid characteristics and parameters for historical comparisons. RCT Console software is included with the RCT1000 Coriolis meter.

Sample	Time	33, Phase	60, Tube Frequency	183, Coil A Voltage	184, Driver Output	185, Coil B Voltage		
	[s]	μs	Hz	mV	%	mV		
1	0.359	-0.018321750685572624	88.507232666015625	60.0019416809082	69.021713256835937	59.978321075439453		
2	1.045	0.0089603438973426819	88.516281127929688	59.999141693115234	69.029747009277344	59.97698974609375		
3	2.075	0.044337108731269836	88.521278381347656	60.000080108642578	69.03057861328125	59.9730110168457		
4	3.105	-0.059853188693523407	88.511688232421875	60.009830474853516	69.027748107910156	59.9715690612793		
5	4.134	0.021695289760828018	88.5118637084961	59.991420745849609	69.026771545410156	59.969928741455078		
6	5.164	0.0785641223192215	88.512863159179688	59.994338989257813	69.041763305664063	59.967929840087891		
7	6.193	0.029011240229010582	88.509567260742187	59.99884033203125	69.036247253417969	59.965499877929688		
8	7.223	0.066253632307052612	88.510772705078125	59.999370574951172	69.035362243652344	59.967361450195313		
9	8.253	0.061536498367786407	88.491180419921875	59.990581512451172	69.039588928222656	59.9675407409668		
10	9.282	-0.1050340011715889	88.511962890625	59.99462890625	69.03460693359375	59.963081359863281		
11	10.312	-0.015941370278596878	88.50128173828125	60.005199432373047	69.028480529785156	59.986789703369141		
12	11.341	-0.0635964497923851	88.497077941894531	60.016311645507813	69.017707824707031	59.9633903503418		
13	12.137	-0.00923190638422966	88.506942749023438	59.997470855712891	69.030845642089844	59.971458435058594		
14	13.167	0.11063340306282043	88.502738952636719	60.005691528320312	69.027137756347656	59.976848602294922		
15	14.196	0.023042159155011177	88.499702453613281	59.993961334228516	69.033676147460938	59.969009399414063		
16	15.226	-0.057191379368305206	88.509368896484375	60.004070281982422	69.027626037597656	59.978610992431641		
17	16.256	0.030765749514102936	88.512100219726563	59.993301391601563	69.03558349609375	59.983150482177734		
18	17.285	0.086112096905708313	88.518013000488281	59.984481811523438	69.042228698730469	59.971881866455078		
19	18.315	-0.10414709895849228	88.516181945800781	59.997970581054687	69.034095764160156	59.97052001953125		
20	19.344	-0.034287728369235992	88.5077896118164	59.990089416503906	69.038200378417969	59.971920013427734		
21	20.031	0.032753609120845795	88.5064697265625	59.99407958984375	69.039588928222656	59.980728149414063		
22	21.060	0.0646323710680008	88.501480102539062	59.996551513671875	69.027915954589844	59.966129302978516		
23	22.090	0.000642613391391933	88.503471374511719	60.015239715576172	69.015998840332031	59.985980987548828		
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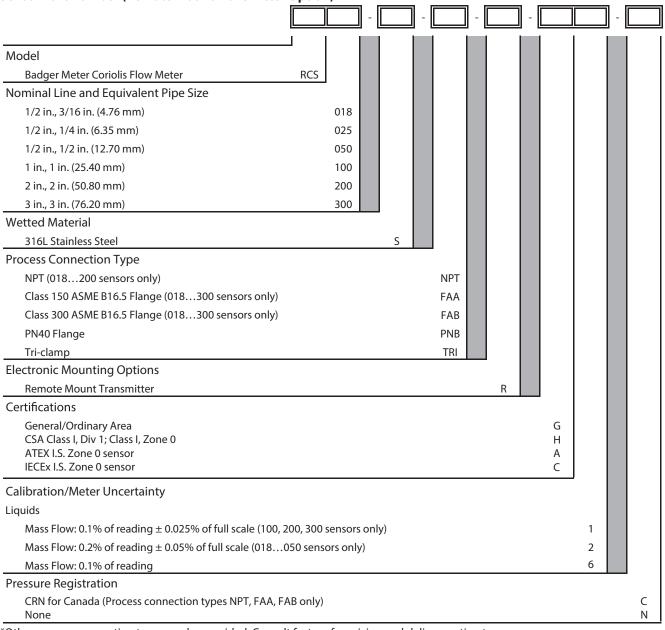


ACCESSORIES

Please consult the factory for the availability, pricing and delivery estimates of additional accessories.

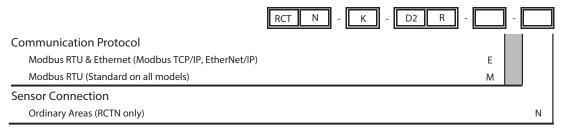
PART NUMBER CONSTRUCTION

Sensor Part Number (Remote Mount Transmitter Option)

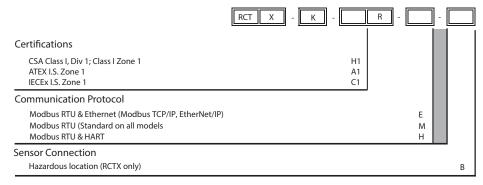


*Other process connection types can be provided. Consult factory for pricing and delivery estimates.

General Safety Transmitter Part Number (Remote Mount)



Hazardous Location Transmitter Part Number (Remote Mount)



Integral Mount Transmitter with Sensor Part Number Construction

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							4 U		1 I	<u> </u>	I					I
Model	-															
RCT1000 Coriolis Sensor	RCS															
Nominal Line Size and Flow Rate																
1/2 Inch / DN15 20 lb/min		018														
1/2 Inch / DN15 40 lb/min		025														
1/2 Inch / DN15 220 lb/min		050														
1 Inch / DN25 1000 lb/min		100														
2 Inch / DN50 1700 lb/min		200														
3 Inch / DN80 5200 lb/min		300														
Wetted Material																
316L Stainless Steel				S												
Process Connection Type *																
National Pipe Thread (018200 sensors)						NPT										
Class 150 ASME 16.5 Flange (018300 sensors)						FAA										
Class 300 ASME 16.5 Flange (018300 sensors)						FAB										
PN40 Flange						PNB										
Tri-clamp						TRI										
Electronic Mounting Options																
Integral Mount Transmitter (with RCTX only)								М								
Certifications										•						
CSA Class I, Div 1; Class I, Zone 1										Н						
ATEX I.S. Zone 1										А						
IECEx I.S. Zone 1										C	J					
Calibration/Meter Uncertainty																
Liquids																
(018050 sensors) Mass Flow: 0.2% of reading \pm 0.05%	of full sca	ale									2					
(100300 sensors) Mass Flow: 0.1% of reading \pm 0.025	% of full s	cale									1					
Mass Flow: 0.1% of reading											6					
Pressure Registration													C			
CRN for Canada (Process connection types NPT, FAA, F None	AB only)												C N			
Display																
Explosion Proof Transmitter, Display / Keypad															ХК	
Explosion Proof Transmitter, No Display / Keypad															XN	
Communication																
Modbus RTU & Ethernet (Modbus TCP/IP, EtherNet/IP)																Е
Modbus RTU (Standard on all models)																М
Modbus RTU and HART																н

*Other process connection types can be provided. Consult factory for pricing and delivery estimates.

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Control. Manage. Optimize.

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