

Micro Motion[®] R-Series Coriolis Flow and Density Meters



Multi-variable flow and density measurement

- Basic liquid mass flow, volume flow, and density measurement performance in a compact design
- Rugged design minimizing process, mounting, and environmental effects

Best fit-for-application

- Cleanable, self-draining design for critical process control service
- Compact design enables installation flexibility
- Broad range of I/O offerings including HART, FOUNDATION[™] fieldbus, 4-20mA, and wireless capabilities

Exceptional reliability and safety

- No moving parts to wear or replace minimizes maintenance for long-term reliability
- Robust sensor design

Micro Motion® R-Series flow meters

Micro Motion R-Series meters are designed for general utility use across a wide range of applications where basic flow and density measurements are needed. Benefiting from the fundamental advantages of Coriolis technology, the Micro Motion R-series is an ideal replacement for mechanical flow meters.

Tip

If you need help determining which Micro Motion products are right for your application, check out the [Micro Motion® Technical Overview and Specification Summary](#) and other resources available at www.emerson.com/flowmeasurement.

Optimal flow measurement fit for general purpose applications

- Rugged measurement in a compact, drainable design that maximizes process up time
- Low frequency, high sensitivity fit-and-forget meter provides robust measurements even under demanding process conditions
- Multiple line sizes provide an ideal platform for batching, distribution, allocation and intra-plant measurement applications

Industry-leading capabilities that unleash your process potential

- Available with an extensive offering of transmitter and mounting options for maximum compatibility with your system
- State of the art, ISO-IEC 17025 compliant calibration stands achieving $\pm 0.014\%$ uncertainty drive best in class measurement accuracy
- The most robust communication protocol offering in the industry including Smart Wireless
- True multi-variable technology measures necessary flow process variables simultaneously

Widest range of installation and process condition flexibility

- Featuring a low pressure drop, low weight design that reduces installation and commissioning costs
- Unmatched MVD transmitter technology with digital signal processing (DSP) delivers the fastest response rates enabling accurate batch and process measurement

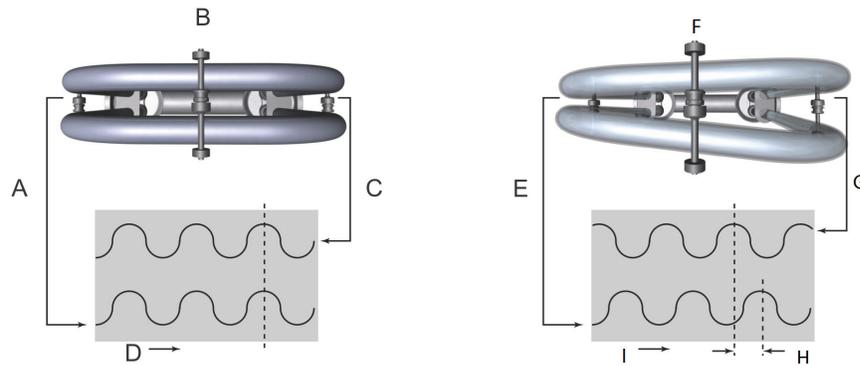
Measurement principles

As a practical application of the Coriolis effect, the Coriolis mass flow meter operating principle involves inducing a vibration of the flow tube through which the fluid passes. The vibration, though it is not completely circular, provides the rotating reference frame which gives rise to the Coriolis effect. While specific methods vary according to the design of the flow meter, sensors monitor and analyze changes in frequency, phase shift, and amplitude of the vibrating flow tubes. The changes observed represent the mass flow rate and density of the fluid.

Mass flow measurement

The measuring tubes are forced to oscillate producing a sine wave. At zero flow, the two tubes vibrate in phase with each other. When flow is introduced, the Coriolis forces cause the tubes to twist resulting in a phase shift. The time difference between the waves is measured and is directly proportional to the mass flow rate.

Watch this video to learn more about how a Coriolis flow meter measures mass flow and density (click the link and select **View Videos**): <https://www.emerson.com/en-us/automation/measurement-instrumentation/flow-measurement/coriolis-flow-meters>.



- A. Inlet pickoff displacement
- B. No flow
- C. Outlet pickoff displacement
- D. Time
- E. Inlet pickoff displacement
- F. With flow
- G. Outlet pickoff displacement
- H. Time difference
- I. Time

Temperature measurement

Temperature is a measured variable that is available as an output. The temperature is also used internal to the sensor to compensate for temperature influences on Young's Modulus of Elasticity.

Meter characteristics

- Measurement accuracy is a function of fluid mass flow rate independent of operating temperature, pressure, or composition. However, pressure drop through the sensor is dependent upon operating temperature, pressure, and fluid composition.
- Specifications and capabilities vary by model and certain models may have fewer available options. For detailed information regarding performance and capabilities, contact customer service.
- The letter at the end of the base model code (for example R100S) represents wetted part material and/or application designation: S = stainless steel and P = high pressure. Detailed information about the complete product model codes are described later in this document.

Performance specifications

Reference operating conditions

For determining the performance capabilities of our meters, the following conditions were observed/utilized:

- Water at 68 °F (20.0 °C) to 77 °F (25.0 °C) and 14.5 psig (1.000 barg) to 29 psig (2.00 barg)
- Air and Natural Gas at 68 °F (20.0 °C) to 77 °F (25.0 °C) and 500 psig (34.47 barg) - 1,450 psig (99.97 barg)
- Accuracy based on industry leading accredited calibration stands according to ISO 17025/IEC 17025
- All models have a density range up to 5 g/cm³ (5000 kg/m³)

Accuracy and repeatability

Accuracy and repeatability on liquids and slurries

Performance Specification	Calibration code Y	Calibration code A
Mass flow accuracy ⁽¹⁾	±0.5% of rate	±0.4% of rate
Volume flow accuracy ⁽¹⁾	±0.5% of rate ⁽²⁾	±0.4% of rate
Mass flow repeatability	0.25% of rate	0.2% of rate
Volume flow repeatability	0.25% of rate	0.2% of rate
Density accuracy	±0.01 g/cm ³ (±10 kg/m ³)	±0.003 g/cm ³ (±3 kg/m ³)
Density repeatability	0.005 g/cm ³ (5 kg/m ³)	0.0015 g/cm ³ (1.5 kg/m ³)
Temperature accuracy	±1 °C ±0.5% of reading	
Temperature repeatability	32.36 °F (0.200 °C)	

(1) Stated flow accuracy includes the combined effects of repeatability, linearity, and hysteresis.

(2) Valid at calibration conditions.

Accuracy and repeatability on gases

Performance specification	All models
Mass flow accuracy ⁽¹⁾	±0.75% of rate
Mass flow repeatability ⁽¹⁾	0.5% of rate
Temperature accuracy	±1 °C 0.5% of reading
Temperature repeatability	32.36 °F (0.200 °C)

(1) Stated flow accuracy includes the combined effects of repeatability, linearity, and hysteresis.

Liquid flow rates

Nominal flow rate

Micro Motion has adopted the term nominal flow rate, which is the flow rate at which water at reference conditions causes approximately 14.5 psig (1.000 barg) of pressure drop across the meter.

Mass flow rates for all models: 316L stainless steel (S) and high pressure (P)

Model	Nominal line size		Nominal flow rate		Maximum flow rate	
	inch	mm	lb/min	kg/h	lb/min	kg/h
R025	0.25	DN6	50	1,366	100	2,720
R050	0.50	DN15	155	4,226	300	8,160
R100	1	DN25	717	19,514	1,200	32,650
R200	2	DN50	1,917	52,160	3,200	87,100

Model	Nominal line size		Nominal flow rate		Maximum flow rate	
	inch	mm	lb/min	kg/h	lb/min	kg/h
R300	3	DN80	4,900	133,356	8,744	238,499

Volume flow rates for all models: 316L stainless steel (S) and high pressure (P)

Model	Nominal flow rate			Maximum flow rate		
	gal/min	barrels/h	l/h	gal/min	barrels/h	l/h
R025	6	9	1,366	12	23	2,720
R050	19	27	4,226	36	69	8,160
R100	85	122	19,514	144	274	32,650
R200	230	328	52,160	384	731	87,100
R300	587	839	133,356	1,047	1,497	238,499

Gas flow rates

When selecting sensors for gas applications, pressure drop through the sensor is dependent upon operating temperature, pressure, and fluid composition. Therefore, when selecting a sensor for any particular gas application, it is highly recommended that you either refer to www.emerson.com/flowmeasurement or contact customer service for more information.

The below table indicates flow rates that produce approximately 25 psig (1.72 barg) pressure drop on natural gas.

Gas flow rates for all models: 316L stainless steel (S) and high pressure (P)

Model	Mass		Volume	
	lb/min	kg/h	SCFM	Nm ³ /h
R025	17	468	388	659
R050	52	1,429	1,183	2,010
R100	200	5,452	4,514	7,670
R200	666	18,137	15,018	25,515
R300	1,745	47,505	39,334	66,829

Note

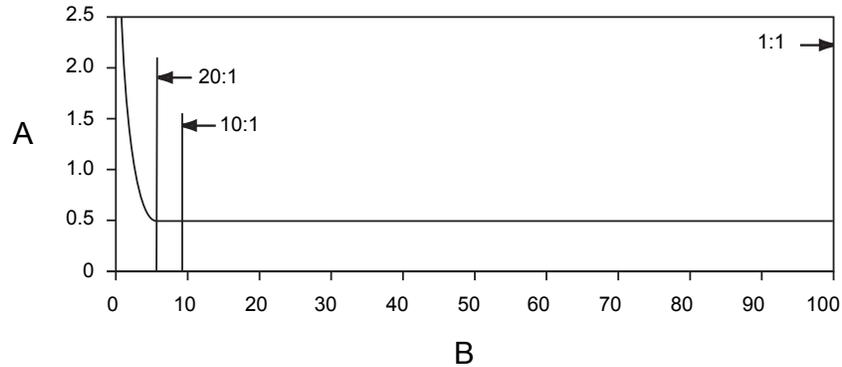
Standard (SCFM) reference conditions are 14.7 psig (1.014 barg) and 60 °F (15.6 °C). Normal reference conditions are 14.69 psig (1.013 barg) and 32.0 °F (0 °C)

Zero stability

Zero stability is used when the flow rate approaches the low end of the flow range where the meter accuracy begins to deviate from the stated accuracy rating, as depicted in the turndown section below. When operating at flow rates where meter accuracy begins to deviate from the stated accuracy rating, accuracy is governed by the formula: accuracy = (zero stability/flow rate) x 100%. Repeatability is similarly affected by low flow conditions.

Turndown capabilities

The graph and table below represent an example of the measurement characteristics under various flow conditions. At flow rates requiring large turndowns (greater than 20:1), the zero stability values may begin to govern capability dependent upon flow conditions and meter in use.



A. Accuracy, %
 B. Flow rate, % of nominal

Turndown from nominal flow rate	20:1	10:1	1:1
Accuracy	±% 0.50	±% 0.50	±% 0.50
Pressure drop	0.1 psig (0.007 barg)	0.813 psig (0.05605 barg)	54.00 psig (3.7232 barg)

Zero stability for all models: 316L stainless steel (S) and high pressure (P)

Model	Zero stability	
	lb/min	kg/h
R025	0.0061	0.165
R050	0.0180	0.492
R100	0.0750	2.046
R200	0.2398	6.540
R300	0.4950	13.472

Process pressure ratings

Sensor maximum working pressure reflects the highest possible pressure rating for a given sensor. Process connection type and environmental and process fluid temperatures may reduce the maximum rating. Refer to the Technical Data Sheet for common sensor and fitting combinations.

All sensors comply with Council Directive 2014/68/EU on pressure equipment.

Note

R-Series sensors with JIS process connections do not comply with ASME B31.1 power piping code.

Sensor maximum working pressure for all models: 316L stainless steel (S) and high pressure (P)

Model	Pressure
All stainless steel models (R025S–R300S)	1,450 psig (100 barg)
R025P	2,300 psig (159 barg)

Case pressure

Case pressure for all models: 316L stainless steel (S) and high pressure (P)

Model	Case maximum pressure ⁽¹⁾	Typical burst pressure
R025	471 psig (32 barg)	1,884 psig (130 barg)
R050	383 psig (26 barg)	1,530 psig (105 barg)
R100	320 psig (22 barg)	1,281 psig (88 barg)
R200	190 psig (13 barg)	760 psig (52 barg)
R300	417 psig (29 barg)	1,668 psig (115 barg)

(1) Case maximum pressure is determined by applying a safety factor of 4 to typical burst pressure.

Operating conditions: Environmental

Vibration limits

Meets IEC 60068-2-6, endurance sweep, 5 to 2000 Hz, 50 sweep cycles at 1.0 g.

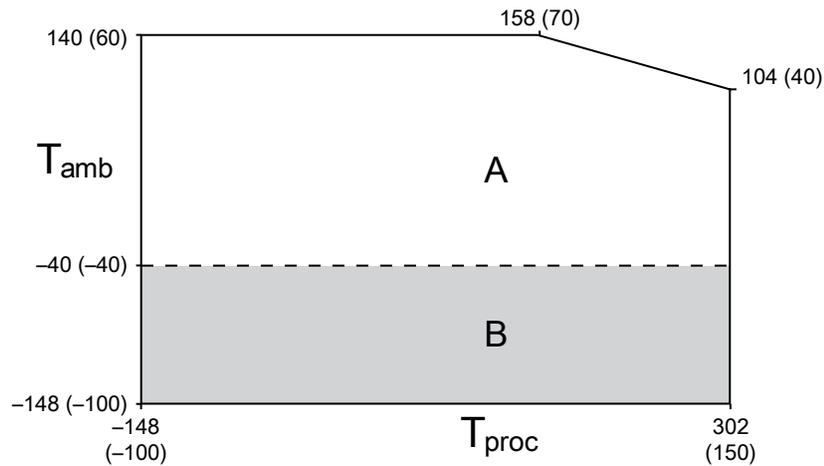
Temperature limits

Sensors can be used in the process and ambient temperature ranges shown in the temperature limit graphs. For the purposes of selecting electronics options, temperature limit graphs should be used only as a general guide. If your process conditions are close to the gray area, consult with your Micro Motion representative.

Note

- In all cases, the electronics cannot be operated where the ambient temperature is below -40 °F (-40.0 °C) or above 140 °F (60.0 °C). If a sensor is to be used where the ambient temperature is outside of the range permissible for the electronics, the electronics must be remotely located where the ambient temperature is within the permissible range, as indicated by the shaded areas of the temperature limit graphs.
- Temperature limits may be further restricted by hazardous area approvals. Refer to the hazardous area approvals documentation shipped with the sensor or available at www.emerson.com/flowmeasurement.
- The extended-mount electronics option allows the sensor case to be insulated without covering the transmitter, core processor, or junction box, but does not affect temperature ratings. When insulating the sensor case at elevated process temperatures (above 140 °F (60.0 °C)), please ensure electronics are not enclosed in insulation as this may lead to electronics failure.

Ambient and process temperature limits for all models: 316L stainless steel (S) and high pressure (P)



T_{amb} = Ambient temperature °F (°C)
 T_{proc} = Process temperature °F (°C)
 A = All available electronic options
 B = Remote mount electronics only

Operating conditions: Process

Process temperature effect

- For mass flow measurement, process temperature effect is defined as the change in sensor flow accuracy due to process temperature change away from the calibration temperature. Temperature effect can be corrected by zeroing at the process conditions.

Process temperature effect for all models: 316L stainless steel (S) and high pressure (P)

Model code	Mass flow rate (% of maximum rate) per °C	Density	
		g/cm ³ per °C	kg/m ³ per °C
R025, R050, R100, R200, R300	±0.00175	±0.0001	±0.1

Process pressure effect

Process pressure effect is defined as the change in sensor flow accuracy due to process pressure change away from the calibration pressure. This effect can be corrected by dynamic pressure input or a fixed meter factor. See installation manual for proper setup and configuration.

Process pressure effect for all models: 316L stainless steel (S) and high pressure (P)

Model code	Liquid or gas flow (% of rate)	Density
R025, R050, R100	none	none
R200	-0.001 per psig (-0.015 per barg)	-0.00003 g/cm ³ per psig (-0.43 kg/m ³ per barg)

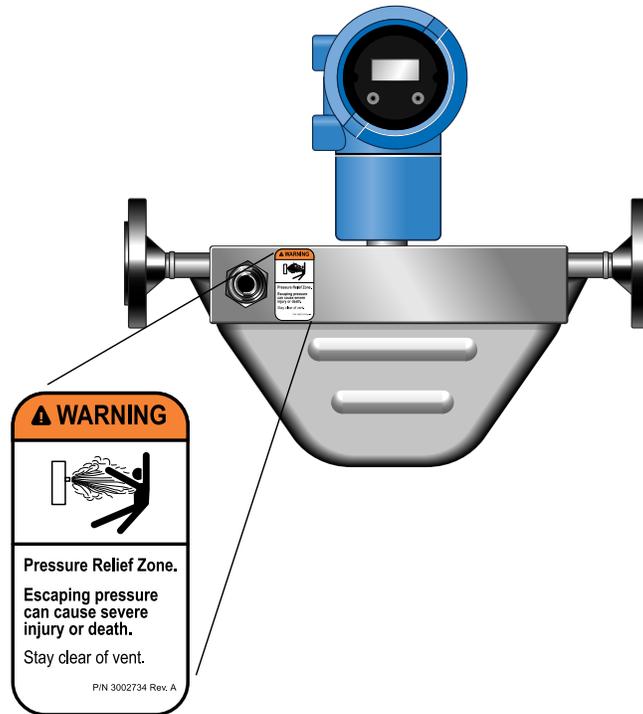
Model code	Liquid or gas flow (% of rate)	Density
R300	-0.001 per psig (-0.015 per barg)	-0.00001 g/cm ³ per psig (-0.145 kg/m ³ per barg)

Pressure relief

R-Series sensors are available with a rupture disk installed on the case. Rupture disks are meant to vent process fluid from the sensor case in the unlikely event of a flow tube breach. Some users connect a pipeline to the rupture disk to help contain escaping process fluid. For more information about rupture disks, contact Micro Motion Customer Service.

If the sensor has a rupture disk, it should remain installed at all times as it would otherwise be necessary to re-purge the case. If the rupture disk is activated by a tube breach, the seal in the rupture disk will be broken, and the Coriolis meter should be removed from service.

The rupture disk is located as follows on the meter, and the warning sticker shown is placed next to it.



! DANGER

Stay clear of the rupture disk pressure relief area. High-pressure fluid escaping from the sensor can cause severe injury or death.

The sensor must be oriented so that personnel and equipment will not be exposed to any discharge along the pressure relief path.

Important

If a rupture disk is used, the housing can no longer assume a secondary containment function.

! WARNING

Removing the Purge Fitting, Blind Plug, or Rupture Disks compromises the Ex-i Safety Certification, the Ex-tc Safety Certification, and the IP-rating of the Coriolis meter. Any modification to the Purge Fitting, Blind Plug, or Rupture Disks must maintain a minimum of IP66/IP67 Ratings.

Hazardous area classifications

Approvals and certifications

Type	Approval or certification (typical)	
CSA and CSA C-US	Ambient temperature: -40 °F (-40.0 °C) to 140 °F (60.0 °C) Class I, Div. 1, Groups C and D Class I, Div. 2, Groups A, B, C, and D Class II, Div.1, Groups E, F, and G	
ATEX		II 1(2) G Ex ib IIB/IIC T6.T1 Ga/Gb II 2 D Ex ib IIIC T* °C Db IP66/IP67
		II 3G Ex nA IIC T1-T4/T5 Gc II 3D Ex tc IIIC T*°C Dc IP66
IECEX	Ex ib IIB/IIC T1-T4/T5/T6 Ga/Gb Ex ib IIIC T* °C Db Ex nA IIC T1-T4/T5 Gc Ex tc IIIC T* °C Dc	
NEPSI	Ex ib IIB/IIC T1-T6 Gb Ex ibD 21 T450°C-T85°C Ex nA IIC T1-T6 Gc DIP A22 T(1) T1-T6	
Ingress Protection Rating	IP 66/67 for sensors and transmitters	
EMC effects	Complies with EMC directive 2004/108/EC per EN 61326 Industrial	
	Complies with NAMUR NE-21 (22.08.2007)	

Note

- Approvals shown are for R-Series meters configured with a model 1700 transmitter. Meters with integral electronics may have more restrictive approvals. Refer to the Product Data Sheet for each transmitter for details.
- When a meter is ordered with hazardous area approvals, detailed information is shipped along with the product.
- More information about hazardous approvals, including detailed specifications and temperature graphs for all meter configurations is available on the R-Series product page from the Emerson web site (www.emerson.com/flowmeasurement).

Industry standards

Type	Standard
Industry standards and commercial approvals	<ul style="list-style-type: none"> ■ NAMUR: NE132 (burst pressure, sensor flange to flange length), NE131 ■ Pressure Equipment Directive (PED) ■ Canadian Registration Number (CRN) ■ Dual Seal ■ ASME B31.3 Piping Code ■ SIL2 and SIL3 safety certifications

Transmitter interface

A Micro Motion flowmeter system is highly customizable to provide a configuration that is tailor-fit to specific applications.

Robust transmitter offerings allow a multitude of mounting options:

- Compact mounting integral to the sensor
- Field mount variants for harsh conditions
- Compact control room DIN rail packages for optimal locating in a control cabinet
- Specific fit-for-purpose solutions for two-wire connectivity or filling and dosing machinery integration

Micro Motion meters are available with an expansive selection of input and output connectivity options including the following:

- 4-20 mA
- HART™
- WirelessHART™
- DeviceNet
- EtherNet/IP
- Profinet
- FOUNDATION™ fieldbus
- Modbus®
- Other protocols may be available on request

Physical specifications

Materials of construction

General corrosion guidelines do not account for cyclical stress, and therefore should not be relied upon when choosing a wetted material for a Micro Motion meter. Please refer to the *Micro Motion Corrosion Guide* for material compatibility information.

Wetted part materials

Model	Material options	Sensor weight
	316L Stainless steel	
R025	R025S and R025P	10 lb (4.5 kg)
R050	R050S	11 lb (5.0 kg)
R100	R100S	21 lb (9.5 kg)
R200	R200S	42 lb (19.1 kg)
R300	R300S	105 lb (47.6 kg)

Note

- Weight specifications are based upon ASME B16.5 CL150 flange and do not include electronics.
- Heat jackets and steam kits are also available.

Non-wetted part materials

Component	Enclosure rating	316L stainless steel	304L stainless steel	Polyurethane-painted aluminum
Sensor housing	—		•	

Component	Enclosure rating	316L stainless steel	304L stainless steel	Polyurethane-painted aluminum
Core processor housing	NEMA 4X (IP66/67)	•		•
Model 1700/2700 transmitter housing	NEMA 4X (IP66/67/69K)	•		•
Model 5700 transmitter housing	NEMA 4X (IP66/67/69K)	•		•

Flanges

Sensor type	Flange types
Stainless steel 316L	<ul style="list-style-type: none"> ■ ASME B16.5 weld neck flange (up to CL600) ■ ASME B16.5 weld neck flange raised face (up to CL600) ■ EN 1092-1 weld neck flange form B1, B2, D (up to PN100), and F ■ JIS B2220 weld neck raised face (up to 20K) ■ VCO, VCR swagelok compatible fitting ■ Hygienic tri-clamp compatible

Note

For flange compatibility, please refer to either www.emerson.com/flowmeasurement or customer service.

Dimensions

These dimensional drawings are intended to provide a basic guideline for sizing and planning. They are representative of a 316 stainless steel model fitted with ASME B16.5 CL150 flange, and 1700 transmitter.

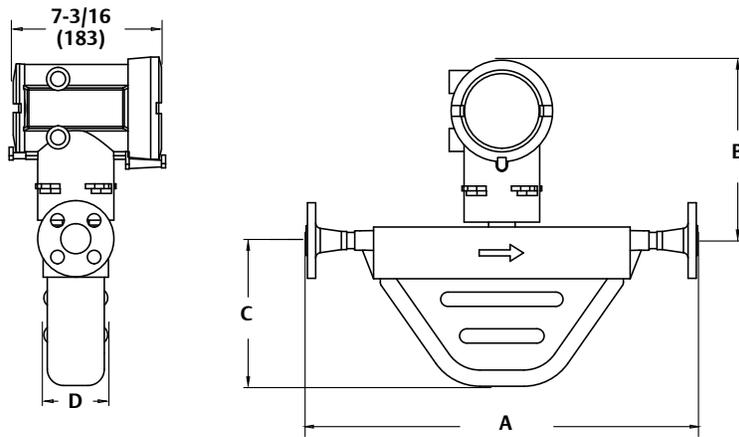
Face-to-Face (Dim. A, below) dimensions for all R-series meters with each available process connection can be found in the R-series Technical Data Sheet.

Complete and detailed dimensional drawings can be found through the product link in www.emerson.com/flowmeasurement.

Note

- All dimensions ±0.12 in (±3.0 mm).
- Representative of a 316 stainless steel model fitted with ASME B16.5 CL150 flange, and 1700 transmitter

Example dimensions for all models: 316L stainless steel (S), and high pressure (P)



Model	Dim. A		Dim. B		Dim. C		Dim. D	
	Inch	mm	Inch	mm	Inch	mm	Inch	mm
R025	16	406	8-3/8	213	5-1/8	130	2-13/16	71
R050	18-1/8	460	8-3/8	213	6-3/4	171	2-15/16	75
R100	22-11/16	576	8-5/8	219	9-1/8	232	4-1/8	105
R200	24-3/4	629	9-9/16	267	12-9/16	319	5-5/8	143
R300	34-11/16	881	9-7/8	250	11-1/8	283	7-5/16	186

Ordering information

Model code structure

A complete sensor model code includes the ordering options.

Example code	Description
R	Sensor type
025	Model – Base model
S	Model type – Base model
113	Process connections
N	Case options
C	Electronics interface
A	Conduit connections
M	Approvals

Example code	Description
E	Languages
Y	Calibration
Z	Future option 1
Z	Measurement application software
Z	Factory options

Base model

Codes available by model

Codes S and P are model designations used to identify the type of meter.

Model	Available codes	
	S ⁽¹⁾	P ⁽²⁾
R025 0.25 in (6.4 mm)	S	P
R050 0.5 in (13 mm)	S	
R100 1 in (25 mm)	S	
R200 2 in (51 mm)	S	
R300 3 in (76 mm)	S	

(1) 316 stainless steel

(2) High pressure

Process connections

Model R025S

Code	Description					
113	1/2-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
114	1/2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face
115	1/2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
116	DN15	PN40	DIN 2635	F316/F316L	Weld neck flange	Form C face
120	DN15	PN100/160	DIN 2638	F316/F316L	Weld neck flange	Form E face
121	1/2-inch		Tri-Clamp compatible	316L	Hygienic fitting	
122	15mm	20K	JIS B 2220	F316/316L	Weld neck flange	Raised face
150	1/2-inch	CL900/1500	ASME B16.5	F316/316L	Weld neck flange	Raised face
170	DN15	PN100/160	EN 1092-1	F316/F316L	Weld neck flange	Type B2

Code	Description					
172	DN25	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
176	DN15	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
178	DN15	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type D
183	DN25	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
221	15mm	40K	JIS B 2220	F316/316L	Weld neck flange	Raised face
222	DN15		DIN11851	316/316L	Hygienic coupling	
310	DN15	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
319	#8		VCO	316/316L	Swagelok compatible fitting	1/2-inch NPT female adapter
A94	1/2-inch	CL150	ASME B16.5	316/316L	Weld neck flange	Raised face 63-125 RA face finish
A95	1/2-inch	CL300	ASME B16.5	316/316L	Weld neck flange	Raised face 63-125 RA face finish
A96	1/2-inch	CL600	ASME B16.5	316/316L	Weld neck flange	Raised face 63-125 RA face finish
A97	1/2-inch	CL900/1500	ASME B16.5	316/316L	Weld neck flange	Raised face 63-125 RA face finish
A99	3/4-inch	CL150	ASME B16.5	316/316L	Weld neck flange	Raised face
B01	3/4-inch	CL300	ASME B16.5	316/316L	Weld neck flange	Raised face
B02	1/2-inch	CL600	ASME B16.5	316/316L	Weld neck flange	Raised face
B03	1/2-inch	CL900/1500	ASME B16.5	316/316L	Weld neck flange	Raised face
B04	1-inch	CL150	ASME B16.5	316/316L	Weld neck flange	Raised face
B05	1-inch	CL300	ASME B16.5	316/316L	Weld neck flange	Raised face
B06	1-inch	CL600	ASME B16.5	316/316L	Weld neck flange	Raised face
B07	1-inch	CL900/1500	ASME B16.5	316/316L	Weld neck flange	Raised face
B09	1/2-inch	CL300	ASME B16.5	316/316L	Weld neck flange	RTJ face
B10	1/2-inch	CL600	ASME B16.5	316/316L	Weld neck flange	RTJ face
B11	1/2-inch	CL900/1500	ASME B16.5	316/316L	Weld neck flange	RTJ face
B77	#8	[blank]	VCR	Swagelok compatible fitting	Weld neck flange	1/2-inch 316 NPT female adapter
B78	#12	[blank]	VCR	Swagelok compatible fitting	Weld neck flange	3/4-inch 316 NPT female adapter
C73	DN15	PN40	EN 1092-1	316/316L	Weld neck flange	Type F

Model R025P

Code	Description					
120	DN15	PN100/160	DIN 2638	F316/F316L	Weld neck flange	Type E face
170	DN15	PN100/160	EN 1092-1	F316/F316L	Weld neck flange	Form B2
178	DN15	PN100	EN 1092-1	F316/F316L	Weld neck flange	Form D
180	DN25	PN100	EN 1092-1	F316/F316L	Weld neck flange	Form B2
319	#8		VCO	316/316L	Swagelok compatible fitting	1/2-inch NPT female adapter

Model R050S

Code	Description					
113	1/2-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
114	1/2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face
115	1/2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
116	DN15	PN40	DIN 2635	F316/F316L	Weld neck flange	Form C face
120	DN15	PN100/160	DIN 2638	F316/F316L	Weld neck flange	Form E face
122	15mm	20K	JIS B 2220	F316/316L	Weld neck flange	Raised face
131	DN25	PN40	DIN 2635	F316/F316L	Weld neck flange	Form C face
150	½-inch	CL900/1500	ASME B16.5	F316/F316L	Weld neck flange	Raised face
170	DN15	PN100/160	EN 1092-1	F316/F316L	Weld neck flange	Type B2
172	DN25	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
176	DN15	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
178	DN15	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type D
183	DN25	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
221	15mm	40K	JIS B 2220	F316/316L	Weld neck flange	Raised face
222	DN15		DIN11851	316/316L	Hygienic coupling	
239	#12		VCO	316/316L	Swagelok compatible fitting	3/4-inch NPT female adapter
310	DN15	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
322	3/4-inch		Tri-Clamp compatible	316L	Hygienic fitting	
A94	1/2-inch	CL150	ASME B16.5	316/316L	Weld neck flange	Raised face 63-125 RA face finish
A95	1/2-inch	CL300	ASME B16.5	316/316L	Weld neck flange	Raised face 63-125 RA face finish
A96	1/2-inch	CL600	ASME B16.5	316/316L	Weld neck flange	Raised face 63-125 RA face finish

Code	Description					
A97	1/2-inch	CL900/1500	ASME B16.5	316/316L	Weld neck flange	Raised face 63-125 RA face finish
A99	3/4-inch	CL150	ASME B16.5	316/316L	Weld neck flange	Raised face
B01	3/4-inch	CL300	ASME B16.5	316/316L	Weld neck flange	Raised face
B02	3/4-inch	CL600	ASME B16.5	316/316L	Weld neck flange	Raised face
B03	3/4-inch	CL900/1500	ASME B16.5	316/316L	Weld neck flange	Raised face
B04	1-inch	CL150	ASME B16.5	316/316L	Weld neck flange	Raised face
B05	1-inch	CL300	ASME B16.5	316/316L	Weld neck flange	Raised face
B06	1-inch	CL600	ASME B16.5	316/316L	Weld neck flange	Raised face
B07	1-inch	CL900/1500	ASME B16.5	316/316L	Weld neck flange	Raised face
B09	1/2-inch	CL300	ASME B16.5	316/316L	Weld neck flange	RTJ face
B10	1/2-inch	CL600	ASME B16.5	316/316L	Weld neck flange	RTJ face
B11	1/2-inch	CL900/1500	ASME B16.5	316/316L	Weld neck flange	RTJ face
B77	#8	[blank]	VCR	316/316L	Swagelok compatible fitting	½-inch 316 NPT female adapter
B78	#12	[blank]	VCR	316/316L	Swagelok compatible fitting	3/4-inch 316 NPT female adapter
C73	DN15	PN40	EN 1092-1	316/316L	Weld neck flange	Type F

Model R100S

Code	Description					
128	1-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
129	1-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face
130	1-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
131	DN25	PN40	DIN 2635	F316/F316L	Weld neck flange	Form C face
137	DN25	PN100/160	DIN 2638	F316/F316L	Weld neck flange	Form E face
138	1-inch		Tri-Clamp compatible	316L	Hygienic fitting	
139	25mm	20K	JIS B 2220	F316/F316L	Weld neck flange	Raised face
179	DN25	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
180	DN25	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type B2
181	DN25	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type D
209	2-inch	CL150	ASME B16.5	F316/316L	Weld neck flange	Raised face

Code	Description					
229	25mm	40K	JIS B 2220	F316/F316L	Weld neck flange	Raised face
230	DN25		DIN11851	316/316L	Hygienic coupling	
311	DN25	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
928	1-inch	CL900/1500	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B14	1-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 RA face finish
B15	1-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 RA face finish
B16	1-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B17	1 1/2-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B18	1 1/2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B19	1 1/2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B20	1 1/2-inch	CL900/1500	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B21	2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B22	2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B23	2-inch	CL900/1500	ASME B16.5	F316/F316L	Weld neck flange	Raised face
B24	1-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
B25	1-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
B26	1 1/2-inch	CL900/1500	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
B81	#16	[blank]	VCO	F316/F316L	Swagelok compatible fitting	1-inch NPT female adapter
B82	#16	[blank]	VCO	F316/F316L	Swagelok compatible fitting	1-inch NPT female adapter
C74	DN25	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type F

Model R200S

Code	Description					
312	DN40	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
316	DN50	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
341	1-1/2-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
342	1-1/2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face

Code	Description					
343	1-1/2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
351	1-1/2-inch		Tri-Clamp compatible	316L	Hygienic fitting	
352	2-inch		Tri-Clamp compatible	316L	Hygienic fitting	
353	DN40		DIN11851	316/316L	Hygienic coupling	
363	DN40	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type B2
365	DN50	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type B2
366	DN40	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type D
367	DN50	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type D
368	DN40	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
369	DN50	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
378	DN50	PN100	DIN 2637	F316/F316L	Weld neck flange	Form E face
381	DN40	PN40	DIN 2635	F316/F316L	Weld neck flange	Form C face
382	DN50	PN40	DIN 2635	F316/F316L	Weld neck flange	Form C face
385	40mm	10K	JIS B 2220	F316/F316L	Weld neck flange	Raised face
386	50mm	10K	JIS B 2220	F316/316L	Weld neck flange	Raised face
387	40mm	20K	JIS B 2220	F316/F316L	Weld neck flange	Raised face
388	50mm	20K	JIS B 2220	F316/316L	Weld neck flange	Raised face
418	2-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
419	2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face
420	2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
A31	1 1/2-inch	CL900/1500	ASME B16.5	F316/F316L	Weld neck flange	Raised face
A32	1 1/2-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A33	1 1/2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A34	1 1/2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A35	2-inch	CL900/1500	ASME B16.5	F316/F316L	Weld neck flange	Raised face
A36	3-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
A37	3-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face

Code	Description					
A38	3-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
A39	2-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A40	2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A41	2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A42	2-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A43	2-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A44	2-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A45	2-inch	CL900/1500	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
B55	2-inch	CL600	ASME B16.5	A105 Carbon Steel	Lap joint flange	316/316L stub
B85	50mm	10K	JIS B 2220	A105 Carbon Steel	Lap joint flange	316/316L stub
B86	50mm	20K	JIS B 2220	A105 Carbon Steel	Lap joint flange	316/316L stub
C75	DN40	PN40	EN1092-1	F316/F316L	Weld neck flange	Type F
C76	DN50	PN40	EN1092-1	F316/F316L	Weld neck flange	Type F

Model R300S

Code	Description					
326	DN80	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
333	DN100	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type D
355	3-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
356	3-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face
357	3-inch	CL600	ASME B16.5	316L	Weld neck flange	Raised face
358	3-inch	CL900	ASME B16.5	316L	Weld neck flange	Raised face
359	DN100	PN100	EN 1092-1	316/316L	Weld neck flange	Type D
361	3-inch	[blank]	Tri-Clamp compatible	F316L	Hygienic fitting	[blank]
371	DN80	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
372	DN100	PN40	EN 1092-1	F316/F316L	Weld neck flange	Type B1
373	DN80	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type B2
374	DN100	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type B2

Code	Description					
375	DN80	PN100	EN 1092-1	F316/F316L	Weld neck flange	Type D
391	DN80	PN40	DIN 2635	F316/F316L	Weld neck flange	Form C face
392	DN100	PN40	DIN 2635	F316/F316L	Weld neck flange	Form C face
393	DN80	PN40	DIN 2635	F316/F316L	Weld neck flange	Form N grooved face
394	DN100	PN40	DIN 2635	F316/F316L	Weld neck flange	Form N grooved face
395	DN80	PN100	DIN 2637	F316/316L	Weld neck flange	Form E face
396	DN100	PN100	DIN 2637	F316/F316L	Weld neck flange	Form E face
397	DN80	PN100	DIN 2637	F316/316L	Weld neck flange	Form N grooved face
398	DN100	PN100	DIN 2637	F316/F316L	Weld neck flange	Form N grooved face
400	80mm	10K	JIS B 2220	F316/F316L	Weld neck flange	Raised face
401	100mm	10K	JIS B 2220	F316/F316L	Weld neck flange	Raised face
402	80mm	20K	JIS B 2220	F316/F316L	Weld neck flange	Raised face
410	3-inch	[blank]	Victaulic compatible	F316L	Hygienic coupling	[blank]
425	4-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face
426	4-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face
427	4-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face
428	4-inch	CL900	ASME B16.5	F316/F316L	Weld neck flange	Raised face
A47	3-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A48	3-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A49	3-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A50	3-inch	CL900	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A52	4-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A53	4-inch	CL900	ASME B16.5	F316/F316L	Weld neck flange	Raised face 63-125 Ra face finish
A54	3-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A55	3-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A56	3-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A57	3-inch	CL900	ASME B16.5	F316/F316L	Weld neck flange	RTJ face

Code	Description					
A58	4-inch	CL150	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A59	4-inch	CL300	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A60	4-inch	CL600	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
A61	4-inch	CL900	ASME B16.5	F316/F316L	Weld neck flange	RTJ face
B59	3-inch	CL300	ASME B16.5	A105 Carbon Steel	Lap joint flange	316/316L stub
B60	3-inch	CL600	ASME B16.5	A105 Carbon Steel	Lap joint flange	316/316L stub
B87	100mm	10K	JIS B 2220	A105 Carbon Steel	Lap joint flange	316/316L stub
B88	100mm	10K	JIS B 2220	A105 Carbon Steel	Lap joint flange	316/316L stub
C77	DN80	PN40	EN1092-1	F316/F316L	Weld neck flange	Type F

Case options

Code	Case option
N	Standard case
D ⁽¹⁾	Standard case with rupture disk (1/2-inch NPT male)
p ⁽¹⁾	Standard case with purge fittings (1/2-inch NPT female)

(1) Not available with approval T, S, or J.

Electronics interface

Code	Description
2	4-wire polyurethane-painted aluminum integral enhanced core processor for remote mount transmitters
3	4-wire stainless steel integral enhanced core processor for remote mount transmitters
4	4-wire extended polyurethane-painted aluminum integral enhanced core processor for remote mount transmitters
5	4-wire extended stainless steel integral enhanced core processor for remote mount transmitters
6 ⁽¹⁾	MVD Solo; polyurethane-painted aluminum integral enhanced core processor (for OEMs)
7 ⁽¹⁾	MVD Solo; stainless steel integral enhanced core processor (for OEMs)
8 ⁽¹⁾	MVD Solo; extended mount polyurethane-painted aluminum integral enhanced core processor (for OEMs)
9 ⁽¹⁾	MVD Solo; extended mount stainless steel integral enhanced core processor (for OEMs)
Q	4-wire epoxy-painted aluminum integral core processor for remotely mounted transmitter with MVD technology

Code	Description
A	4-wire stainless steel integral core processor for remotely mounted transmitter with MVD technology
V	4-wire epoxy-painted aluminum integral core processor with extended mount for remotely mounted transmitter with MVD technology
B	4-wire stainless steel integral core processor with extended mount for remotely mounted transmitter with MVD technology
C	Integrally mounted Model 1700 or 2700 transmitter.
W ⁽¹⁾	MVD Solo; epoxy-painted aluminum integral core processor for direct host connection (for (OEMs)
D ⁽¹⁾	MVD Solo; stainless steel integral core processor for direct host connection (for (OEMs)
Y ⁽¹⁾	MVD Solo; extended-mount epoxy-painted aluminum integral core processor (for (OEMs)
E ⁽¹⁾	MVD Solo; extended-mount stainless steel integral core processor for (OEMs)

(1) When electronics interface code 6, 7, 8, 9, W, D, Y, or E is ordered with approval code C, A, or Z, MVD Direct Connect™ I.S. barrier is supplied.

Conduit connections

Code descriptions

Code	Description
A	No gland
B	0.5 in (13 mm) NPT - no gland
E	M20 - no gland
F	Brass/nickel cable gland (cable diameter 0.335 to 0.394 inches [8.5 to 10 mm])
G	Stainless steel cable gland (cable diameter 0.335 to 0.394 inches [8.5 to 10 mm])
K	JIS B0202 1/2G - no gland
L	Japan - brass nickel cable gland
M	Japan - stainless steel gland

Codes available by model

Model	Available codes							
	M	L	K	G	F	E	B	A
All models with electronics interface codes 2, 3, 4, 5, Q, A, V, and B	M	L	K	G	F	E	B	
All models with electronics interface code C								A
All models with electronics interface codes 6, 7, 8, 9, W, D, Y, and E				G	F	E	B	

Approvals

Code descriptions

Code	Description
M	Micro Motion Standard (no approval)
N	Micro Motion Standard / PED compliant
C	CSA (Canada only)
A	CSA (US and Canada): Class I, Division 1, Groups C and D
Z	ATEX - Equipment Category 2 (Zone 1) / PED compliant
I	IECEx Zone 1
P	NEPSI; only available with language option M (Chinese)
T	TIIS - T4 Temperature Classification (Not available for quotes outside of Japan) N/C
S	TIIS - T3 Temperature Classification (Not available for quotes outside of Japan)
L	TIIS - T2 Temperature Classification (Not available for quotes outside of Japan)
J	Hardware ready for TIIS approval (EPM Japan only)

Codes available by model

Model	Available codes										
	J	S	T	P	I	Z	A	C	N	M	
With electronics interface codes 2, 3, 4, 5, Q, A, V, B, and C	J	S	T	P	I	Z	A	C	N	M	
Note T, S, L, and J approval codes are not available with electronics interface codes 2, 3, 4, and 5.											
With electronics interface codes 6, 7, 8, 9, W, D, Y, and E				P		Z	A	C	N	M	

Languages

A	Danish CE requirements document and English installation manual
C	Czech installation manual
D	Dutch CE requirements document and English installation manual
E	English installation manual
F	French installation manual
G	German installation manual
H	Finnish CE requirements document and English installation manual
I	Italian installation manual

J	Japanese installation manual
M	Chinese installation manual
N	Norwegian CE requirements document and English installation manual
O	Polish installation manual
P	Portuguese installation manual
S	Spanish installation manual
W	Swedish CE requirements document and English installation manual
B	Hungarian CE requirements document and English installation manual
K	Slovak CE requirements document and English installation manual
T	Estonian CE requirements document and English installation manual
U	Greek CE requirements document and English installation manual
L	Latvian CE requirements document and English installation manual
V	Lithuanian CE requirements document and English installation manual
Y	Slovenian CE requirements document and English installation manual

Calibration

Code	Calibration option
Y	0.5% mass flow and 0.01 g/cm ³ (10 kg/m ³) density calibration (±0.5% volume flow)
A	0.4% mass flow and 0.003 g/cm ³ (3.0 kg/m ³) density calibration (±0.5% volume flow)
Z	0.5% mass flow calibration

Future option 1

Code	Future option 1
Z	Reserved for future use

Measurement application software

Code	Measurement application software option
Z	No measurement application software

Factory options

Code	Factory option
Z	Standard product
X	ETO product
R	Restocked product (if available)

Certificates, tests, calibrations, and services

These option codes can be added to the end of the model code if needed, but no code is required when none of these options is selected.

Note

There may be additional options or limitations depending on total meter configuration. Contact a sales representative before making your final selections.

Material quality examination tests and certificates

Select any from this group.

Code	Factory option
MC	Material inspection certificate 3.1 (supplier lot traceability per EN 10204)
NC	NACE certificate 2.1 (MR0175 and MR0103)
KH	<p>KHK package 3.1 — certificate package to accommodate approval in Japan. Includes:</p> <ul style="list-style-type: none"> ■ Radiographic and tube wall examination ■ HSB witness primary containment hydrostatic and pneumatic testing ■ Material inspection certificate <p>Not available with optional feature codes RE, RT, HT, MC (because they are already included)</p>

Radiographic testing

Select only one from this group.

Code	Factory option
RE	X-ray package 3.1 (radiographic examination certificate; weld map; radiographic inspection NDE qualification)
RT	X-Ray package 3.1 (radiographic examination certificate with digital image; weld map; radiographic inspection NDE qualification)

Pressure testing

Code	Factory option
HT	Hydrostatic test certificate 3.1 (wetted components only)

Dye penetrant examination

Select any from this group.

Code	Factory option
D1	Dye penetrant test package 3.1 (Liquid Dye Penetration NDE Qualification): <ul style="list-style-type: none"> ■ Process connection only for R300 sensors ■ Sensor only for all other sensor models

Weld examination

Code	Factory option
WP	Weld procedure package (weld map, weld procedure specification, weld procedure qualification record, welder performance qualification)

Positive material testing

Select only one from this group.

Code	Factory option
PM	Positive material test certificate 3.1 (without carbon content)
PC	Positive material test certificate 3.1 (including carbon content)

ASME B31.1 Compliance options

Code	Factory option
GC	B31.1 General compliance (not available with JIS flange options)

Special cleaning

Code	Factory option
O2	Declaration of compliance oxygen service 2.1

Metrology compliance

Code	Factory option
GR	Russian metrology calibration verification certificate

Sensor completion

Select any from this group.

Code	Factory option
WG	Witness general
SP	Special packaging

Country specific approvals

Select one from the following if approval code G is selected.

Code	Factory option
R1	EAC Zone 1 – Hazardous Approval ⁽¹⁾
B1	INMETRO Zone 1 – Hazardous Approval ⁽¹⁾

(1) Only available with approval code G.

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