

# Multivariable Mass Vortex Flow Meter

## FEATURES

- Mass and volumetric flow measurement of gas, liquid, and steam
- Multivariable outputs for five process parameters:
  - Mass flow rate
  - Volumetric flow rate
  - Temperature
  - Pressure
  - Density
- Single process connection
- In-line (1/2 inch to 8 inch) and insertion (into pipes > 2 inch) configurations
- Field-configurable ranges, alarms, outputs and displays
- Field configurable via six push buttons or magnet through explosion-proof window
- Smart DSP electronics extends low flow range down to a Reynolds number of 5000
- Rangeability up to 30:1
- Temperature -330°F (-200°C) up to 750°F (400°C)
- Cryogenic version measures liquid O<sub>2</sub>, N<sub>2</sub>, Ar, and CO<sub>2</sub> down to -330°F (-200°C)
- Pressure up to 1500 psia (100 bara)
- High pressure version to 5000 psig (345 barg)
- Ideal for steam applications
- Flow computer integrates AGA-8 equations for natural gas
- Supports HART, Modbus and BACnet digital communication protocols
- FMC and ATEX approval



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# InnovaMass<sup>®</sup> 240 & 241



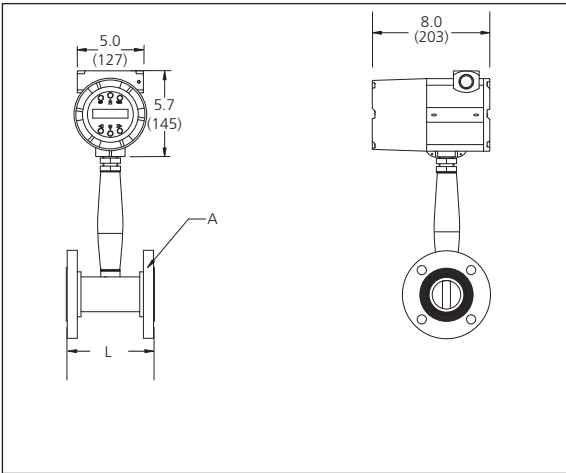
## DESCRIPTION

**S**ierra was the first to introduce a multivariable mass vortex flow meter to the market in the late 1990's. Sierra's multivariable product line features an in-line version, the InnovaMass<sup>®</sup> 240 and a unique insertion version, the InnovaMass<sup>®</sup> 241. The 241 has emerged recently as the proven instrument of choice in geothermal steam applications across the globe. Both the 240 and 241 measure the mass flow rate of any gas or liquid and are ideally suited for saturated or superheated steam. The InnovaMass offers customers one instrument and one process connection, measuring five process parameters simultaneously: mass flow rate, temperature, pressure, volumetric flow rate, and fluid density.

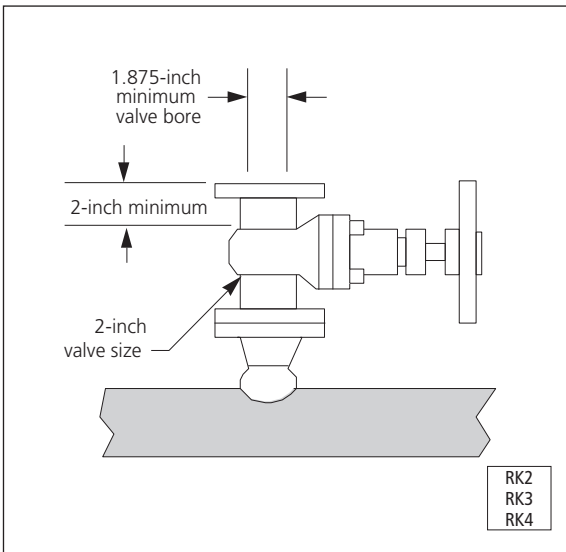
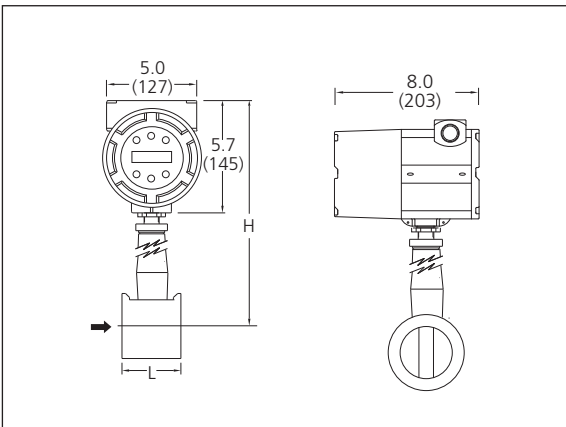
The 241 is available in high-pressure versions capable of mass flow measurement up to 5000 psig (345 barg), and the 240 cryogenic version is widely used for fluids down to -330°F (-200°C). All models are fully field-programmable, configurable and feature RS-485, Modbus, HART and BACnet protocols. InnovaMass is a true high performance, rugged, and reliable workhorse in industry.

## DIMENSIONAL SPECIFICATIONS

240 Flanged In-line—Side / Outlet View



240 Wafer — Side / Outlet View



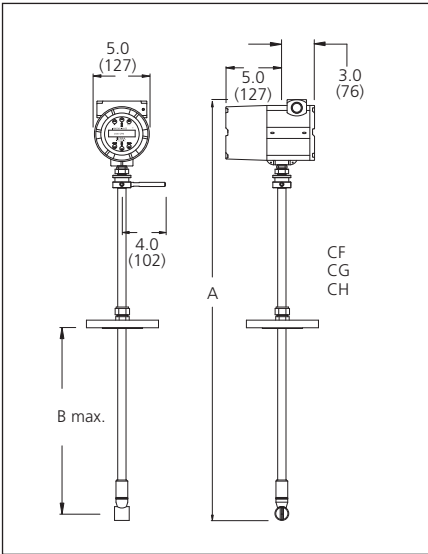
## IN-LINE TABLE

InnovaFlo® 240 Sizes			
Flow Body Size	A	L	H
<b>0.5-inch SCH 80</b>	150 lb flange	4.56 (116)	14.8 (376)
	300 lb flange	4.56 (116)	14.8 (376)
	600 lb flange	4.56 (116)	14.8 (376)
	1.4 flange wafer O.D.	4.56 (116)	14.8 (376)
<b>0.75-inch SCH 80</b>	150 lb flange	4.8 (122)	14.8 (376)
	300 lb flange	4.8 (122)	15.0 (381)
	600 lb flange	4.8 (122)	15.0 (381)
	1.7 flange wafer O.D.	4.8 (122)	15.0 (381)
<b>1-inch SCH 80</b>	150 lb flange	4.94 (125)	15.0 (381)
	300 lb flange	4.94 (125)	15.0 (381)
	600 lb flange	4.94 (125)	15.0 (381)
	2.0 flange wafer O.D.	2.8 (71)	14.8 (376)
<b>1.5-inch SCH 80</b>	150 lb flange	5.5 (140)	15.1 (384)
	300 lb flange	5.5 (140)	15.1 (384)
	600 lb flange	5.5 (140)	15.1 (384)
	2.9 flange wafer O.D.	2.8 (71)	15.1 (384)
<b>2-inch SCH 80</b>	150 lb flange	6.0 (152)	15.3 (389)
	300 lb flange	6.0 (152)	15.3 (389)
	600 lb flange	6.0 (152)	15.3 (389)
	3.7 flange wafer O.D.	3.0 (76)	15.3 (389)
<b>3-inch SCH 80</b>	150 lb flange	6.9 (175)	15.8 (401)
	300 lb flange	6.9 (175)	15.8 (401)
	600 lb flange	6.9 (175)	15.8 (401)
	5.0 flange wafer O.D.	4.0 (102)	15.8 (401)
<b>4-inch SCH 80</b>	150 lb flange	8.0 (203)	16.2 (411)
	300 lb flange	8.0 (203)	16.2 (411)
	600 lb flange	8.0 (203)	16.2 (411)
	6.2 flange wafer O.D.	4.7 (119)	16.2 (411)
<b>6-inch SCH 80</b>	150 lb flange	9.0 (229)	17.3 (439)
	300 lb flange	9.0 (229)	17.3 (439)
	600 lb flange	9.0 (229)	17.3 (439)
<b>8-inch SCH 80</b>	150 lb flange	10.5 (267)	18.2 (462)
	300 lb flange	10.5 (267)	18.2 (462)
	600 lb flange	10.5 (267)	18.2 (462)

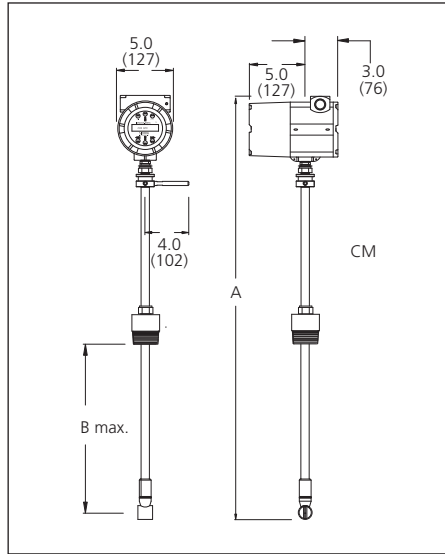
All dimensions are inches (+/- .25-inch significant value). Millimeters are in parentheses. Certified drawings are available on request.

Notes: (1) Can be used with removable retractor.  
(2) Retractor is permanently mounted to meter.

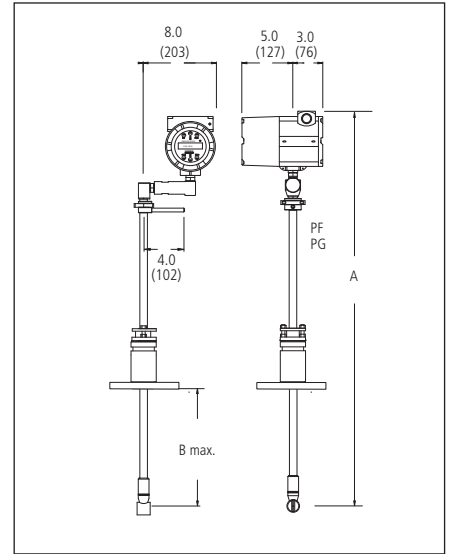
241 Compression, Flange



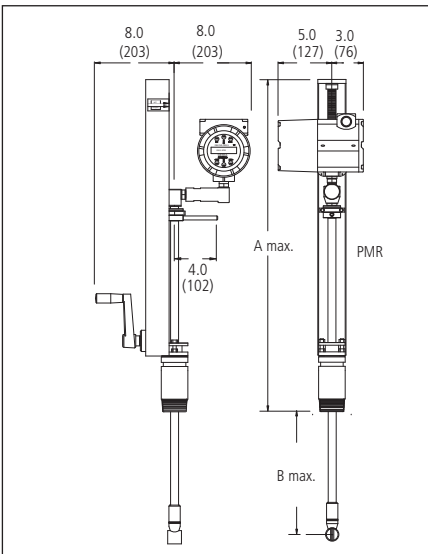
241 Compression, Male NPT



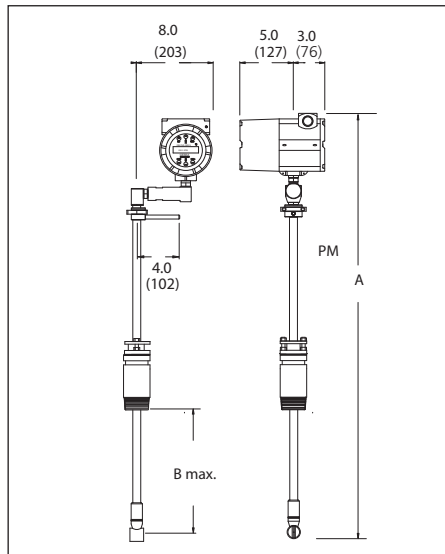
241 Packing Gland, Flange



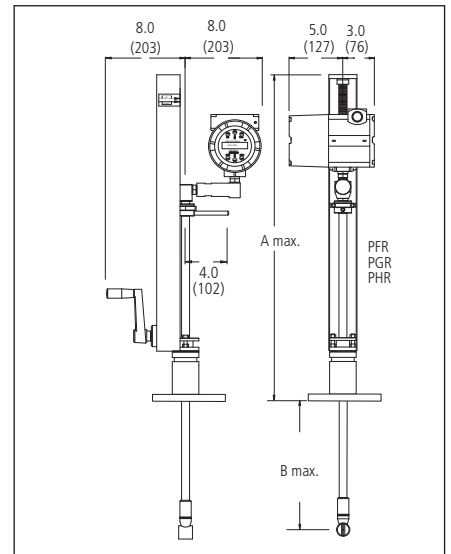
241 Packing Gland, Male NPT, Retractor



241 Packing Gland, Male NPT



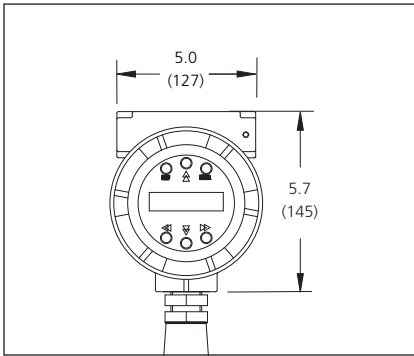
241 Packing Gland, Flange, Retractor



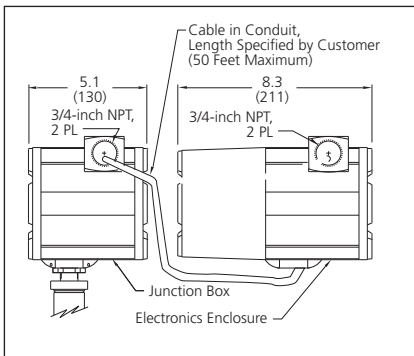
InnovaMass® 241 Sizes

Model Code / Probe Seal / Process Connection	Standard Probe		Compact Probe		Extended Probe	
	A	B	A	B	A	B
CM / Compression / 2-in Male NPT	41.0 (1041)	26.2 (665)	24.6 (625)	9.8 (249)	53.0 (1346)	38.2 (970)
CF / Compression / 150 lb Flange	41.0 (1041)	27.3 (693)	24.6 (625)	10.9 (277)	53.0 (1346)	39.3 (998)
CG / Compression / 300 lb Flange	41.0 (1041)	27.2 (691)	24.6 (625)	10.8 (274)	53.0 (1346)	39.2 (996)
CH / Compression / 600 lb Flange	41.0 (1041)	26.8 (681)	24.6 (625)	10.4 (264)	53.0 (1346)	38.8 (986)
PM / Packing Gland / 2-in Male NPT	40.5 (1029)	21.5 (546)	N / A	N / A	53.0 (1346)	33.5 (851)
PMR / Packing Gland / 2-in Male NPT with Retractor	40.5 (1029)	21.5 (546)	N / A	N / A	53.0 (1346)	33.5 (851)
PF / Packing Gland / 150 lb Flange	40.5 (1029)	21.1 (536)	N / A	N / A	53.0 (1346)	33.1 (841)
PFR / Packing Gland / 150 lb Flange with Retractor	40.5 (1029)	21.1 (536)	N / A	N / A	53.0 (1346)	33.1 (841)
PG / Packing Gland / 300 lb Flange	40.5 (1029)	21.1 (536)	N / A	N / A	53.0 (1346)	33.1 (841)
PGR / Packing Gland / 300 lb Flange w/ Retractor	40.5 (1029)	21.1 (536)	N / A	N / A	53.0 (1346)	33.1 (841)
PHR / Packing Gland / 600 lb flange w/ Retractor	40.5 (1029)	21.1 (536)	N / A	N / A	53.0 (1346)	33.1 (841)

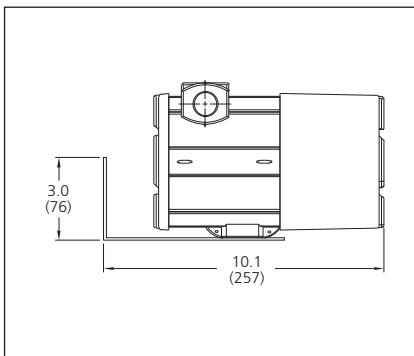
240/241 Remote—Front View



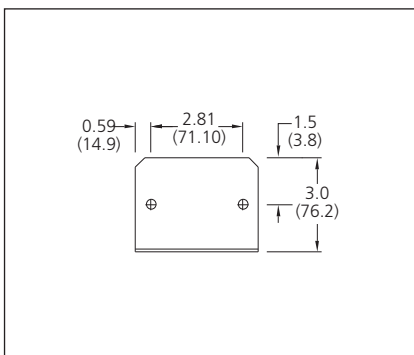
240/241 Remote—Side View



Remote Rear Bracket Mounted Electronics



Mounting Holes for Remote Rear Bracket



**Straight Pipe Length Requirements (in number of internal diameters, D)**

	Upstream	Downstream
One 90° elbow before meter	10 D	5 D
Two 90° elbows before meter	15 D	5 D
Two 90° elbows before meter out of plane (If three 90° bends present, double recommend length)	25 D	10 D
Reduction before meter	10 D	5 D
Expansion before meter	20 D	5 D
Regulator or valve partially closed before meter (If valve wide open, base length requirements on fitting directly preceding it.)	25 D	10 D

Weight

**240 In-Line Meter**

Connection Size	ANSI 150 lb		ANSI 300 lb		ANSI 600 lb	
	lb	kg	lb	kg	lb	kg
0.5-inch Flange	12.0	5.5	12.5	5.7	13	5.9
0.75-inch Flange	13.0	5.9	14	6.4	14.5	6.6
1-inch Flange	13.5	6.1	16.4	7.4	16.4	7.4
1.5-inch Flange	14.6	6.6	22.7	10.3	24.8	11.2
2-inch Flange	19.5	8.8	26.9	12.2	33.2	15.1
3-inch Flange	27.5	12.5	39.5	17.9	56.3	25.5
4-inch Flange	43.5	19.7	60.5	27.4	96.2	43.6
6-inch Flange	48.4	22.0	96.2	43.6	178	80.8
8-inch Flange	71.0	32.2	149	67.4	300	136
1-inch Wafer	—	—	—	—	10.1	4.6
1.5-inch Wafer	—	—	—	—	11.8	5.4
2-inch Wafer	—	—	—	—	14.2	6.4
3-inch Flange	—	—	—	—	22.7	10.3
4-inch Flange	—	—	—	—	33.0	15.0

**241 Insertion Meter**

Connection Size	lb	kg
Compression Fitting, Male NPT	13.8	6.2
Compression Fitting, 150 lb Flange	16.3	7.3
Compression Fitting, 300 lb Flange	18.3	8.3
Compression Fitting, 600 lb Flange	19.3	8.7
Packing Gland, Male NPT	15.8	7.1
Packing Gland, Male NPT with Reactor	25.3	11.5
Packing Gland, 150 lb Flange	20.8	9.4
Packing Gland, 150 lb Flange with Reactor	30.3	13.7
Packing Gland, 300 lb Flange	24.8	11.3
Packing Gland, 300 lb Flange with Reactor	34.3	15.5
Packing Gland, 600 lb Flange with Reactor	35.3	16.0

All dimensions are inches (+/- .25-inch significant value). Millimeters are in parentheses. Certified drawings are available on request.

Accuracy

240 In-Line Meter				
Process Variables	240 Series In-Line Meters		241 Insertion Meters <sup>(1)</sup>	
	Liquids	Gas and Steam	Liquids	Gas and Steam
Mass Flow Rate	+/- 1.0% of rate over a 30:1 range <sup>(3)</sup>	+/- 1.5% of rate <sup>(2)</sup> over a 30:1 range <sup>(3)</sup>	+/- 1.0% of rate over a 30:1 range <sup>(3)</sup>	+/- 2.0% of rate <sup>(2)</sup> over a 30:1 range <sup>(3)</sup>
Volumetric Flow Rate	+/- 0.7% of rate over a 30:1 range <sup>(3)</sup>	+/- 1.0% of rate over a 30:1 range <sup>(3)</sup>	+/- 1.2% of rate over a 30:1 range <sup>(3)</sup>	+/- 1.5% of rate over a 30:1 range <sup>(3)</sup>
Temperature	+/- 2°F (+/- 1°C)	+/- 2°F (+/- 1°C)	+/- 2°F (+/- 1°C)	+/- 2°F (+/- 1°C)
Pressure	0.4% of transducer full scale	0.4% of transducer full scale	0.4% of transducer full scale	0.4% of transducer full scale
Density	0.3% of reading	0.5% of reading <sup>(2)</sup>	0.3% of reading	0.5% of reading <sup>(2)</sup>

Notes: (1) Accuracies stated are for the total mass flow through the pipe. (2) Over 50 to 100% of the pressure transducer's full scale. (3) Nominal rangeability is stated. Precise rangeability depends on fluid and pipe size.

Repeatability

- Mass Flow Rate . . . +/- 0.2% of reading
- Volumetric Flow Rate +/- 0.1% of reading
- Temperature. . . . . +/- 0.2° F (+/- 0.1° C)
- Pressure . . . . . +/- 0.05% of full scale
- Density. . . . . +/- 0.1% of reading

Stability Over 12 Months

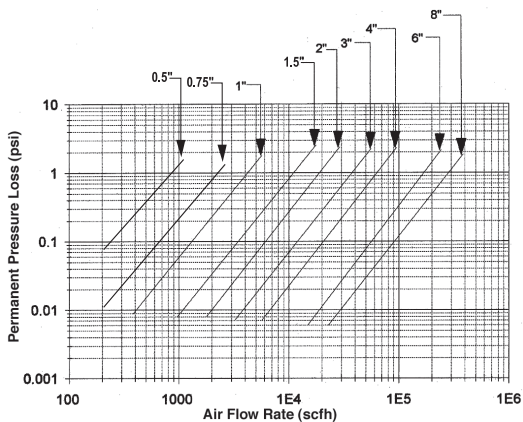
- Mass Flow Rate . . . +/- 0.2% of reading maximum
- Volumetric Flow Rate Negligible error
- Temperature. . . . . +/- 0.1° F (+/- 0.5° C) maximum
- Pressure . . . . . +/- 0.1% of full scale maximum
- Density. . . . . +/- 0.1% of reading maximum

Response Time

Adjustable from 1 to 100 seconds

Differential Pressure Requirements, Δ P

Permanent pressure loss of in-line meters for air at 68°F (20°C) and 14.70 psi (1.104 bara).  
 Permanent pressure loss of in-line meters for water at 68°F (20°C)

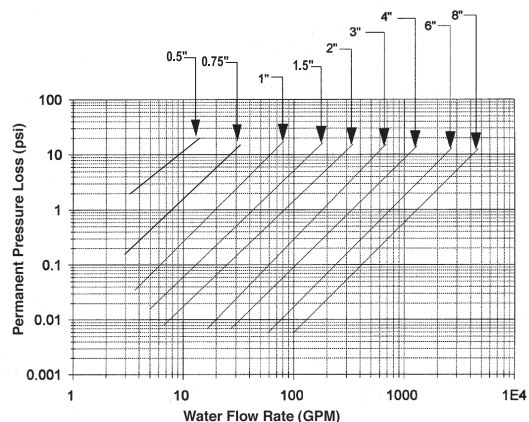


Material Compatibility

- 240. . . . . Any gas, liquid or steam compatible with 316L stainless steel, C276 Hastalloy® or A105 carbon steel. Not recommended for multi-phase fluids.
- 241. . . . . Any gas, liquid or steam compatible with 316L stainless steel. Not recommended for multi-phase fluids.

Linear Range

Smart electronics corrects for lower flow down to a Reynolds number of 5,000. The Reynolds number is calculated using the fluid's actual temperature and pressure monitored by the meter. Rangeability depends on the fluid, process connections and pipe size. Consult factory for your application. Velocity rangeability under ideal conditions is as follows:  
 Liquids 30:1 . . . . . 1 foot per second velocity minimum  
 30 feet per second velocity maximum  
 Gases 30:1 . . . . . 10 feet per second velocity minimum  
 300 feet per second velocity maximum



**Flow Rates**

Typical mass flow ranges are given in the following table. Precise flow ranges depend on the fluid and pipe size. 241 insertion meters are applicable to pipe sizes from 2 inches and greater. Consult factory for sizing program.

Water Minimum and Maximum Flow Rates									
Pressure	0.5-inch	0.75-inch	1-inch	1.5-inch	2-inch	3-inch	4-inch	6-inch	8-inch
gpm	0.9	1.4	2.2	5.5	9.2	21	36	81	142
	22	40	67	166	276	618	1076	2437	4270
m <sup>3</sup> /hr	0.2	0.3	0.5	1.3	2.1	4.7	8.1	18	32
	5	9	15	38	63	140	244	554	970

Air Minimum and Maximum Flow Rates (scfm) <sup>(1)</sup>									
Pressure	0.5-inch	0.75-inch	1-inch	1.5-inch	2-inch	3-inch	4-inch	6-inch	8-inch
0 psig	1.8	3	5	13	22	50	87	198	347
	18	41	90	221	369	826	1437	3258	5708
100 psig	5	9	15	38	63	141	245	555	972
	138	325	704	1730	2890	6466	11254	25515	44698
200 psig	7	13	21	52	86	193	335	761	1332
	258	609	1322	3248	5427	12140	21131	47911	83931
300 psig	8	15	25	63	104	234	407	922	1615
	380	896	1944	4775	7978	17847	31064	70431	123375
400 psig	10	18	29	72	120	269	467	1060	1857
	502	1183	2568	6309	10542	23580	41043	93057	163000
500 psig	11	20	33	80	134	300	521	1182	2071
	624	1472	3195	7849	13115	28034	51063	115775	203000

Note: (1) Standard conditions are 70° F and 1 atmosphere.

Saturated Steam Minimum and Maximum Flow Rates (lb/hr)									
Pressure	0.5-inch	0.75-inch	1-inch	1.5-inch	2-inch	3-inch	4-inch	6-inch	8-inch
5 psig	6.5	12	20	49	82	183	318	722	1264
	52	122	265	650	1087	2431	4231	9594	16806
100 psig	15	27	46	112	187	419	728	1652	2893
	271	639	1386	3405	5690	12729	22156	50233	87998
200 psig	20	37	62	151	253	565	983	2229	3905
	493	1163	2525	6203	10365	23184	40354	91494	160279
300 psig	24	45	74	182	304	680	1184	2685	4704
	716	1688	3664	9000	15040	33642	58556	132763	232575
400 psig	28	51	85	209	349	780	1358	3079	5393
	941	2220	4816	11831	19770	44222	76971	174516	305717
500 psig	31	57	95	233	389	870	1514	3433	6014
	1170	2760	5988	14711	24582	54987	95710	17001	380148

Process Fluid Pressure

240 Pressure Ratings				
Probe Seal	Process Connection	Material	Rating	Ordering Code
Compression Fitting	2-inch male NPT	316L SS	ANSI 600 lb	CM
	2-inch 150 lb flange	316L SS	ANSI 150 lb	CF
	2-inch 300 lb flange	316L SS	ANSI 300 lb	CG
	2-inch 600 lb flange	316L SS	ANSI 600 lb	CH
Packing Gland	2-inch male NPT	316L SS	50 psig	PM
	2-inch 150 lb flange	316L SS	50 psig	PF
	2-inch 300 lb flange	316L SS	50 psig	PG
Packing Gland w/ Removable Retractor	2-inch male NPT	316L SS	ANSI 300 lb	PM, RR
	2-inch 150 lb flange	316L SS	ANSI 150 lb	PF, RR
	2-inch 300 lb flange	316L SS	ANSI 300 lb	PG, RR
Packing Gland w/ Permanent Retractor	2-inch male NPT	316L SS	ANSI 600 lb	PMR
	2-inch 150 lb flange	316L SS	ANSI 150 lb	PFR
	2-inch 300 lb flange	316L SS	ANSI 300 lb	PGR
	2-inch 600 lb flange	316L SS	ANSI 600 lb	PHR

Process Fluid Pressure

240 Pressure Ratings		
Process Connection	Material	Rating
Flanged	316L SS, A105 carbon steel, C276 Hastalloy®	150, 300, 600 lb
Wafer	316L SS, A105 carbon steel, C276 Hastalloy®	600 lb

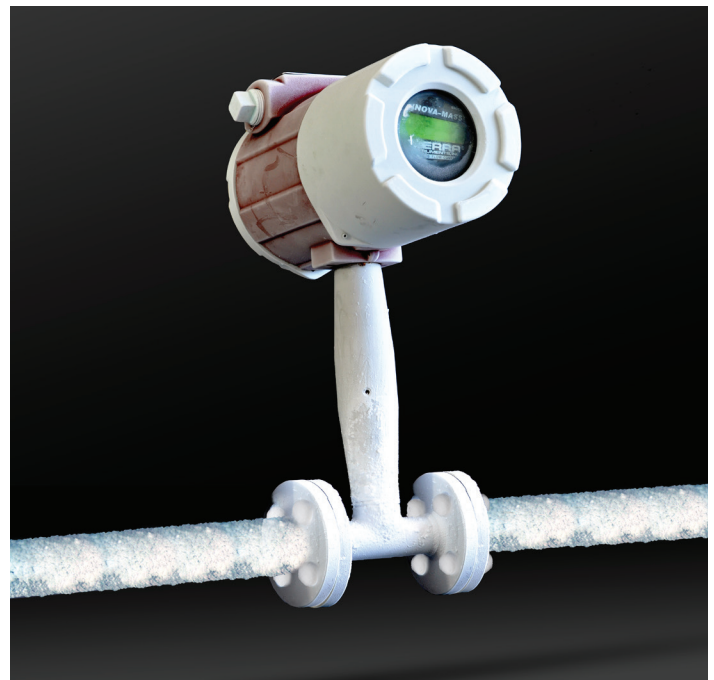
Pressure Transducer Ranges

Pressure Sensor Ranges <sup>(1)</sup> psia (bara)			
Full Scale Operating Pressure		Maximum Over-Range Pressure	
psia	(bara)	psia	(bara)
30	2	60	4
100	7	200	14
300	20	600	41
500	34	1000	69
1500	100	1500	100

Note: (1) To maximize accuracy, specify the lowest full scale operating pressure range for the application. To avoid damage, the flow meter must never be subjected to pressure above the over-range pressure shown above.

Teflon is a registered trademark of DuPont.

Cryogenic Version



**OPERATING SPECIFICATIONS (continued)**

**Power Requirements**

12 to 36 VDC, 100 mA (add 20mA per output up to 60mA)  
100 to 240 VAC, 50/60 Hz, 25 watts

**Display**

Alphanumeric 2x16 LCD digital display  
Six push buttons switches (up, down, right, left, enter, exit)  
operable through the display glass of the explosion-proof enclosure viewing at 90° mounting intervals

**Process Fluid & Ambient Temperature**

Process Fluid . . . . . Cryogenic Temperature Sensor:  
-330°F to -40°F (-200°C to -40°C)  
Standard Temperature Sensor:  
-40°F to 500°F (-40°C to 260°C)  
High Temperature Sensor:  
-40°F to 750°F (40°C to 400°C)  
Ambient . . . . . Operating:  
-5°F to 140°F (-20° to 60°C)  
Storage:  
-40°F to 150°F (-40° to 65°C)  
0-98% relative humidity, non-condensing conditions

**Output Signals<sup>(1)</sup>**

Analog . . . . . One to three field rangeable, simultaneous linear 4-20 mA output signals (1000 ohms maximum loop resistance) selected by user from the five parameters—mass flow rate, volumetric flow rate, temperature, pressure and density  
Pulse. . . . . Pulse output for totalization is a 50-millisecond duration pulse operating a solid-state relay capable of switching 40 VDC, 40 mA maximum HART standard, optional MODBUS RTU

Note: (1) All outputs are optically isolated and require external power for operation.

**Alarms**

Up to three programmable solid-state relays for high, low or window alarms capable of switching to 40 VDC, 40 mA maximum

**Totalizer**

Based on user-determined flow units, nine full digits, with rollover at 999,999,999; total stored in non-volatile memory.

**DIGITAL COMMUNICATION**

HART (with DD)  
Modbus  
BACnet

**PERFORMANCE SPECIFICATIONS**

**Wetted Materials**

240. . . . . 316L stainless steel standard  
C276 Hastalloy® or A105 carbon steel optional  
Teflon-based thread sealant on pressure transducer  
241. . . . . 316L stainless steel  
Teflon® packing gland below 500°F (260°C)  
Graphite packing gland above 500°F (260°C)  
Teflon-based thread sealant on pressure transducer

**Enclosure**

NEMA 4x/7 (IP65) cast enclosure

**Electrical Ports**

Two 3/4-inch female NPT ports

**Mounting Connections**

240. . . . . Wafer or 150, 300, 600 lb ANSI flange  
241. . . . . Permanent Installation:  
Two-inch male NPT; 150, 300, 600 lb ANSI flange with compression fitting probe seal  
Hot Tap<sup>(1)</sup> Installation:  
Two-inch male NPT; 150, 300, 600 lb ANSI flange; and optional retractor with packing gland probe seal

Note: (1) Removable under line pressure.

**Mounting Position**

240. . . . . No effect  
241. . . . . Meter must be perpendicular within +/- 5° of the pipe centerline

**FMC Approval**

Explosion proof for Class I, Division 1, Groups B, C & D.  
Dust-ignition proof for Class II/III, Division 1, Groups E, F & G.  
NEMA Type 4x/7 and IP66  
T6 at Tamb=60°C

**ATEX Approval**

II 2 G Ex d II B + H2 T6  
II 2 D Ex t D A 21 IP66 T6  
KEMA 08 ATEX 0143

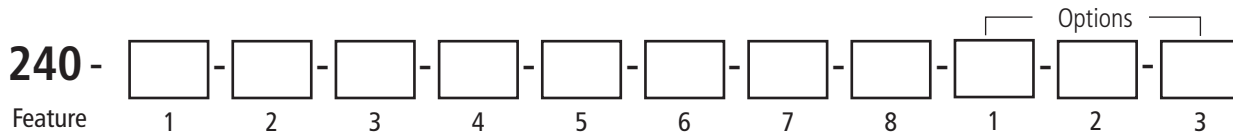
**CE Approval**

0344

**Optional Certifications**

Construction and inspection (ANSI/ASME B31.3)  
Materials (NACE MR-01-75(90))





Instructions: To order a 241 please fill in each number block by selecting the codes from the corresponding features below and following pages.

Parent Model Number	
<b>240</b>	In-line Multiparameter Mass Vortex Flow Meter. FMC and ATEX approval (Ex-d). Two or four wire system

Feature 1: Process Fluid	
<b>V</b>	Volumetric flow meter for liquid, gas and steam
<b>VT</b>	Velocity and Temperature Sensors. Mass measurement with temperature compensation
<b>VTP</b>	Velocity, temperature and pressure sensors. Mass measurement with pressure and temperature compensation
<b>VTEP</b>	Velocity, temperature and pressure sensors. Mass measurement with pressure temperature compensation. Pressure sensor is not included. (select MPO), but unit has a 4-20 mA input for an external pressure sensor
<b>VT EMS</b>	VT meter plus energy meter package. Calculates energy in BTU or kjoules. Based on flow and temperature measurement (class A RTD) from meter and secondary RTD to provide delta temperature. Remote RTD not included
<b>VTP EMS</b>	VTP meter plus energy meter package. Calculates energy in BTU or kjoules. Based on flow and temperature measurement (class A RTD) from meter and secondary RTD to provide delta temperature. Remote RTD not included

Feature 2: Flow Body (ANSI 316L)					
<b>F2</b>	1/2-inch ANSI class 150 flanged, 316L	<b>G2</b>	1/2-inch ANSI class 300 flanged, 316L	<b>H2</b>	1/2-inch ANSI class 600 flanged, 316L
<b>F3</b>	3/4-inch ANSI class 150 flanged, 316L	<b>G3</b>	3/4-inch ANSI class 300 flanged, 316L	<b>H3</b>	3/4-inch ANSI class 600 flanged, 316L
<b>F4</b>	1-inch ANSI class 150 flanged, 316L	<b>G4</b>	1-inch ANSI class 300 flanged, 316L	<b>H4</b>	1-inch ANSI class 600 flanged, 316L
<b>F5</b>	1.5-inch ANSI class 150 flanged, 316L	<b>G5</b>	1.5-inch ANSI class 300 flanged, 316L	<b>H5</b>	1.5-inch ANSI class 600 flanged, 316L
<b>F6</b>	2-inch ANSI class 150 flanged, 316L	<b>G6</b>	2-inch ANSI class 300 flanged, 316L	<b>H6</b>	2-inch ANSI class 600 flanged, 316L
<b>F7</b>	3-inch ANSI class 150 flanged, 316L	<b>G7</b>	3-inch ANSI class 300 flanged, 316L	<b>H7</b>	3-inch ANSI class 600 flanged, 316L
<b>F8</b>	4-inch ANSI class 150 flanged, 316L	<b>G8</b>	4-inch ANSI class 300 flanged, 316L	<b>H8</b>	4-inch ANSI class 600 flanged, 316L
<b>F9</b>	6-inch ANSI class 150 flanged, 316L	<b>G9</b>	6-inch ANSI class 300 flanged, 316L	<b>H9</b>	6-inch ANSI class 600 flanged, 316L
<b>F10</b>	8-inch ANSI class 150 flanged, 316L	<b>G10</b>	8-inch ANSI class 300 flanged, 316L	<b>H10</b>	8-inch ANSI class 600 flanged, 316L

Also available in C276 Hastalloy®. Consult factory for pricing/delivery

Feature 2: Flow Body (DN 316L)					
<b>FD2</b>	DN15/PN16 flanged, 316L	<b>GD2</b>	DN15/PN40 flanged, 316L	<b>HD2</b>	DN15/PN64 flanged, 316L
<b>FD3</b>	DN20/PN16 flanged, 316L	<b>GD3</b>	DN20/PN40 flanged, 316L	<b>HD3</b>	DN20/PN64 flanged, 316L
<b>FD4</b>	DN25/PN16 flanged, 316L	<b>GD4</b>	DN25/PN40 flanged, 316L	<b>HD4</b>	DN25/PN64 flanged, 316L
<b>FD5</b>	DN40/PN16 flanged, 316L	<b>GD5</b>	DN40/PN40 flanged, 316L	<b>HD5</b>	DN40/PN64 flanged, 316L
<b>FD6</b>	DN50/PN16 flanged, 316L	<b>GD6</b>	DN50/PN40 flanged, 316L	<b>HD6</b>	DN50/PN64 flanged, 316L
<b>FD7</b>	DN80/PN16 flanged, 316L	<b>GD7</b>	DN80/PN40 flanged, 316L	<b>HD7</b>	DN80/PN64 flanged, 316L
<b>FD8</b>	DN100/PN16 flanged, 316L	<b>GD8</b>	DN100/PN40 flanged, 316L	<b>HD8</b>	DN100/PN64 flanged, 316L
<b>FD9</b>	DN150/PN16 flanged, 316L	<b>GD9</b>	DN150/PN40 flanged, 316L	<b>H9</b>	6-inch ANSI class 600 flanged, 316L
<b>FD10</b>	DN200/PN16 flanged, 316L	<b>GD10</b>	DN200/PN40 flanged, 316L	<b>H10</b>	8-inch ANSI class 600 flanged, 316L

Also available in C276 Hastalloy®. Consult factory for pricing/delivery

Feature 2: Flow Body (Wafer 316L)	
<b>W2</b>	1/2-inch wafer connection, 316L
<b>W3</b>	3/4-inch wafer connection, 316L
<b>W4</b>	1-inch wafer connection, 316L
<b>W5</b>	1.5-inch wafer connection, 316L
<b>W6</b>	2-inch wafer connection, 316L
<b>W7</b>	3-inch wafer connection, 316L
<b>W8</b>	4-inch wafer connection, 316L

Also Available in carbon steel and C276 Hastalloy. Consult Factory for pricing/delivery

Feature 2: Feature 2: Flow Body (ANSI CS)					
<b>FC4</b>	1-inch ANSI class 150 flanged, carbon steel	<b>GC4</b>	1-inch ANSI class 300 flanged, carbon steel	<b>HC4</b>	1-inch ANSI class 600 flanged, carbon steel
<b>FC5</b>	1.5-inch ANSI class 150 flanged, carbon steel	<b>GC5</b>	1.5-inch ANSI class 300 flanged, carbon steel	<b>HC5</b>	1.5-inch ANSI class 600 flanged, carbon steel
<b>FC6</b>	2-inch ANSI class 150 flanged, carbon steel	<b>GC6</b>	2-inch ANSI class 300 flanged, carbon steel	<b>HC6</b>	2-inch ANSI class 600 flanged, carbon steel
<b>FC7</b>	3-inch ANSI class 150 flanged, carbon steel	<b>GC7</b>	3-inch ANSI class 300 flanged, carbon steel	<b>HC7</b>	3-inch ANSI class 600 flanged, carbon steel
<b>FC8</b>	4-inch ANSI class 150 flanged, carbon steel	<b>GC8</b>	4-inch ANSI class 300 flanged, carbon steel	<b>HC8</b>	4-inch ANSI class 600 flanged, carbon steel
<b>FC9</b>	6-inch ANSI class 150 flanged, carbon steel	<b>GC9</b>	6-inch ANSI class 300 flanged, carbon steel	<b>HC9</b>	6-inch ANSI class 600 flanged, carbon steel
<b>FC10</b>	8-inch ANSI class 150 flanged, carbon steel	<b>GC10</b>	8-inch ANSI class 300 flanged, carbon steel	<b>HC10</b>	8-inch ANSI class 600 flanged, carbon steel

Feature 3: Electronics Enclosure	
<b>E2</b>	NEMA 4X Enclosure mounted on probe; includes FM, CSA and ATEX, CL 1 Division 2
<b>E4( )</b>	Remote Electronics NEMA 4X includes NEMA 4X on probe. Specify cable length in parentheses, maximum 50 feet (15.24 m). Includes FM, CSA, ATEX, IECEx Cable glands. CL 1 Division 2

Feature 4: Display Option	
<b>DD</b>	Digital display with push buttons
<b>NR</b>	No readout (display highly recommended for setup/diagnostics)

Feature 5: Input Power	
<b>PV1L</b>	12-36 VDC loop powered (only available with V4LH)
<b>PV1</b>	12-36 VDC
<b>PS</b>	100-240 VAC, 50/60 Hz line power, 25 Watts

Feature 6: Output	
<b>V4LH</b>	One analog output (4-20 mA), one pulse, HART. Loop powered.
<b>V4H</b>	One analog output (4-20 mA), one pulse, HART. Loop powered. One analog output (4-20 mA), one pulse, HART. Loop powered.
<b>V4M</b>	One analog output (4-20 mA), one alarm, one pulse, and MODBUS
<b>V4B</b>	One analog output (4-20 mA), one alarm, one pulse, and BACNet
<b>V6H</b>	Three analog outputs (4-20 mA), three alarms, one pulse, HART
<b>V6M</b>	Three analog outputs (4-20 mA), three alarms, one pulse, MODBUS
<b>V6B</b>	Three analog outputs (4-20 mA), three alarms, one pulse, BACNet

Feature 7: Process Temperature	
<b>CT</b>	Cryogenic process temperature -330°F to -40°F (-200°C to -40°C). NOTE: CT temperature option can only be used with V or VT versions of the InnovaMass. Not available in carbon steel.
<b>ST</b>	Standard process temperature -40°F to 500°F (-40°C to 260°C)
<b>HT</b>	High process temperature -40°F to 750°F (-40° to 400°C)

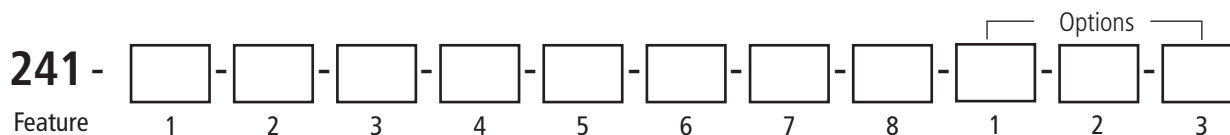
Feature 8: Process Pressure	
<b>MP0</b>	No pressure sensor. Used with VT option
<b>MP1</b>	Maximum 30 psig (2.1 barg), Proof 60 psig (4.1 barg)
<b>MP2</b>	Maximum 100 psig (6.9 barg), Proof 200 psig (13.8 barg)
<b>MP3</b>	Maximum 300 psig (20.7 barg), Proof 600 psig (41.4 barg)
<b>MP4</b>	Maximum 500 psig (34.5 barg), Proof 1000 psig (69.0 barg)
<b>MP5</b>	Maximum 1500 psig (103.4 barg), Proof 2500 psig (172.4 barg)

Option 1: Certificates	
<b>MC</b>	Material certificates--US Mill certs on all wetted parts
<b>PT</b>	Pressure test certificate
<b>CC</b>	Certificate of conformance
<b>NC</b>	NACE certification

Option 2: Oxygen Cleaning	
<b>O2C</b>	Cleaned for O2 service (includes certification). Meter must include O2C (oxygen cleaning) if meter to be used for oxygen service.

Option 3: Cables and Glands	
<b>ARM25V</b>	25 feet (7.6 m) armored cable with glands (ATEX, IECEX) V meter only- Adder to remote option
<b>ARM50V</b>	50 feet (17 m) armored cable with glands (ATEX, IECEX) V meter only- Adder to remote option
<b>ARM25VTP</b>	25 feet (7.6 m) armored cable with glands (ATEX, IECEX) V meter only- Adder to remote option
<b>ARM50VTP</b>	50' (17 m) armored cable with glands (ATEX, IECEX) V meter only- Adder to remote option
<b>M20L</b>	3/4-inch NPT to M20 conversion kit - local electronics (E2)
<b>M20R</b>	3/4-inch NPT to M20 conversion kit - remote electronics (E4)

**ACCESSORIES** (Consult Factory) removable retractors, isolated gate valves, mounting kits, material certificates, pressure certificates, certificate of conformance, NACE certification



Instructions: To order a 240 please fill in each number block by selecting the codes from the corresponding features below and following pages.

Parent Model Number	
<b>241</b>	Insertion Multiparameter Mass Vortex Flow Meter. FMC, ATEX Approved (Ex-d). Two or four wire system

Feature 1 : Multiparameter Options	
<b>V</b>	Volumetric flow meter for liquid, gas and steam.
<b>VT</b>	Velocity and temperature sensors. Mass measurement with temperature compensation
<b>VTP</b>	Velocity, temperature and pressure sensors. Mass measurement with pressure and temperature compensation and automatic flow profile compensation by calculating the Reynolds number
<b>VTEP</b>	Velocity, temperature and pressure sensors. Mass measurement with pressure temperature compensation. Pressure sensor is not included. (select MPO), but unit has a 4-20 mA input for an external pressure sensor
<b>VT EMS</b>	VT Meter plus energy meter package. Calculates energy in BTU or kjoules. Based on flow and temperature measurement (class A RTD) from meter and secondary RTD to provide delta temperature. Remote RTD not included
<b>VTP EMS</b>	VTP meter plus energy meter package. Calculates energy in BTU or kjoules. Based on flow and temperature measurement (class A RTD) from meter and secondary RTD to provide delta temperature. Remote RTD not included

Feature 2: Probe Length	
<b>LS</b>	Standard probe
<b>LC</b>	Compact probe available only for connections CM, CF, CG and CH
<b>LE</b>	Extended probe (consult factory if for PMR, PFR, PGR or PHR)

Feature 3: Electronics Enclosure	
<b>E2</b>	NEMA 4X Enclosure mounted on probe; includes FM, CSA and ATEX, CL 1 Division 2
<b>E4( )</b>	Remote Electronics NEMA 4X includes NEMA 4X on probe. Specify cable length in parentheses, maximum 50 feet (15.24 m). Includes FM, CSA, ATEX, IECEx Cable glands. CL 1 Division 2

Feature 4: Display Option	
<b>DD</b>	Digital display with pushbuttons
<b>NR</b>	No readout (display highly recommended for setup/diagnostics)

Feature 5: Input Power	
<b>PV1L</b>	12-36 VDC loop powered (only available with V4LH)
<b>PV1</b>	12-36VDC
<b>PS</b>	100-240 VAC, 50/60 Hz line power, 25 Watts

Feature 6: Output	
<b>V4LH</b>	One analog output (4-20 mA), one pulse, HART. Loop powered.
<b>V4H</b>	One analog output (4-20 mA), one alarm, one pulse and HART Communication; not loop powered
<b>V4M</b>	One analog output (4-20 mA), one alarm, one pulse, and MODBUS
<b>V4B</b>	One analog output (4-20 mA), one alarm, one pulse, and BACNet
<b>V6H</b>	Three analog outputs (4-20 mA), three alarms, one pulse, HART
<b>V6M</b>	Three analog outputs (4-20 mA), three alarms, one pulse, MODBUS
<b>V6B</b>	Three analog outputs (4-20 mA), three alarms, one pulse, BACNet

Feature 7: Process Temperature	
<b>CT</b>	Cryogenic process temperature -330°F to -40°F (-200°C to -40°C). NOTE: CT temperature option can only be used with V or VT versions of the InnovaMass. Not available in carbon steel.
<b>ST</b>	Standard process temperature -40°F to 500°F (-40°C to 260°C)
<b>HT</b>	High process temperature -40°F to 750°F (120°C to 400°C)

Feature 8: Process Pressure	
<b>MP0</b>	No pressure sensor. Used with VT option
<b>MP1</b>	Maximum 30 psig (2.1 barg), Proof 60 psig (4.1 barg)
<b>MP2</b>	Maximum 100 psig (6.9 barg), Proof 200 psig (13.8 barg)
<b>MP3</b>	Maximum 300 psig (20.7 barg), Proof 600 psig (41.4 barg)
<b>MP4</b>	Maximum 500 psig (34.5 barg), Proof 1000 psig (69.0 barg)
<b>MP5</b>	Maximum 1500 psig (103.4 barg), Proof 2500 psig (172.4 barg)

Feature 9: Process Connection ANSI	
<b>CM</b>	Compression fitting 2-inch Male NPT, class 600 pressure rating
<b>CF</b>	Compression fitting on 2-inch class 150 flange
<b>CG</b>	Compression fitting on 2-inch class 300 flange
<b>CH</b>	Compression fitting on 2-inch class 600 flange
<b>PM</b>	Packing gland* on 2-inch Male NPT, 50 psig (3.4 barg) maximum process pressure for live insertion/removal without a retractor. Packing gland itself rated to 600 psig process pressure. Packing gland live insertion/removal up to 600 psig (41.4 barg) must use a retractor (removable or welded on).
<b>PMR</b>	Packing gland on 2-inch Male NPT with welded on retractor. Must be used for process pressures 600 psig (41.4 barg) or greater but can be used for lower process pressures.
<b>PMR-LE</b>	Packing gland. 2-inch Male NPT with retractor, class 600 psig (41.4 barg) pressure rating. (for LE)
<b>PF</b>	Packing gland* on 2-inch class 150 flange, 50 psig (3.4 barg) maximum process pressure without removable retractor. Packing gland itself rated to 600 psig (41.4 barg) process pressure. Packing gland live insertion/removal up to 600 psig (41.4 barg) must use a retractor (removable or welded on).
<b>PFR</b>	Packing gland 2-inch class 150 flange with retractor
<b>PFR-LE</b>	Packing gland 2-inch class 150 flange with retractor for use with extended probe length (see LE option)
<b>PG</b>	Packing gland* on 2-inch class 300 flange, 50 psig (3.4 barg) maximum process pressure without removable retractor. Packing gland itself rated to 600 psig (41.4 barg) process pressure. Packing gland live insertion/removal up to 600 psig (41.4 barg) must use a retractor (removable or welded on).
<b>PGR</b>	Packing gland 2-inch class 300 flange with retractor
<b>PGR-LE</b>	Packing gland 2-inch class 150 flange with retractor for use with extended probe length (see LE option)
<b>PHR</b>	Packing gland. 2-inch class 600 flange with retractor
<b>PHR-LE</b>	Packing gland 2-inch class 600 flange with retractor. For use with extended probe length (see LE option)

Feature 9: Process Connection DN	
<b>CFD</b>	Compression fitting on DN50/PN16 flange
<b>CGD</b>	Compression fitting on DN50/PN40 flange
<b>CHD</b>	Compression fitting on DN50/PN64 flange
<b>PFD</b>	Packing gland* on DN50/PN16 flange, 50 psig (3.4 barg) maximum process pressure without removable retractor
<b>PFDR</b>	Packing gland, DN50/PN16 flange with retractor
<b>PFDR-LE</b>	Packing gland DN50/PN16 flange with retractor. For use with extended probe length (see LE option)
<b>PGD</b>	Packing gland* on DN50/PN40 flange, 50 psig (3.4 barg) maximum process pressure without removable retractor
<b>PGDR</b>	Packing gland DN50/PN40 flange with retractor
<b>PGDR_LE</b>	Packing gland DN50/PN40 flange with retractor. For use with extended probe length (see LE option)
<b>PHDR</b>	Packing gland DN50/PN64 flange with retractor
<b>PHDR-LE</b>	Packing gland DN50/PN64 flange with retractor. For use with extended probe length (see LE option)

**Option 1: Certificates**

<b>MC</b>	Material certificates--US Mill certs on all wetted parts
<b>PT</b>	Pressure test certificate
<b>CC</b>	Certificate of conformance
<b>NC</b>	NACE certification

**Option 2: Oxygen Cleaning**

<b>O2C</b>	Cleaned for O2 service (includes certification). Meter must include O2C (oxygen cleaning) if meter to be used for oxygen service.
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**Option 3: Cables and Glands**

<b>ARM25V</b>	25 feet (7.6 m) armored cable with glands (ATEX, IECEx) V meter only- Adder to remote option
<b>ARM50V</b>	50 feet (17 m) armored cable with glands (ATEX, IECEx) V meter only- Adder to remote option
<b>ARM25VTP</b>	25 feet (7.6 m) armored cable with glands (ATEX, IECEx) V meter only- Adder to remote option
<b>ARM50VTP</b>	50' (17 m) armored cable with glands (ATEX, IECEx) V meter only- Adder to remote option
<b>M20L</b>	3/4-inch NPT to M20 conversion kit - local electronics (E2)
<b>M20R</b>	3/4-inch NPT to M20 conversion kit - remote electronics (E4)



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