

# PanaFlow™ MV82

## Insertion Style Multivariable Flowmeter

### Key Benefits

- Multivariable vortex flowmeter for measuring volumetric flow, temperature, pressure, density, and mass flow using a single meter
- Advanced design and digital signal processing for vibration isolation
- Cost effective, accurate and reliable meter for volumetric and mass flow measurement in most gases, liquids and steam without the need to recalibrate
- Energy management through accurate measurement of both temperature and mass flow simultaneously
- Remote monitoring and integration to DCS using HART® and Modbus® communication protocols
- Significant cost savings through reduced installation costs, wiring runs and services support using MV meter with no moving parts
- Certified for Division 1/Zone 1 Explosive Atmospheres –US/CAN/ATEX/IEC Ex



### Applications

- Ideal for high temperature and high velocity steam
- Power Generation—steam applications
- Industrial—HVAC, district energy management
- Commercial—building, campus and facility energy management
- Oil & gas—allocation of natural gas
- Petrochemical—mass balancing, reaction processes heating



## Unique Multivariable Design

GE Sensing's PanaFlow MV82 In-line Multivariable Mass Vortex flowmeter is the next generation vortex meter. PanaFlow MV82's multivariable design consists of a vortex shedding velocity sensor, an RTD temperature sensor and a solid state pressure transducer that measures the mass flow rate of steam, gases and liquids. Other meter types use external process measurements to calculate mass flow. The temperature and pressure devices are typically not installed in the same location as the flowmeter. Process conditions can vary greatly between the two locations, causing inaccurate mass flow readings. PanaFlow MV82 measures velocity, temperature and pressure at the same location, which provides more accurate process measurement.

## Portfolio of Flowmeter Solutions

GE Sensing is committed to providing customers with the best technologies for their flow measurement needs. PanaFlow MV82 is the newest addition to the PanaFlow family of flowmeters, providing effective solutions for smaller pipe sizes for a variety of applications. GE Sensing offers the PanaFlow MV82 in a number of configurations to best suit your application measurement needs.

## Field Service Solutions

GE Sensing has a global field service team ready to assist in the start-up and commissioning of the PanaFlow MV82 flowmeters. This service includes validating the proper installation and programming of the meter, and can include customized training for theory, operation and maintenance. Regularly scheduled preventative maintenance visits will provide peace of mind, ensuring that the meters work to specification and your expectation for years.

## Mass Flow Measurement—True Multivariable

The MV82 offers flow computer functionality in a compact field device. The VTP option incorporates temperature and pressure sensors to provide an instantaneous reading of compensated mass flow rate of gases, liquids and steam. In addition to outputs for totalized mass and alarm settings, the field configurable electronics deliver up to three analog 4-20 mA outputs of five process measurements, including volumetric flow rate, mass flow rate, pressure, temperature and density. Alternate configurations for mass flow include a temperature only compensation (VT), best used when in saturated steam applications, and an integrated RTD with an external pressure transmitter (VT-EP) when a full function pressure transmitter is desired.

## Energy Measurement in Liquids and Steam

The VT-EM energy monitoring option enables real time-of-flight diffraction calculation of energy consumption for a facility or process. The meter can be programmed to measure steam, hot water or chilled water. This option uses the MV82 flowmeter to monitor one side of the process, either sent or return, and uses the input from a second separate temperature sensor on the opposite leg of the process to calculate the change in energy. Selectable energy units include BTU, joules, calories, Watt-hours, Megawatt-hours and Horsepower-hours. The local or remote electronics indicate two temperatures, delta T, mass total and energy total. For energy measurement in steam, the VTP-EM option adds a pressure transmitter to offer better accuracy.

## Volumetric Flow for Most Gases and Liquids

The base model MV82 delivers a direct reading of volumetric flow rate—generally the most cost-effective solution for liquid flow monitoring—in applications ranging from general water flows to hydrocarbon fuel flow measurement.

Model	Configuration	Volumetric	Mass Flow	Integrated RTD	Integrated Pressure	External Temperature	External Pressure	Typical Application
MV82-V	Volumetric for liquid, gas and steam	X						Liquids
MV82-VT	Mass flow with Temperature and assumed saturated steam	X	X	X				Saturated Steam Liquid Mass
MV82-VTP	Mass flow with integrated Temperature and Pressure in one device	X	X	X	X			Steam and Gases
MV82-VT-EP	Mass flow with integrated Temperature and analog input for an external pressure transmitter	X	X	X			X	Steam and Gases
MV82-VT-EM	Energy using integrated Temperature and one input for an RTD Transmitter	X		X		X		Liquid Energy
MV82-VTP-EM	Energy for steam with integrated pressure and temperature and one input for an RTD transmitter.	X	X	X	X	X		Steam Energy

# PanaFlow MV82 Specifications

## Performance

### Accuracy

Mass flow rate accuracy for gas and steam based on 50-100% of pressure range

PanaFlow MV82 Accuracy Flowmeter		
Process Variable	Liquids	Gas and Steam
Volumetric Flow Rate	± 1.2% of Rate	± 1.5% of Rate
Mass Flow Rate	± 1.5% of Rate	± 2% of Rate
Temperature	± 2°F (± 1°C)	± 2°F (± 1°C)
Pressure	± .3% of Full Scale	± .3% of Full Scale
Density	± .3% of Reading	± .5% of Reading

### Repeatability

Mass Flow Rate	±0.2% of rate
Volumetric Flow Rate	±0.1% of rate
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 rate
Volumetric Flow Rate	negligible
Temperature	±0.9°F (± 0.5°C)
Pressure	±0.1% of full scale
Density	±0.1% of reading

### Response Time

Adjustable from 1 to 100 seconds

## Operating

### Process and Ambient Temperature

Process Standard Temperature (code ST):	-40 to 500°F (-40 to 260°C)
Process High Temperature (code HT):	Up to 750°F (400°C)
Ambient Operating:	-5 to 185°F (-20 to 85°C)
Ambient Storage:	-40 to 185°F (-40 to 85°C)

Pressure Transducer Ratings			
Full Scale Operating Pressure		Max. Over-Range Pressure	
psia	bara	psia	bara
30	2	60	4
100	7	200	14
300	20	600	40
500	35	1000	70
1500	100	2500	175

Pressure Ratings			
Style Connection	Process	Rating	Ordering
	2-inch (50mm) Male NPT	ANSI 600 lb	CNPT
	2-inch 150 lb (50mm 70kg) flange	ANSI 150 lb -- PN 16	C150
	2-inch 300 lb (50mm 135kg) flange	ANSI 300 lb -- PN 40	C300
	2-inch 600 lb (50mm 275kg) flange	ANSI 600 lb -- PN 64	C600
Packing Gland			
	2-inch (50mm) Male NPT	50 psig (3.5 barg)	PNPT
	2-inch 150 lb (50mm 70kg) flange	50 psig (3.5 barg)	P150
	2-inch 300 lb (50mm 135kg) flange	50 psig (3.5 barg)	P300
Packing Gland and Removable Retractor			
	2-inch (50mm) Male NPT	ANSI 300 lb (135kg)	PNPT and RR
	2-inch 150 lb (50mm 70kg) flange	ANSI 150 lb (70kg)	P150 and RR
	2-inch 300 lb (50mm 135kg) flange	ANSI 300 lb (135kg)	P300 and RR
Packing Gland and Permanent Retractor			
	2-inch (50mm) Male NPT	ANSI 600 lb (275kg)	PNPTR
	2-inch 150 lb (50mm 70kg) flange	ANSI 150 lb (70kg)	P150R
	2-inch 300 lb (50mm 135kg) flange	ANSI 300 lb (135kg)	P300R
	2-inch 600 lb (50mm 275kg) flange	ANSI 600 lb (275kg)	P600R

## Power Requirements

Model MV82-V: 12-36 VDC loop powered  
 Model MV82-VTP, DC option: 12-36 VDC, 100 mA max  
 Model MV82-VTP, AC option: 85-240 VAC, 50/60 Hz, 1 Watt

## Display

Alphanumeric 2 line x 16 character LCD digital display  
 Six pushbuttons for full field configuration  
 Pushbuttons can be operated with magnetic wand without removal of enclosure covers  
 Display can be mounted in 90° intervals for better viewing

## Output Signals

Analog: 4-20 mA, loop powered for volumetric meters  
 Alarm: Solid state relay, 40 VDC  
 Totalizer Pulse: 50 millisecond, 40 VDC  
 Volumetric: One analog, one totalizer pulse, HART  
 Multivariable: Up to three analog signals, three alarms, one totalizer pulse, HART  
 Multivariable option: Modbus process monitoring

## Physical

### Wetted Materials

316L stainless steel, plus:

- PTFE-based thread sealant on models with pressure transducer
- PTFE packing on standard temperature models with packing gland
- Graphite-based packing on high temperature models with packing gland

## Certifications

Explosion-proof for Class I, Division 1, Groups B, C & D  
 Dust-ignitionproof for Class II, III, Division 1, Groups E, F & G  
 Type 4x and IP66  
 T6 Temperature Class at -40°C - +70°C  
 KEMA ATEX/IEC Ex Approvals II 2 G Ex d IIB + H2 T6  
 II 2 D Ex tD A21 IP66 T85°C

## Sizing Considerations

Piping Conditions		
Condition	Pipe Diameters, D	
	Upstream	Downstream
One 90° elbow before meter	10D	5D
Two 90° elbows before meter	15D	5D
Two 90° elbows before meter, out of plane	25D	5D
Reduction before meter	10D	5D
Expansion before meter	20D	5D
Partially open valve	25D	5D

## Velocity Range

Maximum velocity, liquid: 30 feet/sec (9 meters/second)  
 Minimum velocity, liquid: 1 foot/sec (.3 meters/second)  
 Maximum velocity, gas or steam: 300 feet/sec (90 meters/second)  
 Minimum velocity, gas or steam feet/sec (meters/second):

$$\frac{5}{\sqrt{\text{density (lb/ft}^3\text{)}}} \qquad \frac{6.1}{\sqrt{\text{density (kg/m}^3\text{)}}}$$

Consult the PanaFlow MV Sizing Program for easy calculation of flow range.

Water Minimum and Maximum Flow Rates						
Rate	Nominal Pipe Size (in)					
	3	6	8	12	16	24
GPM min	20.6	81.3	142	317	501	1138
GPM max	618	2437	4270	9501	15043	34144
	Nominal Pipe Size (mm)					
	80	150	200	300	400	600
M <sup>3</sup> /hr min	5.2	20.4	35.4	79.2	125	284
M <sup>3</sup> /hr max	157	614	1062	2337	3753	8537

Typical Saturated Steam Minimum and Maximum Flow Rates (lb/hr)						
Nominal Pipe Size (in)	Pressure					
	3	6	8	12	16	24
5 psig	205	800	1385	3099	4893	11132
	2721	10633	18412	41196	65039	147954
100 psig	468	1831	3170	7092	11197	25472
	14246	55674	96407	215703	340546	774698
200 psig	632	2471	4278	9572	15111	34377
	25948	101405	175595	392880	620268	1411029
300 psig	762	2976	5153	11530	18203	41410
	37652	147145	254799	570093	900047	2047489
400 psig	873	3412	5908	13219	20870	47477
	49494	193420	334930	749382	1183103	2691404
500 psig	974	3805	6588	14741	23272	52942
	61543	240507	416468	931816	1471125	3346615

Typical Saturated Steam Minimum and Maximum Flow Rates (kg/hr)						
Nominal Pipe Size (mm)	Pressure					
	80	150	200	300	400	600
0 barg	81	316	548	1226	1936	4404
	938	3667	6350	14209	22432	51039
5 barg	187	729	1263	2826	4461	10151
	4946	19486	33742	75495	119189	271187
10 barg	249	972	1683	3767	5947	13530
	8859	34620	59949	134132	211764	481821
15 barg	298	1164	2016	4510	7120	16200
	12700	49629	85939	192283	303570	690705
20 barg	340	1329	2301	5148	8128	18493
	16550	64676	111995	250581	395609	900119
30 barg	413	1612	2791	6246	9860	22435
	24357	95187	164827	368789	582234	582234

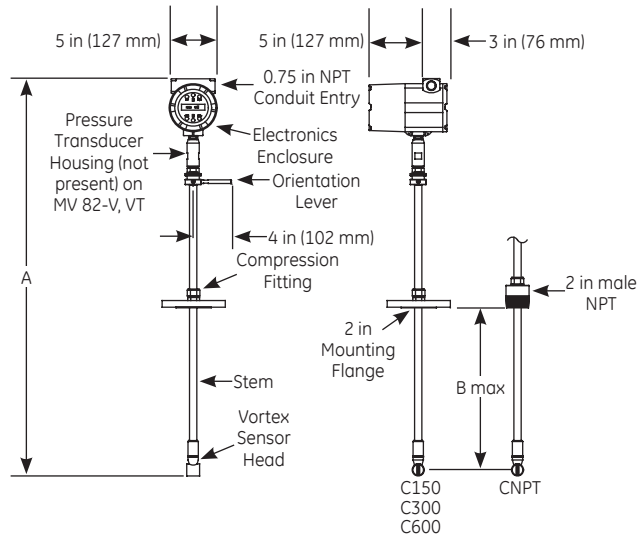
Typical Air Minimum and Maximum Flow Rates (SCFM) Air at 70°F						
Nominal Pipe Size (in)	Pressure					
	3	6	8	12	16	24
0 psig	56	220	381	852	1345	3059
	924	3611	6253	13991	22089	50250
100 psig	157	615	1065	2383	3763	8560
	7236	28279	48969	109564	172977	393500
200 psig	216	843	1460	3266	5156	11729
	13588	53101	91950	205732	324804	738886
300 psig	262	1022	1770	3960	6251	14221
	19974	78059	135169	302430	477467	1086176
400 psig	301	1175	2034	4551	7186	16346
	26391	103136	178593	399588	630859	1435121
500 psig	335	1310	2269	5077	8015	18233
	32834	128314	222191	497136	784865	1785464

Typical Air Minimum and Maximum Flow Rates (nm <sup>3</sup> /hr) Air at 20°C						
Nominal Pipe Size (mm)	Pressure					
	80	150	200	300	400	600
0 barg	89	347	601	1345	2124	4833
	1463	5716	9897	22145	34962	79547
5 barg	217	847	1467	3282	5181	11788
	8702	34006	58885	131751	208004	473266
10 barg	294	1148	1987	4446	7020	15972
	15975	62430	108105	241878	381870	868857
15 barg	355	1385	2399	5368	8474	19282
	23280	90979	157542	352487	556497	1266182
20 barg	407	1589	2751	6156	9718	22112
	30615	119642	207175	463539	731823	1665095
30 barg	495	1934	3349	7493	11829	26915
	45361	177268	306961	686081	1084302	2467081

## Turndown

Turndown is application-dependent. Consult the PanaFlow MV Sizing Program for exact values. Turndown can exceed 100:1.

## Dimensional Outline: Compression Fitting Models



### Approximate Weight, lb (kg)

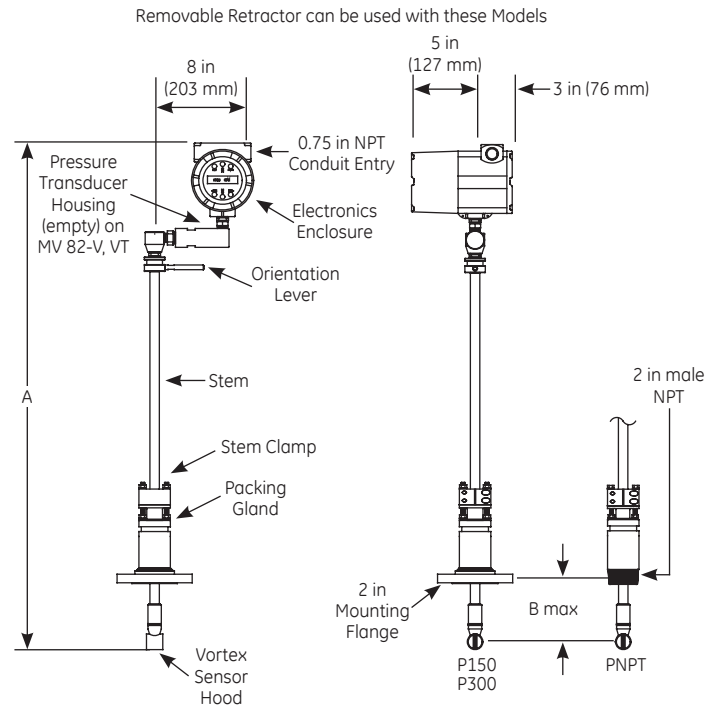
	CL		SL		EL	
CNPT	13	(5.7)	14	(6.2)	15	(6.7)
C150	15	(6.8)	16	(7.3)	17	(7.8)
C300	17	(7.8)	18	(8.3)	19	(8.8)
C600	18	(8.2)	19	(8.0)	20	(9.2)

Add 11 lb (5 kg) for remote electronics

PanaFlow MV82-V, VT in (mm)	CL/Compact Length		SL/Standard Length		EL/Extended Length	
	A	B	A	B	A	B
CNPT, Compression Fitting, Male NPT	21.6 (549)	9.8 (249)	38 (965)	26.2 (665)	50 (1270)	38.2 (970)
C150, Compression Fitting, 150 lb Flange	21.6 (549)	10.9 (277)	38 (965)	27.3 (693)	50 (1270)	39.3 (998)
C300, Compression Fitting, 300 lb Flange	21.6 (549)	10.8 (277)	38 (965)	27.2 (691)	50 (1270)	39.2 (996)
C600, Compression Fitting, 600 lb Flange	21.6 (549)	10.4 (264)	38 (965)	26.8 (681)	50 (1270)	38.8 (986)

PanaFlow MV82-VTP in (mm)	CL/Compact Length		SL/Standard Length		EL/Extended Length	
	A	B	A	B	A	B
CNPT, Compression Fitting, Male NPT	24.6 (625)	9.8 (249)	41 (1041)	26.2 (665)	53 (1346)	38.2 (970)
C150, Compression Fitting, 150 lb Flange	24.6 (625)	10.9 (277)	41 (1041)	27.3 (693)	53 (1346)	39.3 (998)
C300, Compression Fitting, 300 lb Flange	24.6 (625)	10.8 (274)	41 (1041)	27.2 (691)	53 (1346)	39.2 (996)
C600, Compression Fitting, 600 lb Flange	24.6 (625)	10.4 (264)	41 (1041)	26.8 (681)	53 (1346)	38.8 (986)

## Dimensional Outline: Packing Gland Models



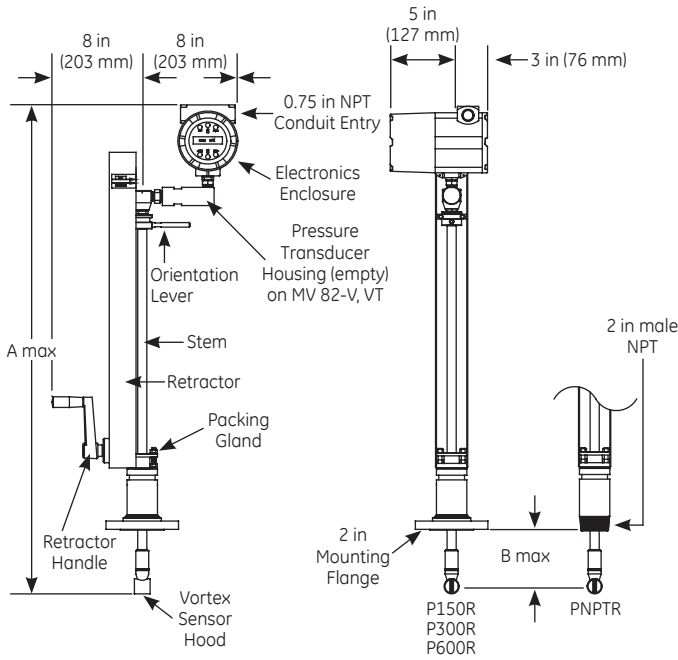
PanaFlow MV82 in (mm)	SL/Compact Length		EL/Standard Length	
	A	B	A	B
PNPT, Packing Gland, Male NPT	40.5 (1029)	21.5 (546)	52.5 (1334)	33.5 (851)
P150, Packing Gland, 150 lb Flange	40.5 (1029)	21.1 (536)	52.5 (1334)	33.1 (841)
P300, Packing Gland, 300 lb Flange	40.5 (1029)	21.1 (536)	52.5 (1334)	33.1 (841)

### Approximate Weight, lb (kg)

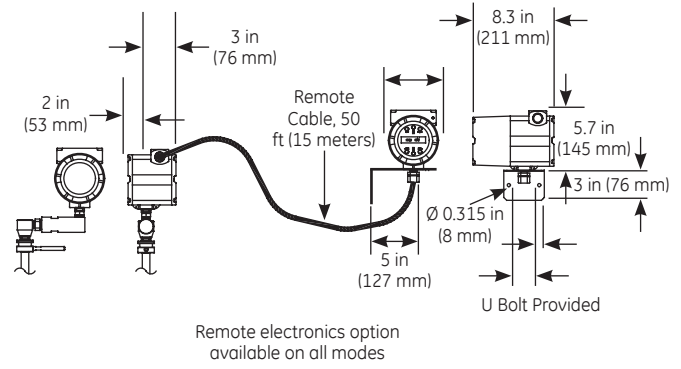
	SL	EL
PNPT	16 (7.1)	17 (7.6)
P150	21 (9.4)	22 (9.9)
P300	25 (11.3)	26 (11.8)

Add 11 lb (5 kg) for remote electronics

## Dimensional Outline: Packing Gland Models with Permanent Retractor



## Dimensional Outline: Remote Electronics Option



PanaFlow MV82 in (mm) With Permanent Retractor	SL/Standard Length		EL/Extended Length	
	A	B	A	B
PNPT, Packing Gland, Male NPT	40.5 (1029)	21.5 (546)	52.5 (1334)	33.5 (851)
P150R, Packing Gland, 150 lb Flange	40.5 (1029)	21.1 (536)	52.5 (1334)	33.5 (841)
P300R, Packing Gland, 300 lb Flange	40.5 (1029)	21.1 (536)	52.5 (1334)	33.1 (841)
P600R, Packing Gland, 600 lb Flange	40.5 (1029)	21.1 (536)	52.5 (1334)	33.1 (841)

Approximate Weight, lb (kg)		
	SL	EL
PNPT	25 (11.5)	32 (14.5)
P150	30 (13.7)	37 (16.7)
P300	34 (15.5)	41 (18.5)
P600	35 (16.0)	42 (19.0)

Add 11 lb (5 kg) for remote electronics

# PanaFlow MV82 Ordering Information

## Parent Number Code

- MV82** Insertion Multivariable Mass  
Vortex Flowmeter
- Feature 1: Multivariable Options**
- V** Volumetric flowmeter for liquid, gas and steam
  - VT** Velocity and temperature sensors
  - VTP** Velocity, temperature and pressure sensors
  - VT-EM** Energy output options
  - VTP-EM** Energy options with pressure sensor
  - VT-EP** Velocity and temperature sensors with analog input for pressure

### Feature 2: Probe Length

- SL** Standard length
- CL** Compact length
- EL** Extended length

### Feature 3: Electronics Enclosure

- L** Local electronics Type 4X enclosure mounted on probe
- R (25)** Remote electronics Type 4X, 25 ft (8 m) cable
- R (50)** Remote electronics Type 4X, 50 ft (17 m) cable

### Feature 4: Display Options

- DD** Digital Display and Programming Buttons
- ND** No Display

### Feature 5: Input Power

- DC2** 12 to 36 VDC required on 2-wire (loop powered) meters with 1AHL only
- DC4** 12 to 36 VDC standard volumetric meter on 4-wire
- AC** 100-240 VAC, 50/60 Hz

### Feature 6: Output Signal

- 1AHL** Loop powered option—one analog output (4-20 mA), one pulse, HART communication protocol - Must used DC2 input power
- 1AH** One analog output (4-20 mA), one alarm, one pulse, HART communication protocol
- 1AM** One analog output (4-20 mA), one alarm, one pulse, HART communication protocol
- 3AH** Three analog outputs (4-20 mA), three alarms, one pulse, HART, (VT, VTP only)
- 3AM** Three analog outputs (4-20 mA), three alarms, one pulse, MODBUS, (VT, VTP only)

### Feature 7: Process Temperature Options

- ST** Standard process temperature -40° to 500°F (-40° to 260°C)
- HT** High process temperature 750°F (400°C)

### Feature 8: Pressure Options

- P0** No pressure sensor
- P1** Maximum 30 psi (2 barg), Proof 60 psia (4barag)
- P2** Maximum 100 psi (7 barg), Proof 200 psia (14barag)
- P3** Maximum 300 psi (20 barg), Proof 600 psia (41 barg)
- P4** Maximum 500 psi (34 barg), Proof 1000 psia (64 barg)
- P5** Maximum 1500 psi (100 barg), Proof 2500 psia (175 barg)

### Feature 9: Process Connections

- CNPT** Compression, 2 inch NPT
- C150** Compression, 2 inch 150# Flange
- C16** Compression, DN50 PN16 Flange
- C300** Compression, 2 inch 300# Flange
- C40** Compression, DN50 PN40 Flange
- C600** Compression, 2 inch 600# Flange
- C64** Compression, DN50 PN64 Flange
- PNPT** Packing Gland, 2 inch NPT
- P150** Packing Gland, 2 inch 150# Flange
- P16** Packing Gland, DN50 PN16 Flange
- P300** Packing Gland, 2 inch 300# Flange
- P40** Packing Gland, DN50 PN40 Flange
- PNPTR** Packing Gland, 2 inch NPT, Retractor
- P150R** Packing Gland, 2 inch 150# Flange, Retractor
- P16R** Packing Gland, DN50 PN16 Flange, Retractor
- P300R** Packing Gland, 2 inch 300# Flange, Retractor
- P40R** Packing Gland, DN50 PN40 Flange, Retractor
- P600R** Packing Gland, 2 inch 600# Flange, Retractor
- P64R** Packing Gland, DN50 PN64 Flange, Retractor

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## Accessories

Suffix	Description
PED	PED Compliant System
MC	Material Certifications, US Mil Certs on all wetted parts
PT	Pressure Test Certificate
CC	Certificate of Conformance
NC	NACE Certification
O2	Oxygen Cleaning



### **EX-CALIBRA**

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