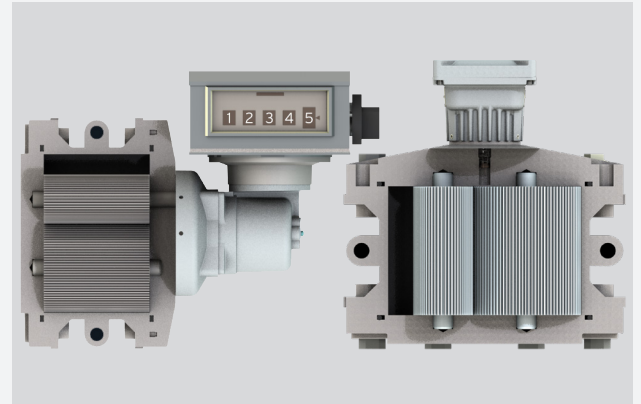


Maximizing the efficiency of liquid measurement in industrial applications:

Oval Gear Flowmeter Series - 9400, 9800 and 9900 Models Best-in-class "Any-Liquid" Flowmeter

The Brodie Oval Gear Flowmeter series is virtually unaffected by changes in viscosity and flowput. This makes it unparalleled in many applications involved in the Chemical Processing, Industrial, Food and Beverage, and Hydrocarbon processing industries.

Brodie continually strives to improve the accuracy of fluid transactions in all applications. To this end, the Brodie Oval Gear Flowmeter series can handle almost any liquid you push through it and measure it accurately every time.



Every drop counts.



Overview

The Brodie Oval Gear Flowmeters come in two varieties: the 9400 Models are mechanical positive displacement meters, while the 9800 and 9900 Models are electronic positive displacement meters. These meters were designed for use in industrial applications, such as the Chemical Processing, Industrial, Food and Beverage, and Hydrocarbon processing industries. Utilizing precision matched oval gears for exact liquid measurement, these highly accurate meters are virtually unaffected by changes in viscosity and maintain precision accuracy even when handling low-viscosity products at low flow rates.

Brodie's Oval Gear meters are supplied in a 3-piece design, which uses both a top and bottom flange in place of the closed-end body configuration found on previous models. This 3-piece design meets or exceeds all of the design and performance specifications of the original oval gear meter while offering several distinct advantages.

Improving the service life of the meter body in addition to service features, the 3-piece design offers:

- A clean, compact design
- Contoured flow paths for smooth liquid transitions
- Complete interchangeability with existing units
- Gear sets that are completely interchangeable

Electronic registration for the 9800/9900 Series is provided through the Brodie electronic register. This microprocessor based instrument is used for flowrate indication and totalization. It is capable of transmitting a factored analog current output signal (4-20 mA) used to drive standard process instrumentation.

Mechanical power transmission for the 9400 Series is established using a proven "Type 7" magnetic coupling technology in which the product does not come in contact with the transmission components. This coupling allows a variety of accessories and components to be mechanically driven without external power requirements.

The 9800 features either an electronic non-powered signal or a preamplified square-wave signal, proportional to the meter's flow rate. These are transmitted to locally-mounted or remote-receiving equipment.

Additional Features Available with the 9900 Series:

Smart Meter Manager™

- Automatic temperature compensation
- 4-20 mA (2-wire mass/volume) output with HART® communication
- User configurable and scalable pulse output
- Comprehensive alarms for both process flow and internal diagnostic checks
- Easy access programming
- 10-Point meter factor linearization

Design Highlights

SIMPLE, DURABLE CONSTRUCTION
A clean, compact design with contoured flow paths for smooth liquid transitions. Complete interchangeability with existing units and gear sets that are completely interchangeable

EASY ACCESS 3-PIECE DESIGN
Brodie's Oval Gear meters are supplied in a 3-piece design, which uses both a top and bottom flange in place of the closed-end body configuration found on previous models

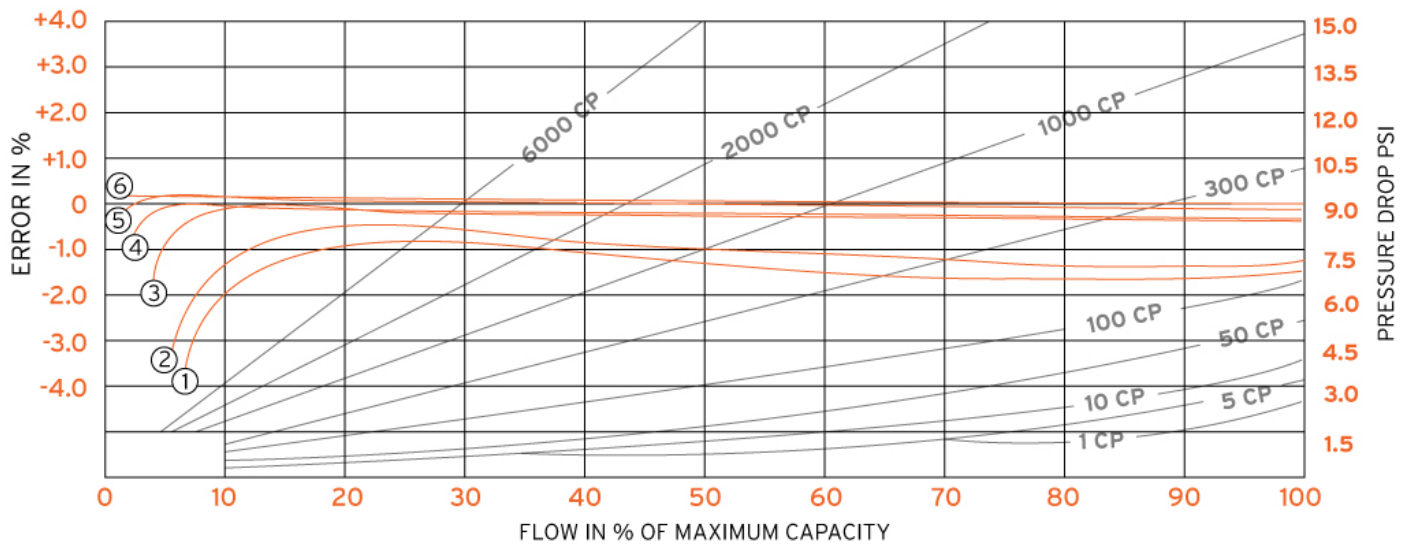
VIRTUALLY IMMUNE TO VISCOSITY CHANGES
These highly accurate meters are virtually unaffected by changes in viscosity and maintain precision accuracy even when handling low-viscosity products at low flow rates.

SMART METER MANAGER™ (Available in the 9900 Series)
• Automatic temperature compensation
• 4-20 mA (2-wire mass/volume) output with HART® communication
• User configurable and scalable pulse output
• Comprehensive alarms for both process flow and internal diagnostic checks
• Easy access programming
• 10-Point meter factor linearization

HIGH ACCURACY
Utilizing precision matched oval gears for exact liquid measurement

LOW MAINTENANCE REQUIREMENTS
• Allows service access from either side of the measuring chamber
• Provides access without interrupting electrical or mechanical connections to auxiliary equipment
• Allows easy access for visual inspection

Accuracy and Pressure-Drop Curves



- | | | | |
|--------------------|----------------------|-----------------------|---|
| ① Gasoline: 0.7 CP | ③ Light Oil: 5.0 CP | ⑤ B Heavy Oil: 100 CP | NOTE: For viscosities greater than 300 CP, special cut rotors are required. |
| ② Water: 1.0 CP | ④ A Heavy Oil: 20 CP | ⑥ C Heavy Oil: 300 CP | |

Principle of Operation

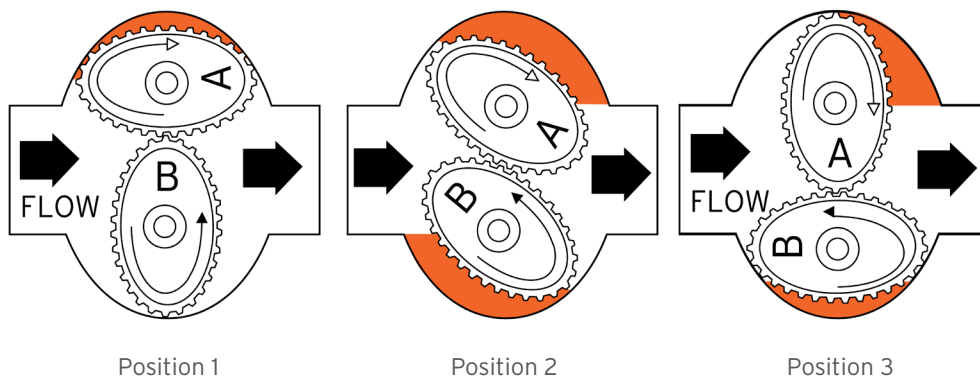
The Power Pulse Oval Flowmeter accurately measures liquid flow by using a slight pressure differential to rotate a pair of oval gears located within the measuring chamber.

Each complete rotation of the gears (rotors) displaces a fixed amount of liquid from the inlet to the outlet of the meter in a continuous flow pattern.

When in the position as shown in Figure 1, Position 1, all of the driving torque resulting from differential pressure is applied to Gear A. Gear B has zero driving torque since equal areas of gear surface on opposite sides of the axis of rotation are exposed to higher inlet pressure.

As the gears begin to rotate (Position 2), the torque applied to Gear A decreases but Gear B now has driving torque due to increased area exposed to the high pressure. At Position 3, all of the driving torque is exerted on Gear B and Gear A has decreased to zero. This alternate driving action provides a smooth rotation of almost constant torque without dead spots.

Because the amount of slippage between the oval gears and the measuring chamber wall is minimal, the meter is essentially unaffected by changes in viscosity and lubricity of the liquids being metered.



Technical Specifications

Flowrange Capacities

Connection Size	Model Number	Flow Rates	Cold Water	Hot Water 140°-230°F	LPG 0.2 cP	Gasoline 0.3-0.7 cP	Kerosene 0.8-1.8 cP	Light Oil 2-4 cP	Heavy Oil 5-300 cP
1/2"	9X52	gpm	1.3 - 6.6	1.8 - 4.4	3.1 - 8	1.8 - 8	1.3 - 8	0.7 - 9	0.4 - 9
		lpm	5 - 25	6.7 - 17	12 - 30	6.7 - 30	5 - 30	2.5 - 33	1.3 - 33
1"	9X53	gpm	2.4 - 13	3.1 - 8.8	4.8 - 16	3.1 - 16	2.4 - 16	1.2 - 17	0.7 - 17
		lpm	9 - 50	12 - 33	18 - 60	12 - 60	9.2 - 60	5 - 67	2.5 - 67
1"	9X55	gpm	4.4 - 31	5.3 - 22	7.9 - 37	5.3 - 37	4.4 - 37	1.8 - 44	1 - 44
		lpm	17 - 117	20 - 83	30 - 142	20 - 142	17 - 141	6.7 - 167	4.3 - 167
1-1/2"	9X56	gpm	8.8 - 62	11 - 44	15 - 75	11 - 75	8.8 - 75	4 - 88	2.6 - 88
		lpm	33 - 233	42 - 167	58 - 283	42 - 283	33 - 283	15 - 333	10 - 333
2"	9X57	gpm	18 - 132	22 - 88	35 - 154	35 - 154	18 - 154	8.8 - 176	5 - 176
		lpm	67 - 500	83 - 333	133 - 583	133 - 583	67 - 583	33 - 667	20 - 667
3"	9X59	gpm	35 - 264	44 - 176	66 - 308	44 - 308	35 - 308	26 - 396	18 - 396
		lpm	133 - 1000	167 - 667	250 - 1167	167 - 1167	133 - 1167	100 - 1500	67 - 1500

Maximum Working Pressure

Flange Materials of Construction	ANSI Flange (lbs.)	Pressure Rating at 100° (38°C)	
		psi	kPa
Steel	150 RF	285	1965
Steel	300 RF	740	5102
316 Stn. Stl.	150 RF	275	1896
316 Stn. Stl.	300 RF	720	4964

Maximum Working Temperature:

Class "A" Option - 0°F to 230°F (-17°C to +110°C)
 Class "C" Option - 230°F to 392°F (110°C to 200°C)

Accuracy:

+/- 0.25% for viscosities of 5 centipoise and above on Class "A" meters only (Temperatures to 230°F or 110°C).
 +/- 0.5% on viscosities from 0.2 to 5 centipoise on Class "A" and Class "C" meters (Temperatures to 392°F or 200°C).

Repeatability: +/- 0.05% or better

Power: Input supply voltage: 10-30Vdc, 130 mA maximum

Strainers Specifications

Model Number	Connection Size	Mesh	Microns
9X52	1/2"	80	150
9X53	1"	80	150
9X55	1"	60	250
9X56	1-1/2"	60	250
9X57	2"	40	350
9X59	3"	40	350

Viscosity Classification:

- Standard viscosity ranges from 0.2 to 300 cP
- High viscosity is classified as above 300 cP

Process Connections:

Standard: 1/2" to 3" CLASS 150 ANSI flange
 Optional: 1/2" to 3" CLASS 300 ANSI flange, DIN, Tri-Clover

Materials of Construction:

Body, Rotors, and Shafts: Stainless steel
 Rotor bearings: Carbon (std.) or for corrosive/abrasive product, Waukesha (opt.) or carbon/ceramic (opt.)
 O-rings: Viton (std.); Teflon, EPR, silicon (opt.)



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