

Oval gear meters for industrial applications



Badger Meter Europa GmbH

with middle and high viscosity

Oval gear meters

Oval gear meters are volumetric meters and are best suited for liquids with a viscosity up to 1.000 mPas. (Special models up to 1.000.000 mPas.). Typical applications are mineral oils, hydraulic oils, solvents, brake fluids, coolants, transmission oils, etc.

Measuring principle

As fluid passes through the metering chamber by entering the inlet port, it forces the internal gears to rotate and exits through the outlet port. Each rotation of the gear displaces a given volume of fluid. Controlled clearances between the gears and chamber wall insure minimum leakage. As the gears rotate, a magnet on each end of the gear activates the microprocessor in the register.



Model LM OG-I

for industrial applications

The Badger electronic lube meter is designed specifically to dispense motor oils (S.A.E. 5-50), gear oils (S.A.E. 80-240), automatic transmission fluid, engine coolant (Ethylene Glycol) brake fluid and windshield wiper fluid solutions.



Specifications

	OG oil meter		Brake fluid / waste oil meter	
	ANSI	Metric	ANSI	Metric
Maximum flow *	6 gpm	23 liters/minute	8 gpm	35 liters/minute
Minimum flow *	1.0 gpm	3.8 liters/minute	0.25 gpm	1.0 liters/minute
Operating pressure (maximum)	1015 psi	70 bar	1015 psi	70 bar
Operating pressure (minimum)	5 psi	0.35 bar	5 psi	.35 bar
Operating temperature (maximum)	110° F	45° C	110° F	45° C
Operating temperature (minimum)	-10° F	-20° C	-10° F	-20° C
Accuracy (non-approved version)	±0.5%	±0.5%	±0.5%	±0.5%
Accuracy (approved version)	±0.4%	±0.3%	n/a	n/a
Weight, less handle	2.5 lbs / 3.0 lbs	1.0 kg / 1.4 kg	2.5 lbs / 3.0 lbs	1.0 kg / 1.4 kg
5-digit LCD display, 5/16" high (8 mm)	Pints-Quarts-Gallons	Liters	Pints-Quarts-Gallons	Liters
Inlet & outlet connections	½" NPTF	½" BSPP	½" NPTF	½" BSPP

* Tested with Mobil DTE-25 motor oil at ambient temperature. Min./max. flow rates will vary with fluid viscosity.

	Engine coolant / wiper fluid	
	ANSI	Metric
Maximum flow *	6 gpm	23 liters/minute
Minimum flow *	1.0 gpm	3.8 liters/minute
Operating pressure (maximum)	1015 psi	70 bar
Operating pressure (minimum)	5 psi	0.35 bar
Operating temperature (maximum)	110° F	45° C
Operating temperature (minimum)	-10° F	-20° C
Accuracy (non-approved version)	±1.0%	±1.0%
Weight, less handle	2.5 lbs / 3.0 lbs	1.0 kg / 1.4 kg
5-Digit LCD Display, 5/16" High (8 mm)	Pints-Quarts-Gallons	Liters
Inlet & outlet connections	½" NPTF	½" BSPP

*Tested with water at ambient temperature

Please ensure that the fluid is properly filtered before entering the meter. Foreign particles will cause inaccuracy as well as malfunction of the meter.

Model LM OG - TI

for industrial applications

The transmitter, mounted on the meter, can be wired to batch controllers, remote counters and other electronically operated instruments that can accept pulses from a reed switch and have scaling capabilities. The oval gear transmitter is contained in a glass filled plastic housing with a NEMA 4X rating.



Specifications

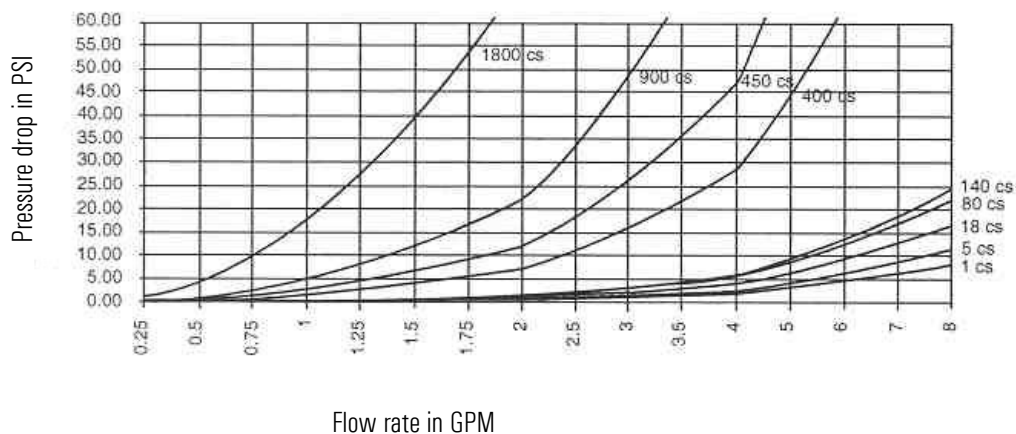
	ANSI	Metric
Flow range	.25 – 8 gpm	1 – 35 liters/minute
Operating pressure (maximum)	1015 psi	70 bar
Operating pressure (minimum)	5 psi	0.35 bar
Operating temperature (maximum) range	-10° to 110° F	-20° to 45° C
Accuracy	±0.75%	±0.75%
Pulse rate	380 Pulses / Gal.	100 Pulses / Liter
Reed switch rating (maximum)	150 VAC @ 10 Watts	150 VAC @ 10 Watts
Weight	2.0 lbs	0.9 kg
Inlet and outlet connections	½" NPTF	½" BSPP

Materials of construction

Meter housing/cover	:	Cast aluminium with hardcoat black anodize per Mil 8625 III Class 2
Gears	:	LCP (Liquid Crystal Polymer)
Transmitter housing	:	Glass filled nylon
Seal material	:	Viton

Oval gear pressure drop vs flow rate for various fluids

Viscosities in centistokes (11-19-96)



MN series



Fully positive displacement flow meters utilising the time proven oval gear principle offer extremely high accuracy (better than $\pm 0.5\%$ of reading), unaffected by viscosity (< 1 to $> 1,000,000$) with low pressure loss. The meters are available in a range of construction materials, port types and can be supplied with ancillary accessories including mechanical and electronic displays. One of the major advantages of the MN series meters is low maintenance and the ability for on site repairs when needed. The range includes meters with flows as low as 0.5 litres per hour and as high as 733 litres per minute. Each meter is supplied with a calibration certificate showing meter accuracy.

MN05 • MN1 • MN2



Technical data

Type	MN05		MN1				MN2			
Model	Stainless steel	Aluminium	Plastic	Stainless steel	Aluminium	High pressure	Plastic	Stainless steel	Aluminium	High pressure
Size	DN 3		DN 6				DN 6			
Flow range	under 1 mPas: 1 – 50 l/h over 1 mPas: 0,5 – 50 l/h		under 5 mPas: 5 – 100 l/h over 5 mPas: 2 – 100 l/h				under 5 mPas: 25 – 500 l/h over 5 mPas: 15 – 500 l/h			
Accuracy	$\pm 1\%$ of value		$\pm 1\%$ of value				$\pm 1\%$ of value			
Repeatability	0,03%		0,03%				0,03%			
Max. viscosity	1000 mPas		1000 mPas				1000 mPas*			
Max. pressure	10 bars 55 bars	5 bars	5 bars	10 bars 55 bars	5 bars	551 bars	5 bars	10 bars 55 bars	5 bars	551 bars
Max. temperature	80°C / 120°C		80°C / 120°C				80°C / 120°C			
Pulse rate	1552 PPL		1000 PPL				400 PPL			
Pulse transmitter	Reedswitch		Reedswitch				Reedswitch			
Recommended filter unit	0,05 mm		0,05 mm				0,05 mm			
Register	without		without				without			
Process connections	R 1/8"		R 1/4"				R 1/4"			
Housing material	316 SS	Alu	PPS	316 SS	Alu	316 SS	PPS	316 SS	Alu	316 SS
Oval gear material	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS	316 SS
Option	Pulse transmitter / hall effect sensor		Pulse transmitter / hall effect sensor				Pulse transmitter / hall effect sensor			

*With special oval gears up to 1.000.000 mPas as an option

MN 4

**Technical data**

Type	MN4		
Model	with pulse transmitter	with electronic display	with mechanical display
Size	DN 15		
Flow range	under 5 mPas: 180 – 1500 l/h over 5 mPas: 60 – 1800 l/h		
Accuracy	±0,5% of value		±1% of value
Repeatability	0,03%		
Max. viscosity	1000 mPas*		
Max. pressure	55 bars	55 bars	34 bars
Max. temperature	80°C / 120°C		
Pulse rate	112 PPL		
Pulse transmitter	Reedswitch		
Recommended filter unit	0,1 mm		
Register	none	electronic	mechanical**
Process connections	R 1/2"		
Housing material	Alu/316 SS		
Oval gear material	PPS/316 SS		PPS only
Option	Pulse transmitter / hall effect sensor Standard LCD display / Option with EEx-i Deluxe LCD preset meter / Option with EEx-i		

*With special oval gears up to 1.000.000 mPas

**No pulse transmitter in connection with mechanical register

MN 7

**Technical data**

Type	MN7	
Model	with pulse transmitter	with electronic display
Size	DN 25	
Flow range	under 5 mPas: 480 – 4200 l/h over 5 mPas: 180 – 4500 l/h	
Accuracy	±0,5% of value	
Repeatability	0,03%	
Max. viscosity	1000 mPas	
Max. pressure	10 bars	
Max. temperature	80°C	
Pulse rate	52 PPL	
Pulse transmitter	Reedswitch	
Recommended filter unit	0,1 mm	
Register	without	electronic
Process connections	R 1"	
Housing material	PPS	
Oval gear material	PPS	
Option	Pulse transmitter / hall effect sensor Standard LCD display / Option with EEx-i Deluxe LCD preset meter / Option with EEx-i	

MN 10

**Technical data**

Type	MN10		
Model	with pulse transmitter	with electronic display	with mechanical display
Size	DN 25		
Flow range	under 5 mPas: 600 – 6000 l/h over 5 mPas: 360 – 7200 l/h		
Accuracy	±0,5% of value		±1% of value
Repeatability	0,03%		
Max. viscosity	1000 mPas*		
Max. pressure	16/55 bars	16/55 bars	16/34 bars
Max. temperature	80°C / 120°C		
Pulse rate	36 or 72 PPL		---
Pulse transmitter	Reedswitch		
Recommended filter unit	0,1 mm		
Register	none	electronic	mechanical**
Process connections	BSP / NPT R 1" / DN 25 / ANSI 1" / Triclamp		
Housing material	Alu/316 SS/Bronze		
Oval gear material	PPS/316 SS		
Option	Pulse transmitter / hall effect sensor or combined Standard LCD display / Option with EEX-i Deluxe LCD preset meter / Option with EEX-i		

*With special oval gears up to 1.000.000 mPas

**No pulse transmitter in connection with mechanical register

MN 40

**Technical data**

Type	MN40		
Model	with pulse transmitter	with electronic display	with mechanical display
Size	DN 40		
Flow range	under 5 mPas: 900 – 14100 l/h over 5 mPas: 600 – 15000 l/h		
Accuracy	±0,5% of value		±1% of value
Repeatability	0,03%		
Max. viscosity	1000 mPas*		
Max. pressure	18 bars	18 bars	18 bars
Max. temperature	80°C / 120°C		
Pulse rate	14,5 PPL		---
Pulse transmitter	Reedswitch		
Recommended filter unit	0,1 mm		
Register	none	electronic	mechanical**
Process connections	R 1 1/2" / DN 40 / ANSI 1 1/2" / Triclamp		
Housing material	Alu/316 SS/Bronze		
Oval gear material	PPS/316 SS		
Option	Pulse transmitter / hall effect sensor Standard LCD display / Option with EEX-i Deluxe LCD preset meter / Option with EEX-i		

*With special oval gears up to 1.000.000 mPas

**No pulse transmitter in connection with mechanical register (analogue version has pulse option)

MN 50



Technical data

Type	MN50		
Model	with pulse transmitter	with electronic display	with mechanical display
Size	DN 50		
Flow range	under 5 mPas: 1800 – 18000 l/h over 5 mPas: 900 – 21000 l/h		
Accuracy	±0,5% of value		±1% of value
Repeatability	0,03%		
Max. viscosity	1000 mPas*		
Max. pressure	18 bars	18 bars	18 bars
Max. temperature	80°C / 120°C		
Pulse rate	6,68 PPL		---
Pulse transmitter	Reedswitch		
Recommended filter unit	0,1 mm		
Register	none	electronic	mechanical**
Process connections	R2" / DN 50 / ANSI 2" / Triclamp		
Housing material	Alu/316 SS/Bronze		
Oval gear material	PPS/316 SS		
Option	Pulse transmitter / hall effect sensor Standard LCD display / Option with EEx-i Deluxe LCD preset meter / option with EEx-i		

*With special oval gears up to 1.000.000 mPas

**No pulse transmitter in connection with mechanical register (analogue version has pulse option)

MN 80



Technical data

Type	MN80		
Model	with pulse transmitter	with electronic display	with mechanical display
Size	DN 80		
Flow range	under 5 mPas: 1200 - 43980 l/h over 5 mPas: 3960 - 36960 l/h		
Accuracy	±0,5% of value		±1% of value
Repeatability	0,03%		
Max. viscosity	1000 mPas*		
Max. pressure	12 bars	12 bars	12 bars
Max. temperature	80°C / 120°C		
Pulse rate	2.59 PPL	2.59 PPL	10 PPL
Pulse transmitter	Reedswitch		---
Recommended filter unit	0,1 mm		
Register	none	electronic	mechanical**
Process connections	3" BSP / NPT	DIN DN 80	ANSI 3"
Housing material	Aluminium		
Oval gear material	Aluminium		
Option	Pulse transmitter with hall effect sensor Standard LCD display EEx-i LCD		

*With special oval gears up to 1.000.000 mPas

**No pulse transmitter in connection with mechanical register

MN 100



Technical data

Type	MN100		
Model	with pulse transmitter	with standard display	with deluxe display
Size	DN 100		
Flow range	under 5 mPas: 300 – 1200 l/min over 5 mPas: 120 – 1200 l/min		
Accuracy	±0,5% of value		
Repeatability	0,03%		
Max. viscosity	1000 mPas		
Max. pressure	10 bars*		
Max. temperature	80°C	70°C	60°C
Pulse rate	2.315 PPL		
Pulse transmitter	Reed switch / Hall effect or reed / hall		
Pulse type	Dual reed switches**		
Recommended filter unit	0,1 mm		
Process connections	ANSI 150lb	JIS 10K or DN 100 PN16	
Housing material	Aluminium		
Oval gear material	Aluminium		
Option	Standard display intrinsically safe / Deluxe display intrinsically safe / Mechanical display with pulse option P500		

*Meets European pressure directive 97/23/EC

**Reed switch required for standard and deluxe LC displays.

MN D100



Technical data

Wetted components	Aluminium, zinc plated carbon steel, nitrile and viton
Accuracy	+/- 1% of reading
Flow range	3 litres (0.8 US gallon) – 80 litres (21 US gal) per min.
Max. pressure	1000kPa/145psi/10 bar
Register – totaliser	0 – 999999 litres/gallons
Register – reset	0 – 999.9 litres/gallons
Max. temp	80°C (176°F)
Process connections	1" BSP or NPT (F)
Dimensions	134 mm (w) x 118 mm (h) x 121 (d)
Weight	1.2 kg

MN 75 HG100



Technical data

Wetted components	PEI resin, aluminium, nitrile (NBR), mild steel
Accuracy	0.5% of reading
Flow range	3-60 l/min (0.8-15.8 US gal/min)
Max. working pressure	10,350 kPa / 1500 psi /103.5 bar
Inlet thread	3/4" NPT (F) or 3/4" BSP
Operating temperature	-10°C to +55°C (14°F to 131°F)
Approx. weight	980g

MN HG100



Technical data

Wetted components	Aluminium/zinc, mild steel, nitrile rubber
Flow rate	Up to 57 l/min (15 US gal)
Max. operating pressure	10,340 kPa/1,5000 psi/105 bar
Max.operating temperature	70°C (158°F)
Inlet swivel	3/4" BSP or NPT (F)
Weight (approx)	2.2 kg

Product line overview

Electromagnetic flow meters

Ultrasonic flow meters

Impeller meters

Turbine meters

Nutating disc meters

Oscillating piston meters

Lubrication meters

Oil management systems

Tank level systems

Control valves



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