



Avery-Hardoll bulkmeters are precision made positive displacement liquid measuring instruments that maintain accurate metering over long periods of operation. Simplicity of design together with sustained accuracy has led to widespread global use on aviation refuelling vehicles as well as master meters for use in calibration.

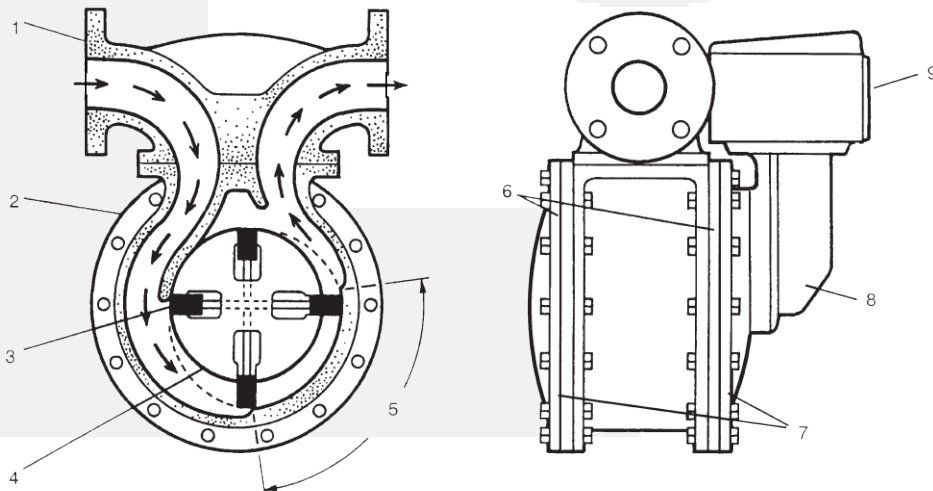
### Features

- Positive displacement liquid measuring instruments
- Unequalled performance in measurement to 0.1% accuracy.
- Free from installation effects
- 115 to 3870 LPM (25 to 850 GPM) flow rates

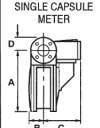
### Operation

The positive displacement principle is the ONLY accurate method of measuring fluid flow. No other technology can achieve such accuracy because measurement becomes inferred, that is indirect and subject to assumption. The Avery-Hardoll® bulkmeter directly converts volume to rotational output with minimum scope for error and with minimal disturbance from surrounding conditions, eg. turbulence from nearby valves, bends, etc.

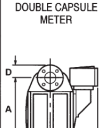
- The product enters the meter through the inlet manifold (1) and causes the rotor (4) to revolve by pressure on the vanes (3).
- The proximity of the rotor (4) to the body (2) forms an efficient seal, whilst the profile of the casing ensures that the vanes (3) are guided through the measuring crescent (5), where the volume of product is accurately measured.
- Product at line pressure fills the spaces between the inner (6) and outer (7) end covers providing pressure balanced inner end covers' which are therefore protected from distortion due to changes in line pressure.
- An extension shaft driving through a pressure tight gland in the meter front cover, transmits the rotor revolutions to the calibrating gearing (8) which drives the counter (9).



## Key Dimensions

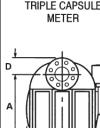
SINGLE CAPSULE METER 	METER SERIES	PIPELINE SIZE	FLOW RATE			FLANGES	
			Imp Gall	Lpm	m <sup>3</sup> /hr	Conform to	Material
	BM 250	2 1/2" (63mm)	25 to 250	115 to 1140	7 to 68	ASA 150 FF	DUCTILE IRON STEEL
			30 to 300	130 to 1370	8 to 82		
	BM 950	3" (76mm)	30 to 300	130 to 1370	8 to 82	ASA 150 FF	DUCTILE IRON STEEL

FLANGE BOLT HOLES	No. Off	SIZE		DIMENSION BETWEEN FLANGE FACES		METER DIMENSIONS								APPROX. WEIGHT OF BASIC METER	
		mm	ins	mm	ins	A		B		C		D		kg	lbs
				mm	ins	mm	ins	mm	ins	mm	ins	mm	ins		
4	4	19	.75	356	14	410	16.1	107	4.2	285	11.2	89	3.5	65	143
4	4	19	.75	356	15.75	400	15.75	107	4.2	285	11.2	89	3.5		
4	4	19	.75	356	14	410	16.1	107	4.2	285	11.2	95	3.75	65	143
4	4	19	.75	356	15.75	400	15.75	107	4.2	285	11.2	95	3.75		

DOUBLE CAPSULE METER 	METER SERIES	PIPELINE SIZE	FLOW RATE			FLANGES	
			Imp Gall	Lpm	m <sup>3</sup> /hr	Conform to	Material
	BM 450	3" (76mm)	45 to 450	200 to 2050	12 to 123	ASA 150 FF	DUCTILE IRON STEEL
			50 to 500	220 to 2280	14 to 136		
	BM 550	4" (102mm)	50 to 500	220 to 2280	14 to 136	ASA 150 FF	DUCTILE IRON STEEL
	BM 350	4" (102mm)	55 to 615	250 to 2800	15 to 168	ASA 150 FF	DUCTILE IRON STEEL intermittent use

FLANGE BOLT HOLES	No. Off	SIZE		DIMENSION BETWEEN FLANGE FACES		METER DIMENSIONS								APPROX. WEIGHT OF BASIC METER	
		mm	ins	mm	ins	A		B		C		D		kg	lbs
				mm	ins	mm	ins	mm	ins	mm	ins	mm	ins		
4	4	19	.75	400	15.75	407	16.0	170	6.7	348	13.7	95	3.75	105	232
4	4	19	.75	400	15.75	430	16.9	170	6.7	348	13.7	95	3.75		
8	8	19	.75	400	15.75	420	16.5	170	6.7	348	13.7	115	4.5	112	247
8	8	19	.75	400	15.75	430	16.9	170	6.7	348	13.7	115	4.5		

ALL DIMENSIONS AS BM 550

TRIPLE CAPSULE METER 	METER SERIES	PIPELINE SIZE	FLOW RATE			FLANGES	
			Imp Gall	Lpm	m <sup>3</sup> /hr	Conform to	Material
	BM 650	4" (102mm)	65 to 650	300 to 3000	18 to 177	ASA 150 FF	STEEL
			65 to 650	300 to 3000	18 to 177		
	BM 750	6" (152mm)	65 to 650	300 to 3000	18 to 177	ASA 150 FF	STEEL
	BM 850	6" (152mm)	85 to 850	387 to 3870	23 to 232	ASA 150 FF	STEEL used on aviation kerosene

FLANGE BOLT HOLES	No. Off	SIZE		DIMENSION BETWEEN FLANGE FACES		METER DIMENSIONS								APPROX. WEIGHT OF BASIC METER	
		mm	ins	mm	ins	A		B		C		D		kg	lbs
				mm	ins	mm	ins	mm	ins	mm	ins	mm	ins		
8	8	19	.75	400	15.75	430	16.9	233	9.2	411	16.2	115	4.5	126	278
8	8	19	.75	400	15.75	430	16.9	233	9.2	411	16.2	115	4.5		
8	8	22	.875	400	15.75	430	16.9	233	9.2	411	16.2	140	5.5	143	315
8	8	22	.875	400	15.75	430	16.9	233	9.2	411	16.2	140	5.5		

ALL DIMENSIONS AS BM 750

## Operational Specifications and Calibration

**Maximum working pressure:** 10.5 bar (150 psi)

**Test pressure:** 21 bar (300 psi)

**Temperature range:** -28°C to 100°C

**Volume per revolution:**

- 2.27 litres (single capsule)
- 4.54 litres (double capsule)
- 6.82 litres (triple capsule)

**Repeatability (typically):** .02%

**All meters are tested to 300 psi (21 bar).**

**Calibration adjustment:** Is provided to minimize the meter error at any selected flowrate. Adjustment is stepless; no gear changing is necessary; the calibration screw is easily accessible after breaking a seal and removing a sealing screw.

**All meters are tested before dispatch:** Meters are tested at a range of flow rates. Test certificates available upon request.

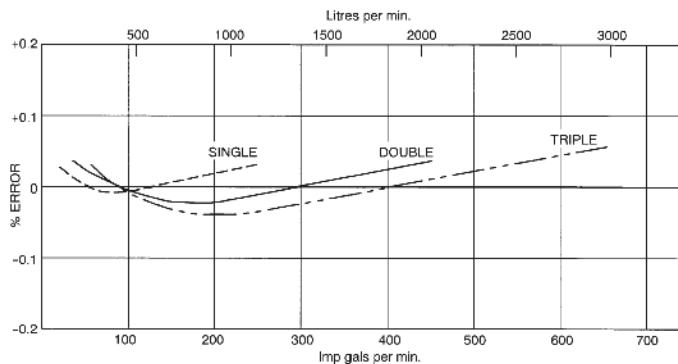
**The fluid used for testing:** Odorless kerosene.

**Specific gravity:** @ 60/60°F, 15/15°C = 0.8

**Viscosity at 60°F, 15°C = 2.4 centistokes.**

**Suggested correction to be made to the calibrating**

*Typical accuracy curves for the basic meter build (10:1 turndown)*



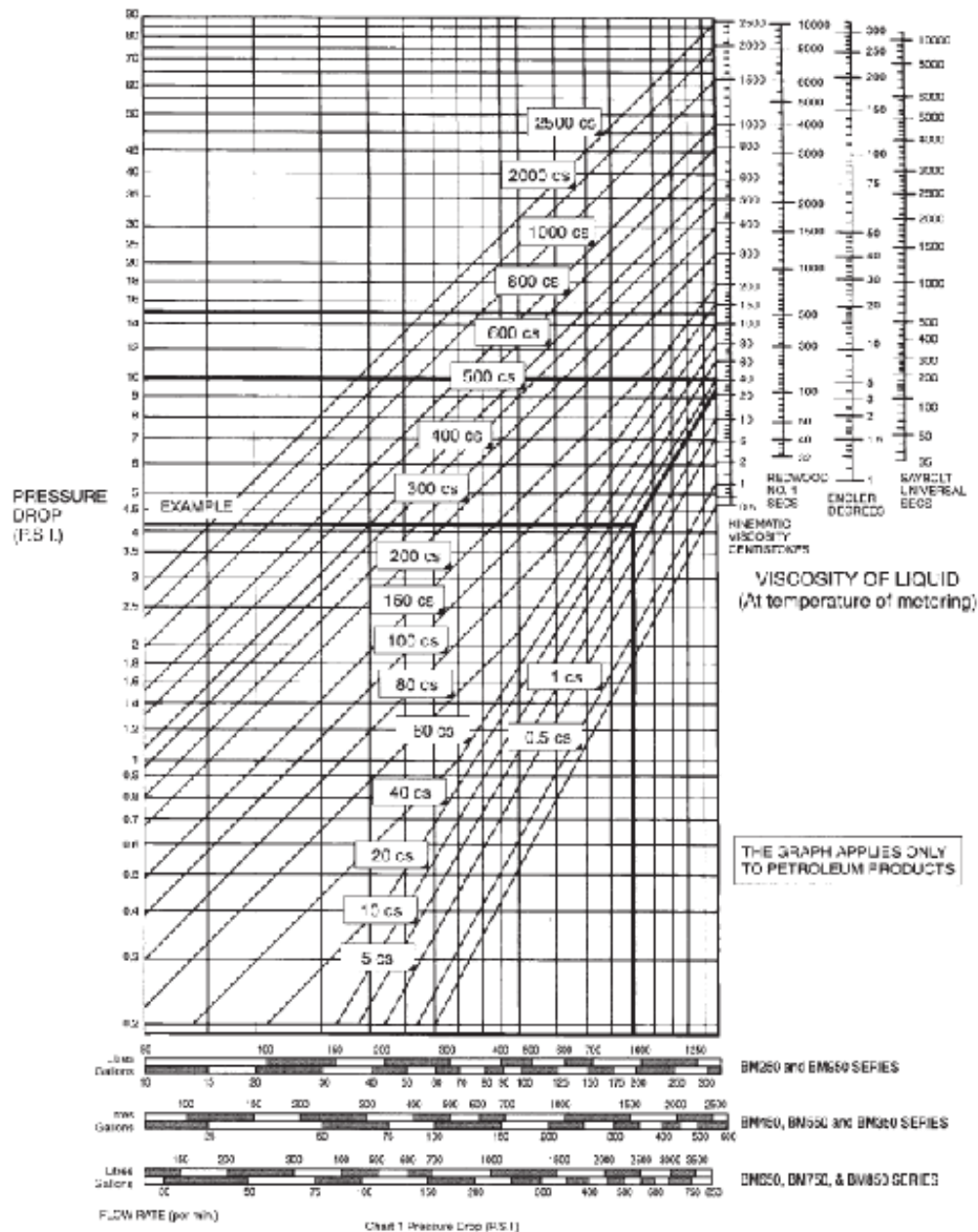
## Performance

### Viscous Products

Avery-Hardoll bulkmeters can be used on all petroleum products of all viscosities. However there is an increase in pressure drop with more viscous fuels, which under normal circumstances will limit the maximum flow rate obtainable.

It is recommended that the pressure drop through a bulkmeter should not exceed 15 psi (one bar), above which the load on the bearings will start to cause wear. Consequently when using products with viscosities (at operating conditions) above 100 centistokes, it is necessary to reduce the maximum permitted flowrate. As a guide it is suggested that the pressure drop through the meter should not exceed 10 psi (0.7 bar) for continuous running at maximum speed or 15 psi (one bar) for continuous running at half speed.

**Pressure Loss:** The low pressure drop for the BM series of Avery-Hardoll bulkmeters is displayed below:



## Standard Materials

### Manifold

- Fabricated steel or ductile iron ductile iron not available on triple capsule meters

### Body

- Ni-Resist cast iron

### Vanes

- Carbon

### Rotor

- Aluminium or Ni-Resist cast iron

### Outer Covers

- Aluminium or Ni-Resist cast iron

### Inner Covers

- Ni-Resist cast iron

### Bearings

- Stainless steel

### Seals

- High nitrile or fluorocarbon

## Accuracy/Performance

### Maximum Working Pressure

- 10.5 bar (150 PSI)

### Test Pressure

- 21 bar (300 PSI)

### Temperature Range

- 28 to 100 °C

### Repeatability

- 0.02% typically

### Volume Per Revolution

- 2.27 litres single capsule
- 4.54 litres double capsule
- 6.82 litres triple capsule

### Maximum Flow Rate

- 1370 LPM (82 m<sup>3</sup>/hr) single capsule
- 2500 LPM (168 m<sup>3</sup>/hr) double capsule - intermittent
- 3870 LPM (232 m<sup>3</sup>/hr) triple capsule

## Meter Accessories

### MASTERLOAD II Register

The Avery-Hardoll MASTERLOAD II™ is a versatile micro processor-based electronic controller. The system is comprised of a pulse transmitter, display unit, flow rate and a totaliser.

### MASTERLOAD III Register

The Avery-Hardoll MASTERLOAD III™ is a dual microprocessor-based electronic meter register. Monitors and reports over 20 fueling data points and is wireless reporting capable with FlightConnect® (option).

### Counters

Standard Veeder-Root counters with five large-figure zeroing drum and a seven-figure, small non-zeroing totaliser.

### Ticket Printer

Available with or without identifier, in the following forms:

- Batch delivery, starting at zero and showing the amount delivered.
- Accumulative total with initial and final totaliser figures.

### Mechanical Preset and Preset Valve

A Veeder-Root preset register with five-figure resettable counter can be configured to perform preset fuellings via mechanical linkage to a lever-operated preset valve, providing two stage closure and precise shut off of flow.

### Rate Of Flow Indicator

### Air Separator

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Prevents trapped air from reaching the meter.

### Slipstream™ Densitometer

Provides real-time density measurement of fuel through the system. (Can be used with MASTERLOAD III register)

### Mechanical Preset With Microswitches

Microswitches can be fitted to the preset register to control pump start and stop, and solenoid operated preset valves.

### Extended Counter Drive

Provided for installations where the counter is required to be read at height above the bulkmeter.

### Counter Extensions

Counter extensions are available to arrange the counter upright for BM Series flowmeters mounted in vertical pipework.

### Additive Injection

Mechanically injects fractional proportions of additives at a pre-determined ratio.

### Strainer

Essential to prevent damage to the meter and is available with 40, 60, 80, 100 and 120 mesh baskets, with either cast iron or cast steel body.

### Flow Governor

Limits flow rate at maximum meter capacity when several meters are fed from one pump.

Liquid Controls  
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