

MS16HP
0410
0006



# POSITIVE DISPLACEMENT FLOWMETERS

## M1HP SERIES INSTRUCTION MANUAL

### TO THE OWNER

Please take a few minutes to read through this manual before installing and operating your meter.

Please retain this manual for future reference.

If you have any problems with the meter, refer to the maintenance and trouble shooting sections of this manual.

This manual contains connection and operating instructions for the meters. If you need further assistance, contact your local representative or distributor for advice.

This flow meter has incorporated the oval rotor principal into its design.

This has proven to be a reliable and highly accurate method of measuring flow.

Exceptional repeatability and high accuracy over a wide range of fluid viscosities and flow rates are features of the oval rotor design. With low pressure drop and high pressure rating means oval rotor flow meters are suitable for both gravity and pump (in-line) applications.

Flow meters and rotors are manufactured in 316 Stainless Steel only.



To prevent damage from dirt or foreign matter it is recommended that a Y or basket type 200 mesh strainer be installed as close as possible to the inlet side of the meter. Contact your local representative for advice.

**Note:**

To prevent damage to the meter slowly fill the system with fluid (this will prevent damage caused by air purge).

Failure to do this could damage the meter.

To reduce pressure build up turn off the pump at the end of each day.

### OPERATION



**PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE**

**Before use, confirm the fluid to be used is compatible with the meter. Refer to Industry fluid compatibility charts or consult your local representative for advice.**

Configuration  
Reed

Configuration  
Hall Effect

<b>Reed Switch</b>	<b>1</b>	No Connection
<b>Reed Switch</b>	<b>2</b>	No Connection
No Connection	<b>3</b>	HE Common 0V
No Connection	<b>4</b>	HE Signal Output
No Connection	<b>5</b>	HE Supply + 5 ~ 24vdc

**Notes: Hall Effect Sensor**

**Current Draw: Do not exceed 25mA**

**Output: NPN Open Collector NO Resistor is provided on PCB  
With L C Displays, reed switch must be used.**

Hall Effect Specifications

**Absolute Maximum Ratings**

Characteristic	Symbol	Notes	Rating	Units
Supply Voltage	V <sub>CC</sub>		30	V
Reverse Supply Voltage	V <sub>RCS</sub>		-30	V
Output Off Voltage	V <sub>OUT</sub>		30	V
Reverse Output Voltage	V <sub>ROUT</sub>		-0.5	V
Output Current	I <sub>OUT(SINK)</sub>		25	mA
Magnetic Flux Density	B		Unlimited	G
Operating Ambient Temperature	T <sub>A</sub>		-40 to 150	°C
Maximum Junction Temperature	T <sub>J(max)</sub>	Range L	165	°C
Storage Temperature	T <sub>Stg</sub>		-65 to 170	°C

Hall Effect Specifications

Magnetic properties	Conditions	Min	Typ	Max	Unit
Pull-In	at 20°C			36.5	AT
Test equipment				KMS-03	

Special Product Data	Conditions	Min	Typ	Max	Unit
Contact rating	Any DC combination of V & A ref to exposed part, individual max.'s			1.0	W
Switching Voltage	DC or Peak AC			30	VDC
Operating Amperes	DC or Peak AC			0.5	A
Switching current	DC or Peak AC			0.5	A
Sensor-resistance	measured with 40% overdrive			360	mOhm
Housing material				Celanex 3216	
Case colour				black	
Sealing compound				Epoxy resin	

Environmental data	Conditions	Min	Typ	Max	Unit
Operating Temperature		-5		130	°C
Storage Temperature		-20		130	°C

Cable specification	Conditions	Min	Typ	Max	Unit
Cable type					
Temperature range unmoved		-30		130	°C
Temperature range moved		-5		130	°C
Cable material				FEP	
Cross section				AWG 28	

Reed Switch Specifications

## INSTALLATION

1. Use thread sealant on all pipe threads.
2. Ensure the meter is installed so that rotor shafts are always in a horizontal plane.  
Flow is bi-directional.
2. Ensure the meter is installed so that rotor shafts are always in a horizontal plane.  
Flow is bi-directional.
3. The use of flexible connections is recommended.
4. Extreme care must be taken when installing the meter. Pipe strain or over tightening meter connections can cause meter damage.

## MAINTENANCE

### Disassembly

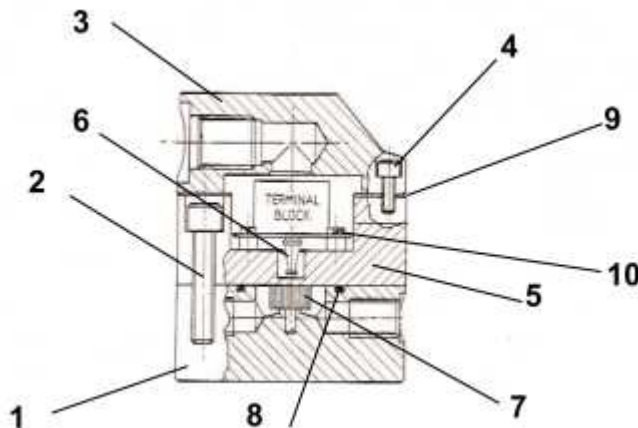
1. Ensure the fluid supply to the meter has been disconnected, and the line pressure has been released before disassembly.
2. Remove four (4) screws (Item 4) and remove the pulser cap (Item 3).

3. Remove the gasket (Item 9).
4. Remove eight (8) screws (Item 2) and remove the meter cap (Item 6).
5. Remove o-ring (Item 8) and inspect (replace o-ring if damaged).
6. Remove rotors (Item 7), clean and inspect (replace rotors if damaged).
7. To remove the PCB (Item 5) remove the 2 screws (Item 10).

### Reassembly

1. Place rotors (Item 7) into the meter body. The rotors should be at 90 degrees to each other.
2. Lightly rotate the rotors (Item 7) by hand (they must rotate freely).
3. Install o-ring (Item 8).
4. Replace the meter cap (Item 6) and tighten the 8 screws (Item 2) uniformly to 35Nm (25 Ft/lbs).
5. Replace the pulser cap (Item 3) and tighten the 4 screws (Item 4).

## DISPLAY PARTS LISTING



Key:  
X - Indicates recommended Spare Parts to stock  
Bold text indicates Stainless Steel Parts

Item No.	No off	Rec. Parts	Part or Set (for order)	Part Description
1	1		MS1BS	Meter Body Assy. (BSP)
1	1		MS1NS	Meter Body Assy. (NPT)
2	8		MS367S	Bolt set - Socket Head
3	1		MS170H	Pulser Cap (BSP)
3	1		MS170HN	Pulser Cap (NPT)
4	4	X	MS115S	Bolt set - Socket Head
5	1		MS3HS	Meter Cap
6	1	X	MS344HS	Hall Effect PCB
6	1	X	MS3344RS	Reed Switch PCB
7	2	X	MS6-1S	Rotor Set Stainless Steel
8	1	X	BS029VS	O-ring (Viton)
8	1	X	BS029ES	O-ring (EPM)
8	1	X	BS029PS	O-ring (Perfluoro elastomer)
9	1		MS300HS	Gasket
10	1		MS284S	Screws Sets

# METER SPECIFICATION

**Meter Type**

**Flow Ranges (Liters per hour or US Gall. per hour)**

**Above 5 centipoise**

**Below 5 centipoise**

**Accuracy of reading**

**Maximum Viscosity**

**Maximum Operating Pressure**

**Maximum Operating Temperature**

**Pulse Type**

**Pulses per Litre/US Gallons**

**Meter Dimensions**

**Weight**

**Pulse**

2 to 100/0.53 to 26.4

5 to 100/1.32 to 26.4

+/- 1%

1000 Centipoise

55160kPa/8000psi/551Bar

120C/248F

Hall Effect Sensor/Reed Switch

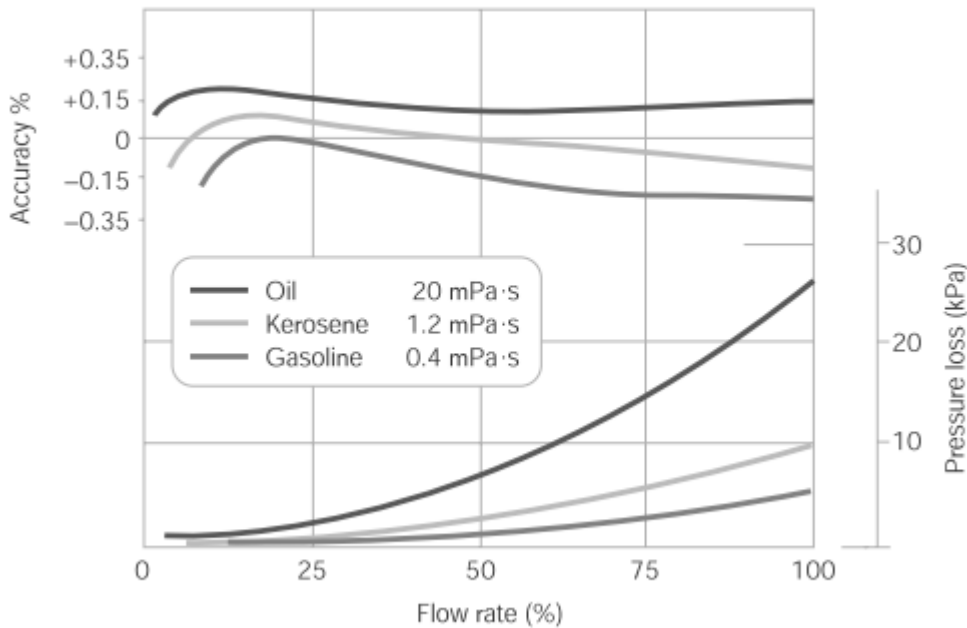
1000/3785

86mm Dia. 3.4" Dia (Meter Body)

83mm/3.25"(Port Face to Face)

3.3Kg/116oz

**Meter sizes M05, M1 & M2**



# TROUBLE SHOOTING

TROUBLESHOOTING GUIDE		
TROUBLE	CAUSE	REMEDY
Fluid will not flow through the meter	a) Foreign matter blocking rotors b) Line strainer blocked c) Damaged rotors d) Meter connections over tightened	a) Dismantle meter, clean rotors (strainer must be fitted in line) b) Clean strainer c) Replace rotors (Strainer must be fitted in line) d) Re-adjust connections
Reduced flow through the meter	a) Line strainer is partially blocked b) Fluid is too viscous	a) Clean strainer b) Maximum viscosity 1000 centipoise
Meter reading inaccurate	a) Fluid flowrate is too low or high b) Air in fluid c) Excess wear caused by incorrect installation	a) See specifications for min. and max. flowrates b) Bleed air from system c) Check meter body and rotors
Meter not giving a pulse signal	A) Faulty Hall effect sensor or reed switch b) Faulty magnet	a) Replace meter cap for reed switch models, replace PCB for Hall effect models b) Replace rotors

# macnaught warranty

1. Macnaught Pty Ltd ("Macnaught") warrants that all products manufactured by Macnaught and/or supplied by Macnaught under the "Macnaught" brand, excluding M-SERIES, MEC-SERIES and WM-SERIES positive displacement meters ("Meters") and components subject to wear, will be free from any defects caused by faulty materials or workmanship ("Warranty") for a period of 5 years from the date of purchase of the product.
2. For products (excluding Meters) which carry the "Macnaught design" endorsement, an additional Warranty period of 5 years applies to all mechanical components (excluding electronic and electrical components), giving a total Warranty period of 10 years.
3. For Meters, the Warranty period is 2 years from the date of purchase of that product.
4. For components contained in all products which are usually subject to wear from normal operation of the products (such as o-rings, seals, bushes, springs, hoses and batteries), the Warranty period is 12 months from the date of purchase of the relevant product.
5. For products and components which are not manufactured by Macnaught and are supplied by Macnaught under a brand name other than "Macnaught", the Warranty period is the longer of 12 months from the date of purchase of the relevant product and the period of the manufacturer's warranty.
6. The warranties contained in clauses 1, 2, 3, 4 and 5 above are conditional on the purchaser, during the relevant Warranty period:
  - A. delivering to Macnaught a detailed notice setting out full details of any defect in any product and details of the date and place of purchase (together with copies of purchase receipts and/or other supporting documents); and
  - B. at the purchaser's own cost, returning the defective product to the nearest authorised Macnaught service centre.
7. Subject to compliance by the purchaser with clause 6, Macnaught shall, at its option, repair or replace any product or component found defective by its inspection by reason of faulty materials or workmanship of Macnaught.
8. This Warranty does not cover the failure of products, parts or components which, in the sole judgment of Macnaught, arises other than from faulty materials or workmanship of Macnaught, including misuse, abrasion, corrosion, negligence, accident, substitution of non-Macnaught parts, unauthorised modification, improper use, storage or handling, faulty installation or tampering by the purchaser or any third party.
9. If Macnaught's inspection discloses no defect in material or workmanship, repair or replacement and return (at Macnaught's sole option) will be made at customary charges, which will be advised to the purchaser.
10. Macnaught's liability and the purchaser's rights under this Warranty shall be limited to the repair or replacement of defective products or components and in particular, shall not extend to any direct, special, indirect or consequential damage or losses of any nature.
11. The foregoing Warranty supersedes, voids and is in lieu of all or any other warranties.

This Warranty does not form part of, nor does it constitute, a contract between Macnaught and the end-user or purchaser. It is additional to any warranty given by the seller of the products. This Warranty does not exclude, limit, restrict or modify the non-excludable rights or remedies conferred upon the end-user or purchaser, or the non-excludable duties or liabilities imposed on the seller or Macnaught, by Part V, Divisions 2, 2A and Part VA of the Trade Practices Act 1974 (Commonwealth) or other legislative provisions. Macnaught otherwise excludes, to the extent permitted by law, any rights conferred on the end-user or purchaser or duties or liabilities imposed upon Macnaught.



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