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| MS17PE |
| 0410 |
| 0007 |



POSITIVE DISPLACEMENT FLOWMETERS

M2 ENCODER SERIES INSTRUCTION MANUAL

TO THE OWNER

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

The 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.

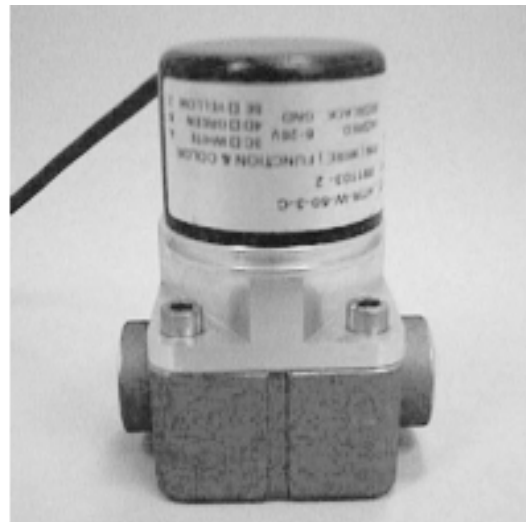
The flow meters and rotors are manufactured in 316 Stainless Steel only.

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.



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.

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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.
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.

ENCODER DETAILS

Optical encoders are delicate instruments and should be treated with care. Shock loads and incorrect electrical connection will lead to Encoder damage.

To avoid electrical interference use quality shielded cable to connect the encoder to the recording instrument, ensure the cable is grounded, as shown in the wiring diagram below.

To avoid damage to the encoder please observe the manufacturers electrical specifications, wiring table and wiring diagram shown below.

Encoder Specifications:

MS360 10 pulses/rev. **

MS361 50 pulses/rev. **

Open collector.

Max. signal transfer distance 50m.

Storage Temperature Range -20dgr C to 80dgr C.

Operating Humidity Range 35% to 90%, non condensation.

IP50 Rating.

MAINTENANCE

Disassembly

1. Ensure the fluid supply to the meter has been disconnected, and the line pressure has been released before disassembly.
2. Remove the four screws (Items 4 and 5) and remove the meter cap (Item 2).
3. Remove o-ring (Item 7) and inspect (replace o-ring if damaged).
4. Remove rotors (Item 6), clean and inspect (replace rotors if damaged).

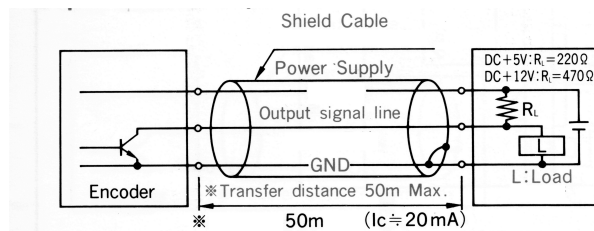
Reassembly:

1. Place rotors (Item 6) into the meter body. The rotors should be at 90o to each other.
Note: The rotor with magnets must be placed in the body on the same side as the groove on the body. This rotor drives the clutch (Item 10).
2. Lightly rotate the rotors (Item 6) by hand (they must rotate freely).
3. Install o-ring (Item 7).
4. Replace the meter cap (Item 2)

- Note:** The Clutch (Item 10) must line up with the rotor containing the magnets.
5. Replace four screws (Items 4 and 5).

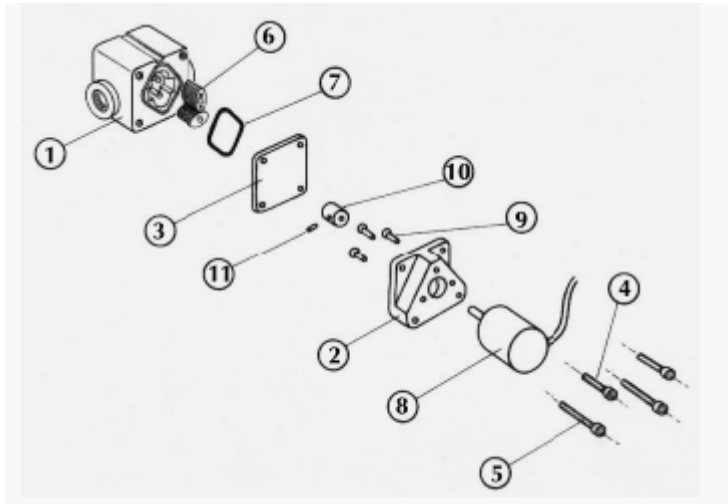
CAUTION:

Care must be taken not to over tighten the screws (Items 4 and 5) or damage may occur.



| Wire Colour | ** Function | ## Function |
|--------------------|--------------------|--------------------|
| Red | +V | DC +5 ~ 12V |
| Black | 0V Common | GND |
| White | A Signal | GND |
| Green | B Signal | B Channel Out |
| Yellow | Z Signal | Z Channel Out |
| Blue | NA | A Channel Out |
| Shield | NC | NC |

DISPLAY PARTS LISTING



Key:

X Indicates recommended Spare Parts to stock
Bold text indicates Stainless Steel Model Parts

| ITEM No | No OFF | REC. PARTS | PART/SET | PART DESCRIPTION |
|---------|--------|------------|-------------------------------|--|
| 1 | 1 | | MS2S-1S | Meter Body Assy. (BSP) Stainless Steel |
| 1 | 1 | | MS2S-2S | Meter Body Assy. (NPT) Stainless Steel |
| 2 | 1 | | MS510S | Meter Cap Alumin. 10/50 Pulse/Rev (incl.items 4 & 5) |
| 2 | 1 | | MS511S | Meter Cap Alumin. 1000/2000 Pulse/Rev (incl.items 4 & 5) |
| 3 | 1 | | MS513S | Cover Plate |
| 4 | 2 | | Order MS510S or MS511S | Meter Cap front mounting Screws M5 X 16 |
| 5 | 2 | | Order MS510S or MS511S | Meter Cap rear mounting Screws M5 X 25 |
| 6 | 1 | X | MS7-1ES | Rotor SS (Set) |
| 6 | 1 | X | MS7-1HES | Rotor SS (Set) High Viscosity |
| 7 | 1 | X | BS029VS | O-ring (Viton) |
| 7 | 1 | X | BS029PS | O-ring (Perfluoro Elastomer) |
| 7 | 1 | X | BS029ES | O-ring (EPDM) |
| 8 | 1 | | MS360S | Encoder 10 pulses per rev (incl. 2 x item 9) |
| 8 | 1 | | MS361S | Encoder 50 pulses per rev (incl. 2 x item 9) |
| 8 | 1 | | MS407S | Encoder 1000 pulses per rev (incl. 3 x item 9) |
| 8 | 1 | | MS564S | Encoder 2000 pulses per rev (incl. 3 x item 9) |
| 9 | 2 | | | Encoder mounting screws M3 x 16 |
| 9 | 3 | | | Encoder mounting screws M3 x 16 |
| 10 | 1 | | MS512S | Clutch (incl. 2 x ms11 Magnets and item 11) |
| 11 | 1 | | MS512S | Grub screw |

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 Gall. (10 pulse/rev encoder)

Pulses per Litre/US Gall. (50 pulse/rev encoder)

Meter Dimensions

Weight

Pulse

15 to 500/4.0 to 132

25 to 500/6.6 to 132

+/- 1%

1000 Centipoise

275kPa/40psi/2.75Bar

60C/140F

Open Collector Encoder

2,000/528.34

10,000/2641.72

50mm x 50mm /1.97" x 1.97" (Meter Body)

65mm/2.58"(Port Face to Face)

700g/25oz

| 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 "Macnaughtdesign" 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.