MS17PE
1101
0003

MACNAUGHT®

The experts in fluid technology

Positive displacement flowmeters

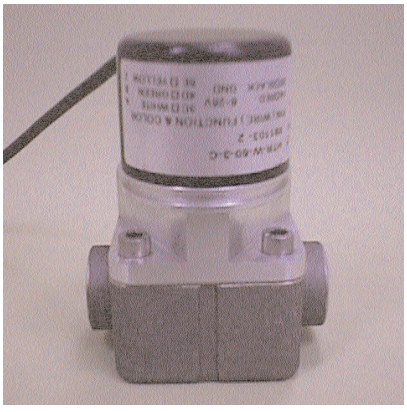
M2 Encoder series instruction manual

To the owner

Thank you for purchasing a Macnaught M Series Flowmeter. Please take a few minutes to read through this manual before installing and operating your meter. 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 M2 Encoder Series meters. If you need further assistance, contact your local Macnaught representative or contact Macnaught by telephone, fax or e-mail for advice.

The Macnaught M Series Flowmeter 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 M Series flowmeter design. The low pressure drop and high pressure rating means the M Series flowmeter is suitable for both gravity and pump (in-line) applications.



The Macnaught M2 Encoder Series flowmeters are supplied in 316 Stainless Steel. Standard rotors are made from 316 Stainless Steel.

Operation

PLEASE READ THIS INFORMATION CAREFULLY BEFORE USE!

Before use, confirm the fluid to be used is compatible with the meter (refer to the Macnaught fluid compatibility chart), or consult your local Macnaught representative for advice.

To prevent damage from dirt or foreign matter, Macnaught recommends a Y or basket type 200 mesh strainer be installed as close as possible to the inlet side of the meter (if required contact Macnaught for further information).

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

Note: Failure to do this could damage the meter.

For pump applications, turn off the pump at the end of each day.

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. Macnaught recommends use of flexible connections.
4. Extreme care must be taken when installing the meter. Pipe strain or overtightening meter connections can cause meter damage.

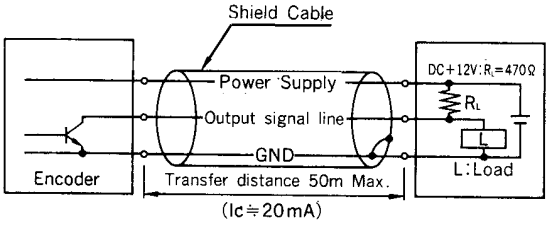
Encoder details

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. **
  MS407 1000 pulses/rev. ##
  MS564 2000 pulses/rev. ##
- Open collector.
- Max. signal transfer distance 50m.
- Current consumption:
  ** <=60mA.
  ## <=50mA
- Square wave output
- Operating Voltage:
  ** 8 to 26 VDC.
  ## DC5V -5% ~ DC12V +5%
- Operating Temperature Range 0^{O}C to 60^{O}C
- Storage Temperature Range -20^{O}C to 80^{O}C.
- Operating Humidity Range 35% to 90%, non condensating.
- IP50 Rating.



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

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 3 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 90^{o} to each other.

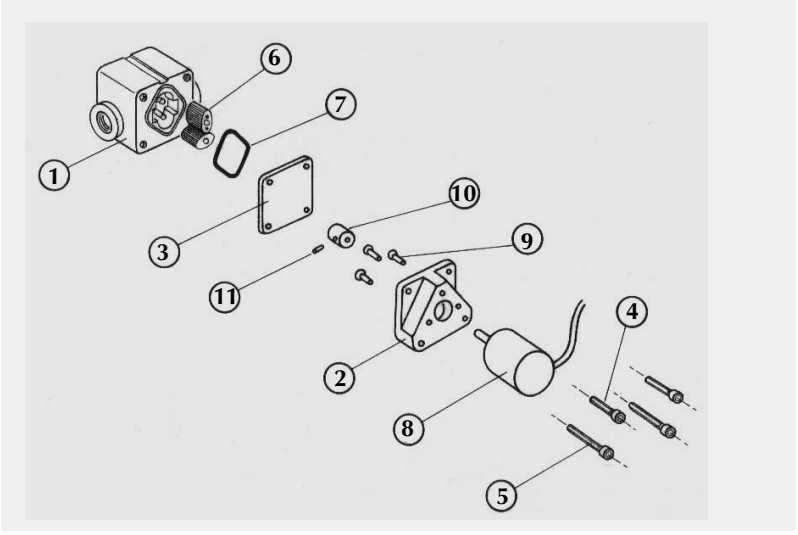
Note: The rotor with magnets must be placed in the body on the same side as the groove on the body. This rotor drives the clutch (Item 10).

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 overtighten the screws (Items 4 and 5) or damage may occur.

Display parts listing



Key:
u **Indicates recommended Spare Parts to stock**
Bold text indicates Stainless Steel Model Parts

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	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**	u	**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**	u	**MS7-1Es**	**Rotor SS (Set)**
6	**1**	u	**MS7-1HEs**	**Rotor SS (Set) High Viscosity**
7	1	u	BS127Vs	O-ring (Viton)
7	1	u	BS127Ps	O-ring (Perfluro Elastomer)
7	1	u	BS127Es	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 specifications

Meter Type	Pulse
Flow Ranges (Litres per hour/US Gallons per hour)	
Above 5 centipoise	15 to 500 / 0.66 to 132
Below 5 centipoise	25 to 500 / 1.85 to 132
Accuracy of Reading	+/- 1%
Maximum Viscosity	1000 Centipoise
Maximum Operating Pressure	275 kPa/ 40 PSI/ 2.75 Bar
Maximum Operating Temperature	60^{O}C / 140^{O}F
Pulse Type	Open Collector Encoder
Pulses per Litre/US Gallons (10 pulse/rev encoder)	2,000/528.34
Pulses per Litre/US Gallons (50 pulse/rev encoder)	10,000/2641.72
Pulses per Litre/US Gallons (1000 pulse/rev encoder)	200,000/52834.57
Pulses per Litre/US Gallons (2000 pulse/rev encoder)	400,000/105669.15
Meter Dimensions	50 x 50mm / 1.97″ x 1.97″ (Meter Body) 65mm / 2.58″ (Port Face to Face)
Weight	700g / 25oz

Trouble shooting

TROUBLE SHOOTING 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 stariner 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 too 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 Encoder B] Faulty Encoder wiring C] Rotors installed in wrong position	A] Replace Encoder B] Check Encoder wiring C] Refer to correct rotor positioning - assembly instructions.

Warranty

Macnaught Industries ('Macnaught') warrants that the Products will be free from any defects caused by faulty material or workmanship for a period of twelve (12) months from the date of sale of the Products to the enduser (the 'Warranty Period') PROVIDED THAT, during the Warranty Period:

1. Macnaught receives notice setting out full details of any defect in any product and details of the time and place of purchase of the Product: and
2. the enduser, at its own cost returns the Product to the nearest authorised Macnaught Service Centre.

Macnaught shall, as its option repair or replace and Product found defective by its inspection or refund the price paid by the enduser for that Product.

Macnaught's liability and the enduser's rights under this warranty shall be limited to such repair, replacement or refund and, in particular, shall not extend to any direct, special, indirect or consequential damage or losses of any nature.

Note:

This warranty does not form part of, nor does it constitute, a contract between Macnaught and the enduser. It is additional to any warranty given by the seller of the Products and does not exclude, limit, restrict or modify the rights and remedies conferred upon the enduser, or the liabilities imposed on the seller, by any statute or other laws in respect of the sale of the Product.

MACNAUGHT®

MACNAUGHT PTY. LTD
ACN 000 075 785
41-49 Henderson Street, Turella Sydney NSW Australia 2205
PO Box 90 Arncliffe, Sydney NSW Australia 2205
Telephone +61 2 9567 0401 Facsimile +61 2 9597 7773
Email sales@macnaught.com.au - Web Site www.macnaught.com.au