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POSITIVE DISPLACEMENT FLOWMETERS

M80 SERIES INSTRUCTION MANUAL

M80 Pulse; Standard LCD; Deluxe LCD; From serial No.CXXXX

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 meters with Pulse outputs and Liquid Crystal Displays. Each model with a Liquid Crystal Display has an additional LCD instruction manual supplied

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. The low pressure drop and high pressure rating means oval rotor flow meters are suitable for both gravity and pump (in line) applications.

Flow meters are available in either Aluminium or 316 Stainless Steel. Standard rotors are made from PPS (Polyphenylene Sulfide Resins) with optional 316 Stainless Steel rotors available for both Stainless steel and Aluminium models.
Meters are available with either:

- Pulse output
- Standard LC Display and Pulse
- Deluxe LC Display and Pulse

IMPORTANT INFORMATION

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 60 mesh strainer be installed as close as possible to the inlet side of the meter. Contact your local representative for advice.

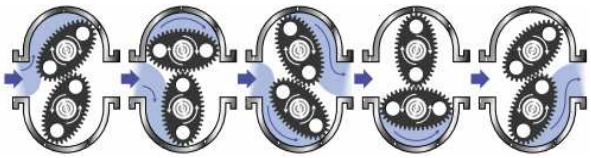
Note: When a strainer is installed it should be regularly inspected and cleaned. Failure to keep the strainer clean will dramatically effect flow meter performance.

Note: To prevent damage caused by air purge slowly fill the meter with fluid. To reduce pressure build up turn off the pump at the end of each day.

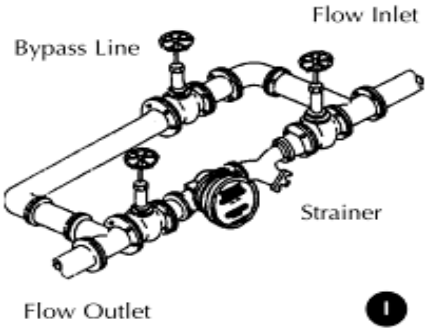
Maintenance can be carried out to the liquid crystal displays and pulse units without removing or isolating the meter from the line. The reed switch pulse unit can cause inaccurate counts when used with high speed counters. It is advised that a debounce circuit be used. Contact your meter distributor for further information.

OPERATING PRINCIPLE

When fluid passes through the meter the rotors turn, as shown below. The magnets which are located in the rotors will pass across the pulser circuitboard (containing either Reed switches or Hall Effect sensors). A signalis generated which is then sent by the Pulse Circuit Board (PCB) to the relevant LC display or receiving instrument..



INSTALLATION



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1) It is recommended that when setting up pipe work for meter installations a bypass line be included in the design. This provides the facility for a meter to be removed for maintenance without interrupting production. (See Fig.1)

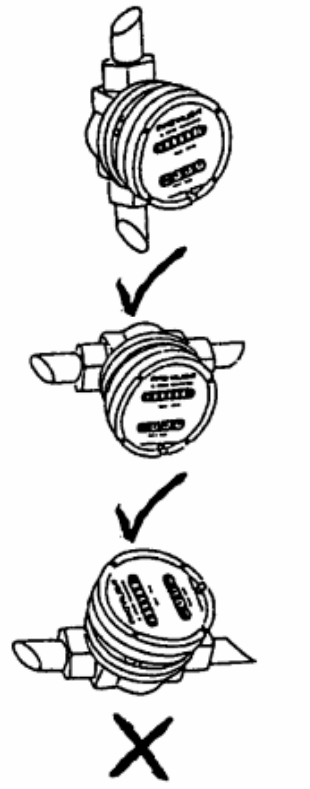
2) Use thread sealant on all pipe threads.

3) For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump.

4) Install a wire mesh strainer (Y or basket type) as close as possible to the inlet side of the meter.

5) Ensure that the meter is installed so that the flow of the liquid is in the direction of the arrows embossed on the meter body.

6) The meter can be installed in any orientation as long as the meter shafts are in a horizontal plane. (Refer to Fig.2 for correct installation)



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Note: Incorrect installation can cause premature wear of meter components.

7) Do not over tighten meter connections.

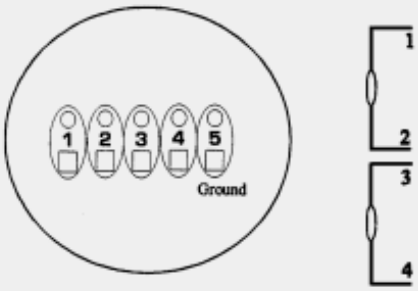
8) It is important that after initial installation you fill the line slowly, high speed air purge could cause damage to the rotors.

9) Test the system for leaks.

10) Check the strainer for swarf or foreign material, after the first 200 litres check periodically, particularly if the flow rate decreases.

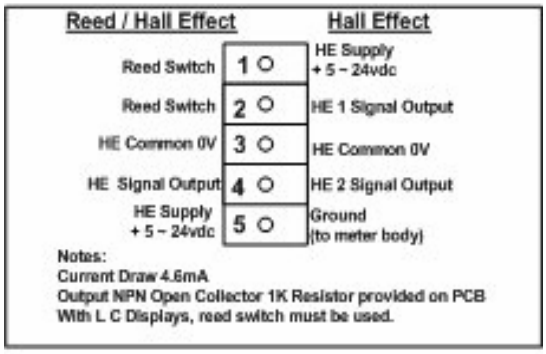
ELECTRICAL CONNECTIONS

Reed Switch Connections



Contact rating 15VA
Maximum Voltage 150VDC
Note: Double rate pulse output not available

Hall Effect or Reed/Hall Sensor Connections



SERVICE INSTRUCTIONS

Disassembly

Ensure that the fluid supply to the meter is disconnected, and the line pressure is released before disassembly, with the exception for repair or maintenance to the LC Display or PCB where there is no necessity to isolate the meter from flow.

Refer to the exploded parts diagram on subsequent pages for item numbers.

1a) Pulse Caps models: Undo the conduit connector, remove pulse cap (item 9) and remove the wires from the pulse terminal board (item 5).

1b) Standard LC Display: Mark the display orientation with a marking pen, unscrew the four large screws (Item 26) on top of the LC Display.

Carefully separate the LC Display from the plastic housing and disconnect the wires from the pulse terminal block. (Refer to additional Standard LC Display instruction manual).

1c) Deluxe LC Display: Mark the display orientation with a marking pen, remove the four retaining screws on the display face (Item16).

Lift off the display unit and remove the 9 pin connector at the back of the display unit. (Refer to additional Deluxe LC Display instruction manual).

2) Remove the mounting adaptor plate and gasket (Item 14).

3) Loosen the cap head screws (Item 7) that hold down the meter cap (Item 4), remove the screws, washers and lift off the cap.

4) Remove the o'ring (Item 2) from the o'ring groove in the meter cap (Item 4).

5) Remove rotors (Item 3).

Reassembly

1) Before reassembling check the condition of the rotors (replace if necessary).

2) Check that the smooth side of the rotors (not the plug side) is facing you when inserting the rotors, the smooth side of the rotor is the magnet side.

There is no difference between rotor one or rotor two.

3) Replace the rotors (Item 3) onto the shafts at 90dgr to each other (refer Fig. 5) and check their operation by turning either of the rotors.

If the rotors are not in mesh correctly or do not move freely, remove one of the rotors and replace correctly at 90dgr to the other rotor.

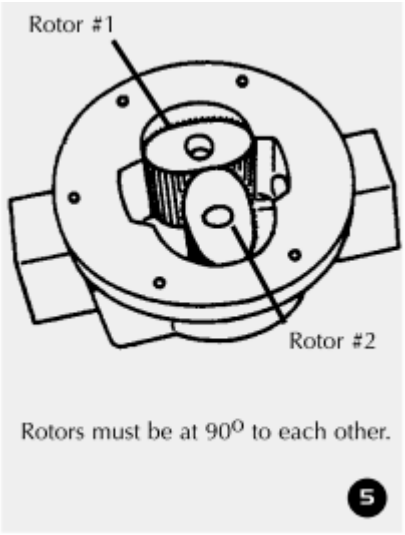
Re-check the operation of the rotors.

4) Replace the o'ring (Item 2) into groove in the meter cap, if the o'ring has grown or is damaged in any way replace it with a new part.

5) Replace the meter cap making sure that the locating pin in the body lines up with the hole in the meter cap. Insert the cap head screws (Item 7) and tighten in a diagonal sequence 1, 3, 2, 4, etc.

6) The replacement of cables and connectors are a reversal of the disassembly procedure, replace conduit fitting if required.

When replacing the Standard LC Display or the Deluxe LC Display, confirm the orientation marks made on disassembly are aligned then screw the register into place.



7) Test the meter by turning the rotors with a finger or by applying very low air pressure (no more than a good breath) to one end of the meter, before returning the meter to the line.

Pulse Circuit Board (PCB) Notes:

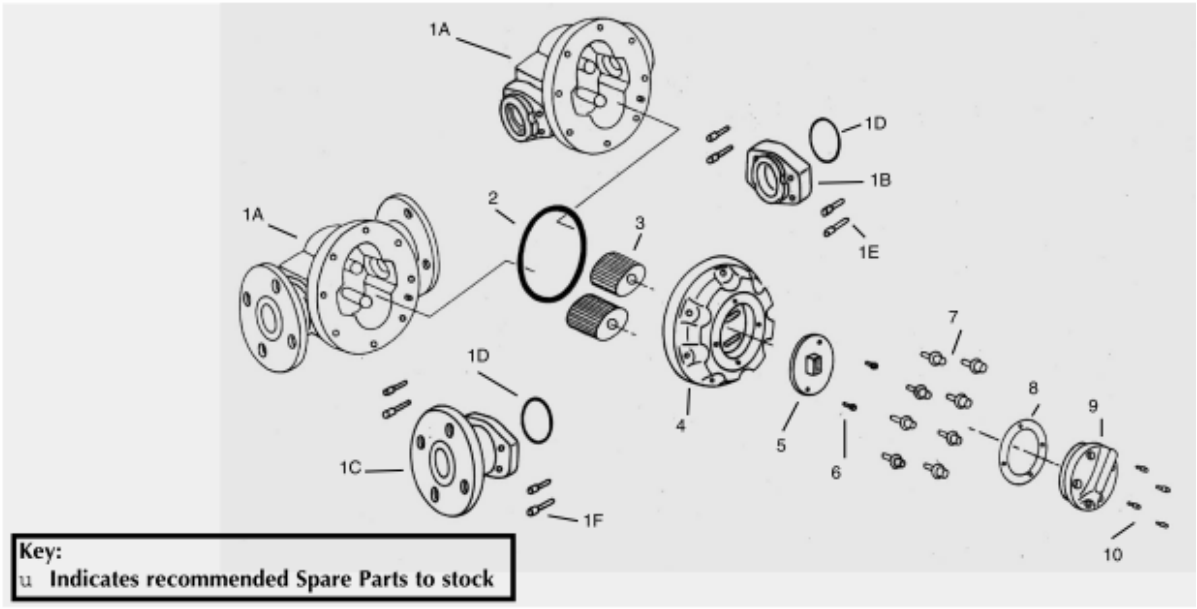
The pulse PCB (Item 5) is fitted with (A) two reed switches; (B) hall effect sensors; or (C) one reed switch and one hall effect sensor.

The PCB board is fastened to the meter cap (Item 4) by two screws and stand off's.

All care and caution should be taken when removing or handling the PCB as both the reed switch and hall effect sensor are fragile.

Reed switch or hall effect sensors are not available as individual replacement parts and are only available with the complete PCB (Item 5).

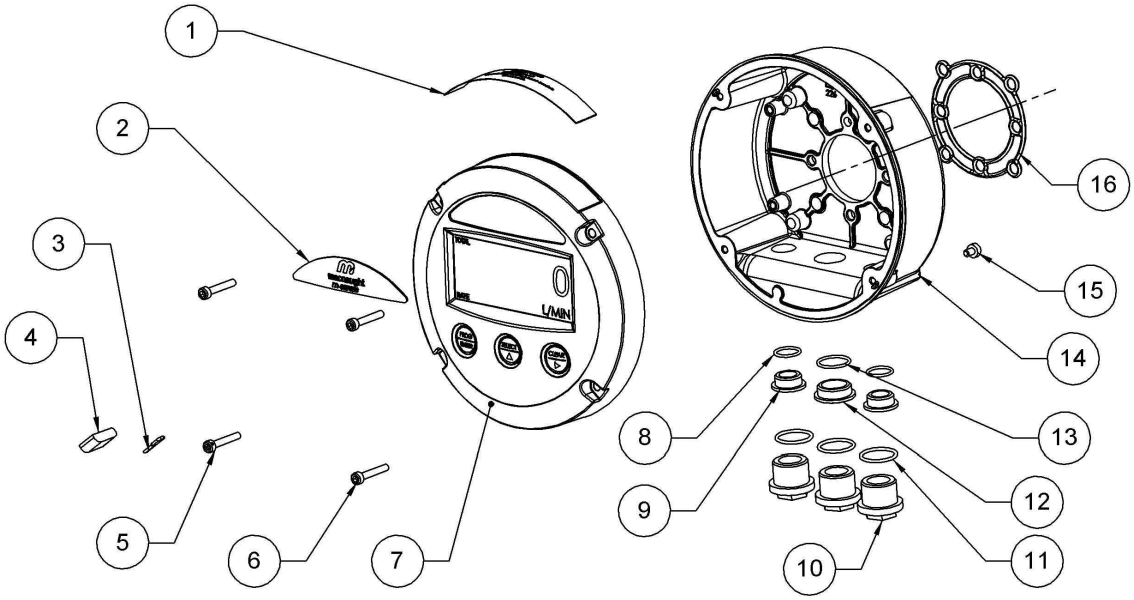
METER PARTS LISTING



NOTE: SPARE PARTS FOR D SERIES METERS FITTED WITH ROLLER BEARINGS

Item No.	No. Off	Rec. Parts	Part or Set	Part Description
			(for order)	
1A	1		MS687S	Meter Body 1/2" Module (Aluminium)
1B	2		MS578S	3" BSP Flange (Aluminium)
1B	2		MS578NS	3" NPT Flange (Aluminium)
1C	2		MS579S	3" ANSI-150lb Flange (Aluminium)
1C	2		MS579DS	3" DIN-16 Flange (Aluminium)
1D	2	u	BS237S	O-ring (NBR)
1D	2	u	BS237ES	O-ring (EPDM)
1D	2	u	BS237TES	O-ring (Teflon)
1D	2	u	BS237VS	O-ring (Viton)
1E	4	u	MS585S	Bolt set (To suit item 1B only)
1F	4	u	MS528s	Bolt set (To suit item 1C only)
2	1	u	BS262S	O-ring (NBR)
2	1	u	BS262ES	O-ring (EPDM)
2	1	u	BS262TES	O-ring (Teflon)
2	1	u	BS262VS	O-ring (Viton)
3	2	u	MS1198NS	Rotors (Aluminium)
3	2	u	MS1198HNS	High Viscosity Rotors (Aluminium)
4	1		MS588	Meter Cap (Aluminium)
5	1	u	MS1101-RS	PCB (Standard Reed Switch)
5	1	u	MS201-HES	PCB (Hall Effect Sensor)
5	1		MS201-R/HES	PCB (1 Reed Switch & 1 Hall Effect Switch)
6	2		MS284S	PCB Board Screws
7	8	u	MS243S	Meter Cap Screws (Standard)
8	1	u	MS300S	Pulser Cap Gasket
9	1		MS160	Pulser Cap (Aluminium) 20mm Conduit Thread
9	1		MS160N	Pulser Cap (Aluminium) 1/2" NPT Thread
10	2		MS115S	Pulser Cap Screw (Stainless Steel)

DISPLAY PARTS LISTING



Item	Part No.		Parts Kit	Description	Qty.
1	ER012		ER012S	IECEX Label Intrinsic Safety Option	1
1	ER027A		ER027AS	Label Gx012PHRPB	1
1	ER027B		ER027BS	Label Gx110PHRPB	1
2	ER015		ER015S	Macnaught Logo Label	1
2	ER011		ER011S	MEC Logo Label	1
3 4	MS1063 MS1064	}	MS1065AS	Security Wire Seal Crimp	1 1
5 6	ER009 ER029	}	ER009S	SHCS M4x0.7x25L SS C/Drilled SHCS M4x0.7x25L SS	1 3
7	ER002A-C		ER002A-CS	Register Housing Charcoal Inc 3,4,5,6	1
7	ER002A-R		ER002A-RS	Register Housing Red Inc 3,4,5,6	1
8 9	OR13x1.5 ER025	}	ER025S	O'Ring M16 Blanking Cap incl. item 8	2 2
10 11	ER026 BS018	}	ER026S	1/2" NPT Blanking Cap incl. item 11	3 3
12 13	ER024 OR17x1.5	}	ER024S	M20 Blanking Cap Inc 13 O'Ring	1 1
14	ER001M		ER001MS	Back Housing ISO inc. 9,12,14,15,16	1
14	ER001N		ER001NS	Back Housing NPT inc. 10,14,15,16	1
15	MS199		MS199S	Cheese Head Screw M6x6 S/S	1
16	ER014		ER014S	Register Cap Seal	1
17	ER051		ER051S	Wall Mount Bracket incl. item 18 x 4	1
18	N46		N46S	Phillips Head C'sk Screw M4x8 S/S	4

METER SPECIFICATIONS

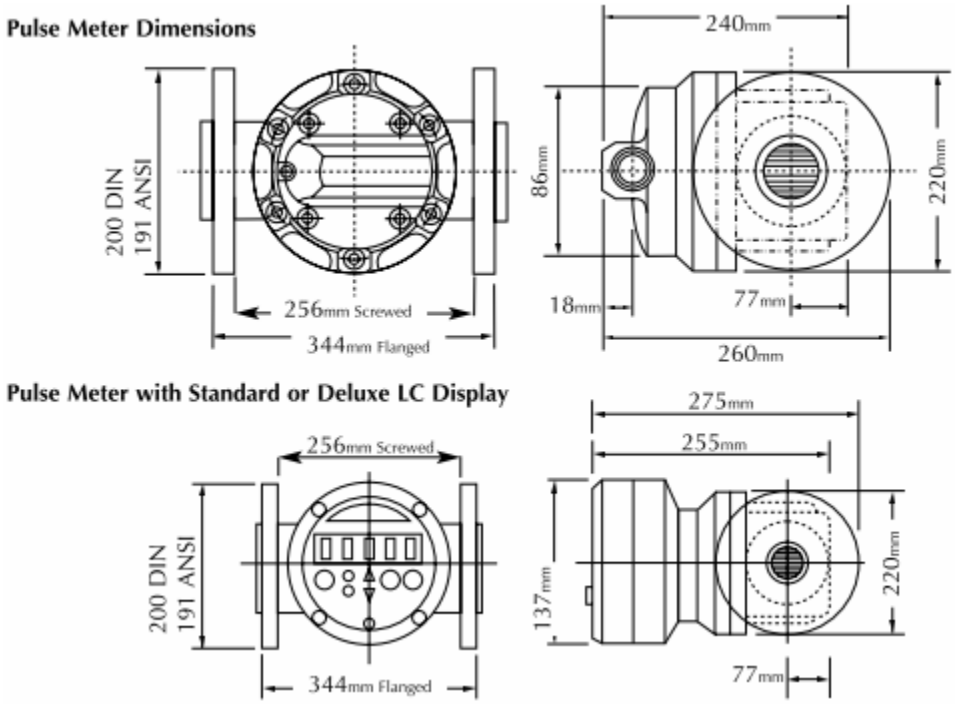
Meter Type	Pulse	Pulse with Standard LC Display	Pulse with Deluxe LC Display
Flow Ranges Litres/minute - US Gall/min **Above 5 Centipoise**	20 to 733 / 5 to 194	20 to 733 / 5 to 194	20 to 733 / 5 to 194
Accuracy of Reading	+/- 0.5%	+/- 0.5%	+/- 0.5%
Maximum Viscosity	1000 Centipoise	1000 Centipoise	1000 Centipoise
Max. Operating Pressure	1200kPa/ 175 PSI/ 12 BAR	1200 kPa/ 175 PSI/ 12 BAR	1200kPa/ 175 PSI/ 12 BAR
Max. Operating Temp.	80°C/ 176°F	80°C/ 176°F	80°C/ 176°F
Pulse Type	Hall or Reed Switch **	Hall or Reed Switch **	Hall or Reed Switch **
Pulses Per Litre / US Gall.	2.56 / 9.69	2.56 / 9.69	2.56 / 9.69

****Reed switch required for Standard and Deluxe LC Displays.**

METER TROUBLE SHOOTING

TROUBLE	CAUSE	REMEDY
Fluid will not flow through meter	**a]** Foreign matter blocking rotors **b]** Line strainer blocked **c]** Damaged rotors **d]** Meter connections over tightened **e]** Fluid is too viscous	**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 **e]** See specifications for maximum viscosity
Reduced flow through the meter	**a]** Strainer is partially blocked **b]** Fluid is too viscous	**a]** Clean strainer **b]** See specifications for maximum viscosity
Meter reading inaccurate	**a]** Fluid flow rate is too high or too low **b]** Fluid is too viscous **c]** Excess wear caused by incorrect installation	**a]** See specifications for minimum and maximum flow rates **b]** Bleed air from system **c]** Check meter body and rotors. Replace as required. Refer to installation instructions
Meter not giving a pulse signal	**a]** Faulty hall effect sensor **b]** Faulty reed switch **c]** Magnets failed	**a]** Replace PCB Board **b]** Replace PCB Board **c]** Replace magnets
LCD Register not working	**a]** Battery not connected properly **b]** Battery flat **c]** Faulty wiring connections **d]** Faulty LC display **e]** Faulty connection from LC display	**a]** Check battery connections **b]** Replace battery **c]** Check wiring for loose or faulty connections **d]** Replace LC display **e]** Check wiring connections

METER DIMENSIONS



WARRANTY

Macnaught Pty Ltd warrants that the Products will be free from any defects caused by faulty material or workmanship for a period of Twenty Four (24) months from the date of sale of the Products to the end user (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 end user, 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 end user for that Product.
Macnaught liability and the end user'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 end user. 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 end user, or the liabilities imposed on the seller, by any statute or other laws in respect of the sale of the Product.

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