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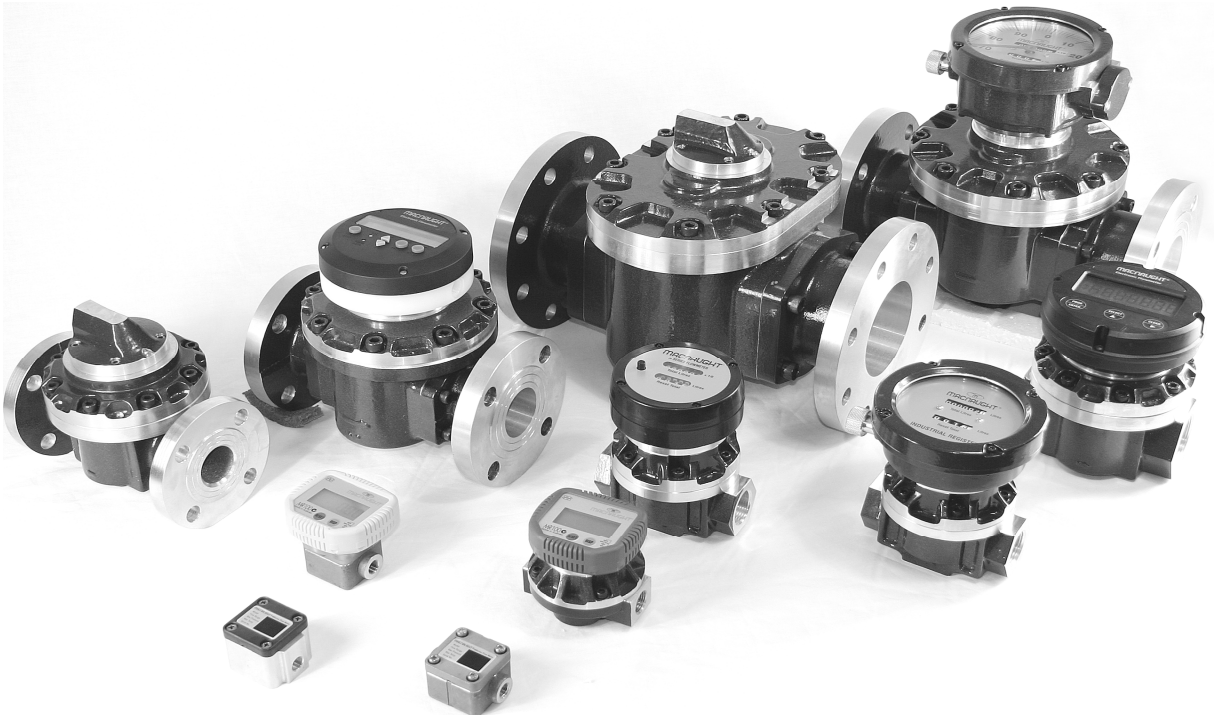
macnaught

POSITIVE DISPLACEMENT FLOWMETERS

M100 SERIES INSTRUCTION MANUAL

M100 Pulse; M100 Standard LCD; M100 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. With low pressure drop and high pressure rating oval rotor flow meters are suitable for both gravity and pump (in line) applications.
These meters are only available in Aluminium. Standard rotors are also made from Aluminium.

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.

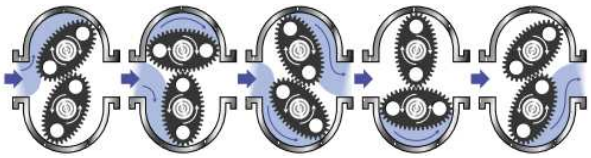
Note: To prevent damage caused by air purge slowly fill the meter with fluid. To reduce pressure build up turn off the pump at the end of each day.

Maintenance can be carried out on the liquid crystal displays and pulse units without removing or isolating the meter from the line. When maintenance to any other part of the meter is required, the meter must be isolated and the line pressure reduced.

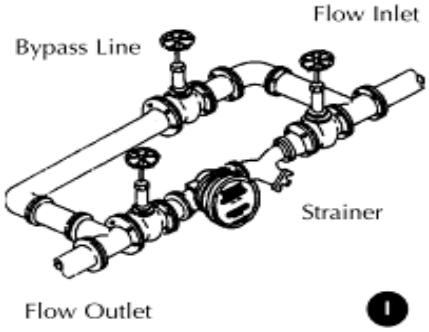
The reed switch pulse unit can cause inaccurate rate counts when used with high speed counters. It is advised that a debounce circuit be used. Contact your meter distributor for further information.

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 circuit board (containing either Reed switches or Hall Effect sensors). A signal is generated which is then sent by the Pulse Circuit Board (PCB) to



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)

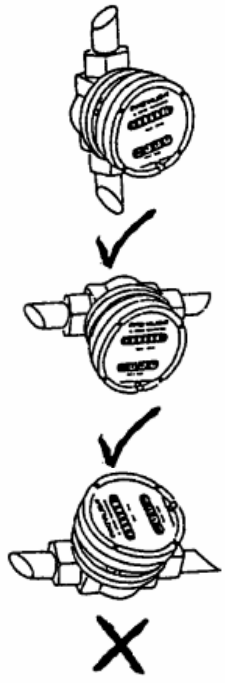
2) Use thread sealant on all pipe threads.

3) For pump applications ensure pipe work has the appropriate working pressure rating to match the pressure output of the pump. See Meter Specifications section for further details.

4) Install a wire mesh strainer (Y or basket type 60 mesh 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) The register assembly may be orientated to suit the individual installation.



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

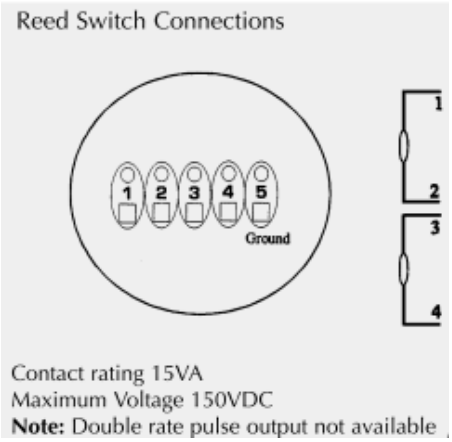
7) Do not over tighten meter connections.

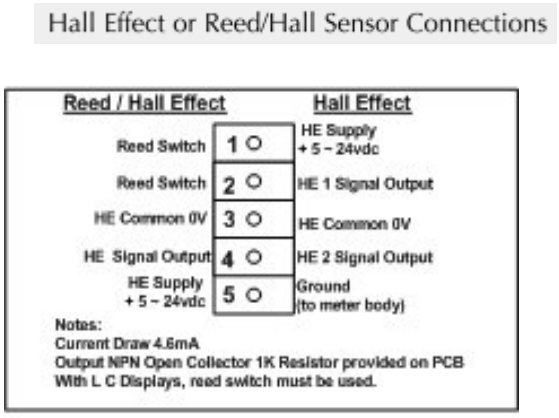
8) It is important that after initial installation you fill the line slowly, high speed air purge could cause damage to the rotors.

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





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 (Item 16).

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). Note the position of the timing marks.

Reassembly

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

2) Check that the plug side of the rotors is facing you when inserting the rotors, the plug side of the rotor is the magnet side. There is no difference between rotor one or rotor two.

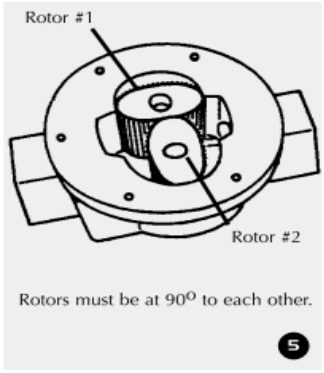
3) Replace the rotors (Item 3) onto the shafts at 90dgr to each other (refer Fig. 5).
Check the operation of the rotors by turning either by hand. If the rotors are not in mesh correctly or do not move freely, remove one of the rotors and replace correctly at 90dgr to the other rotor.
Re-check the operation 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 and tighten the cap head screws following the sequence shown in figure 6.

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 to one end of the meter, before returning the meter to the line.

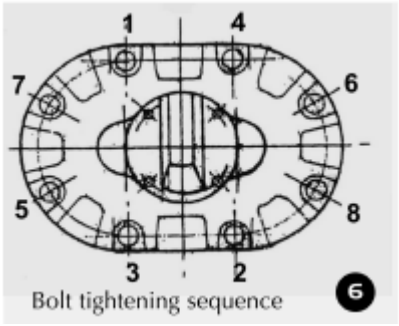


Pulse Circuit Board (PCB) Notes:

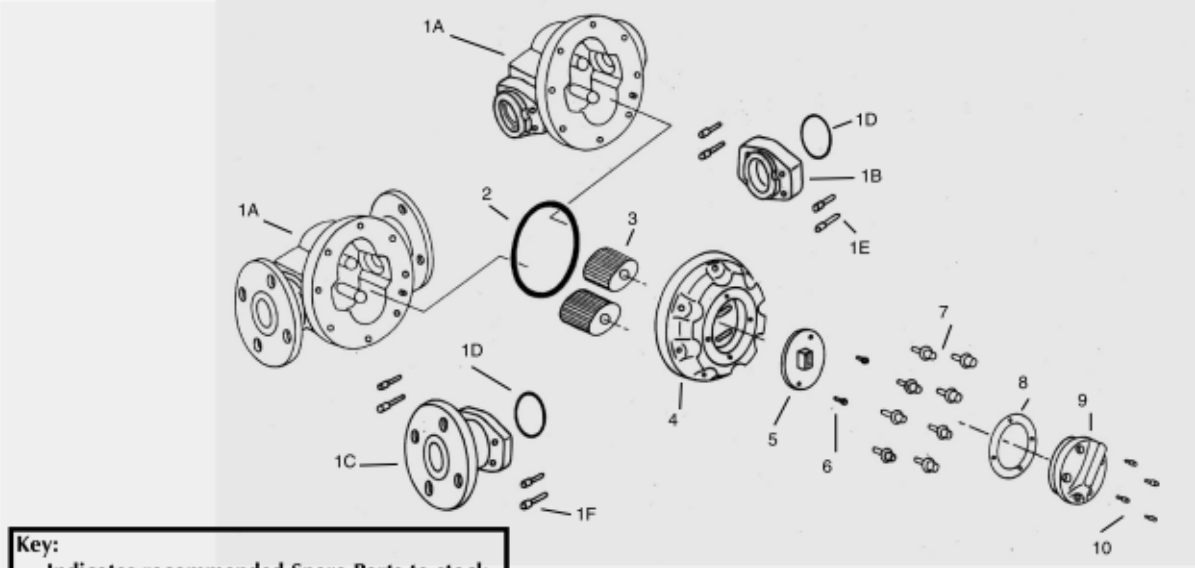
The pulse PCB (Item 5) is fitted with (A) two reed switches; (B) hall effect sensors; or (C) one reed switch and one hall effect sensor.

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).



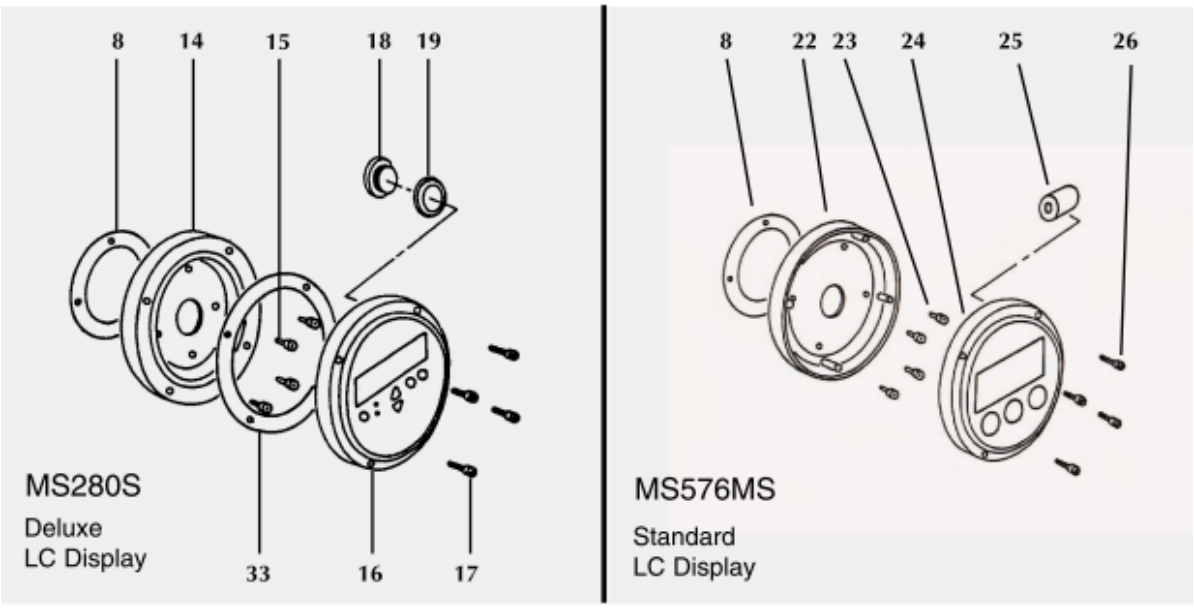
METER PARTS LISTING



Key:
u **Indicates recommended Spare Parts to stock**

Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1A	1		MS631S	Meter Body Module (Aluminium)
1B	2		MS632BS	4" BSP Flange (Aluminium)
1B	2		MS632NS	4" NPT Flange (Aluminium)
1C	2		MS632S	4" ANSI - 150lb Flange (Aluminium)
1C	2		MS653S	3" ANSI - 150lb Flange (Aluminium)
1C	2		MS632DS	4" DIN-16 Flange (Aluminium)
1C	2		MS632JS	4" JIS10K Flange (Aluminium)
1D	2	u	BS245S	"O" Ring (NBR)
1D	2	u	BS245ES	"O" Ring (EPDM)
1D	2	u	BS245TES	"O" Ring (Teflon)
1D	2	u	BS245VS	"O" Ring (Viton)
1E	4	u	MS649S	Bolt set (To suit item 1B only)
1F	4	u	MS647S	Bolt set (To suit item 1C only)
2	1	u	BS267S	"O" Ring (NBR)
2	1	u	BS267ES	"O" Ring (EPDM)
2	1	u	BS267TES	"O" Ring (Teflon)
2	1	u	BS267VS	"O" Ring (Viton)
3	2	u	MS1199N	Rotors (Aluminium)
3	2	u	MS634HS	High Viscosity Rotors (Aluminium)
4	1		MS633	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 Sensor)
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 (Aluminum) 1/2" NPT Thread
10	2		MS115S	Pulser Cap Screw (Stainless Steel)
11	1		MS37	Warning Label (Not Shown)
12	1		MS14	Explosion Proof Approval Label (Not Shown)

DISPLAY PARTS LISTING



Item No.	No. Off.	Rec. Parts	Part or Set (Order from this column only)	Part Description
			MS280S	**Deluxe LCD Display (Complete)**
14	1		MS279S	Mounting Adaptor Plate
15	4	u	MS117S	Adaptor Screws
16	1	u	MS69S	LC Display Unit
17	4	u	MS118S	LC Display Mounting Screws
18	1	u	MS127	Battery Retaining Screw
19	1	u	MS126	Battery (Standard) CR2040
20	1	u	MS68	Connector and Cable (Not Shown)
21	1		MS87	PTB Approval Label (Not Shown)
22	1	u	MS128S	Extended Life Battery 2/3 AA (Not Shown) NOTE: Note Suitable for Intrinsic Use
33	1	u	MS307S	Gasket
			MS576MS	**Standard LC Display (Complete)**
22	1		MS572S	Mounting Adaptor Plate
23	4	u	MS115S	Adaptor Screws
24	1	u	MS570S	LC Display Module
25	1	u	MS493S	3.6 Volt Battery (Lithium) Size C
26	4	u	MS129S	Register Screws

METER SPECIFICATONS

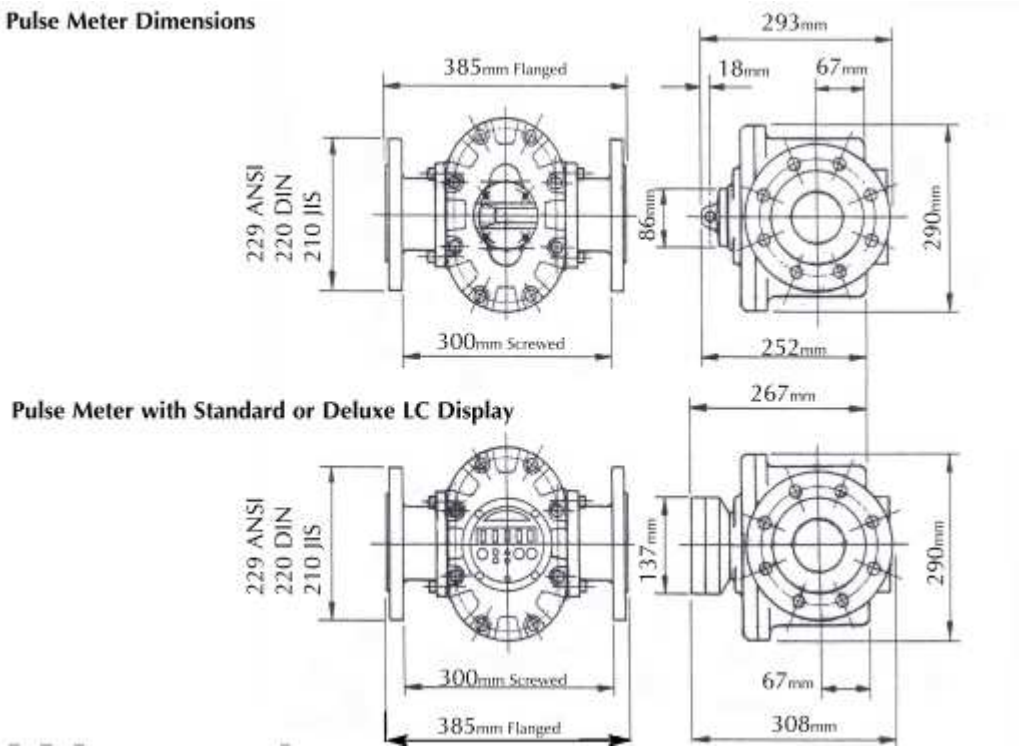
Meter Type	Pulse	Pulse with Standard LC Display	Pulse with Deluxe LC Display
Flow Ranges Litres/minute - US Gall/min **Above 5 Centipoise**	120 to 1200/ 32 to 317	120 to 1200/ 32 to 317	120 to 1200/ 32 to 317
Accuracy of Reading	+/- 0.5%	+/- 0.5%	+/- 0.5%
Maximum Viscosity	1000 Centipoise	1000 Centipoise	1000 Centipoise
Max. Operating Pressure	1000kPa/ 145 PSI/ 10 BAR	1000 kPa/ 145 PSI/ 10 BAR	1000kPa/ 145 PSI/ 10 BAR
Min. Operating Temp.	-10°C/ 14°F	-10°C/ 14°F	0°C/ 32°F
Max. Operating Temp.	80°C/ 176°F	70°C/ 158°F	60°C/ 140°F
Pulse Type	Dual Reed Switches **	Dual Reed Switches **	Dual Reed Switches **
Pulses Per Litre	2.288	2.288	2.288

****Reed switch required for Standard and Deluxe LC Displays.**
Meter conforms to PED Directive 97/23/EC Cat 1.

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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