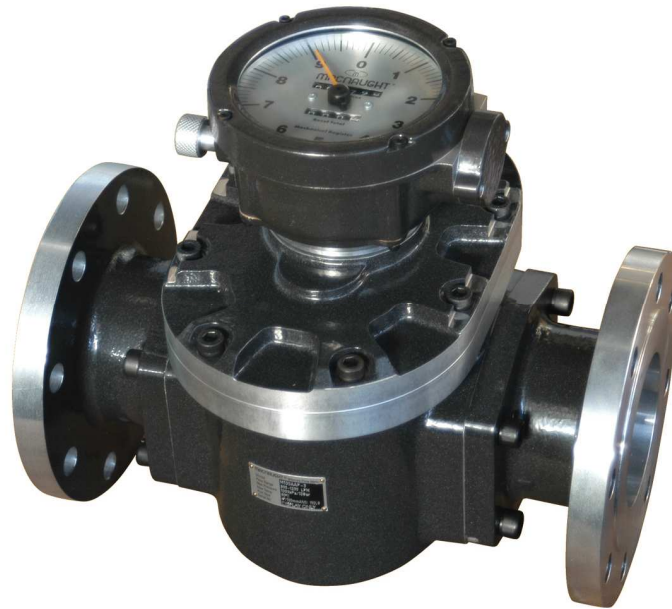


Analogue Register Mechanical Meters (Models With or Without Encoder)



Special Note: If fitting this register to a meter that had a “M”, “MI”, or “MR” register previously fitted, the meter will need to be rotated 180° to the flow that it was previously installed. Original install → Flow Left to Right as per arrow marking pointing to the right, once the new register is installed the flow should be ← Left to Right but the arrow pointing left.



Normal Flow from Left to Right with “M” register



When replacing register the flow changes 180° so the arrow points in the opposite direction when flow is still left to right



IMPORTANT INFORMATION

**PLEASE READ THIS INFORMATION
CAREFULLY BEFORE USE!**

Ensure that the fluid supply to the meter is isolated and disconnected, and the line pressure is released before disassembly.

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.

SERVICE INSTRUCTIONS

Removal of Register Assembly

Ensure that the fluid supply to the meter is disconnected, and the line pressure is released before disassembly. Refer to the exploded parts diagram Figure 1 and 2 on pages 3 and 4, respectively for item numbers.

- 1] Remove the four screws (Item 27) located under the register housing.
- 2] Remove the register assembly from the meter.
- 3] Check the Gasket (Item 24) for damage, replace if necessary.

Reassembly

- 1] Clean all components before reassembly.
- 2] Install the Gasket (Item 24)
- 3] Align the drive dog on the Register assembly with the mating dog on the meter body/cap assembly.
- 4] Position the Register Assembly, in the preferred orientation, then fit and tighten the 4 screws (Item 27).
- 5] Test the Register by turning the rotors with a finger or by applying low air pressure (No more than a good breath) to one end of the meter, before re-installing meter to the line.

Dismantling Register Assembly WITHOUT Rotary Encoder

Refer to Figure 1 unless otherwise stated

- 1] Undo the four screws (Item 1) and remove the clamp ring (Item 2)
- 2] Remove the glass cover (Item 4) and inspect the seal (Item 3) for damage, replace if necessary.
- 3] Carefully remove the plastic pointer (Item 5) so as not to damage the stem which is a push fit onto the needle shaft (Item 11, refer Figure 2).

- 4] Undo the register face screws (Item 6) and remove the register face.
- 5] Undo the screws (Item 8) and remove register mechanism tilting slightly so as to clear the reset arm (Item 18) and shaft collar (Item 20).
- 6] To remove the reset arm undo grub screw (Item 23) and remove the reset knob (Item 21). Slide the reset arm from the housing being careful not to loose or damage the o-ring (Item 22). Inspect o-ring for damage, Replace o-ring if necessary.
- 7] Assembly is the reverse of the above procedure.

Dismantling Register Assembly WITH Rotary encoder

Refer to Figure 1 unless otherwise stated.

- 1] Follow steps 1, 2, 3 and 4 above.
- 2] Undo grub screw (Item 14) to enable the shaft coupling (Item 12) to be withdrawn from encoder shaft (Refer Item 16, Figure 2).
- 3] Undo two socket head cap screws (Item 9) and slide encoder housing

away from register housing. If it is necessary to remove the encoder coupling (Item 12) from the encoder, record the distance the coupling is from the face of the encoder so it can be replaced in the same position. This is important to prevent overloading of the encoder bevel drive gears.

- 4] Follow steps 5 and 6 above to complete disassembly.
- 5] Assembly is the reverse of the above.

Dismantle Counter wheel assembly

Refer to Figure 2 unless otherwise stated

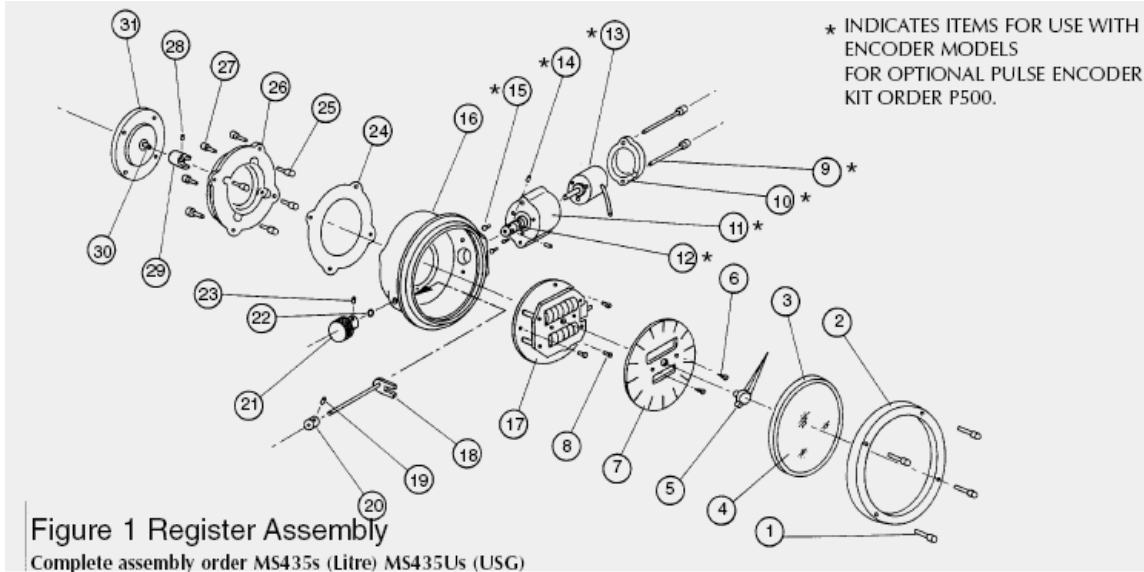
- 1] Dismantle the Register assembly as previously detailed.
- 2] Undo the 4 screws (Item 1).
- 3] Undo the two countersunk screws (Item 17) and remove the register display mechanism assembly (Item 3) and encoder shaft (Item 16) complete with bearing block (Item 15), bevel gear (Item 18) and spur gear (Item 13). Do not attempt to remove this gear from the shaft.

4] Further disassembly is done by removing the remaining grub screws (Item 14, 19 & 21), and withdrawing the shafts (Items 6 & 11).

- 5] Assembly is the reverse of the above procedure.

Refer to the standard Mechanical register instruction sheet for further advise on gearbox, output shaft and seal related maintenance issues.

REGISTER PARTS LISTING



Item No.	No . Off	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	4	MS444	MS433S	Clamp Ring Screws
2	1	MS443	MS433S	Clamp Ring
3	1	MS446	MS445S	Seal
4	1	MS445	MS445S	Glass Face
5	1	MS448	MS448S	Pointer
6	2	MS439	MS447S	Screw
7	1	MS447	MS447S	Fascia-Litres
7	1	MS447U	MS447US incl. item 6	Fascia-US Gallons
8	3	MS464	MS464S	Screw
9*	2	MS442	MS442S	Cap Screw (Encoder model only)
9	2	MS115	MS492S	Cap Screw (Without Encoder)
10*	1	MS441	MS441S incl. 2x item 9*	Cover (Encoder Model Only)
10	1	MS441-B	MS441-BS incl. 2x item 9+BS120	Cover (Without Encoder - Requires BS120 O'Ring)
11*	1	MS440	MS440S incl. items 9* + 10*	Encoder Housing (Encoder model only)
12*	1	MS494	MS407S	Encoder Coupling (Encoder model only)
13*	1	MS407	MS407S	Encoder-1000 pulse per rev (Encoder model only)
14*	4	MS151	MS407S	Grub Screw (Encoder Model only)
15*	3	MS437	MS407S	Screw (Encoder Model Only)
16	1	MS435	MS435HS	Register Housing
17	1	MS143	MS143S incl. item 8	Register Mechanism Assembly (Refer Figure 2)
18	1	MS463L	MS463LS	Reset Arm
19	1	MS146	MS463LS	Grub Screw
20	1	MS450	MS463LS	Shaft Collar
21	1	MS451	MS451S	Reset Knob
22	1	BS008	MS451S	O'Ring (Nitrile)
23	1	MS146	MS451S	Grub Screw
24	1	MS107	MS107S	Gasket
25	4	MS514	MS326S	Bolt
26	1	MS326	MS326S	Register Adaptor
27	4	MS465	MS326S	Bolt
28	1	MS146	MS246S	Grub Screw
29	1	MS246	MS246S	Drive Dog
30	1	MS309	MS246S	Output Shaft (Long)
31	1	MS327	MS327S	Cover Plate (Aluminium)
31	1	MS327-1	MS327-1S	Cover Plate (Stainless Steel)

COUNTER PARTS LISTING

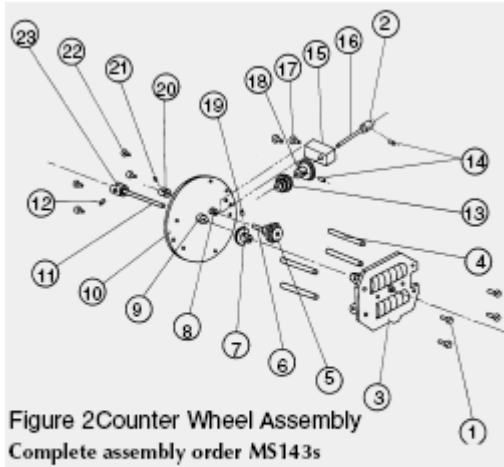


Figure 2 Counter Wheel Assembly
Complete assembly order MS143s

Note: Only available as a complete register assembly, order MS143s. Spare part includes items 18, 19 & 20 from figure 1.

Item No.	No. Off	Part No.	Part Description
1	4	MS438	Screw
2	1	MS704	Encoder Connector
3	1	MS702A	Register Display Mechanism
4	4	MS453	Spacer
5	1	MS462	Bevel Compound Gear
6	1	MS308	Output Shaft (short)
7	1	MS460	Gear
8	1	MS458	Bush - Idler Shaft
9	1	MS457	Bush - Needle Shaft (Bottom)
10	1	MS436	Register Chassis
11	1	MS452	Needle Shaft
12	1	MS146	Grub Screw
13	1	HG219	Spur Gear
14	2	MS146	Grub screw
15	1	MS455	Encoder Shaft Housing
16	1	MS456	Encoder Shaft
17	2	MS437	Cap Screw
18	1	MS461	Bevel Gear
19	1	MS146	Grub Screw
20	1	MS459	Idler Shaft Gear
21	1	MS146	Grub Screw
22	4	MS437	Cap Screw
23	1	MS409	Drive Dog

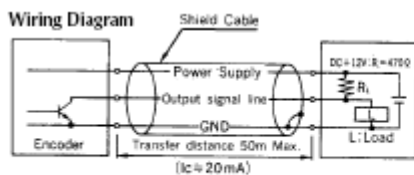
ENCODER WIRING

The encoder (Item 13, refer Figure 1) is an Optical Incremental shaft Encoder. It has a 1000 pulses per revolution resolution output. The output is an open collector with 3 phases (A, B and Z) that can function on a 5 to 12 Volts DC power supply. Optical encoders are delicate instruments and should

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 shield is grounded, as shown in wiring diagram below. To avoid damage to the encoder observe the electrical specifications, wiring table & wiring diagram shown below.

Resolution	1000 pulses per rev.
Power Supply	DC5V -5% ~ DC12V +5%
Current Consumption	50mA Maximum
Output Form (Open Collector)	
Max. Allowable Output Voltage	40V
Maximum Sink Current	30 mA
Maximum Response Frequency	200 kHz
Operating Temperature	-10oC ~ +70oC
Encoder Protection	IP50
Maximum signal transfer distance	50 Metres

Lead Colour	Function
Red	DC + 5 ~ 12V
Black	GND
Yellow	Z channel output
White	GND
Blue	A channel output
Green	B channel output
Brown	-
Orange	-



Note: The voltage waveform shown on the right can be obtained by loading RL as shown above.

