

Mechanical Meter

L-FM25

Manual



FM-120 MECHANICAL METER

General information

FM-120 are mechanical flow meters with nutating disk, designed to allow a precise measurement of Diesel oil or other fluids compatible with the manufacturing material. The nutating disk of the metering chamber(see diagram 1,drawing '27'),which is set in motion by the fluid itself, drives the gear train located in the cover of the meter body (drawing '28') which transmits the motion to the meter (pop. '4').

The meter is equipped with a nonresettable litre totaliser and a batch register which can be reset by means of a knob (Pos. '2')whose unit digit is provided with marks for the readout of the tenths of a litre/gal.

Warning!!

To ensure a proper and safe use of the meter it is necessary to read and follow the instructions and warnings contained in this manual.

An improper installation or use of the meter may cause damage to objects an people.

Technical Data	Mod. Mk33 / Mod. Mk44
Meter mechanism	Nutating disk
Flow-rate (range)	20-120L/min (5.28-31.7Gal/min)
Operating pressure (max)	3.5bar (49psi)
Burst pressure (min)	30bar (420psi)
Storage time (range)	-20-+80°
Storage humidity (max)	95%
Operating temperature (range)	-10-+60°
Accuracy after calibration	+/-1%
Repeatability (typical)	+/-0.3%
Readout resolution	0.1L/Gal
Connection (inlet/outlet)	1Inch BSP/NPT
Weight (approximate)	1.8Kg
Package dimensions	18x16x14cm

Installation

The meters FM-120 can be installed in any position, on rigid pipelines or flexible hoses, directly on pumps or flexible hoses, directly on pumps or tanks.

The meter flow direction is fixed and indicated by an arrow. The meter is supplied in the standard configuration(A).

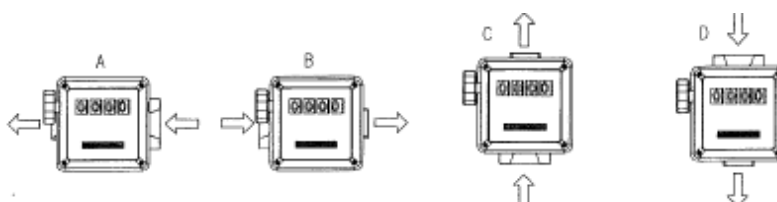
The meter and the cover (see diagram 1,pos '3') can be rotated by 90° to 90° in respect to the body in order to carry out the different configurations shown(B,C,D).

The reset knob can be installed either on the right side or on the left side of the meter In order to modify the standard configuration follow the instructions given in section

'Disassembling/Reassembling' .

The meter body is equipped with 4 blind holes(see diagram 2)which can be threaded (M5) for a possible fastening. If solid particles enter the measuing chamber the correct working of the nutating disk may be affected.

Always filter the fluid by installing a filter on the meter inlet (recommended filter 400).



Gear unit

To reach the gear unit components:

a: Remove the cover 'see diagram 1, pos.28' .

b. Loosen the screws 'pos. 13' .

c. Remove the plate 'pos.12' .Now all gears can be reached for inspection.

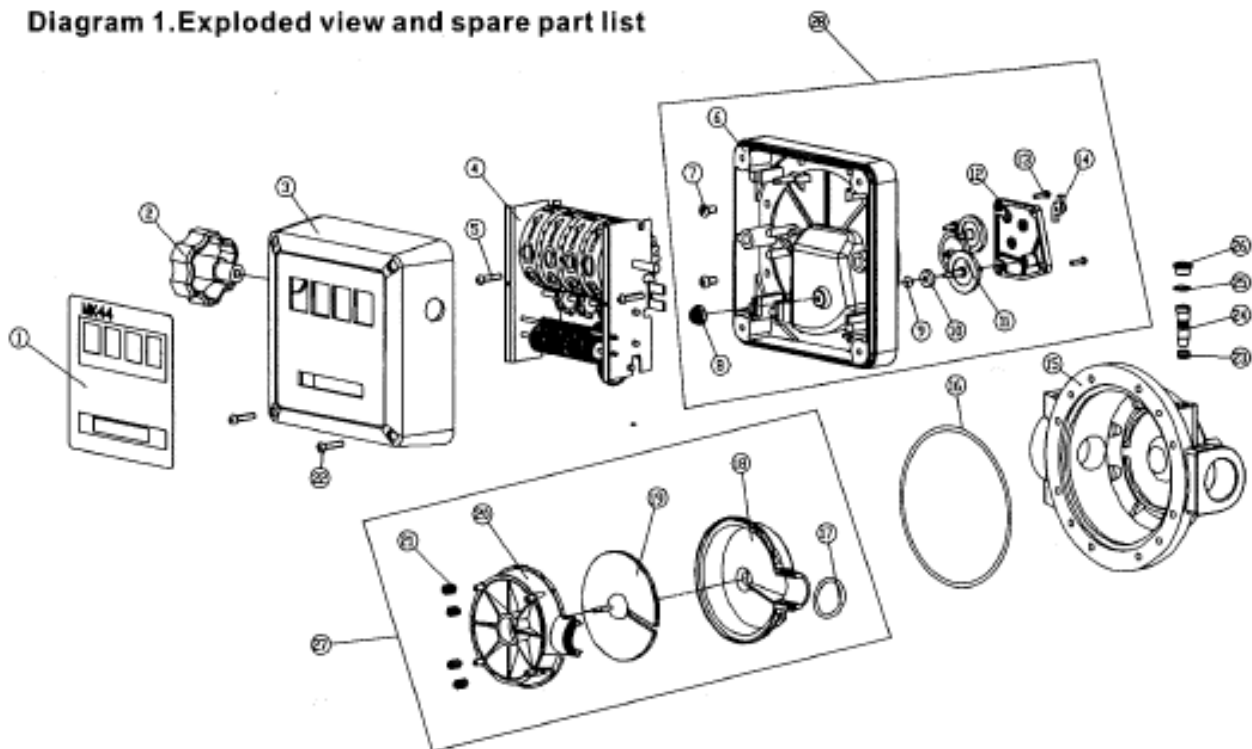
Should the gasket 'pos.10' be replaced, remove the bevel gear 'pos.8' from the shaft by pulling axially, then remove the gear 'pos.' 11' together with the shaft. The gasket replacement 'pos.9,10' always requires the replacement of the bush provided with the spare part kit. To reassemble reverse the above described procedure paying particular

attention to :

Lubricate the O ring before installation..

Check that the gear unit can rotate freely before fixing the cover.

Diagram 1.Exploded view and spare part list



No.	Description	Material	Quality	No.	Description	Material	Quality
1	Name plate Mk4	Polycarbonate	1	15	Meter body	Aluminum	1
2	Reset knob	Nylon	1	16	O-ring 110.72x3.53	Nbr	1
3	External cover	Nylon	1	17	O-ring 23.47x2.62	Nbr	1
4	Meter Mk44		1	18	Measuring chamber	Plastics	1
5	Screws 4x20	Steel	2	19	Measuring tray	Plastics	1
6	Body cover	Aluminum	1	20	Measuring chamber	Plastics	1
7	Screw 5x16	Steel	8	21	Cylinder spring	65Mn	4
8	Bevel pinion	Nylon	1	22	Screws 4x20	Steel	4
9	O-ring 3.63x2.62	NBR	1	23	O-ring 4.47x1.78	Nbr	2
10	Cover sealing	Nylon	1	24	By-pass adjusting screw	Cu	1
11	Gear kit	Pom	1	25	O-ring 9.25x1.78	Nbr	1
12	Gear plate	Pom	1	26	By-pass plug	Cu	1
13	Screws 3x10	Steel	4	27	Measuring chamber		1
14	Driving lever	Pom	1	28	Cover		1

* NO SPARE PARTS AVAILABE

Calibration

FM-120 are pre-calibrated in factory to be used with Diesel oil.

As specific operating conditions (such as real flow rate, nature and temperature of the measured fluid) may affect the meter accuracy, a recalibration should be carried out after the installation has been completed. A new calibration is necessary each time the meter is disassembled for maintenance operations or when it is used to measure fluids that differ from Diesel oil.

Calibration procedure

1. Unscrew the plug (see diagram 1, pos. '26').
2. Purge the system (pump, pipelines, meter) of air by dispensing until the flow stream is full and steady.
3. Stop the flow by shutting off the nozzle, but let the pump running.
4. Reset the batch register by means of the reset knob (pos. '2').
5. Dispense at the flow rate which the best accuracy is required at, by using a calibration container having a capacity not lower than 20 litres. Do not reduce the flow in order to reach the graduated zone of the calibration container. The right method is to start and stop the full flow repeatedly until the required filling is obtained.
6. Compare the indication of the calibration container (real value) with the one of the meter (indicated value)
 - If the indicated value is higher than the real value, loosen the screw (pos. '24');
 - If the indicated value is lower than the real value, tighten the screw (pos. '24').
7. Repeat the operations 4 to 6 until accuracy is satisfactory.
8. Tighten the plug (pos. '26') again. The O ring (pos. '23') which the calibration screw is provided with, has the function to avoid accidental loosening of the adjustment screw but does not have any sealing functions.
Therefore it is always necessary to properly fix the plug (pos. '26') with the sealing gasket (pos. '25').

Use

After installation and calibration FM-120 is ready to work.

Turn the reset knob (see diagram 1, pos. '2') (clockwise if it is mounted on the left of the meter and anticlockwise if it is mounted on the right) until the batch register is completely reset. The totaliser cannot be reset in any way. Make sure that during use pressure does not exceed the value indicated in section 'Technical data'.

Use by gravity

FM-120 can also be used in fuel units which are not equipped with pumps and where the flow is generated by the difference in fuel level between the tank and the nozzle outlet.

As a reference, a system composed of a tank off the ground, with the meter installed right at the bottom of the tank, a 3-m long 1" flexible pipe, guarantees a flow rate of approximately 30 litres/minute if the difference in level is higher than 1.5 metres.

Longer pipes or nozzles producing higher pressure losses reduce the flow in respect to the existing difference in level.

Use by gravity is not recommended with differences in level lower than 1 metre, as the consequent reduced flow rate causes the meter to work outside its guaranteed accuracy range. On field calibration is always advisable in case of gravity installations.

Maintenance

No ordinary maintenance is required provided that the meter FM-120 is properly installed and used. An incorrect filtering on the meter inlet may block or wear out the measuring chamber, thus affecting the meter accuracy. Should this problem occur (see section 'Problem occur (see section 'Problem, Causes and Solutions') disassemble the measuring chamber, as shown in section.

' Disassembling/Reassembling ' .

Warning

Before disassembling always make sure that all fluid is drained from the meter and pipes connected to it.

Necessary cleaning can be carried out by means of a soft brush or small tool (i.e. a screwdriver). During cleaning be careful not to damage the chamber or the disk. Carefully check the meter and replace the parts which have suffered any possible damage. Only use the original spare part kits shown in diagram 1 'Exploded view and spare part list'

A new calibration is always necessary after cleaning or replacing the meter parts.

Disassembling/Reassembling

FM-120 can be easily disassembled into its main parts without removing the body from the pipes.

Meter unit

To disassemble the meter unit operate as follows:

a. Remove the reset knob by firmly pulling it axially.

b. Loosen the 4 retaining screws (see diagram 1, pos. '22').

c. Loosen the 2 screws (pos. '5'). To reassemble the unit reverse the procedure described above.

Measuring chamber

To enter the measuring chamber operate as follows:

a. Disassemble the meter unit.

b. Loosen the eight screws (see diagram 1, pos. '7')

c. Remove the body cover (pos. '28') together with the gear unit. During this operation be careful not to damage the gasket (pos. '16')

d. Remove the whole measuring chamber (pos. '27') by lifting it from the meter body and at the same time pulling it back towards the inlet in order to remove the O ring (pos. '17') from its seat at the outlet.

To check the inside of the measuring chamber (pos. '27'), remove the O ring (pos. '17') and divide the two half chamber containing the nutating disk.

To reassemble the chamber reverse the procedure and be very careful to :

Verify that the disk rotates freely in the assembled chamber

Install the gaskets properly after checking and lubricating them.

Make sure that, while fixing the cover on the body, the nutating disk needle does not hit the gear (pos. '14') which must remain free to be pulled by the disk needle.

Tighten the screws (pos. '7') correctly.