Oval Gear Flow Meter

Flowtech

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1. Introduction

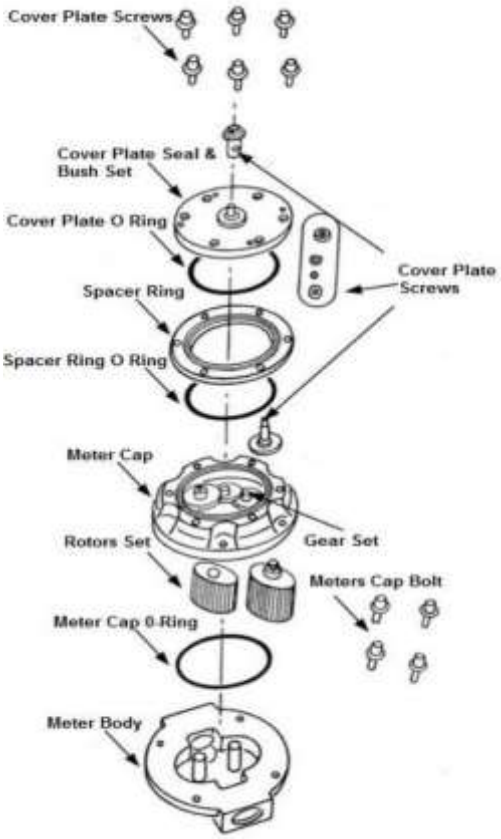
OMFF/OFS Series aluminium oval gear flow meter has the ability to handle a wide range of fluid viscosities with exceptional levels of repeatability and durability, applying in the petroleum, chemical, food industry, etc.

It is also applicable in Diesel, Kerosene and Petrol fluid usage industries

Flowtech provides Fuel Flow Meter from FMIPL-OFMM-025 to 50 Positive Displacement Fuel Meter. The Diesel Flow Meter FMIPL-OFMM-025 to 50 has also incorporated the oval rotor principal into its design.

This has proven to be a highly reliable and highly accurate method of measuring flow, providing exceptional repeatability and high accuracy. The low pressure drop through the meter makes the meter ideally suited for use in gravity applications or with the Diesel Flow Meter & Digital Diesel Flow Meter range of electric fuel pumps.

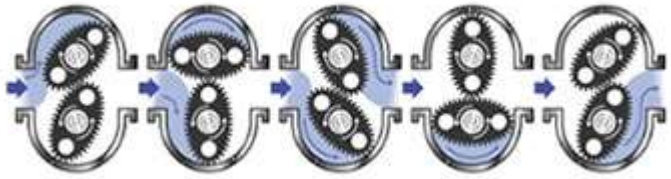
2. Technical Specification



Model	OFMM-025 OFS-025	OFMM-040 OFS-040	OFMM-050 OFS-050
Size	25MM	40MM	50MM
Min Flow (LPM)	12 L/Min	25 L/Min	30 L/Min
Max Flow (LPM)	120 L/Min	250 L/Min	300 L/Min
Accuracy	+/- 0.5%	+/- 0.5%	+/- 0.5%
Repeatability	0.03%	0.03%	0.03%
Max Viscosity	1000 CPS	1000 CPS	1000 CPS
Best Working Pressure	0.3 Mpa	0.3 Mpa	0.3 Mpa

3. Operating Principle

The oval gear flow meter comprises oval-shaped, geared rotors which rotate within a housing of specified geometry as shown in the diagram below. One of the rotors is fitted with a gearing pinion which (through a secondary gearing set) transfers the rotation of the rotor to the Mechanical Register. **Fluid differential pressure** causes the intermeshing gears to rotate, trapping a 'pocket' of fluid between the gear and the outer housing and subsequently emptying the fluid pocket into the downstream flow.



The measurement part of oval gear flow meter is posed by two elliptical gears mesh with each other and its shell (measuring room).

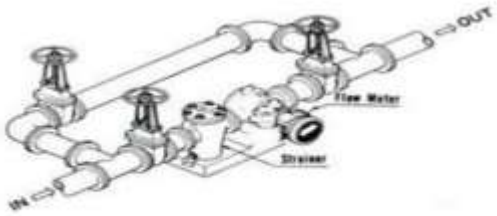
The flow meter works by two elliptical gears to mesh with each other, its working process are as follows: P1 in the figure shows the pressure of

liquid from inlet side, to show the outlet pressure, the bottom rotor has no rotating torque even it effected the liquid pressure, but the above gears will move by the rotating pressure. ln the status of the above gears driving gear, and the bottom gear is driven gear.
Both of these two gears have rotating torque by the liquid press u/'e, and they move with the direction of the arrow to space. The gear space is opposite to, the bottom gear is driving gear, and above gear is driven gear. The bottom gear pushes the liquid out from the half-moon space under the liquid press pushes liquid volume four times of "measurement room". So, as long as the rotation of gears, the liquid volume can be counted.

4. Installation Guide

1. Flow Meter should be cleaned before installing pipes. If the liquid containing solid particles in the upstream of the pipe, you must install filters. Only when the flow meter connected to the pipeline, can you remove the interface on the piston to prevent debris from entering the meter
2. No Specific requirements on the front and back of the flow meter pipeline, it can be installed horizontally or vertically. During the installation, this oval gear flow meter axis of rotation should be parallel to the ground. Please stick to the Picture 4

Picture 4



Picture 5

3. The direction of the flow meter installation should be the same as shown in the direction of the arrow with the liquid flow to the meter shell: installation position should pay attention to the ease of reading.
4. The flow meter should be installed on the output end of the pump. If installed in the suction side, the pressure loss of the flow meter filter will lead to the increase of the pump negative suction pressure, the liquid at the outflow of the pump shaft also causes the flow meter error increases, the flange of the pump suction side should be designed to prevent leakage, otherwise, it can also cause the error increases to the flow meter.
5. A filter should be installed at the front of the flow meter to prevent greater than 0.2mm tiny particles blocking the flow meter and the filter should be easy to clean
6. The flow meter is preferably mounted in front of the one-way valve only unidirectional flow of the liquid within the pipe to prevent the reverse rotation of the counting gear
7. The flow meter recommendations shown in Picture 5. The bypass valve can be installed in the vertical or the other direction of the pipeline from the top down, from bottom to top, right to left from left to right
8. When using the flow meter makes sure the internal filled with liquid. If the liquid to be measured mixed with a gas otherwise the measured gas and liquid mixing volume it will cause the measurement in error accuracy. If the liquid is mixed with gas and oil and gas separator must be installed.
9. When the flow rate traffic exceeds the specified maximum flow the speed of the oval gear increased and wear increases and the pressure loss increased dramatically and so it should be avoided though still measured at below the minimum flow the error increases the viscosity of a liquid slow meter 10Pa.s start the flow of about 1% of the maximum flow rate
10. When the flow meter is out the factory were used on the 7th mechanical oil calibration under ambient conditions the viscosity of the oil due to room temperature changes and about 13 Pa.s at room temperature. Theoretical volumetric flow meter measuring viscosity of the liquid changes does not affect the measurement accuracy because the measurement of the amount of leakage is generated in the gap,

the gap exists between the inner wall and the oval gear influenced by the viscosity of the liquid varies but actually in a small flow liquid viscosity greater impact

11. When the flow meter is used to measure high viscosity liquid, generally the heating liquid reduce the viscosity and then flow within the duct stop using the flow meter because the liquid inside cooling becomes viscous. If enabled the flow meter external steam liquid shall get heat until the liquid viscosity has been reduced in order to use the meter otherwise the mucus will bite transmission parts and cause damage
12. The measured liquid temperature should not be higher than the predetermined value, if its exceed and it will cause jammed and cannot move, the liquid temperature change will cause additional error of the viscosity affect in addition the temperature increase will cause the increase in volume of the crescent shaped space so that the flow will become slow
13. Pressure loss proportional to the square of the liquid flow, the liquid viscosity increases the pressure loss is also increased

5. Inspection and Elimination of the Fault

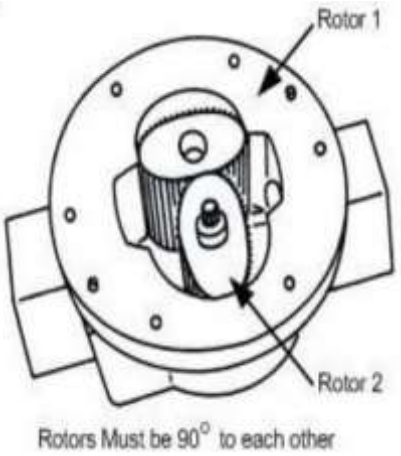
Phenomena	Reason	Measurement	Remarks
The failure of the oval gear rotation	1. Installation is jammed when the gear impurities fall into the flow meter	Reinstall removed after cleaning. Installation follows the mark on the oval gear	*An annotated mark installed oval gear*
	2. The measured liquid impure, filter clogging impurities	Clearing filter to remove impurities	
	3. The measured pressure of the liquid is too small	Increase the pressure	
Oval gear rotates but the word wheel fixed	The drive wheel might be stuck	Remove impurities, if cause gear damage and replace the gear	
Gear turns, abnormal noise	Exceeding the specified value due to the over run of the flow rate	Adjust the flow rate to the specified value	
The Counter turning of the word wheel	The flow direction of the liquid might be in the opposite way to the arrow of the meter shell	Disassemble the flow meter as the arrow direction	
The error is too large	1. The flow is too small and below the specified value 2. Bypass leak 3. Useful lives for too long oval gear wear serious 4. Liquid containing gas 5. The liquid viscosity has a large difference with the testing liquid viscosity	Change a smaller diameter flow meter	*Negotiate with Manufacturer*
		Check the bypass to prevent a leak	
		Adjust the oval gear according to the change range of the error data	
		An oil and gas separator should be installed at the front of the flowmeter to prevent the leak of the joint of the flange	
		Choose a proper liquid viscosity	

6. Maintenance Procedure

6.1 Disassembly - Flow Meter

Ensure that the fluid supply to the meter is disconnected, and the line pressure is released before disassembly. Refer to the exploded parts diagram and parts list.

1. Remove the four screws located on the face of the register. Then remove the face plate cover including register assembly
2. Remove the four register mounting screws and remove the lower half of the register housing.
3. Remove the six cover plate screws and remove the cover plate
4. Remove the six-meter cap screws and remove the meter cap
5. Remove the rotors



6.2 Reassembly – Flow Meter

1. Before reassembling check the condition of the rotors (replace if necessary). Note: there is one long and one short shaft. The short shaft is to accommodate the rotor with the gearing pinion fitted
2. Replace the rotors onto the shafts at 90 degrees to each other 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 90 degrees to the other rotor
3. Re-check the operation of the rotors
4. Inspect the gears in the meter cap for wear. (Replace if required, refer to exploded diagram)
5. Replace the o'ring into groove in the meter cap, if the o'ring has grown or is damaged in any way replace it with a new part
6. Replace the meter cap making sure that the gear on the rotor is meshing correctly with the gear in the meter cap. Insert the cap head screws and tighten in a diagonal sequence 1, 4, 2, 5, 3, 6
7. Replace the cover plate inspects the O-ring, bevel gear, for wear or damage. (Replace if necessary)

7. Applications

Chemical Production Plants, Food Industry, Pharmaceutical Industry, Cosmetic Industry, Oil and Gas Industry, Water and Wastewater Industry, Pulp and Paper Industry, Printing, Automotive Industry, Textile Plants, Petroleum Industry, Paints, Shipbuilding, Mining Industry, Metal Industry, Glue Industry