

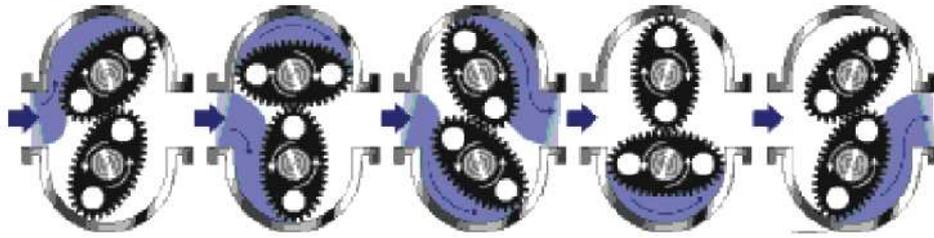


Over Gear Flow meter



ADDMAS oval gear flow meter is a kind of direct-reading accumulating liquid flow meter. ADDMAS oval gear flow meter adds transmitter mechanism on the basic of ADDMAS flow meter. It possesses many virtues such as large testing range, high precision etc.. It is widely used in Flow measurement in industrial field such as oil development, oil refining, chemical, commerce, oil storage.

Operation Principle : Measurement is made in the testing room. There is a pair of oval gear in it. The pair of oval gear will keep rotating on the axis under the role of liquid pressure difference between inlet and outlet. Liquid flow through the flow meter will be known by testing gears' rotation number. As it is showed in picture 1(a), the inlet and outlet are separated by a pair of oval gear A and B. There is crescent-shaped space between Gear A and inner wall of the testing room (It is showed as shadow in the picture). There is a rotating torque while the total torque on Gear B is zero. Gear B will be rotated by driven of Gear A. The picture 1(b) shows the middle position of the two gears. When the gears turn to the position showed in the picture 1(c), Gear A will lose rotating torque while Gear B will gain rotating torque. Gear A will be rotated by driven of Gear B. It is showed in the picture 1(d).



Operation Principle Picture

Structure :

The ADDMAS oval gear flow meter mainly consists of testing room, sealing mechanism and counting mechanism.

1. Testing room: out cover of instrument is made by cast iron. Inner space and the board consists of the testing room. There are 2 stainless steel axes and a pair of oval gear is sleeved on the axes.. The liquid from the inlet will be sent to the outlet through the crescent-shaped space by the gears 'turn which is driven by pressure difference between inlet and outlet in flow meter. Four times volume of crescent-shaped space will be accumulated while the gear makes one revolution round. The space between oval gear and inner wall of the testing room is very small with tens of micro-meter only to decrease leak of the instrument.

2. Sealing mechanism: The testing room is sealed. The permanent magnetic sealing Mechanism is adopted on the small size flow meter. The partition separates the active and passive permanent magnet . Sensitivity Of the structure is high and seal is solid. Poly tetra fluoroethylene plastic is used as packing seal for the big size flow meter. T he sealing lining will be extended to seal by change of spring compression through adjusting the nut. The structure is rather simple and convenient for adjustment.

3. Counting mechanism: It includes driving wheel speed ratio adjusting mechanism and reckoning mechanism. The total rotation number and speed of a pair of gears will be passed to the needle and wording wheel of reckoning mechanism(11).after speed changed caused by driving wheel. The total liquid volume and instant flux through the pipe will be known. Speed ratio adjusting mechanism is used for adjusting and correcting errors of instrument. Oval gear flow meter is installed electrical impulses signal transmitter in the counting mechanism of the ADDMAS oval gear flow meter.I.E. one permanent magnet disk is fixed on the transducer is installed on the counter. The transducer possesses merits such as long life, strong capacity of anti interference, wide working frequency, no spark, fearless of oil, grease and dust, small measurement, convenient installation. The solid testing signals can be got without contact when the magnet accesses to the induction surface with the action distances. Permanent magnet driving block diagram of Model DTO flow meter Poly tetra fluoroethylene seal driving diagram of Model DTO flow meter Main technical data Basic errors allowance ± 0.5 (± 0.2) Max. working pressure 16 Bar. Connecting flange of pipe ...GB2555-81 Viscosity



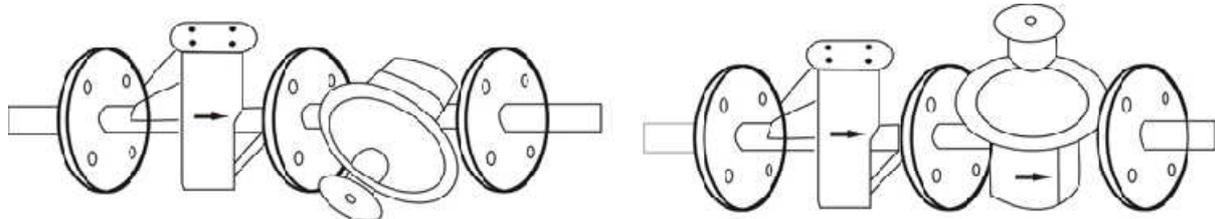
of liquid (MPa.s). 0.6-250 (up to 2000mPa.s, Please specify in order) Temperature of tested medium -30-160 Specification of oval gear flow meter and scope of flux

Technical data		Flow rate(L/H)		
Type	Connection	0.6~2map.s	2~8map.s	8~200map.s
DT-O-10	1/2"~3/8"	40~400	40~400	40~400
DT-O-15	Flange ANSI 150#	380~1500	200~1500	150~1500
DT-O-20	Flange ANSI 150#	750~3000	400~3000	300~3000
DT-O-25	Flange ANSI 150#	1500~6000	800~6000	600~6000
DT-O-40	Flange ANSI 150#	3000~15000	2000~15000	1500~15000
DT-O-50	Flange ANSI 150#	4800~24000	3200~24000	2400~24000
DT-O-80	Flange ANSI 150#	12000~60000	8000~60000	6000~60000
DT-O-100	Flange ANSI 150#	20000~100000	13000~100000	10000~100000
DT-O-150	Flange ANSI 150#	24000~120000	15000~120000	12000~120000

Note: When choosing at causticity medium, top discharge must reduce one third

Installation :

Installation shall keep the direction on the carcase of the flow meter to be consistent with flow direction of liquid. Installation position shall be convenient for reading. (See picture 4)



Correct installation

Wrong installation Picture 4 Installation position

2. The flow meter shall be installed in the normal temperature place without harmful gas and strong heat radiation to prevent the flow meter from coming to harm.

3. The oval gear axis shall be in level position i.e. the dial shall be installed to the vertical position (graduation "0" shall be on the top) to decrease friction between oval gear and body and abrasion of spare parts. To be convenient for reading, the counter can be rotated to 90 degree or 180 degree according to the different installation position.

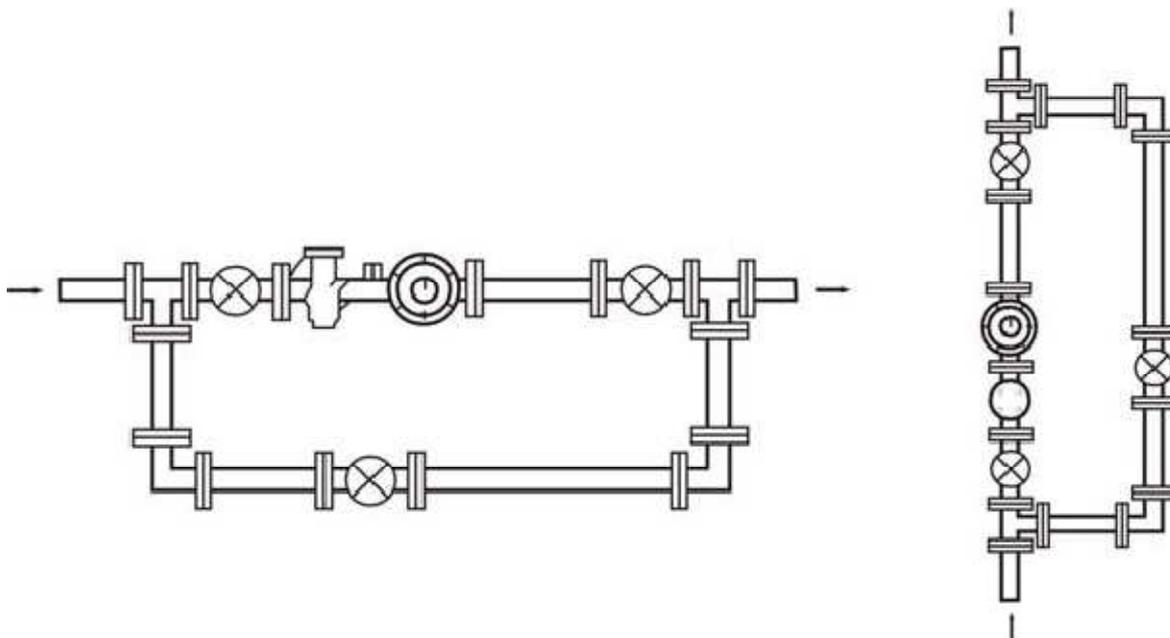
4. The pipes shall be completely washed before installation of flow meter. The filter shall be installed before installation of flow meter if filter no filter available to avoid impurity to the flow meter.

5. The flow meter shall be installed at the side of the pump's outlet while the flow regulating valve at the backward position of the flow meter. First open the stop valve at the upper side, then open the



flow regulating valve or stop valve slowly at the backward position. It is strictly prohibited to open or close suddenly.

6. When the flow meter is using, the liquid shall be fully filled in the meter. No gas shall be mixed in the liquid or it won't be accurate to test with the gas and liquid mix cubage. The gas separator shall be installed before the flow meter if liquid mixed with gas.



Picture 5

Horizontal installation

Vertical installation

Picture 5 Installation Position 7. Flow range in the pipe shall not be increased or decreased suddenly. Events shall be avoided such as shake of pipe, water hammer and sudden fluctuate of pressure etc. Or it will influence normal work of the meter. 8. Abrasion of the oval gear will be increased with high rotation speed if flux exceeds the max. flux limited. It can be used but errors will be big if the flux less than the min. flux limited. The starting flux is 2% around of the max. one. It's better that normal working flow is 70%-80% of the max. one. 9. Upon high viscosity liquid, it shall be heated to decrease viscosity first and flow in the tube. When flow meter, methods such as heating by steam outside the flow meter to make liquid flow shall be done. The flow meter can be used after liquid viscosity decreased. Or viscous liquid will "bite" driving parts and destroy the flow meter. 10. Temperature of testing liquid shall not higher than limited one. If high, the flow meter will stop to work. Change of temperature will cause additional errors of viscosity influence. Furthermore, crescent-shaped space will be large as increase of temperature and make flow meter "walk slowly" If the testing room is made by cast iron while oval gear is cast aluminum, additional errors +0.4%/1000C 11. Each flow meter will be marked by No.7 machinery oil under room temperature. Oil viscosity is 10 centipoise



under normal temperature. If liquid viscosity difference is large comparing with it, double layer gear can be used to replace. 12. Hose sweeping steam and water is prohibited to flow in the meter.

Error adjustment The basic min. and max. flow range error allowed is between $\pm 0.5\%$. The calculation of error is percentage comparing difference between accumulating flux showed and actual flux in standard container with actual flux.

1. The standard of double layer gear designed is 38/35. If it is found the flow meter runs fast when checking, it means “+” errors occurred. For example $+1.02$ - $+0.3\%$ (average error is $+0.66\%$). Referring to the error registration chart, replace the gears with the corresponding double layer gear 41/38 to decrease 0.62% error and change into $+0.4\%$ - -0.32% which is within the qualified scope.

2. Accuracy of flow meter will be changed owing to gears’ abrasion during usage and lead to ultra-error. It can be adjusted up to grade if error range is less than 1%. For example, if precision of meter declined to $+0.22\%$ - -0.64% (average error is -0.21%), first check number of teeth of original double gear. If it is 38/35, adjust as the above No.1. If it is 41/38 gear, corresponding error $+0.62\%$ shall be tread as 0, raise 0.21% to make error decline 0.21% and change into 0.41%. Referring to the error registration chart, replace 40/37 double layer gear. (Its error is 0.43% and it is most similar to 0.41%). The actual error will decline 0.19% after adjustment. Precision of meter is $+0.41\%$ - 0.45% within specified Limit.

3. Means to verify and adjust Grade 0.2 oval gear flow meter is same as No. 1,2.

4. Take off out cover first and loose axle sleeve at the back of it and nuts, replace and adjust gear then turn adjusting board to make adjusting gear and driving gear to joggle correctly, tight axle sleeve and nuts.



Problem Description		Reason	Measure	Remark
1.Oval gear stops turning		1.Impurity mixed in the meter and the oval gear blocked	Unpick and wash reinstall as marke on the oval gear.	New meter easy to happen,oval gear laied as marks.
		2.There is mixture in liquid tested,filter filled with impurity	Wash filter and clear impurity	
		3.Pressure of liquid tested is too low	Increase pressure	
2.Oval tear turns while needle doesn't turn		1. Drive wheel blocked	Clear impurity aned add lubricant	
		2. Loose of gear riveting	Riveting gear	
3.Joffling when needle turns back		Flow exceed then max. specified flux	Adjust the flow to specified value.	
4.Abnormal noise during turning of oval gear		Flow exceed the max. specified flow	Adjust the flow to specified value.	
5.Needle reverse turn		Direction of flow is opposite to the arrow direction marked on the out cover.of meter	Unpick and reinstall according to the direction marked.	
6.Large error	Minus error	1.Flow less than min. specified values	Replace flow meter with small caliber	
		2. Leakage of bypass	Check bypass to prevent leakage	
		3. Much abrasion of oval gear as long time usage	Replace adjusting gear as per change value of error	
	Plus error	4.Gas included in liquid	Install gas separator before meter and prevent leakage at the join of flange	
		5.Viscosity difference between liquid tested and verified	Replace adjusting gear as per change value of error	

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