1. Working principle

1.0 Working principle for the metering body

M series meter is positive displacement meter for liquids. They are designed for liquid metering both in transfer and process control applications. Thanks to their design they are easy to keep and can suit a wide range of applications. The meter consists of a housing where two bladed displacement rotors and a central single blocking rotor turn in synchronized relationship within three cylindrical bores with no metal-to-metal contact within the meter element. Each rotor is supported on either end by a bearing plate through which the rotor shafts protrude.

The bladed displacement rotors, alternately move through the two half-cylinder bores of the meter element, while the single blocking rotor rotates within its bore in such a way as to produce a continuous capillary seal between the unmetered upstream product and the metered, downstream product.

At one end of each rotor shaft is a timing gear. The blocking rotor gear, having twice the number of teeth of each of the displacement rotor gears, rotates at half the RPM of the displacement rotors.

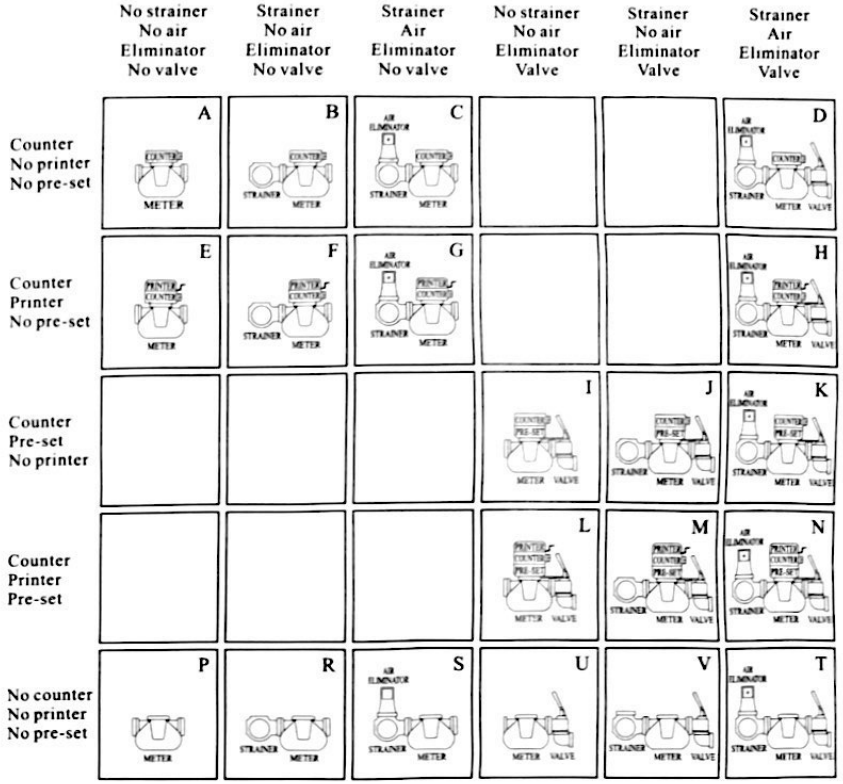
2 Model

2.1 Model Description

M - 50 - CX - 1

TYPE	NORMAL CAPACITY	MODEL ACCESSORIES	AIR CHECK VALVE	MATERIALS OF CONSTRUCTION
M	50	C	X	1
M Meter	40 60GPM	A Thrup···	Blank no air check or differential valve	See "Meter Materials Of construction"charts Class 1 thru 20
GLQ Strainer	50 100GPM	See Chart of	X either air check or differential Valve	
V Valve	80 200GPM	Accessory	Y either air check or differential valve plus temperature volume compensator	
K Check valve	100 350GPM	Combinations		
FL Air eliminator	150 600GPM	Below		

2.2 Model Accessories



3.0 Typical Application

- Check of loading/unloading operations of fuel and petrochemical products in fuel bulk plants and/or refineries
- On truck tanker for fuel/LPG transport and delivery
- Heavy duty fuel dispensing system for big vehicles and airplanes

Typical Application of Aluminum Construction

Class 1 meter: refined petroleum products, such as gasoline, fuel oil, diesel fuel, kerosene, ethylene glycol, motor oils and rotogravure ink.

Class 2 meter : aviation gasoline and jet fuels.

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Typical Application of Aluminum Construction

Class3meter: a wide variety of products such as: liquid sugars, corn syrup, corn sweetners, dextrose, fructose, sucrose, maltose, lactose, corn oil, soy bean oil, cotton seed oil, coconut oil, and shortening's etc. Rate of flow is based on viscosity to pressure loss relationship.

Class10meter: liquefied petroleum gas(LPG) including butane, isobutene, pentane, ethane, freons and propane.

Class14meter: crude oil, also for heated and/or viscous liquids including animals fats, resins, #6 oil and non-abrasive asphalt emulsions.

Class15meter: for metering oil or water based latex products, polyester resins, and adhesives (neutral PH). Also available for metering herbicides and nitrogen fertilizer solutions (requires Viton and Teflon seals).

Class16meter: for general solvent metering, such as methanol, toluene, xylene, naphtha, acetone, MEK, MIBK, and alcohols including ethanol.

4.0 Technical data

Flow rate: M-40-1 1 1/2" 25L/min-250L/min

M-50-1 2"55L/min-550L/min

M-80-1 3" 115L/min-1150L/min

M-100-1 4" 170L/min-1700L/min

M-150-1 6" 300L/min-3000L/min

Max Pressure: 10Bar

Standard measure unit: Liter and US Gallon for option

Repeatability: 0.05%

Type of flange: ANSI, NPT, BSPF

Strainer mesh: 80Mesh for diesel, 40Mesh for gasoline.

5.0 Installation requirement

- Make sure you observed all of safety rules concerning room ventilation, temperature control, fire prevention and fire extinguishing systems
- Make all connections in order to ensure the meter and grounding device system are equipotential.
- Make sure you can get easily to fire extinguishers for your product. Consult your local fire department for proper information about fire problems and mandatory law dispositions
- Install the meter and its accessories complying with the electric and safety standards in force.
- Prior to meter installation the entire piping system must be flushed, with a liquid that is compatible with the construction of the meter

5.0 Installation requirement

- Keep the meter external surfaces clean in order to notice easily possible defects.
- The meter must be firmly fastened to a platform or other support regardless of its mounting position. Never hand the meter to the piping system and do all necessary to avoid that piping tensions due to such cases as material dilation by temperature, stress of flange screw etc, are conveyed to the meter assembly. Expansion joints both at the inlet and outlet of the meter assembly will prevent it from these tensions.
- Calculate suitable working areas for maintenance operations. Remember you need a support where to mount the meter.
- Meters are designed with special materials depending on the liquid/s they are used. Their compatibility with a certain class of liquids is indicated on the M series tag. Meters should not be used with other liquids. In case of doubt please apply to M series for information.
- If required, convey the piping downstream of the meter towards a tank prover in order to carry out calibration and/or metrological check.
- When missing in the assembly install a suitable strainer upstream of the meter so as to strain every foreign material (welding dross, dirt etc.).Foreign bodies over a certain size could get into the rotors and cause them to seize.
- When the meter assembly has got an air eliminator you have to connect the two outlet threaded ports (or just one when the assembly includes an air check valve) to the tank of the liquid which is metered or to other sealed container under ambient pressure. This to avoid contamination of the surrounding ambience.
- There is a mutual relationship between the liquid flow direction in the meter and the correct indication of the delivered quantity on the register display; if you desire the register to count down you will have to reverse the position of the adjuster drive gear.
- New or repaired piping can be the source of welding dross or foreign material which clog or break the strainer network. The strainer basket must be daily checked during the first 100hours of operation.
- A frequent check and cleaning of the strainer are required in order to get a good performance. Locate the strainer on the inlet side of the meter. Screw the strainer firmly to the meter flange. Fasten the piping to the strainer.
- The meter and its accessories must not support the weight of piping system. There is enough room to remove the air eliminator.
- Locate the air eliminator on the inlet side of the meter. Always mount the air eliminator in vertical position. Screw the air eliminator to the coupling flange of the strainer. Connect and fasten the piping to the air eliminator.

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6.0 Operation requirements

- The meter must remain full of product at all times. An easy way to accomplish this is to put the meter assembly in the line below the piping centre-line. This requires adding elbows and flanges prior to installing the meter. The meter should be installed in a bypass loop, below the pipe centre-line, with block valves upstream and downstream. A block valve should be located in the mainstream, labelled as the bypass valve. Mounting the meter like this allows to keep the meter always full of liquid and to isolate it for servicing or calibration when required, while continuing flow through the bypass-valve.

Attention: every part of the piping which could stop and/or isolate the flow should be provided with a pressure relief to prevent damages from thermal expansion.

- Upstream lines must be maintained full to prevent air from entering the meter. If the upstream or inlet lines are constructed in a manner which allows reverse flow, foot valves or back checks must be installed.
- Underground tanks that are furnished with a submersible pump will eliminate many problems that occur with positive displacement pumps (suction pumps) when suction piping is incorrectly sized of when the lift is too great.
- Give careful attention to your system's pumping equipment and piping because of their influence on liquid being measured as it enters the meter assembly. Systems should be made free of conditions that cause or introduce entrained air or vapor.
- Follow the manufacturer's recommendation fully when installing pumps. Give particular attention to factors like: use of foot valve, pipe size to the inlet and conformance to net positive suction head conditions when suction pumping is required.
- For volatile liquids, such as light hydrocarbons which tend to flash or vaporize easily at higher ambient temperatures, it is desirable to use flooded suctions and piping sized larger than the normal pump size.
- When locating the meter under a tank (on truck tankers) the course of the suction piping affects metering precision. The piping should have a constant inclination towards the pump avoiding goosenecks.

6.0 Operation requirements

- Hydraulic shock is harmful to all components of an operating system including valves, pump and the meter. In particular meters must be afforded protection from shock because of their need to measure with high precision. Generally the best protection is prevention, which can be readily accomplished by adjusting valve closing rates in such a manner that shock does not occur.
- Thermal expansion like hydraulic shock is a phenomenon that can easily damage meters and systems in general. Care should be taken in designing the system to include pressure relief valves in any portion or branch of the system that might be closed off by closure of operating valves or block valves.
- The meter can operate in a dry condition (with no liquid) for no longer than 5 minutes.
- The meter shall operate within the recommended flow rate range. Only in some exceptional events it may be allowed to let it work with a 20% higher flow rate than the nominal one and only for a short time.
- Start up. During the starting up the system shall be slowly filled in with liquid. There shall be no air in this phase. Take care not to damage the meter. The system should be filled in by gravity or by using a pump.
- Filling in the system by means of a pump. Apply to the pump manufacturer for information about its loading. After the pump has been loaded with liquid, operate as follows:

  Make sure the downstream valve is shut down.

  The meter counter will start turning.

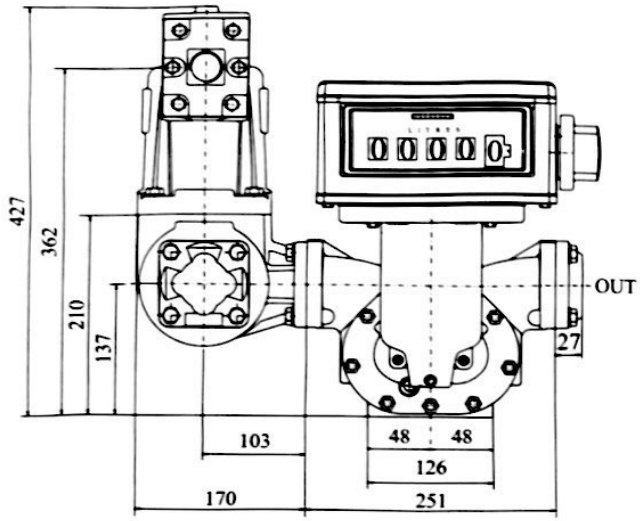
  When the meter has started counting volume open completely the valve.

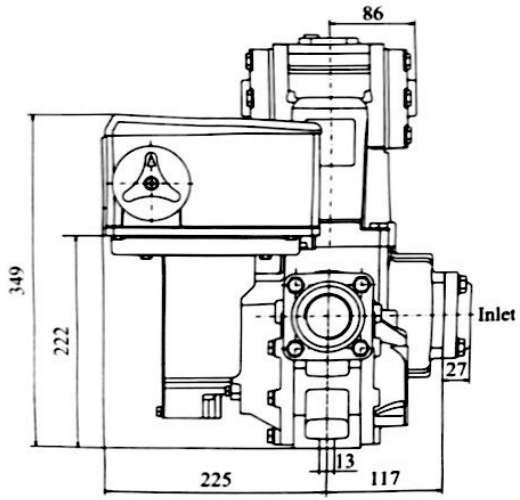
  In this phase the meter should not run faster than 20%of its rated flow. Once the product is flowing out the end of your system, the outlet valve can be opened all the way provided that the system is designed not to exceed the flow rate marked on the meter.
- Never use the meter or the system when they are not completely full of liquid or in presence of air bubbles or compressed air/vapour. If this is not possible you require devices to eliminate air/vapour.

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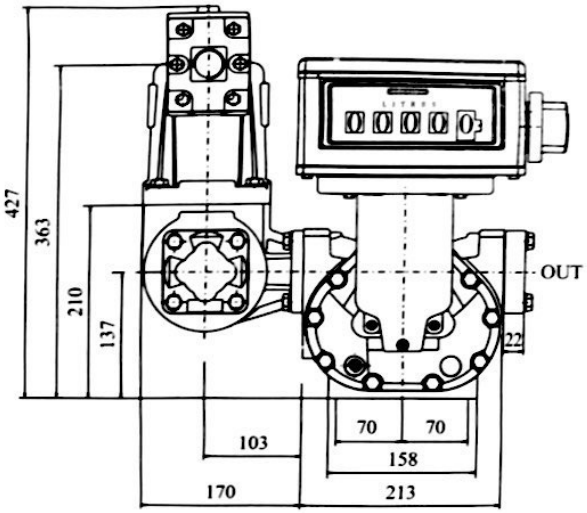
8.0 Dimensions

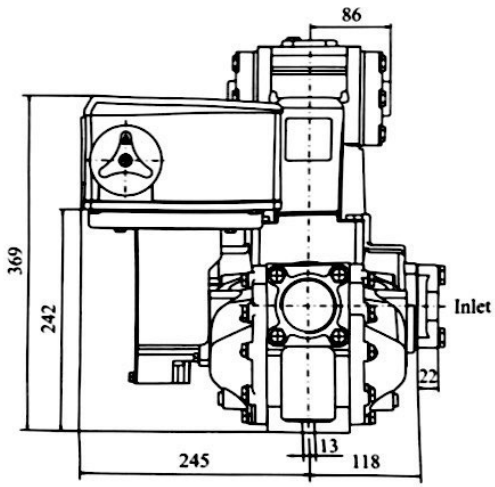
8.1 M-40-1 Meter Dimension





8.2 M-50-1 Meter Dimension

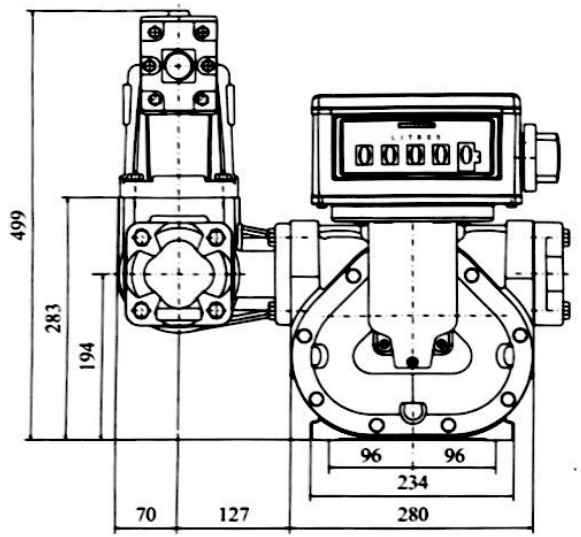


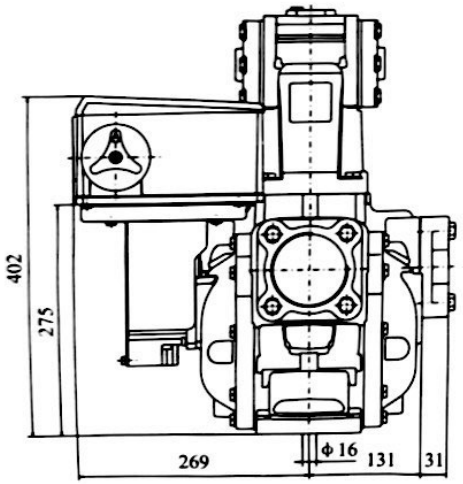


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8.3 M-80-1 Meter Dimension





8.4 M-100-1 Meter Dimension

