



SENSORES INDUSTRIALES E INTELIGENTES, S.A. DE C.V.

SPECIFICATION
VARIABLE AREA FLOWMETER

SECTION
10A

Series M10A1290





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Introduction.

Series M10A1290 Variable Area Flowmeters operate on the variable area principle to meter fluid flow. The glass meter tube can be removed easily for range change or cleaning, without disassembling the end fittings or removing the meter from the line.

The elevation on the float in the tapered glass metering tube is proportional to the fluid flow rate. Readings are taken from the scale on the metering tube. The scales are graduated to provide one of three readings: diameter ratio (Dt/Df), percentage or direct reading.

These industrial type flowmeters provide visual indication of flowrate with linear scales of 12.5 to 1 range. A choice of capacity is available from a fraction of a cm³/min to 95 GPM water or air equivalent. Because of its O-ring construction the meter has no packing or stuffing boxes, eliminating the need for operating and maintenance adjustments.

Engineering specifications

Repeatability: 0.5% of full scale

Accuracy: Standard is $\pm 2\%$ of maximum flow (except for 1/16" tube size which is $\pm 4\%$ of maximum flow); calibrated standard is $\pm 1\%$ of maximum flow (except for 1/16" tube which is $\pm 3\%$ of maximum flow).

Range: 12.5 to 1

Mounting: Standard in line mounting
Scale length
100 mm for meter size 1/16"
127/130 mm for meter size 1/8" to 1/4"
250 mm for meter size 1/2" to 2"

Scale graduation

Dt/Df for tube size 1/16" to 1/4" Percentage for tube size 1/2" to 2" Direct reading optional

Allowable fluid temperature

Minimum recommended temperature is 32° F

(0° C) . Maximum recommended temperature is 250° F (121° C).

Max. 40° C for floats and fittings of PVC
if higher temperature, consult F&P

Caution:

Is important that the O-ring material be compatible with the process fluid. Meter tube breakage can occur if the wrong material is used. For example: VITON O-RING MUST NEVER BE USED FOR AMMONIA SERVICE. Refer to Catalog 10A1023. Rotameter Selection guides for material selection.

Pressure ratings: (I.S.A. RP 16.1)

Maximum Safe Working Pressure
at 100° F (38° C)

Tube size	PSIG	kPa
1/16" to 1/4"	450	3105
1/2"	300	2070
3/4"	200	1380
1"	200	1380
1-1/2"	130	895
2"	100	690

WARNING:

These meters must not be operated without the operator protection shield in place. To do so could result in injury to personnel.

Connections (standard)

Meter sizes	NPT	Flanged RF 150 #
1/16" to 1/4"	1/4"	1/2"
1/2"	1/2"	1/2"
3/4"	3/4"	1"
1"	3/4"	1"
1-1/2"	1-1/2"	1-1/2"
2"	1-1/2"	1-1/2"

Other NPT & flanges options
Consult F&P

Weight, approx. Kg

Meter size	M10A1297	M10A1298
1/16" to 1/4"	0.5	1.4
1/2"	1.7	2.4
3/4"	2.3	3.5
1"	2.7	4.7
1-1/2"	4.4	7.5



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Service

Glass tube meters are not recommended for continuous services on alkalis above 100° F (38° C) or more than 20% concentrations. Nor for fluorine, hydrofluoric acid, water above 200° F (93° C), steam slurries or molten metal.

Materials of construction

Tube: Standard Tri-flat guided borosilicate glass tubes used in 1/16", 1/8" and 1/4" size. Beadguide borosilicate glass tubes are used in 1/2" size and up.

Spherical floats: Standard - glass, stainless steel, sapphire, optional - tantalum

USV, SV, NSV floats: Standard- stainless steel.

O-rings: Standard- buna N: Optional Viton

Fittings: Standard - Steel, brass, stainless steel

Inlet float stop: Tube sizes 1/16" to 1/4" Glass formed in tube.

Tube sizes 1/2" to 2": Teflon

Outlet float stop: Tube sizes 1/16" to 1/4" Stainless steel.

Tube sizes 1/2" to 2": Teflon

Tube rest gaskets: Standard Teflon.

Meter body: Rigid stainless steel sch 40 or Seamless anodized Aluminum

Tube Retainer Spring: Armo 17-7 pH stainless steel, external to fluid stream .

Shield: Polycarbonate

Accessories:

External scale: Graduated plastic flow scale mounted adjacent to metering tube.

Min. and/or max. alarm Consult for specs.

Ordering Information:

Model number

Materials of construction

Scale graduation

Operating conditions:

fluid, Max. flowrate, density and viscosity at operating conditions and max. temperature and pressure.

Customer standard conditions

Allowable pressure drop

Meter sizing:

Ask for the F&P computing program and related information.

General

All series M10A1290 flowmeters are available with either screwed or flanged end fittings. All meters are provided with O-rings of material specified at the time of purchase. Should requirements of the fluid being metered demand a change in materials, this may easily be accomplished in the field.

Important

It is imperative that the following measures be observed in order to minimize and hopefully eliminate, the possibility of operator injury.

1) Glass meter tubes have been designed to operate up to maximum design working pressure listed herein. This not to be construed as a certification that the tubes will not break at any pressure. Inherent material limitations can result in tube breakage due to conditions beyond our control. For example: glass is a brittle material which may break; glass is notch sensitive in that scratches, nicks or cracks may result in breakage when pressurized; incorrect installation or faulty operation methods can cause tube breakage regardless of operating pressure.

2) Glass meter tubes are not recommended for either hot or strong alkalis,



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fluorine, hydrofluoric acid, steam or water over 93°C (200°F). Glass meter tubes should be periodically inspected for signs of wear. Erosion, stress, cracks, nicks or deep scratches provide early warning for tube replacement. With certain fluids, the glass may erode evenly so wear is not visibly noticeable. If wear is suspected, the tube should be replaced in order to eliminate this potential cause of meter tube breakage.

3) It is important that all materials of construction be compatible with the service to which the meter is applied, it is especially important that "O"-ring material be compatible with the process fluid.

4) The meter should never be subject to excessive vibration. Avoid the use of quick acting devices in the fluid stream in order to prevent shock waves, associated with such devices, from damaging the meter.

5) The use of a pressure relief valve and/or a rupture disc is recommended in the pipe line containing the meter and located such to preclude glass meter tube breakage in the event of an overpressurization of the line.

6) When applied to a high pressure gas cylinder, at least two step-down pressure regulators are to be used between the meter and the cylinder.

7) Remove pressure from the meter before attempting to remove the meter tube.

8) Be sure the parts that serve to lock the meter end fittings in place are secure. This should be checked before the meter is put into service or returned to service after maintenance. Loose end fittings may result in glass meter tube breakage.

9) The glass meter tube should be periodically inspected and replaced if cracked, scratched or worn.

Installation.

General

In general, when a meter is to be used for gas service, it should be located as closely as possible to a throttling point but preferably with the valve located at the outlet fitting. Inlet piping size for gas service should be kept to a minimum. For liquid service however, piping should be as large as economically practicable.

Flowmeters must be installed vertical with the outlet at the top. Use of a plumb bob or equivalent device to check vertical alignment is recommended.

Surge chambers and accumulators

Surge chambers and accumulators are frequently used on flow installations to smooth out pulsations of the metering float where reciprocating pumps or compressors are used on the feed lines to the meter. Surge chambers, when used on liquid service, may have a gas introduced on the upper side of the chamber.

When it is objectionable to have the gas in contact with the liquid, accumulators are used. Accumulators are similar to surge chambers except that they include a rubber bag on the upper side which seals the gas from the liquid. Accumulators usually have the rubber bag factory sealed with nitrogen or other suitable gas to a pressure of approximately 60 % of the pumping pressure. It is recommended that the manufacturer be consulted for the correct size surge chamber or accumulator required to suit the installation.

Pipe Mounting

Flowmeters of a smaller size will, in general, be adequately supported by connecting piping. It is recommended that by-pass piping be placed around the meter to allow continuous flow through the pipe line while the meter is being serviced.



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Placing the meter in operation

Gradually start flow through the meter by opening the flow rate valve. A gradual start-up reduces flow surges that may damage the float, outlet float stop or tube. All air or vapor must be vented from the meter and pipe line when metering a liquid. Meter readings must be taken from the scale at the graduation which coincides with the reading edges of the float.

Should float bounce occur in meters being used in gas service, it may be the result of one of the following reasons: Low pressure operation, long range tube and float combinations, heavy floats, operation near tube zero or large piping volumes.

If bounce occurs or initiates only at low diameter ratios and the lower portion of the scale is not normally used, the problem may be corrected by using an extra long inlet float stop: This will of course render the lower portion of the scale unusable.

Liquid pulsation is often caused by a pumping with a pulsating discharge by pipe vibrations. If these conditions cannot be altered, a surge chamber is usually the best available solution. this chamber should be located as closely as possible to the pump or source of vibration.

Maintenance

Tube and float removal, Tube cleaning and float installation.

The float is a precision manufactured part; be careful not to nick, drop or damage it otherwise as this will adversely affect accuracy. Never subject the metering tube to

unnecessary shock or strain. Care must be taken when removing the metering tube to note locations of float stops at both ends of the tube. When reassembling the meter, stops must be located at their original place. In order to remove the metering tube and float proceed as follows:

1.- Disconnect the meter from the piping. Unscrew the Allen-screws of the upper fitting.

2.- Grasp the metering tube and slowly but firmly pull the tube up and out the housing. Make certain that the float does not drop out and becomes damaged when lifting the tube from the meter body.

Assembly

Essentially, assembly of the meter is reverse of disassembly shown above. When assembling

“O” -rings on fittings it is advisable to lubricate with silicone grease.

Care should be exercised in replacing the tube and float so that the lowest scale reading is at the bottom of the meter and the float is properly oriented. Note also that float stops are positioned as they were before disassembly.

Spare parts order

When ordering eventually necessary spare parts, please, always indicate the number of the instrument. You will find the identification instrument in the name-plate at the housing of the flowmeter.

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