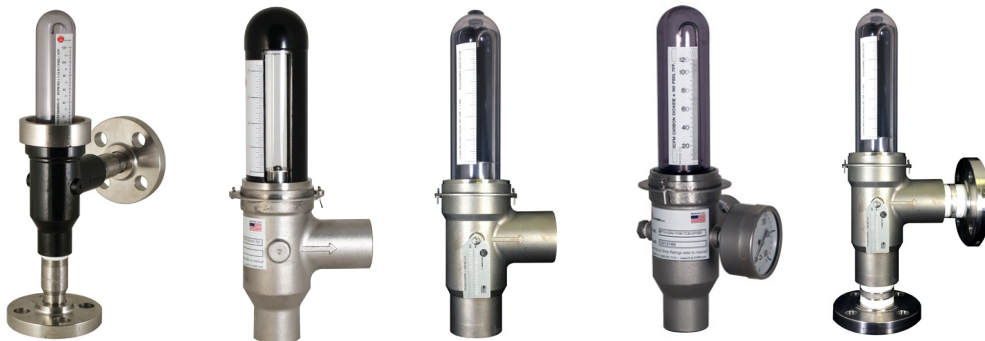


# OPERATING INSTRUCTIONS

## MEMFLO™ MFTV METAL BODIED FLOW METER



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## Introduction

*Please read carefully! No liability can be accepted for damage caused by improper use or installation of the MEMFlo™ MFTV Flow Meter.*

MEMFlo™ MFTV Metal Bodied Flow Meters with Clear Top are simple, accurate, meters for use in a wide range of industrial liquid and gas applications. These meters have an excellent tolerance to suspended solids and measure flow to one percent accuracy. Unlike tapered tube rotameters, MFTV flow meters have an indicator disk in close proximity to the edge of the sight tube for visibility even in many dirty fluids. These meters can be supplied with the MFT2™ 2-Wire Flow Transmitters for flow rate and total.

The indicator disk should be visible in most thinner oils and light colored liquids. Visibility in black, viscous liquids is unlikely, and the magnetic indication option should be ordered for these cases.

## Safety Precautions

If you are unsure of the suitability of a MFTV Flow Meter for your installation, please consult your FLO-CORP representative for further information.

**NOTE: REMOVE ALL PACKING INSERTS BEFORE OPERATING FLOW METER.**

## Authorized Personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorized by the plant operator. During work on and with the device the required personal protection equipment must always be worn.

## Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel over fill or damage to system components through incorrect mounting or adjustment.

## General Safety Instructions

The user must take note of the safety instructions in this operating instructions manual, the country specific installation standards as well as all prevailing safety regulations and accident prevention rules. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument. During the entire duration of use, the user is obliged to determine the compliance of the required occupational safety measures with the current valid rules and regulations and also take note of new regulations.

## Disclaimer

The information contained in this document is subject to change without notice. FLO-CORP makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.

Use the diagram below, working from left to right to construct your FLO-CORP Model Number. Simply match the category number to the corresponding box number.

**Example: MFTV-GSU-0508-TCB**

*MEMFlo MFTV Flow Meter for Gas Service, SST Body, Polysulfone sight tube, 1-20 SCFM, 1" Connection Size, Female NPT Threaded Connection, Corrosive Resistant Scale, Buna-N O-Ring, No Additional Options*

**MFTV** —       —         —       —

**Connection Size (4)**

04)	1/2"
06)	3/4"
08)	1"
12)	1 1/2"
16)	2"
16)	2"
20)	2 1/2"
24)	3"
32)	4"

**MFTV**

**Service (1)**

L) Liquid  
G) Gas

**Body Material (2)**

S) T-316 Stainless Steel (1/2" to 1 1/2" small body)  
Zinc Phosphate, Xylan 1052 Coated Steel (2" to 4" Large Body)

**Sight Tube Material**

U) Polysulfone  
G) Armored Glass

**Capacity Designator (3)**

	GPM Liquid	SCFM Gas
00)	0.025 - 0.545	0.16 - 3.2
01)	0.04 - 0.8	0.5 - 5
02)	0.6 - 1.2	0.3 - 7.4
03)	0.08 - 1.64	0.5 - 10.2
04)	0.1 - 2.6	0.6 - 14
05)	0.15 - 3.8	1 - 20
06)	0.5 - 5.4	1 - 26
07)	0.2 - 7	1 - 35
08)	0.2 - 10	2 - 50
09)	0.6 - 15	3 - 70
10)	0.5 - 20	4 - 85
11)	0.5 - 11	6 - 125
12)	0.7 - 15	6 - 160
13)	1 - 21	4 - 260
14)	0.5 - 35	1.5 - 25
15)	1 - 50	1 - 31
16)	2 - 70	2 - 40
17)	3 - 90	3 - 70
18)	4 - 120	4 - 100
19)	N/A	5 - 140
20)	N/A	5 - 175
21)	N/A	6 - 250
22)	N/A	2 - 310
23)	N/A	7.5 - 390
24)	N/A	10 - 510
25)	N/A	35 - 750
26)	N/A	20 - 1,000
27)	3 - 70	30 - 750
28)	3 - 100	40 - 1000
29)	6 - 150	50 - 1750
30)	3 - 100	40 - 1000
31)	6 - 150	50 - 1750
32)	10 - 200	100 - 2300
33)	14 - 300	150 - 3500
34)	5 - 100	50 - 1200
35)	10 - 200	100 - 2300
36)	14 - 300	150 - 3500
37)	15 - 400	200 - 4600
38)	20 - 500	230 - 5750

**Connection Type (5)**

T) Female NPT Threaded  
F) ANSI 150lb Flange  
X) Special Connection

**Scaling Options (6)**

C) Vinyl  
P) Percent of Flow  
M) Multiple Scales  
X) Other

**O-Ring Material**

B) Buna-N  
E) EPDM (Ethylene Propylene)  
K) Kalrez  
N) Neoprene  
S) Silicone  
T) Teflon  
V) Viton

**Additional Options (7)**

N--) None  
GP#) Gauge Port  
GS#) T-316 Pressure Gauge  
AG1) Armored Glass Sight Tube (connection size: 1/2" - 1")  
AG2) Armored Glass Sight Tube (connection size: 1 1/2" - 4")  
HPO) 600 PSIG Option

**Ordering Notes:**

- (1) Select the best configuration based on your requirements.
- (2) Stainless bodies available in large body sizes. Please consult factory.
- (3) Sizing is based on GPM Liquid, Sp. Gr. = 1.00 or SCFM Air @ 100 psig 70° F
- (4) Connection Size is based on Capacity - Colors must match to ensure compatibility.
- (5) If you require a Special Connection (X), please consult factory with requirements.
- (6) For digital or custom scaling, select Other (X) and note the following requirements:  
Digital Display: Requires Flow Monitor (Consult Factory for best option)  
Custom Scale: Requires Flow Application (Consult Factory)
- (7) To package the MFT2 flow transmitter see MFT2 data sheet model number builder

**Note:** Match color with connection size.

## SPECIFICATIONS

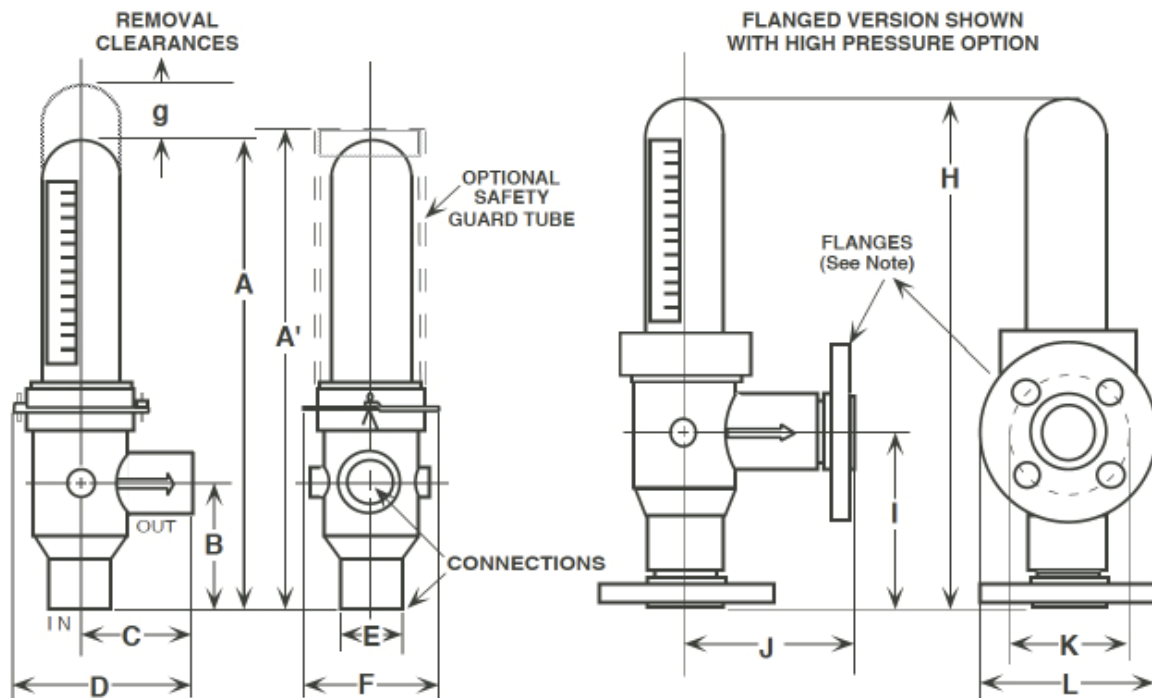
<b>Accuracy</b>	± 1% of 100% flow rate
<b>Repeatability</b>	1/2" to 1 1/2": +/- 1/4% of indicated flow rate 2" to 4": +/- 1/2% of indicated flow rate
<b>Rangeability</b>	30 to 1 average
<b>Materials</b>	1/2" to 2" Small Body: T-316 Stainless Steel 2" to 4" Large Body: Zinc Phosphate, Xylan 1052 coated steel with all stainless internals
<b>Pressure Rating</b>	Up to 300 psig

<b>Temperature Rating</b>	Up to 300°F (pressure ratings decrease at higher temperatures).
<b>O-Rings</b>	Buna N standard; Viton, Ethylene-Propylene (EPR), Silicone, Neoprene, Kalrez and Teflon optional.
<b>Scales</b>	Standard direct reading (GPM or LPM Liquid, Sp. Gr. = 1.00 or SCFM Dry Air @ 100 psig, 70°F.) or percentage scale. Special scales for other flow units or media conditions, or mylar scales for corrosive environments are available at extra cost.

*Note: Please Consult Factory for Special Requirements*

## DIMENSIONS

### Small Body

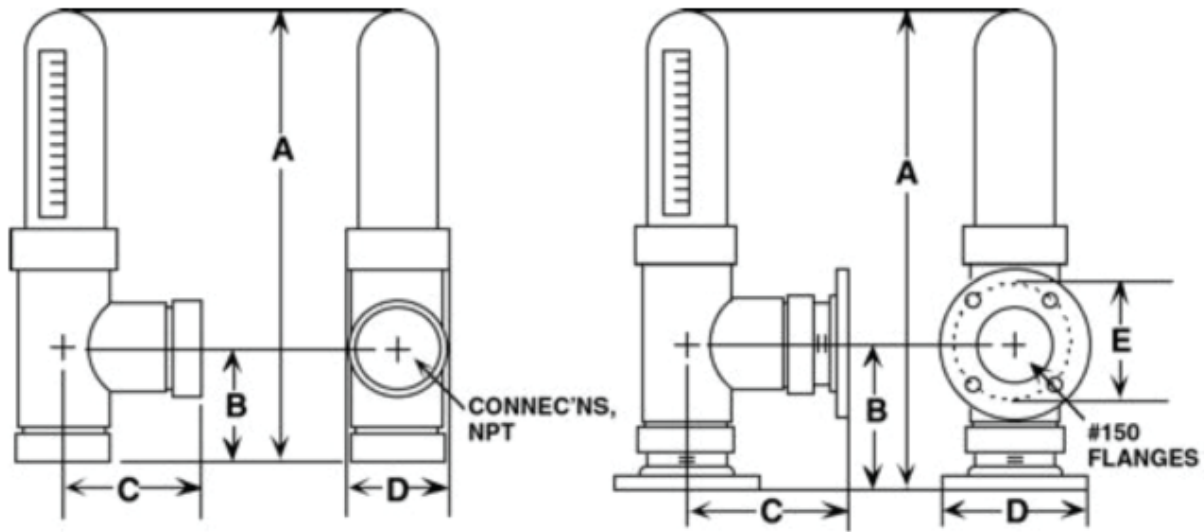


BODY & MEASURING TUBE DESCRIPTION	A	A'	B	C	D	E	F	G	Female NPT
Stainless & Polysulfone	9.36	9.66	2.81	2.68	4.00	1.35	2.72	3.00	Up to 3/4"
Stainless & Polysulfone	15.22	15.36	4.53	3.71	5.70	2.48	3.95	5.00	Up to 2"

BODY & MEASURING TUBE DESCRIPTION	H	I	J	K	L	150lb Flange
Stainless & Polysulfone	10.24	3.69	3.56	2.75	3.88	Up to 3/4"
Stainless & Polysulfone	16.61	5.92	4.96	3.88	5.00	Up to 2"

**Note:** All dimensions are in inches, with a tolerance of ±0.03" on threaded models, ±0.20" on flanged units.

**Large Body**



BODY & MEASURING TUBE DESCRIPTION	A	B	C	D	E	Female NPT
Stainless & Polysulfone	20.23	6.38	5.38	3.63	NA	2"
Stainless & Polysulfone	20.85	6.38	5.38	3.36	NA	2 "
Stainless & Polysulfone (150 GPM/1750 SCFM)	22.35	7.50	6.00	4.25	NA	3"
Stainless & Polysulfone (200 GPM/2300 SCFM)	26.85	8.63	7.13	5.56	NA	4"

BODY & MEASURING TUBE DESCRIPTION	A	B	C	D	E	150lb Flange
Stainless & Polysulfone	20.73	6.28	6.88	6.00	4.75	2"
Stainless & Polysulfone	21.35	6.88	6.88	7.00	5.50	2 "
Stainless & Polysulfone (150 GPM/1750 SCFM)	22.60	7.75	7.75	7.50	6.00	3"
Stainless & Polysulfone (200 GPM/2300 SCFM)	28.10	9.88	9.88	9.00	7.50	4"

**Note:** All dimensions are in inches,  $\pm 0.05"$ . Subject to change without prior notice.

## Installation and Setup

**RECOMMENDED PIPING:** FLO-CORP's flow meters generally have no special straight run or other piping requirements. Restrictive valves, reducer bushings, elbows, and other devices that might cause contraction of the fluid stream or severe turbulence should not be mounted at inlet. A slight effect on meter accuracy may occur at high flow velocities if inlet piping guidelines are violated.

Inlet piping should be the same size as the meter connection. When installing a different pipe size, use standard pipe adapters and come into the meter inlet with a nipple eight diameters long of the same size for greatest accuracy. Control valves should be mounted on the outlet side of the meter. The use of a three valve manifold around the meter is suggested as it allows uninterrupted process flow while the meter is being cleaned.

**PREPARATION:** FLO-CORP's flow meters are ready to install as-is, although the measuring tube may need to be reoriented so the scale is visible after installation.

**PLUMBING-IN:** While the flow meters should be vertical, exact plumbness is not necessary. A general rule is that if the meter appears plumb, it is close enough (even if off by 10°, the predictable reading error is usually less than 1%). Pipe should be cut to proper lengths to avoid stress on the meter used. Avoid over-tightening of the flange bolts.

**MEASURING TUBE ROTATION:** On visual (the float disk is seen) indication models with plastic measuring tubes, grasp the tube firmly with hand near the body and twist until the scale faces the desired direction. Do not use any tools.

**SURGE CHAMBERS & ACCUMULATORS:** Flow meters are more accurate and less likely to be damaged when the fluid flow is smooth. If the meter must be installed on a line where reciprocating pumps or compressors causing pulsation are used, surge chambers or accumulators are strongly suggested to damp the shock wave.

**CAUTION:** BE SURE PRESSURE IS FULLY VENTED AND FLUIDS COMPLETELY DRAINED BEFORE DISASSEMBLING THE FLOWMETER. WEAR SAFETY GLASSES AND PROTECTIVE CLOTHING IF THERE IS ANY CHANCE OF EXPOSURE TO HAZARDOUS CHEMICALS!

The measuring tubes of all standard MEMFlo flow meters may be removed by, depending on model type: (a) removing the cotter pins and pulling the lock rings out horizontally; (b) removing the bolts from the body/measuring tube flange; or (c) removing the internal snap ring with retaining ring pliers. Using hands only, pull the measuring tube straight up out of the body with a slight twisting motion, lifting it clear of the body and snorkel or guide rod. Remove the float assembly by lifting it up and away from the snorkel/guide rod (on some models, the snorkel/guide rod transition assembly must be lifted out with the float). The core tube assembly may then be lifted out---if stuck, CAREFULLY pry up at the top of the slot with a metal rod, taking care not to damage the body or core tube. On MFTV models, the spider ring, O-Ring, (and back-up ring on glass measuring tube styles) will come out with the core tube. If the core tube is stuck, try removing the metal spider ring first.

## Start Up

System flow should be started with the by-pass valve open and meter inlet and outlet valves closed. After the system is operating, open the meter inlet valve gradually to equalize internal pressure. Then slowly crack meter outlet valve and wait for float to stabilize. Finally, slowly open the meter outlet and/ or flow regulating valve all the way and close the system by-pass valve. AVOID SUDDEN SURGES THAT CAUSE THE METER FLOAT TO SLAM INTO THE TOP OF THE MEASURING TUBE! Although not essential, the meter measuring tube should be filled to a level above the float on liquid systems. The snorkel tube (present in most standard models) allows escape of entrapped gases except for a small pocket in the upper end which helps cushion hydraulic shock. To assure proper filling and to flush any foreign particles from the meter, operate the system at full flow briefly at startup.

## Reading Flow

Read flow directly from the scale as the number nearest the top edge of the float indicator disk.

## Maintenance

Occasional cleaning of the measuring tube and internal sensing elements to assure float visibility and continued accuracy is the only maintenance necessary for MEMFlo flow meters. Frequency will depend on the application – in most cases, an annual cleaning is adequate. It is not necessary to remove the MEMFlo flow meter from the pipeline for cleaning or replacing parts. The body remains plumbed into the pipe, allowing easy service and even installation of different sensing elements to accommodate new flow rates or fluids.

## Inspection and Cleaning

Inspect parts for nicks, scratches, chips, wear and contaminant build-up. The edges of the core tube slot, ID of the core tube, and OD of the piston (largest section at the float assembly bottom) are precision machined. Damage to these areas can destroy the meter's accuracy. Also, inspect the O-Ring, the bottom section of the measuring tube and the inside of the upper body section. Damage to these areas may result in leaking. Clean, rinse, and dry all parts carefully, including the O-Ring, preferably with a mild detergent, water, and a soft cloth or soft tube brush. If solvents are used, make sure they are compatible with meter parts.



## Assembly Instructions

In general, replace all parts in reverse order of disassembly.

- 1)** Place the slotted meter tube into the body, aligning the “key” at the bottom of the tube with the keyslot in the bottom of the body.
- 2)** Place the spider over the meter tube with the “notched” leg over the snorkel tube or guide rod. Slide the spider down to the meters tube’s shoulder.
- 3)** Place the meter float in the meter tube, aligning the notch in the indicator disk with the snorkel.
- 4)** Seat the O-Ring on the measuring tube, lubricating it with a small amount of service-compatible silicone grease or petroleum jelly to facilitate replacement.
- 5)** Using hands only, press the measuring tube firmly down into the meter body with a twisting motion. Be careful not to rock the measuring tube side to side and bend the snorkel tube/guide inward where it might interfere with float movement. Rotate measuring tube as necessary for scale visibility and/or alignment of the raceway screw.
- 6)** Slide the lock ring into the groove at the top of the meter body. Then secure with cotter pin.

## Replacement Parts

Because MEMFlo flow meters are custom meters, it is best to stock several complete units as spares to assure availability of replacement parts. Under proper care, there should be no need to stock additional replacement components. If the service or environment is quite harsh, or frequent meter disassembly dictated, spare O-Rings and measuring tubes should be considered.

Otherwise, parts only need to be replaced if damaged. Any visible damage to the entire surface of the O-Ring or measuring tube (particularly from the bottom edge) indicates need for replacement. To insure accuracy, the inside surface of the meter core tube, the slot edges, and the OD of the float piston should be free of nicks, chips, with no visible erosion of any surfaces. If abrasive particles are suspended in the metered fluid, it may be desirable to keep replacement core tube/float assemblies on hand.

FLO-CORP can inspect any suspect parts or recheck calibration. Parts returned should include information regarding the flow application, suspected problem, and who to contact for an authorization on corrective measures. Again, unless the meter is misused, or service is extremely hard, there should be no need for factory recalibration.

To order parts, include the model and serial numbers of the units involved along with a description of the part ordered. If converting the meter to a new application, in addition to the model and serial numbers, SEND FLO-CORP COMPLETE APPLICATION DATA INCLUDING FLUID, MAXIMUM FLOW RATE, MAXIMUM AND OPERATING PRESSURES AND TEMPERATURES AND ANY OTHER APPLICATION PARTICULARS OR FLUID CHARACTERISTIC. This information is essential for FLO-CORP to provide proper items and verify that the new application is within the operating limits of the flow meter.

The only storage or handling requirements for MEMFlo flow meters or parts is to keep them in a reasonably clean location away from excessive heat (over 120°F), chemical or solvent fumes and vapors not compatible with the materials of construction.

## Calibration Traceability

Each MEMFlo flow meter is individually calibrated on test facilities designed and operated according to applicable ASME, ISA, and NIST standards and practices. Individual measuring components of these facilities are certified traceable to NIST, and tandem meter arrangements are employed to continually verify flow data. FLO-CORP's calibrations meet both static and dynamic traceability criteria. For an additional charge, calibrations for  $\pm 1\%$  full scale accuracy can be certified per MIL-STD-45662.

## Flow Rate Selection

It is common practice to select a flow meter placing normal flow at about 75% of full scale. However, the unique "over-read" feature of MEMFlo flow meters allows sizing meters to normal flows in the 85% — 100% range. This provides more precise flow measurement, as meter accuracy is generally a percentage of the 100% scale rating.

## Interchangeability

A wide variety of capacities and different fluids can be accommodated in one meter body by insertion of different metering core tube and float combinations. Disassembly is quickly and easily accomplished while leaving the meter body in the pipeline (this facilitates cleaning). Scales must also be changed.

GPM @ 100%, SIZE 6	GPM @ 100%, SIZE 12
0.54 — 1.64	11.0 — 15.0
2.60 — 3.80	21.0 — 120.
5.40 — 23.0	

**Table 1:** 100% liquid flow capacities that are interchangeable within the same flowmeter body without removing the outlet restriction

In gas flow meters, any capacity range offered in a given body size can be interchanged in this fashion. However, some low flow capacity liquid flowmeters incorporate a restriction in the outlet of the meter to facilitate filling of the measuring tube. This restriction creates significant pressure drop if higher flows are used, and must be removed for higher flows. Table 1 shows the liquid flow capacity ranges which can be interchanged without removing the restriction.

## Temperature Limits

Temperature Limits of Standard MEMFlo Materials

MATERIALS	TEMPERATURE LIMITS
BUNA N	250°F
NEOPRENE	300°F
VITON	475°F
T316 STAINLESS	600°F
CPVC	210°F
EPR (STD.)	250°F
SILICONE	450°F
GEOTHERMAL EPR (WATER/STEAM ONLY)	600°F
POLYSULFONE	300°F
KALREZ	575°F
TEFLON	500°F

MATERIAL	SPECIFIC GRAVITY OF METER FLOAT	DENSITY OF THE METER FLOAT
Stainless Steel	8.05	501.1

### Specific Gravity or Density

Density, viscosity, and temperature (which affects both density and viscosity) are the key variables affecting accuracy. Pressure effects are negligible, except for safety considerations, since in MEMFlo meter ranges, liquids are generally incompressible. The specific gravity or density of the metered liquid must be known to correctly size the flow meter. This is necessary since the flow indication is proportional to the square root of liquid density. Conversion formulas are provided in this specification.

### Viscosity Considerations

Each MEMFlo flow meter for liquid service has a so-called “Viscosity Immunity Ceiling” (V.I.C.). In most cases, as long as the viscosity of the metered liquid is less than the V.I.C. of the particular flowmeter, accuracy will not be influenced by changes in viscosity. When the viscosity is greater the V.I.C., accuracy is influenced significantly, and the flow meter must be calibrated for the particular fluid. In general, the higher the capacity of the flow meter, the greater (higher V.I.C.) the range of immunity to viscosity variations.

However, the effects of viscosity on a given flow meter are not always predictable. Two apparently similar liquids with comparable densities and viscosities may affect meter calibrations quite differently.

### Small Body

**Table 1: Flow Meter Capacities, GPM Liquid, Sp. Gr. = 1.00**

CAPACITY DESIGNATOR	FLOW RANGE (GPM LIQUID)	CONNECTION SIZE	OVER-READ FLOW	SCALE INCREMENTS	ΔP, INCHES H2O
00	0.025-0.54	04 (1/2")	0.58	0.005	5.5
01	0.04-0.80		0.87	0.01	6.5
02	0.06-1.20		1.25	0.01	7.5
03	0.08-1.64		1.78	0.02	7.5
04	0.10-2.60	06 (3/4")	2.82	0.02	14.2
05	0.15-3.80		4.40	0.05	17.2
06	0.20-5.40		6.10	0.05	17.2
07	0.20-7.0		7.90	0.10	22.0
08	0.20-10.0	08 (1")	12.0	0.10	22.0
09	0.60-15.0		16.0	0.20	40.0
10	0.50-20.0		30.0	0.50	75.0
11	0.50-11.0		13.0	0.10	13.8
12	0.70-15.0	12 (1½")	16.4	0.10	14.8
13	1.00-25.0		28.0	0.20	17.5
14	0.50-35.0		40.0	0.25	18.5
15	1.00-50.0	16 (2")	60.0	0.50	26.0
16	2.00-70.0		75.0	0.50	80.0
17	4.00-120		130.0	1.00	130.0

**Table 2: Flow Meter Capacities, SCFM Air, @ 100 PSIG, 70°F.**

CAPACITY DESIGNATOR	FLOW RANGE (SCFM AIR)	CONNECTION SIZE	OVER-READ FLOW	SCALE INCREMENTS	ΔP, INCHES H2O	
00	0.16 - 3.20	04 (1/2")	3.40	0.02	1.5	
01	0.50 - 5.0		5.60	0.05	1.5	
02	0.30 - 7.40		8.90	0.10	1.5	
03	0.50 - 10.20		10.9	0.10	2.5	
04	0.60 - 14.0		15.0	0.20	3.1	
05	1.00 - 20.0	06 (3/4")	23.0	0.25	3.3	
06	1.00 - 26.0		28.0	0.50	3.4	
07	1.00 - 35.0		39.0	0.50	4.0	
08	2.00 - 50.0		55.0	0.50	4.5	
09	3.00 - 70.0		75.0	1.00	11.8	
10	4.00 - 85.0	08 (1")	100.0	1.00	18.0	
11	6.00 - 125.0		140.0	1.00	22.0	
12	6.0 - 160.0		180.0	2.00	45.0	
13	4.00 - 260.0		290.0	2.00	93.0	
14	1.50 - 25.0		12 (1½")	26.5	0.25	1.4
15	1.00 - 31.0	35.0		0.20	1.4	
16	2.00 - 40.0	43.0		0.50	1.4	
17	3.0 - 70.0	75.0		0.50	4.2	
18	4.0 - 100.0	110.0		1.00	7.6	
19	5.0 - 140.0	168.0		1.00	7.8	
20	5.0 - 175.0	210.0		1.00	7.6	
21	6.00 - 250.0	16 (2")		320.0	2.00	7.5
22	2.00 - 310.0			350.0	2.00	12.0
23	7.50 - 390.0			470.0	2.50	22.0
24	10.0 - 510.0		310.0	5.00	40.0	
25	35.0 - 750.0		900.0	5.00	70.0	
26	20.0 - 1000.0		1200.0	5.00	90.0	

**Large Body**

**Table 3: Flow Meter Capacities, GPM Liquid, Sp. Gr. = 1.00, 70°F**

CAPACITY DESIGNATOR	FLOW RANGE (SCFM AIR)	CONNECTION SIZE	ΔP, INCHES H2O
00	3.0 - 70.0	16 (2")	28.5
01	3.0 - 100		32.5
02	6.0 - 150	20 (2½")	40.0
03	3.0 - 100		32.5
04	6.0 - 150	24 (3")	40.0
05	10.0 - 200		31.5
06	14.0 - 300		45.5
07	5.0 - 100	32 (4")	20.0
08	10.0 - 200		29.5
09	14.0 - 300		32.0
10	15.0 - 400		65.0
11	20.0 - 500		92.5

**Table 4: Flow Meter Capacities, SCFM Air @ 100 PSIG, 70°F**

CAPACITY DESIGNATOR	FLOW RANGE (SCFM AIR)	CONNECTION SIZE	ΔP, INCHES H2O
00	30.0 - 750	16 (2")	28.5
01	40.0 - 1000		32.5
02	50.0 - 1750	20 (2½")	40.0
03	40.0 - 1000		32.5
04	50.0 - 1750	24 (3")	40.0
05	100 - 2300		31.5
06	150 - 3500		45.5
07	50.0 - 1200	32 (4")	20.0
08	100 - 2300		29.5
09	150 - 3500		32.0
10	200 - 4600		65.0
11	230 - 5750		92.5

**Table 5: Operating Limits, Metal Bodied Flow Meter with Clear Top, Small Body**

MAXIMUM NON-SHOCK WORKING PRESSURE, PSIG @ F									
BODY SIZE & DESCRIPTION	MAXIMUM NON-SHOCK WORKING PRESSURE, PSIG @ F								CONNECTION SIZE
	70°F	80°F	100°F	120°F	140°F	200°F	250°F	300°F	
Stainless & Polysulfone	300	300	300	300	300	300	250	115	Up to 3/4"
Stainless & Polysulfone	180	180	180	180	180	180	145	70	Up to 2"

**Table 6: Operating Limits, Metal Bodied Flow Meter with Clear Top, Large Body**

MAXIMUM NON-SHOCK WORKING PRESSURE, PSIG @ F								
BODY SIZE & DESCRIPTION	MAXIMUM NON-SHOCK WORKING PRESSURE, PSIG @ F							CONNECTION SIZE
	To 100°F	150°F	200°F	250°F	300°F	400°F		
Stainless & Polysulfone	180	180	180	145	70	NR	2" to 4"	

**N.R. = NOT RECOMMENDED**

\* OPERATING LIMITS GIVEN ARE BASED ON WATER OR AIR. FOR MORE SEVERE SERVICE, CORROSIVES, AND OTHER MEDIA AND/OR ENVIRONMENTAL FACTORS, AN ADDITIONAL CORRECTION FACTOR DOWN-RATING THESE LIMITS MAY BE REQUIRED. LIMITS ARE BASED ON TESTING AND PRACTICAL EXPERIENCE. POSSIBLE EXTREME APPLICATION CONDITIONS CANNOT BE FORESEEN. THUS, DATA IS OFFERED ONLY AS A GUIDE. IT IN NO WAY CONSTITUTES A SPECIFIC RECOMMENDATION OR WARRANTY EXPRESSED OR IMPLIED.

**Troubleshooting**

SYMPTOM	USUAL CAUSE	SUGGESTED REMEDY
<b>FLOAT HANG-UP</b>	Usually caused by particles, sludge, etc. (including failure to remove the plastic tubing used to block meter float during shipment) inside the core tube and/or measuring tube holding float. A bent float shaft or guide rod (usually caused by careless disassembly or violent surges) may also be causing float to stick.	Remedies include tapping the meter gently to temporarily dislodge the float, but if the problem reoccurs, meter should be disassembled and cleaned, and/or float shaft or guide rod straightened. If hang-up caused by sludge or pipe scale, clean lines and install a filter or other form of cleaner in supply line.
<b>FLOAT BOUNCE</b>	Caused by pumping/compressor surges or other pulsation sources, loose valve disks or similar mechanical components, extreme violation of inlet piping recommendations, or for gas applications, harmonics commonly found in systems with low pressure, low density gas.	Modification of piping, such as addition of a desurger, receiver, accumulator, vibration eliminators, loops, hoses, etc. between the source and meter should remedy the problem. Severe vibration may ultimately damage the meter, and should be avoided. If "bounce" seems to be from some other source, or shocks such as "water hammer" (a potentially dangerous condition), discontinue using the meter and contact FLO-CORP.
<b>APPARENT FALSE READING, GAS METERS</b>	Gas density not according to calibration data( different pressure, temperature, gas, etc), high water vapor content, saturated gas going into vapor or condensation phases, partially clogged core tube slot or foreign matter interfering with float movement, and/or violation of piping recommendations at high flow velocities.	Remedies include checking meter pressure (FLO-CORP can install a pressure gauge on the meter) & temperature, determining actual gas mixture density & correcting with appropriate formulae in this bulletin. Modifying inlet piping, relocating meter to point of higher temperature and/or lower pressure to eliminate vapor or condensation phase effects, and/or cleaning the meter (install filter or other form of cleaner if dirt repetitive problem) may also be required. If accuracy still questioned, return core tube/float assembly to FLO-CORP for calibration check.

<p><b>APPARENT FALSE READINGS, LIQUID METERS</b></p>	<p>Liquid density not according to calibration data (different temperature or new liquid mixture), excessive dissolved or suspended solids or gases, partial clogging of core tube slot or foreign matter interfering with float movement, or viscosity levels above the meter's immunity index (V.I.C.).</p> <p>NOTE: If the MEMFlo meter is suspected of giving false readings, and none of the causes mentioned is found, please advise MEMFlo as to the method used in determining the suspected flow "error." Each MEMFlo flow meter is individually calibrated by traceable methods, and carefully inspected. There may be some error in checking the MEMFlo meter against another standard.</p>	<p>By determining the actual density (due to changes in mixture, temperature, etc.), the correction formula may be applied. If dissolved gases are in the liquid, some elimination means should be provided on the supply side (also recheck all piping, as improper seals at connection points are common sources of air in the liquid.) If the metered liquid is near the boiling point producing partial "flash gas" at the meter, relocate the meter to point of lower temperature and/or higher pressure, or cool lines and/or increase system pressure. Note: It is potentially dangerous to meter near the "flash point" of any fluid, and this practice should be avoided. Consult FLO-CORP for recommendations. The previous recommendations regarding cleaning the meter and/or filtration will also solve problems due to dirt. If metering liquids with high viscosities, consult FLO-CORP (may require special calibration). If none of these causes seem to be present, return meter core tube/float assembly to FLO-CORP along with the application data.</p>
<p><b>APPARENT METER READING MIGRATION (reading changes but flow appears constant)</b></p>	<p>Frequently caused by use of soft disc type valves, which may need to be replaced with a valve more suited to flow control. Can also be indicative of changing fluid conditions (density, viscosity, etc.) Problems with other elements of the flow system, including leaks, clogged filters, pump/compressor wear, etc. may first appear as a change in meter reading-one of the functions of a flow meter.</p>	<p>Verifying the proper fluid conditions are known and applying correction formulae as needed will remedy problems associated with changing fluids. Cleaning, servicing, and replacement and/or repair of other system components may be required.</p>
<p><b>LEAKAGE</b></p>	<p>If at the junction of the body and measuring tube, it is indicative of either (a) damaged O-Ring (most common); (b) damaged measuring tube; or (c) damage to the gland section of the body. It may also be caused by improper reassembly of the flowmeter in the field.</p> <p>If there is leakage at the pipe connections to the meter, it is probably caused from over-tightening pipes on a prior installation (or the initial installation, particularly with PVC or CPVC flow meters).</p>	<p>Replace any damaged parts immediately, using the proper assembly procedures indicated in this instruction and the assembly detail drawings.</p> <p>Remove the body and inspect for damage--if none is visible, check pipe threads, reapply proper thread lubricant/sealant, and reinstall. If leak persists, replace meter body.</p>

All MEMFlo flow meters are hydrostatically pressure tested before they are shipped. FLO-CORP encourages you to contact your FLO-CORP representative or the factory with any questions regarding the proper installation and operation of our flow meters.

## **Repairs and Returns**

No merchandise should be returned to FLO-CORP without first obtaining a Material Return Authorization (MRA) number. You can receive an MRA number by filling out the form below. Read specifications of acceptable returned merchandise below. Any merchandise returned without a valid MRA number is subject to a minimum 50% restocking fee. MRA numbers expire after 30 days unless otherwise approved by a FLO-CORP representative.

### **Returning a DEFECTIVE ITEM**

Unless otherwise specified, we accept DEFECTIVE EXCHANGES on products within 30 days of original invoice. FLO-CORP shall have sole discretion as to the credit method. We may issue a credit, ship a replacement product, exchange or we may repair the item and return it to you.

### **NON-DEFECTIVE Returns**

Returns of NON-DEFECTIVE items, that are accompanied by a valid MRA number and pass receipt inspection may be accepted for return. NON-DEFECTIVE RETURNS WILL BE SUBJECT TO A MINIMUM 25% RESTOCKING FEE. Please call FLO-CORP at (877) 356-5463 with questions pertaining to the restocking fee or for an explanation of circumstances under which an increased restocking fee may be charged.