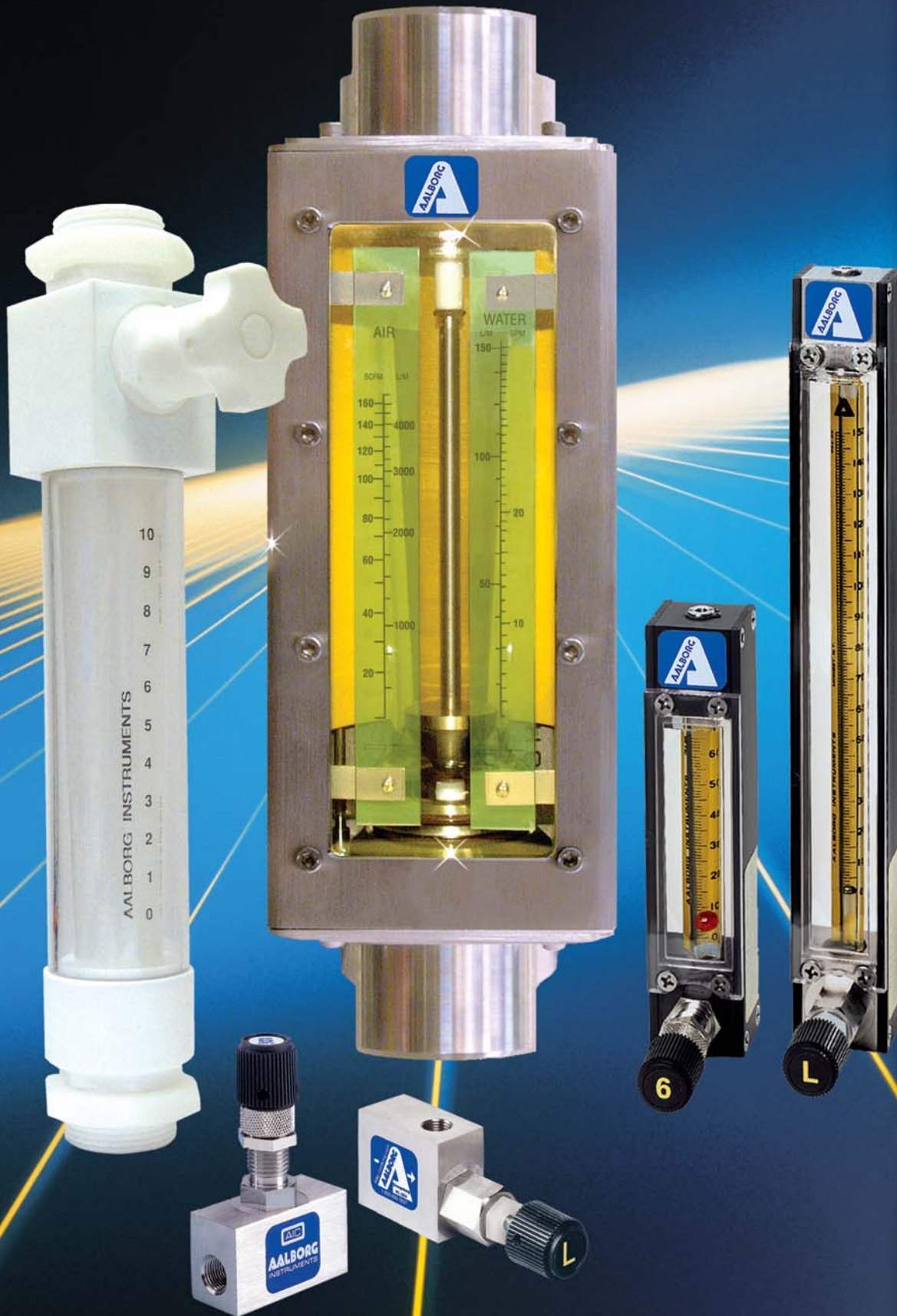


rotameters



AALBORG

## INTERCHANGEABLE

Designed for low flow rates, the **Model P** flow meter is a precision instrument embodying the inherent simplicity, versatility and economy of the classical rotameter. It is particularly suitable for metering carrier gases in chromatography, indicating and controlling gases in manufacturing processes, liquid and gas measurement in laboratories, pilot plants, flow and level indicating, etc.

Shipped completely assembled, flow meters include standard mounting fittings in a choice of materials, side plates, thick protective magnifying front shield and back plate, optional built-in control valve, and flow tubes selected from the Flow Capacities tables. Panel mounting style is convertible to bench mounting through the use of the optional acrylic tripod. The tripod has a built-in spirit leveler and leveling screws.

For multiple tube meters see pages 7 and 8.

### design features

- ✓ Rib-guided or fluted metering tubes facilitate stable, accurate readings.
- ✓ Magnifier lens in front shield to enhance reading resolution.
- ✓ Interchangeability of flow tubes and floats.
- ✓ Ease of installation and exchange of flow tubes.
- ✓ "Non-rotating" adapter feature - glass flow tubes are prevented from turning during the tightening phase of the assembly procedure.
- ✓ OPTIGRAD™ scales minimize parallax and eye fatigue.
- ✓ Chemical compatibility.
- ✓ Simple means of panel mounting.

150 mm Meter with CV™ Valve



65 mm Meter with MFV™ Valve



# P

# SINGLE TUBE FLOW METERS

## BUILT-IN VALVES

Meters are available with built-in needle valves (CV™), high precision metering valves (MFV™) with “non-rising stems”, or with no valves. The higher cost of MFV™ valves is justified whenever high sensitivity control and resolution are desirable particularly in conjunction with metering tubes of very low flow rates.

Generally, for gas metering it is recommended that valves are positioned at inlets (bottom) for liquids valves may be positioned either at inlets or outlets (top). For vacuum services, valves must be mounted at outlets. If unspecified at the time of ordering, meters will be shipped with valves mounted at the inlets.

Panel mounting is convertible to bench mounting through the use of an optional acrylic tripod base with spirit leveler (catalog No. TP1).

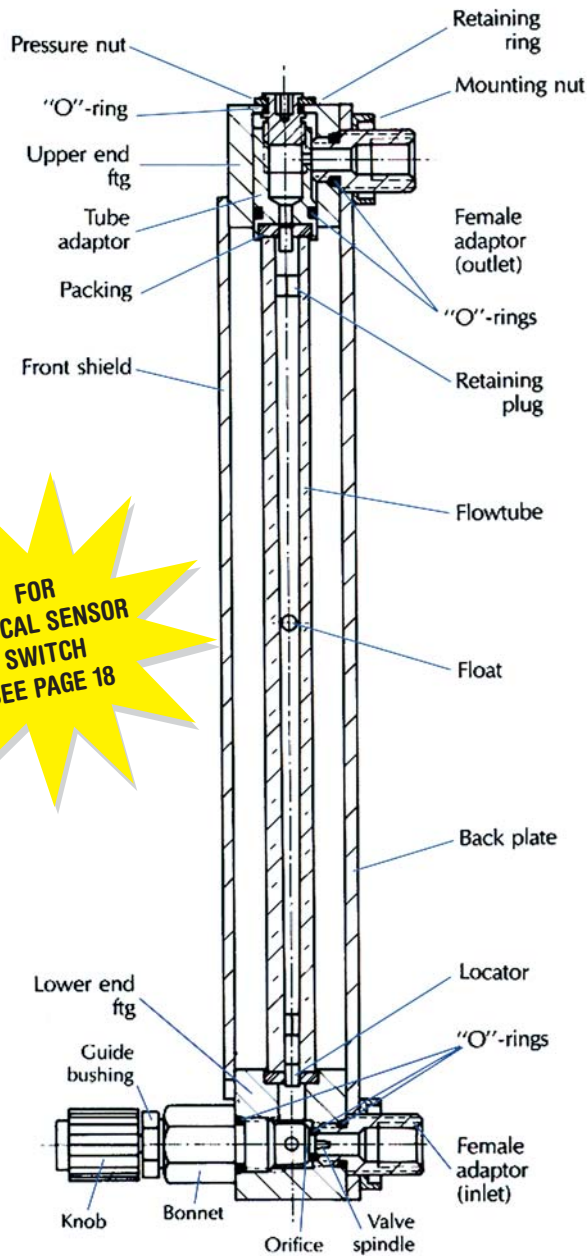
### SPECIFICATIONS

<b>STANDARD ACCURACY</b>	±2% FS (mm scales). ±5% FS (direct reading scales).
<b>CALIBRATED ACCURACY</b>	±1% FS.
<b>REPEATABILITY</b>	±0.25%.
<b>USEFUL FLOW RANGE</b>	10:1 minimum with one float and better than 20:1 with combination of two floats installed in meters.
<b>MAXIMUM OPERATING PRESSURE</b>	200 psig/13.8 bars.
<b>MAXIMUM OPERATING TEMPERATURE</b>	250°F/ 121°C.

### MATERIALS OF CONSTRUCTION

<b>FLOW TUBES</b>	Heavy walled borosilicate glass.
<b>FLOATS</b>	Glass, Sapphire, 316 Stainless Steel, Carbonyl and Tantalum.
<b>CHOICE OF MOUNTING FITTINGS IN CONTACT WITH FLUIDS</b>	a) Aluminum, black anodized. b) Brass, chrome plated. c) 316 stainless steel.
<b>SIDE PANELS</b>	Aluminum, black anodized.
<b>FRONT SHIELD</b>	Lexan® with longitudinal magnifier lens for enhanced reading resolution.
<b>BACK PLATE</b>	1/8" thick white acrylics.
<b>O-RINGS AND PACKING</b>	Buna-N® o-rings in aluminum/ brass model. Viton® o-rings in stainless steel meters. <b>OPTIONAL</b> Viton® PTFE Kalrez® and EPR.
<b>CONNECTIONS</b>	1/8" NPT female inlet and outlet connections. <b>OPTIONAL</b> 1/4" FNPT, hose and compression fittings are available.

Select flow tube consistent with requirements from flow capacity tables 6 to 22 (page 34 to 39).



Assorted flow tubes may be used in conjunction with a single mounting frame, an apparent benefit in many laboratory applications.

**Ordering information see page 9.**  
**Dimensional information see page 8.**



# PTFE-GLASS FLOW METERS

## GENERAL DESCRIPTION

**Model T** flow meters incorporate the principles of traditional variable area flow technology.

**These rugged PTFE-Glass flow meters offer solutions to low to medium flow range measurements of highly corrosive or ultra-pure liquids and gases.**

Wetted inert components are surrounded by structurally rigid anodized aluminum. The resultant design represents a unique combination of a rugged mechanically rigid frame and chemically inert wetted parts.

For additional protection of personnel each meter is supplied with a thick protective magnifying safety shield.

\*Glass and Sapphire floats are recommended.

### design features

- ✓ Constructed of inert materials: Borosilicate Glass, PTFE and PCTFE.
- ✓ Chemically inert wetted parts within mechanically rigid frame
- ✓ Rib-guided or fluted metering tubes facilitate stable, accurate readings.
- ✓ Magnifier lens in front shield to enhance reading resolution.
- ✓ OPTIGRAD™ scales minimize parallax and eye fatigue.
- ✓ Simple means of panel mounting.
- ✓ Interchangeability of flow tubes and floats.
- ✓ Conveniently overlapping flow ranges available in both standard millimeter and "direct reading" scales.



PTFE 150mm  
with HTR™ Valve

PTFE 65mm  
with CVT™ Valve



**LEAK INTEGRITY**

Flow meters are individually tested on a Mass Spectrometer Leak Detector and certified to a leak integrity rating of  $1 \times 10^{-7}$  sccs Helium or better.

**BUILT-IN VALVES**

Meters are available with built-in needle valves (CVT™), high precision metering valves (HRT™) with “non-rising stems”, or with no valves. The higher cost of HRT™ valves is justified whenever high sensitivity control and resolution are desirable particularly in conjunction with metering tubes of very low flow rates.

When meters with valves are ordered the valve cartridges are installed at the inlet. For vacuum service it is recommended that meters are ordered with valves at the outlet.

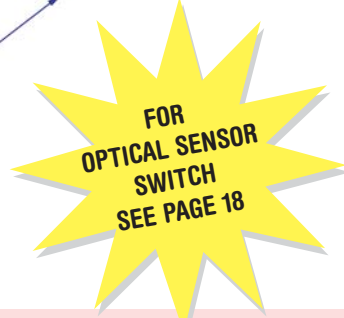
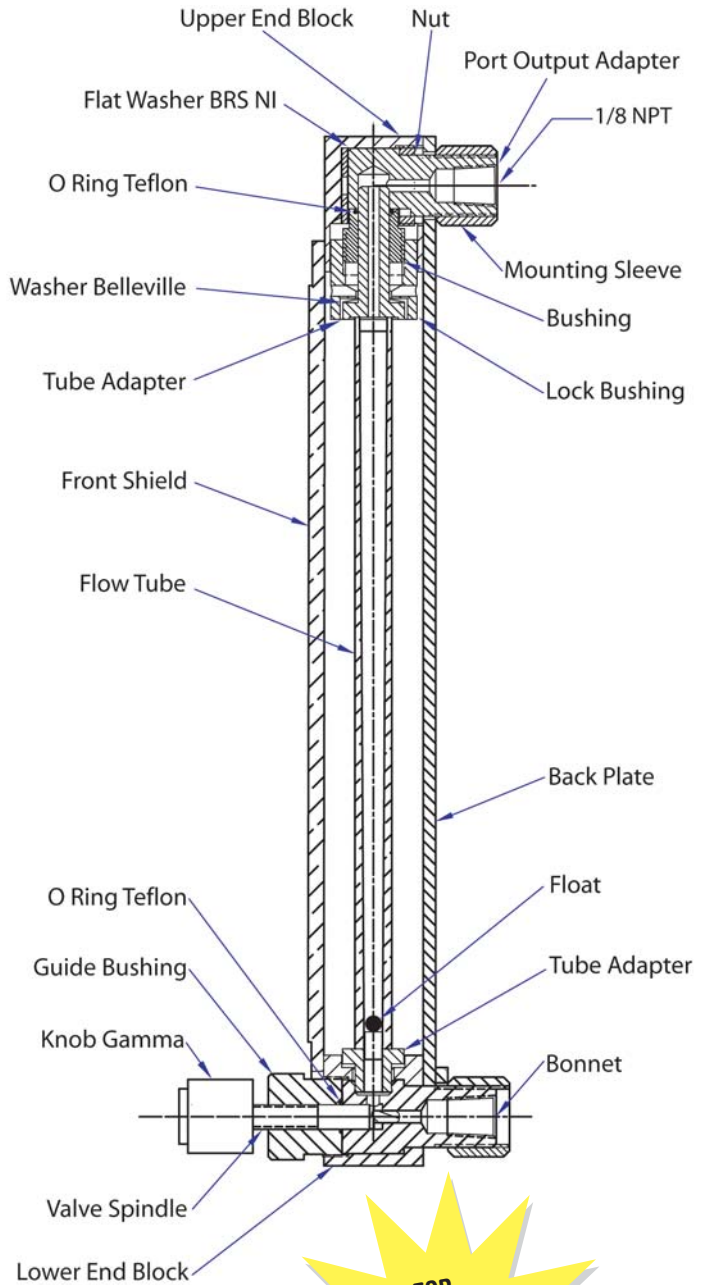
Assorted flow tubes may be used in conjunction with a single mounting frame, an apparent benefit in many laboratory applications.

**SPECIFICATIONS**

<b>STANDARD ACCURACY</b>	±2% FS (mm scales) ±5% FS (direct reading scales).
<b>REPEATABILITY</b>	± 0.25%
<b>USEFUL FLOW RANGES</b>	10:1 minimum with one float.
<b>MAXIMUM OPERATING PRESSURE</b>	100 psig/6.7 bars.
<b>MAXIMUM OPERATING TEMPERATURE</b>	150°F/ 65°C.
<b>LEAK INTEGRITY</b>	Individually pressure and leak tested and certified to a rating of $1 \times 10^{-7}$ sccs Helium.

**MATERIALS OF CONSTRUCTION**

<b>FLOW TUBES</b>	Heavy walled borosilicate glass. (Sapphire or glass floats recommended).
<b>FITTINGS IN CONTACT WITH FLUIDS</b>	Virgin PTFE PCTFE.
<b>SIDE PLATES</b>	Aluminum, black anodized.
<b>FRONT SHIELD AND BACK PLATE</b>	1/8" thick clear polycarbonate and white acrylics.
<b>O-RINGS</b>	PTFE.
<b>CONNECTIONS</b>	1/8" NPT female inlet and outlet connections.
<b>OPTIONAL</b>	glass hose nipples or compression fittings.



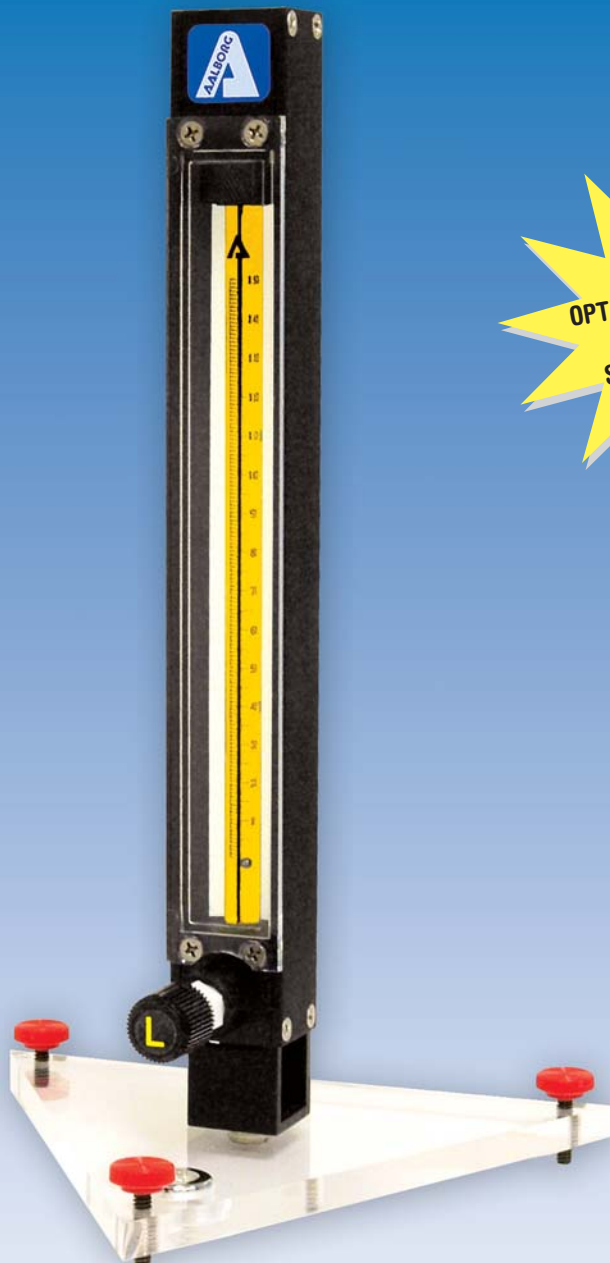
Panel mounting is convertible to bench mounting through the use of an optional acrylic tripod base with spirit leveler (catalog No. TP1).

**Ordering information see page 14.**  
**Dimensional information see page 13.**

**S STYLE**

*Model S* single-tube flow meters pictured on this page are similar to *P* meters in design, employing the same interchangeable flow tubes, valves, and accessories. Likewise they may be panel or bench mounted.

Model S Flow Meter Shown.  
With Optional Tripod Base and CV™ Valve



FOR  
OPTICAL SENSOR  
SWITCH  
SEE PAGE 18

The important advantage of the S meter is convenience in applications, where frequent changing of tubes in meter cases is desired.

An example is when several flow tubes are used in conjunction with a single meter case, or when because of the nature of the fluid, periodic cleaning necessitates disassembly.

Aalborg's® exclusive TUBELOK™ design facilitates simple installation and replacement of tubes in mounting cases.

As a result of the “non-rotating” adapter feature, glass flow tubes are prevented from turning during the tightening phase of the assembly procedure.

### design features

- ✓ TUBELOK™ design simplifies installation and replacement of tubes.
- ✓ Rib-guided or fluted metering tubes facilitate stable, accurate readings.
- ✓ Magnifier lens in front shield to enhance reading resolution.
- ✓ OPTIGRAD™ scales minimize parallax and eye fatigue.
- ✓ Simple means of panel mounting.
- ✓ Interchangeable flow tubes and floats.



# S

## SINGLE TUBE FLOW METERS

### BUILT-IN VALVES

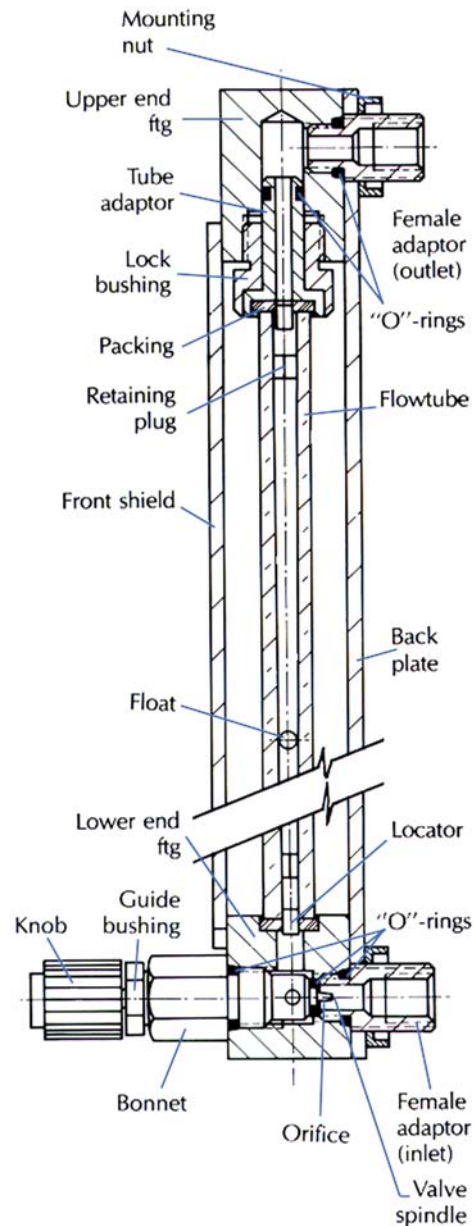
Meters are available with built-in needle valves (CV™), high precision metering valves (MFV™) with “non-rising stems”, or with no valves. The higher cost of MFV™ valves is justified whenever high sensitivity control and resolution are desirable particularly in conjunction with metering tubes of very low flow rates. Generally, for gas metering it is recommended that valves are positioned at inlets (bottom) for liquids valves may be positioned either at inlets or outlets (top). For vacuum services, valves must be mounted at outlets. If unspecified at the time of ordering, meters will be shipped with valves mounted at the inlets.

#### SPECIFICATIONS

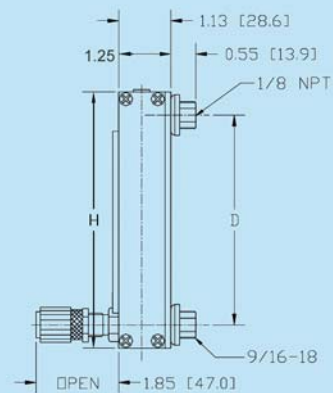
<b>STANDARD ACCURACY</b>	±2% FS (mm scales). ±5% FS (direct reading scales).
<b>CALIBRATED ACCURACY</b>	±1% FS.
<b>REPEATABILITY</b>	±0.25%.
<b>USEFUL FLOW RANGE</b>	10:1 minimum with one float. Better than 20:1 with combination of two floats installed in meters.
<b>MAXIMUM OPERATING PRESSURE</b>	200 psig/13.8 bars.
<b>MAXIMUM OPERATING TEMPERATURE</b>	250°F/ 121°C.

#### MATERIALS OF CONSTRUCTION

<b>FLOW TUBES</b>	Heavy walled borosilicate glass.
<b>FLOATS</b>	Glass, Sapphire, 316 Stainless Steel, Carbonyl and Tantalum.
<b>CHOICE OF MOUNTING FITTINGS IN CONTACT WITH FLUIDS</b>	a) Aluminum, black anodized. b) Brass, chrome plated. c) 316 stainless steel.
<b>SIDE PANELS</b>	Aluminum, black anodized.
<b>FRONT SHIELD</b>	Lexan® with longitudinal magnifier lens for enhanced reading resolution.
<b>BACK PLATE</b>	1/8" thick white acrylics.
<b>O-RINGS AND PACKING</b>	Buna-N® o-rings in aluminum model. Viton® o-rings in stainless steel meters. <b>OPTIONAL</b> Viton®, PTFE/Kalrez and EPR.
<b>CONNECTIONS</b>	1/8" NPT female inlet and outlet connections. <b>OPTIONAL</b> 1/4" FNPT, hose and compression fittings are available.



#### DIMENSIONS



#### DIMENSIONS FOR S STYLE METERS

SCALE LENGTH (A)	ALL METERS	
	HEIGHT (H)	CENTER TO CENTER (D)
65mm	6.156	5.156
150mm	10.46	9.469



**EXAMPLE**

<b>S</b>	S STYLE METERS						
	<b>CODE</b>	NUMBER OF CHANNELS					
	1	SINGLE CHANNEL (ONE TUBE)					
		<b>CODE</b>	SIZE				
		6	65 mm				
		1	150 mm				
		<b>CODE</b>	MATERIAL				
		A	ALUMINUM				
		B	BRASS				
		S	STAINLESS STEEL				
		<b>CODE</b>	VALVE POSITION				
		1	MFV (HIGH PRECISION) INLET				
		3	NO VALVE				
		4	CV (STANDARD CARTRIDGE) INLET				
		5	MFV (HIGH PRECISION) OUTLET				
		6	CV (STANDARD CARTRIDGE) OUTLET				
		<b>CODE</b>	SEALS				
		V	VITON® STD ON STAINLESS METERS				
		B	BUNA® STD ON BRASS AND ALUMINUM				
		E	EPR				
		T	PTFE/KALREZ®				
		<b>CODE</b>	FITTINGS				
		A	1/8" FNPT				
		B	1/4" FNPT				
		C	1/8" HOSE NIPPLE				
		D	1/4" HOSE NIPPLE				
		E	1/8" COMPRESSION				
		F	1/4" COMPRESSION				
		H	VCR				
		<b>CODE</b>	FITTINGS				
		0	NONE				

S					—				—	TUBE
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**Optional Accessories**  
 TP1-Tripod for single channel meter.

**Select tube from the following tables:**  
 Tables 6 to 22. Pages 35 to 39.



Made entirely of PTFE, PFA, and PCTFE, the *Model F* flow meter is excellent for high-purity applications or use with corrosive liquids.

Units are available with a standard valve to monitor and control flow or without a valve to just monitor flow.

Flow meters are individually tested on a Mass Spectrometer Leak Detector and certified to a leak integrity rating of  $1 \times 10^{-7}$  sccs Helium or better.

**design features**

- ✓ Chemically inert wetted components.
- ✓ Removable protective shield.
- ✓ Individually leak tested.



**SPECIFICATIONS**

<b>SCALES</b>	0 to 10 markings.
<b>ACCURACY</b>	±5% of full scale.
<b>MAXIMUM TEMPERATURE</b>	250° F (121°C).
<b>MAXIMUM PRESSURE</b>	100 psig (6.7 bars).
<b>LEAK INTEGRITY</b>	Individually, leak tested and certified to a rating of $1 \times 10^{-7}$ sccs of Helium.

**MATERIALS OF CONSTRUCTION**

<b>TUBESHIELDS</b>	Polycarbonate.
<b>FLOW TUBES</b>	PTFE PFA.
<b>FLOATS</b>	PTFE.
<b>WETTED PARTS</b>	PTFE end fittings. PCTFE guide rods.

**DIMENSIONS FOR F STYLE METERS**

LOW RANGE MODELS	HIGH RANGE MODELS
5-11/16" Length x 1-1/4" O.D.	10-1/2" Length x 2" O.D.

**ORDERING INFORMATION**

**F STYLE LOW RANGE METERS**

MODEL NUMBER		CONNECTION	MAXIMUM FLOW	
BUILT IN VALVE	NO VALVE		mL/min WATER	gph WATER
F6C-F01-01-TF	F3C-F01-01-TF	1/4" FNPT	125	1.98
F6C-F02-01-TF	F3C-F02-01-TF	1/4" FNPT	250	3.96
F6C-F03-01-TF	F3C-F03-01-TF	1/4" FNPT	400	6.34
F6C-F04-01-TF	F3C-F04-01-TF	1/4" FNPT	500	7.92
F6C-F05-01-TF	F3C-F05-01-TF	1/4" FNPT	1000	15.85
F6D-F06-01-TF	F3D-F06-01-TF	3/8" FNPT	2000	31.69
F6D-F07-01-TF	F3D-F07-01-TF	3/8" FNPT	2500	39.62
F6D-F08-01-TF	F3D-F08-01-TF	3/8" FNPT	3000	47.54
F6D-F09-01-TF	F3D-F09-01-TF	3/8" FNPT	5000	79.23

**F STYLE HIGH RANGE METERS**

MODEL NUMBER		CONNECTION	MAXIMUM FLOW	
BUILT IN VALVE	NO VALVE		L/min WATER	gpm WATER
F6E-F10-01-TF	F3E-F10-01-TF	1/2" FNPT	13	3.43
F6E-F11-01-TF	F3E-F11-01-TF	1/2" FNPT	20	5.28
F6F-F12-01-TF	F3F-F12-01-TF	3/4" FNPT	30	7.93
F6F-F13-01-TF	F3F-F13-01-TF	3/4" FNPT	40	10.57
F6F-F14-01-TF	F3F-F14-01-TF	3/4" FNPT	45	11.89