

# PRECISION ACCURACY CONVERTIBLE INDICATING FLOWRATOR METERS

SPECIFICATION  
10A3700  
File:  
Section  
10A

## 10A3700/3800 Series

The F&P Precision Accuracy Convertible Flowrator<sup>1</sup> meter is a glass tube variable-area flowmeter suitable for liquid or gas service. A 24-inch long scale affords the high resolution necessary for precision type flowmetering.

Seals in the meter can be either o-ring or packing gland and conversion from one type to the other is easily accomplished without removing meter from the piping. With either type of seal the tube can be removed easily for a range change or cleaning, without removing the meter from the line.

The meter is available in tube sizes from 1/4-inch through 2-inch bore for liquid or gas service.

### DESIGN FEATURES

- One basic meter offers o-ring or packing seal<sup>2</sup> options—minimizes parts inventories.
- Metering tube can be removed for range change or cleaning; seal can be converted from o-ring to packing type (or vice versa)—with meter in line and without disassembly of meter.
- Meter has equal area ends on tube and external retaining spring to prevent shift of tube under pressure, vacuum, overrange, or backflow when o-ring seals are used.
- Rotatable end fittings.

### ENGINEERING SPECIFICATIONS

#### ACCURACY & RANGE

- ±1% of rate with 5-1/2 to 1 range (Capacity Tables I & III Only)
- ±1/2% of rate with 5-1/2 to 1 range (Capacity Tables I & III Only)
- ±1% of rate with 12-1/2 to 1 range (Capacity Tables II & IV Only)

**MOUNTING:** Standard—line mounting; Optional—panel mounting (flush, surface).

1. T.M., Fischer & Porter Company
2. Patent pending
3. T.M., Union Carbide Corporation



Model 10A3775

### SCALES

#### 24-inch Nominal Length

Standard: MM Scale on tube & D.R. metal scale plate.

Optional: D.R. engraved on tube

### MATERIALS OF CONSTRUCTION

**Tube:** Tubes feature controlled O.D. and I.D. equal area ends. Standard Tri-Flat<sup>1</sup> or Bead guided borosilicate tubes used in 1/4-inch, 3/8-inch and 1/2-inch; standard plain tapered borosilicate tubes in 1/2-inch thru 2-inch sizes.

#### Floats:

BSX, FSX, USVP & SVP: Standard 316 Stn. Stl. Optional - Alloy 20 Hastelloy "C", Nickel, Monel.

BSXI, FSXI, BSVIT & SVIP: "Plasmet"<sup>1</sup> (Stainless Steel, 39 Nickel & epoxy cast Resin)

FISCHER & PORTER

Complete Process Instrumentation



SPECIFICATION 10A3700  
File: Section 10A

O-rings: Standard—buna N; Optional—butyl, Viton<sup>4</sup>

Packing: Standard—Neoprene; Optional—molded Teflon<sup>4</sup> liner.

Fittings: Standard—steel, brass, stainless steel; Optional—Hastelloy C<sup>3</sup>, Alloy 20<sup>5</sup>, nickel, Monel<sup>6</sup>.

†Offered only in packing gland option since potential corrosion of end fittings can destroy o-ring effectiveness.

Float Stops: Teflon

Tube Rest Gaskets:

Standard—Durabla<sup>7</sup>

Optional—Teflon

Glands:

Standard—die-cast aluminum

Optional—stainless steel

Compression Screws:

Standard—steel

Optional—stainless steel

Meter Body: rigid extruded aluminum with Alodine<sup>8</sup> protective coating and smooth black enamel finish.

Tube Retainer Spring: Armco 17-7 PH stainless steel, external to fluid stream in o-ring meters.

Optional Tube Protection: Lucite safety shield.

#### OPERATIONAL LIMITS

Service: Glass tube meters are not recommended for continuous service on alkalis

above 100 F or more than 20% concentrations, or fluorine, hydrofluoric acid, water above 200 F, steam, slurries, or molten metal.

Temperature Ratings: Minimum recommended temperature is 32 F. Maximum recommended temperatures are:

1) Glass tube—400 F

2) O-rings—Buna-N, 250 F; Butyl, 250 F; Viton, 400 F.

3) Packing—Neoprene, 250 F; Teflon, 400 F.

4) Float stops—Teflon, 400 F.

5) Tube Rest Gaskets—Durabla, 400 F Teflon, 400 F.

6) Tube Protection—Lucite safety shield, 250 F;

Tube Pressure Ratings:

Tube Size	Max. Safe Static Working Pressure, psia @ 200 F	
1/4	430	Standard Borosilicate Glass
3/8	400	
1/2	600	Tempered Borosilicate Glass
3/4	440	
1	325	
1-1/2	230	
2	150	

#### STANDARD MODELS

Type of Seal	Type of Connection	Open	Lucite Safety Shield
O-Ring	Horizontal Screwed	10A3775A	10A3765A
	Horizontal Flanged	10A3776A	10A3766A
	Vertical Screwed	10A3777A	10A3767A
	Vertical Flanged	10A3778A	10A3768A
Packing Gland	Horizontal Screwed	10A3875A	10A3865A
	Horizontal Flanged	10A3876A	10A3866A
	Vertical Screwed	10A3877A	10A3867A
	Vertical Flanged	10A3878A	10A3868A

4. T.M., E.I. DuPont de Nemours & Company, Inc.

5. T.M., Carpenter Steel Company

6. T.M., International Nickel Company

7. T.M., Durabla Corporation

8. T.M., Amchem Products, Incorporated

# WEIGHTS AND CONNECTION TYPES AND SIZES

Tube Size

Connection Type	Meter Weight and Connection Size	Tube Size		
		1/4", 3/8"	3/4", 1"	1-1/2", 2"
Screwed	Weight, lb.	6 lb.	14 lb.	38 lb.
	Size, inches	1/2	3/4	1-1/2
Flanged	Weight, lb.	12 lb.	22 lb.	48 lb.
	Size, inches	1/2	1	1-1/2

Note: Flange connections match 125-150 pound ASA Standards; 1/16-inch raised face.

## METER SIZING

For sizing flowmeters with type 316 stainless steel floats, when the required flow is of liquid (density 1.0 g/cc), or of gas (sp gr of air and at 14.7 psia and 70 F) the capacity table may be entered directly.

The conversion equations shown below permit the capacity tables to be used for other operating conditions.

### LIQUID CONVERSION (Tables I & II Only)

$$\text{gpm H}_2\text{O} = \text{gpm} \sqrt{\frac{7.02 \times \rho}{\rho f - \rho}}$$

or

$$\text{gpm H}_2\text{O} = \frac{\text{lbs/min}}{8.33 \times \rho} \sqrt{\frac{7.02 \times \rho}{\rho f - \rho}}$$

### LIQUID CONVERSION (Tables III & IV Only)

$$\text{pph} \left( \frac{\text{Liq. Sp. Gr.}}{0.72 - 0.82} \right) = \text{pph} \sqrt{\frac{(1.54 - \rho) \rho}{0.592}}$$

or

$$\text{pph} \left( \frac{\text{Liq. Sp. Gr.}}{0.72 - 0.82} \right) = \text{gpm} \times \rho \times 500 \sqrt{\frac{(1.54 - \rho) \rho}{0.592}}$$

where:

gpm = desired maximum flow rate in gallons/minute

pph = desired maximum flow rate in pounds/hour

lbs/min = desired maximum flow rate in pounds per minute

$\rho f$  = density of the float required for the application and selected from the following list

316 stainless steel = 8.02

Hastelloy C = 8.94

Nickel = 8.91

Monel = 8.84

$\rho$  = fluid density, g/cc at operating conditions

gpm H<sub>2</sub>O = equivalent flow rate in gpm water

### GAS CONVERSION (Tables I & II Only)

$$\text{scfm air at 14.7 psia and 70 F} = \text{scfm} \sqrt{\frac{\text{sp gr} \times 14.7 \times T_{op} \times 8.02}{1.0 \times P_{op} \times 530 \times \rho f}}$$

or

$$\text{scfm air at 14.7 psia and 70 F} = \text{lbs/min} \times 13.34 \sqrt{\frac{1.0 \times 14.7 \times T_{op} \times 8.02}{\text{sp gr} \times P_{op} \times 530 \times \rho f}}$$

### GAS CONVERSION (Tables III & IV Only)

$$\text{scfm air at 14.7 psia and 70 F} = \text{scfm} \sqrt{\frac{\text{sp gr} \times 14.7 \times T_{op}}{1.0 \times P_{op} \times 530}}$$

$$\text{scfm air at 14.7 psia and 70 F} = \text{lbs/min} \times 13.34 \sqrt{\frac{1.0 \times 14.7 \times T_{op}}{\text{sp gr} \times P_{op} \times 530}}$$

where:

scfm = desired maximum flow rate in scfm

sp gr = specific gravity of gas at standard temperature and pressure, referred to air at standard temperature and pressure (14.7 psia and 70 F)

$T_{op}$  = absolute temperature, (460 + °F) at operating temperature

$P_{op}$  = absolute pressure in psia at operating conditions

scfm air = equivalent flow rate in scfm of air at 14.7 psia and 70 F

**CAPACITIES**

**TABLE I  
METAL FLOATS,  
5-1/2 TO 1 RANGES**

Tube Size	Std. Max.		Metering Tubes		Hydraulic Float No.	Total Δ P Inches H <sub>2</sub> O Note (1)	V.I.C. Factor Note (2)	PSIA Crit. Note (3)
	GPM Liquid Sp. Gr. 1.0	SCFM Air 14.7 PSIA & 70 F	Linear Tube No.	Log Tube No.				
1/4"	.17	.700	F2-18-600	-	FSX-20	2.7	2.40	14.7
	.23	.950	F2-18-600	-	FSX-21	2.9	3.30	14.7
3/8"	.35	1.44	F3-18-600	-	FSX-343	2.7	4.55	14.7
	.55	2.26	F3-18-600	-	FSX-31	3.1	4.85	14.7
1/2"	.78	3.20	4-26-600	Log-4-30-600	SVP-499	3.8	4.20	14.7
	.94	3.90	4-26-600	Log-4-30-600	SVP-480	4.1	4.80	14.7
	1.12	4.60	4-26-600	Log-4-30-600	SVP-481	5.6	4.00	14.7
	1.32	5.45	4-35-600	Log-4-39-600	SVP-480	5.3	4.80	14.7
	1.52	6.25	4-35-600	Log-4-39-600	SVP-481	6.8	4.00	14.7
	1.75	7.20	4-26-600	Log-4-30-600	SVP-482	13.7	7.40	14.7
	2.00	8.25	4-26-600	Log-4-30-600	SVP-483	18.0	8.70	16.2
	2.45	10.0	4-35-600	Log-4-39-600	SVP-482	17.3	7.40	14.7
3/4"	2.84	11.7	4-35-600	Log-4-39-600	SVP-483	23.4	8.70	16.2
	3.10	12.8	5-25-600	Log-5-28-600	SVP-580	9.5	8.8	14.7
	3.70	15.2	5-25-600	Log-5-28-600	SVP-581	13.5	10.4	14.7
	4.50	18.6	5-25-600	Log-5-28-600	SVP-582	20.0	12.8	20.3
	5.60	23.0	5-25-600	Log-5-28-600	SVP-583	29.0	15.3	30.4
	6.70	27.6	5-35-600	Log-5-39-600	SVP-582	25.0	12.8	20.3
1"	8.05	33.00	5-35-600	Log-5-39-600	SVP-583	35.7	15.3	30.4
	9.40	38.5	6-35-600	Log-6-39-600	SVP-680	25.7	14.4	15.9
	11.1	46.0	6-35-600	Log-6-39-600	SVP-681	36.7	17.6	22.3
1-1/2"	12.9	53.0	6-35-600	Log-6-39-600	SVP-682	46.0	20.0	30.2
	15.2	62.5	8-27-600	Log-8-31-600	SVP-880	10.3	20.8	14.7
	17.5	72.0	8-27-600	Log-8-31-600	SVP-881	14.2	24.8	16.2
	20.0	82.5	8-27-600	Log-8-31-600	SVP-882	18.3	28.4	20.9
	22.5	93.0	8-27-600	Log-8-31-600	SVP-883	24.0	32.0	26.7
	26.7	110	8-35-600	Log-8-39-600	SVP-882	23.8	28.4	20.9
2"	30.4	125	8-35-600	Log-8-39-600	SVP-883	30.8	32.0	26.7
	36.0	150	9-35-600	Log-9-39-600	SVP-980	18.8	28.8	14.7
	42.5	175	9-35-600	Log-9-39-600	SVP-981	26.0	35.4	14.7
	50.0	206	9-35-600	Log-9-39-600	SVP-982	36.1	40.0	19.5
57.5	240	9-35-600	Log-9-39-600	SVP-983	46.7	46.0	25.5	

**TABLE II  
METAL FLOATS,  
(±1% OF RATE ONLY),  
12-1/2 TO 1 RANGE**

Tube Size	Std. Max.		Metering Tube No.	Hydraulic Float No.	Total Δ P Inches H <sub>2</sub> O Note (1)	V.I.C. Factor Note (2)	PSIA Crit. Note (3)
	GPM Liquid Sp. Gr. 1.0	SCFM Air 14.7 PSIA & 70 F					
3/8"	.125	.500	Log F3-18-600	FSX-346	2.4	1.96	14.7
	.240	1.05	Log F3-18-600	FSX-342	2.8	3.64	14.7
	.270	1.10	Log F3-18-600	FSX-340	3.4	4.12	15.9
	.330	1.35	Log F3-18-600	FSX-345	4.2	4.96	19.4
	.400	1.65	Log F3-18-600	FSX-353	6.0	5.30	21.5
	.470	1.95	Log F3-18-600	FSX-347	6.7	5.71	27.6
1/2"	.480	2.00	Log-4-30-600	USVP-436	2.0	2.50	14.7
	.570	2.35	Log-4-30-600	USVP-437	2.9	3.04	14.7
	.820	3.40	Log-4-30-600	SVP-485	3.7	5.83	14.7
	1.15	4.80	Log-4-39-600	SVP-494	4.0	4.93	14.7
	1.25	5.20	Log-4-39-600	SVP-4-101	4.8	5.52	16.1
	1.65	6.80	Log-4-39-600	SVP-497	8.6	7.63	21.2
	1.90	7.90	Log-4-39-600	SVP-4-103	11.4	8.93	24.5
	2.10	8.70	Log-4-39-600	SVP-492	13.9	9.72	27.0
3/4"	2.30	9.50	Log-5-28-600	SVP-596	5.3	9.68	14.7
	2.60	10.8	Log-5-28-600	SVP-592	6.8	11.1	14.7
	3.00	12.5	Log-5-28-600	SVP-586	9.1	13.0	16.9
	3.40	14.0	Log-5-39-600	SVP-594	7.9	9.68	14.7
	3.90	16.0	Log-5-39-600	SVP-5-102	10.4	11.1	14.7
	4.50	18.6	Log-5-39-600	SVP-5-103	13.9	13.0	14.7
	5.00	20.6	Log-5-39-600	SVP-5-104	17.1	14.1	16.3
	5.50	22.8	Log-5-39-600	SVP-5-100	20.6	15.6	18.0
1"	5.60	23.0	Log-6-28-600	SVP-688	19.7	19.2	14.7
	6.00	24.8	Log-6-28-600	SVP-6-108	22.6	20.5	14.7
	7.00	29.0	Log-6-28-600	SVP-6-102	30.9	23.5	17.2
	8.20	34.0	Log-6-39-600	SVP-6-103	32.5	18.5	14.7
	8.70	36.0	Log-6-39-600	SVP-6-104	36.7	19.6	14.7
	9.50	39.0	Log-6-39-600	SVP-6-106	43.8	21.4	14.7
	10.5	43.0	Log-6-39-600	SVP-6-114	53.5	23.5	16.3
	11.0	45.0	Log-6-39-600	SVP-6-115	59.0	24.9	17.8
12.0	50.0	Log-6-39-600	SVP-6-111	70.2	27.4	21.2	
1-1/2"	12.8	53.0	Log-8-31-600	SVP-873	14.8	26.1	14.7
	14.5	60.0	Log-8-31-600	SVP-898	19.0	30.2	16.7
	17.5	72.0	Log-8-31-600	SVP-8-110	27.8	35.9	20.1
	18.2	75.0	Log-8-39-600	SVP-874	22.9	26.9	14.7
	20.0	83.0	Log-8-39-600	SVP-8-101	27.8	29.5	16.2
	21.5	89.0	Log-8-39-600	SVP-894	31.8	31.7	17.4
	24.0	100	Log-8-39-600	SVP-8-114	39.7	35.5	19.4
	27.0	110	Log-8-39-600	SVP-895	49.5	40.3	21.8
29.0	120	Log-8-39-600	SVP-899	58.0	43.3	23.4	
2"	28.0	116	Log-9-39-600	SVP-9-128	23.9	32.4	14.7
	31.0	128	Log-9-39-600	SVP-9-129	29.3	37.4	14.7
	35.0	145	Log-9-39-600	SVP-9-123	37.2	42.7	16.6
	40.0	165	Log-9-39-600	SVP-9-115	49.0	47.3	18.9
	45.0	185	Log-9-39-600	SVP-9-126	61.7	53.5	21.3
	50.0	205	Log-9-39-600	SVP-9-130	76.2	59.6	23.7
	56.0	230	Log-9-39-600	SVP-9-131	95.5	66.8	26.5
	62.0	256	Log-9-39-600	SVP-9-132	121	72.5	29.4

Tube Size	STD. MAX.		METERING TUBES		Hydraulic Float No. $\rho f = 1.54$ gms/cc	Total $\Delta P$ Inches Water Note (1)	V.I.C. Factor Note (2)	PSIA Crit. Note (3)
	PPH Liquid Sp. Gr. .67-.82	SCFM Air 14.7 PSIA & 70 F	Linear Tube No.	Log Tube No.				
1/4"	21	.26	F2-18-600	-	FSX1-231	1.0	1.1	14.7
	30	.37	F2-18-600	-	FSX1-230	1.0	1.2	14.7
3/8"	50	.62	F3-18-600	-	FSX1-322	1.2	1.2	14.7
	72	.89	(CO+50 -650)	-	FSX1-342	1.4	1.3	14.7
1/2"	130	1.60	B4-21-600	-	BSVIT-412	1.2	1.1	14.7
	175	2.20	B4-21-600	-	BSVIT-411	1.4	1.2	14.7
3/4"	240	3.00	4-26-600	Log-4-30-600	SVIP-450	1.2	1.6	14.7
	280	3.50	4-26-600	Log-4-30-600	SVIP-452	1.3	2.0	14.7
	320	4.00	4-26-600	Log-4-30-600	SVIP-453	1.8	2.4	14.7
	360	4.50	4-35-600	Log-4-39-600	SVIP-451	1.5	2.0	14.7
	400	5.00	4-35-600	Log-4-39-600	SVIP-452	2.1	2.3	14.7
	440	5.50	4-35-600	Log-4-39-600	SVIP-453	2.5	2.6	14.7
1"	500	6.20	5-25-600	Log-5-28-600	SVIP-566	1.2	2.7	14.7
	600	7.50	5-25-600	Log-5-28-600	SVIP-557	1.4	2.9	14.7
	700	8.70	5-25-600	Log-5-28-600	SVIP-549	2.0	3.4	14.7
	850	10.6	5-35-600	Log-5-39-600	SVIP-556	1.3	2.7	14.7
	1000	12.4	5-35-600	Log-5-39-600	SVIP-549	2.5	3.0	14.7
1-1/2"	1200	15.5	6-24-600	Log-6-28-600	SVIP-648	2.3	5.4	14.7
	1400	17.5	6-24-600	Log-6-28-600	SVIP-663	3.3	6.5	14.7
	1600	20.0	6-35-600	Log-6-39-600	SVIP-662	3.5	4.9	14.7
	1800	23.5	6-35-600	Log-6-39-600	SVIP-649	4.5	5.5	14.7
	2000	25.0	6-35-600	Log-6-39-600	SVIP-663	5.9	6.0	14.7
2"	2200	27.5	6-35-600	Log-6-39-600	SVIP-664	6.7	6.4	14.7
	2500	31.0	8-27-600	Log-8-31-600	SVIP-855	2.1	6.6	14.7
	3000	37.0	8-27-600	Log-8-31-600	SVIP-854	2.8	7.7	14.7
	3600	45.0	8-27-600	Log-8-31-600	SVIP-849	3.9	8.3	14.7
	4200	52.0	8-35-600	Log-8-39-600	SVIP-848	4.6	8.0	14.7
2"	5000	62.0	8-35-600	Log-8-39-600	SVIP-849	5.2	8.3	14.7
	6000	75.0	9-35-600	Log-9-39-600	SVIP-950	3.2	9.4	14.7
	7000	87.0	9-35-600	Log-9-39-600	SVIP-951	4.2	10.8	14.7
	8000	100	9-35-600	Log-9-39-600	SVIP-952	5.0	11.5	14.7
	9000	112	9-35-600	Log-9-39-600	SVIP-953	5.6	12.6	14.7
2"	10000	124	9-35-600	Log-9-39-600	SVIP-954	6.4	13.2	14.7
	11000	136	9-35-600	Log-9-39-600	SVIP-955	7.7	14.4	14.7

TABLE III  
DENSITY COMPENSATING  
FLOATS  
5-1/2 TO 1 RANGES

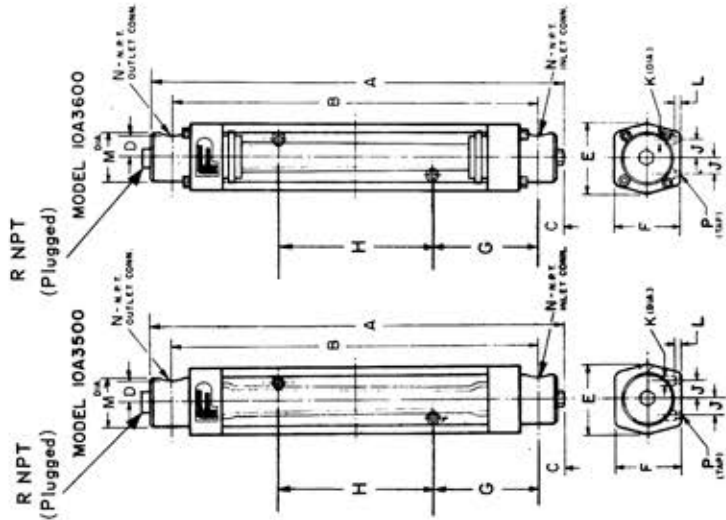
Tube Size	STD. MAX.		Metering Tube No.	Hydraulic Float No. $\rho f = 1.54$	Total $\Delta P$ Inches Water Note (1)	V.I.C. Factor Note (2)	PSIA Factor Note (3)
	PPH Liquid Sp. Gr. .67-.82	SCFM Air 14.7 PSIA & 70 F					
3/8"	34.0	.42	Log-F3-18-600	FSX1-336	1.0	1.00	14.7
	40.0	.50	Log-F3-18-600	FSX1-338	1.1	1.10	14.7
	50.0	.62	Log-F3-18-600	FSX1-344	1.2	1.20	14.7
	58.0	.72	Log-F3-18-600	FSX1-335	1.3	1.40	14.7
1/2"	90.0	1.1	Log-4-30-600	SVIP-465	1.0	1.02	14.7
	120	1.5	Log-4-30-600	SVIP-461	1.1	1.13	14.7
	170	2.1	Log-4-30-600	SVIP-458	1.2	1.60	14.7
	220	2.7	Log-4-30-600	SVIP-459	1.3	2.06	14.7
	260	3.2	Log-4-30-600	SVIP-455	1.8	2.42	14.7
	290	3.6	Log-4-39-600	SVIP-460	1.5	1.97	14.7
	340	4.2	Log-4-39-600	SVIP-464	2.1	2.28	14.7
3/4"	370	4.6	Log-4-39-600	SVIP-463	2.5	2.54	14.7
	410	5.1	Log-5-28-600	SVIP-562	1.2	2.72	14.7
	440	5.5	Log-5-28-600	SVIP-535	1.4	2.95	14.7
	520	6.5	Log-5-28-600	SVIP-536	2.0	3.38	14.7
	600	7.5	Log-5-39-600	SVIP-563	1.3	2.73	14.7
1"	800	10.0	Log-5-39-600	SVIP-564	2.3	3.00	14.7
	1000	12.5	Log-6-28-600	SVIP-659	2.3	5.38	14.7
	1200	15.0	Log-6-28-600	SVIP-660	3.3	6.50	14.7
	1400	17.5	Log-6-39-600	SVIP-658	3.5	4.90	14.7
	1600	20.0	Log-6-39-600	SVIP-661	4.5	5.54	14.7
1-1/2"	1800	22.5	Log-6-39-600	SVIP-631	5.8	5.96	14.7
	2000	25.0	Log-8-31-600	SVIP-856	2.1	6.58	14.7
	2300	29.0	Log-8-31-600	SVIP-859	2.8	7.65	14.7
	2740	34.0	Log-8-31-600	SVIP-861	3.9	8.30	14.7
	3200	40.0	Log-8-39-600	SVIP-863	3.2	7.65	14.7
	3600	45.0	Log-8-39-600	SVIP-864	4.1	8.13	14.7
2"	4000	50.0	Log-8-39-600	SVIP-865	5.0	9.15	14.7
	5200	65.0	Log-9-39-600	SVIP-969	3.2	9.40	14.7
	6000	75.0	Log-9-39-600	SVIP-968	4.2	10.8	14.7
	6400	80.0	Log-9-39-600	SVIP-964	4.9	11.5	14.7
	7000	87.0	Log-9-39-600	SVIP-971	5.8	12.6	14.7
2"	8000	100	Log-9-39-600	SVIP-972	7.5	14.4	14.7

TABLE IV  
DENSITY COMPENSATING  
FLOATS  
( $\pm 1\%$  OF RATE ONLY)  
12-1/2 TO 1 RANGES

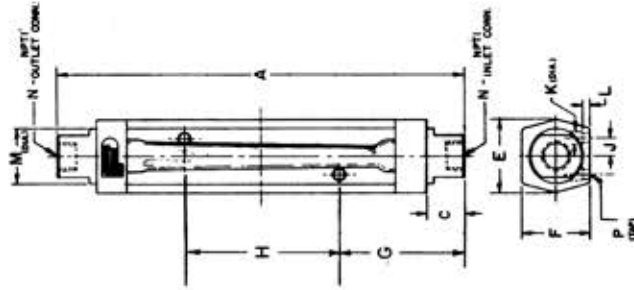
NOTES:

- Total Pressure Drop across meter at maximum flow.
- V.I.C. = Maximum allowable viscosity in centipoise for which capacities listed are valid = V.I.C. factor  $\times \rho$  ; for viscosities above VIC, refer to Warminster.
- PSIA Critical = Minimum operating absolute pressure required to eliminate float bounce when throttling at meter outlet.

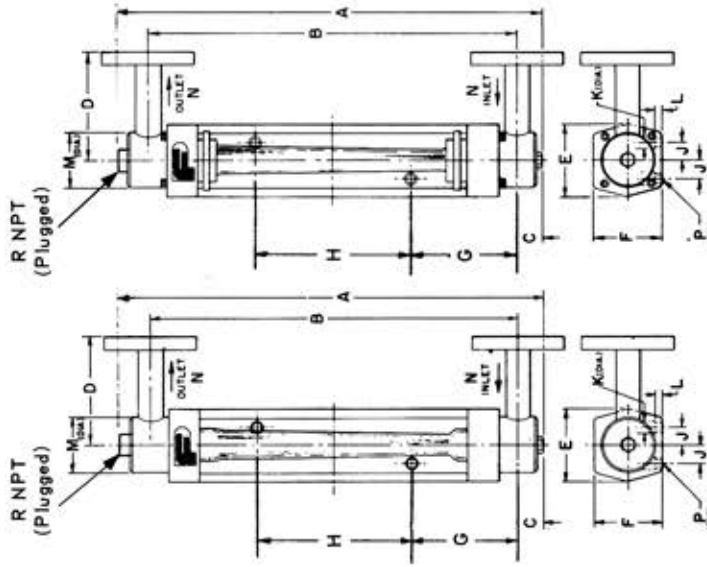
Horizontal Screwed Connections



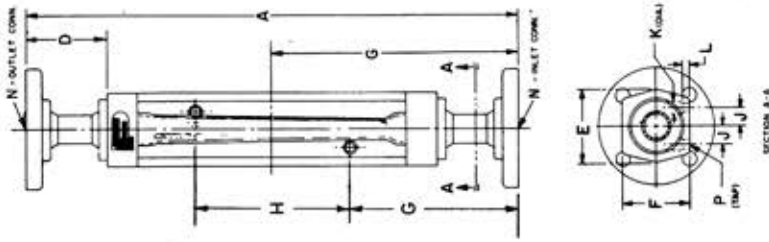
Vertical Screwed Connections



Horizontal Flanged Connections



Vertical Flanged Connections



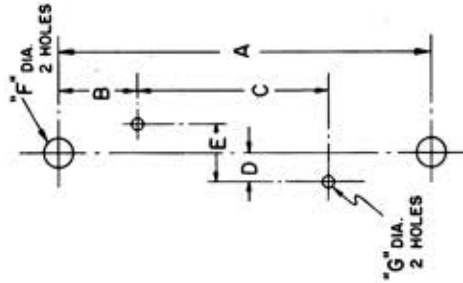
DIMENSIONS

CONNECTIONS	Meter Tube Size	1/4 to 1/2	3/4 to 1	1-1/2 to 2
Horizontal	A	35-3/4	40-9/32	47-5/32
Vertical		35-1/8	40	45-5/32
Horizontal Only	B	33-3/4	37-25/32	43-13/32
Horizontal	C	1	1-1/4	1-7/8
Vertical		5/8	15/16	1-1/16
Horizontal Only	D	21/32	1	1-11/16
Horizontal and Vertical	E	2-5/16	3-1/8	5-1/8
Horizontal	F	2	3	4-1/2
Vertical		3-9/16	4-13/16	6
Horizontal	G	4-1/4	5-15/16	6-7/8
Vertical		4-1/4	5-15/16	6-7/8
Horizontal and Vertical	H	26-5/8	28-5/32	31-13/32
Horizontal	J	1/2	3/4	1
Vertical		3/8	9/16	5/8
Horizontal and Vertical	K (Dia.)	3/16	5/16	5/8
Horizontal	L	1-1/2	2-1/4	3-3/4
Vertical		1/2	3/4	1-1/2
Horizontal (Top)	P (Top)	1/4-20	5/16-18	3/8-16
Horizontal	R (NPT)	1/8	1/8	1/4

CONNECTIONS	Meter Tube Size	1/4 to 1/2	3/4 to 1	1-1/2 to 2
Horizontal	A	35-3/4	40-9/32	47-5/32
Vertical		37-5/8	41-25/32	47-13/32
Horizontal Only	B	33-1/4	37-25/32	43-13/32
Horizontal	C	1	1-1/4	1-7/8
Vertical		3-1/2	4	5
Horizontal and Vertical	D	2-1/2	2-3/4	3-1/4
Horizontal	E	2-5/16	3-1/8	5-1/8
Vertical		2	3	4-1/2
Horizontal	F	3-9/16	4-13/16	6
Vertical		5-1/2	6-13/16	8
Horizontal and Vertical	H	26-5/8	28-5/32	31-13/32
Horizontal	J	1/2	3/4	1
Vertical		3/8	9/16	5/8
Horizontal and Vertical	K (Dia.)	3/16	5/16	5/8
Horizontal only	L	1-1/2	2-1/4	3-3/4
Horizontal and Vertical	N	1/2	1	1-1/2
Vertical	P (Top)	1/4-20	5/16-18	3/8-16
Horizontal	R (NPT)	1/8	1/8	1/4



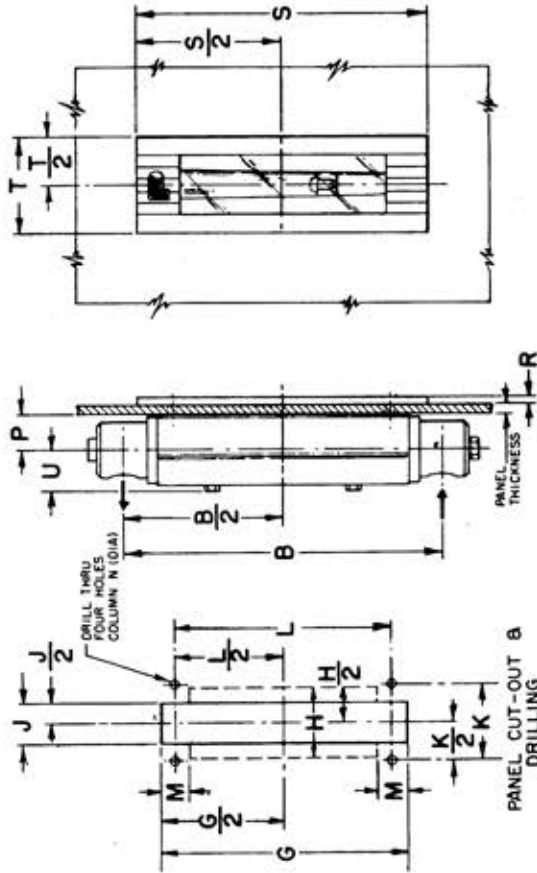
Front Panel Mounting



PANEL DRILLING; METER WITHOUT LIGHTING FIXTURE

Tube Size	Scale Length	A	B	C	D	E	F	G
1/4-1/2	24	33-3/4	3-9/16	26-5/8	1/2	1	7/8	9/32
3/4	24	37-25/32	4-13/16	28-5/32	3/4	1-1/2	1-1/8	11/32
1	24	37-25/32	4-13/16	28-5/32	3/4	1-1/2	1-1/8	11/32
1-1/2	24	43-13/32	6	31-13/32	1	2	2	13/32
2	24	43-13/32	6	31-13/32	1	2	2	13/32

Rear Panel Mounting



Flowmeter Connection Size	Scale Length	B	G	H	J	K	L	M	N	P	R	S	T	U
1/2	24	33-3/4	30-1/4	-	2-3/4	3-7/16	28-1/8	-	7/32	1-1/8	3/8	32-13/16	4-3/8	1-1/4
3/4	24	37-25/32	33-9/32	-	2-3/4	3-1/2	31-5/32	-	9/32	1-9/16	3/8	35-27/32	4-3/8	1-7/8
1-1/2	24	43-13/32	37	-	4-7/16	5-3/16	34-3/8	-	11/32	2-5/16	1/2	40-3/32	6-1/2	2-5/8

## ACCESSORIES

Base Plate (B): Available in all sizes for portable bench or table top use.

Hose Connectors (H): Available in brass or stainless steel for all sizes. For use where meter is to be used with soft flexible hose and hose clamps.

Base Plate and Hose Connectors (D): Combination of Accessories B and H.

Illumination (L): Standard non-explosion proof fluorescent lighting fixture that illuminates the metering elements. Mounts on meter body.

External Metal Scale (S): Graduated metal flow scale mounted adjacent to metering tube.

Surface (Front) Panel Mounting (Y): Nuts, bolts, and lock washers for mounting meter against front of panel by means of mounting holes provided in every meter body.

Flush (Rear) Panel Mounting (Z): Brackets, bezel and hardware for mounting meter behind panel.

Note: Substitute letter(s) listed above for the suffix letter "A" in basic Model Number, page 2.

## ORDERING INFORMATION

To eliminate any delays in the processing of orders and to insure prompt delivery, please specify:

Model number

Tube size & "24-inch scale"

Materials of construction

float, end fitting, packing, packing glands, packing compression screws, o-rings, float stops, tube rest gaskets.

Type of scale

Accuracy desired

Accessories

Operating conditions

Fluid measured

Maximum flow rate

Fluid density

Fluid viscosity

Allowable pressure drop

Operating and maximum temperature

Operating and maximum pressure

## EQUIPMENT DESCRIPTION

*The variable-area flowmeters shall be Fischer & Porter (10A3700) or (10A3800) Series readily convertible from o-ring to packing type or vice versa. Tubes are to be removable for range change or cleaning without disassembling meter or removing it from line. Bodies, end fittings, tubes, tube rest gaskets, floats, and float stops are to be interchangeable between o-ring and packing designs. Tubes are to have equal area ends, and tube retainer springs in o-ring design are to be external to the fluid stream. End fittings are to be rotatable.*

*The flowmeters shall have 24-inch scale length (standard) (tempered) borosilicate glass metering tubes with D.R. scales on metal scale plate (or on Tube). The meters shall have (screwed) (flanged) horizontal or vertical end fittings with (size) connections and shall be of the (open) (Lucite Safety Shielded) type. The meters shall be furnished with extruded aluminum bodies, (material) float stops, and (material) tube rest gaskets.*

*The meters shall have an accuracy of ( $\pm 1\%$  of rate) ( $\pm 1/2\%$  of rate), handling (name of fluid) at a maximum rate of (specify). Fluid density is (specify), viscosity is (specify), operating and maximum temperatures are (specify) and (specify) respectively, and operating and maximum pressure are (specify) and (specify), respectively. Allowable pressure drop is (specify).*

*The flowmeter shall be furnished with the following accessories: (base plate), (hose connectors), (illumination), (external direct reading metal scale), (surface panel mounting), (flush panel mounting).*

*When Specifying Packing Gland Meter Include: The meter shall be equipped with packing gland seals comprised of (material) packing, (material) packing gland and (material) packing compression screws.*

*When Specifying O-Ring Meter Include: The flowmeters shall be equipped with (material) o-ring seals.*