

# CONVERTIBLE INDICATING FLOWRATOR METERS

SPECIFICATION

10A3500\*

File:  
Section  
10A1

## 10A 3000 Series

The F&P Convertible Flowrator<sup>1</sup> meter is a glass tube variable-area flowmeter providing visual indication of flow rate over a 12-1/2 to 1 range on a linear scale. Seals in the meter are readily converted from o-ring to packing gland type by simple addition of a packing gland assembly. Conversion can be made in a few minutes with the meter in the line—requiring only removal of the tube. No other parts need be disassembled.

With either type of seal, the glass metering tube can be removed easily for range change or cleaning, without disassembling other meter parts or removing the meter from the line. One basic convertible meter with seal options minimizes parts inventories.

The meter is available in tube sizes from 1/16-inch through 2-inch bore for liquid or gas service. Dimensions meet ISA Standard RP 16.1.2.3.

### 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: standard  $\pm 2\%$  of maximum flow,  $\pm 1\%$  of maximum flow (calibrated)

\*RANGE: 12-1/2 to 1

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

1. T.M., Fischer & Porter Company
2. Patent pending



MODEL  
10A3565A



MODEL  
10A3665A

### SCALES

Tube Sizes, Inches	SCALE	
	Nominal Length	Type and Location
1/16	4-inch	Diameter Ratio on tube or Direct Reading on external metal scale.
1/8, 1/4	5-inch	
1/2, 3/4, 1-1/2	10-inch	Percentage on tube or Direct Reading on external metal scale
1, 2	9-inch	

### MATERIALS OF CONSTRUCTION

Tube: Tubes feature controlled O.D. and I.D. equal area ends. Standard Tri-Flat<sup>1</sup> guided borosilicate tubes used in 1/16-inch, 1/8-inch, and borosilicate glass, 1/2-inch and up.

Spherical Floats: Standard—glass, stainless steel, sapphire; Optional—tantalum.

USV, SV, NSV Floats: Standard—stainless steel; Optional—Hastelloy C<sup>3</sup>, nickel, Monel.

3. T.M., Union Carbide Corporation

\*Supersedes Specification 10A1/10A3500  
Asterisks in body of specification designate specific changes or additions.

FISCHER & PORTER

Complete Process Instrumentation



## MATERIALS OF CONSTRUCTION (cont.)

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

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

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

### Inlet Float Stop

Tube sizes 1/16-inch, 1/8-inch, 1/4-inch: Glass formed in tube.

Tube sizes 1/2-inch, 3/4-inch, 1-inch, 1-1/2-inch, 2-inch: Teflon.

### Outlet Float Stop

Tube size 1/16-inch, 1/8-inch, 1/4-inch: Standard—Stainless steel; Optional—Hastelloy C.

Tube size 1/2-inch, 3/4-inch, 1-inch, 1-1/2-inch, 2-inch: 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, safety glass enclosure of stainless steel.

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

## OPERATIONAL LIMITS

\* Service: Glass tube meters are not recommended for continuous service on alkalis above 100 F or more than 20% concentrations of 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; Safety glass enclosure, 400 F.

### Tube Pressure Ratings:

Tube Size	Max. Safe Static Working Pressure, psig @ 200 F	
1/16	560	Standard Borosilicate Glass
1/8	490	
1/4	430	
1/2	600	Tempered Borosilicate Glass
3/4	440	
1	325	
1-1/2	230	
2	150	

### NOTE:

1) Sizes 1/16-thru 3/4-inch; maximum pressure rating does not decrease with increasing temperature.

2) Sizes 1-thru 2-inch; decrease pressure rating by 1% each 4 F, increase in operating temperature above 200 F.

## STANDARD MODELS

Type of Seal	Type of Connection	Open	Lucite Safety Shield	Safety Glass
O-Ring	Horizontal Screwed	10A3575A	10A3565A	10A3535A
	Horizontal Flanged	10A3576A	10A3566A	10A3536A
	Vertical Screwed	10A3577A	10A3567A	10A3537A
	Vertical Flanged	10A3578A	10A3568A	10A3538A
Packing Gland	Horizontal Screwed	10A3675A	10A3665A	10A3635A
	Horizontal Flanged	10A3676A	10A3666A	10A3636A
	Vertical Screwed	10A3677A	10A3667A	10A3637A
	Vertical Flanged	10A3678A	10A3668A	10A3638A

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	1/16"	1/8", 1/4"	1/2"	3/4", 1"	1-1/2", 2"
		Screwed	Weight, lb.	2 lb	4 lb	11 lb
	Size, inches	1/4"	1/2"	3/4"	1-1/2"	
Flanged	Weight, lb.	7 lb	10 lb	19 lb	43 lb	
	Size, inches	1/2"	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 70F) the capacity table may be entered directly.

For meters with Tri-Flat tubes, sizes 1/16-1/8-, and 1/4-inch, follow the sizing procedure

outlined in the Fischer & Porter Tri-Flat Variable-Area Flowmeter Handbook.

The conversion equations shown below permit the capacity tables to be used for other operating conditions, and apply to meters with tube sizes of 1/2-, 3/4-, 1-, 1-1/2-, and 2-inch.

**LIQUID CONVERSION**

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

or

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

where:

- gpm = desired maximum flow rate in gpm
- 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 H<sub>2</sub>O

**GAS CONVERSION**

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

or

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

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 pressure
- $P_{op}$  = absolute pressure in psia at operating conditions
- scfm air = equivalent flow rate in scfm of air at 14.7 psia and 70 F

Key to Spherical Float Nomenclature  
See capacity table on following page

Code Letters	Material	Density g/cc
CD	Constant density glass	2.28
SA	Sapphire	3.98
SS	Stainless Steel	8.02
TA	Tantalum	16.6

**CAPACITY TABLE**  
Tri Flat Meters with Spherical Floats

Tube Size (Inches)	Maximum Flow Rate		Tri Flat Tube Number	Spherical Float Number
	cc/min H <sub>2</sub> O $\rho = 1.0 \text{ g/cc}$ visc = 1 cps	scc/min Air $\rho = 14.7 \text{ psia}$ & 70 F		
1/16	0.59	43.5	FP-1/16-08-G-5	1/16-SA
	1.05	75.0	FP-1/16-10-G-5	1/16-SA
	1.37	83.3	FP-1/16-08-G-5	1/16-SS
	1.81	122	FP-1/16-12-G-5	1/16-SA
	2.46	136	FP-1/16-10-G-5	1/16-SS
	3.05	159 ††	FP-1/16-08-G-5	1/16-TA
	3.20	196	FP-1/16-16-G-5	1/16-SA
	4.20	206	FP-1/16-12-G-5	1/16-SS
	4.82	271	FP-1/16-20-G-5	1/16-SA
	5.25	240 ††	FP-1/16-10-G-5	1/16-TA
	7.20	315	FP-1/16-16-G-5	1/16-SS
	8.40	332 ††	FP-1/16-12-G-5	1/16-TA
	10.3	426	FP-1/16-20-G-5	1/16-SS
	13.5	510 ††	FP-1/16-16-G-5	1/16-TA
	18.6	681 ††	FP-1/16-20-G-5	1/16-TA
	1/8	10.5	525	FP-1/8-08-G-5
20.5		840	FP-1/8-08-G-5	1/8-SS
23.0		960	FP-1/8-12-G-5	1/8-SA
35.7		1420	FP-1/8-16-G-5	1/8-SA
36.5		1360 ††	FP-1/8-08-G-5	1/8-TA
39.5		1470	FP-1/8-12-G-5	1/8-SS
48.5		1910	FP-1/8-20-G-5	1/8-SA
60.0		2120	FP-1/8-16-G-5	1/8-SS
64.5		2480	FP-1/8-25-G-5	1/8-SA
66.0		2292 ††	FP-1/8-12-G-5	1/8-TA
81.0		2860	FP-1/8-20-G-5	1/8-SS
97.5		3270 ††	FP-1/8-16-G-5	1/8-TA
107.0		3660	FP-1/8-25-G-5	1/8-SS
130.0		4325 ††	FP-1/8-20-G-5	1/8-TA
171.5		5580 ††	FP-1/8-25-G-5	1/8-TA
1/4		78.0	3850	FP-1/4-10-G-5
	151.0	6950	FP-1/4-16-G-5	1/4-CD
	203	9100	FP-1/4-20-G-5	1/4-CD
	228	8050	FP-1/4-10-G-5	1/4-SS
	268	11,750	FP-1/4-25-G-5	1/4-CD
	370	12,250 ††	FP-1/4-10-G-5	1/4-TA
	415	14,100	FP-1/4-16-G-5	1/4-SS
	547	18,400	FP-1/4-20-G-5	1/4-SS
	660	21,250 ††	FP-1/4-16-G-5	1/4-TA
	703	23,400	FP-1/4-25-G-5	1/4-SS
	860	27,600 ††	FP-1/4-20-G-5	1/4-TA
	1105	35,200 ††	FP-1/4-25-G-5	1/4-TA

††Tantalum floats are not recommended for gas service below 2 psig.

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### CAPACITY TABLE

Bead Guide Meters with USV, SV and NSV Floats

Tube Size (Inches)	Maximum Flow Rate		Bead Guide Tube Number	Float Number	$\Delta P$ -inch H <sub>2</sub> O (1)	V.I.C. (2)	Minimum psia for gas service (3)
	gpm H <sub>2</sub> O $\rho = 1.0 \text{ g/cc}$ $\text{visc} = 1 \text{ cps}$	scfm Air @ 14.7 psia & 70 F					
1/2	0.267	1.10	FP-1/2-17-G-10	1/2-GUSVT-40	1.2	2.9	5.5
	0.328	1.35	FP-1/2-21-G-10	1/2-GUSVT-40	1.4	2.9	3.5
	0.434	1.78	FP-1/2-27-G-10	1/2-GUSVT-40	2.0	2.0	2.7
	0.600	2.47	FP-1/2-21-G-10	1/2-GSVT-45-A	4.6	5.1	11.5
	0.810	3.35	FP-1/2-27-G-10	1/2-GSVT-45-A	6.8	5.1	8.4
	1.12	4.60	FP-1/2-27-G-10	1/2-GSVT-44-A	12.3	7.1	16.2
	1.19	4.90	FP-1/2-27-G-10	1/2-GSVT-48-A	13.7	7.6	18.6
	1.52	6.25	FP-1/2-27-G-10	1/2-GNSVT-48-A	20.2	1.1	18.6
3/4	1.96	8.08	FP-3/4-21-G-10	3/4-GSVGT-54	5.3	10.4	13.9
	2.70	11.1	FP-3/4-27-G-10	3/4-GSVGT-54	7.7	10.4	9.6
	3.55	14.6	FP-3/4-27-G-10	3/4-GNSVGT-54	11.5	1.6	9.6
	3.67	15.1	FP-3/4-27-G-10	3/4-GSVGT-59	13.7	14.1	19.8
	4.80	19.8	FP-3/4-27-G-10	3/4-GNSVGT-59	20.5	2.1	19.8
1	4.25	17.5	FP-1-27-G-10	1-GSVGT-64	12.9	14.8	11.5
	5.63	23.2	FP-1-27-G-10	1-GNSVGT-64	20.7	2.2	11.5
	6.00	24.7	FP-1-35-G-10	1-GSVGT-64	22.3	14.8	6.8
	6.80	28.0	FP-1-35-G-10	1-GSVGT-68	28.7	16.9	8.9
	7.84	32.4	FP-1-35-G-10	1-GNSVGT-64	36.4	2.2	6.8
	9.00	37.0	FP-1-35-G-10	1-GNSVGT-68	45.7	2.5	8.9
	9.50	39.2	FP-1-35-G-10	1-GSVGT-69	56.5	8.5	13.4
	11.0	45.3	FP-1-35-G-10	1-GNSVGT-69	66.8	1.5	13.4
	20.0	82.4	FP-1-60-P-8	SVP-6-116	110.0	19.5	24.0
	30.0	-	FP-1-60-P-8	PL-655	450.0	2.0	-
1-1/2	13.2	54.4	FP-1-1/2-27-G-10	1-1/2-GSVGT-87	9.5	27.6	15.4
	14.6	60.0	FP-1-1/2-27-G-10	1-1/2-GSVGT-86	11.1	31.0	22.0
	17.1	70.2	FP-1-1/2-27-G-10	1-1/2-GNSVGT-87	12.8	4.2	15.4
	18.6	76.5	FP-1-1/2-27-G-10	1-1/2-GNSVGT-86	15.2	4.8	22.0
2	24.0	99.0	FP-2-27-G-10	2-GSVGT-97	16.3	26.5	16.4
	30.0	123.6	FP-2-27-G-10	2-GSVGT-98	23.5	18.5	21.2
	36.1	148.8	FP-2-27-G-10	2-GNSVGT-98	31.6	3.3	21.2
	75.0	-	FP-2-50-P-8	NSVP-936	100.0	4.5	-
	130.0	-	FP-2-50-P-8	PL-937	275.0	4.0	-

### CAPACITY TABLE

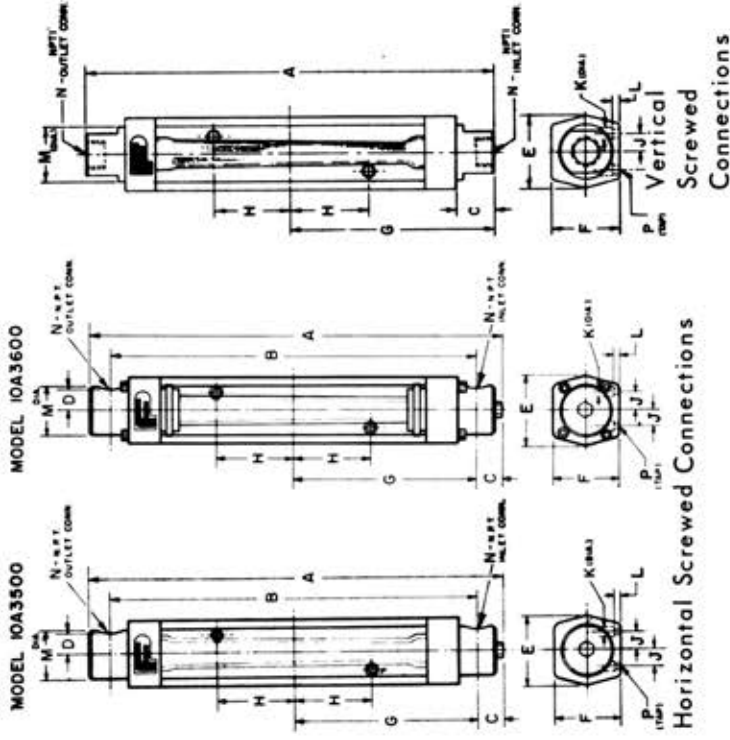
Low Pressure Drop Design

Tube Size (In.)	Maximum Capacities		Tube Number	Float Nomenclature	$\Delta P$ -inches H <sub>2</sub> O (1)	VIC (2)	Minimum psia Gas Service (3)
	gpm H <sub>2</sub> O	scfm Air @ STP					
1/2	0.198	0.800	FP-1/2-17-G-10	1/2-GUSVT-410	0.53	2.2	3.6
	0.238	0.982	FP-1/2-21-G-10	1/2-GUSVT-410	0.53	2.2	3.6
	0.324	1.339	FP-1/2-27-G-10	1/2-GUSVT-410	0.58	2.2	3.6
3/4	0.633	2.620	FP-3/4-21-G-10	3/4-GUSVT-510	0.60	3.3	3.1
	0.860	3.540	FP-3/4-27-G-10	3/4-GUSVT-510	0.71	3.3	1.5
1	1.205	4.980	FP-1-27-G-10	1-GUSVT-611	1.28	4.0	1.0
	1.670	6.900	FP-1-35-G-10	1-GUSVT-611	1.83	4.0	0.75
	2.580	10.700	FP-1-27-G-10	1-GUSVT-610	5.47	8.6	4.5
	3.600	14.840	FP-1-35-G-10	1-GUSVT-610	7.97	8.6	3.4
1-1/2	2.450	10.300	FP-1-1/2-21-G-10	1-1/2-GUSVT-813	0.92	6.5	1.0
	3.330	13.800	FP-1-1/2-27-G-10	1-1/2-GUSVT-813	1.24	6.5	1.0
	6.500	27.000	FP-1-1/2-21-G-10	1-1/2-GUSVT-814	5.75	16.2	6.8
	8.700	36.000	FP-1-1/2-27-G-10	1-1/2-GUSVT-814	7.20	16.2	6.8
2	5.540	22.900	FP-2-27-G-10	2-GUSVT-913	1.65	8.9	1.0
	13.750	56.700	FP-2-27-G-10	2-GUSVT-914	9.00	22.0	6.2

Notes:

- 1) Pressure drop is total pressure loss across the meter.
- 2) Meter is unaffected by viscosity when the value of  $\text{cps} / \sqrt{\rho}$  (using operating density in g/cc and viscosity in centipoises) is less than V.I.C. (viscosity immunity ceiling). V.I.C. is applicable to liquids only; all gas flows fall below Viscosity Immunity Ceiling.
- 3) Meters not recommended for gas service where pressure is below minimum shown. For such applications use low pressure drop capacity table. A flow throttling valve close coupled to meter outlet is recommended for all gas applications.
- 4) See page 3 for sizing procedure.

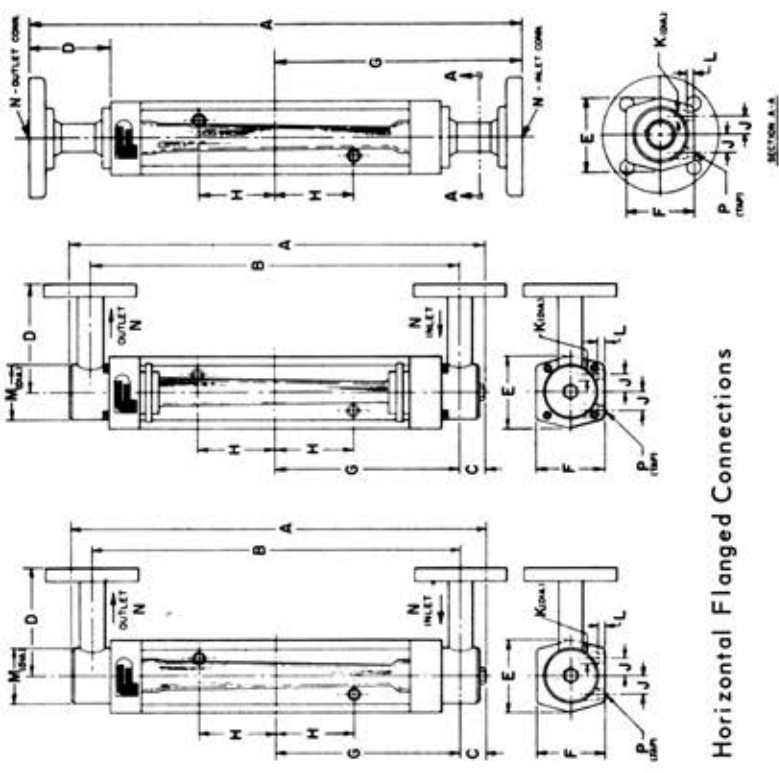
# DIMENSIONS



Horizontal Screwed Connections

Vertical Screwed Connections

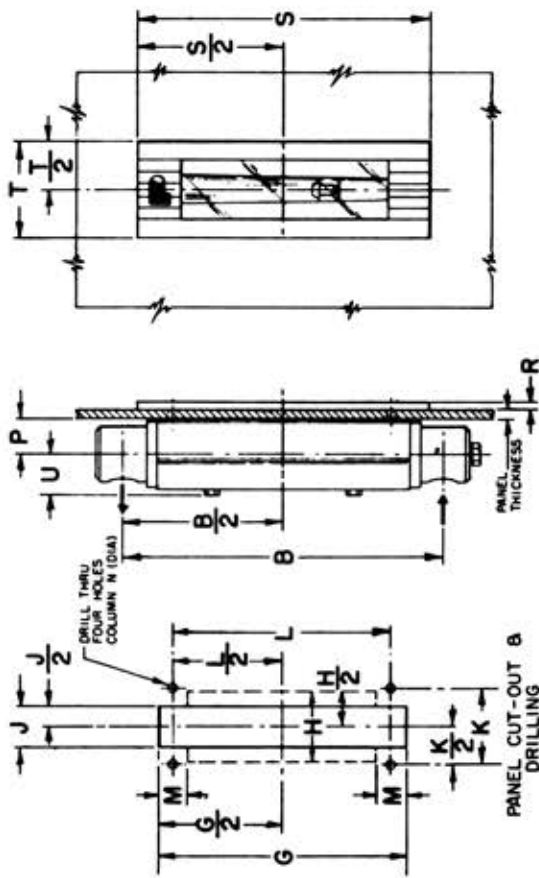
CONNECTIONS	Model IOA3500		Model IOA3600	
	1/16 to 1/4	1/2	3/4 to 1	1-1/2 to 2
Horizontal Vertical	A 12.2/16 13.1/8	18.1/4 16.5/8	19.3/4 17.7/8	23.2/4 20.1/8
Horizontal Only	B 11	16-1/2	17-1/2	20-1/2
Horizontal Vertical	C 23-22 9/16	1	1-1/4	1-7/8
Horizontal Only	D 13-22	21-22	1	1-11/16
Horizontal and Vertical	E 1.5-8 1-7/16	2.5-16 2	3-18 3	5-18 4-1/2
Horizontal Vertical	G 5-1/2 5/8-16	8-2/4 8-5/16	8-2/4 8-15/16	10-1/4 10-17/16
Horizontal and Vertical	H 212-22	4-11/16	3-15/16	4-1/4
Horizontal and Vertical	J 11-22	1/2	3/4	1
Horizontal and Vertical	K 5/16	3/8	9/16	5/8
Horizontal and Vertical	L 3/16	3/16	5/16	5/16
Horizontal and Vertical	M 1	1-1/2	2-1/4	3-3/4
Horizontal and Vertical	N 1/4	1/2	3/4	1-1/2
(Top)	P 1/4 - 20	1/4 - 20	5/16 - 18	3/8 - 16



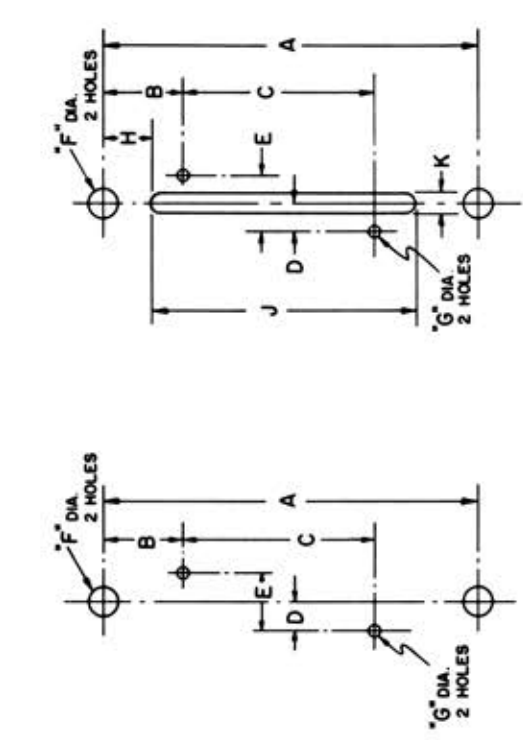
Horizontal Flanged Connections

Vertical Flanged Connections

CONNECTIONS	Model IOA3500		Model IOA3600	
	1/16 to 1/4	1/2	3/4 to 1	1-1/2 to 2
Horizontal Vertical	A 12.2/16 13.1/2	18.1/4 16.5/8	19.3/4 17.7/8	23.2/4 20.1/8
Horizontal Only	B 11	16-1/2	17-1/2	20-1/2
Horizontal Vertical	C 23-22 5/8	1	1-1/4	1-7/8
Horizontal Only	D 13-22	21-22	1	1-11/16
Horizontal and Vertical	E 1.5-8 1-7/16	2.5-16 2	3-18 3	5-18 4-1/2
Horizontal Vertical	G 5-1/2 6-3/4	8-2/4 10-2/16	8-2/4 10-15/16	10-1/4 10-17/16
Horizontal and Vertical	H 212-22	4-11/16	3-15/16	4-1/4
Horizontal and Vertical	J 11-22	1/2	3/4	1
Horizontal and Vertical	K 5/16	3/8	9/16	5/8
Horizontal and Vertical	L 3/16	3/16	5/16	5/16
Horizontal and Vertical	M 1	1-1/2	2-1/4	3-3/4
Horizontal and Vertical	N 1/2	1/2	1	1-1/2
(Top)	P 1/4 - 20	1/4 - 20	5/16 - 18	3/8 - 16



PANEL CUT-OUT & DRILLING

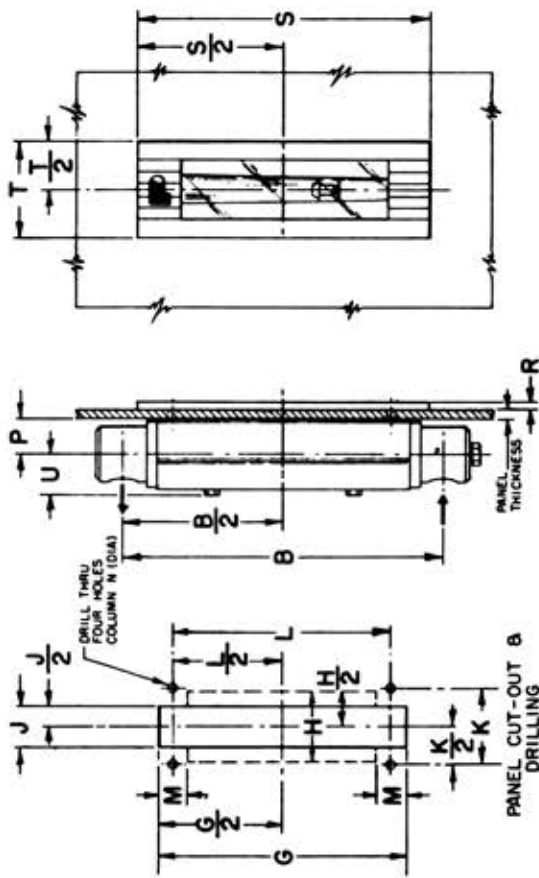


PANEL DRILLING; METER WITHOUT LIGHTING FIXTURE  
PANEL CUT-OUT & DRILLING; METER WITH LIGHTING FIXTURE

Front Panel Mounting

Tube Size	Scale Length	A	B	C	D	E	F	G	H	J	K
1/16	5	11	3-3/32	4-13/16	11/32	11/16	19/32	9/32	1-7/8	7-1/4	1/4
1/8	10	16-1/2	3-9/16	9-3/8	1/2	1	7/8	9/32	2-27/32	10-13/16	5/16
1/4	10	17-1/2	4-13/16	7-7/8	3/4	1-1/2	1-1/8	11/32	3-5/16	11	7/16
1	10	17-1/2	4-13/16	7-7/8	3/4	1-1/2	1-1/8	11/32	3-5/16	11	7/16
1-1/2	10	20-1/2	6	8-1/2	1	2	2	13/32	4-13/16	11	7/16
2	10	20-1/2	6	8-1/2	1	2	2	13/32	4-13/16	11	7/16

All dimensions in inches.



Rear Panel Mounting

Flowmeter Size	Connection Size	Scale Length	B	G	H	J	K	L	M	N	P	R	S	T	U
1/4	5	11	8	2	1-1/2	2-3/8	6	1	5/32	3/4	3/8	9-1/2	3-1/8	1	
1/2	10	16-1/2	13	-	2-3/4	3-7/16	10-7/8	-	7/32	1-1/8	3/8	15-9/16	4-3/8	1-1/4	
3/4	10	17-1/2	13	-	2-3/4	3-1/2	10-7/8	-	9/32	1-9/16	3/8	15-9/16	4-3/8	1-7/8	
1-1/2	10	20-1/2	14-1/8	-	4-7/16	5-3/16	11-1/2	-	11/32	2-5/16	1/2	17-3/16	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

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 (3500) or (3600) 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 (5-inch) (10-inch) scale length (standard) (tempered) borosilicate glass metering tubes with ( $D_t/D_f$ ) (%) scales. The meters shall have (screwed) (flanged) horizontal end fittings with (size) connections and shall be of the (open) (Lucite Safety Shielded (Safety Glass Enclosed) 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 ( $\pm 2\%$ )

( $\pm 1\%$ ) of full scale, 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 glands and (material) packing compression screws.

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

