

Indicating Flowrator® Meters

SERIES 10A1700

The 10A1700 Series *Flowrator* meters are glass tube variable-area flowmeters adaptable to a wide range of metering applications in both liquid and gas service.

In addition to its basic function as a plain indicator, the meter can be supplied with various alarm, transmitting, recording and controlling extensions. For these options refer to Specification 10A1700 O/U.

DESIGN FEATURES

- All 300 Series stainless steel side plates and bezels
- Rugged packing gland design
- Available with a wide variety of options and accessories
- End fittings rotatable through 360°
- Only special screws needed for either front or rear panel mounting.
- Same basic body is used for std. polycarbonate or heavy duty enclosure, either of which will protect personnel in event of accidental tube breakage

ENGINEERING SPECIFICATIONS

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

Rangeability: 12-1/2 to 1

Pressure Limits: In flanged meters, the ANSI rating of the flange should be used if lower than the glass tube rating.

| Tube Size | Max. Safe Static Working Pressure @ 100°F (38°C) | |
|-------------|--|-----------|
| | psig | kPa gauge |
| 1/16 | 450 | 3100 |
| 1/8 | 450 | 3100 |
| 1/4 | 450 | 3100 |
| 1/2 | 300 | 2060 |
| 3/4 | 200 | 1380 |
| 1 | 200 | 1380 |
| FP-1-50-G-9 | 130 | 895 |
| 1-1/2 | 130 | 895 |
| 2 | 100 | 690 |
| 3 | 70 | 483 |

NOTES:

1. Ratings are in accordance with I.S.A. RP 16.1
2. Decrease pressure rating by 1% each 4°F (2°C), increase in operating temperature above 200°F (93°C); no de-rating required for temperatures below 200°F (93°C).



Temperature Limit

Minimum: -50°F (-45.5°C)

Maximum: 250°F (121°C)

Service Limits: Glass tube meters are not recommended for continuous service 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.

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

Materials of Construction

Floats

Ball Type: Standard materials — glass, stainless steel, sapphire; Optional material — tantalum.

Conventional Type: Standard material — 316 stainless steel; Optional materials — nickel, Monel¹, Hastelloy² C, alloy 20.

Fittings: Standard materials - iron (size 1-1/2 and above), steel, brass (bronze size 1-1/2 and above) 316 stainless steel; Optional materials - aluminum, nickel, Monel, alloy 20, Hastelloy C, phosphor bronze, PVC.

Gaskets: Standard — compressed asbestos sheet packing; Optional — Teflon³

Tube: Borosilicate glass

Packing: Standard — moulded neoprene; Optional — Teflon (sizes 1/16" — 2" only), butyl, Hycar or Koroseal (size 3" only)

1. T.M., International Nickel Co.
2. T.M., Union Carbide & Carbon Corp.
3. T.M., E.I. DuPont de Nemours & Company, Inc.

Mounting: Standard — in-line; Optional — panel.



CONNECTIONS

| Nominal Tube Size (inches) | Meter Connection Size (inches) | | |
|----------------------------|--------------------------------|------------------|--------------------|
| | Vertical or Horizontal Screwed | Vertical Flanged | Horizontal Flanged |
| 1/16-1/4 | 1/4 | 1/2 | 1/2 |
| 1/2 | 1/2 | 1/2 | 1/2 |
| 3/4-1 | 3/4 | 1 | 1 |
| 1-1/2 | 1-1/2 | 1-1/2 | 1-1/2 |
| 2 | 1-1/2 | 2 | 1-1/2 |
| 3 | — | 3 | 3 |

NOTE: Flanged connections match 125-150 lb ANSI. Threaded connections are NPT.

KEY TO BALL FLOAT NOMENCLATURE

| Code Letters | Material | Density g/ml |
|--------------|-----------------|--------------|
| BG | Black glass | 2.54 |
| SA | Sapphire | 3.98 |
| SS | Stainless steel | 8.02 |
| TA | Tantalum | 16.6 |

SCALES

| Tube Size | Nominal Length | Types |
|-----------|----------------------|--|
| 1/16 | 4-inch† | Diameter Ratio on Tube† Direct Reading on Metal Scale* |
| 1/8-1/4 | 5-inch† | Direct Reading on Tube* |
| 1/2 to 3 | 10-inch† and 5-inch* | Percentage on Tube† Direct Reading on Metal Scale* Direct Reading on Tube* |

† = Standard * = Optional

WEIGHT — lbs (kg)

| Tube Size | 1/16" to 3" | | | | | | |
|----------------|---------------|----------|-----------|-----------|-----------|-----------|----------|
| | 1/16" to 1/4" | 1/2" | 3/4" & 1" | 1 1/2" | 2" | 3" | |
| Approx. Weight | Threaded | 4 (1.8) | 12 (5.4) | 20 (9) | 30 (13.6) | 50 (22.6) | — |
| | Flanged | 10 (4.5) | 15 (6.8) | 24 (10.9) | 38 (17.2) | 56 (25.4) | 135 (61) |

STANDARD MODELS

| Type of Connection | Type of Enclosure | |
|---------------------|--|-----------------------------------|
| | Standard Available in sizes 1/16" - 2" | Heavy Duty Available in all sizes |
| Horizontal Threaded | 10A1755A | 10A1795A |
| Horizontal Flanged | 10A1756A | 10A1796A |
| Vertical Threaded | 10A1757A | 10A1797A |
| Vertical Flanged | 10A1758A | 10A1798A |

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 or 103.4 kPa abs and 21°C) the capacity table may be entered directly.

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 through 3".

LIQUID CONVERSION

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

or

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

where:

gpm = desired maximum flow rate in gpm

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

ρ_f = density of the float required for the application and selected from the following list

316 stainless steel = 8.02 g/mL

Hastelloy C = 8.94 g/mL

Nickel = 8.91 g/mL

Monel = 8.84 g/mL

ρ = density of fluid to be metered-g/mL

gpm H₂O equivalent = flow rate in gpm H₂O with stainless steel float

GAS CONVERSION

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

or

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

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 with stainless steel float

ACCESSORIES

Illumination (L): Accessory light available for use in poorly illuminated areas or for metering semi-opaque fluids. Explosion-proof fixture available for separate mounting.

Tripod Base (B): Available in sizes 1/16" to 1-1/2" for portable bench or table top use.

Hose Connectors (H): Available in brass or stainless steel for sizes 1/16"-2", for use where meter is to be used with soft flexible hose and hose clamps. Use (D) when both tripod base and hose connectors are desired.

Frost Shield (F): Sealed enclosure containing silica-gel available to maintain dry dead-air space between metering tube and atmosphere, thus allowing unrestricted visibility of float at all times. Not available with steam tracing.

Accessories, Continued

Metal Scale (S): Special Direct Reading Scale Units on metal scale plate.

Guide Rod (P): Required on all meters with plain tapered tubes, sizes 3/4" to 3" only.

Steam Tracing (N): single or double steam tubes available, suitable for up to 120 psi saturated steam. Double steam tubes are not available with lighting fixture or external metal scale.

Panel Mounting: Front (Y) or Rear (Z) Panel Mounting.

NOTE: When specifying metal scale substitute "S" for "A" at end of standard model number. When specifying other accessories with metal scales add the letter shown after the "S". When specifying other accessories without a metal scale, substitute "X" for the "A" at the end of standard model number, then add the letter shown.

CAPACITIES

LOW PRESSURE DROP DESIGN

| Meter Size | Maximum Capacity | | Tube Number 5-inch or 10-inch | Float Number (316 Stainless Steel) | Total ΔP (See Note 1) | V.I.C. (See Note 2) | psia Critical (See Note 3) |
|------------|--------------------------------|-----------------------|-------------------------------------|--|-----------------------------|---------------------------|-------------------------------------|
| | gpm H ₂ O Equiv. | scfm Air Equiv. | | | | | |
| 1/2" | 0.198 | 0.815 | FP-1/2-17-G- | BSX-497 | 0.53 | 2.2 | 3.6 |
| | 0.238 | 0.982 | FP-1/2-21-G- | BSX-497 | 0.53 | 2.2 | 3.6 |
| | 0.324 | 1.339 | FP-1/2-27-G- | BSX-497 | 0.58 | 2.2 | 3.6 |
| 3/4" | 0.633 | 2.62 | FP-3/4-21-G- | BSX-599 | 0.55 | 3.25 | 3.1 |
| | 0.860 | 3.54 | FP-3/4-27-G- | BSX-599 | 0.67 | 3.25 | 3.1 |
| 1" | 1.36 | 5.60 | FP-1-27-G | BSX-688 | 1.28 | 4.00 | 1.0 |
| | 1.88 | 7.80 | FP-1-35-G- | BSX-688 | 1.83 | 4.00 | 1.0 |
| | 2.90 | 12.10 | FP-1-27-G- | BSX-673 | 5.47 | 8.6 | 4.5 |
| | 4.05 | 16.84 | FP-1-35-G- | BSX-673 | 7.97 | 8.6 | 4.5 |
| 1-1/2" | 2.52 | 10.53 | FP-1-1/2-21-G- | BSX-867 | 0.79 | 6.45 | 14.7 |
| | 3.32 | 13.72 | FP-1-1/2-27-G- | BSX-867 | 0.97 | 6.45 | 14.7 |
| | 6.65 | 27.50 | FP-1-1/2-21-G- | BSX-858 | 4.96 | 16.2 | 14.7 |
| | 8.65 | 35.70 | FP-1-1/2-27-G- | BSX-858 | 6.00 | 16.2 | 14.7 |
| 2" | 6.25 | 25.95 | FP-2-27-G- | BSX-955 | 1.31 | 8.90 | 1.0 |
| | 15.50 | 64.00 | FP-2-27-G- | BSX-944 | 7.34 | 22.0 | 14.7 |
| 3" | 12.50 | 51.50 | FP-3-20-G- | BSX-11-27 | 1.13 | 16.8 | 14.7 |
| | 31.90 | 132.75 | FP-3-20-G- | BSX-11-33 | 7.26 | 38.5 | 14.7 |

Note: Standard percent scales are not applicable to low pressure drop floats. Price & delivery of percent scales with these floats must be the same as that for Direct Reading Scales.

POLE-GUIDED STAINLESS STEEL FLOATS

| METER Size | MAXIMUM FLOW | | 5-inch or 10-inch Tube Number | FLOAT NUMBER | TOTAL ΔP (See Note 1) | V.I.C. (See Note 2) | psia Critical (See Note 3) |
|---------------|-----------------------------------|---------------|--|---------------|--------------------------|------------------------|----------------------------------|
| | H ₂ O gpm sp gr 1.0 | scfm Air | | | | | |
| 3/4" | 2.50 | 10.2 | FP-3/4-17-P- | 3/4-SVP-58 | 9.7 | 15.9 | 38.8 |
| | 3.00 | 12.4 | | 3/4-SVP-57 | 13.6 | 19.2 | 57.6 |
| | 3.50 | 14.4 | | 3/4-NSVP-58 | 11.2 | 2.47 | 39.8 |
| | 4.15 | 17.0 | | 3/4-NSVP-57 | 15.4 | 2.93 | 57.6 |
| 1" | 4.90 | 20.0 | FP-1-25-P- | 1-SVP-68 | 9.7 | 16.0 | 18.4 |
| | 6.80 | 28.0 | | 1-NSVP-68 | 13.3 | 2.4 | 18.4 |
| | 7.60 | 31.5 | | 1-SVP-67 | 21.5 | 24.8 | 44.6 |
| | 10.4 | 43.0 | | 1-NSVP-67 | 29.3 | 3.7 | 44.6 |
| 1-1/2" | 15.6 | 64.0 | FP-1-1/2-27-P | 1-1/2-SVP-89 | 10.9 | 30.3 | 16.0 |
| | 18.0 | 74.0 | | 1-1/2-SVP-88 | 14.2 | 35.4 | 21.1 |
| | 21.2 | 87.0 | | 1-1/2-SVP-87 | 19.2 | 40.8 | 28.9 |
| | 24.8 | 102 | | 1-1/2-NSVP-88 | 17.3 | 5.3 | 21.1 |
| 29.0 | 120 | 1-1/2-NSVP-87 | 24.2 | 6.1 | 28.9 | | |
| 2" | 47.0 | 196 | FP-2-35-P-5 or FP-2-37-P-10 (CO + 15-265) | 2-SVP-9-101 | 27.5 | 46.9 | 16.4 |
| | 61.0 | 250 | | 2-SVP-9-100 | 46.1 | 59.0 | 29.0 |
| | 66.0 | 270 | | 2-NSVP-9-101 | 45.5 | 7.0 | 16.4 |
| | 86.0 | 350 | | 2-NSVP-9-100 | 71.6 | 8.9 | 29.0 |
| 3" | 66.0 | 270 | FP-3-27-P- | 3-SVP-11-6 | 11.6 | 65.0 | 15.1 |
| | 83.0 | 340 | | 3-SVP-11-5 | 18.1 | 82.0 | 23.1 |
| | 94.0 | 390 | | 3-NSVP-11-6 | 14.1 | 10.1 | 15.1 |
| | 120 | 490 | | 3-NSVP-11-5 | 22.2 | 12.9 | 23.1 |

BEAD-GUIDED STAINLESS STEEL FLOATS

Plain indicating Tri-Flat meters with spherical floats (use Tri-Flat Handbook for sizing).

| Meter Size | Maximum Flow | | Metering Tube 5 or 10 Inch Except Where Shown | Float Number | Total ΔP See Note 1 | V.I.C. See Note 2 | psia Critical See Note 3 |
|------------|--------------------------------|--------------------|--|------------------|------------------------|----------------------|--------------------------------|
| | gpm H ₂ O equiv. | scfm air equiv. | | | | | |
| 1/2" | .267 | 1.10 | FP-1/2-17-G- | 1/2-GUSVT-40 | .74 | 2.9 | 5.5 |
| | .328 | 1.35 | FP-1/2-21-G- | 1/2-GUSVT-40 | .77 | 2.9 | 3.5 |
| | .442 | 1.82 | FP-1/2-27-G- | 1/2-GUSVT-40 | .78 | 2.9 | 2.7 |
| | .480 | 1.92 | FP-1/2-17-G- | 1/2-GSVT-45 A | 2.0 | 5.1 | 17.9 |
| | .600 | 2.47 | FP-1/2-21-G- | 1/2-GSVT-45 A | 2.3 | 5.1 | 11.5 |
| | .670 | 2.65 | FP-1/2-17-G- | 1/2-GSVT-44 A | 3.8 | 7.1 | 33.4 |
| | .736 | 3.04 | FP-1/2-21-G- | 1/2-GNSVT-45 A | 3.2 | 1.0 | 11.5 |
| | .810 | 3.35 | FP-1/2-27-G- | 1/2-GSVT-45 A | 2.4 | 5.1 | 8.4 |
| | .880 | 3.62 | FP-1/2-21-G- | 1/2-GSVT-48 A | 4.5 | 7.6 | 24.6 |
| | 1.02 | 4.20 | FP-1/2-27-G- | 1/2-GNSVT-45 A | 3.7 | 0.8 | 8.4 |
| | 1.12 | 4.60 | FP-1/2-27-G- | 1/2-GSVT-44 A | 4.6 | 7.1 | 16.2 |
| | 1.44 | 6.00 | FP-1/2-27-G- | 1/2-GSVT-43 A | 8.9 | 9.2 | 27.5 |
| | 1.84 | 7.60 | FP-1/2-27-G- | 1/2-GNSVT-43 A | 10.4 | 1.3 | 27.5 |
| | 1.98 * | 8.16 * | FP-1/2-35-G-10 | 1/2-GSVT-43 A | 17.0 | 9.2 | 22.7 |
| | 2.43 * | 10.0 * | FP-1/2-35-G-10 | 1/2-GNSVT-43 A | 26.5 | 1.3 | 22.7 |
| | 2.76 * | 11.3 * | FP-1/2-50-G-9 | 1/2-GSVT-44 A | 34.2 | 7.1 | 7.7 |
| 3.49 * | 14.4 * | FP-1/2-50-G-9 | 1/2-GSVT-43 A | 54.8 | 9.2 | 12.3 | |
| 4.00 * | 16.5 * | FP-1/2-50-G-9 | 1/2-GNSVT-43 A | 72.0 | 1.3 | 12.3 | |
| 3/4" | 1.96 | 8.08 | FP-3/4-21-G- | 3/4-GSVT-54 A | 3.8 | 10.4 | 13.9 |
| | 2.49 | 10.2 | FP-3/4-21-G- | 3/4-GNSVT-54 A | 4.6 | 1.6 | 13.9 |
| | 2.70 | 11.1 | FP-3/4-27-G- | 3/4-GSVT-54 A | 4.4 | 10.4 | 9.6 |
| | 3.15 | 13.0 | FP-3/4-21-G- | 3/4-GSVT-53 A | 11.0 | 16.8 | 36.0 |
| | 3.55 | 14.6 | FP-3/4-27-G- | 3/4-GNSVT-54 A | 5.4 | 1.6 | 9.6 |
| | 4.00 | 16.6 | FP-3/4-21-G- | 3/4-GNSVT-53 A | 12.0 | 2.5 | 36.0 |
| | 4.35 | 18.0 | FP-3/4-27-G- | 3/4-GSVT-53 A | 13.0 | 16.8 | 25.0 |
| | 5.70 | 23.6 | FP-3/4-27-G- | 3/4-GNSVT-53 A | 15.9 | 2.5 | 25.0 |
| 1" | 4.70 | 19.4 | FP-1-27-G- | 1-GSVT-64 A | 7.6 | 14.8 | 11.5 |
| | 5.35 | 22.0 | FP-1-27-G- | 1-GSVT-65 A | 10.0 | 16.9 | 14.8 |
| | 6.24 | 25.7 | FP-1-27-G- | 1-GNSVT-64 A | 10.4 | 2.2 | 11.5 |
| | 6.60 | 27.0 | FP-1-35-G- | 1-GSVT-64 A | 11.1 | 14.8 | 6.8 |
| | 6.70 | 27.8 | FP-1-27-G- | 1-GSVT-63 A | 15.4 | 20.8 | 23.7 |
| | 7.50 | 31.0 | FP-1-35-G- | 1-GSVT-65 A | 14.3 | 16.9 | 8.9 |
| | 8.70 | 36.0 | FP-1-35-G- | 1-GNSVT-64 A | 16.6 | 2.2 | 6.8 |
| | 9.40 | 39.0 | FP-1-35-G- | 1-GSVT-63 A | 24.0 | 20.8 | 13.9 |
| | 10.0 | 41.0 | FP-1-35-G- | 1-GNSVT-65 A | 21.4 | 2.5 | 8.9 |
| | 12.4 | 51.0 | FP-1-35-G- | 1-GNSVT-63 A | 34.0 | 2.9 | 13.9 |
| | 13.2 * | 54.4 * | FP-1-50-G-9 | 1-GSVT-65 A | 115.0 | 16.9 | 7.5 |
| | 14.3 * | 59.0 * | FP-1-50-G-9 | 1-GNSVT-64 A | 135.0 | 2.2 | 5.7 |
| | 16.6 * | 68.5 * | FP-1-50-G-9 | 1-GNSVT-65 A | 180.0 | 2.5 | 7.5 |
| | 19.3 * | 79.5 * | FP-1-50-G-9 | 1-GSVT-66 A | 260.0 | 8.5 | 11.3 |
| | 21.6 * | 89.0 * | FP-1-50-G-9 | 1-GNSVT-66 A | 325.0 | 1.5 | 11.3 |
| | 1-1/2" | 13.4 | 55.0 | FP-1-1/2-27-G- | 1-1/2-GSVT-84 A | 8.8 | 27.6 |
| 16.0 | | 66.0 | FP-1-1/2-27-G- | 1-1/2-GSVT-83A | 12.4 | 33.0 | 22.0 |
| 17.6 | | 72.0 | FP-1-1/2-27-G- | 1-1/2-GNSVT-84 A | 10.4 | 4.2 | 15.4 |
| 21.2 | | 87.0 | FP-1-1/2-27-G- | 1-1/2-GNSVT-83 A | 14.6 | 4.9 | 22.0 |
| 2" | 26.5 | 110.0 | FP-2-27-G- | 2-GSVT-94 A | 12.4 | 40.5 | 16.4 |
| | 31.0 | 128.0 | FP-2-27-G- | 2-GSVT-93 A | 18.7 | 49.0 | 24.0 |
| | 35.0 | 144.0 | FP-2-27-G- | 2-GSVT-96 | 19.8 | 18.5 | 21.2 |
| | 42.5 | 174.0 | FP-2-27-G- | 2-GNSVT-93 A | 24.4 | 7.3 | 24.0 |
| | 68.8 | 284.0 | FP-2-27-G- | 2-BL-953 | 114.0 | 5.4 | 64.3 |
| | 85.4 | 354.0 | FP-2-27-G- | 2-BL-950 | 148.0 | 6.7 | 99.2 |
| 3" | 57.0 | 236.0 | FP-3-20-G- | 3-GSVT-11-3 A | 20.9 | 83.0 | 15.5 |
| | 78.0 | 320.0 | FP-3-20-G- | 3-GNSVT-11-3 A | 26.6 | 12.6 | 15.5 |

| scc/min | scc/min Air | Tube | Float |
|---------|----------------|-----------------------------------|---------------------|
| 0.56 | 41.4 | FP-1/16-08-G-5 (08F-1/16-08-4) | 1/16-SA (SA-16) |
| 1.04 | 74.3 | FP-1/16-10-G-5 (08F-1/16-10-4) | 1/16-SA (SA-16) |
| 1.32 | 83.4 | FP-1/16-08-G-5 (08F-1/16-08-4) | 1/16-SS (SS-16) |
| 1.71 | 114 | FP-1/16-12-G-5 (08F-1/16-12-4) | 1/16-SA (SA-16) |
| 2.45 | 136 | FP-1/16-10-G-5 (08F-1/16-10-4) | 1/16-SS (SS-16)* |
| 2.94 | 161 * | FP-1/16-08-G-5 (08F-1/16-08-4) | 1/16-TA (TA-16) |
| 3.05 | 185 | FP-1/16-16-G-5 (08F-1/16-16-4) | 1/16-SA (SA-16) |
| 4.00 | 200 | FP-1/16-12-G-5 (08F-1/16-12-4) | 1/16-SS (SS-16) |
| 4.70 | 271 | FP-1/16-20-G-5 (08F-1/16-20-4) | 1/16-SA (SA-16) |
| 5.24 | 240 * | FP-1/16-10-G-5 (08F-1/16-10-4) | 1/16-TA (TA-16) |
| 6.81 | 293 | FP-1/16-16-G-5 (08F-1/16-16-4) | 1/16-SS (SS-16) |
| 8.02 | 330 * | FP-1/16-12-G-5 (08F-1/16-12-4) | 1/16-TA (TA-16) |
| 10.2 | 425 | FP-1/16-20-G-5 (08F-1/16-20-4) | 1/16-SS (SS-16) |
| 10.6 | 532 | FP-1/8-08-G-5 (02F-1/8-08-5) | 1/8-SA (SA-18) |
| 12.9 | 467 * | FP-1/16-16-G-5 (08F-1/16-16-4) | 1/16-TA (TA-16) |
| 18.9 | 671 * | FP-1/16-20-G-5 (08F-1/16-20-4) | 1/16-TA (TA-16) |
| 21.2 | 844 | FP-1/8-08-G-5 (02F-1/8-08-5) | 1/8-SS (SS-18) |
| 22.6 | 962 | FP-1/8-12-G-5 (02F-1/8-12-5) | 1/8-SA (SA-18) |
| 34.9 | 1410 | FP-1/8-16-G-5 (02F-1/8-16-5) | 1/8-SA (SA-18) |
| 37.0 | 1340 * | FP-1/8-08-G-5 (02F-1/8-08-5) | 1/8-TA (TA-18) |
| 40.1 | 1480 | FP-1/8-12-G-5 (02F-1/8-12-5) | 1/8-SS (SS-18) |
| 48.8 | 1910 | FP-1/8-20-G-5 (02F-1/8-20-5) | 1/8-SA (SA-18) |
| 60.0 | 2140 | FP-1/8-16-G-5 (02F-1/8-16-5) | 1/8-SS (SS-18) |
| 64.8 | 2490 | FP-1/8-25-G-5 (02F-1/8-25-5) | 1/8-SA (SA-18) |
| 66.5 | 2280 * | FP-1/8-12-G-5 (02F-1/8-12-5) | 1/8-TA (TA-18) |
| 88 | 3980 | FP-1/4-10-G-5 (2F-1/4-10-5) | 1/4-BG (BG-14) |
| 82.2 | 2860 | FP-1/8-20-G-5 (02F-1/8-20-5) | 1/8-SS (SS-18) |
| 97.6 | 3270 * | FP-1/8-16-G-5 (02F-1/8-16-5) | 1/8-TA (TA-18) |
| 108.0 | 3720 | FP-1/8-25-G-5 (02F-1/8-25-5) | 1/8-SS (SS-18) |
| 132 | 4330 * | FP-1/8-20-G-5 (02F-1/8-20-5) | 1/8-TA (TA-18) |
| 170 | 7500 | FP-1/4-16-G-5 (2F-1/4-16-5) | 1/4-BG (BG-14) |
| 172.0 | 5600 * | FP-1/8-25-G-5 (02F-1/8-25-5) | 1/8-TA (TA-18) |
| 230 | 9750 | FP-1/4-20-G-5 (2F-1/4-20-5) | 1/4-BG (BG-14) |
| 228 | 7980 | FP-1/4-10-G-5 (2F-1/4-10-5) | 1/4-SS (SS-14) |
| 304 | 12650 | FP-1/4-25-G-5 (2F-1/4-25-5) | 1/4-BG (BG-14) |
| 370 | 12,250 * | FP-1/4-10-G-5 (2F-1/4-10-5) | 1/4-TA (TA-14) |
| 414 | 14,000 | FP-1/4-16-G-5 (2F-1/4-16-5) | 1/4-SS (SS-14) |
| 549 | 18,400 | FP-1/4-20-G-5 (2F-1/4-20-5) | 1/4-SS (SS-14) |
| 660 | 21,250 * | FP-1/4-16-G-5 (2F01/4-16-5) | 1/4-TA (TA-14) |
| 709 | 23600 | FP-1/4-25-G-5 (2F-1/4-25-5) | 1/4-SS (SS-14) |

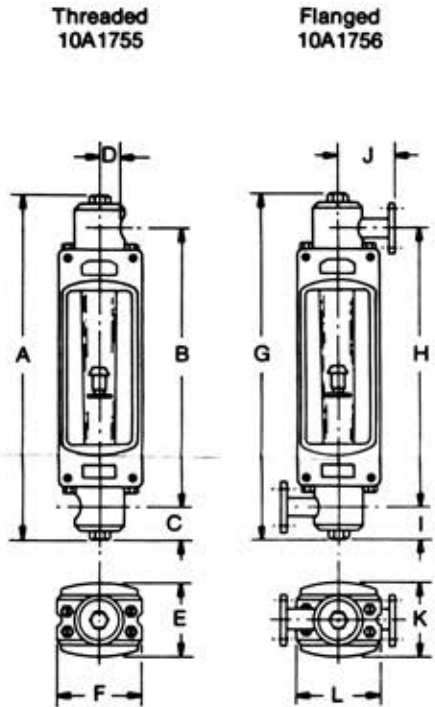
NOTES:

- Pressure drop is total pressure loss across the meter, at 100% flow rate, in inches of water column.
- Meter is unaffected by viscosity when the value of $\frac{cps}{\sqrt{\rho}}$ (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.
- 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.
- These capacities are available only in 10-inch scale meters.

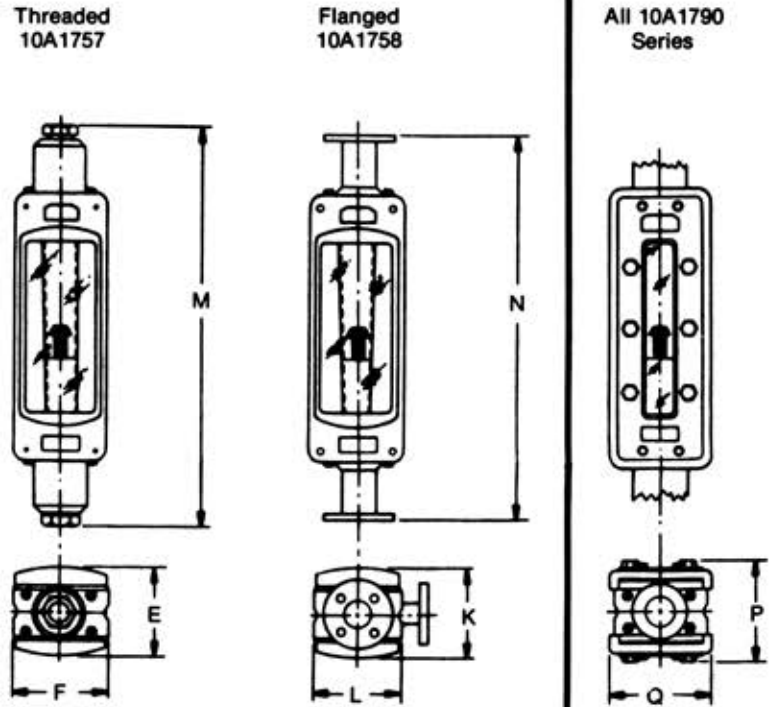
*Tantalum Ball Floats not to be used on gas service below 2 psig.

DIMENSIONS

HORIZONTAL CONNECTIONS



VERTICAL CONNECTIONS



THREADED

| TUBE SIZE | CONNECTION SIZE NPT SCREWED | NOMINAL SCALE LENGTH | A | | B | | C | | D | | E | | F | | M | | P | | Q | |
|--------------------|-----------------------------|----------------------|---------|-----|----------|-----|---------|----|-------|----|---------|-----|--------|-----|---------|-----|---------|-----|-------|------|
| | | | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM |
| 1/16 1/8 1/4 | 1/4 | 5 | 13-3/8 | 340 | 11-1/8 | 283 | 1-1/8 | 29 | 17/32 | 14 | 2-7/16 | 62 | 2-3/16 | 56 | 13-3/8 | 340 | 3-13/16 | 97 | 2-1/2 | 63.5 |
| 1/2 | 1/2 | 5 | 15-5/32 | 385 | 11-25/32 | 299 | 1-11/16 | 43 | 7/8 | 22 | 3-1/4 | 83 | 3-1/4 | 83 | 15-5/32 | 385 | 4-7/8 | 124 | 3-5/8 | 92.1 |
| | | 10 | 20 | 508 | 16-5/8 | 422 | 1-11/16 | 43 | 7/8 | 22 | 3-1/4 | 83 | 3-1/4 | 83 | 20 | 508 | 4-7/8 | 124 | 3-5/8 | 92.1 |
| 3/4 1 | 3/4 | 5 | 16-9/32 | 414 | 12-21/32 | 322 | 1-13/16 | 46 | 1-1/4 | 32 | 3-15/16 | 100 | 4 | 102 | 16-9/32 | 414 | 5-9/16 | 141 | 4-3/8 | 111 |
| | | 10 | 21-1/8 | 537 | 17-1/2 | 445 | 1-13/16 | 46 | 1-1/4 | 32 | 3-15/16 | 100 | 4 | 102 | 21-1/8 | 537 | 5-9/16 | 141 | 4-3/8 | 111 |
| 1-1/2 | 1-1/2 | 5 | 18-5/8 | 473 | 13-7/8 | 352 | 2-3/8 | 60 | 1-5/8 | 41 | 5 | 127 | 5-1/4 | 133 | 18-5/8 | 473 | 6-9/16 | 167 | 5-5/8 | 143 |
| | | 10 | 23-1/2 | 597 | 18-3/4 | 476 | 2-3/8 | 60 | 1-5/8 | 41 | 5 | 127 | 5-1/4 | 133 | 23-1/2 | 597 | 6-9/16 | 167 | 5-5/8 | 143 |
| 2 | 1-1/2 | 5 | 21-1/8 | 537 | 15-3/4 | 400 | 2-11/16 | 68 | 2 | 51 | 6-1/8 | 156 | 6-1/8 | 156 | 21-1/8 | 537 | 7-5/8 | 194 | 6-5/8 | 168 |
| | | 10 | 26 | 660 | 20-5/8 | 524 | 2-11/16 | 68 | 2 | 51 | 6-1/8 | 156 | 6-1/8 | 156 | 26 | 660 | 7-5/8 | 194 | 6-5/8 | 168 |

FLANGED

| TUBE SIZE | FLANGE SIZE | NOMINAL SCALE LENGTH | G | | H | | I | | J | | K | | L | | N | | P | | Q | |
|--------------------|------------------------|----------------------|----------|------|----------|-----|---------|-----|-------|-----|---------|-----|-------|-----|----------|-----|--------|-----|-------|------|
| | | | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM | IN | MM |
| 1/16 1/8 1/4 | 1/2 | 5 | 15-5/32 | 385 | 11-25/32 | 299 | 1-11/16 | 43 | 3-1/2 | 89 | 3-1/4 | 83 | 3-1/4 | 83 | 15-17/32 | 395 | 4-7/8 | 124 | 3-5/8 | 92.1 |
| 1/2 | 1/2 | 5 | 15-5/32 | 385 | 11-25/32 | 299 | 1-11/16 | 43 | 3-1/2 | 89 | 3-1/4 | 83 | 3-1/4 | 83 | 15-17/32 | 395 | 4-7/8 | 124 | 3-5/8 | 92.1 |
| | | 10 | 20 | 508 | 16-5/8 | 422 | 1-11/16 | 43 | 3-1/2 | 89 | 3-1/4 | 83 | 3-1/4 | 83 | 20-3/8 | 518 | 4-7/8 | 124 | 3-5/8 | 92.1 |
| 3/4 1 | 1 | 5 | 16-9/32 | 414 | 12-21/32 | 322 | 1-13/16 | 46 | 3-7/8 | 98 | 3-15/16 | 100 | 4 | 102 | 16-17/32 | 420 | 5-9/16 | 141 | 4-3/8 | 111 |
| | | 10 | 21-1/8 | 537 | 17-1/2 | 445 | 1-13/16 | 46 | 3-7/8 | 98 | 3-15/16 | 100 | 4 | 102 | 21-3/8 | 543 | 5-9/16 | 141 | 4-3/8 | 111 |
| 1-1/2 | 1-1/2 | 5 | 18-5/8 | 473 | 13-7/8 | 352 | 2-3/8 | 60 | 4-1/8 | 105 | 5 | 127 | 5-1/4 | 133 | 17-3/8 | 441 | 6-9/16 | 167 | 5-5/8 | 143 |
| | | 10 | 23-1/2 | 597 | 18-3/4 | 476 | 2-3/8 | 60 | 4-1/8 | 105 | 5 | 127 | 5-1/4 | 133 | 22-1/4 | 565 | 6-9/16 | 167 | 5-5/8 | 143 |
| 2 | 1-1/2 Horiz 2 Vert. | 5 | 21-1/8 | 537 | 15-3/4 | 400 | 2-11/16 | 68 | 4-3/8 | 111 | 6-1/8 | 156 | 6-1/8 | 156 | 18-7/8 | 479 | 7-5/8 | 194 | 6-5/8 | 168 |
| | | 10 | 26 | 660 | 20-5/8 | 524 | 2-11/16 | 68 | 4-3/8 | 111 | 6-1/8 | 156 | 6-1/8 | 156 | 23-3/4 | 603 | 7-5/8 | 194 | 6-5/8 | 168 |
| 3 | 3 | 5 | 36-27/32 | 936 | 26-13/32 | 671 | 5-1/32 | 128 | 4-3/4 | 121 | — | — | — | — | 22-13/32 | 544 | 8-5/16 | 211 | 8-1/4 | 210 |
| | | 10 | 41-11/16 | 1059 | 31-1/4 | 794 | 5-1/32 | 128 | 4-3/4 | 121 | — | — | — | — | 27-1/4 | 692 | 8-5/16 | 211 | 8-1/4 | 210 |

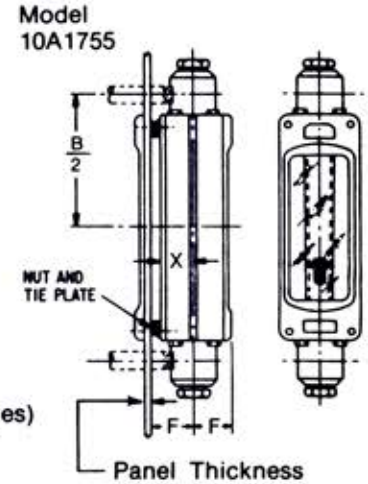
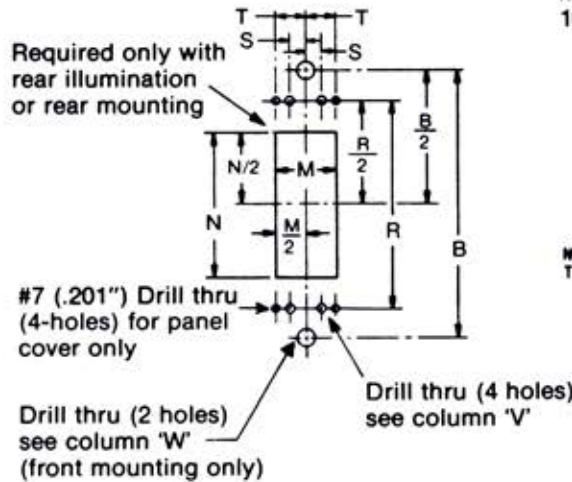
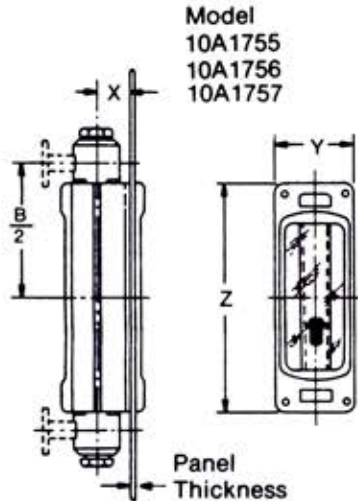
PANEL MOUNTING DIMENSIONS

REAR MOUNTING

Threaded connections face right, left, back. Flanged connections face back.

FRONT MOUNTING

Threaded connections only.



| TUBE SIZE | SIZE & TYPE CONNECTION | NOMINAL SCALE LENGTH | B | | F | | M | | N | | R | | S | | T | | V | | W | | X | | Y | | Z | |
|--------------------|--|----------------------|----------|-----|---------|----|---------|-----|--------|-----|----------|-----|---------|----|---------|----|------|----|-------|----|---------|----|---------|-----|----------|-----|
| | | | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm |
| 1/16", 1/8" & 1/4" | 1/4" Screwed | 5" | 11-1/8 | 283 | 1-3/16 | 26 | 1-15/16 | 49 | 6-1/2 | 165 | 9-1/8 | 232 | 13/32 | 10 | 3/4 | 19 | 9/32 | 7 | 5/8 | 16 | 7/8 | 22 | 2-3/16 | 56 | 9-15/16 | 252 |
| | 1/2" Flanged | 5" | 11-25/32 | 299 | 1-13/32 | 36 | 2-15/16 | 75 | 6-1/16 | 154 | 8-31/32 | 228 | 13/16 | 21 | 1-3/16 | 30 | 9/32 | 7 | 15/16 | 24 | 1-3/16 | 30 | 3-1/4 | 83 | 10 | 254 |
| 1/2" | 1/2" Screwed or 1/2" Flanged | 5" | 11-25/32 | 299 | 1-13/32 | 36 | 2-15/16 | 75 | 6-1/16 | 154 | 8-31/32 | 228 | 13/16 | 21 | 1-3/16 | 30 | 9/32 | 7 | 15/16 | 24 | 1-3/16 | 30 | 3-1/4 | 83 | 10 | 254 |
| | 1/2" Flanged or 3/4" Screwed or 1" Flanged | 10" | 16-5/8 | 422 | | | | | 10-7/8 | 276 | 13-13/16 | 351 | | | | | | | | | | | | | 14-13/16 | 376 |
| 3/4" & 1" | 3/4" Screwed or 1" Flanged | 5" | 12-21/32 | 322 | 1-23/32 | 44 | 3-9/16 | 91 | 6-1/16 | 154 | 9-19/32 | 244 | 1-1/32 | 26 | 1-7/16 | 37 | 9/32 | 7 | 1-1/8 | 29 | 1-1/2 | 38 | 3-15/16 | 100 | 15-1/2 | 394 |
| | 1-1/2" Screwed or 1-1/2" Flanged | 10" | 17-1/2 | 445 | | | | | 10-7/8 | 276 | 14-7/16 | 367 | | | | | | | | | | | | | 15-1/2 | 394 |
| 1-1/2" | 1-1/2" Screwed or 1-1/2" Flanged | 5" | 13-7/8 | 352 | 2-7/32 | 56 | 4-11/16 | 119 | 6-1/16 | 154 | 9-7/8 | 251 | 1-1/2 | 38 | 2-1/32 | 52 | 7/16 | 11 | 2 | 51 | 1-15/16 | 49 | 5-3/16 | 132 | 11-1/16 | 281 |
| | 1-1/2" Flanged | 10" | 18-3/4 | 476 | | | | | 10-7/8 | 276 | 14-23/32 | 374 | | | | | | | | | | | | | 15-15/16 | 405 |
| 2" | 1-1/2" Screwed or 1-1/2" Flanged | 5" | 15-3/4 | 400 | 2-21/32 | 68 | 5-5/8 | 143 | 6-1/16 | 154 | 10-13/16 | 275 | 1-25/32 | 45 | 2-13/32 | 61 | 7/16 | 11 | 2 | 51 | 2-3/8 | 60 | 6-1/16 | 154 | 12-3/16 | 310 |
| | 1-1/2" Flanged | 10" | 20-5/8 | 524 | | | | | 10-7/8 | 276 | 15-21/32 | 398 | | | | | | | | | | | | | 17 | 432 |

ORDERING INFORMATION

- Model number
- Meter size
- Tube design
- Materials of construction
- Type of scale
- Accuracy desired
- Accessories
- Operating conditions
 - Fluid measured
 - Maximum flow rate
 - Fluid density and viscosity
 - Allowable pressure drop
 - Operating and maximum temperature and pressure

The meter end fittings shall be fully rotatable through 360° for ease of installation. All external metal parts to be of 300 series stainless steel. The meter is to be equipped with a shield to contain glass in event of accidental tube rupture at any pressure up to the recommended test pressure.

The meter shall have (material) end fittings (material) metering float. The meter shall be sized for a flow range of (specify flow range and units) of (specify fluid) metered at (specify metering temperature, pressure, fluid operating density and viscosity). Maximum temperature and pressure shall be (specify).

EQUIPMENT DESCRIPTION

The flowmeter shall be of the variable-area type with borosilicate glass meter tubing and (material) pack-

To complete the EQUIPMENT DESCRIPTION of a specific unit, include data outlined under ORDERING INFORMATION.

Note: Specifications are subject to change without notice.