

# LOW FLOW FLOWRATOR

SPECIFICATION  
10A1300\*

File:  
Section  
10A1

## 10A1300 Series

The Fischer & Porter 10A1300 Series Low Flow Flowrator<sup>®</sup> flowmeters accurately measure the flow rate of liquids, gases, or vapors within a range of maximum flows from 0.5 to 2000 ccm of water or 38 to 59,000 sccm of air. These variable-area meters use heavy wall glass tubes and feature fine control needle valves. Models are available in four different styles, each with 1-1/2", 3" or 6-3/4" scale length tubes. Three of the styles are suitable for in-line mounting or front (surface) panel mounting. The fourth style is designed for rear (flush) panel mounting.

Individual meters are available in combination with constant differential regulators. Several flowmeters (from 2 to 8) can be mounted in a single panel to provide multiple tube mounting. Individual or manifold connections are available with the multiple tube panel.

### DESIGN FEATURES

- Repeatable measurement to 1/4% of range with Tri-Flat<sup>™</sup> tubes.
- Interchangeable tubes and needle valves – fewer parts to stock.
- Tube is easily removed from front of meter for cleaning or range change.
- Corrosion-resistant materials include Hastelloy C<sup>1</sup>, 316 Stainless Steel and Teflon<sup>2</sup>.

### ENGINEERING SPECIFICATIONS

**MAXIMUM FLOW RANGE:** 0.5 to 2000 ccm of water or 38 to 59,000 sccm of air.

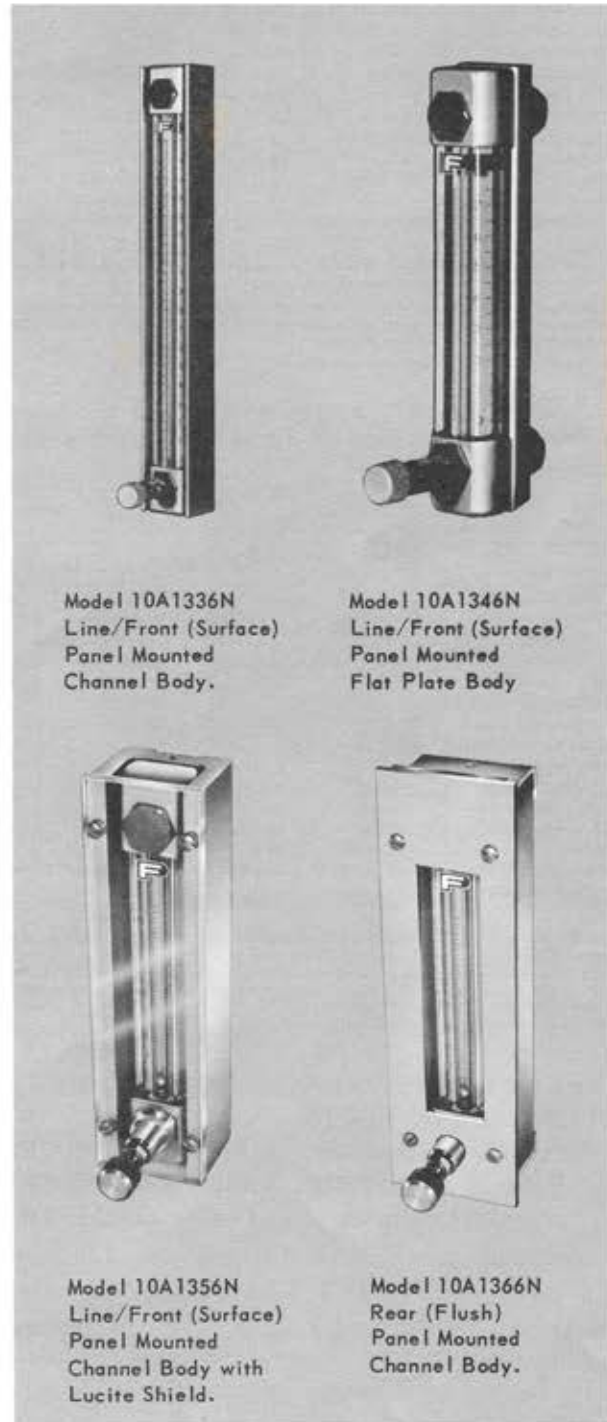
### PERFORMANCE

#### Accuracy

Uncalibrated: 1-1/2-inch scale, ±10% maximum scale reading; 3 and 6-3/4-inch scale, ±5% maximum scale reading.

Calibrated: 3-inch scale, ±3% maximum scale reading; 6-3/4-inch scale, ±2% maximum scale reading.

Capacities: See Tables I, II, III, & IV.



Model 10A1336N  
Line/Front (Surface)  
Panel Mounted  
Channel Body.

Model 10A1346N  
Line/Front (Surface)  
Panel Mounted  
Flat Plate Body

Model 10A1356N  
Line/Front (Surface)  
Panel Mounted  
Channel Body with  
Lucite Shield.

Model 10A1366N  
Rear (Flush)  
Panel Mounted  
Channel Body.

1. Union Carbide and Carbon Corporation
2. E.I. Dupont de Nemours & Company, Inc.

\*Supersedes Specification 10A1300, issue of October 1966. Asterisk in body of specification designates specific revisions.

FISCHER & PORTER

Complete Process Instrumentation



**Table I—Capacities of 1-1/2-inch scale Low Flow Flowrator**

| Tube Number          | Maximum and Minimum Flow Capacities                |  |   |  |
|----------------------|--|--|---|--|
|                      | Cubic Centimeters per Minute of Water <sup>1</sup> | Gallons per Hour of Water <sup>1</sup> | Cubic Centimeters per Minute of Air <sup>2</sup> (at std. temp. & press.) | Cubic Feet per Hour of Air <sup>2</sup> (at std. temp. & press.) |
| FP-1/16-10-P-1-1/2   | 1.8 to .1 <sup>3</sup>                             | .029 to .002 <sup>3</sup>              | 38 to 2 <sup>3</sup>  | .075 to .008 <sup>3</sup>  |
| FP-1/16-13-P-1-1/2   | 4.6 to .2 <sup>3</sup>                             | .072 to .007 <sup>3</sup>              | 80 to 5 <sup>3</sup>  | .17 to .01 <sup>3</sup>  |
| FP-1/16-19-5-P-1-1/2 | 9.5 to .5 <sup>3</sup>                             | .15 to .010 <sup>3</sup>               | 180 to 10 <sup>3</sup>  | .38 to .02 <sup>3</sup>  |
| FP-1/8-09-P-1-1/2    | 22 to 2  | .35 to .03                             | 420 to 40   | .90 to .08   |
| FP-1/8-14-P-1-1/2    | 50 to 2  | .78 to .04                             | 900 to 50   | 1.9 to .10   |
| FP-1/8-23-5-P-1-1/2  | 115 to 5   | 1.8 to .08                             | 2000 to 100   | 4.2 to .20   |
| FP-1/4-09-P-1-1/2    | 190 to 10  | 3.0 to .16                             | 3400 to 200   | 7.2 to .42   |
| FP-1/4-15-5-P-1-1/2  | 400 to 20  | 6.3 to .3                              | 7000 to 500   | 15 to 1.0  |
| FP-1/4-23-P-1-1/2    | 650 to 50  | 10 to .8                               | 12,500 to 1000  | 26 to 2.0  |
| FP-1/4-37-P-1-1/2    | 1300 to 100 <sup>3</sup>                           | 20 to 1.5 <sup>3</sup>                 | 22,000 to 2000 <sup>3</sup>   | 46 to 4.2 <sup>3</sup>   |
| FP-1/4-37-P-1-1/2    | 1900 to 200 <sup>3</sup>                           | 30 to 3.0 <sup>3</sup>                 | 42,000 to 4000 <sup>3</sup>   | 89 to 8.5 <sup>3</sup>   |
| FP-1/4-37-P-1-1/2    | -----  | -----                                  | 58,000 to 6000 <sup>3</sup>   | 125 to 12.5 <sup>3</sup>   |

**Notes:**

1. Water flows in cc/min. are based on use of 316 stainless steel ball floats except for a flow of 1900 to 150 cc/min. for which a Carboloy† float is used.
2. Air flows in cc/min. are based on use of black glass ball float except for a flow of 42,000 to 4000 cc/min. which is based on use of 316 stainless steel float and a flow of 58,000 to 6000 cc/min. for which a Carboloy† float is used.
3. These capacities are not available with regulator.

**Table II—Capacities of 3 and 6-3/4-inch scale Low Flow Flowrator**

| Tube Number (suffix nos. 3 or 6-3/4 are nominal scale lengths) | Maximum and Minimum Flow Capacities                |  |   |  |
|--|--|--|---|--|
|  | Cubic Centimeters per Minute of Water <sup>1</sup> | Gallons per Hour of Water <sup>1</sup> | Cubic Centimeters per Minute of Air <sup>2</sup> (at std. temp. & press.) | Cubic Feet per Hour of Air <sup>2</sup> (at std. temp. & press.) |
| FP-1/16-10-G-3 or P-6-3/4                                      | 2.2 to 0.2 <sup>3</sup>                            | .034 to .003 <sup>3</sup>              | 42 to 3 <sup>3</sup>  | .086 to .006 <sup>3</sup>  |
| FP-1/16-13-G-3 or P-6-3/4                                      | 4.2 to 0.1 <sup>3</sup>                            | .068 to .002 <sup>3</sup>              | 84 to 2 <sup>3</sup>  | .17 to .004 <sup>3</sup>   |
| FP-1/16-19-5-G-3 or 6-3/4                                      | 9.8 to 0.4 <sup>3</sup>                            | .16 to .006 <sup>3</sup>               | 180 to 10 <sup>3</sup>  | .38 to .02 <sup>3</sup>  |
| FP-1/8-09-G-3 or 6-3/4   | 25 to 1.0  | .40 to .016                            | 450 to 20   | .96 to .04   |
| FP-1/8-14-G-3 or 6-3/4   | 50 to 2.0  | .80 to .04                             | 900 to 40   | 1.9 to .08   |
| FP-1/8-23-5-G-3 or 6-3/4                                       | 98 to 4.0  | 1.5 to .06                             | 1700 to 100   | 3.6 to 0.2   |
| FP-1/4-09-G-3 or 6-3/4   | 190 to 10  | 3 to .16                               | 3500 to 200   | 7.4 to 0.4   |
| FP-1/4-15-5-G-3 or 6-3/4                                       | 390 to 30  | 6 to .5                                | 6800 to 600   | 14 to 1.3  |
| FP-1/4-23-G-3 or 6-3/4   | 640 to 80  | 10 to 1.3                              | 11,000 to 1400  | 23 to 2.9  |
| FP-1/4-37-G-3 or 6-3/4   | 1260 to 100 <sup>3</sup>                           | 20 to 1.6 <sup>3</sup>                 | 22,000 to 2000 <sup>3</sup>   | 46 to 4.2 <sup>3</sup>   |
| FP-1/4-37-G-3 or 6-3/4   | 1900 to 150 <sup>3</sup>                           | 30 to 2.4 <sup>3</sup>                 | 42,000 to 4000 <sup>3</sup>   | 89 to 8.5 <sup>3</sup>   |
| FP-1/4-37-G-3 or 6-3/4   | -----  | -----                                  | 59,000 to 5900 <sup>3</sup>   | 125 to 12.5 <sup>3</sup>   |

**Notes:**

1. Water flows in cc/min. are based on use of 316 stainless steel ball floats except for a flow of 1900 to 200 cc/min. for which a Carboloy† float is used.
2. Air flows in cc/min. are based on use of black glass ball float except for a flow of 42,000 to 4000 cc/min. which is based on use of 316 stainless steel float and a flow of 59,000 to 5900 cc/min. for which a Carboloy† float is used.
3. These capacities are not available with regulator.

**OPERATIONAL LIMITS**

Maximum temperature: Teflon seals, 200 F; Buna N seal, 250 F; Viton<sup>2</sup> seals, 400 F; polyvinyl chloride (PVC) valve seat, 150 F.

Maximum pressure: 1/16-inch and 1/8-inch tubes, 350 psig; 1/4-inch tube, 200 psig.

SCALES: Standard—1-1/2, 3 or 6-3/4 inches long graduated in sccm (air) or ccm (water)—for Tables I & II ranges only, or mm; optional—direct reading scales for other fluids or flow units and all capacities shown in Tables I, II, III & IV.

1-1/2-inch scale length is also available in percentage (10-100%), GPH (water), or SCFH (air @ S.T.P.) for Table I capacities listed in bold type.

**Table III—Capacities of 1-1/2-inch scale Low Flow Flowrator (for application where stainless steel floats are unacceptable)**

| Tube Number          | Maximum and Minimum Flow Capacities <sup>1</sup>   |                            |
|----------------------|--|----------------------------|
|                      | Cubic Centimeters per Minute of Water <sup>1</sup> | Gallons per Hour of Water  |
| FP-1/16-10-P-1-1/2   | .50 to .05 <sup>3</sup>                            | .008 to .0008 <sup>3</sup> |
| FP-1/16-13-P-1-1/2   | 1.0 to .1 <sup>3</sup>                             | .015 to .002 <sup>3</sup>  |
| FP-1/16-19-5-P-1-1/2 | 2.2 to .12 <sup>3</sup>                            | .032 to .002 <sup>3</sup>  |
| FP-1/8-09-P-1-1/2    | 6.6 to .6 <sup>3</sup>                             | .10 to .006 <sup>3</sup>   |
| FP-1/8-14-P-1-1/2    | 16 to 1.4  | .25 to .02                 |
| FP-1/8-23-5-P-1-1/2  | 35 to 2  | .56 to .03                 |
| FP-1/4-09-P-1-1/2    | 68 to 4  | 1.0 to .06                 |
| FP-1/4-15-5-P-1-1/2  | 155 to 100   | 2.4 to .2                  |
| FP-1/4-23-P-1-1/2    | 270 to 40  | 4.3 to .35                 |
| FP-1/4-37-P-1-1/2    | 500 to 45  | 8.6 to .7                  |
| FP-1/4-37-P-1-1/2    | 1000 to 80 <sup>3</sup>                            | 15.6 to 1.5 <sup>3</sup>   |
| FP-1/4-37-P-1-1/2    | 2000 to 200 <sup>3</sup>                           | 31 to 3.1 <sup>3</sup>     |

**Notes:**

1. For air flow capacities, refer to Table I.
2. Water flows in cc/min. are based on use of black glass ball floats except for a flow of 1000 to 80 cc/min. and 2000 to 200 cc/min. for which a Tantalum float is used.
3. These capacities are not available with regulator.

**Table IV—Capacities of 3 and 6-3/4-inch scale Low Flow Flowrator (for applications where stainless steel floats are unacceptable)**

| Tube Number (suffix nos. 3 or 6-3/4 are nominal scale lengths) | Maximum and Minimum Water Flow Capacities <sup>1</sup> |                            |
|--|--|----------------------------|
|  | Cubic Centimeters per Minute of Water <sup>2</sup>     | Gallons per Hour of Water  |
| FP-1/16-10-G-3 or P-6-3/4                                      | .58 to .05 <sup>3</sup>                                | .009 to .0008 <sup>3</sup> |
| FP-1/16-13-G-3 or P-6-3/4                                      | 1.1 to .05 <sup>3</sup>                                | .017 to .001 <sup>3</sup>  |
| FP-1/16-19-5-G-3 or 6-3/4                                      | 2.4 to 0.1 <sup>3</sup>                                | .037 to .001 <sup>3</sup>  |
| FP-1/8-09-G-3 or 6-3/4   | 7.5 to 0.3 <sup>3</sup>                                | .12 to .005 <sup>3</sup>   |
| FP-1/8-14-G-3 or 6-3/4   | 18 to 0.8  | .28 to .02                 |
| FP-1/8-23-5-G-3 or 6-3/4                                       | 38 to 1.5  | .60 to .03                 |
| FP-1/4-09-G-3 or 6-3/4   | 72 to 4  | 1.1 to .045                |
| FP-1/4-15-5-G-3 or 6-3/4                                       | 160 to 1.2   | 2.5 to .2                  |
| FP-1/4-23-G-3 or 6-3/4   | 275 to 35  | 4.3 to .54                 |
| FP-1/4-37-G-3 or 6-3/4   | 550 to 45  | 8.6 to .7                  |
| FP-1/4-37-G-3 or 6-3/4   | 1000 to 80 <sup>3</sup>                                | 15.6 to 1.3 <sup>3</sup>   |
| FP-1/4-37-G-3 or 6-3/4   | 2000 to 200 <sup>3</sup>                               | 31 to 3.1 <sup>3</sup>     |

**Notes:**

1. For air flow capacities, refer to Table II.
2. Water flows in cc/min. are based on use of black glass ball floats except for a flow of 1000 to 80 cc/min. and 2000 to 200 cc/min. for which a Tantalum float is used.
3. These capacities are not available with regulator.

† T.M. General Electric Company

METERING TUBE SIZES: 1/16, 1/8, or 1/4-inch nominal internal diameter.

FLOAT AND TUBE TYPE: Ball-type float; Tri-Flat tube (3-inch and 6-3/4-inch scales), plain tapered tube (1-1.2-inch scale).

**MATERIALS OF CONSTRUCTION**

Tubes: Heavy wall glass

Body: Aluminum; Stainless steel is optionally available on only 10A1340 Series meter.

Float: Material determined by flow rate. Refer to capacity tables above.

End Fittings: Nickel-plated Brass, 316 Stainless Steel, or Hastelloy C.

### Needle valves

Meters with brass or stainless steel fittings are supplied with valves having 17-4pH Stainless Steel (similar to 304 SS) stem with coin silver seat.

Meters with stainless steel fittings are optionally available with 316 Stainless Steel valve stem with PVC seat.

Meters with Hastelloy C fittings are supplied with valves having Hastelloy C stem with PVC seat.

Seals: Buna N standard with brass fittings, Teflon optionally available; Viton standard with stainless steel fittings, Teflon optionally available; Teflon standard with Hastelloy C fittings.

Protection: Shield and flush mounting bezel – acrylic plastic.

### CONNECTIONS

#### Single Meter

Standard: 1/8-inch NPTI

Optional: 1/4-inch NPTI (no extra cost)

#### Multiple Meters

Individually connected: 1/8-inch NPTI

Manifold connected: 1/4-inch NPTI

UNIT WEIGHT: 1-1/2-inch scale, 0.5 pound; 3-inch scale, 0.6 pound; 6-3/4-inch scale, 1 pound.

## FLOWRATOR – REGULATOR COMBINATION



The combination of the F&P low flow Flowrator and a differential pressure regulator provides control of constant liquid flows with variable upstream or downstream pressures, or both, and control of constant gas mass flow rate with variable upstream and constant downstream pressure.

### ENGINEERING SPECIFICATIONS FOR REGULATOR

RANGE OF MAXIMUM FLOWS: 16-650 cc/min of water; 420-12,500 scc/min of air at S.T.P.

#### OPERATIONAL LIMITS

Maximum Temperature: 250F with Buna N diaphragm, 400F with Viton diaphragm

Maximum Pressure: 200 psig @ max. temp.

Maximum Differential Pressure: 100 psig

MATERIALS OF CONSTRUCTION: Brass with Buna N diaphragm; Stainless steel with Viton diaphragm.

CONNECTIONS: 1/4-inch NPTI

WEIGHT (Assembled with Flowrator): Approx. 3 pounds

## MULTIPLE METER PANEL



The 10A1030 Series Multiple Meter Panel is available with meters having any one of the three standard scale lengths, individual inlet or outlet needle valves, and manifold for inlet or outlet connections. It may be front (surface) panel mounted or equipped with support legs for bench top use.

### ENGINEERING SPECIFICATIONS FOR PANEL

#### MATERIALS OF CONSTRUCTION

Frame: Aluminum

Front Cover (optional): Glass or acrylic plastic

Manifold: Aluminum manifold is supplied for use with meters having brass fittings; stainless steel manifold is supplied for use with meters having stainless steel fittings.

Fittings: Nickel-plated brass or stainless steel

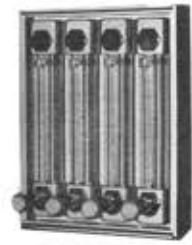
Valve Assemblies and Other Meter Parts: Same material as listed under individual flowmeter specifications.



10A1300  
Base Plate

### OPTIONS & ACCESSORIES

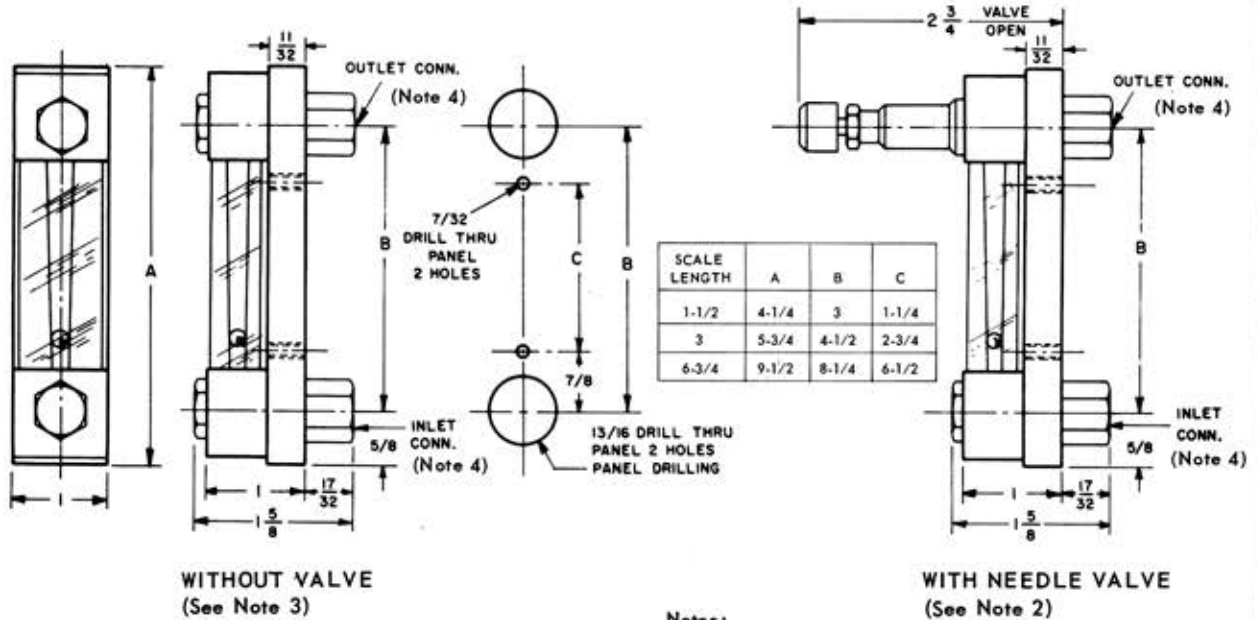
Teflon seals for maximum corrosion resistance.  
Differential pressure regulator (available only with single meters having brass or stainless steel fittings).  
Base plate for portable bench or table top use.  
Hose connectors for use with flexible hose.



10A1030  
Base Plate

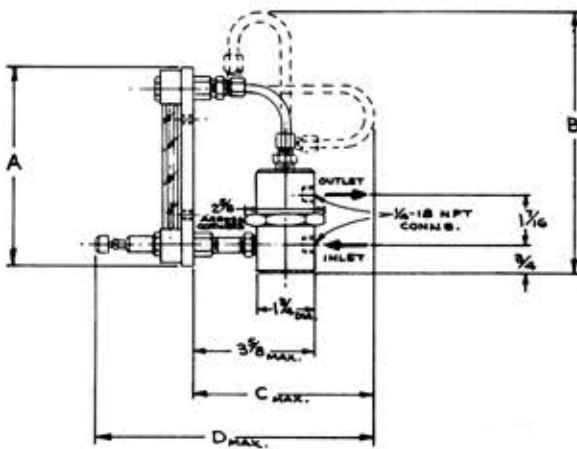
### DIMENSIONS

SERIES 10A1330 & 10A1340  
Line or Front (Surface) Panel Mounted



Notes:

1. All dimensions are in inches.
2. Needle valves can be supplied in either outlet connection (as shown) or in inlet connection.
3. Typical meter with flat back plate shown. Dimensions also apply to meters with channel body except width dimension is 1-3/8" instead of 1".
4. Dimensions shown are for 1/8" NPT connections. For 1/4" NPT, Hexagonal connector is 1/4" longer.

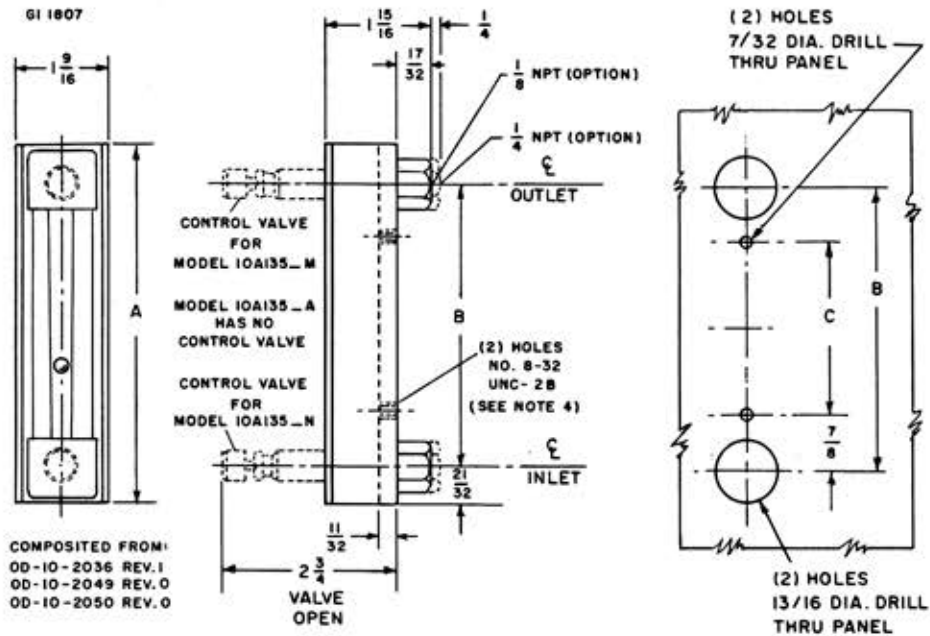


SERIES 10A1340  
Flowmeter With Regulator

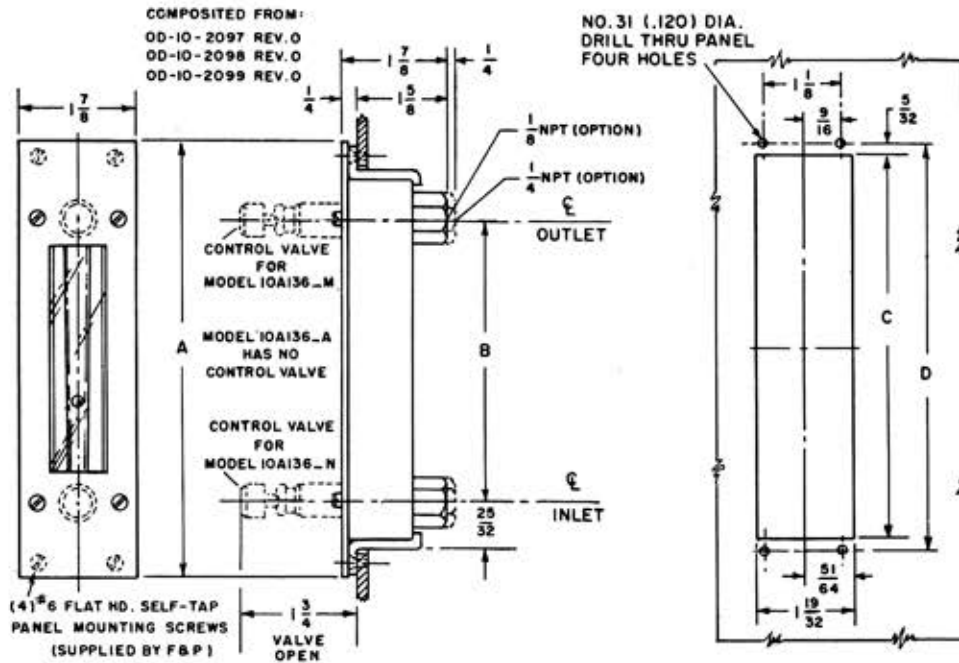
| SCALE LENGTH | A     | B     | C     | D |
|--------------|-------|-------|-------|---|
| 1-1/2        | 4-1/4 | 5-3/4 | -     | - |
| 3            | 5-3/4 | -     | 5-1/4 | 8 |
| 6-3/4        | 9-1/2 | -     | -     | - |

**DIMENSIONS (Continued)**

**SERIES 10A1350**  
Line Mounted Or Front (Surface) Mounted



**SERIES 10A1360**  
Rear (Flush) Mounted Only

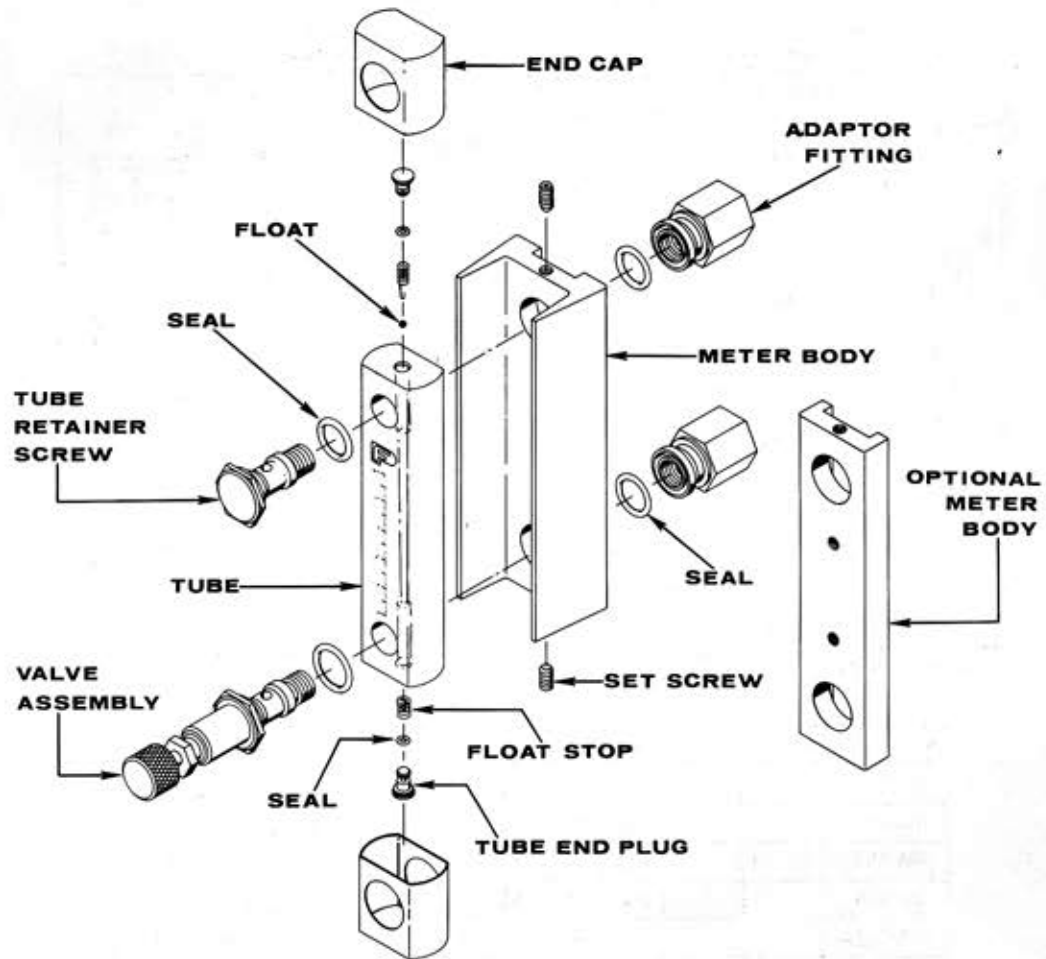
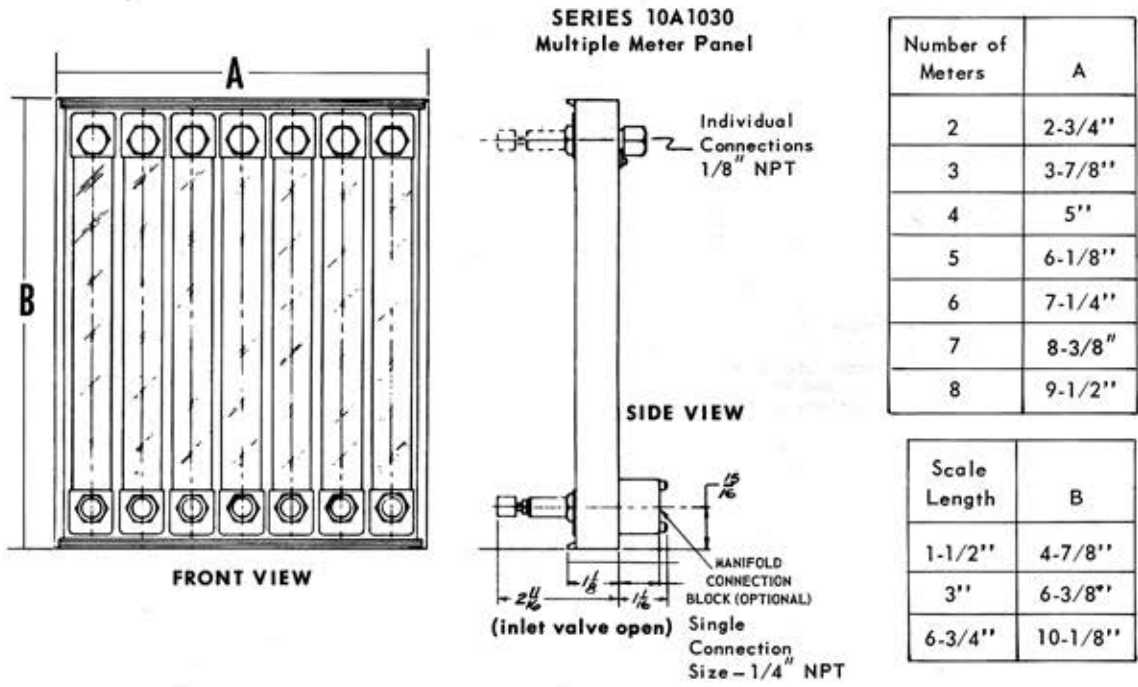


| MODEL NO. | SCALE LENGTH | A       | B     | C     | D       |
|-----------|--------------|---------|-------|-------|---------|
| 10A1355_  | 1 1/2        | 4 11/32 | 3     | 1 1/4 | —       |
| 10A1357_  | 3            | 5 27/32 | 4 1/2 | 2 3/4 | —       |
| 10A1359_  | 6 3/4        | 9 19/32 | 8 1/4 | 6 1/2 | —       |
| 10A1365_  | 1 1/2        | 5 1/2   | 3     | 4 5/8 | 4 15/16 |
| 10A1367_  | 3            | 7       | 4 1/2 | 6 1/8 | 6 7/16  |
| 10A1369_  | 6 3/4        | 10 3/4  | 8 1/4 | 9 7/8 | 10 3/16 |

**NOTES:**

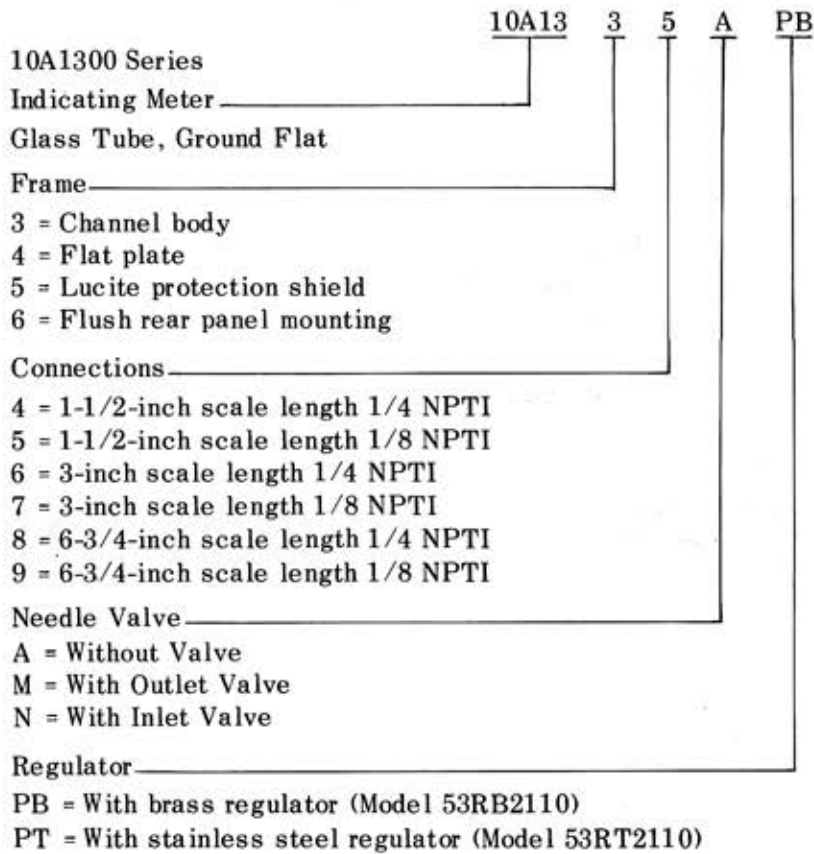
1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS GUARANTEED ONLY IF THIS PRINT IS CERTIFIED.
3. WHEN FACING SCALE:  
INLET - BACK  
OUTLET - BACK
4. SERIES 10A1350 ONLY - PANEL SCREWS MUST NOT PROTRUDE THRU BODY BY MORE THAN 1/32 INCH

**DIMENSIONS (continued)**

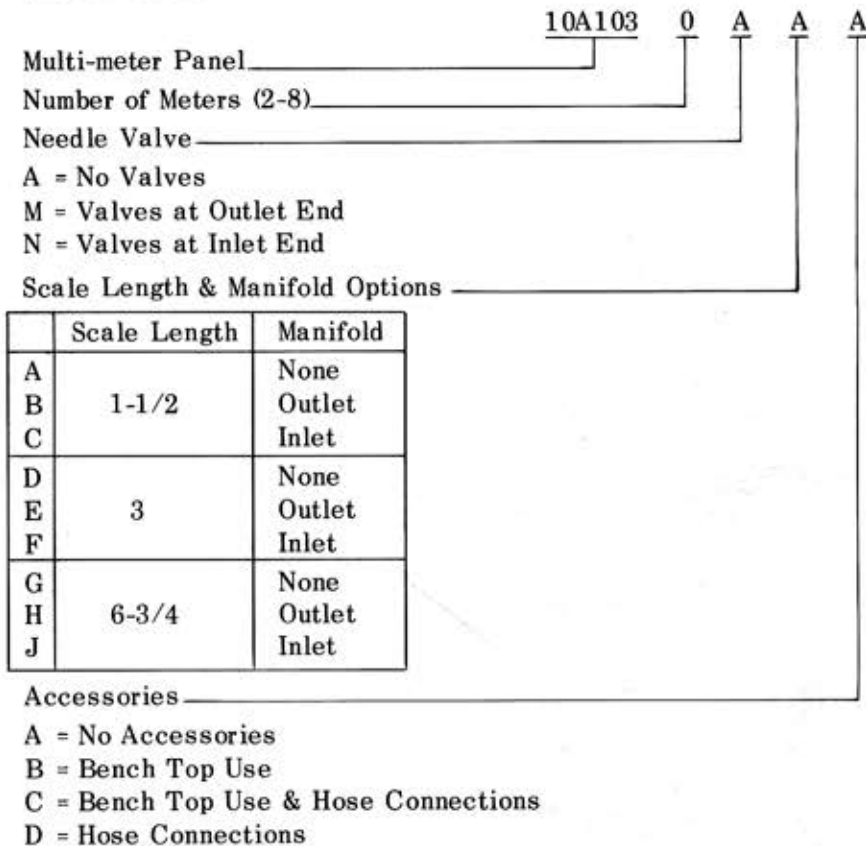


Exploded views of 10A1300 Series Flowrator shows method of assembly which lends itself to interchangeability of component parts.

MODEL DESIGNATION A – SINGLE METER



MODEL DESIGNATION B – MULTIPLE METER PANEL



## ORDERING INFORMATION

For Single Meters, specify:

- Model number (see Model Designation A)
- Scale graduations
- Capacity
- Materials of construction

For Multiple Mounted Meters, specify:

- Model number (see Model Designation B)
- Individual or manifold connections

Capacity of individual meters. If capacities vary, please indicate preferred mounting order by capacity, e.g. lowest to highest from left to right, etc.

For all meters, please specify fluid being measured - indicate temperature, pressure, density, and liquid viscosity.

## EQUIPMENT DESCRIPTION

The low flow flowmeter shall be of the variable area type with heavy wall glass metering tube and compression-type o-ring seals. Scale length shall be (1-1/2") (3") (6-3/4") and shall be sized for a flow range of (specify). The meter body shall be extruded aluminum and of the (channel body) (back plate) (rear panel) design. The flowmeter shall (not) be equipped with a fine control needle valve on the (inlet) (outlet) connection. The fittings shall be made of (specify) and connections will be (1/4") (1/8") NPTI facing the rear. The scale shall be engraved directly on the flat front surface of the metering tube and the rear flat surface will have white backing pigment permanently fired into the glass.

The low flow flowmeter shall be Fischer & Porter Series 10A1300 Flowrator.

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

