



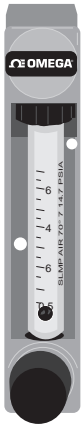
# FL-1900 Series

## Rotameters

Operator's Manual:



M0360/0201



### CAUTION

It is recommended that this publication be read in its entirety before performing any operation. Failure to understand and follow these instructions could result in serious personal injury and/or damage to the equipment

### WARNING

Glass metering tubes are designed for operation up to the maximum operating pressures and temperatures as specified herein. Due to the inherent brittle characteristic of glass and conditions beyond our control, tube breakage could result below specified operating conditions. Possible glass tube breakage represents a potential hazard to operating personnel; therefore, operator protection should be supplied where operating pressures may exceed 50 psig.. A safety shield constructed of 1/2 inch acrylic plastic may be used or the glass tube meter maybe replaced with an all metal (armored) meter.

## SECTION 1 INTRODUCTION

### 1.1 GENERAL DESCRIPTION

OMEGA® Series FL-1900 Rotameters provide an economical and efficient means of flow rate indication when accuracy is not critical. Typical applications include purging, seal oil systems, bearing lubrication, and cooling water flow indication.

Engineering design makes them especially suitable for use with corrosive liquids and gases, and installation in corrosive atmospheres.

The Series FL-1900 Rotameters are furnished with a control valve, but are available without the valve. Indicator body and supported frame are constructed from stainless steel. Sealing parts are manufactured from vinylidene fluoride resin (Kynar). O-ring seals are Viton-A. The meter is totally enclosed within a cover of high impact polycarbonate (Lexan).

### 1.2 SPECIFICATION

The following specifications apply to all models.

#### CAUTION

Do not use this meter in excess of the specified values

<b>PRESSURE RATINGS:</b>	200 psig maximum
<b>TEMPERATURE RATING:</b>	250° F maximum
<b>REPEATABILITY:</b>	± 0.5 % of full scale
<b>ACCURACY:</b>	Meter specified to have an accuracy of ± 10 % of maximum scale from 100 % to 10% of scale reading. Conforms to ISA R.P. 16.1, Specification 10-S-10
<b>DIMENSION:</b>	See Figure 1.1
<b>METERING TUBE:</b>	Borosilicate glass
<b>END FITTINGS:</b>	316SS
<b>WINDOW SHIELD:</b>	High Impact Plastic
<b>FLOAT STOPS:</b>	Teflon
<b>TUBE PACKING:</b>	Viton
<b>O - RINGS:</b>	Viton
<b>SCALE:</b>	65mm direct reading for air or water

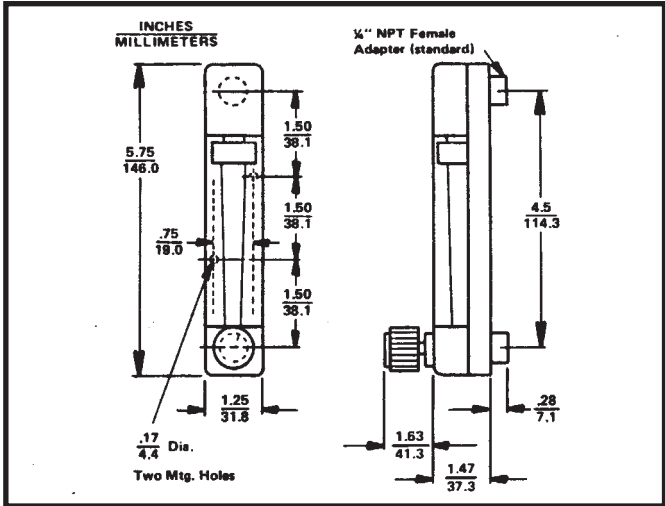


Figure 1.1 Dimension Diagram

## SECTION 2 INSTALLATION

### 2.1 RECEIPT OF EQUIPMENT

When the equipment is received, the outside packing cases should be checked for any damage incurred during shipment. If the packing case is damaged, the local carrier should be notified at once regarding his liability.

Remove the envelope containing the shipping list. Carefully remove the equipment from the packing case. Make sure spare or replacement parts are not discarded with the packing material. Inspect for damaged or missing parts.

### 2.2 RETURN SHIPMENT

Do not return any merchandise without an Authorized Return (AR) number. Call OMEGA Customer Service Department at (203) 359-1660.

## 2.3 FILTER INSTALLATION

It is recommended that a filter with a rating of two (2) microns be installed on the inlet side of the meter. This filter will reduce the amount of foreign matter that could impair operation of meter.

## 2.4 INSTALLATION OF METER

- a. Check the control valve is fully closed.
- b. Check the valve body is fully seated in meter frame. Finger tighten if necessary.
- c. Slowly tip meter back and forth and check that float has freedom to move.
- d. Remove dust covers from the inlet and outlet connections.
- e. Install inlet and outlet line connections. Inlet connection is at the zero end of the meter.

## 2.5 CONTROL VALVE REPOSITIONING PROCEDURE

The user may desire to change the control valve from the inlet side of the meter to the outlet side. If meter is installed in the line, make sure that flow is stopped to the meter. Failure to do this may result in a safety hazard.

- a. Disconnect inlet and outlet lines to meter.
- b. Remove metering tube and seal spindle. Refer to paragraph 4.3
- c. Remove check ball from inside seal spindle. Retain check ball for future use.
- d. Install seal spindle in meter body. Refer to paragraph 4.4
- e. Turn meter 180° from original position so control valve is now on outlet and seal spindle is on inlet.
- f. Install metering tube. Refer to paragraph 4.4
- g. Connect inlet and outlet lines to meter.

# SECTION 3 OPERATION

## 3.1 GENERAL

After the meter has been installed it is ready for operation. During operation make sure that meter temperature and pressure specifications are not exceeded, as stated in paragraph 1.2

When the valve stem knob is turned counterclockwise to the stop, the valve is fully open. Flow indication is measured using the center of the float as the reference point. A check valve is incorporated within the seal spindle. The check valve prevents reverse flow through the meter when upstream flow is stopped. When the control valve is installed on the outlet of the meter, the check valve is not included.

# SECTION 4 MAINTENANCE

## 4.1 GENERAL

No periodic maintenance, oiling, or cleaning is required for the meter or meter components when it is used in normal applications. It may be necessary to remove the metering tube and components for cleaning when various liquids have stained or left a deposit.

It is recommended that the meter and meter components be ultrasonically cleaned if possible. If ultrasonic cleaning is not available, use a suitable solvent. Tube and float may be cleaned with a pipe cleaner or similar accessory.

## 4.2 SERVICE INFORMATION

Should this equipment require repair or adjustment, contact **OMEGA ENGINEERING** Customer Service Department at (203) 359-1660.

It is important that servicing be performed only by trained and qualified service personnel. If this equipment is not properly serviced, serious personal injury and/or damage to the equipment could result.

## 4.3 DISASSEMBLY PROCEDURE (SEE FIGURE 5.1)

- a. Remove shield (8) by squeezing sides at top and bottom, and pulling forward.
- b. Hold metering tube (1), and rotate seal spindle (4) to the right until the stop is reached. Remove metering tube.
- c. Using tweezers, remove outlet float stop (2). Remove float from metering tube. Be careful not to drop float. Remove inlet float stop (2). If float is stuck in metering tube, a rod (wooden dowel or pipe cleaner preferred) may be inserted through the inlet end of the tube, and the float pushed through. Care must be taken not to score or scratch the tube.
- d. Depress seal spindle retainer tab. Rotate seal spindle (4) to the left until it is disengaged from the meter. Be careful not to drop the check ball (6) from inside the seal spindle. Remove check ball.
- e. Remove control valve (9) from meter body.

## 4.4 ASSEMBLY PROCEDURE (SEE FIGURE 5.1)

After the meter and the meter components have been cleaned or checked, the following assembly procedures should be followed. A separate assembly procedure for the control valve is given in paragraph 4.6

- a. Insert control valve body into meter frame and finger tighten to secure.
- b. Insert check ball (6) into seal spindle (4). Check for freedom of movement.
- c. Depress seal spindle retainer tab. Insert seal spindle (4) into end fitting, and turn to the right until fully seated. Release seal spindle retainer.
- d. Insert inlet float stop (2) through outlet end of metering tube. Using a rod (wooden dowel or pipe cleaner preferred) push inlet float stop through metering tube until it is approximately  $\frac{1}{16}$  to  $\frac{1}{32}$  inch from end of metering tube. (See Figure 4.2).
- e. Insert float into metering tube.
- f. Insert outlet float stop (2). Push float stop into metering tube, until it is seated approximately  $\frac{1}{16}$  to  $\frac{1}{32}$  inch from end of tubes. (See Figure 4.2).

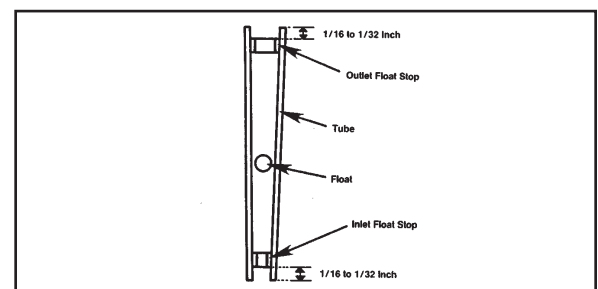


Figure 4.2 Float Stop Installation Diagram

- g. Check the tubular inserts protrude from packings approximately  $\frac{1}{32}$  inch. if not, use tweezers and reposition.
- h. Insert metering tube into meter frame.
- i. Center metering tube over the center of the packings.
- j. Rotate seal spindle to the left until a complete seal between the metering tube and the packings is accomplished.
- k. After the flowmeter has been re-assembled, it is important that it be hydrostatically tested at a liquid pressure rating of 300 psig at room temperature.

**CAUTION**

Hydrostatic testing should be performed only by trained and qualified personnel or serious damage could result.

**4.5 CONTROL VALVE DISASSEMBLY PROCEDURE**

When it is necessary to disassemble the control valve for cleaning or to check components, the following procedure should be followed. It is recommended that the control valve be ultrasonically cleaned. If ultrasonic cleaning is not available, use a suitable solvent.

- a. Before removing control valve, stop all flow to meter.
- b. Rotate valve stem knob to the left until valve is fully open.
- c. Rotate valve body to the left, and remove from meter frame.
- d. Make sure orifice and orifice o-ring are removed from meter body.
- e. Remove o-rings from valve.
- f. Turn knob clockwise as far as possible.
- g. Loosen set-screw in knob and remove knob.
- h. Continue turning valve stem in a clockwise direction to remove the stem from the bonnet.
- i. Remove orifice from stem.

**NOTE**

Do not remove the two small O-rings from valve stem.

**4.6 CONTROL VALVE ASSEMBLY PROCEDURE**

After the control valve components have been cleaned or checked, the following assembly procedures should be followed:

- a. It is recommended the valve stem threads be lubricated with a molybdenum disulfide type lubricant and all O-rings be lubricated with a silicone lubricant.
- b. Insert the valve stem into the bonnet and turn the stem counterclockwise (viewed from knob end) as far as possible.
- c. Install knob on stem and align set-screw with detent in stem. Tighten set-screw.
- d. Install the small orifice o-ring on orifice and insert orifice in end of bonnet. Place the orifice on a flat surface and gently apply downward pressure until the orifice is properly seated in the bonnet.
- e. Install large o-ring on the bonnet.

**SECTION 5 PARTS LIST**  
**5.1 RECOMMENDED SPARE AND REPLACEMENT PARTS**

When ordering parts be sure to specify the following: **SERIAL NUMBER**, complete equipment model number, part description and part number. Refer to Figure 5.1 for part reference.

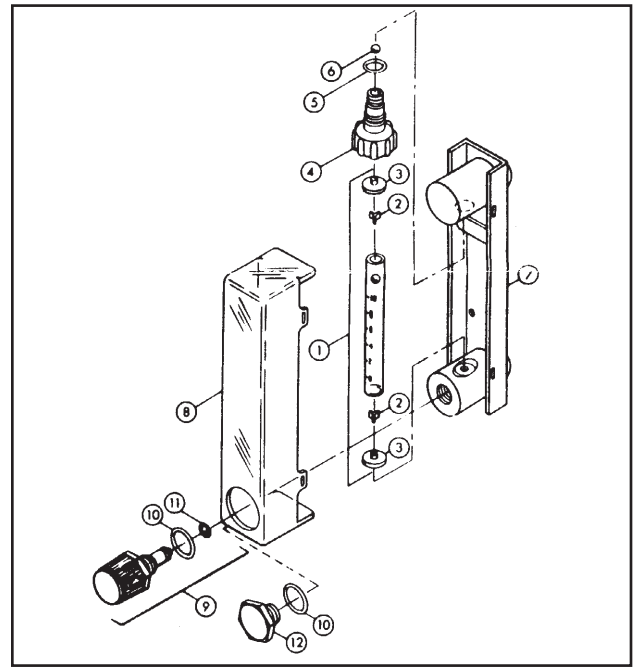


Figure 5.1 Exploded View, FL-1900

Model No.	Float	Range SCFH AIR*	Pressure Drop Inches Water**	Model No.	Float	Range GPH WATER*	Pressure Drop Inches Water**
FL-1901	Glass	0.2 - 1.2	1	FL-1951	Glass	0.01 - 0.14	1.8
FL-1902	Glass	0.2 - 2.0	2.2	FL-1952	316SS	0.05 - 0.5	4.0
FL-1903	316SS	0.5 - 5.0	10.8	FL-1953	316SS	0.1 - 1.0	19.5
FL-1904	Glass	0.5 - 6.0	12.4	FL-1954	Glass	0.05 - 0.7	22.3
FL-1905	316SS	1.0 - 10	10.1	FL-1955	316SS	0.10 - 1.6	18.3
FL-1906	Glass	1.2 - 12	10.4	FL-1956	Glass	0.2 - 2.0	18.7
FL-1907	316SS	2.0 - 18	25	FL-1957	316SS	0.5 - 4.0	45
FL-1908	Glass	5.0 - 45	60	FL-1958	Glass	1.0 - 9.0	109
FL-1909	316SS	10.0 - 80	214	FL-1959	316SS	2.0 - 17	385
FL-1910	Glass	5.0 - 55	73	FL-1960	Glass	1.0 - 11	132
FL-1911	316SS	10.0 - 90	292	FL-1961	316SS	2.0 - 20	525
FL-1912	Carboloy	12.0 - 120	400	FL-1962	Carboloy	3.0 - 30	890

\*Air Flow Given At 14.7 psia and 70° F

\*\*Pressure Drops Are Approximate

Item	Description	Part Number	Qty. Req'd	Material
1*	Tube Assembly, includes float, float stops and inlet & outlet packing	per S/N	1	
2	Float Stops (inlet & outlet)	per S/N	2	Teflon or Stn. Stl. Spring
3	Packing w/insert (inlet & outlet)	per S/N	2	Viton
4	Seal Spindle	B-817-A-045-MP-Q	1	Kynar
5*	O-Ring	F-375-B-011-QT-A	1	Viton
6	Check Ball	F-345-F-012-BM-A	1	316 Stn. Stl.
7	Meter Body Assembly	S-092-Z-482-BM-E	1	316 Stn. Stl.
8	Shield	C-794-A-053-PB-A	1	Polycarbonate
9	Valve Assembly Low Flow, Max. Cap. Air 0.5 cfm; Water 7.3 GPH Med. Flow, Max. Cap. Air 1.0 cfm; Water 14.6 GPH High Flow, Max. Cap. Air 1.7 cfm; Water 25.0 GPH	S-947-M-004-BM-A S-947-M-005-BM-A S-947-M-006-BM-A	1 1 1	Stn. Stl./Viton Stn. Stl./Viton Stn. Stl./Viton
10*	O-Ring	F-375-B-015-QT-A	1	Viton
11*	Orifice O-Ring	F-375-B-006-QT-A	1	Viton
12	Valve Plug (use w/o Valve)	A-618-J-019-BM-A	1	316 Stn. Stl.

\* Recommended Spare Parts

### RECOMMENDED INSTALLATION PRACTICES

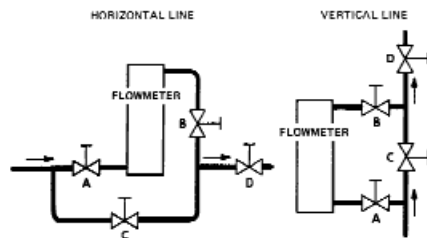
Water Hammer and surges can be damaging to any flowmeter and must *always* be avoided. Water hammer occurs when a liquid flow is suddenly stopped as with quick closing and solenoid operated valves. Surges occur when flow is suddenly begun, as when a pump is turned on at full power or a valve is quickly opened.

Liquid Surges are particularly damaging to flowmeters if the pipe is originally empty. To avoid damaging surges, fluid lines should remain full (if possible) and pumps should be brought up to power slowly and valves opened slowly. In addition, to both water hammer and surges, a surge chamber should be installed.

## WARNING

### FLOWMETER OPERATION

If the inlet and outlet valves adjacent to the flowmeter are to be closed for any reason, the flowmeter must be completely drained. Failure to do so may result in thermal expansion of the liquid which can cause rupture of the meter and possible personal injury.



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### WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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### RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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