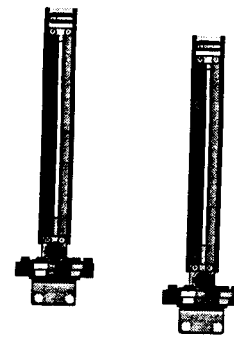




FL-1300 and FL-1400 Series Rotameters

Operator's Manual: M0377/0589



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.

DESCRIPTION

The OMEGA® FL-1300 and FL-1400 Rotameters are variable area, glass tube, flowrate indicating meters. The basic elements are a tapered glass metering tube and a metering float. Features include quick and simple removal or installation of the tube and float while the meter remains in the process piping. The rotameters are also supplied with an integral needle control valve and flow controller.

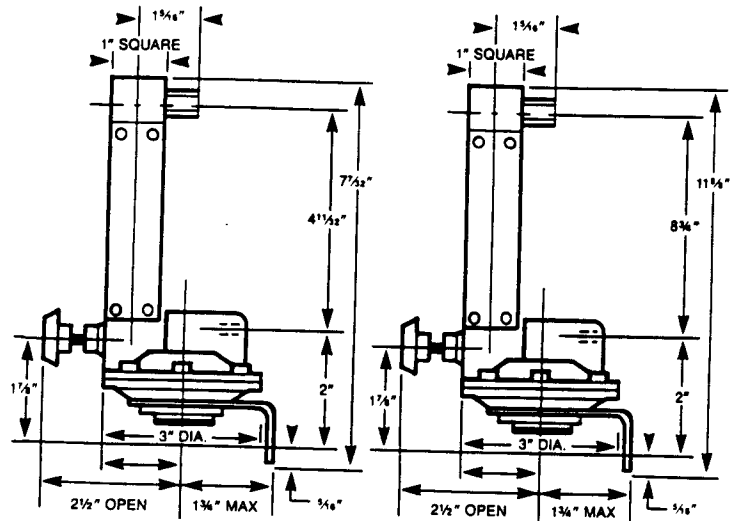
UNPACKING

Remove the Packing List and verify that you have received all equipment. If you have any questions about the shipment, please call the OMEGA Customer Service Department.

When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.



FL-1300 Series

FL-1400 Series

SPECIFICATIONS

SCALES

LENGTH: FL-1300: 65 mm
FL-1400: 150mm

DISPLAY: Direct reading for air or water

GRADUATION: FL-1300: 0-65mm scale with air or water calibration curve.
FL-1400: 0-150mm, with air or water calibration curve.

TYPE: Fused on tube with contrasting yellow background.

RATINGS

PRESSURE: 200 psig at temperatures up to 250°F

PERFORMANCE

REPEATABILITY: $\pm 1/2\%$ full scale

ACCURACY: FL-1300: $\pm 10\%$ full scale. Conforms to ISA R.P. 16.1, specifications 10-S-10.

FL-1400: $\pm 5\%$ full scale. Conforms to ISA Standard 5-S-10.

MATERIALS OF CONSTRUCTION

METERING TUBE: Borosilicate Glass

FLOAT: 316 Stainless Steel, Glass or Carboly

FLOAT STOPS: 316 Stainless Steel

END FITTINGS: 316 Stainless Steel, Chrome Plated Brass

SIDE PLATES: Black Anodized Aluminum

O-RINGS: Viton-A

TUBE PACKING: Viton-A (316SS fittings); Neoprene (Brass fittings)

INSTALLATION

The flowmeter should be mounted within 6° of true vertical. The inlet connection to the flowmeter is in the bottom end fitting. The connections are normally horizontal, female NPT. Be sure that the piping is adequately supported to prevent undue strain on the meter. Both end fittings of the flowmeter may be rotated in 90° increments. To rotate the end fittings simply remove the side plates and tube and rotate the end fitting to the desired location. When the meter is reassembled, the side plates and end fittings are self-aligning.

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 avoid both water hammer and surges, a surge chamber should be installed.

OPERATION

Caution: Do not operate this instrument in excess of specifications.

After the flowmeter has been installed in the flow system, it is ready for operation. A built-in needle control valve is provided to control the flow through flowmeter. This control valve is designed for fine control. Excessive tightening may damage the valve seat and limit its effectiveness as a control valve. If tight shut-off is required, it is recommended that a separate shut-off valve be installed in the line immediately before the flowmeter.

An integral flow controller is provided to control the rate of flow, although either the supply or upstream pressure may vary. Flow rate set point is established by adjusting the external valve handle. The valve acts as a variable orifice to provide a constant pressure across the high and low pressure chamber of the diaphragm. When the pressure drop changes due to a change in supply conditions, the diaphragm will change the operating point of an internal throttling valve to re-establish the constant pressure drop across the manual valve.

No routine maintenance procedures are required for the flow controller. Should the controller become inoperative, clean dry gas may be used in both forward and reverse flow directions to purge the internal passages. If satisfactory operation is not achieved, contact OMEGA Engineering Customer Service Department at (203) 359-1660.

DISASSEMBLY AND CLEANING

It is recommended the user periodically inspect the tube and float, and clean if necessary. Dirt or foreign materials adhering to the tube or float may cause inaccuracy and sticking of the float. The metering tube (Borosilicate glass) and related parts may be ultrasonically cleaned or cleaned with any solvent which does not attack glass. To disassemble, use the following procedures:

1. Remove the plastic safety shield.
2. Loosen the seal spindle or jack screw by turning it counterclockwise with a $\frac{5}{16}$ " hex wrench. The tube may now be canted out of the meter housing.
3. The tube, float, and float stops may be cleaned as an assembly or may be disassembled for cleaning. Using a small hook, remove either Teflon float stop from the metering tube and remove the float. Be careful not to chip the tube ends.
4. Packing seats and packing inserts now may be removed.
5. With the metering tube out, the seal spindle or jack screw may be rotated clockwise for removal. It should not be necessary to remove the seal spindle unless the 'O' Ring which seals the spindle requires replacement. The 'O' Ring may be used as long as it is not torn or distorted.
6. The needle control valve assembly may be removed by turning the valve body counterclockwise. The valve seat, stem and packing then may be removed easily from the valve body for cleaning or replacement.

REASSEMBLY PROCEDURE

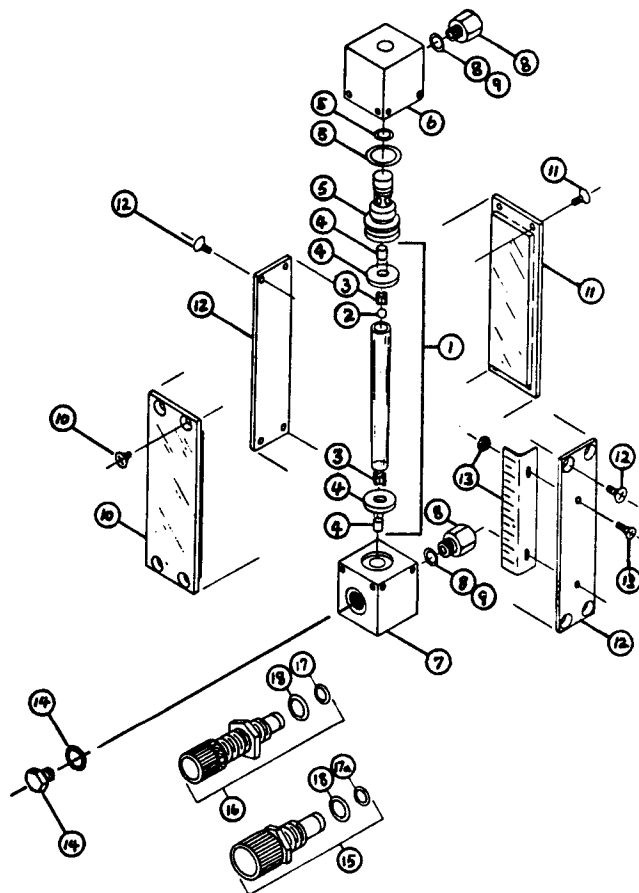
(Refer to applicable parts diagram.)

1. Use the reverse of steps 1 through 6 of the disassembly procedure to reassemble the meter.
2. When replacing the packing seats in the flowmeter body be sure the packing inserts are approximately $\frac{1}{16}$ " above the top of the packing seat. Also be certain the tube seats firmly on the packing seats and does not overlap onto the end block.
3. The seal spindle serves to radially compress the tube seat gasket and exert a uniform pressure on the metering tube to prevent any possibility of leakage. Do not overtighten the seal spindle.
4. After the flowmeter has been reassembled, it is important that it be hydrostatically tested at a liquid pressure of 300 psi at room temperature.

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

PARTS LIST

When ordering parts, please specify: Serial Number, flowmeter Model Number, Part Number if available, and if known, specify materials of construction.



Parts Drawing
Series FL-1300 and FL-1400

WARNING

Glass metering tubes are designed for operation up to the maximum operating pressures and temperatures as specified herein. Due to the inherent brittle characteristics 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 $\frac{1}{2}$ inch acrylic plastic may be used or the glass tube meter may be replaced with an all metal (armored) meter.

Parts List – FL-1300, FL-1400

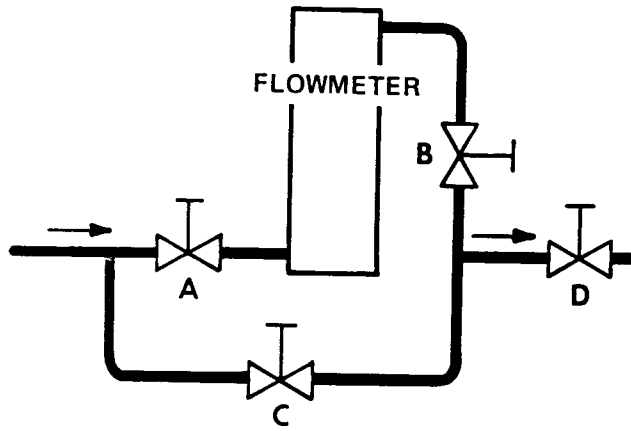
Item	Description	Part Number	Material	
1.	Metering Tube Assembly	Per S/N		
2.	Float	Per S/N		
3.	Inlet and Outlet Float Stops	Per S/N	Stainless Steel	
4.	Inlet and Outlet Packing w/Ring	Per S/N	Neoprene or Viton	
5.	Seal Spindle w/O-Rings (010, 011)	A-817-A-001	Aluminum/Buna, Brass/Buna	
6.	End Fitting (Outlet)	A-325-A-007	Stn. Stl./Viton, Stn. Stl./Kel-F	
7.	End Fitting (Inlet)	B-325-B-019	Brass or Stn. Stl.	
8.	Adapter w/O-Ring, 1/8" NPT (Std.)	B-014-C-008	Stn. Stl./Viton, Stn. Stl./Kel-F	
9.	Two Adapter O-Rings (009)	F-375-B-009	Buna or Viton	
10.	Front Window Shield w/screws			
	For Meters Without Flow Controller	A-794-B-004-NQ-A	Clear Plexiglas	
	For Meters With Flow Controller	B-794-B-005-NQ-A	Clear Plexiglas	
11.	Back Window Shield w/Screws			
	For Meters Without Flow Controller	A-615-B-027-NR-A	White Opaque Plexiglas	
	For Meters With Flow Controller	A-615-B-095-NR-A	White Opaque Plexiglas	
12.	Two Sideplates w/screws			
	Standard	A-614-B-037	Aluminum	
	For Detachable Scale	A-614-B-042	Aluminum	
	For Flo-Gard Alarm (mounted on left)	A-614-B-044	Aluminum	
	For Detachable Scale and Flo-Gard Alarm	A-614-B-047	Aluminum	
13.	Detachable Scale w/Screws and Nuts (Duplicate only)	Per S/N	Aluminum	
14.	Plug w/O-Ring	A-618-J-019	Aluminum/Buna, Brass/Buna	
			Stn. Stl./Viton, Stn. Stl./Kel-F	
15.	Standard Valve Assembly (Avail. on FL-1300, FL-1400)			
	Low Flow, Max. Cap. Air 5 l/min., Water .526 l/min	S-947-M-001-GG-A	Brass/Buna	
		S-947-M-004-BM-A	Stainless Steel/Viton	
		S-947-M-007-JS-A	Titanium/Viton	
	Medium Flow, Max. Cap. Air 14 l/min., Water 1.09 l/min.	S-947-M-002-GG-A	Brass/Buna	
		S-947-L-005-BM-A	Stainless Steel/Viton	
		S-947-M-008-BM-A	Stainless Steel/Kel-F	
		S-947-M-011-JS-A	Titanium/Viton	
	High Flow, Max. Cap. Air 28 l/min., Water 2.2 l/min.	S-947-M-003-GG-A	Brass/Buna	
		S-947-M-006-BM-A	Stainless Steel/Viton	
		S-947-L-009-BM-A	Stainless Steel/Kel-F	
		S-947-M-012-JS-A	Titanium/Viton	
	16.	NRS Valve Assembly (Optional only on FL-1400)		
Size 1, Max. Cap. Air 150 cc/min, Water 4 cc/min		S-947-L-001-GE-A	Brass/Buna	
		S-947-L-007-BM-A	Stainless Steel/Viton	
		S-947-L-013-BM-A	Stainless Steel/Kel-F	
Size 2, Max. Cap. Air 350 cc/min, Water 10 cc/min		S-947-L-002-GE-A	Brass/Buna	
		S-947-L-008-BM-A	Stainless Steel/Viton	
		S-947-L-014-BM-A	Stainless Steel/Kel-F	
Size 3, Max. Cap. Air 600 cc/min, Water 20 cc/min		S-947-L-003-GE-A	Brass/Buna	
		S-947-L-009-BM-A	Stainless Steel/Viton	
		S-947-L-015-BM-A	Stainless Steel/Kel-F	
Size 4, Max. Cap. Air 2400 cc/min, Water 80 cc/min		S-947-L-004-GE-A	Brass/Buna	
		S-947-L-010-BM-A	Stainless Steel/Viton	
		S-947-L-016-BM-A	Stainless Steel/Kel-F	
Size 5, Max. Cap. Air 6800 cc/min, Water 200 cc/min		S-947-L-005-GE-A	Brass/Buna	
		S-947-L-011-BM-A	Stainless Steel/Viton	
		S-947-L-011-BM-A	Stainless Steel/Kel-F	
Size 6, Max. Cap. Air 27,000 cc/min, Water 6500 cc/min		S-947-L-006-GE-A	Brass/Buna	
		S-947-L-012-BM-A	Stainless Steel/Viton	
		S-947-L-018-BM-A	Stainless Steel/Kel-F	
17.		Orifice O-Ring (NRS)	F-375-B-006-QT-A	Viton
			F-375-B-006-SU-A	Buna
	F-375-B-006-MN-A		Kel-F	
17a.	Orifice O-Ring (standard)	F-375-G-031-QT-A	Viton	
		F-375-G-031-SU-A	Buna	
		F-375-G-031-MN-A	Kel-F	
18.	Bonnet O-Ring	F-375-B-015-QT-A	Viton	
		F-375-B-015-SU-A	Buna	
		F-375-B-015-MN-A	Kel-F	

WARNING

FLOWMETER OPERATION

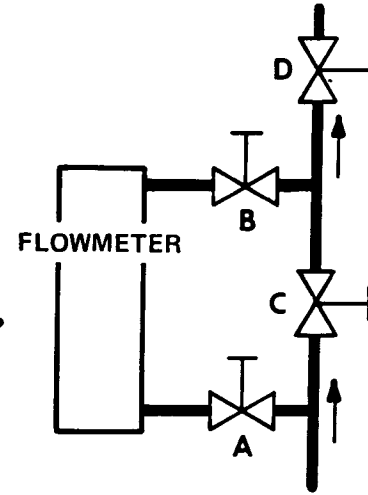
If the inlet and outlet valves adjacent to the flowmeter are to be closed for any reason, the flowmeter must be completely drained. Failure to do so may result in thermal expansion of the liquid which can cause rupture of the meter and possible personal injury.

HORIZONTAL LINE



A - Inlet Valve
B - Outlet Valve

VERTICAL LINE



C - Bypass Valve
D - Control Valve

TYPICAL INSTALLATIONS



WARRANTY/DISCLAIMER

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of **13 months** from date of purchase. OMEGA 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 should malfunction, 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. However, this WARRANTY is VOID, if the unit shows evidence of having been tampered with or shows evidence of being 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 or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. Nevertheless, OMEGA only warrants that the parts manufactured by it will be as specified and free of defects.

OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA ENGINEERING 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.

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

1. P.O. 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 OR **CALIBRATION**, consult OMEGA for current repair/calibration charges. Have the following information available BEFORE contacting OMEGA:

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

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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For immediate technical or application assistance:

USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGASM
Customer Service: 1-800-622-2378 / 1-800-622-BESTSM
Engineering Service: 1-800-872-9436 / 1-800-USA-WHENSM
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It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.