



**OMEGA**  
**ENGINEERING, INC.**  
*An OMEGA Technologies Company*



**FL9000-AC SERIES**  
**Flowmeters**



**Operator's Manual**



## FL9000-AC SERIES INSTALLATION

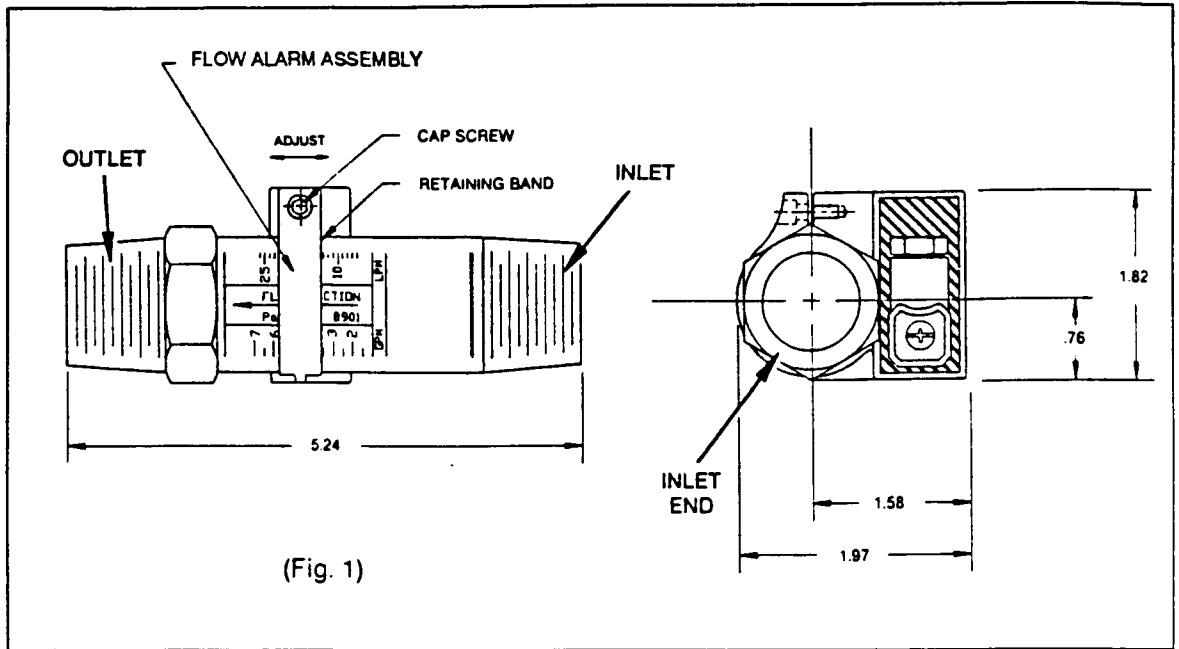
The OMEGA® FL9000-AC Flowmeter combines the rugged proven technology of a direct reading, piston-type, variable area flowmeter, with a hermetically sealed, solid state switching module. This combination aids the machine designer/troubleshooter by providing instantaneous flow-rate indication, coupled with the

electronic signal module, which automatically alerts the operator, or controller if an incorrect flow rate is detected.

Uses of this product include cooling water/Glycol indication and verification, lubrication oil indication and verification, pump testing, etc.

### IMPORTANT READ INSTRUCTIONS THOROUGHLY BEFORE INSTALLING FLOWMETER

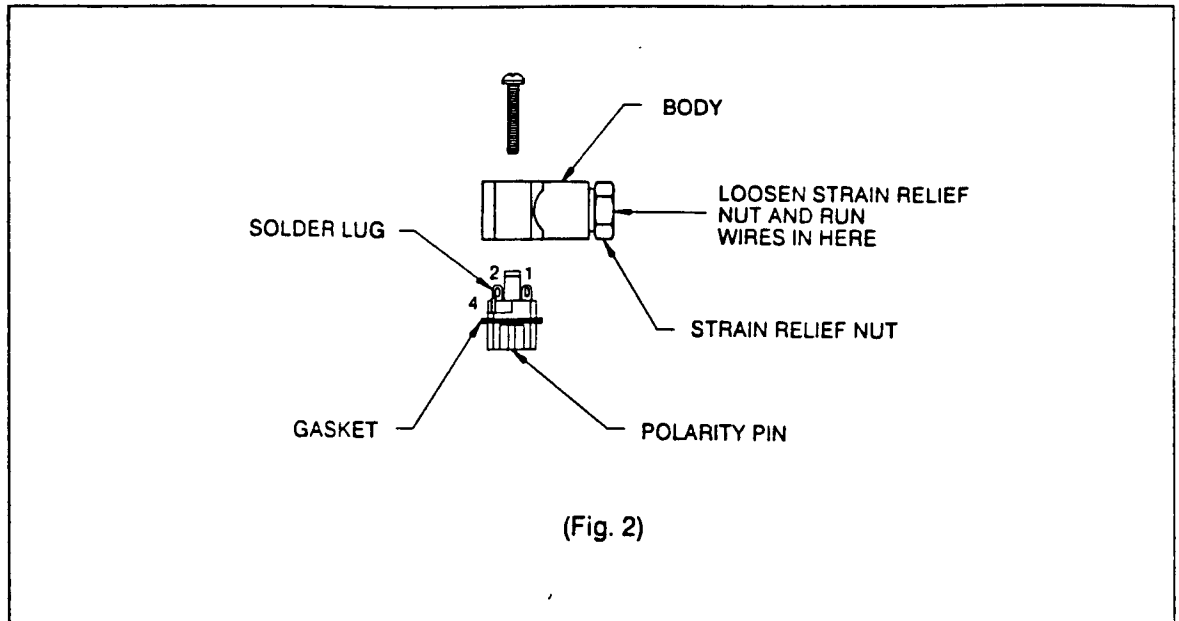
1. The FL9000-AC Flowmeter is made of polysulfone plastic. Polysulfone is a strong thermoplastic, and remains very stable to 210°F. However, some precautions must be observed to ensure proper performance.
  - a) The meter will melt, crack or distort if exposed to an open flame or excessive heat. Therefore, DO NOT sweatfit brass fittings into a system while mounted to the plastic flowmeter body.
  - b) Pipe dope MUST NOT CONTACT the plastic flowmeter body. Some pipe dope formulas will react adversely with Polysulfone. If a sealing material is necessary, use of Teflon tape is recommended.
  - c) Do not overtighten the threads on the plastic flowmeter body. Overtightening NPT pipe threads may cause fracturing of the plastic flowmeter body.
  - d) Piping on the inlet and outlet of the flowmeter must be aligned. Pay special attention to this when high temperature, high pressure, or a combination of both may be encountered.
- e) Check the compatibility of the fluid in the system with the materials used in the flowmeter.
2. The FL9000-AC DOES NOT require lengths of straight pipe at the inlet or outlet to stabilize the flow through the meter.
3. The FL9000-AC can be mounted in any plane of orientation. Its design allows the designer/installer to mount the flowmeter in horizontal piping, or vertical piping, without affecting meter accuracy.
4. The FL9000-AC will tolerate particles that will normally jam valves and other flow controls. If particulate will be encountered, a 200 mesh or 74 micron filter is recommended.
5. Notice the "Flow Direction" arrow located on the flowmeter scale. The FL9000-AC will act as a check valve to flow moving against the arrow.



(Fig. 1)

After the Flow Meter is installed, loosen the cap screw on the electronic alarm assembly (see Figure 1). Adjust the assembly so that the retaining band centers approximately at the desired flow alarm position. Then, retighten cap screw securely. The module turns "on" as

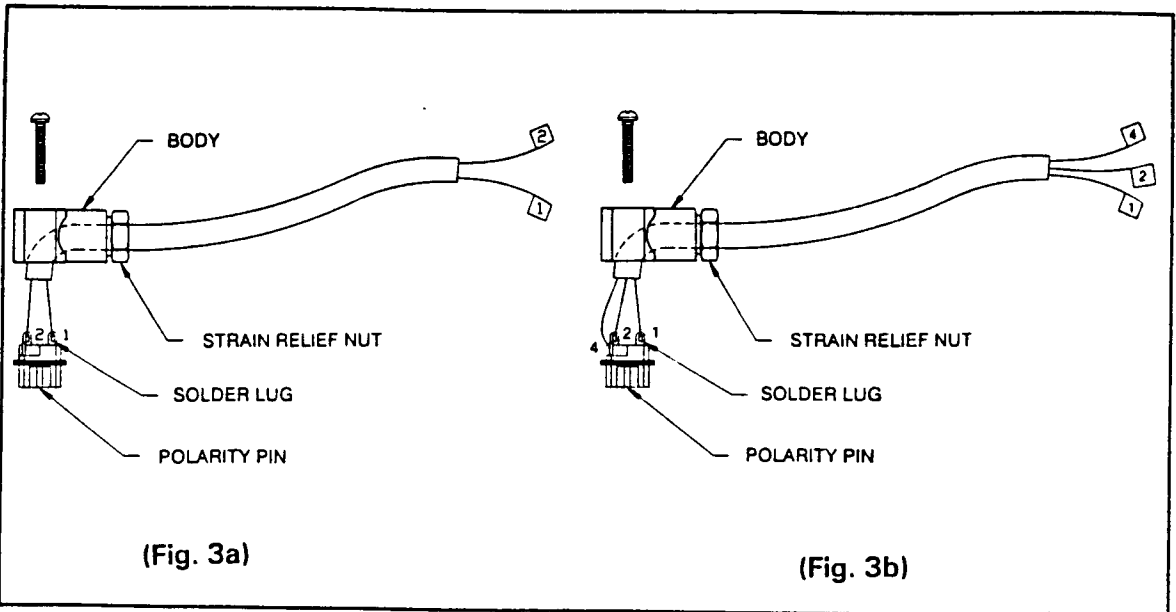
flow exceeds preset. The FL9000-AC comes with a separate four conductor female connector. To solder wires onto the connector, it will have to be disassembled, as shown in Figure 2.



(Fig. 2)

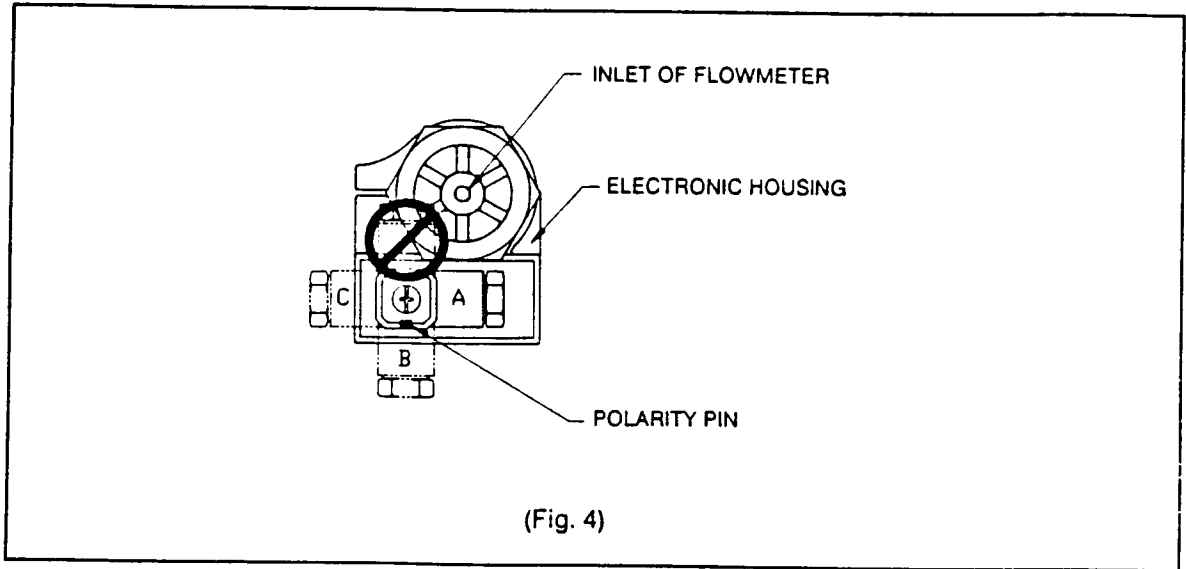
The connector has four solder lugs labeled 1, 2, 3 and 4. On the FL9000 unit with the VAC flow alarm, terminals 3 and 4 are not used. On the FL9000 unit with the VDC flow alarm, terminal 3 is not used. It should be noted

before reassembly, which wire is connected to which solder lug. Color coding, or labeling the wires is advised. See Figures 3a and 3b.



After securing wires to solder lugs, a determination of the orientation that the body of the connector should face, needs to be made. Before snapping the conductors back into the connector body, see Figure 4 below.

After choosing orientation A, B or C, snap connector back together, pull excess wires out of strain relief, and tighten strain nut. Plug into electric housing and secure with screw.



The FL9000-AC is designed to turn "on" or "off" a variety of different 115VAC loads. Examples of loads include: Solenoid valves, warning lights and AC relay coils. The module can only switch loads that consume between 2.5 and 90 watts, or have 5000Ω to 150Ω impedance respectively. If the load draws less than 2.5 watts, a loading capacitor is required. The capacitor's value and connection is demonstrated in Figure 5. If the load draws greater than 90 watts, a power relay is necessary. Figs. 6 and 7 show typical relay connections.

**Wiring Configurations:**

1. Conventional Connection: See Fig. 5

The Schematic in Fig. 5 will provide conduction over 15-20% of full scale above, or below the flow rate set point.

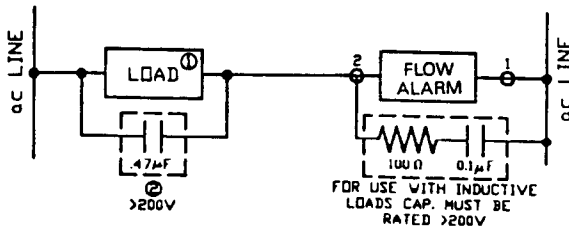


Fig. 5

- 1 Load must draw between 2.5 and 90 watts. For loads smaller than 2.5 watts, see #2. For loads greater than 90 watts, see Figs. 6 and 7.
- 2 Loads consuming less than 2.5 watts require a 0.47 μF capacitor connected as shown. This capacitor will increase the power consumption and ensure complete conduction.
2. Conventional Relay Connections: See Fig. 6

Fig. 6 demonstrates a SPDT relay with a 115 VAC coil integrated with a flow alarm module. This combination allows switching of loads up to the rating of the relay contacts.

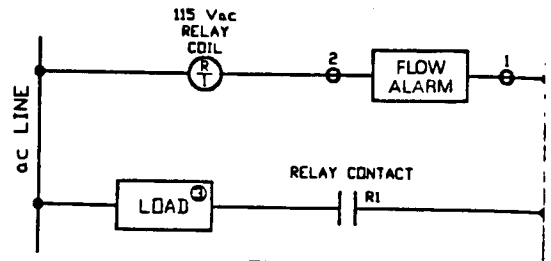


Fig. 6

- 3 Load limited by relay contacts

3. Latching Relay Systems: See Fig. 7

The Flow Alarm Module can be integrated with latching type relays, or a simple latching system can be connected as in Fig. 7.

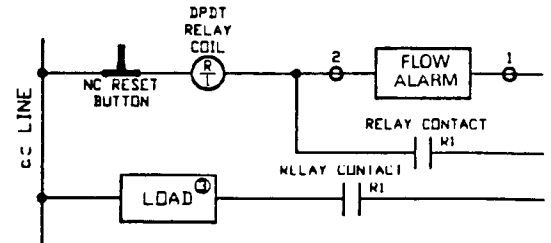


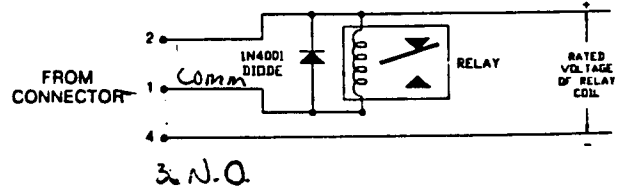
Fig. 7

The module will turn the relay "on" as flow either exceeds, or falls below the flow rate set point. The relay will remain activated until the reset button is depressed.

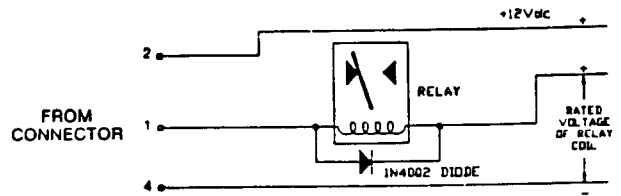
**Wiring Configurations for VDC Flow Alarm:**

**1. For relay output:**

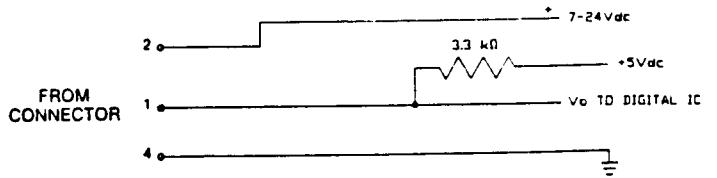
a) Relays with coil voltage between 7 and 24 VDC.



b) Relays with coil voltage between 4 and 60 VDC.

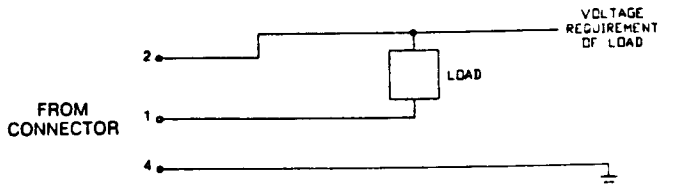


**2. For TTL/CMOS interface:**



**3. Other loads (eg. lamp, buzzer, etc.)**

The load must draw less than 0.5 amps at 7-24 VDC. If the load uses in excess of 0.5 amps or 24 VDC, section 1 wiring must be used.



Note: See specifications to avoid damage to FET (transistor).

**CAUTION:** To protect the FET from damage due to inductive collapse, use a "catch" diode, as demonstrated in section 1 of wiring configurations, when switching inductive loads such as solenoids and relay coils. Connection of Terminal 1 directly to a voltage source will destroy the unit.

**SPECIFICATIONS**

**ACCURACY:** ± 7% full scale

**REPEATABILITY:** ± 1% full scale

**MAX. TEMP./PRESSURE:** 220 PSI @ 70°F;  
80 PSI at 210°F

**MAXIMUM PARTICLE SIZE:** 74 microns for standard  
units; 400 microns for  
ribbed piston water  
meters

**SIZE:** 1 3/8" across flats,  
FL-9200-7/16" Length;  
FL-9000 and 9100-5/8" Length

**CONNECTION:** FL9200-Fits 3/4" Nominal  
(7/8" O.D.) or 1" Nominal  
(1 1/8" O.D.) Type M  
Copper Tubing. FL-9000  
and FL9100-1" NPT,  
Male

**MATERIAL:** Polysulfone

**WETTED PARTS:**

Polysulfone, stainless  
steel, Buna-N, and  
barium ferrite

**ALARM RELAY:**

Proximity switch  
triggering a 110 VAC @  
1 amp triac. Relay pulls in  
over 25% of span, and  
drops out above and  
below that. Includes  
mating connector. Relay  
not field installable.

**SETPOINT:**

Adjustable 0-100% FS

## WARRANTY

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 our customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. Our 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.

THESE UNITS ARE INHERENTLY DANGEROUS AND ARE INTENDED TO BE INSTALLED AND USED ONLY BY QUALIFIED PERSONNEL. NO WARRANTY EXTENDED HEREIN WILL APPLY IF SUCH UNIT IS INSTALLED OR USED BY UNQUALIFIED PERSONNEL. THERE ARE NO WARRANTIES EXCEPT AS STATED HEREIN. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE. OMEGA ENGINEERING, INC. IS NOT RESPONSIBLE FOR ANY DAMAGES OR LOSSES CAUSED TO OTHER EQUIPMENT, WHETHER DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL WHICH THE PURCHASER MAY EXPERIENCE AS A RESULT OF THE INSTALLATION OR USE OF THE PRODUCT. THE BUYER'S SOLE REMEDY FOR ANY BREACH OF THIS AGREEMENT BY OMEGA ENGINEERING, INC. OR ANY BREACH OF ANY WARRANTY BY OMEGA ENGINEERING, INC. SHALL NOT EXCEED THE PURCHASE PRICE PAID BY THE PURCHASER TO OMEGA ENGINEERING, INC. FOR THE UNIT OR UNITS OR EQUIPMENT DIRECTLY AFFECTED BY SUCH BREACH.

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### Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to OMEGA Customer Service Department, telephone number (203) 359-1660. BEFORE RETURNING ANY INSTRUMENT, PLEASE CONTACT THE OMEGA CUSTOMER SERVICE DEPARTMENT TO OBTAIN AN AUTHORIZED RETURN (AR) NUMBER. The designated AR number should then be marked on the outside of the return package.

To avoid processing delays, also please be sure to include:

1. Returnee's name, address, and phone number.
2. Model and Serial numbers.
3. Repair Instructions.

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

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Printed in U.S.A

M1174/0590