1 YEAR
WARRANTY

OMEGA™

User's Guide

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FLSC-45/45B
Paddlewheel Signal Conditioner

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General Description

The FLSC-45 or FLSC-45B Flow Signal Conditioner is a DC-powered sinusoidal frequency input to a 4 to 20 mA or 1 to 5 Vdc field selectable output signal conditioner. Either model is capable of directly accepting magnetic pickup inputs such as paddlewheel sensors and turbine meters without amplification, and provides a scaled analog output signal that is compatible with most flow measuring systems and data acquisition computer boards. The input circuitry of the signal conditioner has been designed to condition the low level sinusoidal output from turbine meters and paddlewheel sensors, while rejecting any unwanted noise on the input line. A signal threshold adjustment is provided which allows the user to set the input sensitivity above the ambient noise level, eliminating any false signal on the output.

The output signal is a DC current (4-20 mA) or DC voltage (1-5 Vdc) output which is proportional to flow rate. The unit is powered by a user supplied, filtered DC voltage power supply.

A zero and span potentiometer and range select DIP switch allow easy bench calibration or field adjustment of the analog output from the signal conditioner.

Unpacking

Remove the Packing List and verify that you have received all equipment. If you have any questions about the shipment, please call the Customer Service Department at **1-800-622-2378 or 203-359-1660**. On the web you can find us at:
omega.com e-mail: **cservice@omega.com**
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 in the event reshipment is necessary.

The following items am supplied in the box:

- FLSC-45 or FLSC-45B Signal Conditioner
- Mounting Plate (attached) FLSC-45 only
- User's Guide

Mounting - FLSC-45

The FLSC-45 can be mounted using the metal mounting plate attached to the unit. Refer to Figure 1 for mounting dimensions. Note that if needed, Velcro or double-sided tape can be used to secure the transmitter in place.

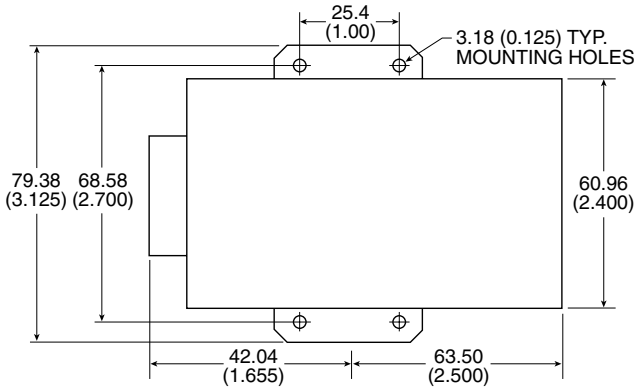

Figure 1A. - FLSC-45 Mounting Dimensions, mm (inches)

Mounting - FLSC-45B

The FLSC-45B is mounted by using the internal mounting holes located inside the aluminum enclosure with the lid removed. Refer to figure below for mounting dimensions.

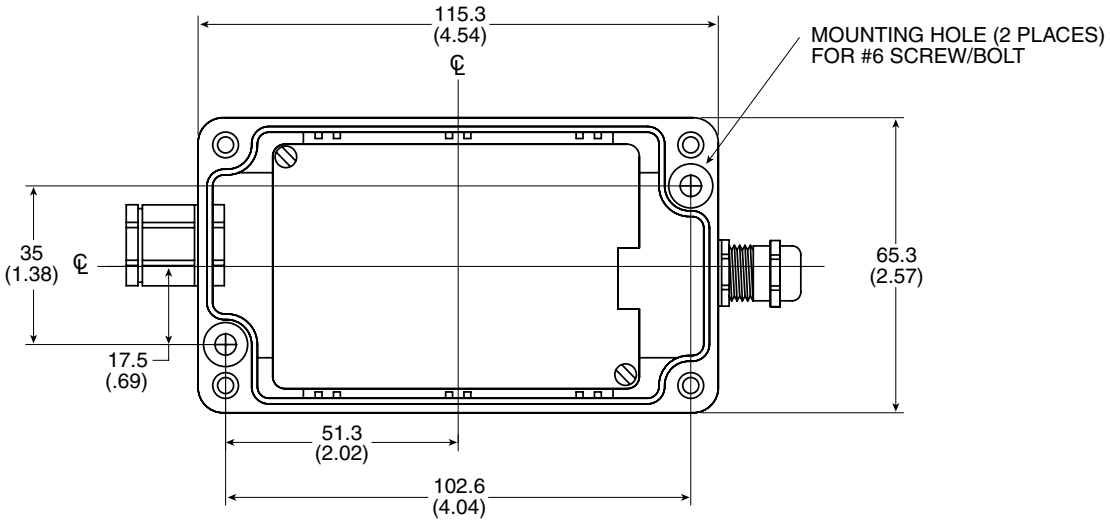

Figure 1B. - FLSC-45B Mounting Dimensions, mm (inches)

Wiring

Sensor Model	Wire Color	FLSC-45 Terminal Connection	FLSC-45B Terminal Connection
FP-5300 FP-5301 FP-5302	Red Black	1 2	5 6
FTB100 Series FTB200 Series FTB400 Series	Black White	1 2	5 6
FP-5200 FP-5201 FP-5202	Red Black	1 2	5 6
FTB-800 Series	Blue Clear	1 2	5 6
FP6000	Red Black	1 2	5 6
FP5100 FP5101 FP51	Red Black	1 2	5 6
FP-8500 FP-8501 FP-8502	Red Black	1 2	5 6

Figure 2. Input Connections to OMEGA™ Sensors

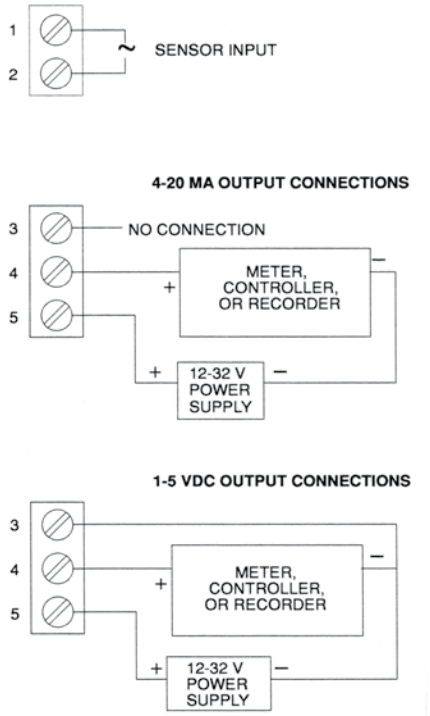

Figure 3A. FLSC-45 Wiring

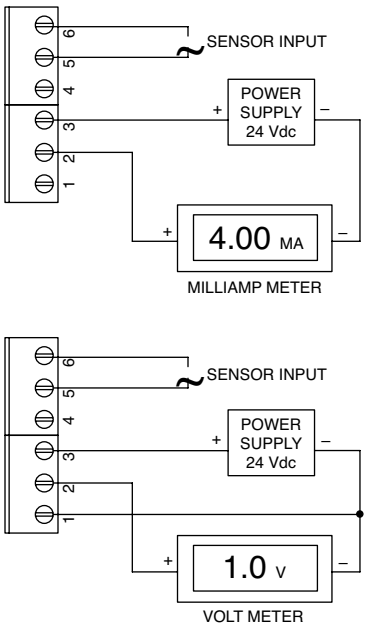

Figure 3B. FLSC-45B Wiring

NOTE:

The low voltage lines from the magnetic pickup should be shielded and kept less than ten feet and isolated from relays, solenoids, or other sources of electrical noise. Let the output from the transmitter make the long run.

For FLSC-45 units purchased recently a new surface mount board has been used and the wiring has been changed, See figure 3C for the new wiring scheme.

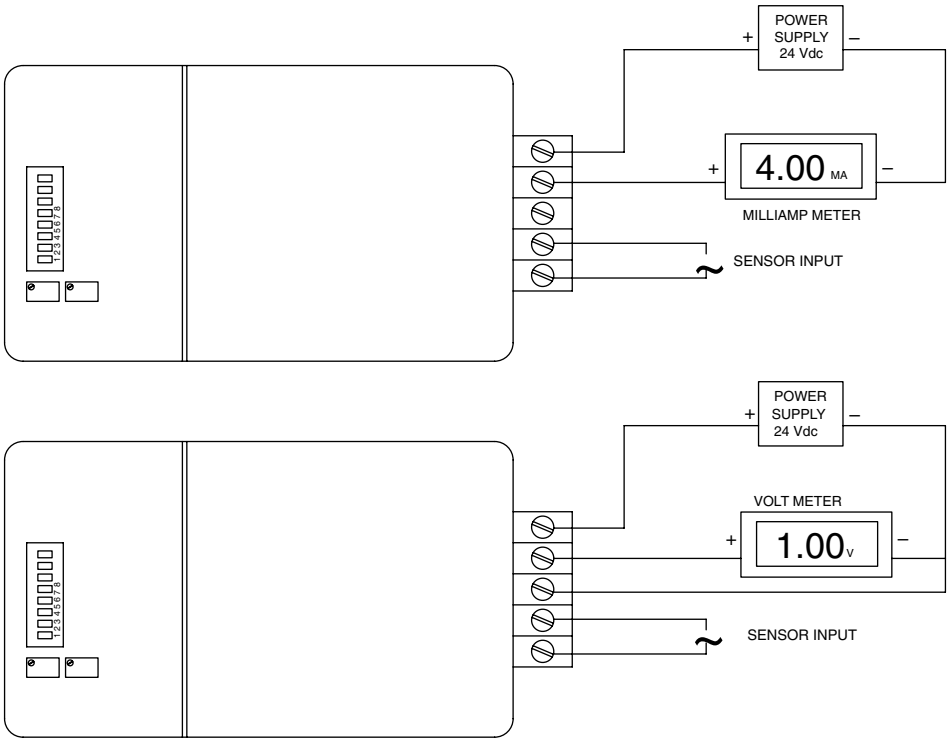

Figure 3C. New FLSC-45 Wiring

Signal Threshold Adjustment (SENS)

During calibration and installation, the signal threshold adjustment (refer to Figure 5), should be set to the full (CW) position. This adjustment should only be changed if there is a high noise level on the input, which is causing a false output reading with no flow. Slowly adjust the pot marked "SENS" CCW until the output returns to a zero reading with no flow or input. Note: The transmitter will not operate with the SENS pot in the full CCW position.

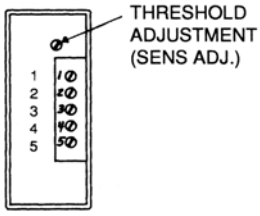

Figure 4A. FLSC-45 Side View

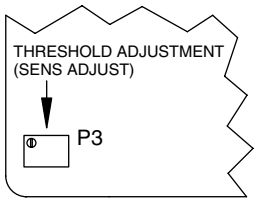

Figure 4B. FLSC-45B

Calibration - FLSC-45

Equipment Required

1. 12-32 Vdc power supply (24 Vdc nominal)
2. Sinusoidal Frequency Generator
3. Milliamp/Voltmeter
4. Small common screwdriver (jeweler's)
5. Small Phillips screwdriver

Calibration Procedure - FLSC-45

1. Remove bottom cover of FLSC-45 to access calibration compartment (see Figure 5B).
2. Connect the power supply, milliamp meter and the frequency generator to signal conditioner as shown in Figure 5A for 4-20 mA or 1-5 Vdc calibration.
3. Determine the maximum volumetric flow rate in GPM, expected by the application. Name this "GPM (Max)".
4. From the calibration constant (or K-Factor) listed on the data sheet for the flow sensor, obtain the frequency corresponding to GPM (Max) using Equation #1 and designate this frequency F (Max).

Equation #1 $F\ (Max) = \frac{\text{K-Factor x GPM (Max)}}{60}$.

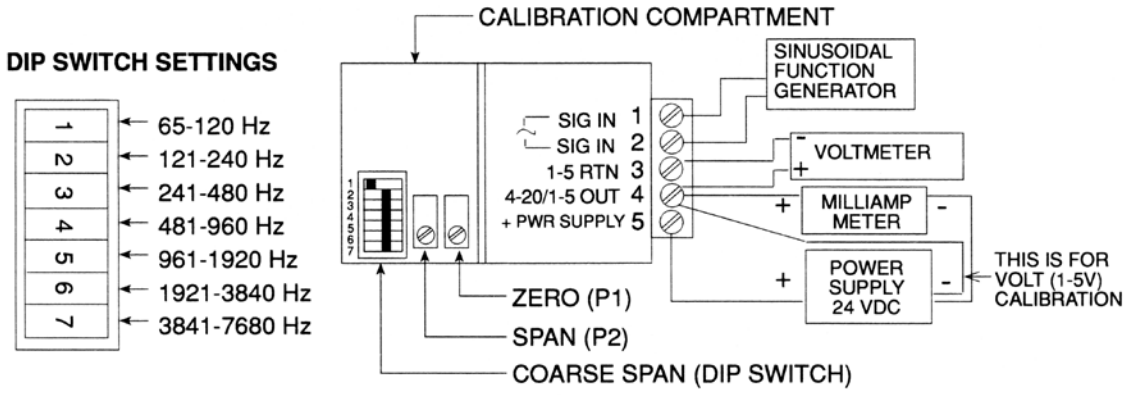

Figure 5A. FLSC-45 Calibration Setup

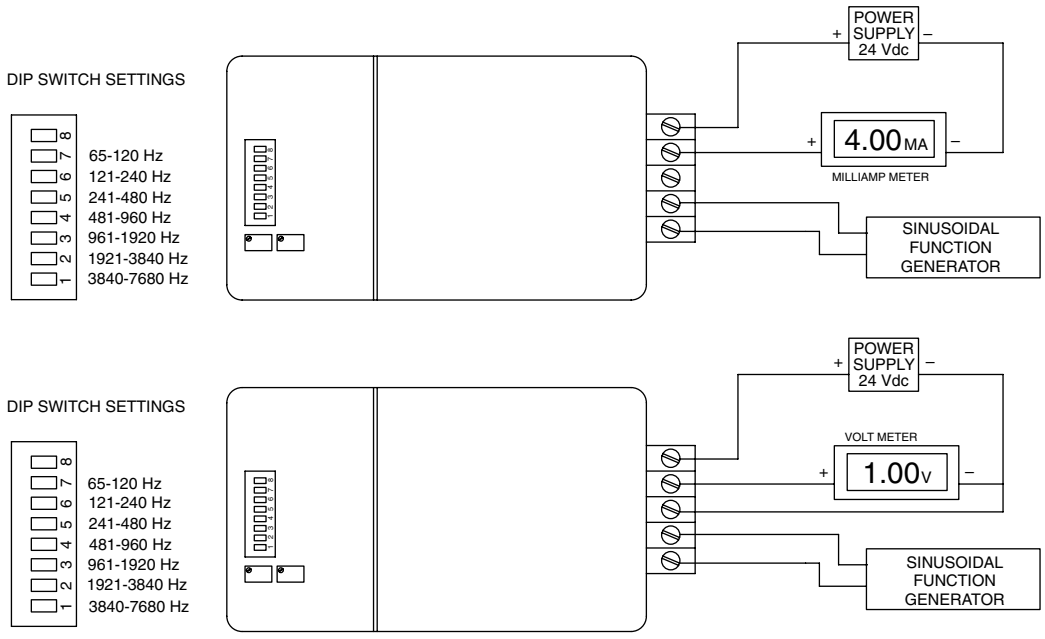

Figure 5B. New FLSC-45 Calibration Setup

5. Set the frequency generator for an output of 0 Hz. Adjust the zero potentiometer (Pl) for an output of 4.00 mA or 1.00 Vdc.
6. Set the coarse range adjustment by selecting a switch position on the DIP switch inside the calibration compartment. Set the correct switch position so that the F (Max) falls within the range you select. Refer to Figure 5A for ranges and DIP switch location.
7. Set the frequency generator an output equal to F (Max) and adjust the span potentiometer (P2) for an output of 20.00 mA or 5.00 Vdc.
8. Reinstall top cover of FLSC-45. Calibration is complete.

Calibration - FLSC-45B

Equipment Required

1. 12-32 Vdc power supply (24 Vdc nominal)
2. Sinusoidal Frequency Generator
3. Milliamp/Voltmeter
4. Small common screwdriver (jeweler's)
5. Small Phillips screwdriver

Calibration Procedure - FLSC-45B

1. Remove top cover of FLSC-45B to access calibration compartment (see Figure 5C).
2. Connect the power supply, milliamp meter and the frequency generator to signal conditioner as shown in Figure 5B for 4-20 mA or 1-5 Vdc calibration.
3. Determine the maximum volumetric flow rate in GPM, expected by the application. Name this "GPM (Max)".
4. From the calibration constant (or K-Factor) listed on the data sheet for the flow sensor,

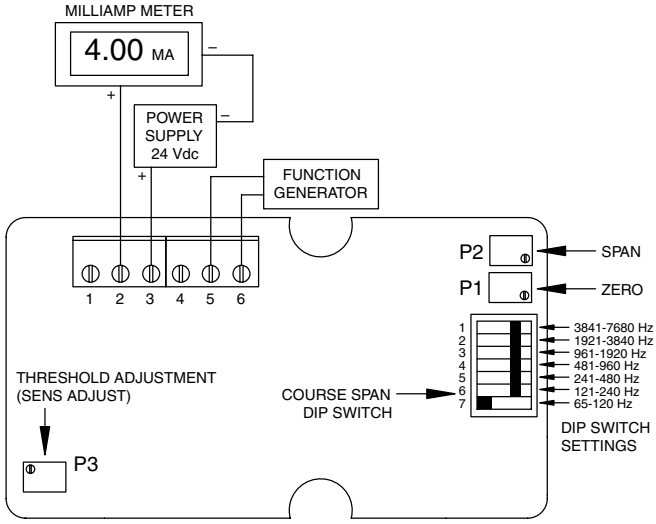

Figure 5C. FLSC-45B Calibration Setup

5. Set the frequency generator for an output of 0 Hz. Adjust the zero potentiometer (Pl) for an output of 4.00 mA or 1.00 Vdc.
6. Set the coarse range adjustment by selecting a switch position on the DIP switch inside the calibration compartment. Set the correct switch position so that the F (Max) falls within the range you select. Refer to Figure 5B for ranges and DIP switch location.
7. Set the frequency generator an output equal to F (Max) and adjust the span potentiometer (P2) for an output of 20.00 mA or 5.00 Vdc.
8. Reinstall top cover of FLSC-45B. Calibration is complete

Troubleshooting

In case of an inoperable or malfunctioning system, the following procedures can be used to isolate the faulty wiring, printed circuit boards and/or alternate causes. Factory consultation is available to assist in diagnosing problems. Please note that in some cases factory repair can be performed more easily than can be accomplished in the field.

Failure conditions are listed and the possible corrective actions given to eliminate the observed problem.

Proper operation of the FLSC-45 can be assumed when with power applied to the unit, the analog output produces a current output signal of 4-20 mA with a span corresponding to that established by the calibration procedure.

OBSERVED CONDITION	CORRECTIVE ACTION
A. Analog output with no input	1. Noise on input. Slowly turn SENS pot CCW (refer to Figure 4) until false indication stops. NOTE: In fully CCW position, the unit will not operate. 2. Defective FLSC-45. Repair or replace.
B. Incorrect zero reading with no flow	1. Verify that power supply voltage is sufficient for the required load resistance. 2. Unit is out of calibration. Recalibrate. 3. Defective FLSC-45. Repair or replace.

OBSERVED CONDITION	CORRECTIVE ACTION
C. Current exceeds desired span	1. Flowmeter being used beyond calibrated span of FLSC-45. 2. Calibration of FLSC-45 incorrect. Recalibrate. 3. Defective unit. Repair or replace.
D. No current output at all	1 . Power supply is reversed. Check wiring as per wiring installation. 2. Short on flowmeter coil or shield. Replace coil and check wiring. 3. Defective unit. Repair or replace.

Specifications

Accuracy:	±0.1% of full scale ±200 ppm/°C
Repeatability:	±0.025%
Input:	Sinusoidal 20 mV p-p min. to 50 V p-p max. (65-7680 Hz)
Response Time:	2 seconds fixed
Output:	DC Current (4-20 mA) or DC voltage (1-5 Vdc)
Min. Input Frequency to achieve 20 mA or 5 Vdc Output:	65 Hz
Max. Input Frequency to achieve 20 mA or 5 Vdc Output:	7680 Hz
Power	
FLSB-45:	8-32 Vdc for 4-20 mA, 15-32 for 1-5 Vdc @ 20 mA
FLSB-45B:	8-24 Vdc for 4-20 mA, 15-24 for 1-5 Vdc @ 20 mA
Max. Loop Resistance:	$(V_{supply} - 8V)/0.020\ A$ = ohms
Operating Temperature:	-10°C to 60°C
Storage Temperature:	-20°C to 65°C
Dimensions	
FLSC-45:	61 H x 104 W x 25.4 mm D (2.4 x 4.1 x 1")
FLSC-45B:	65 H x 116 W x 32 mm D (2.6 x 4.6 x 1.3")
Weight	
FLSC-45:	96 g (3.3 oz)
FLSC-45B:	300 g (0.3 lbs)

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 in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company 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 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.

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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