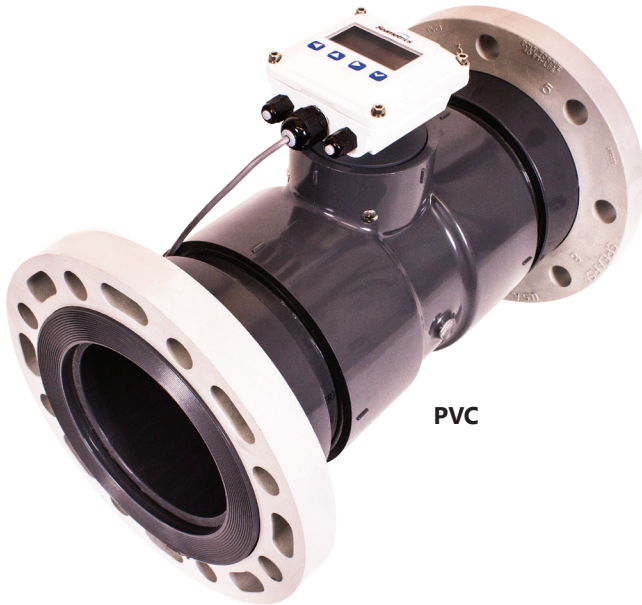


1 YEAR
WARRANTY



PVC



Stainless Steel

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FTB700-SERIES - INLINE TURBINE METERS

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FTB700-T - BLIND ANALOG TRANSMITTER

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This unique system of 3" to 8" turbine meters uses just one moving part, a precision helical rotor. Rotation of the rotor is electronically detected and processed. The high-quality jewel bearings and shafts minimize friction while providing long life in non-lubricating fluids. The entire rotor assembly can be easily removed for field service without removing the meter from the pipe.

FTB700 meters can be ordered with various output options. The basic model comes with pulse output only. An electronic display is available on the DPF144-P/DPF144-W model to display flow rate and total (resettable or non-resettable), and provide a programmable pulse or 4-20 mA output. The controls/displays can be mounted on the meter or remotely mounted on a wall or panel up to 2,000 feet away. FTB700 meters are compatible for use with other remote-mount Omega displays and controls as well.

FTB700 bodies are fabricated from Schedule 80 PVC fittings or from stainless steel tubing. The turbine insert on the stainless steel meters is machined from a stainless steel casting. The PVC turbine insert is machined from a solid piece of PVC. Turbine rotors on all models are PVDF.

Specifications*


	PVC			Stainless Steel				
Pipe Sizes	3", 4", 6"			3", 4", 6", 8"				
Materials	Meter Body	PVC Schedule 80 fittings			304 Stainless steel (316 SS optional)			
	Turbine Insert	PVC			CF8 cast stainless			
	Rotor	PVDF			PVDF			
	Shaft	Zirconia ceramic			Zirconia ceramic			
	Bearings	Sapphire journal, ruby endstone			Sapphire journal, ruby endstone			
Cable	#22 AWG, 2000' max			#22 AWG, 2000' max				
Flanges	Optional (See dimensions)			150 lb. drilling				
Maximum Pressure	150 psi @ 75° F (10 bar @ 24° C) (See chart)			200 psi (14 bar)				
Maximum Temperature	120° F (50° C) (See chart)			200° F (93° C)				
Accuracy	± 1% of full scale			± 1% of full scale				
Flow Range (GPM)	3"	4"	6"	3"	4"	6"	8"	
	Minimum	3	6	12	3	6	12	30
	Maximum	400	600	1200	400	600	1200	3000

* Specifications subject to change. Please consult our web site for current data (omega.com).

Electronic Options Specifications*

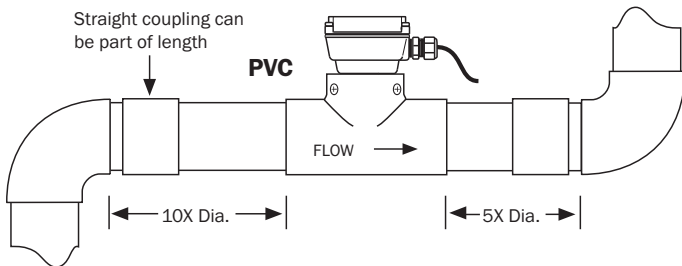
	FTB700	FTB700	DPF144-P/DPF144-W
Power	6-36 Vdc	7-30 Vdc	7-30 Vdc, 4mA (4-20 mA when loop powered)
Electronic Display		DPF143	DPF144
Pulse Out	0-160 pulse/sec. current sinking	Pulse scaled and pulse pass through	Pulse scaled
Analog Out			4-20 mA Loop
Rate		5-digit autorange	5-digit autorange
Total		8-digit	8-digit
Memory		Non-volatile	Non-volatile
Response Time			
High/Low Alarm		Selectable on one output	Selectable on one output
Regulatory	CE Mark	CE Mark	CE Mark

Installation



CAUTION: These water meters are not recommended for installation downstream of the boiler feedwater pump where installation fault may expose the meter to boiler pressure and temperature. Maximum recommended temperature is 120° (PVC) or 200° (Metal).

Piping Conditions. Installing the meter with 10 diameters of straight pipe upstream and 5 downstream is recommended.

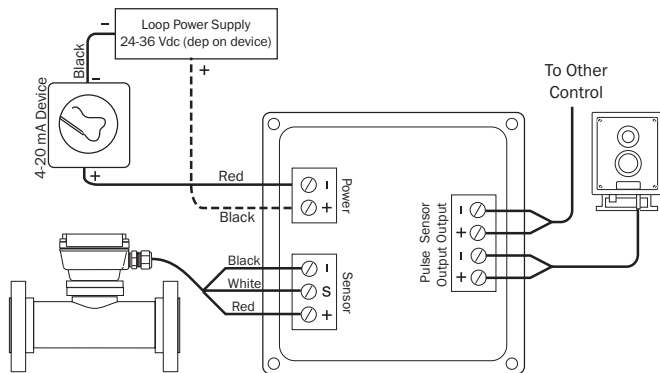


Flanges. For stainless steel meters, standard flanges are 150 lb. ANSI drilling. PVC meters can be installed with optional flanges according to pipe manufacturer's recommendations. For PVC a bolt torque of 20-30 ft-lb for 3" and 4" flanges, and 35-50 ft-lb for 6" flanges is recommended.

Either partial or full-face gaskets can be used. Tighten the bolts evenly. Use care to prevent a misaligned gasket from entering the flow stream.

Position. The FTB700 Series are all-position meters, operable in a vertical or horizontal position, with the meter insert in any radial position. A horizontal position is preferred if there is a risk of air becoming trapped due to constant low flows. Operating the meter in partially-filled pipe will result in inaccuracies.

Connections

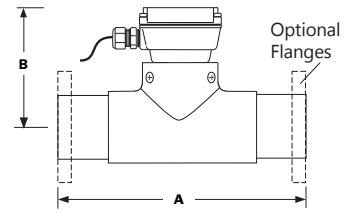


For operating instructions for the various electronic modules, consult the manual for the specific module, included with the meter at purchase.

PVC Meter

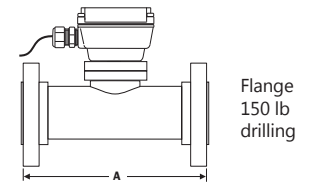
Meter Size	Dim A	Dim B
3"	12"	6.5"
4"	14"	7.0"
6"	18"	8.5"

NOTE: Flange options face-to-face dimension ("A") is the same as plain ends.



Stainless Steel Meter

Meter Size	Dim A
3"	12"
4"	14"
6"	18"
8"	20"



Maintenance and Repair

Recalibration. If it is necessary to recalibrate the meter for any reason, please contact Omega.

Turbine Insert Removal and Installation.

CAUTION: First remove all pressure from the line. Then remove the screws or bolts that hold the insert in place and tug gently until the insert comes free. A twisting motion can help to loosen the O-ring seal. Reverse the procedure to reinstall, after coating the O-ring with lubricant (plastic compatible in the PVC model). Do not overtighten.

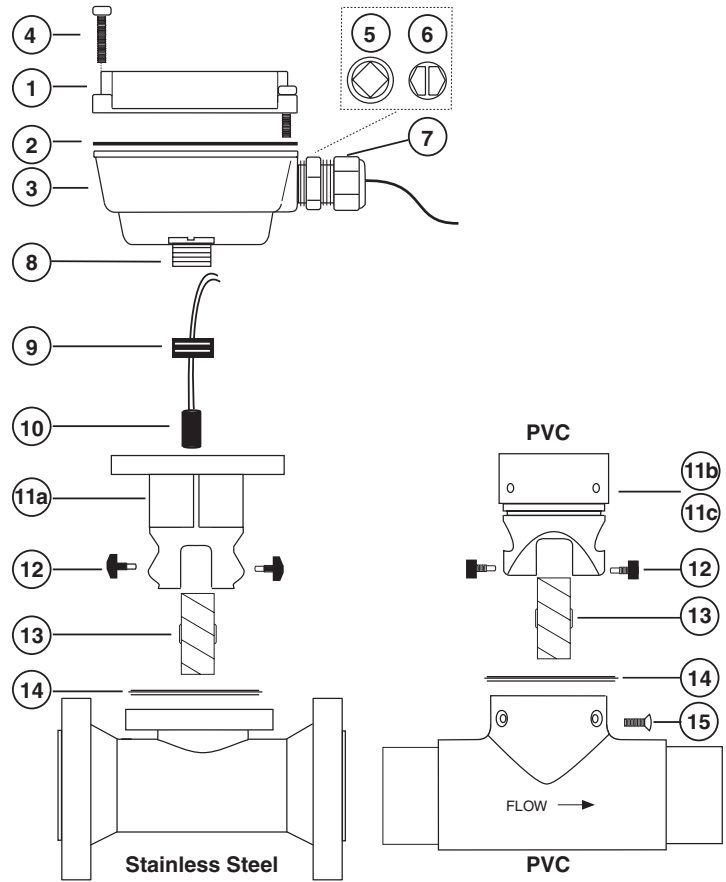
Rotor and Shaft Replacement. Examine the rotor to determine if bearings or shaft are damaged or excessively worn. The rotor should spin smoothly and freely, with no visible wobble. Back and forth play should be very minor, less than 1/64". If it is necessary to replace the rotor or shafts, first back out both shafts with a small blade screwdriver. The rotor will come free as soon as the shaft ends come free of the rotor bearings. Reverse the procedure to reinstall. **Note:** Do not overtighten the shaft screws. Check to be sure that a small amount of free play between the shaft ends and the bearings remains.

Sensor Replacement. This is rarely necessary. However, certain electrical conditions can damage the sensor. To replace it, first remove the electronics module. Disconnect the sensor leads from the electronics module terminals and remove the threaded plug over the sensor. Finally, remove the sensor by pulling on the sensor leads. A gentle tug should be sufficient. Reverse the process to replace the sensor.

REPLACEMENT PARTS

ALL METERS			
		White Housing	Blue Housing
1	Upper housing/electronics	Contact service representative for your specific model	Contact service representative for your specific model
2	Housing gasket/seal	102025	100411
3	Lower housing	Not field replaceable	Not field replaceable
4	Housing screw/washer kit (4 each)	100414	100414
5	Plug, steel (battery units)	100360	100360
6	Strain relief kit, small (includes 2)	100364	100364
7	Strain relief kit, large (includes 1) (externally powered units)	101850	101850

		WTP	WTS
8	Square housing adapter	Not field replaceable	Not field replaceable
9	Pickup retaining screw	100298	100298
10	Pickup	100419	100419
11a	Insert, SS	N/A	100440
11b	Insert, 3" PVC	100438	N/A
11c	Insert, 4"-6" PVC	100439	N/A
12	Shaft assembly, ceramic (includes 2)	103312	103312
13	Rotor (PVDF) /bearing assembly	100333	100333
14	O-ring, EPDM	100214	100270
15	Insert screw (4 req'd)	100023	N/A



Electronics Module Repair. None of the electronics modules have replaceable components. Printed circuit boards must be replaced as complete units. In order to replace an entire electronics module, loosen the four retaining screws and the unit will lift free from the insert housing.

FTB700-T

Blind Analog Transmitter Instructions



The Omega FTB700-T is a blind (non-indicating) 4-20 mA transmitter. It accepts a pulse frequency input from the flow sensor, and converts this input into a continuous analog output signal. Power for the transmitter is taken from the current loop itself, so only two wires are required. The digital design makes it possible to span the unit in the field without tools. The frequency at which 20 mA is desired is entered on a set of rotary switches, and an internal microcontroller automatically scales all other values accordingly. An additional benefit of the microcontroller is its ability to average inputs, for smoothing of the output signal. The degree of averaging can be selected in the field, from 2 to 16 seconds.

For maximum environmental protection, the electronic components are encased in a special semi-flexible urethane potting material. The housing is cast from aluminum and fuse-coated. The clamshell housing is provided with mounting feet or remote mounting.

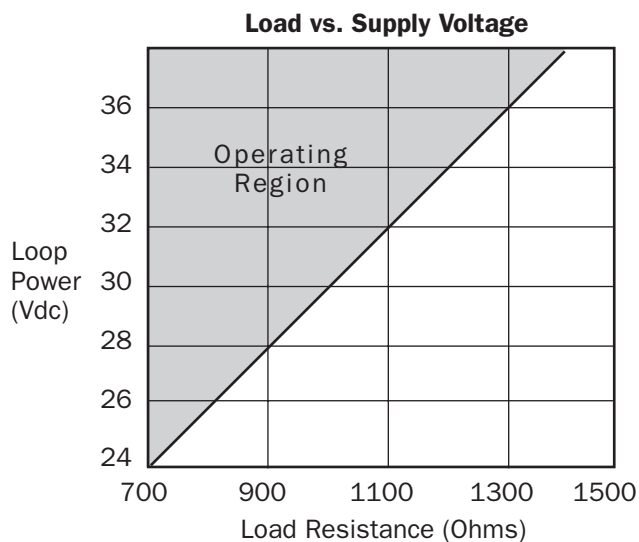
The FTB700-T will operate on a relatively wide range of current loop voltages, 24 to 36 Vdc. Lower voltages limit the load that can be applied to the loop without distortion of the signal. (See Load/Supply chart if there is a question regarding voltage vs. load.) A built-in power regulator supplies the appropriate power to the flow sensor.

Typical applications for this transmitter are telemetry (or SCADA), distributed control systems, programmable controllers, data logging, and chart recording.

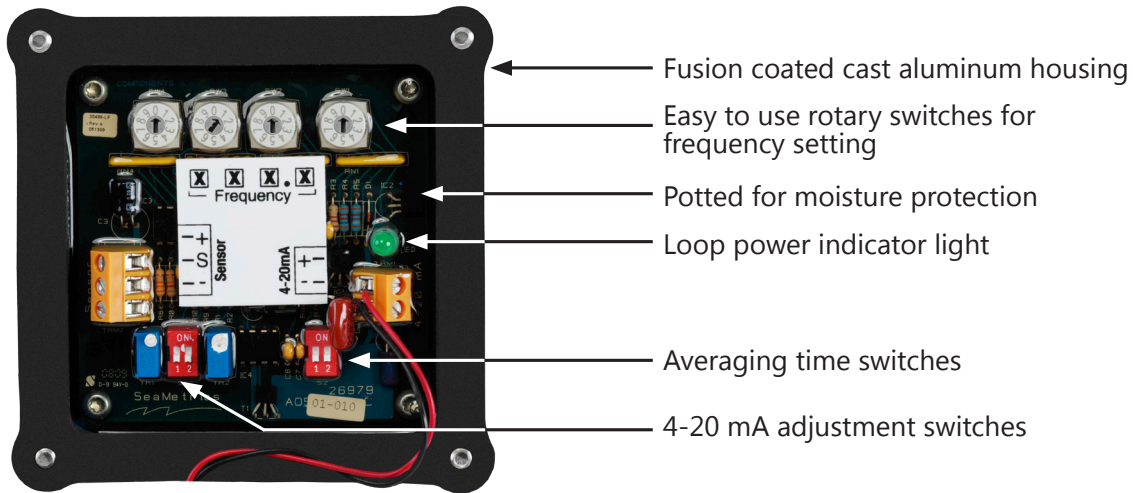
Specifications

Power	24 - 36 Vdc	
Temperature	32° to 130° F (0° to 55° C)	
Input	Open collector solid state sensor	
Input Averaging	2 - 16 seconds (switch selectable)	
Response Time	2 - 60 seconds; 90% of full scale (dependent on input averaging)	
Frequency	Minimum	10 Hz (@20mA)
	Maximum	999.9 Hz
	Setting	4 Rotary DIP switches
Output	Proportional 4-20 mA	

*Specifications subject to change. Please consult our web site for current data (omega.com).



Features

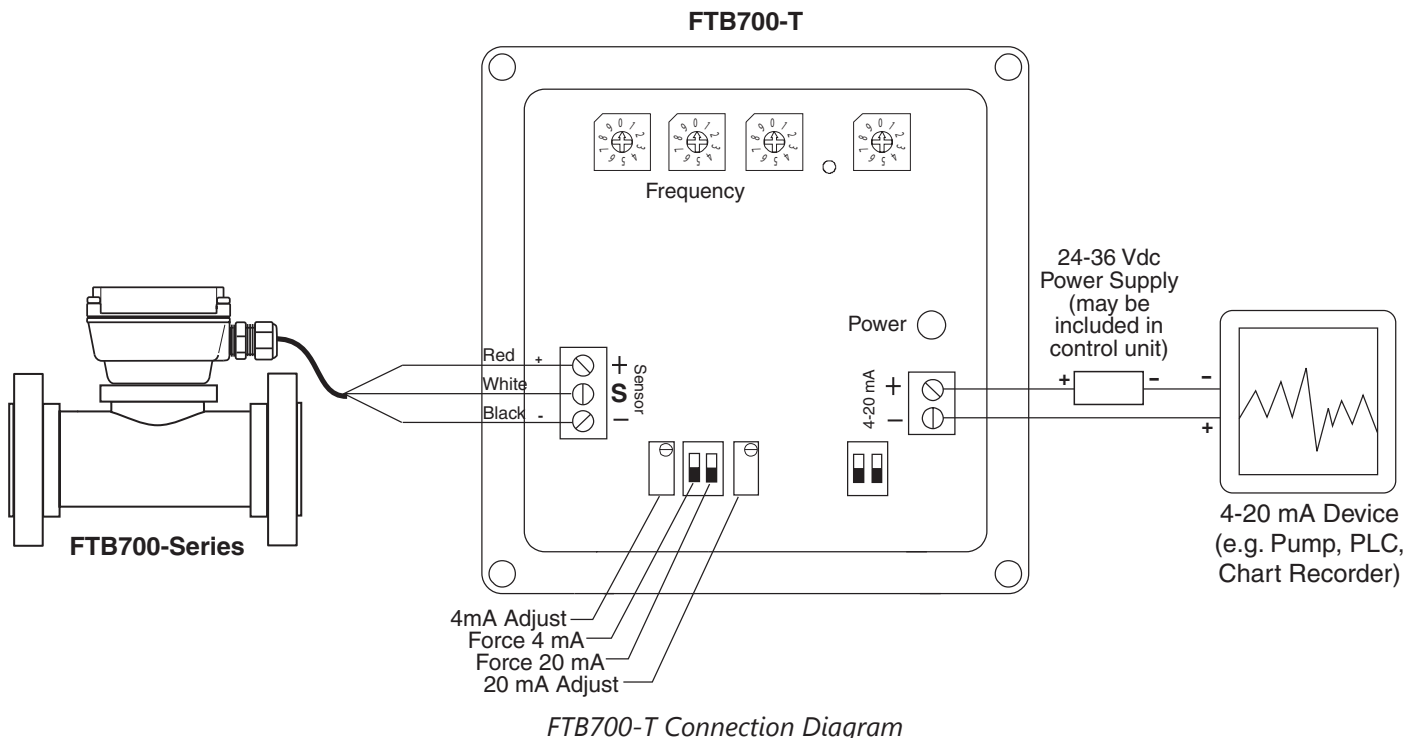


Installation

The upper portion of the housing must be removed to make connections. Use a standard hex wrench (5/32" or 4 mm) to loosen the screws, then remove the upper half. The connections are made to terminal blocks in the upper half, which contains the potted electronics.

Consult the FTB700-T Connections diagram before connecting to the current loop and flow sensor. Be careful to follow the color coding of the flow sensor wires in order to establish the correct polarity. Incorrect polarity can damage the sensor.

Connections



Setting Frequency

The FTB700-T converts a train of off/on pulses from the flow sensor into a continuous milliAmp signal that ranges from 4 mA at zero flow to 20 mA at the desired maximum flow. The desired maximum is determined by the user and entered as a frequency as follows:

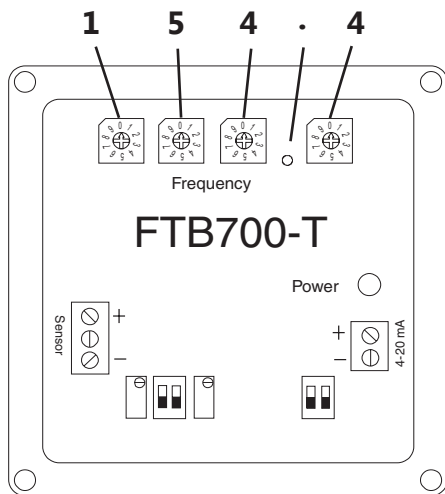
1. Decide what flow rate should represent the top of the scale. This is ordinarily the maximum expected flow, or a value just above it, in gallons per minute.
2. Locate the K-factor of the flow sensor (found on the meter or fitting. The K-factor is the number of pulses the flow sensor produces per gallon of flow.
3. Calculate frequency, using this formula:

$$\text{K-Factor} \times \frac{\text{Top Flow (GPM)}}{60} = \text{Frequency}$$
4. Enter the frequency using the four rotary Frequency switches. Note the decimal point between the third and fourth switches.

Setting Frequency Example

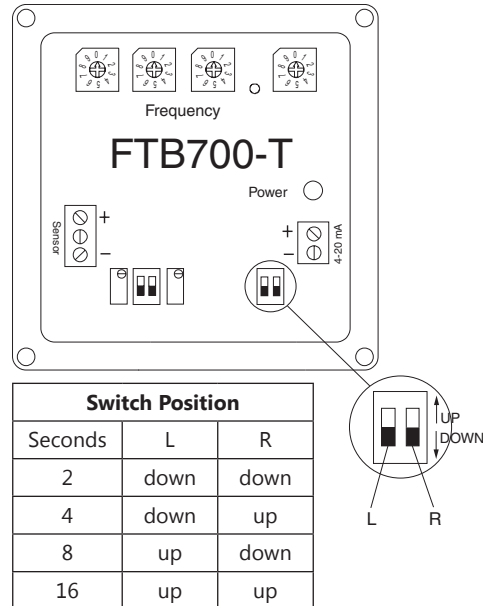
1. In an installation with an estimated maximum flow rate of about 150 GPM, a flow rate of 170 GPM is selected as the full-scale maximum, the flow at which the current loop will register 20 mA.
2. In this example, the K-factor (found on the meter or fitting, or in the manual) is "K = 54.50".
3. Calculate the frequency as:

$$54.50 \times \frac{170}{60} = 154.42$$
4. Rounding to one decimal point, enter 154.4 on the rotary switches by turning the rotary switch pointers to the desired digits.



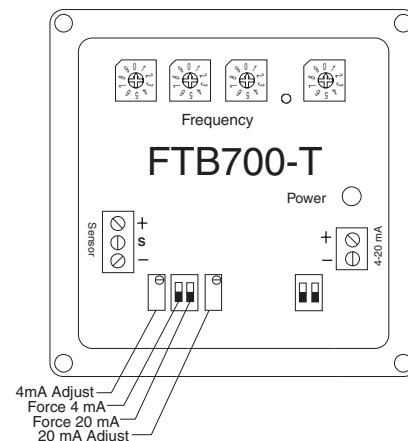
Setting Averaging Time

For most applications, this step can be ignored, as the standard setting will work fine. However, when a particularly steady output signal is desired, or in large pipe, a larger averaging period may be desirable. Note however that the averaging period requires a tradeoff, since a longer averaging period implies a slower response time. If steady signal is more important than fast response, increase the averaging time as desired. See the diagram below for the switch positions and their corresponding times.



Checking Calibration

Normally it should not be necessary to check calibration, since the digital design of this unit virtually eliminates drift. However, there are two types of calibration check that can be performed. Look at the diagram below to locate the 4 and 20 mA force switches. To force the 4 mA output, put its switch in the up position. Check the current output at the Power terminals, and if necessary trim to 4.00 mA using the appropriate trimpot. Return the switch to the down position, and repeat the process with the 20 mA switch.



Problem	Probable Causes	Things to try...
No analog signal at reading device	Break in current loop Dead power supply Reversed polarity	Check if loop indicator light is on Check multimeter voltage on power supply Check polarity
Output stick at 4 mA	No frequency input from flow sensor	Check flow sensor connections Check flow sensor polarity Be sure terminal blocks are firmly plugged in With flow sensor disconnected, use short wire to repeatedly short between sensor "S" and "-" terminals. Output should rise.
mA signal does not match flow rate	Inadequate voltage Wrong frequency setting	Check load vs. supply chart Review setting procedure Check multimeter voltage on power supply

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.

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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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