User's Guide

FPD1001B thru FPD1003B, FPD1102B and FPD1103B, FPD1201B thru FPD1203B SERIES LOW FLOW

Positive Displacement Flowmeters

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To the owner:

Please take a few minutes to read through the manual before installing and operating your meter. Always retain this manual for future reference. If you have any problems with the meter, refer to the Maintenance and Troubleshooting sections of the manual.

This manual contains connection and operating instructions for the OMEGA FPD Series meters. This includes the following models:

FPD1001B	FPD1102B
FPD1201B	FPD1003B
FPD1002B	FPD1203B
FPD1202B	FPD1103B

Part breakdowns for each model are located at the back of this manual. For models with displays and/or 4-20 mA output, an additional instruction manual is provided.

The flowmeter has incorporated the oval rotor principal into its design. This has proven to be a reliable and highly accurate method of measuring flow. Exceptional repeatability and high accuracy over a wide range of fluid viscosities and flowrates are features of the oval rotor design. With low pressure drop and high pressure rating, oval rotor flowmeters are suitable for both gravity and pump (in-line) applications.

OPERATION

Please read this information carefully before use!

Before use, confirm the fluid to be used is compatible with the meter. Refer to Industry fluid compatibility charts or consult your local representative for advice.

To prevent damage from dirt or foreign matter it is recommended that a Y or basket type 200 mesh strainer be installed as close as possible to the inlet side of the meter. Contact your local representative for advice.

NOTE: To prevent damage to the meter, slowly fill the system with fluid (this will prevent damage caused by air purge). Failure to do this could damage the meter.

To reduce pressure build up, turn off the pump at the end of each day.

INSTALLATION

1. Use thread sealant on all pipe threads.
2. Ensure the meter is installed so that rotor shafts are always in a horizontal plane. Flow is bi-directional.
3. OMEGA recommends use of flexible connections.
4. Extreme care must be taken when installing the meter. Pipe strain or overtightening the meter connections can cause meter damage.

PULSER DETAILS

Your meter is equipped with both a Hall Effect sensor and a Reed Switch sensor. The equipment you are sending the pulse signal to will determine which sensor you use. The wires for the unused sensor will not be used.

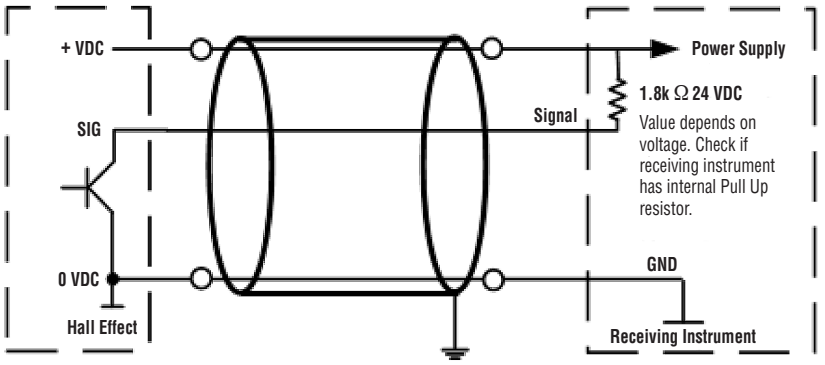
Refer to page 2 for specifications and wiring connections.

Sensor Wiring Connections

Output Type	Wire	Function	Wire	Function	Wire	Function	Note
Reed Switch	Green		Yellow				No Polarity Required
Hall Effect	Red	+VDC	Black	Gnd (0 V)	White	Signal	NPN Open Collector

Figure 1

Typical NPN Open Collector



Hall Effect Specifications (Absolute Maximum Ratings)

Characteristic	Symbol	Notes	Rating	Units
Voltage Supply	V_{CC}		30	V
Reverse Supply Voltage	V_{RCC}		-30	V
Output Off Voltage	V_{OUT}		30	V
Reverse Output Voltage	V_{ROUT}		-0.5	V
Output Current	I_{OUTSNK}		25	mA
Magnetic Flux Density	B		Unlimited	G
Operating Ambient Temperature	T_A	Range L	-40 to 150	°C
Maximum Junction Temperature	$T_{J\,(MAX)}$		165	°C
Storage Temperature	T_{STG}		-65 to 170	°C

Reed Switch Specifications

	Conditions	Min.	Typ.	Max.	Unit
Magnetic Properties:					
Pull-In	at 20°C			36.5	AT
Test Equipment		KMS-03			
Special Product Data:					
Contact Rating	Any DC combination of V & A not to exceed their individual max.'s			10	W
Switching Voltage	DC or Peak AC			30	VDC
Operating Ampere	DC or Peak AC			0.5	A
Switching Current	DC or Peak AC			0.5	A
Sensor Resistance	Measured with 40% overdrive			360	mOhm
Housing Material		Celanex 3216			
Case Color		Black			
Sealing Compound		Epoxy Resin			
Environmental Data:					
Operating Temperature		-5		130	°C
Storage Temperature		-20		130	°C
Cable Specifications:					
Cable Type		Single Wires			
Temp. Range Unmoved		-30		130	°C
Temp. Range Moved		-5		130	°C
Cable Material		FEP			
Cross Section		AWG 28			

MAINTENANCE

⚠ CAUTION

Ensure the fluid is isolated from the meter to be repaired.

⚠ CAUTION

Ensure the fluid line is depressurized before commencing repairs.

⚠ CAUTION

Ensure electrical wiring is isolated and disconnected before commencing repairs.

⚠ CAUTION

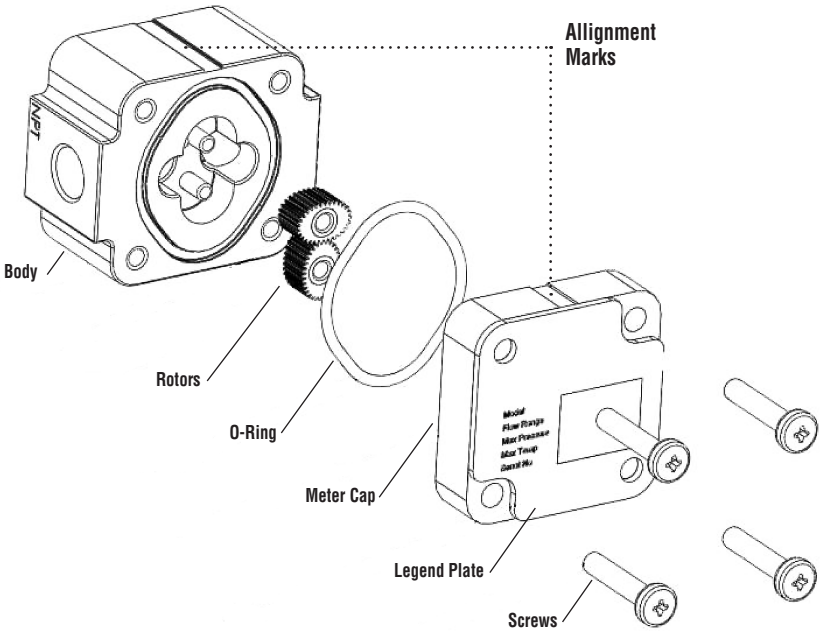
To prevent damage to the meter during re-commissioning, slowly fill the piping system with fluid before starting the pumping system.

⚠ CAUTION

Refer to the Sensor Wiring section for details.

Figure 2

Pulse Meter Parts Breakdown



Pulse Meter Disassembly

1. Loosen and remove four Phillips head or cap head screws (see Figure 2).
2. Remove the meter cap and O-ring.
3. Remove the rotors. Note the position of the rotor with the magnet or grub screws.
4. Clean and inspect all components, replace as necessary.

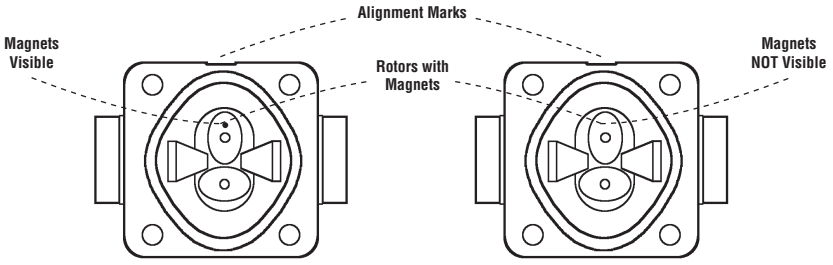
Pulse Meter Reassembly

1. Replace the rotors. Refer to Figure 3 or Figure 4 for correct orientation. Rotate the rotors by hand to ensure correct engagement.
2. Fit the O-ring into the O-ring groove in the meter body.
3. Replace the meter cap.

NOTE: Ensure all the alignment marks are lined up with the mark on the body (see Figure 2).

4. Replace and tighten the four bolts to the required torque. Refer to Bolt Torque in the Specifications section for details.
5. Check meter function using low air pressure.
6. Restore the fluid and reconnect the wiring as detailed in the Installation and Pulser Details sections.

Figure 3 **Figure 4**



Models: FPD1001B & FPD1201B

Models: FPD1002B, FPD1003B, FPD1102B, FPD1103B, FPD1202B & FPD1203B

TROUBLESHOOTING

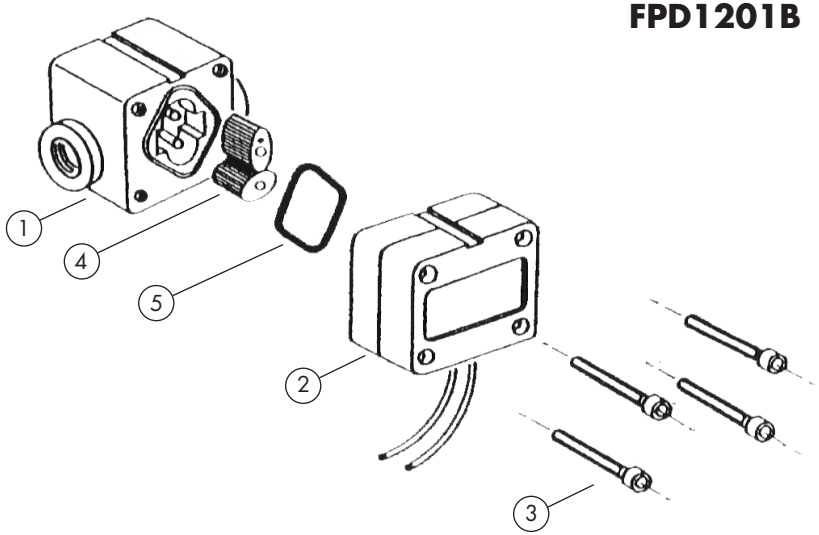
Symptom	Probable Cause	Corrective Action
FLUID WILL NOT FLOW THROUGH THE METER	1. Foreign matter blocking rotors	Dismantle meter, clean rotors. Strainer must be fitted in-line.
	2. Line strainer blocked	Clean strainer.
	3. Damaged rotors	Replace rotors. Strainer must be fitted in-line.
	4. Meter connections over-tightened	Readjust connections.
REDUCED FLOW THROUGH THE METER	1. Line strainer partially blocked	Clean strainer.
	2. Fluid is too viscous	Maximum viscosity 1000 centipoise.
METER READING INACCURATE	1. Fluid flowrate is too low or too high	See specifications for minimum and maximum flowrates.
	2. Air in fluid	Bleed air from system.
	3. Excess wear caused by incorrect installation	Check meter body and rotors.
METER NOT GIVING A PULSE SIGNAL	1. Faulty Hall Effect sensor or Reed Switch	Replace meter cap.
	2. Faulty magnet	Replace rotors.
	3. Rotors installed in wrong position	Refer to correct rotor positioning and assembly instructions.

WETTED MATERIALS

Component	Wetted Materials
Body:	
FPD1001B, FPD1002B & FPD1003B	Aluminum
FPD1102B & FPD1103B	PPS
FPD1201B, FPD1202B & FPD1203B	316L Stainless Steel
Shafts:	
FPD1001B, FPD1002B, FPD1003B, FPD1201B, FPD1202B & FPD1203B	316 Stainless Steel
FPD1102B & FPD1103B	Hastalloy (optional)
Rotors:	
FPD1001B, FPD1002B, FPD1003B, FPD1201B, FPD1202B & FPD1203B	PM Stainless Steel
FPD1102B & FPD1103B	PPS
Bushings:	
FPD1001B, FPD1201B, FPD1002B, FTB1003B, FPD1102B, FPD1103B, FPD1202B & FPD1203B	Carbon
Inner Plate / Meter Cap:	
FPD1001B, FPD1002B, FPD1003B, FPD1102B & FPD1103B	PPS
FPD1201B, FPD1202B & FPD1203B	Stainless Steel
Magnet:	
All models	Samarium Cobalt

DISPLAY PARTS LISTING

Models: FPD1001B
FPD1201B



u = Recommended Spare Parts (See Figure 2).
Bold Text = Indicates Stainless Steel model parts.

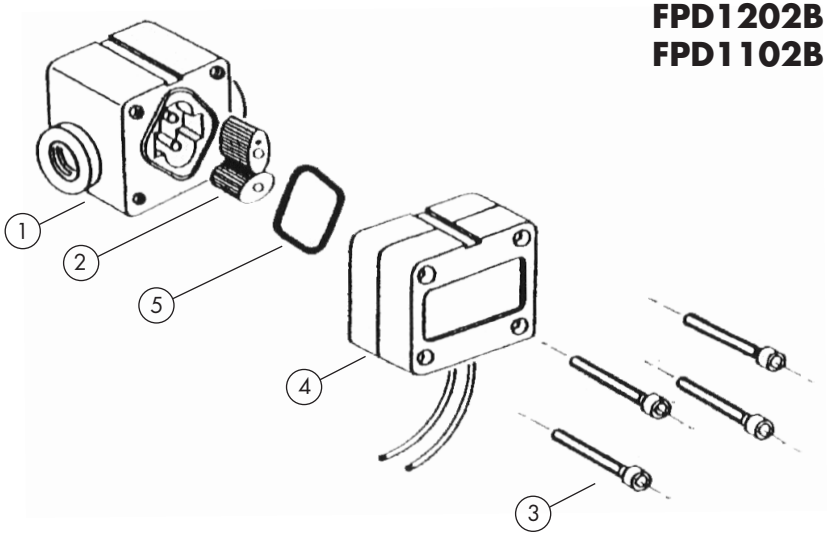
Item No.	Qty.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	**1**		**MS600NS**	**Meter Body & Shafts NPT Stainless Steel**
1	1		MS605NS	Meter Body & Shafts NPT Aluminum
2	1	u	MS1180AS	Meter Cap (FPD1001B)
2	**1**	**u**	**MS1180-1AS**	**Meter Cap (FPD1201B)**
3	4		MS1228S	Screws, Aluminum
3	**4**		**MS12138**	**Screws, Stainless Steel**
4	**1**		**MS601S**	**Rotor Assembly Stainless Steel**
5	1		BS029VS	O-Ring (FKM)
5	1		BS029PS	O-Ring (Perfluoroelastomer)

SPECIFICATIONS

	Stainless Steel Models	Aluminum Models
Port Size	1/8 in.	1/8 in.
Accuracy of Reading	± 1%	± 1%
Maximum Viscosity	1000 Centipoise	1000 Centipoise
Flow Ranges (LPH or GPH)		
Above 5 centipoise	0.5 to 50 / 0.132 to 13.2	0.5 to 50 / 0.132 to 13.2
Below 5 centipoise	2 to 50 / 0.528 to 13.2	2 to 50 / 0.528 to 13.2
K-Factor (Pulses per Liter/Gallon)	1552 / 5875.32	1552 / 5874.32
Max. Operating Pressure	SS = 5500 kPa / 800 PSI / 55 Bar	1000 kPa / 150 PSI / 10 Bar
Strainer Size (Recommended)	200 Mesh	200 Mesh
Bolt Torque	SS = 80 in-lb.	17.7 in-lb.
Min. Operating Temperature	-10°C / +14°F	-10°C / +14°F
Max. Operating Temperature	120°C / 248°F	60°C / 176°F
Pulse Type	Hall Effect Sensor/Reed Switch	Hall Effect Sensor/Reed Switch
Cable Length	1 meter / 3.28 feet	1 meter / 3.28 feet
Weight	602 g / 21.23 oz.	308 g / 10.86 oz.
Dimensions (W x D x H)	60mm x 50mm x 50mm	60mm x 50mm x 50mm
Face to Face	67mm / 2.63 in.	60mm / 2.36 in.

DISPLAY PARTS LISTING

Models: FPD1002B
FPD1202B
FPD1102B



u = Recommended Spare Parts (See Figure 2).
Bold Text = Indicates Stainless Steel model parts.

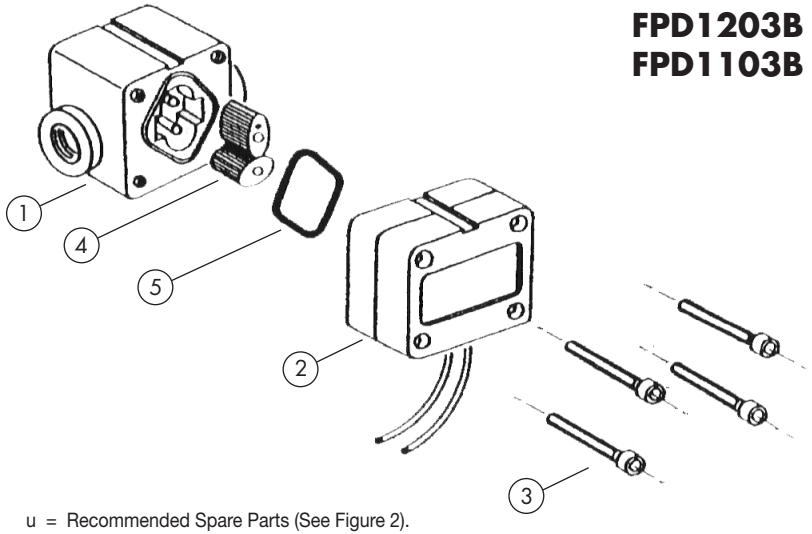
Item No.	Qty.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	**1**		**MS1S-2S**	**Meter Body & Shafts NPT Stainless Steel**
1	1		MS1AL-2S	Meter Body & Shafts NPT Aluminum
1	1		MS1R-2C	Meter Body & Hast Shafts NPT PPS
2	**1**		**MS6-1S**	**Rotor Assembly Stainless Steel**
2	1		MS6S	Rotor Assembly PPS
3	4		MS1228S	Screws, Aluminum/PPS
3	**4**		**MS1213S**	**Screws, Stainless Steel**
4	1	u	MS1180AS	Meter Cap (FPD1002B)
4	**1**	**u**	**MS1180-1AS**	**Meter Cap (FPD1202B)**
4	1	u	MS11870RAS	Meter Cap (FPD1102B)
5	1		BS029VS	O-Ring (FKM)
5	1		BS029PS	O-Ring (Perfluoroelastomer)

SPECIFICATIONS

	Stainless Steel & PPS Models	Aluminum Models
Port Size	1/4 in.	1/4 in.
Accuracy of Reading	± 1%	± 1%
Maximum Viscosity	1000 Centipoise	1000 Centipoise
Flow Ranges (LPH or GPH)		
Above 5 centipoise	2 to 100 / 0.53 to 26.4	2 to 100 / 0.53 to 26.4
Below 5 centipoise	5 to 100 / 1.32 to 26.4	5 to 100 / 1.32 to 26.4
K-Factor (Pulses per Liter/Gallon)	1000 / 3785	1000 / 3785
Max. Operating Pressure	SS = 5515 kPa /800 PSI / 55 Bar PPS = 500 kPa / 75 PSI / 5 Bar	1000 kPa/ 150 PSI / 10 Bar
Strainer Size (Recommended)	200 Mesh	200 Mesh
Bolt Torque	SS = 80 in-lb. PPS = 8.8 in-lb.	17.7 in-lb.
Min. Operating Temperature	-10°C / +14°F	-10°C / +14°F
Max. Operating Temperature	SS = 120°C / 248°F PPS = 80°C / 176°F	80°C / 176°F
Pulse Type	Hall Effect Sensor/Reed Switch	Hall Effect Sensor/Reed Switch
Cable Length	1 meter / 3.28 feet	1 meter / 3.28 feet
Weight	SS = 240 g / 8.5 oz. PPS = 600 g / 21.2 oz.	310 g / 11 oz.
Dimensions (W x D x H)	60mm x 50mm x 50mm	60mm x 50mm x 50mm
Face to Face	SS = 67mm / 2.63 in. PPS = 64mm / 2.52 in.	60mm / 2.36 in.

DISPLAY PARTS LISTING

Models: FPD1003B
FPD1203B
FPD1103B



u = Recommended Spare Parts (See Figure 2).
Bold Text = Indicates Stainless Steel model parts.

No.	Item Qty.	Rec. Parts	Part or Set (Order from this column only)	Part Description
1	**1**		**MS2S-2S**	**Meter Body & Shafts NPT Stainless Steel**
1	1		MS2AL-2S	Meter Body & Shafts NPT Aluminum
1	1		MS2R-2C	Meter Body & Hast Shafts NPT PPS
2	1	u	MS1180AS	Meter Cap (FPD1003B)
2	**1**	**u**	**MS1180-1AS**	**Meter Cap (FPD1203B)**
2	1	u	MS1180RAS	Meter Cap (FPD1103B)
3	4		MS1228S	Screws, Aluminum
3	**4**		**MS1213S**	**Screws, Stainless Steel**
4	**1**		**MS814S**	**Rotor Assembly Stainless Steel**
4	1		MS813S	Rotor Assembly PPS
4	**1**		**MS814HS**	**Rotor Assembly Stainless Steel High Viscosity**
5	1		BS029VS	O-Ring (FKM)
5	1		BS029PS	O-Ring (Perfluoroelastomer)

SPECIFICATIONS

	Stainless Steel & PPS Models	Aluminum Models
Port Size	1/4 in.	1/4 in.
Accuracy of Reading	± 1%	± 1%
Max. Viscosity	1000 Centipoise	1000 Centipoise
High Viscosity Option	Yes	Yes
Flow Ranges (LPH or GPH)		
Above 5 centipoise	15 to 500 / 4 to 32	15 to 500 / 4 t o 32
Below 5 centipoise	25 to 500 / 6 to 132	25 to 500 / 6 to 132
K-Factor (Pulses per Liter/Gallon)	400 / 1514	400 / 1514
Max. Operating Pressure	SS = 5515 kPa/800 PSI/55 Bar PPS = 500 kPa/75 PSI/5 Bar	1000 kPa/150 PSI/10 Bar
Strainer Size (Recommended)	200 Mesh	200 Mesh
Bolt Torque	SS = 80 in-lb. PPS = 8.8 in-lb.	17.7 in./lbs.
Min. Operating Temperature	-10°C / +14°F	-10°C / +14°F
Max. Operating Temperature	SS = 120°C / 248°F PPS = 80°C / 176°F	80°C / 176°F
Pulse Type	Hall Effect Sensor/Reed Switch	Hall Effect Sensor/Reed Switch
Cable Length	1 meter / 3.28 feet	1 meter / 3.28 feet
Weight	240 g / 8.5 oz. 600 g / 21.2 oz. (PPS)	320 g / 12 oz.
Dimensions (W x D x H)	60mm x 50mm x 50mm	60mm x 50mm x 50mm
Face to Face	SS = 67mm / 2.63 in. PPS = 64mm / 2.52 in.	60mm / 2.36 in.

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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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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