

# User's Guide

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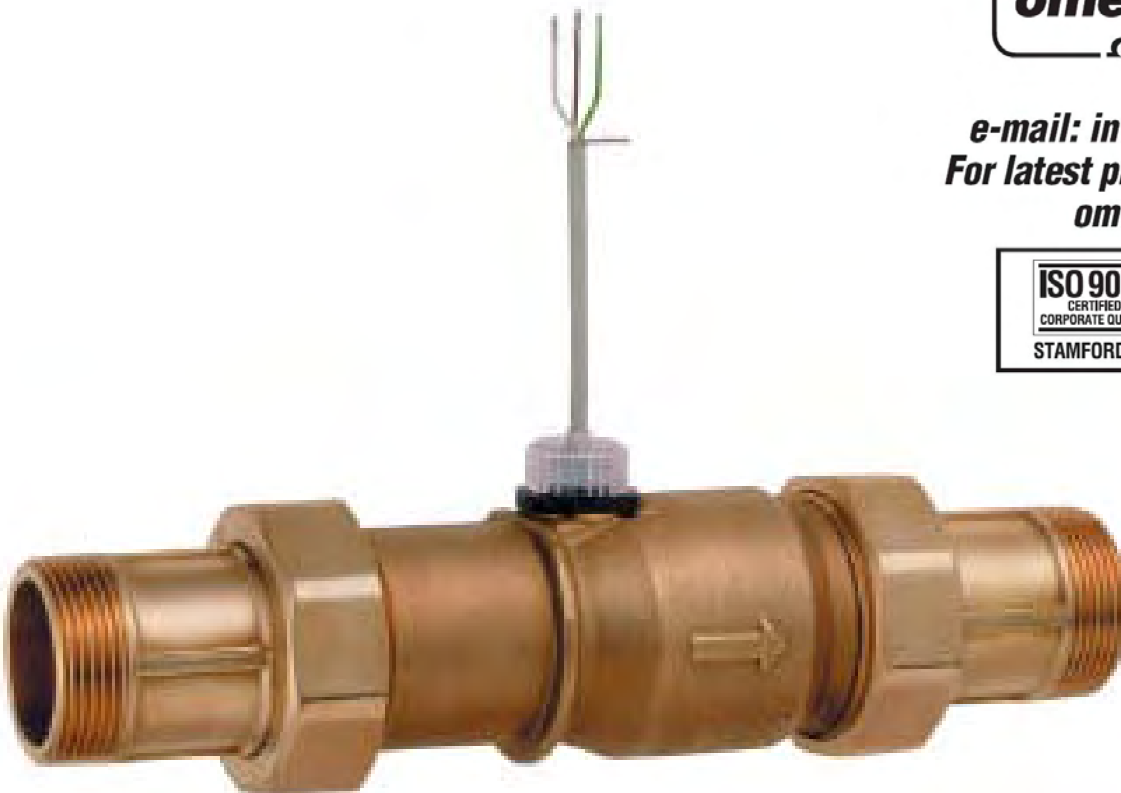
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**FTB 373**

**Turbine Flow Sensor**



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, human applications.

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## 1 Function

The turbine flow sensor of the series turbine is a transducer for flow rate and total flow measurement. It has an almost unlimited application through its exceptionally compact design, its very wide measurement range and its convincing measurement accuracy.

In the centre of the brass turbine body there is the plastic turbine system. For design reasons, there is a ring gap around the turbine system.

A part of the liquid flow makes the turbine rotate while the other

part flows through the ring gap without obstruction.

This special construction does not influence the measurement

result, the output signal of the sensor is equal to the complete

volume flow rate.

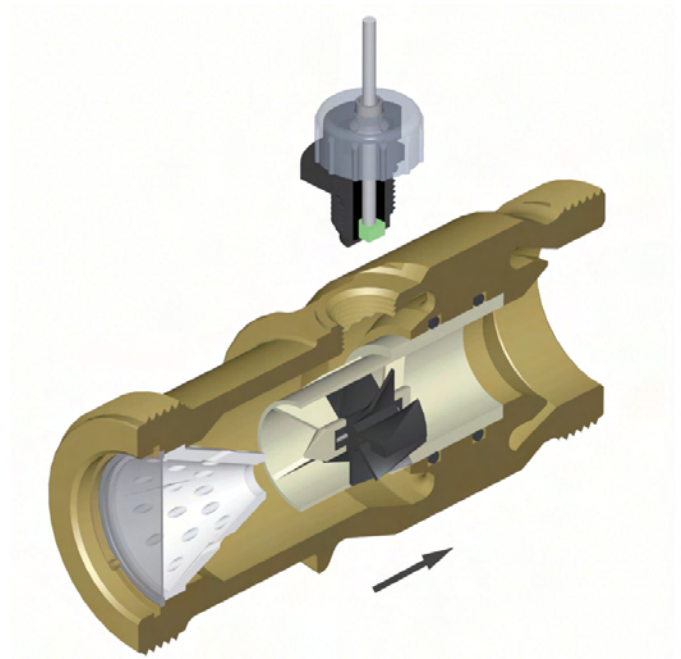
Based on high-quality sapphire bearings and low rotational speed,

the turbine assures an exceptionally long life expectancy.

The rotor speed is transmitted to an electrical pulse signal (frequency):

- FTB 373 is equipped with magnets on the rotor.  
A Hall-Effect sensor detects the rotation of the rotor.

In this case, a flow-proportional frequency signal (square wave signal) is provided.



## 2 Safety instructions

- Before you install the product, please read the relevant chapters of the installation instruction carefully.
- The turbine flow sensor is only suitable for measuring liquid flows, on no account for measuring gas flows.
- Check before installation, whether the material of the turbine flow sensor is suitable for the medium to be monitored (see Materials, Chapter 8)!
- You can fit the turbine flow control instrument in any position. If it is installed into vertical pipes, the flow direction is preferably upwards. You must avoid a free outlet.
- The arrow which is placed on the flow sensor (➔) shows the only permitted flow direction.
- For precise measurement, the length of the straight in - and outlet pipes must be observed (see Chap. 3: requirements for installation and operation)
- In order to achieve highest-possible measurement accuracy, the internal diameter of the in - and outlet tube must correspond with the internal diameter of the flow sensor.
- The flow medium to be measured should preferably contain as few solid particles as possible. Present particles must not exceed a diameter of 0.025 inch. If necessary, install a filter!
- Avoid absolutely the formation of gas bubbles or cavitation in the medium by taking proper measures.
- The material of the instrument is **not suitable** for monitoring oils. The strength of the used plastic parts would be considerably reduced.
- In order to clean the flow sensor of contamination, flush the unit with water reverse to the flow direction (see Chap. 6).
- The instrument must not be blown out with compressed air. The turbine bearings can be damaged.
- We recommend to use only screened connection cables. Connect the shield on one side (the wire ends) on ground.
- There are special customer designs that may differ from the standard data listed in these instructions – always consider the specifications noted on the type plate.
- **Attention:**  
The sensor housing (Hall-Effect-Sensor) is sealed and must not be opened.
- There are special customer designs that may differ from the standard data listed in these instructions – always consider the specifications noted on the type plate.

If you should have any problems or questions, please contact your local supplier or directly:



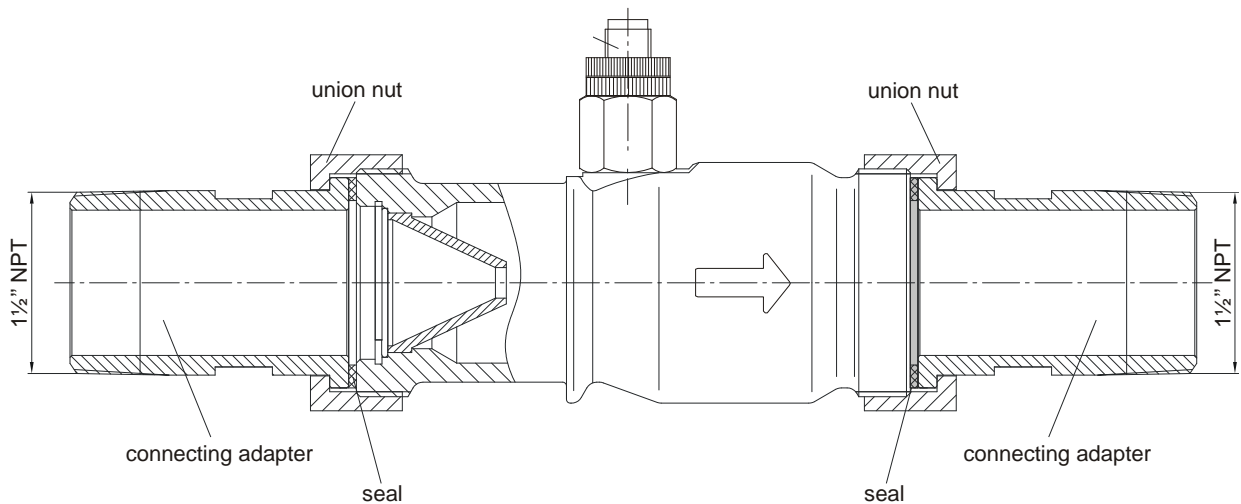
### 3 Important notes and requirements for installation and operation

Observe the following instructions in order to achieve highest-possible measurement accuracy and specified output signal.

- Before installing the turbine flow sensor flush the pipe carefully. You avoid a blocking of the turbine caused by particles from the pipe installation.
- The installation position of the turbine flow sensors is unreserved. If it is installed into vertical pipes, the flow direction is preferably upwards. You must avoid a free outlet.
- The arrow which is placed on the flow sensor (➔) shows the only permitted flow direction.
- In order to achieve highest-possible measurement accuracy, a straight tube in front (upstream) of the flow sensor must be retained, min 10 x ID, i.e. 15.8 inch. Behind the flow sensor (downstream), a straight outlet tube of 5 x ID, i.e. 7.9 inch, must be kept. The internal diameter of the in- and outlet tubes must correspond with the internal diameter of the flow sensor = 1.58 inch. Before and behind the stabilization tubes, the line may be contracted or enlarged.  
In practice these instructions often can not be observed. Then the pulse rate and the measurement accuracy can be affected.
- The flow medium to be measured should preferably contain as few solid particles as possible. Present particles must not exceed a diameter of 0.025 inch. If necessary, install a filter!
- The materials of the instrument are not suitable for monitoring oils. The strength of the used plastic parts would be considerably reduced.
- **Attention:**  
The sensor housing (Hall-Effect-Sensor) is sealed and must not be opened.

## 4 Installation in piping

- Now you can install the Turbotron in the piping system which was prepared according to chapter 3.



- The connecting adapter has an 1½" thread connection male. Make sure that the correspondent part has an 1½" thread connection female.
- At first screw-in the connection adapters into the tube. Use only a suitable compound for sealing. Take care that no fibrous sealing compounds get into the turbine (hemp or Teflon tape).
- Now install the turbine. Make sure that the provided seals fit properly and tighten the union nuts.


## 5 Electrical connection

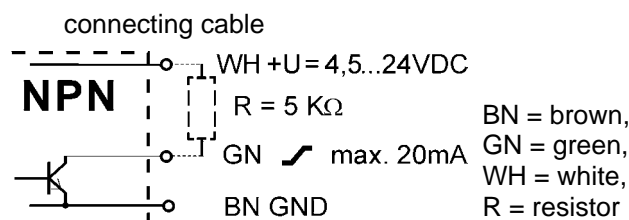
**Attention:** We recommend to use only screened connection cables. Connect the shield on one side (the wire ends) on ground.

### Turbine flow sensor with pulse output

The output signal of FTB 373 is a flow-proportional frequency signal. The shape of the signal is a square wave and its amplitude corresponds approximately with the supply voltage. It is an open collector signal, NPN-switching. The connected electronic instrument should have a loading resistance (pull-up or pull-down resistor) of 5 kΩ in the inlet.

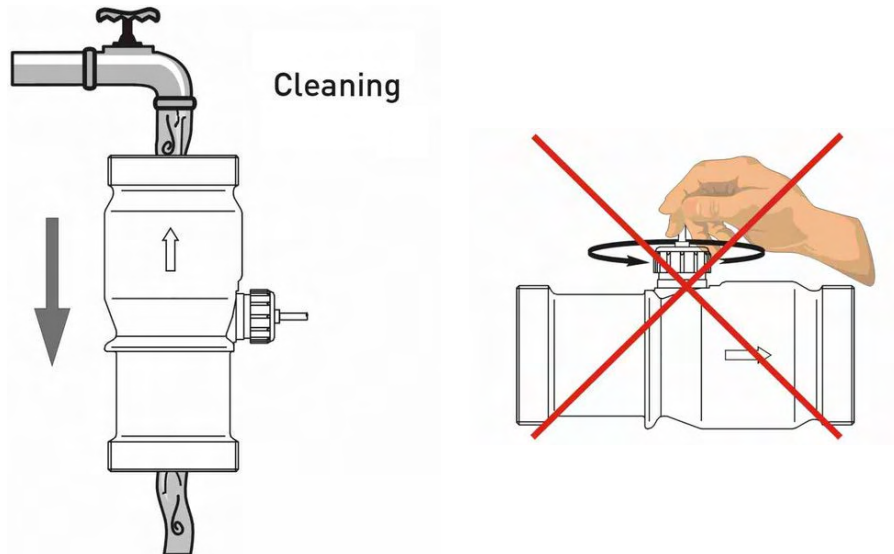
### Schematic representation

A connection is made with three wires, the supply voltage must be connected between +U and GND (ground), the output signal can be tapped between  and GND. The colour assignment of the supply cables can be taken from the sketch on the type plate.



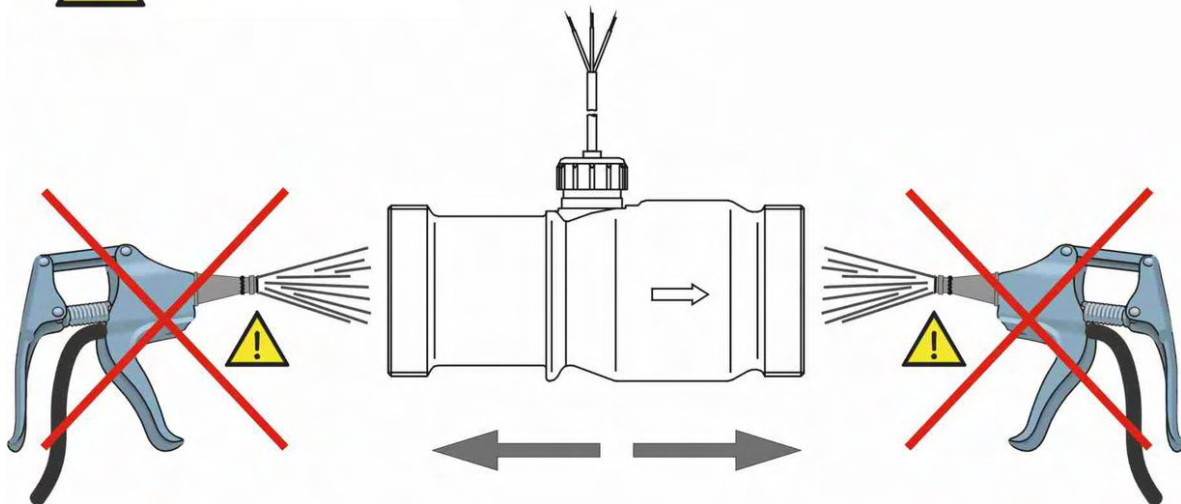
## 6 Cleaning

- To remove dirt from the flow sensor, you should flush it with water reverse to the flow direction.
- **Attention:**  
The sensor housing (Hall-Effect-Sensor) is sealed and must not be opened.



- **Warning:**  
You must not blow-out the instrument with compressed air. The turbine bearings can be damaged.

 Do not blow out !



## 7 Shut-down and disposal

- Remove the electrical connection and remove the flow sensor.
- The Turbotron unit is made of different materials (see technical data). Don't dispose the Turbotron unit together with household waste. The official rules of your area have to be observed at disposing of the Turbotron unit.



## 8 Materials table

Materials	
Type	FTB 373
Pipe section	Brass, CW724R
Turbine cage	PPO Noryl GFN1630V
Rotor	PPO Noryl GFN1520V
Rotor assembly	Hard ferrite magnets
Shaft	Stainless steel 904L
Bearing	Sapphire / PA
Sensor housing	PPO Noryl GFN1630V
O-ring	EPDM
Flow guiding cone	POM
Strainer	Stainless steel 304
Retaining ring	Bronze 2.1030.34

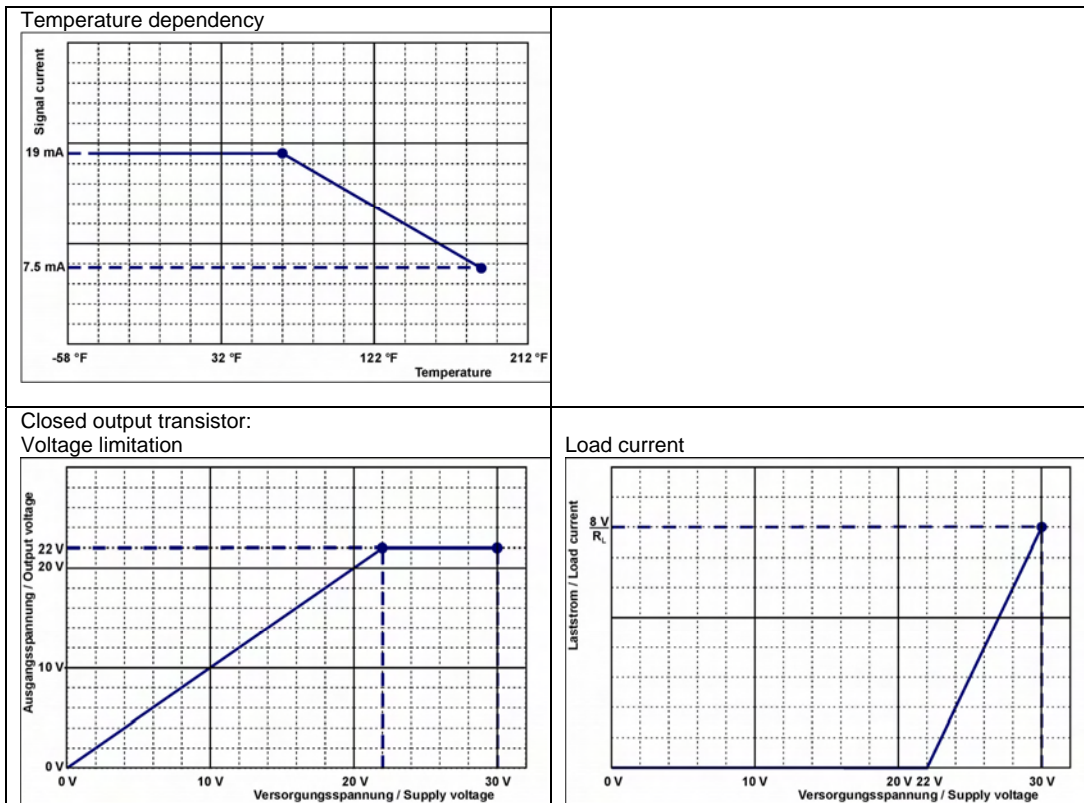
## 9 Technical data

### Turbine flow sensor with pulse output

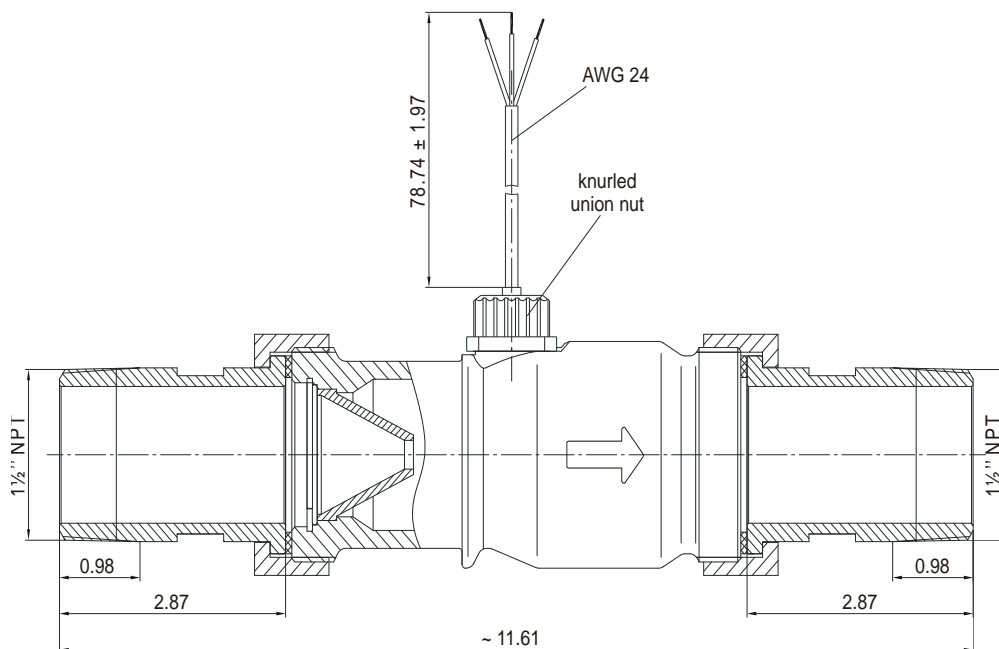
There are special customer designs that may differ from the standard data listed in these instructions – always consider the specifications noted on the type plate.

Type	FTB 373
Material pipe section	Brass
Nominal diameter	1½"
Measurement range	1.8 ... 110 GPM
Accuracy	±7% of reading (1.8...13.2 GPM) ±5% of reading (13.2...110 GPM)
Repeatability	±0.5%
Signal output from	> 1.23 GPM
Sensor	Hall sensor
Output signal - Pulse rate / K-factor - Resolution - Signal shape  - Signal current	101 pulses / gal 0.0099 / pulse Square wave signal NPN open collector  max. 7.5...19 mA (see Sect.9.1)
Pull-up-resistor	5 kΩ (recommendation)
Supply voltage	4,5...24 VDC
Electrical connection	6.6 ft PVC cable, screened (T <sub>max</sub> = 167 °F) or 4-pin-plug M12x1
Degree of protection	IP 54
Max. medium temperature	185 °F
Nominal pressure	145 psi
Particle size in the medium	< 0.025"
Integrated strainer	Flat filter, mesh size 0.025"
Process connection	1½" NPT male thread

## 9.1 Hall sensor output signal characteristics



## 10 Dimensions



## 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.

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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