ΩΞ OMEGA®
User's Guide

DP240

Serial #010991
Object Temp: **125.6°C**

Avg Temp: 126.5
Max Temp: 148.7
Min Temp: 124.7
Sensor Temp: 24.2
Reflected Temp: 24.2

Units
● °C
○ °F

<< Back

ΩΞ OMEGA®

OS210-C4
IR Temperature Sensors

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OS210-C4 series non-contact infrared sensors measure temperatures from -20°C to 500°C and provide an RS485 Modbus RTU interface.

OS210-C4 SPECIFICATIONS

Temperature Range vs Field-of-View table

Field of View	Model Number
2:1	OS211-C4
15:1	OS151-C4

Field of View	Model Number
30:1	OS301-C4
ø5mm @ 100mm	OS801-C4

Interface	RS485 Modbus RTU
Accuracy	±1% of reading or ±1ºC whichever is greater
Repeatability	± 0.5% of reading or ± 0.5ºC whichever is greater
Emissivity	0.2 to 1.0
Response Time, t_{90}	240 ms (90% response)
Spectral Range	8 to 14 µm
Supply Voltage	12 V DC nominal (6 - 13 V DC)
Supply Current	50 mA max.
Baud Rate	9600 baud *
Format	8 data bits, no parity, 1 stop bit *
MECHANICAL	
Construction	Stainless Steel
Dimensions	18 mm diameter x 103 mm long
Thread Mounting	M16 x 1 mm pitch
Cable Length	1 m
Weight with Cable	95 g
ENVIRONMENTAL	
Environmental Rating	IP65
Ambient Temperature	0ºC to 70ºC
Relative Humidity	95% max. non-condensing

* Other configurations available upon request

The DP240 is a 320x240 pixel touch-screen terminal with a 3.5"colour TFT display. It allows the user to display data from up to eight OS210-C4 sensors and configure each sensor individually. The configuration parameters include emissivity setting, signal averaging, peak or valley hold processing and reflected energy compensation.

There are two versions available. Each one provides all of the features above, however, the enhanced DP240-AR also provides analogue transmission for up to four sensors, plus two adjustable alarm outputs per sensor for all eight sensors.

DP240 TOUCHSCREEN TERMINAL SPECIFICATIONS

Display Format	LCD type TFT 320 x 240, 3.5" touch screen, Resistive
Supply Voltage	12 to 24 V DC
Power Consumption	8 W
Serial port EXP1	RS485 Modbus RTU interface for OS210-C4 Series sensors
Serial port COM2	RS485 / RS232 interface for second display (read only)
Outputs (DP240-AR only)	4 analogue outputs, 0 to 10 V DC, 16 programmable alarm outputs,12/24 V DC, 700 mA, (3 A max. per block of 8 outputs).
MECHANICAL	
Construction	Polycarbonate with gasket, transparent lid (PC) and quick release screws
Mounting	Surface
Dimensions	140mm wide x 100mm tall x 44mm deep (DP240)
	140mm wide x 100mm tall x 65mm deep (DP240-AR)
ENVIRONMENTAL	
Environmental Rating	IP54 (front), IP30 (housing)
Ambient Temperature Range	0°C to 45°C
Relative Humidity	35% to 95%, non-condensing

M16 x 1mm

1000 — 12 — 103 — 18
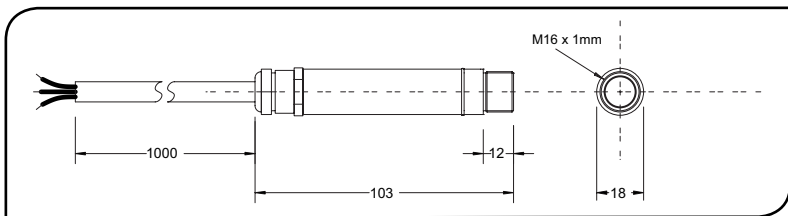
ACCESSORIES

A range of accessories to suit different applications and industrial environments is available. These may be ordered at any time and added on-site. The accessories consist of the following parts.

Fixed mounting bracket   Adjustable mounting bracket   Air purge collar
Laser sighting tool

OPTIONS

The following options are available. Options are factory installed and must be ordered with the sensor.

Air/water cooled housing   Certificate of calibration   Longer cable

OPTICAL CHART

The optical chart below indicates the nominal target spot diameter at any given distance from the sensing head and assumes 90% energy.

OS211-C4   OS151-C4   OS301-C4   OS801-C4
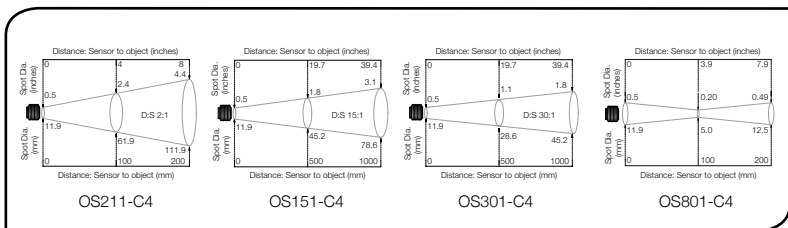
INSTALLATION

The installation process consists of the following stages:

Preparation   Mechanical installation   Electrical installation

Please read the following sections thoroughly before proceeding with the installation.

PREPARATION

Ensure that the sensor is positioned so that it is focused on the target only.
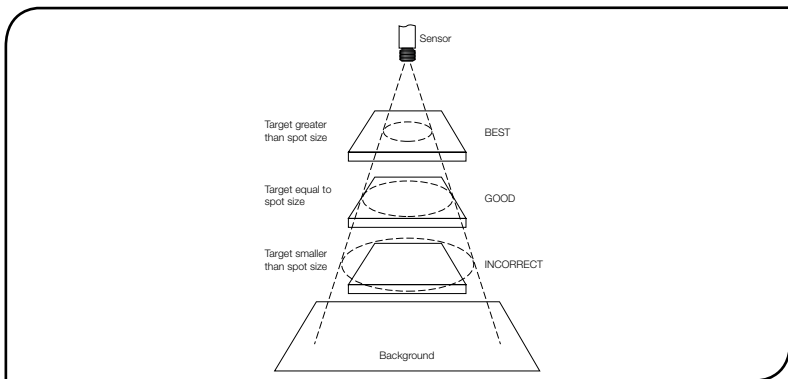
DISTANCE AND SPOT SIZE

The size of the area (spot size) to be measured determines the distance between the sensor and the target. The spot size must not be larger than the target. The sensor should be mounted so that the measured spot size is smaller than the target.

AMBIENT TEMPERATURE

The sensor is designed to operate in ambient temperatures from 0°C to 70°C. For ambient temperatures above 70°C, an air/water-cooled housing will be required.

Avoid thermal shock. Allow 20 minutes for the unit to adjust to large changes in ambient temperature.

ATMOSPHERIC QUALITY

Smoke, fumes or dust can contaminate the lens and cause errors in temperature measurement. In these types of environment the air purge collar should be used to help keep the lens clean.

ELECTRICAL INTERFERENCE

To minimise electromagnetic interference or 'noise', the sensor should be mounted away from motors, generators and such like.

WIRING

Check the distance between the sensor and the Modbus Master. If necessary, the OS210-C4 sensor can be ordered with a longer cable attached.

POWER SUPPLY

Be sure to use a 12Vdc, (50mA max.) power supply.

MECHANICAL INSTALLATION

All sensors come with a 1m cable and a mounting nut. The sensor can be mounted on brackets or cut outs of your own design, or you can use the fixed and adjustable
mounting bracket accessories which are shown below. Note: The sensor must be grounded at only one point, either the cable shield or the sensor housing.
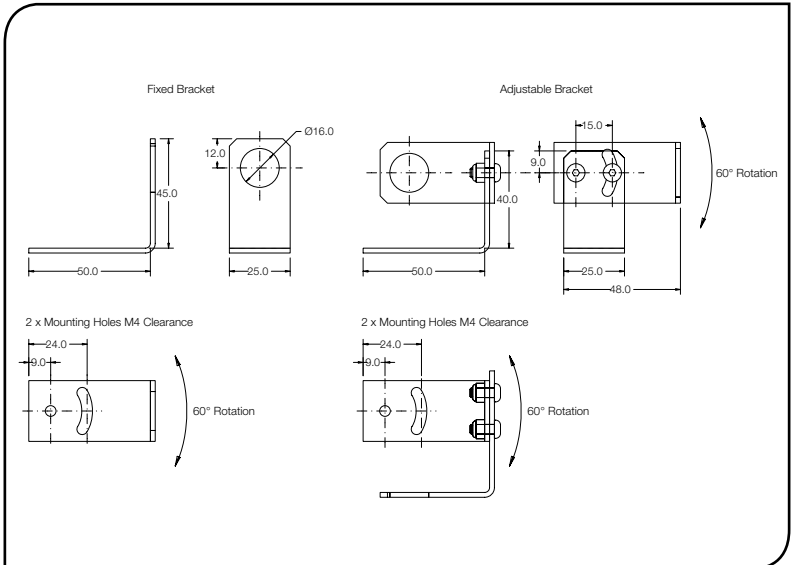
AIR/WATER COOLED HOUSING

The air/water cooled housing shown below allows the sensor to withstand high ambient temperatures. It is equipped with two 1/8" BSP fittings. Water temperature should be 10°C to 27°C for efficient cooling. Chilled water below 10°C is not recommended. To avoid condensation, the air purge collar should be used with the water-cooled housing. Water flow rate should not be more than 0.5 to 1.5 litres/min.
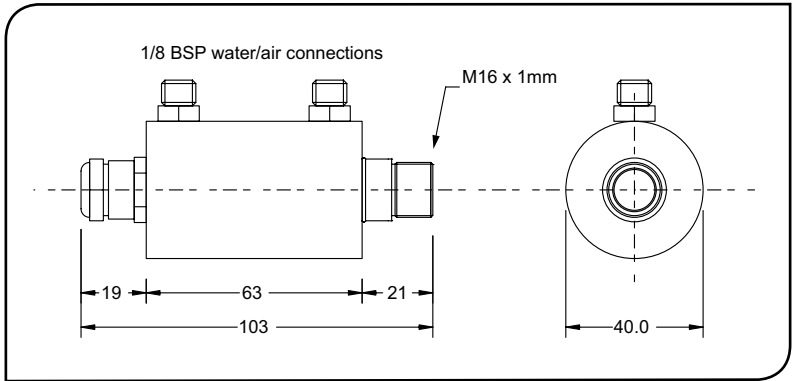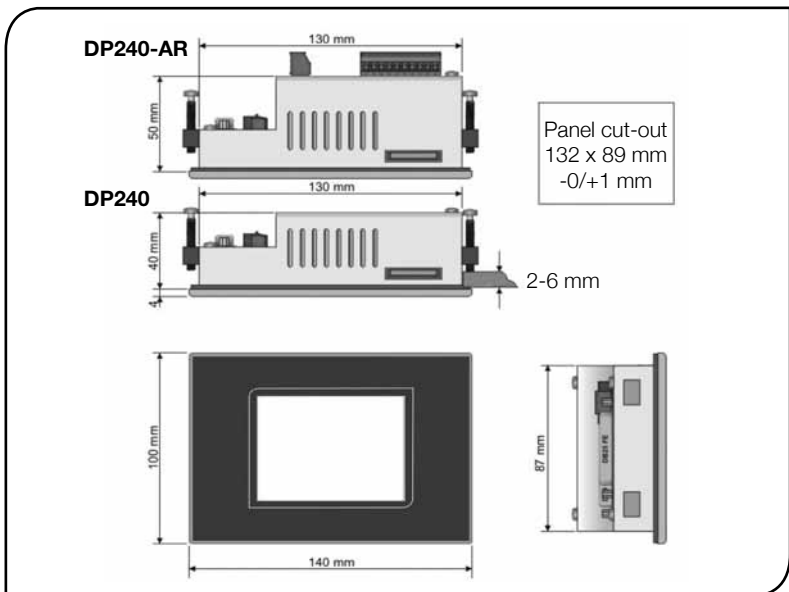

AIR PURGE COLLAR

The air purge collar below is used to keep dust, fumes, moisture, and other contaminants away from the lens. It must be screwed in fully. Air flows into the 1/8" BSP fitting and out of the front aperture. Air flow should be no more than 5 to 15 litres/min.
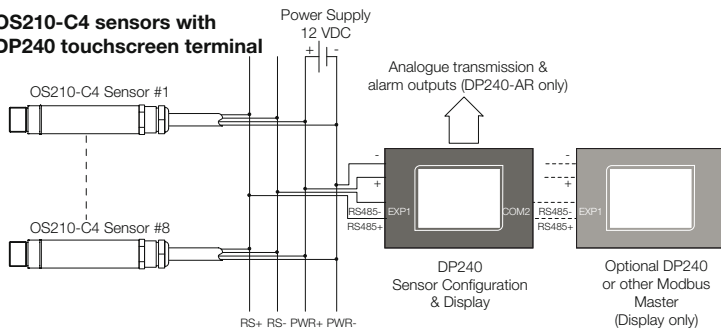
Clean or 'instrument' air is recommended.
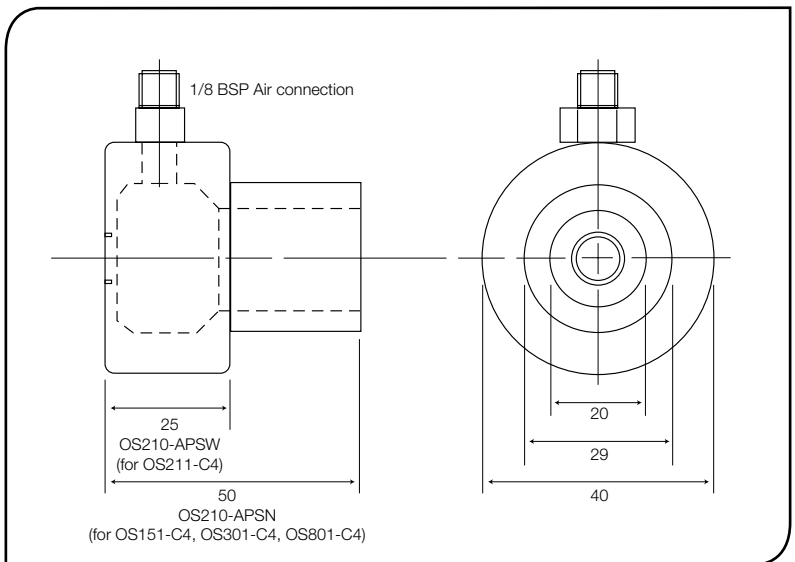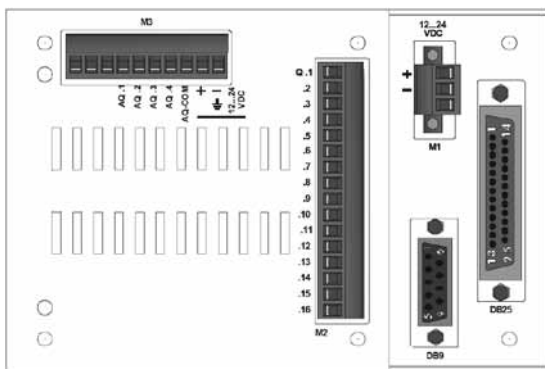
ELECTRICAL INSTALLATION
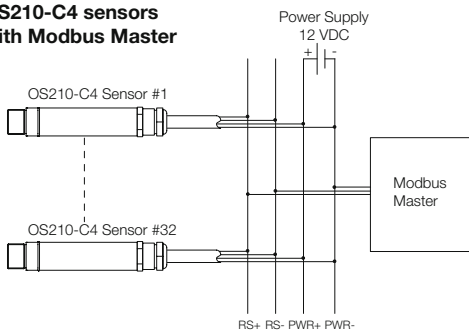
DP240 CONNECTIONS

Power input on M1 (12 to 24 VDC):
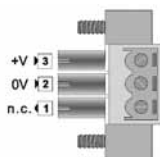
MODBUS master interface EXP1 on DB9:

Description	OS210-C4 cable ident.	DB9 pin no.
RS485 +	RS+	9
RS485 -	RS-	4
RS485 GND	PWR-	5

MODBUS slave interface COM2 on DB25 (only applicable when using second DP240-AR as display only repeater)

Description	DP240 (1) DB9 pin no.	DP240 (2) DB25 pin no.
RS485 +	9	24
RS485 -	4	25
RS485 GND	5	14

Alarm outputs Q1-16 on M2 (DP240-AR only):

	Alarm 1	Alarm 2
Sensor 1	Q1	Q2
Sensor 2	Q3	Q4
Sensor 3	Q5	Q6
Sensor 4	Q7	Q8
Sensor 5	Q9	Q10
Sensor 6	Q11	Q12
Sensor 7	Q13	Q14
Sensor 8	Q15	Q16

Analogue outputs (0-10V) AQ1-4 on M3 (DP240-AR only):

AQ1 = Sensor 1, AQ2 = Sensor 2,
AQ3 = Sensor 3, AQ4 = Sensor 4

DP240 DISPLAY FUNCTIONS

Sensor list screen:

🔒 / 🔓	Unlock display
◐	Edit contrast
🔍	Search for sensors
📱	Move selected sensor up in list
📱	Move selected sensor down in list
#	View selected sensor
#	View all sensors

Single sensor and multiple sensor display screen:

🔒 / 🔓	Lock/Unlock display
#	View sensor list

Icon	Description
ε	View/edit sensor emissivity setting
≥|	View/edit sensor reflected energy
📠	View/edit sensor measurement filtering and peak/valley hold settings
🔔	View/edit sensor alarm settings
ACK	Acknowledge alarms
⊙ °C	Set units to °C
○ °F	Set units to °F
°C °F	Toggle between °C and °F
Serial No. 000000 0000.0	Press to toggle between single sensor and multiple sensor displays
OK	Sensor status display: N/C:Sensor is not connected OK: Sensor is operating correctly ERR: A communications error has occurred AL1: Alarm 1 is active AL2: Alarm 2 is active AL*: Alarm 1 and Alarm 2 are active

Emissivity settings:
Press on emissivity value to manually edit, or select a material from the list.

Icon	Description
↓#	Apply settings to selected sensor only
#↓	Apply settings to all connected sensors
🚪	Exit without applying settings

Reflected energy compensation:
To enable: press on reflected temperature value and enter required temperature. Press on enable. To disable: press on disable.

Icon	Description
↓#	Apply settings to selected sensor only
#↓	Apply settings to all connected sensors
🚪	Exit without applying settings

Filtering and peak/valley hold processing:
Enter average period and hold period by pressing on their respective values. Select the required hold mode from the list.

Icon	Description
↓#	Apply settings to selected sensor only
#↓	Apply settings to all connected sensors
🚪	Exit without applying settings

Alarms:
To set alarms, press on alarm temperatures and enter required values. Select alarm mode from list.

Icon	Description
↓#	Apply settings to selected sensor only
#↓	Apply settings to all connected sensors
🚪	Exit without applying settings
RST#	Reset alarms for selected sensor only
#RST	Reset alarms for all connected sensors

Display lock/unlock:
When the display is locked, sensor settings can be viewed but not edited. To unlock the display, enter the passcode by pressing on **** (default 1234), then press the unlock button. To lock the display, press the lock button. To change the passcode, first unlock the display, then press the change passcode button.

Icon	Description
🔓	Unlock display
🔒	Lock display
✳	Change passcode

Change passcode screen:
To change the passcode: enter the new passcode, confirm the new passcode, press the accept button.

Icon	Description
✳	Accept new passcode
🚪	Exit without changing passcode

MODBUS OVER SERIAL LINE

INTERFACE

Baud rate	9600
Format	8 data bits, No parity, 1 stop bit
Reply delay (ms)	20

SUPPORTED FUNCTIONS

Read register	0x03, 0x04
Write single register	0x06
Write multiple register	0x10
Mask write register	0x16

The list below includes all available addresses:

R = Read, W = Write, MW = Mask write

Address	Length (words)	Description	R/W/MW
0x00	1	MODBUS slave address (1 to 247)	R/W *
0x02	2	Sensor identification register Bits 0..19 - Serial number Bits 20..23 - Sensor type (8 = OS210-C4 sensor) Bits 24..26 - Sensor field-of-view (0 = 2:1, 1 = 15:1, 2 = 30:1) Bits 27..32 - Reserved	R
0x06	1	Un-filtered object temperature	R
0x08	1	Sensor temperature	R
0x0A	1	Maximum temperature over hold period	R
0x0C	1	Minimum temperature over hold period	R
0x0E	1	Average temperature over hold period	R
0x10	1	Filtered object temperature	R
0x12	1	Reflected temperature	R/W
0x14	1	Sensor status register Bits 0..1 - Reserved Bit 2 - Hold processing on (1)/off (0) Bit 3 - Hold peaks (1)/valleys (0) Bits 4..6 - Reserved Bit 7 - Reflected energy compensation on (1)/off (0) Bits 8..15 - Reserved	R/W/MW
0x16	1	Average period (1 LSB = 0.05 seconds) Minimum 0.05 seconds, Maximum 60.00 seconds	R/W
0x18	1	Hold period (1 LSB = 0.05 seconds) Minimum 0.05 seconds, Maximum 1200.00 seconds	R/W
0x1A	1	Emissivity (1 LSB = 0.0001) Minimum 0.2000, Maximum 1.0000	R/W

* Single register writes only. New address will not take effect until next power on.

Notes:
1. All temperatures are in tenths of degrees C
2. Writing to bits listed as reserved or unlisted registers could cause malfunction
3. All write and mask operations are saved to non-volatile memory
4. For further information please refer to http://www.modbus.org/specs.php
5. Use address 255 to communicate with any connected sensor. Use address 0 to broadcast to all connected sensors (no response expected)

OPERATION

Once the sensor is in position and the appropriate power, air, water, and cable connections are secure, the system is ready for continuous operation by completing the following simple steps:

1. Turn on the power supply
2. Turn on the Modbus Master
3. Read / monitor the temperature

IMPORTANT

Be aware of the following when using the sensor:

• If the sensor is exposed to significant changes in ambient temperature (hot to cold, or cold to hot), allow 20 minutes for the temperature to stabilise before taking or recording measurements.
• Do not operate the sensor near large electromagnetic fields (e.g. around arc welders or induction heaters).
  Electromagnetic interference can cause measurement errors.
• Wire must be connected only to the appropriate terminals.

MAINTENANCE

Our customer service representatives are available for application assistance, calibration, repair, and solutions to specific problems. Contact our Service Department before returning any equipment. In many cases, problems can be solved over the telephone. If the sensor is not performing as it should, try to match the symptom below to the problem. If the table does not help, call Omega for further advice.

Troubleshooting		
Symptom	**Probable Cause**	**Solution**
No output	No power to sensor	Check power supply
Erroneous temperature	Incorrect wire connection	Check wire colour codes
Erroneous temperature	Faulty sensor cable	Verify cable continuity
Erroneous temperature	Field of view obstruction	Remove obstruction

LENS CLEANING

Keep the lens clean at all times. Any foreign matter on the lens would affect measurement accuracy. Blow off loose particles (if not using the air purge accessory) with an air 'puffer'.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **37 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **three (3) 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:	FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:
1. Purchase Order number under which the product was PURCHASED,	1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product under warranty, and	2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.	3. Repair instructions and/or specific problems relative to the product.

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