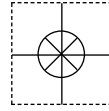


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# User's Guide

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## **OS1592** **Infrared Fiber Optic** **Thermometer/Transmitter**



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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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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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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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## INTRODUCTION

The new OS1592 series Infrared Fiber Optic Thermometer / Transmitter provides non-contact temperature measurement for industrial applications. The unit measures temperature starting at 260°C (500°F) and up to 2482°C (4500°F). It provides dual analog outputs (4-20 mA, 0-5 VDC, 0-10 VDC, 1 mV/Deg, J & K type T/Cs) electrically isolated from the main input DC power supply. The 1 mV/Deg analog output is standard on all units.

The main electronics is in a NEMA-4 rated Die cast Aluminum housing, with a local backlit LCD, built-in Relay, Alarm LED, and a 4 position programmable keypad.

The unit accommodates any of the following assembly types:

- Optical Assembly
- Ceramic Tip Assembly
- Polymer Bolt Assembly

## INSTALLATION

### 2.1 Unpacking

Remove the packing list and verify that you have received all your equipment. If you have any questions about the shipment, please call Customer Service at

1-800-622-2378 or 203-359-1660. We can also be reached on the internet:

[www.omega.com](http://www.omega.com)

e-mail: [info@omega.com](mailto:info@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:**



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The carrier will not honor any damage claims unless all the shipping materials are saved for inspection. After examination and removing contents, save packing material and carton in the event reshipment is necessary.

---

The following items are supplied in the box:

- OS1592 Infrared Fiber Optic Thermometer / Transmitter
- The corresponding Optical Assembly
- User's Manual

The following describes the ordering information:

<b>To Order ( Specify Model Number )</b>			
<b>Model No.</b>	<b>Temperature Range</b>	<b>Optical Assy (Spot Size) Length</b>	<b>Cable</b>
OS1592-L1-R1-1-*	260/538°C (500 to 1000°F)	Lens Probe 6.3 mm (0.25") @ 20.3 cm (8")	1.52 m (5')
OS1592-L2-R1-*	260/538°C (500 to 1000°F)	Ceramic Tip, 15.2 cm (6") Probe	1.52 m (5')
OS1592-L3-R1-*	260/538°C (500 to 1000°F)	Polymer Bolt, 10.2 cm (4") Probe	1.52 m (5')
OS1592-L1-R2-1-*	538/1093°C (1000 to 2000°F)	Lens Probe 6.3 mm (0.25) @ 20.3 cm (8")	1.52 m (5')
OS1592-L1-R2-2-*	538/1093°C (1000 to 2000°F)	Lens Probe 4.8 mm (0.19") @ 50.8 cm (20")	1.52 m (5')
OS1592-L1-R2-3-*	538/1093°C (1000 to 2000°F)	Lens Probe 1.9 mm (0.076") @ 15.2 cm (6")	1.52 m (5')
OS1592-L2-R2-*	538/1093°C (1000 to 2000°F)	Ceramic Tip, 15.2 cm (6") Probe	1.52 m (5')
OS1592-L3-R2-*	538/1093°C (1000 to 2000°F)	Polymer Bolt, 10.2 cm (4") Probe	1.52 m (5')
OS1592-L1-R3-2-*	1093/2482°C (2000 to 4500°F)	Lens Probe 4.8 mm (0.19") @ 50.8 cm (20")	1.52 m (5')
OS1592-L1-R3-3-*	1093/2482°C (2000 to 4500°F)	Lens Probe 1.9 mm (0.076") @ 15.2 cm (6")	1.52 m (5')

The unit provides two separate analog outputs. The first is 1mV/Deg (Standard). The second analog output to be specified as follows :

- \* , where,
- mA , 4-20 mA output
- V1, 0/5 VDC output
- V2, 0/10 VDC output
- K, Thermocouple output, K type (For R1 & R2 Temperature range only)
- J , Thermocouple output, J type (For R1 Temperature range only)

There are three temperature ranges:

R1 – 260 to 538 °C (500 to 1000 °F)

R2 – 538 to 1093 °C (1000 to 2000 °F)

R3 – 1093 to 2482 °C (2000 to 4500 °F)1

<b>Accessories</b>	
<b>Model No.</b>	<b>Description</b>
OS1500-BLS	Backlight Source
OS1500-BLF	Backlight Fiber Assembly to use with OS1500-BLS
OS1500-RC	Replacement Bulb
PSU-93	Unregulated 24 VDC Power Supply
OS1592-MB	Mounting Bracket
OS1592-AP1	Air Purge Collar for -1 & -2 Lens probe 6.3 mm (.25") @ 20.3 cm (8") (-1 probe) 4.8 mm (.19") @ 50.8 cm (20") (-2 probe)
OS1592-AP2	Air Purge Collar for -3 Lens probe 1.9 mm (.076") @ 15.2 cm (6")

## 2.2 – Electrical Connection

Attach the optical assembly to the optical adapter located on the side of the housing. Refer to Fig. 1 for the overall appearance of the unit.

Open the cover of the aluminum housing. Slide your cable through the metal feed thru and connect the wires to the 9 position terminal block (J101) as shown in Fig. 2. Depending on the type of the analog outputs, you need to make the proper connection. Connect the shield of the cable to the inside of the metal feed thru to minimize RF noise.

In order to use the Backlight source OS1500-BLS, disconnect the fiber optic assembly from the main electronic unit and connect to the light source. The focused light through the fiber optic assembly provides the positioning of the optical assembly on the target. After the positioning, reconnect the fiber optic assembly back to the main unit.

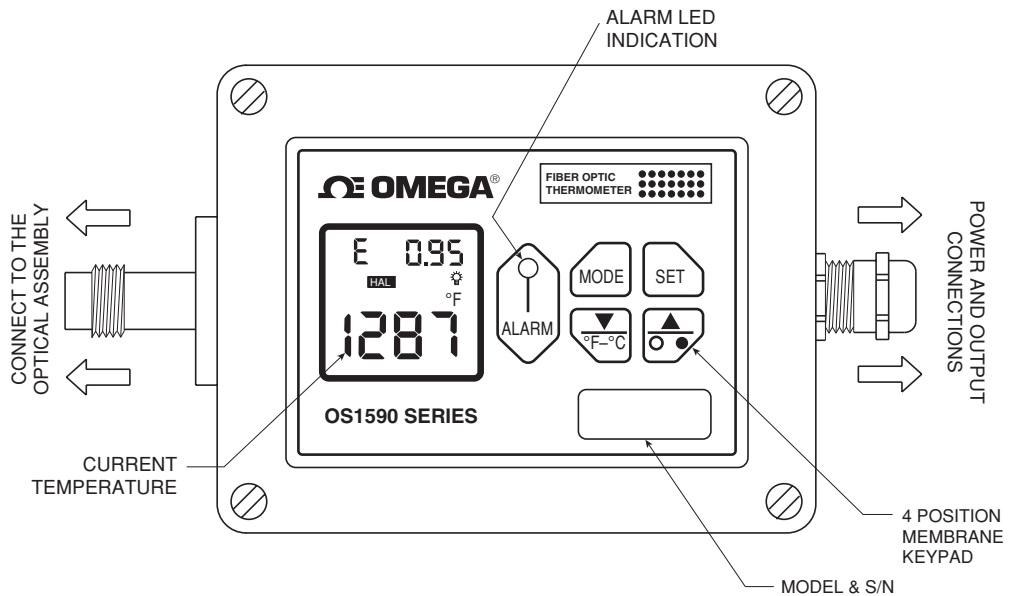


Figure 1 - OS1592 Main Unit

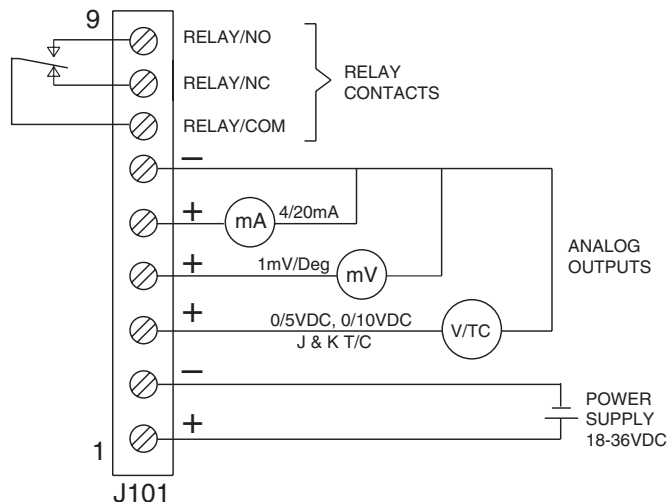


Figure 2 - Power Supply and Analog Output Connections



## OPERATION

Table 1 shows all the display modes of the model OS1592, as well as all the functions of the membrane keypad. Fig 3 shows the Visual Functional flow chart of the display.

DISPLAY MODE:	Display shows:	Press <b>MODE</b> to...	Press <b>SET</b> to...	Press $\downarrow$ or $\uparrow$ to...
<b>E</b>	Current temperature Emissivity	Go to <b>MAX</b>	---	Set emissivity
<b>MAX</b>	Current temperature Maximum temperature	Go to <b>MIN</b>	Reset Max, Min, Dif, temperatures	Press $\downarrow$ to change between °F/°C Press $\uparrow$ to turn LCD backlighting ON and OFF
<b>MIN</b>	Current temperature Minimum temperature	Go to <b>dIF</b>		
<b>dIF</b>	Current temperature Differential temperature	Go to <b>HAL</b>		
<b>HAL</b>	Current temperature High alarm setpoint	Go to <b>E</b>	Activate/Deactivate <b>HAL</b>	Set High alarm value

Table 1 - Functional Flow Chart

### DISPLAY MODES

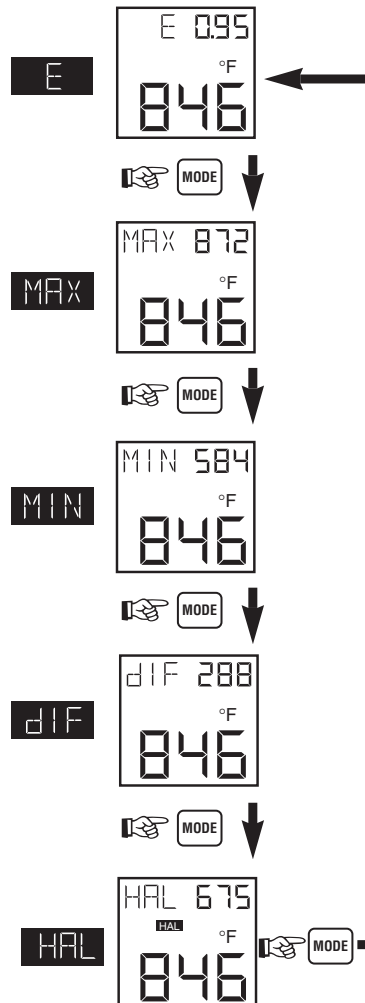




Figure 3 - Visual Functional Flow Chart

**NOTE:**

The Emissivity setting as well as the temperature Engineering unit (°F or °C) are stored in the non-volatile memory. Removing the main power will not erase or change these settings.


**3.1 - Changing the Temperature from °F to °C (or vice versa)**

Press the  key to go to either the MAX, MIN, or DIF display mode.






Press the  key to change the temperature display from °F to °C or vice versa. The analog output 1 (1 mV/Deg) also follows the temperature display unit.


**3.2 - Turning on the Display Backlight**



Press the  key to go to either the MAX, MIN, or DIF display mode.

Press the  key to turn the display backlight ON or OFF.

**3.3 - Using the Alarm Function**

1. Press the  key to go to the HAL display mode.
2. Press either the  or  keys to set the high alarm value.
3. Press the  key to enable the high alarm function. The  icon appears on the display.

If the temperature exceeds the high alarm set point, the unit goes into an alarm condition. The  icon on the display flashes, the alarm red LED turns on, and the internal relay energizes. The relay contacts are brought out to the terminal block J101 for ease of access.

4. To disable the high alarm function, press the  key again, and the  icon disappears.

**NOTE:**

- 1- The alarm temperature value as well as the alarm status are stored in the non-volatile memory. As a result, removing main power will not erase or change these settings.
- 2- The alarm deadband is 10°C or 18°F.

**3.4 - Analog Output vs. Temperature**

The following equations relate the analog outputs of 4-20mA, 0/5VDC, 0/10VDC to measured temperature:

$$4\text{-}20\text{mA: Measured Temperature} = \left[ \frac{(\text{mA Output} - 4)}{16} \times (T_2 - T_1) \right] + T_1$$

$$0-5\text{VDC: Measured Temp} = \left[ \left( \frac{\text{Voltage Output}}{5} \right) \times (T2 - T1) \right] + T1$$

$$0-10\text{VDC: Measured Temp} = \left[ \left( \frac{\text{Voltage Output}}{10} \right) \times (T2 - T1) \right] + T1$$

Where, T1 is the minimum temperature range  
T2 is the maximum temperature range

### 3.5 - Resetting Temperature Values

The calculated temperature values (Min, Max, and Diff) can be reset at any time by pressing the  key in either the MAX, MIN, or DIF display modes. This will reset the calculated temperatures as follows:

MAX = Current Temperature

MIN = Current Temperature

DIF = 0

After the reset, the unit starts to keep track of the Maximum, Minimum, and Differential temperatures.

The following figures show the Main Housing, Optical Assemblies, Mounting Bracket, and Air purge Collar.

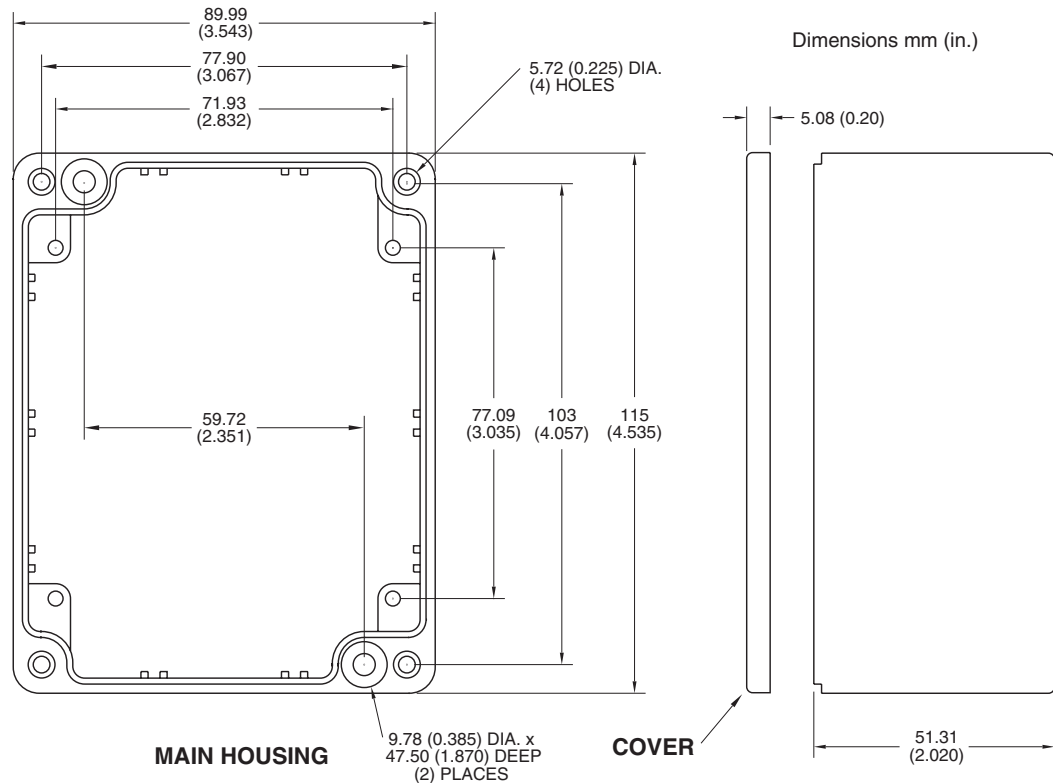


Figure 4 - NEMA-4 Aluminum Enclosure

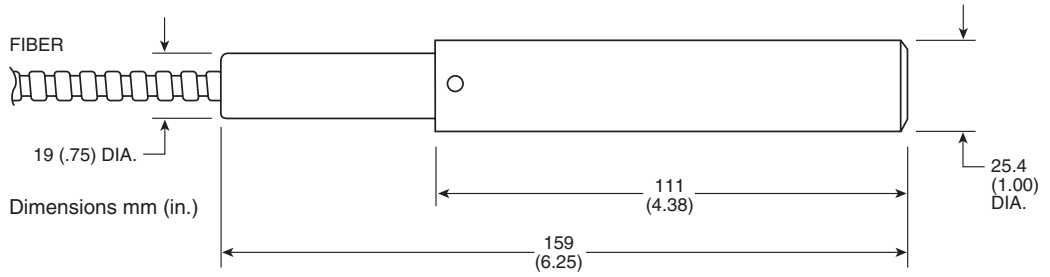


Figure 5 - Optical Lens Assembly (L1) .25" @ 8" FOV

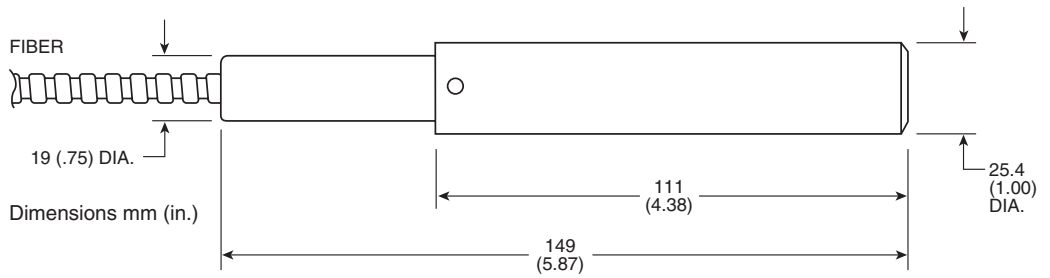


Figure 6 - Optical Lens Assembly (L1) .19" @ 20" FOV

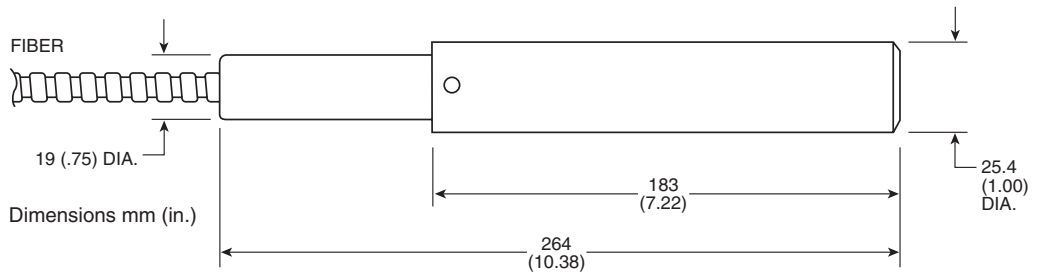


Figure 7 - Optical Lens Assembly (L1) .076" @ 6" FOV

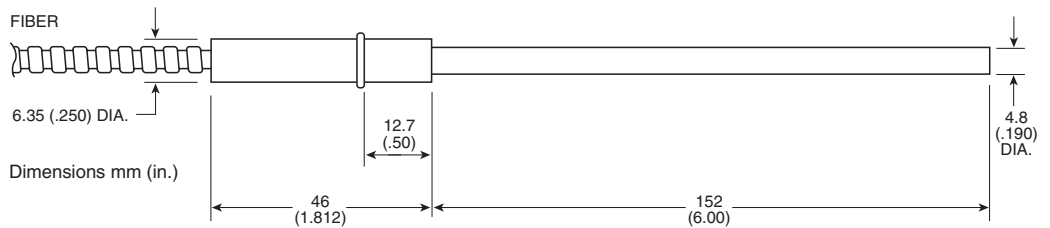


Figure 8 - Ceramic Tip Assembly (L2)

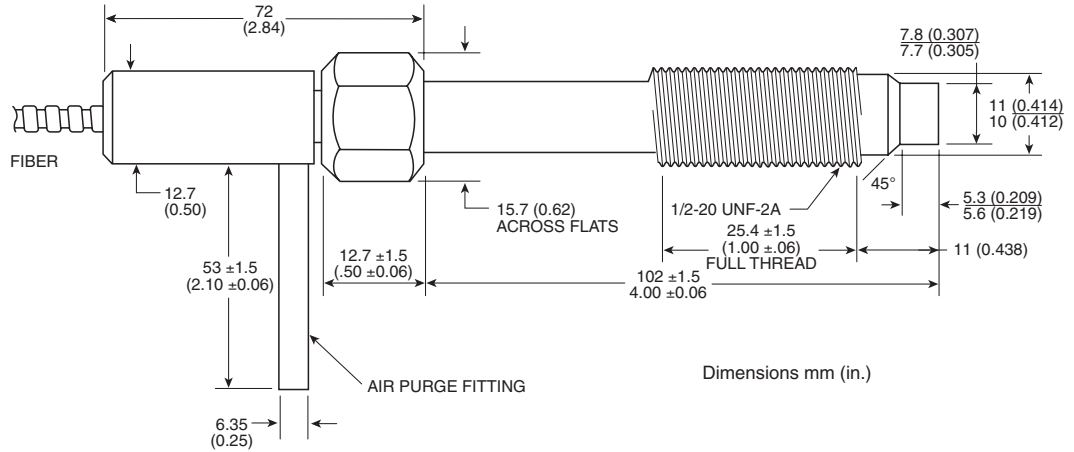


Figure 9 - Polymer Bolt Assembly (L3) with 90° Angle Air Purge Fitting

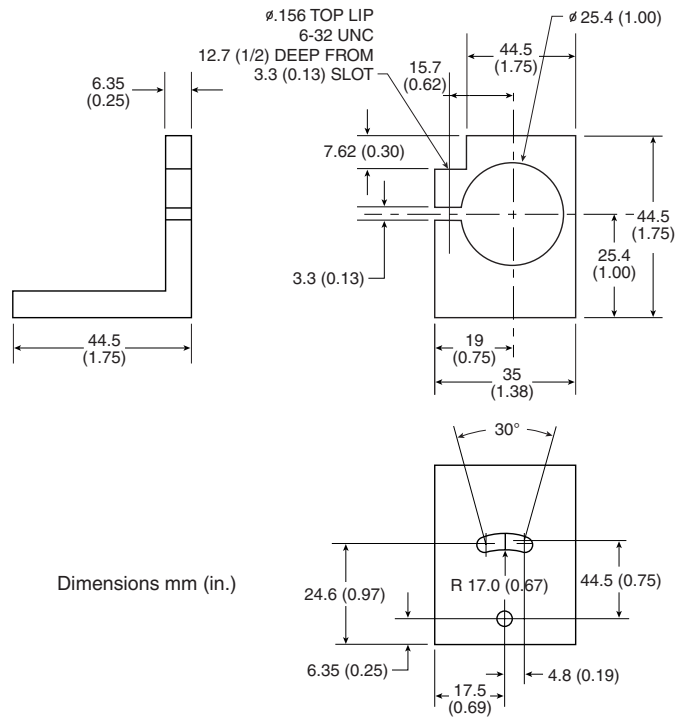
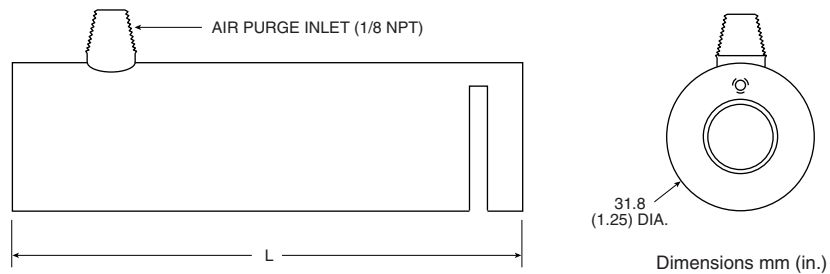


Figure 10 - Optical Head, Mounting Bracket OS1592-MB



MODEL	L
OS1592-AP1	114.3 mm (4.5")
OS1592-AP2	185.4 mm (7.3")

Figure 11 - Air Purge Collar

**SPECIFICATIONS**

Temperature Range	
R1	260 to 538°C (500 to 1000°F)
R2	538 to 1093°C (1000 to 2000°F)
R3	1093 to 2482°C (2000 to 4500°F)
Accuracy at 22°C (72 °F) ambient temperature and at Emissivity of 0.95 or greater	1% of Rdg.
Repeatability	0.5% of Rdg
Resolution	1°C or 1°F
Response Time	25 msec (0 to 63% of Final value)
Spectral Response	0.8 to 1.8 microns
Emissivity	0.05 to 1.00 in 0.01 increments Set via Keypad
<b>Optical Assemblies</b>	
1- Lens Probe (L1-1)	
Spot Size (D:S)	6.3 mm @ 203 mm (0.25" @ 8"), (32:1)
Fiber Bundle	1.8 mm (0.070")
Dimensions	25.4 mm (1") OD. x 159 mm (6.25") L
2- Lens Probe (L1-3)	
Spot Size (D:S)	1.9 mm @ 152 mm (0.076" @ 6"), (79:1)
Fiber Bundle	1.8 mm (0.070")
Dimensions	25.4 mm (1") OD. x 264 mm (10.38") L
3- Lens Probe (L1-2)	
Spot Size (D:S)	4.8 mm @ 508 mm (0.19" @ 20"), (105:1)
Fiber Bundle	0.5 mm (0.020")
Dimensions	25.4 mm (1") OD. x 149 mm (5.87") L
4- Ceramic Tip (L2)	152.4 mm (6") Probe
Fiber Bundle	1.8 mm (0.070")
Dimensions	.48 mm (0.190") OD. x 152.4 mm (6") L
5- Polymer Bolt (L3)	101.6 mm (4") Probe with air purge fitting
Fiber Bundle	1.8 mm (0.070")
Dimensions	12.7 mm (0.5") OD. x 101.6 (4") L
Air Purge Fitting	Included at 90° Angle
Fiber Optic Cable	152.4 cm (5 Feet) Long, Standard
Power	18 to 36 VDC
Operating Ambient Temperature	
Electronic Unit	0 to 50°C (32 to 122°F)
Optical Assembly	0 to 150°C (32 to 302°F)
Operating Relative Humidity	Less than 95% without condensation

Display	Backlit LCD dual display
Keypad switch	4 position, tactile feed back membrane
Electrical Isolation	Between Input supply and Analog outputs, 1000 VAC
Calculated Temperature values	Maximum (MAX), Minimum (MIN) and Differential (DIF), Reset via keypad
High Alarm	LED & Display Icon indication Set & enabled via Keypad
Alarm set point	0 to 100%, set via keypad
Alarm Deadband	10°C or 18°F
Relay Contact rating	5A @ 28 VDC
<b>Analog Outputs</b>	
1-1 mV/°F or °C Accuracy	Standard 6 mV
2-4/20 mA Accuracy Max. Load	Optional, -mA 0.25% of Full Scale 350 Ohms
3-0/5 VDC Accuracy Min. Load	Optional, -V1 0.25% of Full Scale 250 Ohms
4-0/10 VDC Accuracy Min. Load	Optional, -V2 0.25% of Full Scale 750 Ohms
5-J type Thermocouple 500 to 1000°F Range (R1) Accuracy	Optional, -J 7°F, Cold Junction compensated
6-K type Thermocouple 500 to 1000 °F Range (R1) 1000 to 2000 °F range (R2) Accuracy	Optional, -K 7°F , Cold Junction compensated
Air Purge Collar OS1592-AP1	For -1 & -2 Lens Probes 6.3 mm (0.25") @ 203 mm (8") and 4.8 mm (0.19") @ 508 mm (20") FOVs
OS1592-AP2	For -3 Lens Probe 1.9 mm (0.076") @ 152 mm (6") FOV
Main Housing	Die cast Aluminum, NEMA-4 & IP-68
Dimensions	89 W x 114.3 L x 56 mm H (3.5" W x 4.5" L x 2.2" H)
Weight	500 g (1.1 lbs)

## **MAINTENANCE**

Routine maintenance is not required except for periodic re-calibration, occasional inspection of the input and output ends of the fiber assembly for cleanliness, and a check for broken fibers if damage is suspected.

The optical fibers will provide satisfactory service indefinitely if handled with normal care. Although the fibers are protected by a steel jacket, they can be damaged if the jacket is stretched, twisted, shocked or tightly bent to a small radius. The ends should be protected from damage, contaminants, and temperatures above 371°C (700°F). OMEGA does not warrant broken or damaged fibers due to mishandling.

Fiber or lens damage or contamination should be suspected if there is a sudden change in the calibration of the unit.

Dust and particles on the lens or on the output end of the fiber bundle may be removed by use of an air jet or a soft brush. Dirt films and other accumulations should be removed by the use of soft cotton or a Q-tip moistened with Windex, triple-distilled alcohol or other grease-free and solids-free solvent. A final wiping with dry cotton is recommended.

If the fiber bundles are to be removed from the detector head assemblies for extended periods, the fiber bundle receptacles in the head should be taped or capped to prevent the entry of foreign matter.

A periodic check of the electrical ground connection can be helpful in preventing RF-pickup problems.




Fiber cables are not interchangeable, as a fiber optic cable assembly is calibrated with the electronic unit as a system.

There is a gain adjustment for the fiber optic cable assembly inside the electronic box. This gain adjustment will compensate for any small shift in temperature reading due to aging of the fiber optic cable over time. Open the front cover of the Electronic Box. There is a small plug-in PC board with a potentiometer on one side. This potentiometer provides the gain adjustment for the fiber optic cable.



## Safety Warnings and IEC Symbols

This device is marked with international safety and hazardous symbols in accordance with IEC1010. It is important to read and follow all the precautions and instructions in this manual before operating or commissioning this device as it contains important information relating to safety and EMC. Failure to follow all the safety precautions may result in injury and or damage to your equipment.

IEC Symbol	Description
	Caution - Refer to the accompanying document(s).
	Direct Current
	Frame or Chassis

## Caution and Safety Information

- If the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.
- The installation category is one (1).
- There are no user replaceable fuses in this product.
- The output terminals of this product are for use with equipment (digital meters, chart recorders, etc,) which have no accessible live parts. Such equipment should comply with all the applicable safety requirements.
- Do not operate the equipment in flammable or explosive environments.
- All connections to the thermometer should be made via a shielded cable, 24 AWG stranded wire with the following ratings: 300V, 105°C (221°F), PVC insulation.
- Power must be disconnected before making any electrical connections.
- The power supply used to power the thermometer should be VDE or UL approved with the following ratings: 12 to 24vdc @150mA with overload protection of 500mA.

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