

Non-Contact Thermometer  
User's Manual

THERMO-HUNTER BUILT-IN2  
BF-30I-A

Thermo-Hunter Built-In2 series is applicable only for measuring surface of substance.

- Thank you for purchasing Optex products.  
○Please check to make sure the model you purchased is the model you specified.  
○Please read the manual before using the "Thermohunter Built-in 2" in order to use it correctly.  
○After reading the manual, please be sure to keep it for future reference.

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"Take Care of the Environmet." This manual uses recycled paper.  
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**CAUTIONS**

This product is made from Glassfiber and extremely sensitive to shock and bending.  
The followings are the instruction so you would not break the fiberoptics by rough treatment.

- 1 DO NOT PULL THE FIBER.
- 2 DO NOT GIVE SHOCK.
- 3 BENDING RADIUS=min.50mm

**Safe Usage**

This user's manual contains various warnings to ensure safe usage of the product and prevent damage and injury to you and other persons. Please be sure to heed the warnings and strictly follow safety procedures.

- ⊘ : This symbol signifies a prohibited action.
- ❗ : This symbol signifies a required action.

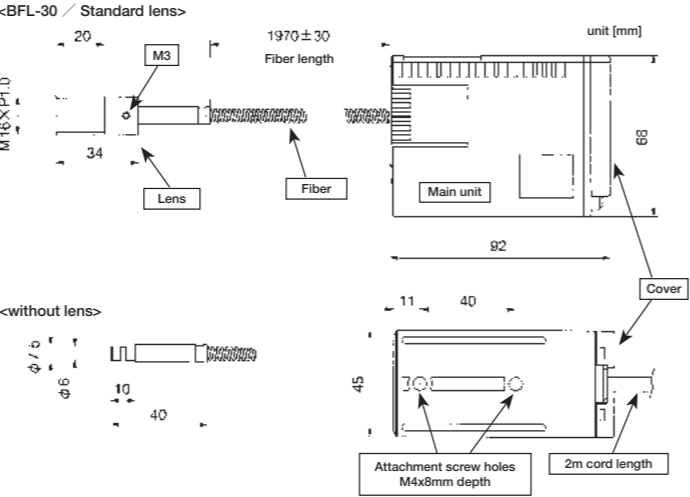
**Environmental Warnings**

- ❗ **KEEP THE THERMOMETER AWAY FROM DIRECT SUNLIGHT, DUST, HIGH TEMPERATURES AND HIGH HUMIDITY DURING USE AND STORAGE.**  
Otherwise, the optical lens will become dirty or damaged. Such usage or storage will result in incorrect measurements.
- ❗ **DO NOT APPLY SUDDEN CHANGE OF ENVIRONMENTAL TEMPERATURE TO THE THERMOMETER.**  
Sudden temperature changes of environments may cause incorrect measuring results. In such cases, leave the thermometer for a moment to let it return to a stable condition prior to the next measurement.
- ❗ **KEEP THE THERMOMETER AWAY FROM PRODUCTS WHICH PRODUCE STRONG ELECTROMAGNETIC WAVES. DO NOT USE IN AN ATMOSPHERE CONTAINING CORPOSIVE GASES OR EXPLOSIVE GASES.**  
Usage in such environments will cause irreparable damages to the unit and incorrect measurements.

**Usage Warnings**

- ❗ **AVOID MEASURING SHINY OBJECTS.**  
Shiny object reflect surrounding temperatures. The emissivity rate of the unit can be adjusted to compensate for this problem.
- ⊘ **DO NOT USE WITH NON-STANDARD VOLTAGE.**  
Using the unit out of DC 12-24 voltage range may result in damage to the unit, shorts, fires and injuries. In such cases, immediately switch the unit off.
- ⊘ **DO NOT TOUCH TO THE OBJECT THAT IS BEING MEASURED.**  
The unit is a non-contact thermometer. Touching the unit to objects with high temperatures will result in irreparable damages in the shape of the unit and incorrect measurements.
- ⊘ **DO NOT TOUCH THE LENS.**  
Do not touch the lens with hard or sharp objects. Do not insert foreign objects into the light receiving part. Otherwise, damage to the lens or incorrect measurements will occur.
- ❗ **DO NOT USE NEAR ELECTRIFIED OBJECTS.**  
Otherwise, irreparable damages or incorrect measurements will result.

Name and Usage of Each Product Part



1. Installation

**Lens**

- 1 Install the lends with thread securely by the attached nut.

**Main unit**

- 1 Please firmly install using the attachment screw holes on the lower section of the main unit while strictly followin the warnings below. Please use the M4 screws provided. When using screws sold on the market, please do not use attachment screws over 8mm in length.

It is possible to angle the product by 45 degrees upward / downward or left / right if the provided attachment fittings are used. The two taps of the attachment fittings are the tripod attachment screws (W 1 / 4). By screwing the attachment fittings onto the main unit, the product can be attached to the tripod.

**Installation Warnings**

- 1 The lens should be installed perpendicular to the target.
- 2 Please install the unit so that the cover can be attached and removed.
- 3 Avoid mechanical shock to the sensor and the lens.
- 4 Make sure if there is not any heat source around the location of the sensor. Highly reflective objects may cause discrepancies in measurement.
- 5 The lens withstands up to 150°C, and the amplifier body endures up to 50°C of environmental temperature. Avoid direct blow of heat to those parts from the target.

2. Connection

**Connection Diagram**

**Internal circuit**

**Connection Warnings**

- 1 Use the unit within rated voltage and confirm proper wiring sufficiently for the connection.
- 2 Please do not connect the analog output(-) with the GND,etc. Discrepancies in measurement may result.
- 3 The analog output should be connected to the devices such as meters with load resistance of 250 ohm or less.
- 4 Please do not let the analog output short circuit.
- 5 When using in an environment with strong EMI noise, it is necessary to run the output cord through an iron pipe, etc. as a precaution.
- 6 The Shield line is connected to the main body for ground. The Shield line is to be connected to F.G.(Frame Grand)

3. Measurement

- 1 Turn the unit on after checking to see there are no mistakes in connection. The LCD display will light up.
- 2 Follow each step in "4. Setting."
- 3 Check to see if the unit is operating normally.

4. Setting

- 1 Take off the cover.
- 2 Press the  $\Delta$ / $\nabla$  button to move the menu bar, and set it to the position you want. At this time, the flashing numerical figure will show the current setting figure.

**Menu bar**

**ENTER button**

**MEAS. :** Conduct a conventional measurement.

**TEACH :** Set the temperature (real temperature) of the object to be measured. Calculate the emissivity ratio from the real temperature. Automatically adjust the set figure of the emissivity ratio.

**$\epsilon$  :** Set the emissivity ratio of the object to be measured.  $\epsilon = 1.20 \sim 0.10$   
Adjust the measurement value according to the set emissivity ratio.

**DELAY :** Select the response time. Set figure 1~200  
Smoothing is possible if setting when the display fluctuates.

**$^{\circ}\text{C}/^{\circ}\text{F}$  :** Switch between temperature displays.

**HI,LO :** Setting the Temperature Range of the Analog Output.  
Factory Default Setting: 4~20mA for 400°C(LO)~1200°C(HI)  
Note: Please refer to the section "Setting the Temperature Range of the Analog Output".

- 4 Press the  $\Delta$ / $\nabla$  button to change the set figure. At this time, the figure which is displayed alternately with the set figure represent the operand temperature of the set figure / value.
- 5 Press the ENTER button to record. At this time, the blinking numerical figure, etc. represents the set figure after change.
- 6 Please the  $\Delta$ / $\nabla$  button to return the menu bar to the MEAS. positon and put into "MEASURE MODE." The unit will automatically return to "MEASURE MODE" if no buttons are pushed for a period greater than 10 seconds. At this time, setting is invalid.  
\* Analog output produces a measurement figure during setting

**Setting the Temperature Range of the Analog Output.**

The Temperature Range of the Analog Output can be set within the temperature measuring range.

- 1 Adjust the menu bar to HI,LO and press the ENTER button to enter the Temperature Range of the Analog Output Setting mode.
- 2 HI(High Limit) Setting: Use the  $\Delta$ / $\nabla$  butto/ns to change the setting value, and press the ENTER button to complete the entry. The menu bar moves to LO (Low Limit) Setting automatically.
- 3 LO(Low Limit) Setting: Use the  $\Delta$ / $\nabla$  buttons to change the setting value, and press the ENTER button to complete the entry.

Note: In the MEASURE MODE, each of menu bars (HI,LO) is indicated accordingly when either or both of Setting Temperature Range (HI(High Limit), LO(Low Limit)) is changed.  
Note: "High Limit" - "Low Limit"  $\geq 100$   
Note: When the Analog Output Range Setting value is changed, the Analog Output Resolution is also changed accordingly.

**TEACH Function**

In case where the emissivity ratio of the object to be measured is not known, firstly measure the temperature of the object with a thermo - couple, etc. then set the temperature (real temperature) to TEACH, and the emissivity ratio will automatically be calculated.  
Teach-in function is not available while the display blinks as well as shows ERR due to unproper setting. Use direct input of  $\epsilon$ -value.

**Emissivity ratio(  $\epsilon$  )**

The emissivity ratio is the rate of the energy emitted from the surface of the object. All objects possess a particular emissivity ratio which changes according to the object's surface conditions or temperature. Since the unit allows the emissivity ratio to be set, even more precise measurements can be conducted by matching the emissivity ratio of the object to be measured.  
Objects with a low emissivity ratio (e.g. the surface of shiny metallic objects) reflect the surrounding temperature since they are highly reflective. In this case, it is necessary to block out these effects from surrounding objects since incorrect measurements will result by reflecting these temperatures.  
The emissivity ratio normally has a maximum value of 1.00.  
However, taking into consideration the influence of surrounding noise, the unit can be set up to 1.20.

Problems	Cause	Solution
Display doesn't appear	The power source is not connected properly.	Check the lead wires and the connections.
	The power voltage is low.	Check the power voltage and adjust it to the DC12~24V range.
Laser doesn't appear, it is dark.	The laser emitting aperture is dirty.	Clean the lens referring to the Lens section under "Maintenance."
The measured figure is odd.	The lens is dirty.	Clean the lens referring to the Lens section under "Maintenance."
	The measuring area is off center.	Aim the target which should be within the area of view field of the sensor.
	The unit is affected by the radiation heat from other objects.	Blockthe heat source using a board, etc.
	The emissivity ratio setting is off.	Reset to the emissivity ratio of the object to be measured.
The measured figure is not stable.	The Lens is slightly shaken by vibration.	Prevent the vibration.
	The temperature of the unit changes suddenly.	Put the unit aside for a while to stabilize the unit's temperature.
Impossible to teach-in. (ERR)	Unproper setting	Confirm again the setting value, or input $\epsilon$ value directly.

If the above solutions do not correct the problems or should other problem not mensioned above occur, please contact your distributor.

Maintenance

**Lens**

Dust, dirt and scratches on the lens cause incorrect measurements. In case of dirty lenses, please remove the dust on the lens with a blower, etc. for lens cleaning use. If the dust or dirt can not be removed with a blower, lightly wipe the lens with a cotton swab or special lens cleaning cloth using a little ethanol alcohol.

**Main Unit**

The main unit is mainly made of PBT, PSF and PC resin. When it becomes cirty, lightly wipe caustic soda, ammonia, acetane, thinner, etc. to clean the dirt off since these chemicals will permeate the surface and melt it.

**Calibration**

We recommend a regular calibration. Please inquire at your distributor where you bought the unit.

Field of View

**BFL-30 / standard lens**

**without lens**

※ Calibration at the factory is done with BFL-30 standard lens.  
The optical resolution values stated in "Field of View"are at minimum 90% energy. The size of measuring object should be sufficiently larger than the field of view (spot size) shown in the above illustration.

Specifications

Models	BF-30I-A
Temperature Range	400~1200°C
Area Size	$\phi$ 30 / 1000mm
Optics	Infrared Fiber-optics
Spectral Response	InGaAs / 1.2~2.6 $\mu$ m
Response Speed	50ms / 90%
Accuracy	$\pm 2\%$ of reading value
Repeatability	$\pm 1^{\circ}\text{C}$
Display Resolution	1°C
Analog Output	4-20mA
Output Resolution	0.1~0.5°C (Depending on the setting value <100~800°C> of "High Limit" - "Low Limit")
Emissivity ratio( $\epsilon$ )Adjustment	0.10~1.20
Delay Function	Nominal 1~200 variable
Power Supply	DC12~24V $\pm 10\%$ / MAX 100mA
Ambient Temperature	0~50°C (Amplifier unit) 0~150°C (Fiber optics)
Environmental Humidity	35~85%Rh (without dew condensation)
Storage Temperature	-10~60°C
Vibration Resistance	10-55Hz, amplitude 1.5mm, two hours each in the direction of X,Y, Z
Water Resistance	IP65
Materials	Ring, Case : glass-containing PBT, Rear : PSF, Cover : PC Fiber : SUS, Lens attachment : BS/Ni-M
Weight	500g

Accessories: Attachment  $\times$  1, M4 screw  $\times$  2, Nut for lens (M16)  $\times$  2  
Optional accessories: Air Purge BF-AP2

\* Design and specifications are subject to change for product improvement without prior notice.