Non-Contact Thermometer

User's Manual

THERMO-HUNTER BUILT-IN2

BS-30T BS-A
BS-05T BS-V
BS-02T

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

Thank you for purchasing this products.
○Please check to make sure the model you purchased is the model you specified.
○Please read the manual before using the "Thermo-hunter Built-in2" in order to use it correctly.
○After reading the manual, please be sure to keep it for future reference.

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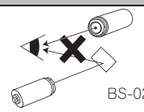
Safe Usage

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.

⚠ CAUTION — This symbol signifies that improper usage may result in injuries or damage.

⃠ : **This symbol signifies a prohibited action.**
❗ : **This symbol signifies a required action.**

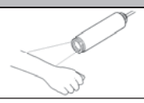
⚠WARNING



Do not look into the laser beam, nor point it directly at eyes. Even the reflection is harmful. This laser may cause eye injury or damage to your health.

BS-02Tonly

⚠CAUTIONS



This product is not a clinical thermometer and therefore, can not be used for medical purposes.

⚠CAUTIONS



Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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.

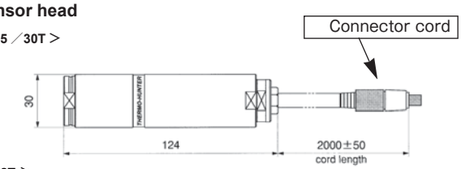
❗ DO NOT USE NEAR ELECTRIFIED OBJECTS.
Otherwise, irreparable damages or incorrect measurements will result.

Name and Usage of Each Product Part

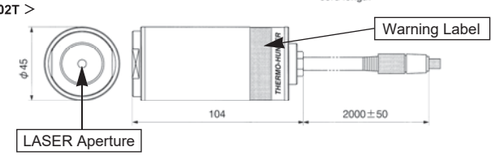
unit [mm]

●Sensor head

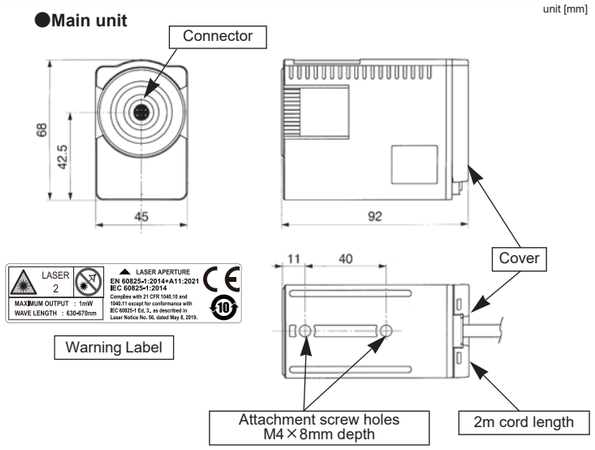
＜BS-05／30T＞



＜BS-02T＞



●Main unit

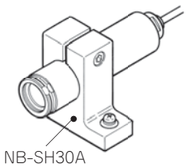


1. Installation

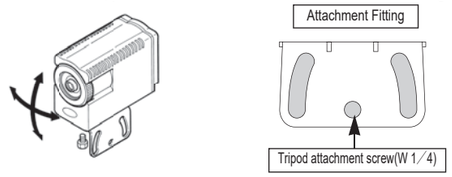
Sensor head
Install at position to obtain the field of view smaller than the size of measuring object. For more accurate measurement, adjust the position of installation by monitoring temperature on the display during measuring (see"3.Measurement").

BS-05/30T
①BS-LD(laser unit) makes it easier to modify measuring target precisely. When ambient temperature exceeds 65℃, install air/water cooling purge jacket(BS-WP1:0～150℃).

BS-02T
①Position of installation can be found easily with the Laser Beam Pointer on while measuring.



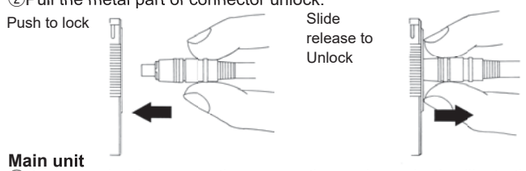
Main unit
①Please firmly install using the attachment screw holes on the lower section of the main unit while strictly following the warnings below. Please use the M4 screws provided. When using screws sold on the market, please do not use attachment screws over 8mm in length.



Installation Warnings
❶The sensor should be installed perpendicular to the target.
❷Please install the unit so that the cover can be attached and removed.
❸Avoid mechanical shock to the sensor and the main unit.
❹Make sure if there is not any heat source around the location of the sensor. Highly reflective objects may cause discrepancies in measurement.
❺Do not expose sensor to direct hot air, nor operate/store in the room of which temperature exceed its ambient temperature range (see "Specification").

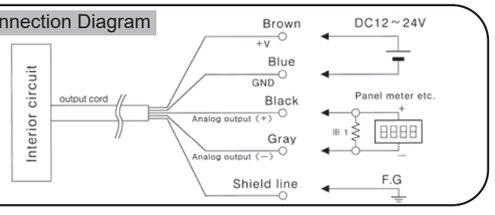
2. Connection

Sensor head
①Insert connector cord into connecting part of main unit until locking. ▲mark on the connector code should be facing upside.
②Pull the metal part of connector unlock.



Main unit
①Please make the connections correctly as shown in the illustration below while strictly following the warnings.

Connection Diagram



Connection Warnings
❶GND and Analog out(−) is inter-connected inside the unit. Therefore do not short it.
❷The voltage-output type (BS-V) will require those meters with input impedance of 100K ohm or more.
❸The current-output type (BS-A) will require those meters with load resistance of 250 ohm or less.
❹Please do not connect the analog output(−) with the GND, etc. Discrepancies in measurement may result.
❺Please do not let the analog output short circuit.
❻Under strong EMI noise circumstance, some treatment are necessary such as protecting the connector cord and output cord with steel pipes etc.

3. Measurement

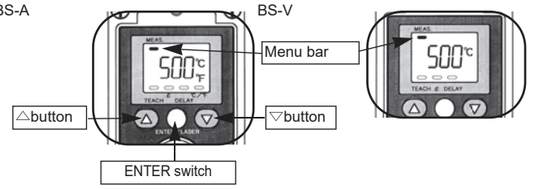
①Turn the unit on after checking to see there are no mistakes in connection. The LCD display will light up.
②Follow each step in “4. Setting.”
③Check to see if the unit is operating normally

*BS-02T;Push once Enter/Laser button to switch on Laser Pointer. Laser can be switched off with the second push of button or automatically off after 20 seconds. Enter/Laser button glows red while the laser is on.

4. Setting

①Take off the cover.
②Press the △／▽ 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.

BS-A BS-V



MEAS.	: Conduct a conventional measurement
TEACH	: Set the temperature(real temperature)of the object to measured. Calculate the emissivity ratio from the real temperature. Automatically adjust the set figure of the emissivity ratio.
ε	: Set the emissivity ratio of the object to be measured. ε＝1.20～0.10 Adjust the measurement value according to the set emissivity ratio.
DELAY	: Select the response time. Set figure 1～200(0.5～10seconds) Smoothing is possible if setting when the display fluctuates.
°C/°F	: Switch between temperature displays. (BS-A only)

③Press the ENTER button to put into “SET MODE”.
For the TEACH and emissivity setting, the laser pointer lights up.(BS-02T only)
④Press the △／▽ 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.
⑤Press the ENTER button to record. At this time, the blinking numerical figure, etc. represents the set figure after change.
⑥Please the △／▽ button to return the menu bar to the MEAS. position 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 produced a measurement figure during setting.

○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 ε-value.

○Emissivity ratio(ε)
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.

Trouble shooting

Problems	Cause	Solution
Display doesn't appear.	The power source is not . connected properly.	Check the lead wires and the connection.
	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 sections 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.
	Near the object to be measured is another object emitting high temperatures, affecting the temperature reading.	Block the heat source using a board,etc.
	The emissivity ratio setting is off.	Reset to the emissivity ratio of the object to be measured.
520: on display	Connector code comes off.	Insert connector until lacked up.
The measured figure is not stable.	The sensor is vibrating	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 ε value directly.

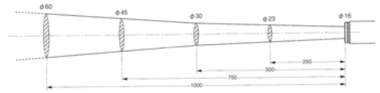
If the above solutions do no correct the problems or should other problems not mentioned above occur, please contact your distributor.

Maintenance

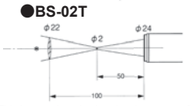
Lens	Dust, dirt and scratches on the lens cause incorrect measurements. In case of dirty lenses, please remove the dust on the lens with a blower, etc. for lens cleaning use. If the dust or dirt can not be removed with a blower, lightly wipe the lens with a cotton swab or special lens cleaning cloth using a little ethanol alcohol.
Main Unit	The main unit is made of PBT and polycarbonate. When it becomes dirty, lightly wipe caustic soda, ammonia, acetone, 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

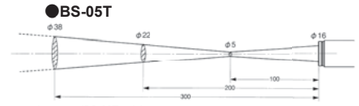
●BS-30T [mm]



●BS-02T



●BS-05T



*This laser pointer is aimed at the center of the measuring area. (BS-02T only)
The optical resolution values stated in “Field of View” are at minimum 90% energy.
The size of measuring object should be approx. 1.5 times larger than the field of view (spot size) shown in the above illustration.

Specifications

	Sensor head		
Models	**BS-05T**	**BS-30T**	**BS-02T**
Area Size	ϕ5/100mm	ϕ30/500mm	ϕ2/50mm
Optics	Silicon lens		
Spectral Response	Thermopile/8～14μm		
Focus	—		Coaxial laser pointer（CLASS2, Wavelength: 630-670nm, Maximum power: ≤1mW, Beam divergence: ≤1mrad）
Ambient Temperature	0～65°C		0～50°C
Environmental Humidity	35～85%RH(without dew condensation)		
Storage Temperature	-20～70°C		-20～60°C
Vibration Resistance	10 to 55 Hz, 1.5 mm amplitude, 2 hours each for XYZ directions with packaging		
Degree of Protection	IP 67 (IEC 60529)		
Materials	Aluminum		
Weight	300g		400g
Applicable Regulations	EMC Directive(2014/30/EU), RoHS Directive(2011/65/EU), China RoHS(MIIT Order No.32)		EMC Directive(2014/30/EU), RoHS Directive(2011/65/EU), China RoHS(MIIT Order No.32) FDA(21CFR 1040.10 and 1040.11) (expect for deviations pursuant to Laser Notice No.56) *2
Applicable Standards	EN IEC 61326-1		EN IEC 61326-1, IEC 60825-1

	Main unit	
Models	**BS-V**	**BS-A**
Temperature Range	0～500°C(display -20～520°C)	
Response Speed	500ms／90%	
Accuracy	0 to 200°C: ±2°C, 201°C Over : ±1°C of reading value *1 Measurement condition: ε =1.0, 23±5°C, Measurement distance 250 mm, Target size ϕ100 mm	
Repeatability	±1°C of reading value	
Display Resolution	1°C	
Analog Output	1mV/°C	4-20mA
Output Resolution	0.2°C	
Emissivity Ratio(ε)Adjustment	0.10～1.20	
Delay Function	Nominal 1(0.5sec)～200(10sec)variable	
Power Supply	DC12～24V±10%／Max 100mA	
Ambient Temperature	0～50°C	
Environmental Humidity	35～85%RH(without dew condensation)	
Storage Temperature	-20～60°C	
Vibration Resistance	10 to 55 Hz, 1.5 mm amplitude, 2 hours each for XYZ directions with packaging	
Degree of Protection	IP 65 (IEC 60529)	
Materials	Case：glass-containing PBT, Rear：PSF, Cover：PC	
Weight	320g	
Applicable Regulations	EMC Directive(2014/30/EU), RoHS Directive(2011/65/EU), China RoHS(MIIT Order No.32), FDA(21CFR 1040.10 and 1040.11) (expect for deviations pursuant to Laser Notice No.56) *2	
Applicable Standards	EN IEC 61326-1, IEC 60825-1	

Accessories：Attachment fitting×1, M4 screw×2
Optional accessories：BS-05/30T＞NB-SH30A,BS-WP1(Air/Water Cooling Jacket)
BS-02T＞NB-SH40A
*1 The measurement accuracy in the specification is limited to the calibration conditions of our factory.
*2 This product is classified as Class 2 by IEC 60825-1: 2014 according to Laser Notice No.56, FDA Guidance Document.

●For China RoHS, please refer to http://www.optex-fa.com/rohs_cn/