HORIBA

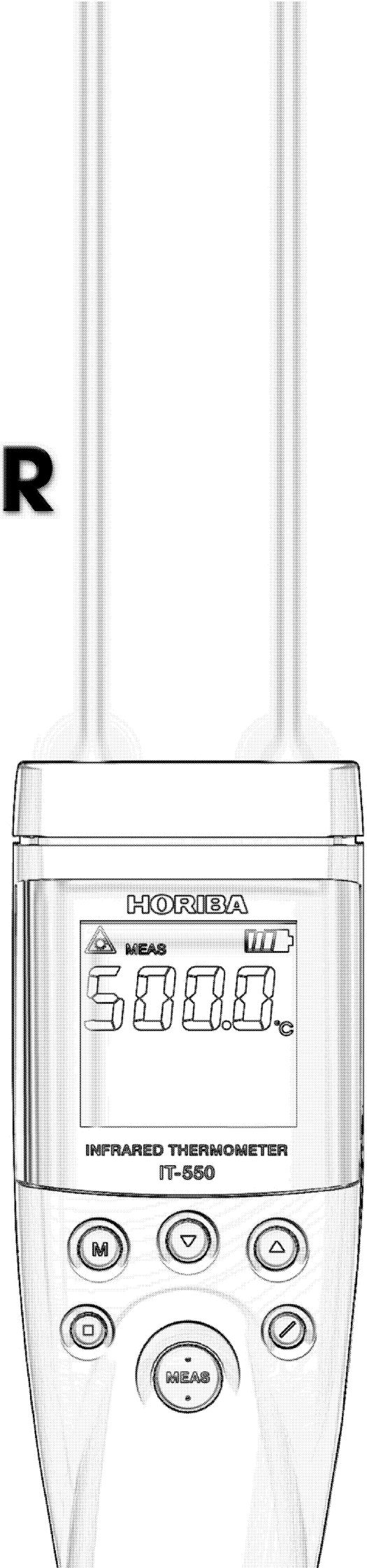
INFRARED THERMOMETER

IT-550L (For lab. use)

IT-550S

(Spot model for lab. use)

CODE : I1000152000C



INSTRUCTION MANUAL

Before using the INFRARED THERMOMETER, throughly read this manual for the proper operation. After reading, keep this manual for future reference.

Printed in Japan

Introduction

Thank you for purchasing our IT-550L, IT-550S infrared thermometer. This Instruction Manual describes the operating procedure for the IT-550L, IT-550S. Be sure to read this manual before using the IT-550L, IT-550S, and store the manual in a safe place so it is readily available whenever necessary.

Limitation of responsibility

Please note the following limitation before using this product.
HORIBA, Ltd. will assume no responsibility for damage to data resulting from the breakdown of this product or the wrong operation of the product by you or a third party.

Conformable Directive

This equipment conforms to the following directives and standards;
Directives : The EMC Directives 89/336/EEC as amended by 91/263/EEC, 92/31/EEC and 93/68/EEC, in accordance with the Article 10 (1) of the Directive.
Standards : EN61326:1997/A2:2001 Class B Minimum requirements (Emission tests were conducted according to the requirements of EN55011:1998)

CE

FCC rules

Warning: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the **FCC Rules.** These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

SAFETY PRECAUTIONS

HORIBA's Safety Policy

We arrange warning labels on our product. Each warning message is described by the following style in this instruction manual. For your safety operation of the equipment, these instruction are to be followed strictly.

⚠ Warning:

This indicates an imminently hazardous situation which, if not avoided, may result in death or serious injury.

⚠ Caution:

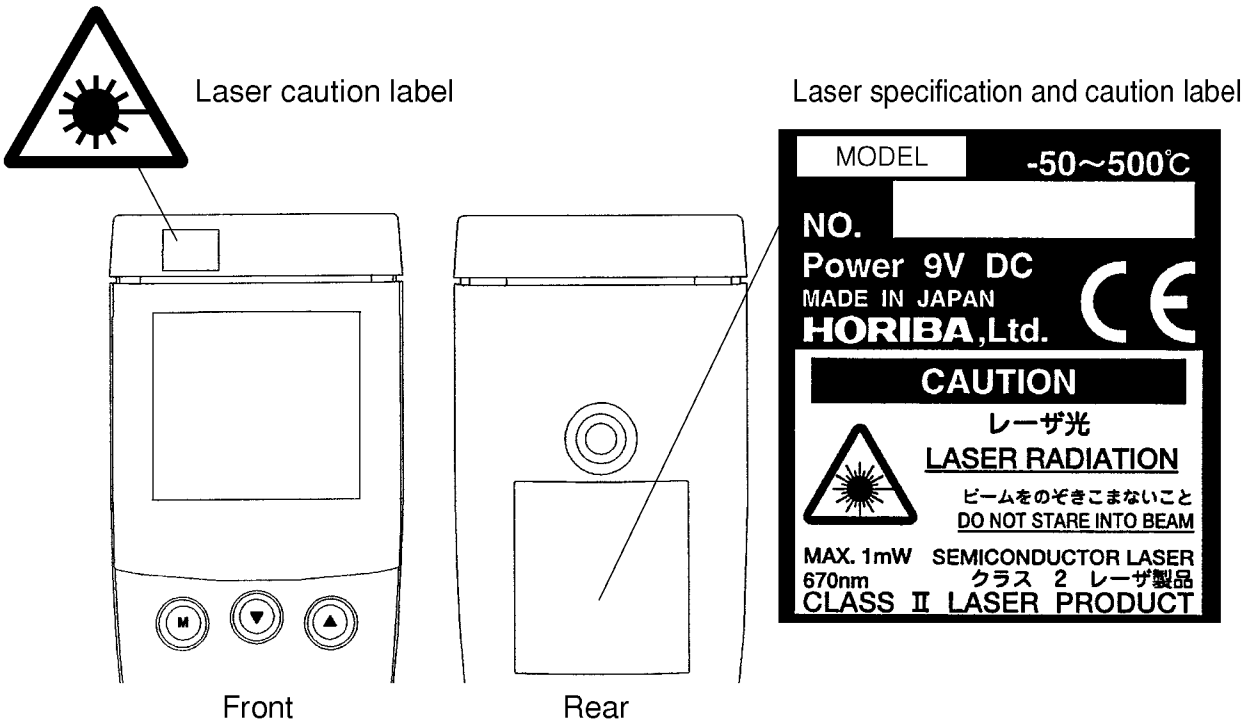
This indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Note:

This indicates a matter you need to be careful about during operation.

Warning Labels

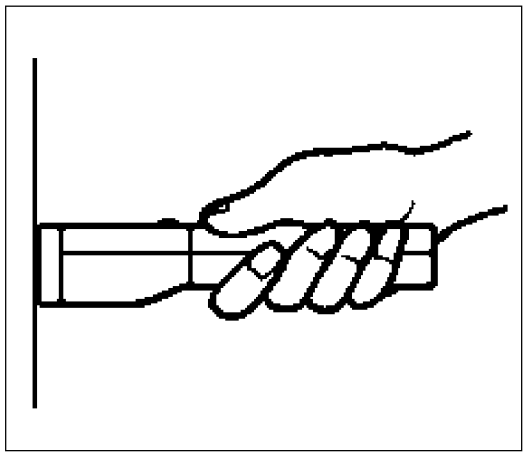
Location of labels used in the IT-550L, IT-550S are as follows.



Caution!

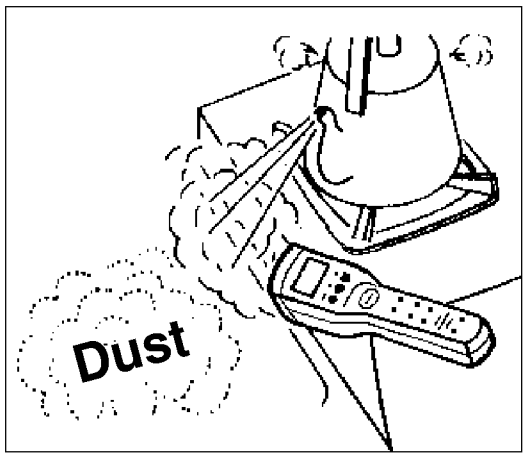
Follow the instructions below, to avoid breakage or malfunction.

■ Usage:



- Do not touch the unit to the objects to be measured.
- Never drop the unit or subject it to strong impact.
- Do not touch the lens with anything hard, and do not apply force on or insert foreign substances into the lens.
- Do not bring the unit into contact with electrically charged bodies.
- Error may occur when unit emissivity is set differently from that of object being measured.
- Never clean the unit with water or soak it in water, this may damage the unit.

■ Environment:



- Do not use or store the IT-550L, IT-550S in direct sunlight, and do not expose to dust, high temperature or high humidity, corrosive enviroment.
- Do not use the unit near any objects that have strong electromagnetic fields such as transceivers and radiophones.
- Do not allow condensation to form on the unit (ex., bringing it from cold to warm environments).
- This unit has been constructed with some degree of water resistance. However if it is subjected to direct contact with water for a long period of time, water may penetrate the unit. Further, water drops left on the lens will cause measurement errors. Wipe off any water drops immediatery.
- Make sure that the connector cover is closed and the screws of the battery box are firmly tightened when exposed to water.
- When ℃ indicator blinks, operating temperature is out of acceptable range. Stop operation immediately.

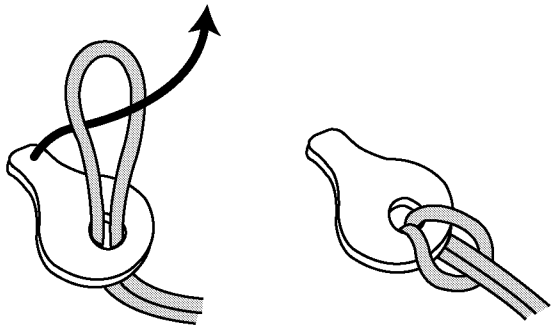
Contents

Before operating

Before to operating the thermometer, follow the instructions below:

1 Attaching the accessory screwdriver

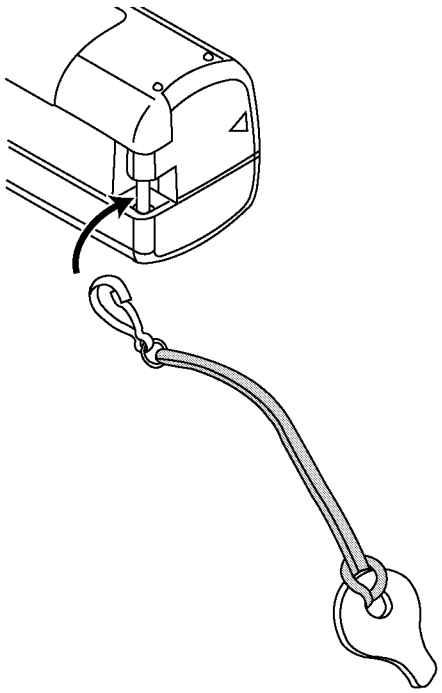
Attach the accessory screwdriver to the hand strap so it will not get lost. This screwdriver is used to remove the battery cover screws.



Attaching the accessory screwdriver

2 Attaching the hand strap

Attach the hand strap to the instrument to help prevent it from being dropped.



Attaching the hand strap

3 Loading the battery

Place the battery correctly in the battery compartment at the back of main body.
For loading the battery, refer to "Battery loading and replacement" on page 3.

Battery loading and replacement

⚠ Caution:

- This thermometer does not come with the battery loaded. Load the battery according to the procedure described below.
- If the battery indicator starts to blink, promptly replace the battery.

If the main body is wet, be sure to wipe off the water, set the battery compartment facing downward so that any water will not enter the case, and then remove the battery cover.

Dry battery used:	Manganese battery 6F22 or alkali battery 6LR61

1 Remove the battery cover

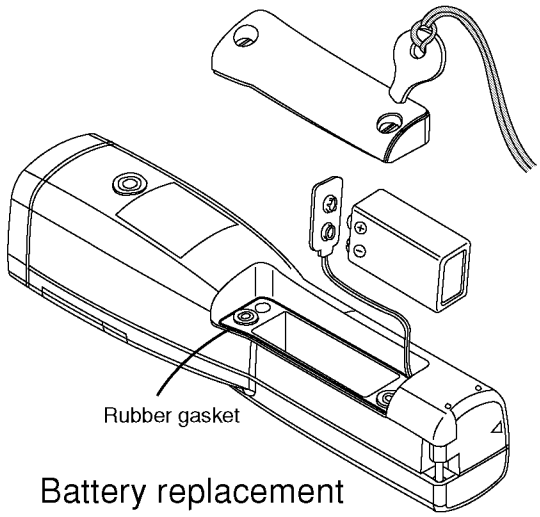
Loosen the screws of the battery cover at the back of the main body with the accessory screwdriver and remove the battery cover.

2 Replace the battery

Remove the old battery.
Check the polarity (+ or -) of the new battery, and load it correctly.

3 Close the battery cover

After the battery is loaded, close the battery cover, and tighten the screws evenly and firmly.



Battery replacement

⚠ Caution:

- Take care not to get the wire caught in the battery cover.
- Do not close the battery cover if the rubber gasket is dirty or twisted. Otherwise, the water-resistance of the instrument's main body will not be maintained.
- When the battery is removed, various set values are lost. When replacing the battery, set the emissivity and analog voltage output scale. (Refer to "Setting emissivity (ε)" on page 10. To use the analog voltage output function, an optional expansion kit is required. Refer to the instruction manual for more information about this expansion kit.)
- Never dispose of by incineration. Do not attempt to recharge old batteries.
- Return exhausted battery to electric appliance store, or dispose in accordance with environmental regulations.
- Remove batteries when the unit is not used for more than six months.
- The batteries included with IT-550L, IT-550S have a limited life.

Maintenance

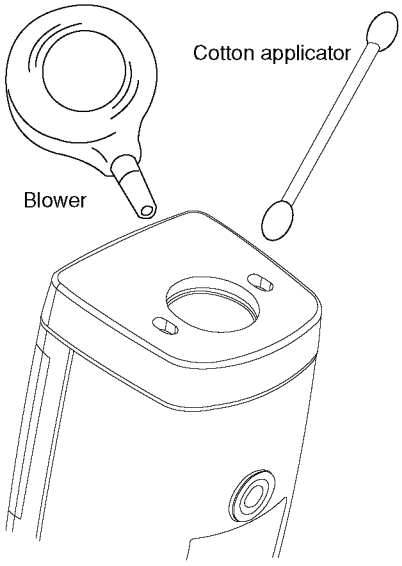
Lens cleaning

⚠ Caution:

Lens dirt may cause measurement error and may result in lens erosion.

If the lens gets dirty:

- Remove the dust on the lens using a camera lens blower.
- Wipe off any water drops with gauze or a cotton applicator.
- Wipe away any persistent dirt with a cotton applicator soaked in alcohol.



Lens cleaning

Body cleaning

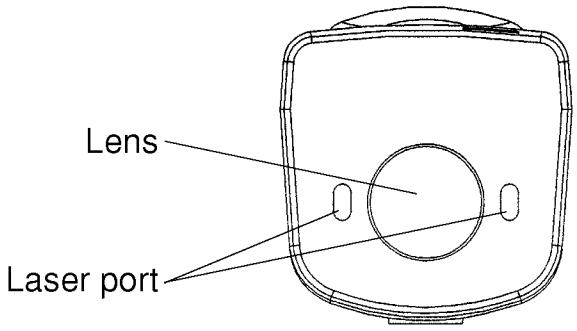
Wipe gently with dry cloth. Persistent dirt may be wiped with slightly damp cloth containing diluted neutral detergent.

⚠ Caution:

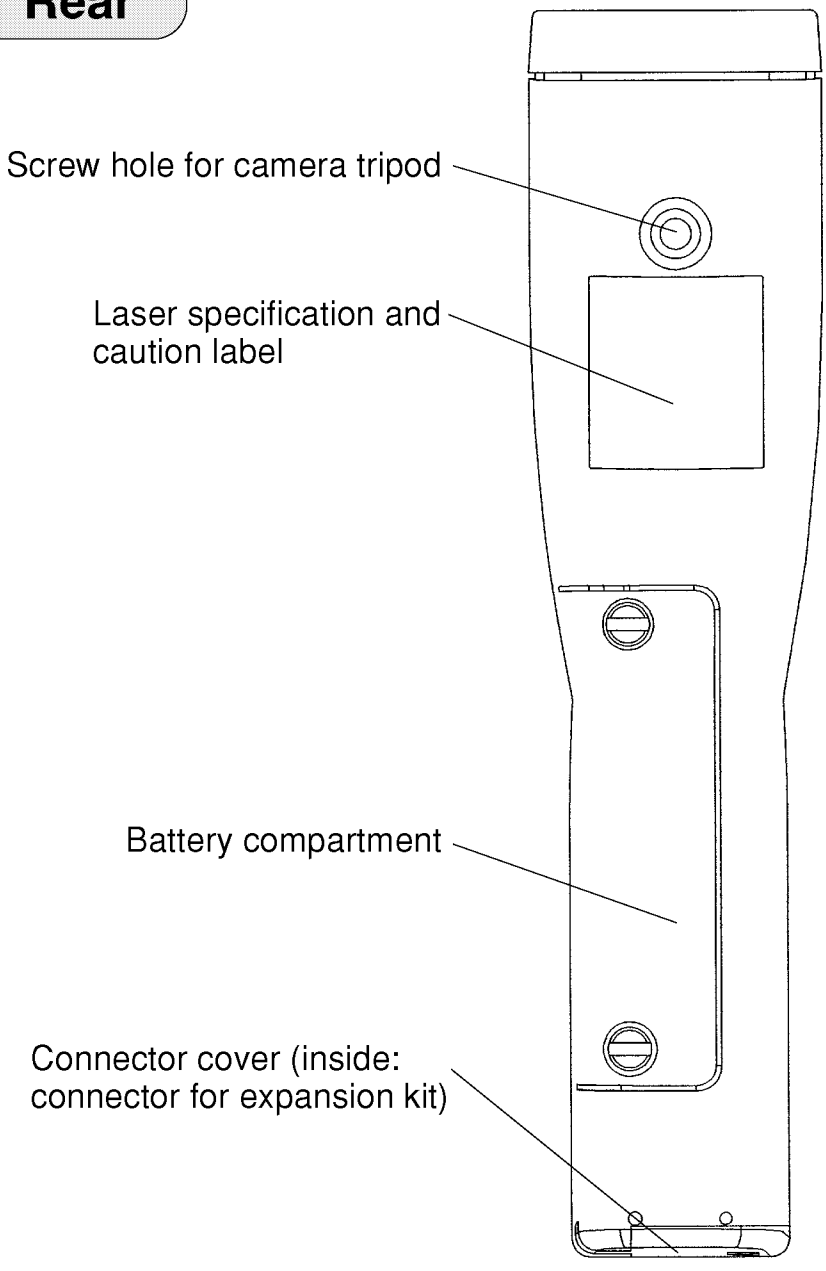
Organic solvents cause surface erosion, and should not be used.
The main body is water-resistant, but it is not waterproof. Never wash the main body with water or soak it in water. Doing so will damage the thermometer.

Names and Functions of Each Part

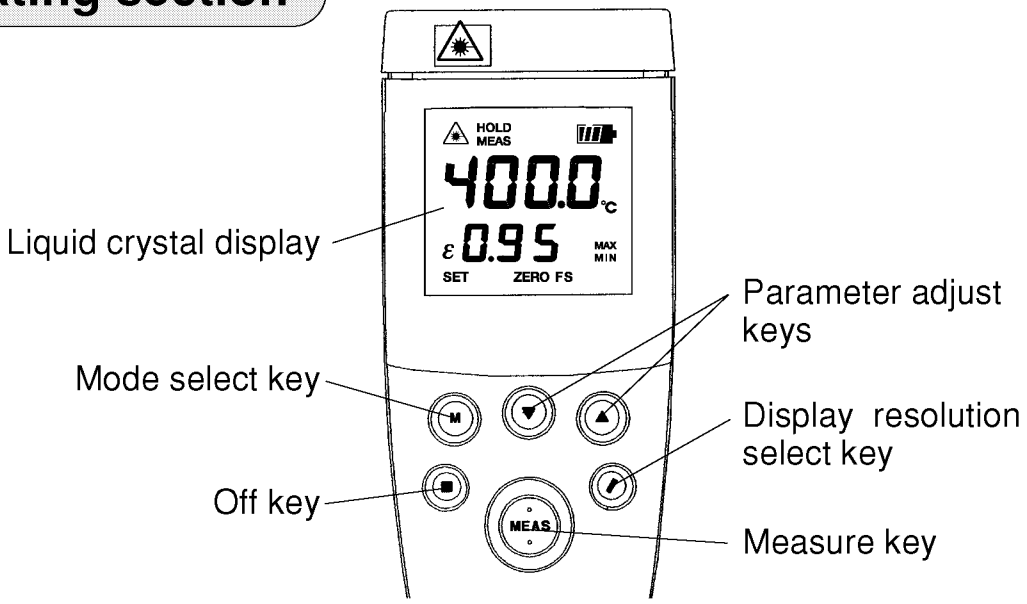
Front



Rear



Operating section



M Mode select key

This key displays the MAX/MIN-temperature or the present high and low readings during measurement. In addition, emissivity and analog voltage output scales are also displayable when on HOLD.

Note:
To use the analog voltage output function, an optional expansion kit is required.

■ Off key

Pressing this key turns OFF the power.

MEAS measure key

Every time the MEAS key is pressed, the thermometer toggles between the measurement and hold functions.

▼▲ Parameter adjust keys

These keys raise/lower emissivity and analog voltage output scales.

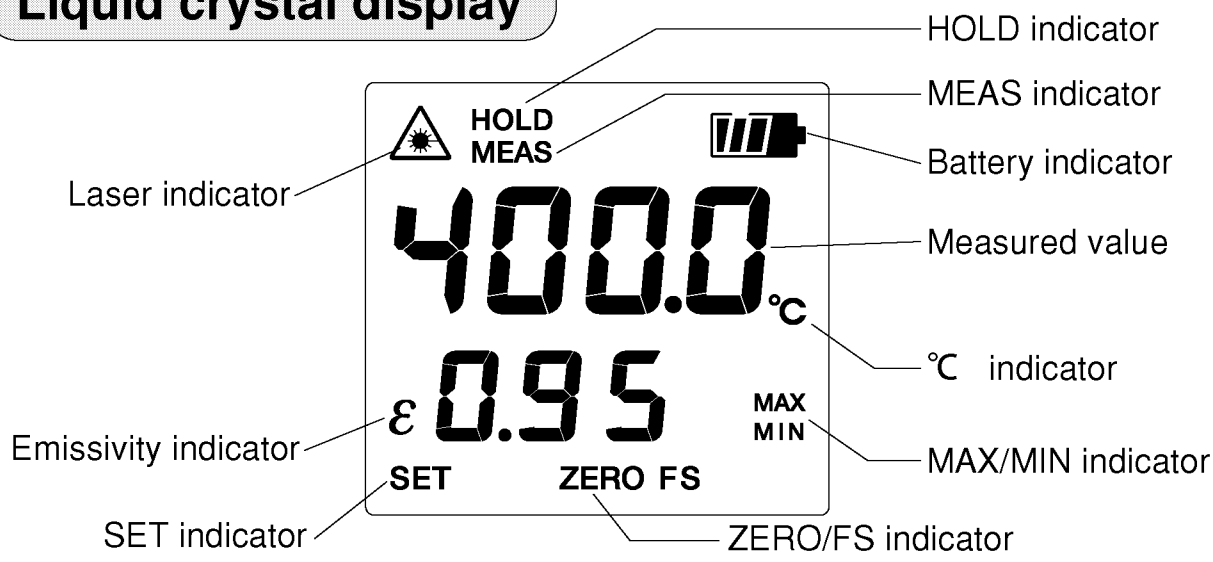
▼ : Decrease
▲ : Increase

⊘ Display resolution select key

Every time the ⊘ key is pressed, the display resolution, 1℃ or 0.1℃, is selected.

There is no power ON switch.
Pressing the MEAS key turns ON the power. The power cuts OFF 15 seconds after HOLD or SET is displayed (automatic power OFF). The automatic power OFF function does not work during measurement. Power can also be turned off with the ■ key.

Liquid crystal display



HOLD indicator

Displayed when the measured value is displayed.

MEAS indicator

Displayed when measurement is being carried out.

Battery indicator

Blinks when battery needs to be replaced.

Laser indicator

Displayed when laser is not emitted.
Blinks when laser is being emitted.

Emissivity indicator

Displayed when emissivity is being set and displayed.

SET indicator

Blinks when emissivity and analog voltage output scale are being set.

ZERO/FS indicator

ZERO: Displayed when lower limit of analog voltage output scale is being set.
F S : Displayed when upper limit of analog voltage output scale is being set.

Note:
To use the analog voltage output function, an optional expansion kit is required.

MAX/MIN indicator

MAX: maximum temp. display
MIN: minimum temp. display

℃ indicator

Unit of centigrade.

Measured value

The entire display blinks when the measurement value falls outside the measurement range (-50 to 500℃).

Operation

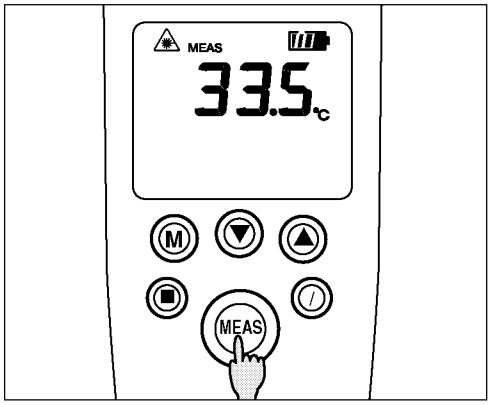
First, confirm that the emissivity setting matches the object to be measured. (Default is 1.00.) Perform measurement according to the following procedure. For the method to decide emissivity, refer to "Setting emissivity (ε)" on page 10.

⚠ Warning:

Class Ⅱ laser is used.
Never stare into the beam or direct it toward the eyes.
Also, be careful to avoid reflected light from a mirror, etc.

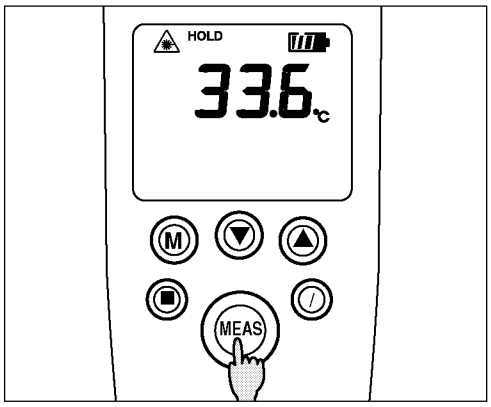
1 Start measurement

Press (MEAS) key to turn ON the power. Next, aim the lens toward the object to be measured, and press the (MEAS) key to start measurement. While the (MEAS) key is being pressed, the laser sighting beam is emitted so you can aim it at the object.
Releasing the (MEAS) key turns off the laser sighting beams even when measurement is continued.



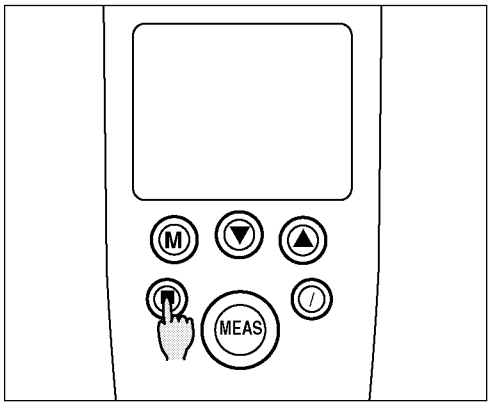
2 Complete measurement

When the (MEAS) key is pressed again during measurement, the measurement is completed, and the measured value is saved (HOLD).



3 Turn OFF power

Pressing the ■ key turns OFF the power.
While HOLD is lit, the automatic power OFF function works after approx. 15 seconds to turn OFF the power.



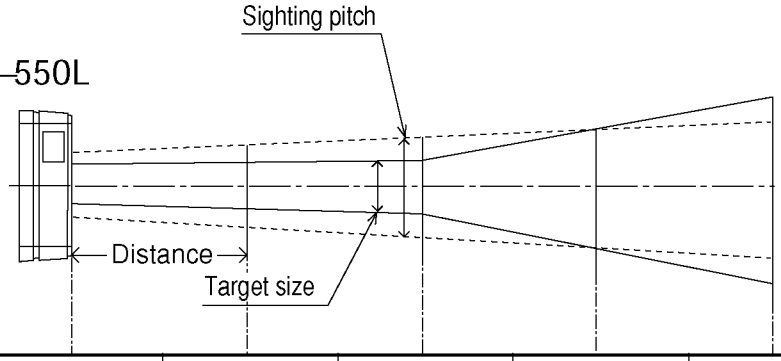
Target size and sighting

The size of the object to be measured must be sufficiently larger than the sighting pitch shown in the Target size and sighting pitch diagram.

Note:

Target size is based on 90% energy limit. For best results, the diameter of the object should be 1.5 times or more larger than the target size.

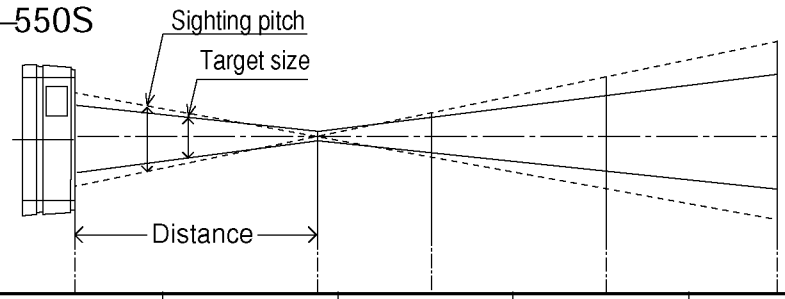
IT–550L



Distance	0.5 m	1 m	1.5 m	2 m
Target size	φ20mm	φ24mm	φ48mm	φ80mm
Sighting pitch	34mm	41mm	48mm	55mm

Target size and sighting pitch

IT–550S



Distance	73mm	100mm	150mm	200mm
Target size	φ2.5mm	φ8mm	φ20mm	φ33mm
Sighting pitch	0mm	10mm	28mm	47mm

Target size and sighting pitch

Measurement distance

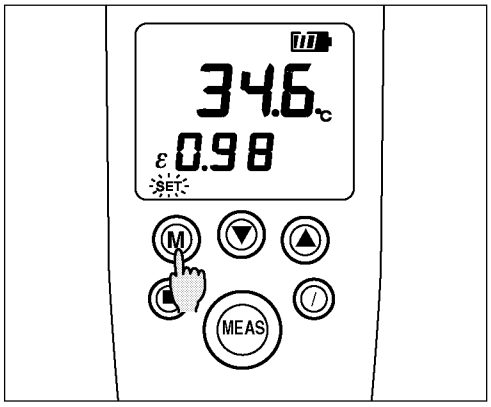
The mean value of the temperature in each point within "Target size" area may be displayed when the distance is more than 2 meters.
It should be considered that the emission from the object may be influenced by absorption and scattering in the optical path.

Setting emissivity (ε)

Each substance has a particular emissivity. Precise measurement requires appropriate setting.

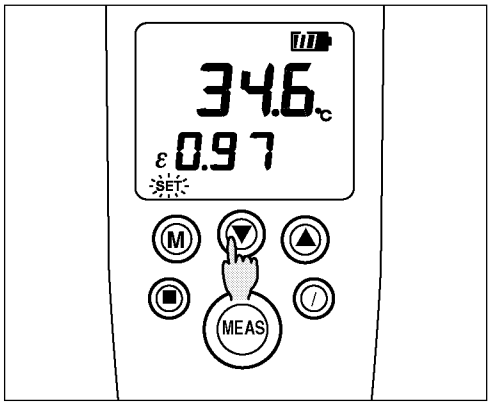
1 Displaying emissivity (ε)

Press the Ⓜ key several times in the HOLD state to display emissivity.
ε will light and SET will blink.



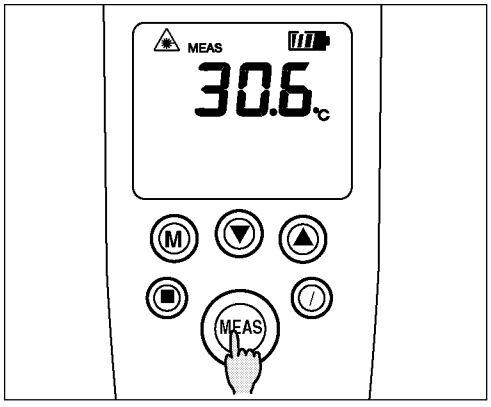
2 Setting emissivity (ε)

Numerals can be changed with the ▼▲ key.



3 Completing the emissivity (ε) setting

Press the MEAS key to complete the setting. Measurement can be started immediately.



Examples of emissivity

Objects with low emissivity may cause readout fluctuation. Use of an optional black-body spray or tape is recommended.

Emissivity differs according to not only the matter but also to the surface type (unevenness) or thickness of the material. Examples in the table below are for reference only.

Item	Emissivity	Item	Emissivity
Asphalt	0.90 to 0.98	Charcoal (powder)	0.96
Concrete	0.94	Paint, lacquer	0.80 to 0.95
Cement	0.96	Paint, lacquer (gloss)	0.97
Sand	0.90	Rubber (black)	0.94
Soil	0.92 to 0.96	Plastic	0.85 to 0.95
Water	0.92 to 0.96	Wood	0.90
Ice	0.96 to 0.98	Paper	0.70 to 0.94
Snow	0.83	Alumina	0.76
Glass	0.90 to 0.95	Chromite	0.81
Ceramics	0.90 to 0.94	Cuprite	0.78
Marble	0.94	Ferrite	0.78 to 0.82
Fluorite	0.30 to 0.40	Nitrite	0.90
Gypsum	0.80 to 0.90	Titanite	0.40 to 0.60
Plaster	0.89 to 0.91	Zn Oxide	0.11 to 0.28
Brick (red)	0.93 to 0.96	Brass oxide	0.56 to 0.64
Fiber	0.90	Irregular bronze surface	0.55
Cloth (black)	0.98	Rolled stainless steel	0.45
Skin (human)	0.98	Red-rusted steel	0.69
Leather	0.75 to 0.80		

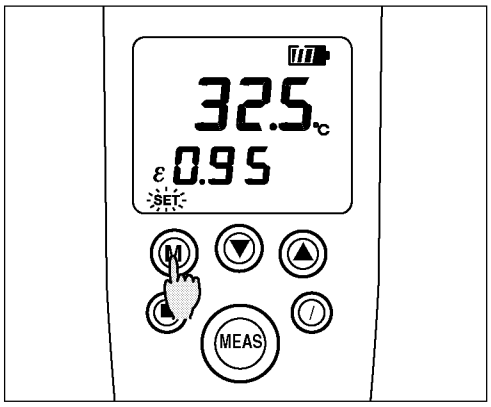
Simple method to determine ε

Each substance has a particular emissivity. Precise measurement requires appropriate setting.
If the setting of emissivity is changed, the thermometer recalculates the temperature according to the emissivity after the HOLD value is set.

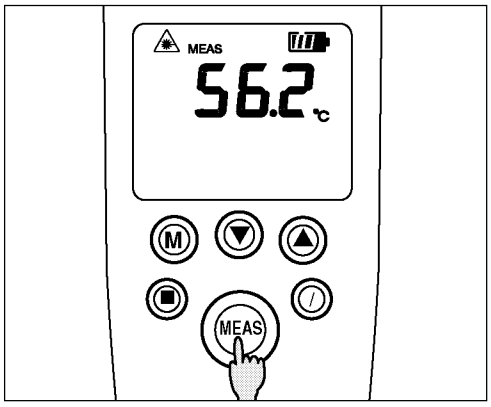
Using either black-body tape or black-body spray makes it easy to determine the emissivity of the object to be measured. Black-body tape and black-body spray are available from HORIBA as optional accesories.

1 Cover the object to be measured with black-body tape, and heat it to the appropriate temperature, i.e., room temperature +20℃ or more. Keep the temperature as constant as possible.
(The emissivity can be determined most accurately when the temperature of the object is high.)

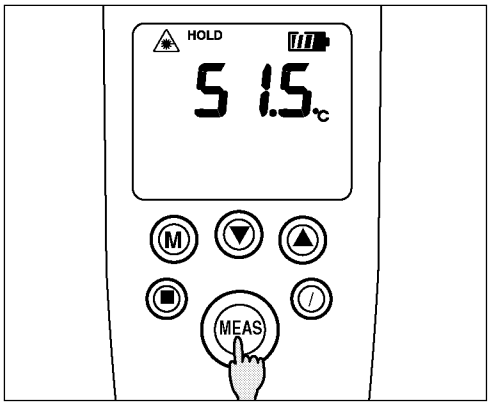
2 Set the IT-550L, IT-550S value of ε to the emissivity of the black-body tape.



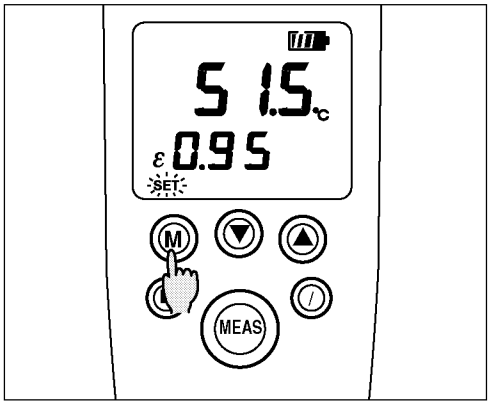
3 Measure the temperature of the portion covered by the black-body tape with this unit and record this value. (This is used in step **6**.)



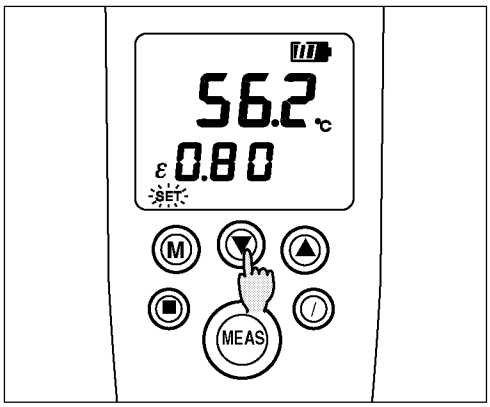
4 Then measure a portion not covered by the black-body tape that is as close as possible to the portion measured in the previous step **3**. Press the (MEAS) key again to hold the measured value.



5 Press the (M) key several times to select the emissivity setting screen.



6 Press the (▼) or the (▲) key to change the ε value until the temperature becomes the value obtained in **3**. The ε value at this time is emissivity of the object to be measured.

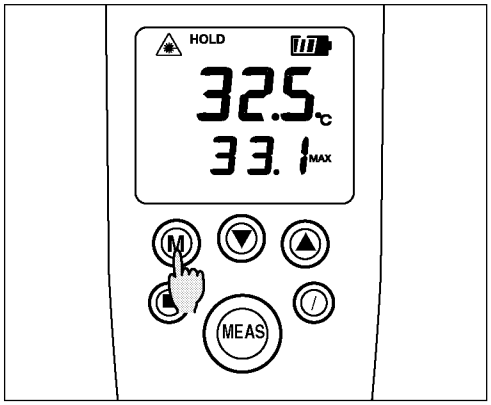


When using the optional black-body spray instead of black-body tape, determine the emissivity of the object using the same method. In this case, set the value mentioned on the label of black-body spray to the ε value of step **2**.

Displaying MAX (MIN) temperature

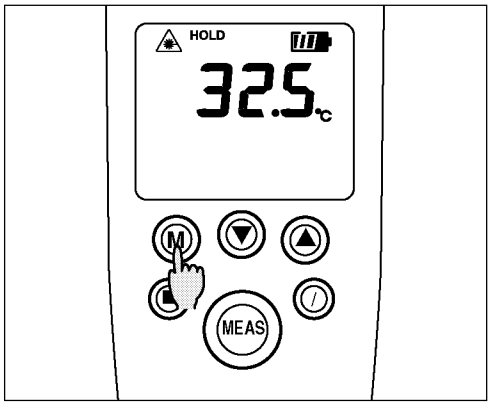
1 Displaying MAX/MIN temperature

Pressing the Ⓜ key displays the maximum (minimum) temperature in the order of MAX→ MIN.
In HOLD mode, the MAX (MIN) temp. of the previous measurement is displayed.
In MEAS mode, the present MAX (MIN) temp. is displayed.



2 Releasing MAX/MIN display

Press the Ⓜ key several times until no setting is displayed.



Troubleshooting

Problem	Cause	Countermeasure
No readout	Battery is dead.	Replace the battery.
Incorrect readout	Dirt or water drops are on the lens.	Clean lens.
	High temp. heat source near by.	Shield unit from source.
	Improper emissivity setting.	Correct setting.
	Battery capacity is low. (indicator is blinking.)	Replace the battery.
℃ indicator blinks.	Operating temperature range (0 to 40℃) exceeded.	Use in operating temperature range.
"Err" displayed.	Unit defective.	Contact representative.

Specifications

Model	IT-550L, IT-550S	
Detector/optical lens	Thermopile/Silicon	
Spectral response	8 to 16 μm	
Measurement temp. range	-50 to 500℃	
Display resolution	0.1℃	1℃
Accuracy -50.0 to -0.1 / -50 to -1℃	within ± (10% of reading -2.0)℃	within ± (10% of reading -2.0)℃
0.0 to 200.0 / 0 to 200℃	within ± 2.0℃	within ± 2℃
200.1 to 500.0 / 201 to 500℃	within 1% of reading	within 1% of reading
Repeatability -50.0 to -0.1 / -50 to -1℃	within ± 1.0℃	within ± 2℃
0.0 to 500.0 / 0 to 500℃	within ± 0.5℃	within ± 1℃
Response time	Less than 1.6 s (95% response)	Less than 0.7 s (95% response)
Target size (90% energy limit)	IT-550L 24 ± 3 mm/ 1m	
	IT-550S 2.5± 1 mm/ 73mm	
Sighting	2-beam laser sight (class 2)	
Emissivity setting	0.10 to 1.00	
Automatic power OFF	approx. 15 s (HOLD and SET mode)	
Other functions	MAX/MIN values displayable. Analog voltage output (0 to 1 V) RS-232C interface ※1	
Power	1 battery (6F22 or 6LR61) 9 V	
Battery life	20 hours or more under continuous operation at sighted lighting (alkali battery)	
Operating ambient temperature, etc.	Temperature 0 to 40℃, relative humidity 35 to 85%, no condensation	
Dustproof, waterproof	IP54 ※2	
Storage temperature	-20 to 55℃, no condensation	
Dimensions (mm)	200 (L) ×47 (W) ×48 (H)	
Mass (including battery)	280 g	

※1 To use optional voltage output and RS-232C interface, an optional expansion kit is required.

※2 IP54: No harmful influence when splashed from any direction(based on IEC529 (1989))

Standard accessories

- Battery (6F22) ·····1
- Hand strap ·····1
- Screwdriver (for removing battery cover) ·····1
- Carrying case ·····1
- Instruction manual ·····1

Optional accessories

- Expansion kit (expansion box, modular cable, analog voltage output cable, software for personal computer)
- Black-body spray
- Black-body tape
- AC adapter (above expansion kit is necessary.)

Optional expansion kit provides the following functions:

- Analog voltage output of measured data
- Inputting data to a personal computer, graph display
- AC adapter connection ※1

※1 AC adapter itself is not included in the expansion kit.

⚠ Warning:

Use of any AC adapter not recommended by HORIBA may cause a fire or damage the instrument.

NOTE

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