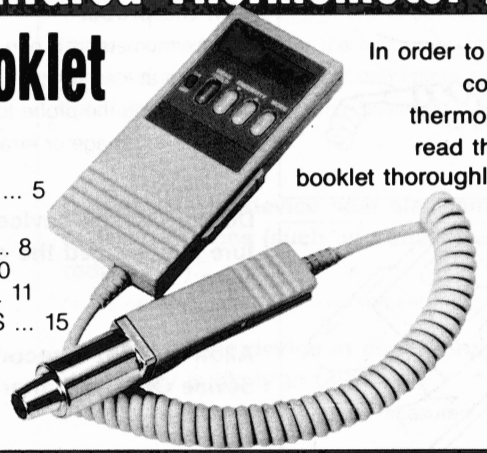
TASCO OSAKA

TASCO JAPAN CO.,LTD
2-16, 1CHOME, KAWAGUCHI, NISI-KU, OSAKA JAPAN

TASCO OSAKA

Non-contact Infrared Thermometer THI-300

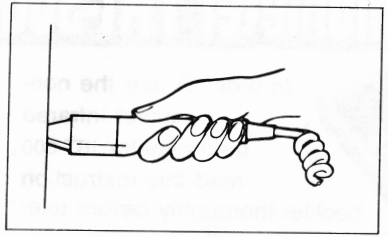
Instruction Booklet



In order to use the non-contact infrared thermometer IRT-300, read this instruction booklet thoroughly before use.

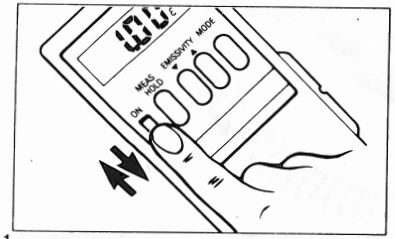
Contents

PRECAUTIONS

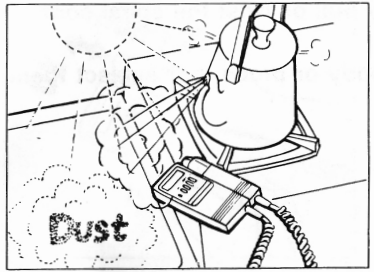


Do not directly touch the object to be measured with the probe.

This thermometer is a non-contact type device. Measure with the probe at least 10mm away from the object to be measured. Allowing the probe to directly touch the object results in irreparable damage or erratic measurement results.

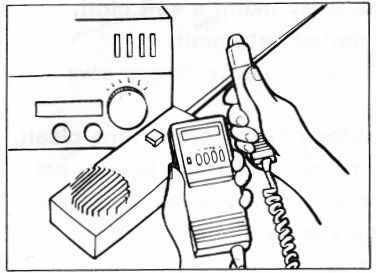


Allow at least 5 seconds before turning the device ON again after turning the power OFF.



Do not use or store the device in places subject to sunlight, dust, and high temperature and humidity.

The lens is the most vital part of this device for measurement. In the above environments, the lens probe may become dirty and deteriorate. If such use is unavoidable, use the optional hood w/film. Contact your local dealer for details.

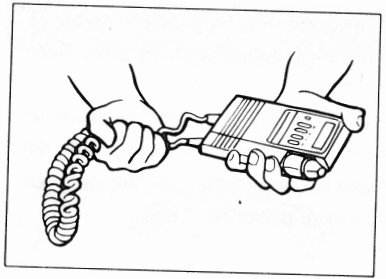


Do not use the device near electromagnetic wave emitting devices (such as transceivers, wireless radios etc.).

Noise prevents accurate measurement.

Do not use the device in conditions where static electricity is likely to build up.

This results in damage or erratic measurement results.



Do not excessively pull or twist the spiral cord.

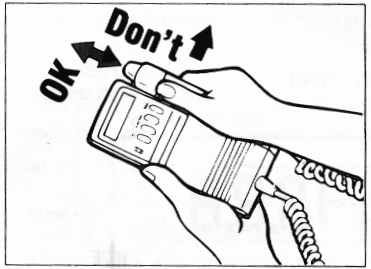
Neither drop the body or probe, nor subject them to strong shock.

Wipe off dirt on the body using a soft cloth moistened with a diluted detergent.

Do not use organic solvents such as benzene or paint thinner.

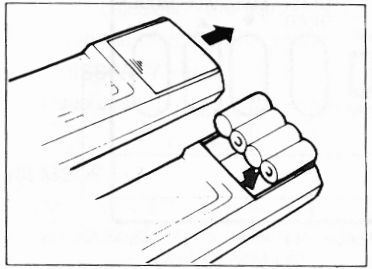
Always keep the surface of the probe lens clean.

If the lens should become dirty, wipe off dirt by a dry soft cloth such as gauze, or gauze slightly moistened with acetone. Do not use detergent or water, as they will cause the properties of the lens to deteriorate.



Take care when detaching the probe from the body.

So that you can measure objects using only one hand, this device has been designed with a slide-on mechanism that enables the probe to be easily attached. Detach the probe as shown in the figure. The device uses a two-stage slide-on mechanism. This mechanism may break if the probe is not detached in the correct manner.



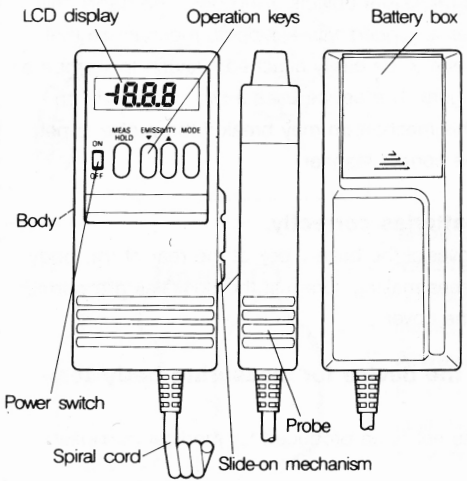
Insert the batteries correctly.

Remove the cover of the battery box at the rear of the body, insert the batteries making sure that the polarities are correct, then replace the cover.

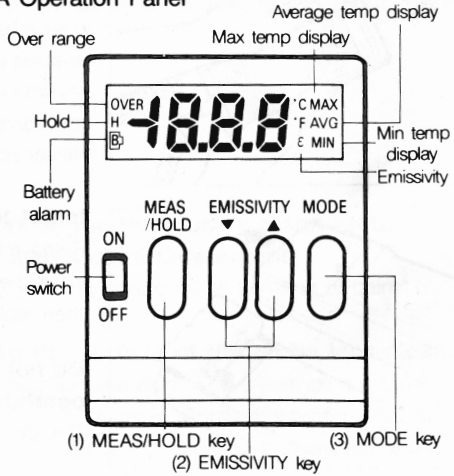
Do not use the device for measuring body temperature.

This device has not been produced for medical purposes.

PARTS NAMES & FUNCTIONS



A Operation Panel



Names and Functions of Operation Panel

(1) MEAS/HOLD key

This is for selecting the measure or hold mode. The device is operable in either of these modes excluding the first 3 seconds after the power has been turned ON. Their functions are as follows:

a) When the key is pressed during measurement, the currently displayed value is held, and measurement is ended. "H" on the LCD display represents "HOLD". The display "C" flickers and is displayed as normal.

b) When the key is pressed in a "HOLD" state, the internal data is cleared, and measurement and calculation are started again. At this time, the display "C" flickers indicating that the device is in the measurement mode.

(2) EMISSIVITY key

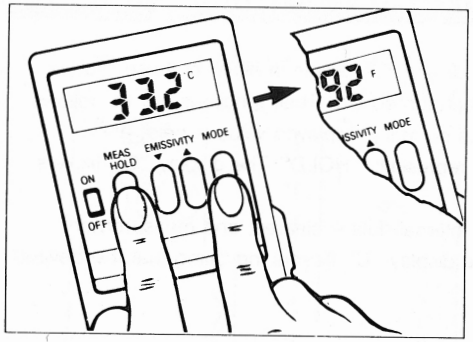
This is used for setting the emissivity (display " ε " flickers). ▼ : value decreases in 0.01 increments
▲ : value increases in 0.01 increments

(3) MODE key

This is used for selecting between the displays for the measurement, emissivity, maximum, average and minimum temperatures.

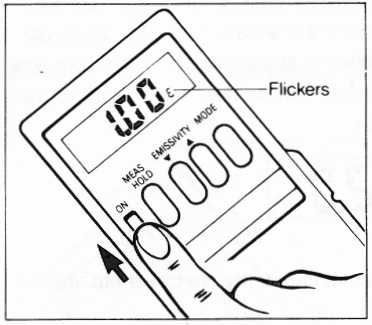
This key can be operated in either of the measurement or hold modes.

When switching between the °C and °F reading



The temperature reading can be interchanged between °C (Centigrade) and °F (Fahrenheit) by pressing the MEAS/HOLD and MODE keys at the same time. °C is displayed first of all when the power has been turned ON.

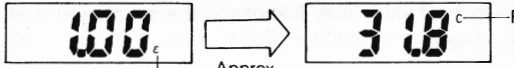
HOW TO MEASURE



GENERAL MEASUREMENTS

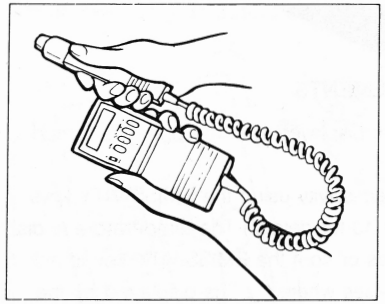
[1] Emissivity "1.00 ε " is displayed after the power is turned ON.

If necessary, set the emissivity using the EMISSIVITY keys (▲ or ▼). (See page 10 for details.) The temperature is displayed after 3 seconds or so if the EMISSIVITY key is not pressed (excluding cases where " ε " is displayed by the MODE key)



Note:

The temperature is measured while the emissivity is displayed, excluding the first 3 seconds after the power has been turned ON.



2 Point the probe at the object to measure its temperature. The object must be larger than the spot size calculated by the measurement field/distance(see page 22). In general measurements, determine the distance from the probe so that the size of the object is at least 1.5 times the spot size. The displayed temperature can be held as required by the operation shown below .

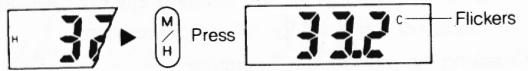
MEAS/HOLD key

Note:

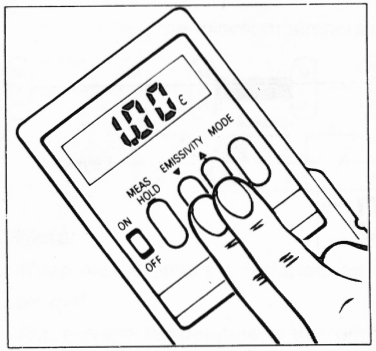
1. **The displayed value may fluctuate if the spiral cord is shaken or suddenly stretched etc. during measurement.**
2. **This device automatically compensates for influence by the ambient temperature of the sensor. When carrying out standard measurement, the device can be measured quickly for normal changes (within approx. ±15°C; no condensation on sensor allowed) in ambient temperatures and about ε = 1. For more accurate measurement, keep it approx 30 min in new temperature.**

3. **When low temperature objects are measured directly after high temperature objects, some time is required for the display to stabilize owing to cooling of the heated detector. In this instance, wait for the temperature to stabilize while measuring the floor etc. and then continue with the measurement.**

3 Restarting measurement after holding the display



This operation restarts measurement. At this time, the previous data is cleared.



HOW TO SET EMISSIVITY

Carry out the following operation when setting the emissivity not to the initial value ("1.00") but to a value specific to the object to be measured.

1 Either switch the power OFF and ON again, or display "ε" by the MODE key.

2 Alter the emissivity value by the ▼ or ▲ keys. The value is altered continuously by keeping the ▲ or ▼ keys pressed down.

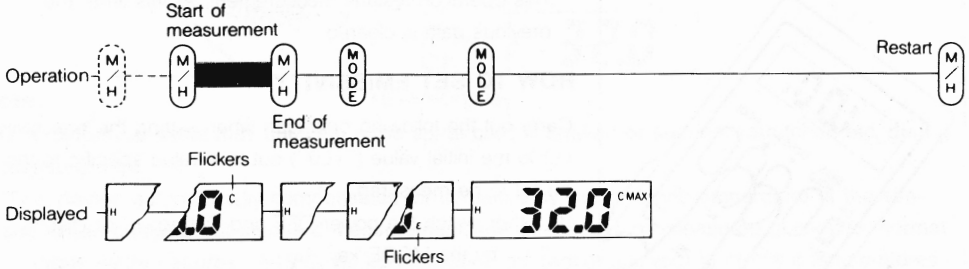
SPECIFIC MEASUREMENTS

1. **When checking after measuring the maximum, average or minimum temperatures within a certain measurement time period (ex: 28.0°C to 32.0°C):**

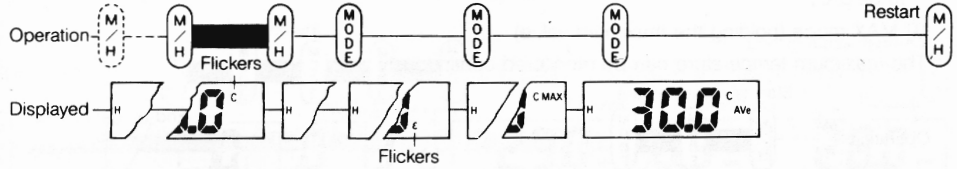
Check that "H" is displayed before starting the measurement.

If "H" is not displayed (when the device is already measuring), press the MEAS/HOLD key. After "H" is displayed, carry out the following operation:

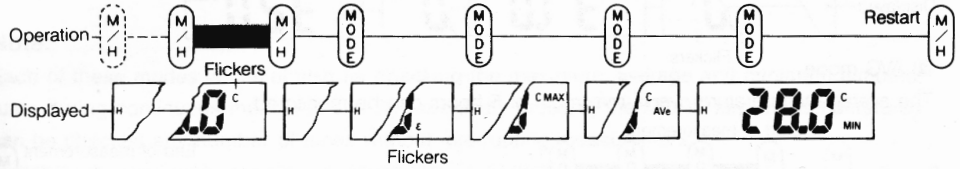
1 Checking the maximum temperature:



2 Checking the average temperature



3 Checking the minimum temperature



Note:

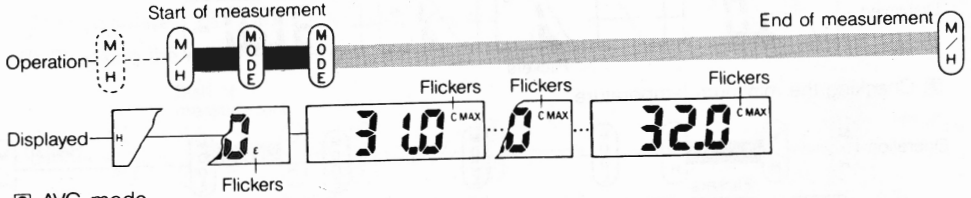
When measurement is restarted, all data is cleared. The emissivity display, however, is not cleared.

The average temperature is the temperature averaged over a maximum of 5 hours.

2. When continuously monitoring the maximum, average and minimum temperatures (ex: 28.0°C to 32.0°C):

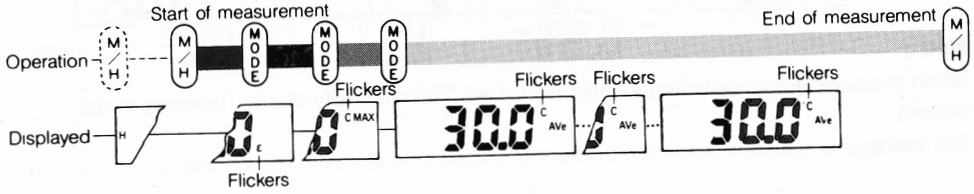
[1] MAX mode (holding the maximum value)

The maximum temperature can be monitored continuously.



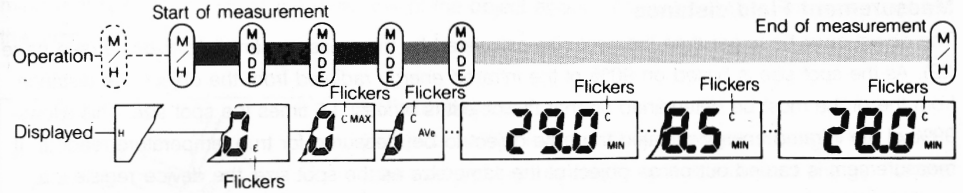
[2] AVG mode

The average temperature over a maximum of 5 hours can be monitored.



[3] MIN mode (holding the minimum value)

The minimum temperature can be monitored continuously.



Note:

Each of these modes is useful also for checking the maximum, average and minimum temperatures during continuous measurement. By repeatedly pressing the MODE key, the temperatures can be checked any number of times without interrupting measurement.

MEASUREMENT TECHNIQUES

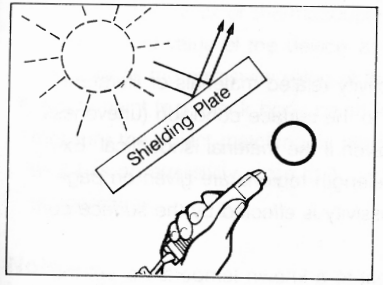
Measurement Field/distance

The object must be larger than the spot size calculated by the measurement field/distance (see page 22). As the spot size is based on 90% of the infrared energy radiated from the object, the distance from the probe must be determined so that the object is at least 1.5 times the spot size. This allows 99% of the infrared energy radiated from the object to be measured for true temperature readout. If measurement is carried out on an object of the same size as the spot size, the device registers a reading slightly lower than the actual temperature (or a slightly higher reading if the object is at a temperature lower than the ambient temperature). In such cases, this is handy for comparative temperature measurment when the size of the object, and the distance from the probe tip to the object is constant.

Collimation Method

No particular problems are encountered when the object is much larger than the spot size calculated by the measurement field/distance. However, careful collimation is required when the object is not large enough.

If the temperature of the object or a part of it is higher (or lower) than the ambient temperature, alter the direction of the probe. Ideal collimation is obtained when the display registers the maximum (or minimum) reading. However, the emissivity of the object and its ambient emissivity must be roughly the same.



Disturbance

Objects having low emissivity or objects having a low temperature yet high emissivity emit little infrared energy. For this reason, measurement of these objects is adversely effected by powerful infrared energy radiated from nearby objects having high emissivity or high temperature.

For example, when such objects are measured in sunlight, erratic measurement is caused as powerful radiated energy from the sun is reflected on the surface of the object and enters the sensor.

In such an instance, erratic measurement can be avoided by placing a shielding plate between the object and the source of radiation disturbance.

How to Calculate Emissivity

Correctly matching the emissivity with the specific value of the object is important in obtaining the true temperature. When the emissivity of the object is unknown, the means of calculating the exact value is troublesome and may also require the use of other devices. However, there are several easy ways of calculating this value, and measurement may be possible without even having to calculate it. Some examples are given below:

1 Calculate the emissivity from Critical Tables, thermal conductivity related materials or literature. Note, however, the measurement conditions differ according to the surface condition (uneveness etc.) of the object and the measurement wavelength region even if the material is identical. Examples of emissivity values with matched measurement wavelength regions are given on page 20. However, these values serve only as a reference, as emissivity is effected by the surface condition of the object.

2 In a thermostatic chamber raise the temperature of the object to a known temperature, set the emissivity so that the temperature of the object is identical to the device readout temperature. Use the value at that time as the emissivity of the material. Measurement at this time must be carried out quickly so that the temperature of the object does not drop through the inrush of outside air when the door to the thermostatic chamber is opened. Care must also be paid to the construction of the thermostatic chamber and the position of the object so that infrared energy such as from Nichrome wire in the thermostatic chamber is not reflected onto the surface of the object and result in disturbance.

3 Measure the temperature as close as possible to the surface of the object using different methods (thermistor or thermocouple thermometers). Set using the EMISSIVITY key so that the measurement value of the device at this time is the same value, and use the emissivity value at that time as the emissivity value of the material.

4 Apply paint (e.g. black body paint) whose emissivity with the object is already known, and measure the object matching its emissivity. Measurement can be aided by using black matt paint as it has an emissivity close to 1. However, heat-resistant paint is required in the case of high temperatures.

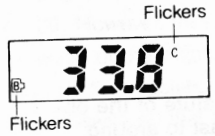
Note:

In case of 2 and 3, the emissivity cannot be correctly calculated if the temperature of the object is close to room temperature. Make sure that the temperataure is set at least to around 100°C.

OTHER READINGS

Or

This is displayed when a temperature outside of the display temperature range (-50°C to 300°C) is measured.



This is displayed when the voltage of the batteries in use has dropped lower than the permissible voltage. Replace with new batteries. Display is eventually lost when the battery voltage drops even further.
(The display example here is for Ⓑ displayed during measurement.)

EMISSIVITY EXAMPLES

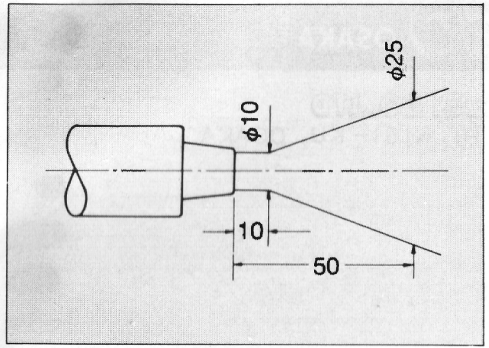
Item	Emissivity	Item	Emissivity	Item	Emissivity
Asphalt	0.90-0.98	Gypsum	0.80-0.90	Paper	0.76
Concrete	0.94	Plaster	0.89-0.91	Alumina	0.76
Cement	0.96	Brick (red)	0.93-0.95	Chromite	0.81
Sand	0.90	Fiber	0.90	Cuprite	0.90
Soil	0.92-0.96	Cloth (black)	0.98	Ferrite	0.78-0.82
Water	0.92-0.96	Leather	0.75-0.80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

*Polished metal surfaces cannot be measured as the emissivity is below 0.1.

SPECIFICATIONS

Model No : THI-300
Range : 0 to 300°C (display : -50 to 300°C)/−58° to 572°F
Resolution : 0.1°C (in range -50.0 to 199.9°C) 1°C (in range 200 to 300°C)
Accuracy : ±1% ±1 digit of full scale (at emissivity ε =1, ambient temperature 20 to 30°C)
Emissivity Setting : 0.10 to 1.00 (in 0.01 increments)
Response : Approx 2 sec
Readout : Emissivity and set, maximum, average and minimum temperatures (selectable by MODE key)
Alarm : over range (below -50°C or above 300°C), battery life
Power Supply : 4 x AAA batteries
Measurement Wavelength Region : 6 to 12μm
Operating Temp : 0 to 50°C at 85% RH or less
Storage Temp : -20 to 55°C at normal humidity
Dimensions Body : 140 (W) x 60 (D) x 27 (H)mm/5.5 (W) x 2.4 (D) x 1.1 (W)in
Probe : 140 (L) x 25 (W)mm (excluding protrusions)/5.5 (L) x 0.98 (W)in

Measurement Field/distance



(Within this field, 90% of the infrared rays radiated from the object can be measured.)