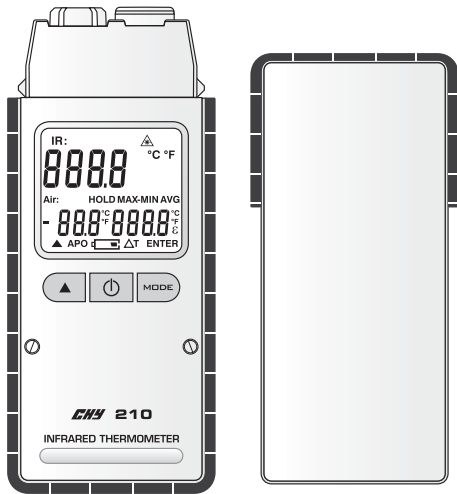


OPERATING INSTRUCTIONS

MODEL 210 CE

INFRARED THERMOMETER



INTRODUCTION

This instrument is a infrared thermometer. Main(upper) display shows the measurement of IR thermometer. Lower-left display shows the temperature of air surrounding the meter. Lower-right display show the difference between IR measurement and air temperature(ΔT).

SAFETY INFORMATION

It is recommended that users read the safety and operation instructions before using the infrared thermometer.

DANGER

When \triangle sign appears, press “▲” to turn the laser beam on and off.

Be very cautious with the laser beam, not aiming your eyes or those of any other person or animal.

- Do not look directly into the laser light from the optical system.
- When measuring the temperature of an object which has a mirror finish, be careful not to allow the laser light beam to be reflected off the surface into your eyes or those of another person.
- Do not allow the laser light beam to impinge upon any gas which can explode.

CAUTION

- Do not use the unit near any device which generates strong electromagnetic radiation or near a static electrical charge, as these may cause errors.
- Do not use the unit where it may be exposed to corrosive or explosive gases. The unit may be damaged, or explosion may occur.
- Do not keep or use this unit in an environment where it will be directly illuminated by sunshine, or where it condensation. If you do, it may be deformed, its insulation may be damaged, or it may no longer function according to specification.
- Do not place the meter on or around hot objects (70°C/158°F). It may cause damage to the case.
- If the meter is exposed to significant changes in ambient temperature (hot to cold or cold to hot). Allow 30 minutes for temperature stabilization, before taking measurement.
- Condensation may form on the sensor when going from a cold to hot environment-wait 10 minutes for condensation to dissipate before taking measurements.
- This unit is not constructed to be waterproof or dustproof, so do not use it in a very dusty environment or in one where it will get wet.
- Do not point the lens at the sun or at any other source of strong light. Doing so may damage sensor.
- Do not contact the lens against the object whose temperature is to be measured, or get it dirty, allow it to be scratched, or allow any foreign material to adhere to it. Doing so may cause errors.
- Do not touch or hold by the front case. Temperature reading can be affected by heat from hand.
- Readings may be affected if the unit is operated within a radio frequency electromagnetic field strength of approximately 3 volts per meter, but the performance of the instrument will not be permanently affected.

SPECIFICATIONS

IR TEMPERATURE

Temperature Range:

-30°C to 550°C, -22°F to 1022°F

Display Resolution:

0.1°C, 0.1°F

Accuracy:

$\pm(2^\circ\text{C}/4^\circ\text{F})$ for -30°C to 100°C, (-22°F to 212°F)

$\pm(2\%$ reading) for 101°C to 550°C, (213°F to 1022°F)

Response Time:

0.5 second

Detection Element:

Thermopile

Spectral Response:

6 to 14 μm

Optical Lens:

Fresnel Lens

Adjustable emissivity (ϵ):

0.1 to 1.0

Field of View:

100mm \varnothing at 600mm(2.4” \varnothing at 24.0”)



Note:

1. The distance between Laser marker and center of spot is 16mm.
2. Spot size increases with distance from the probe tip as shown (Spot Diameter measured at 90% Energy).
3. To ensure accurate measurement, the size of the object needs to 1.5 to 2 time of the spot size, so to provide adequate margin.

AIR TEMPERATURE

Sensor:

Thermistor temperature sensor

Range:

-20°C to 60°C, (-4°F to 140°F)

Resolution:

0.1°C, 0.1°F

Accuracy:

$\pm 0.5^\circ\text{C}$ for 0°C to 45°C

$\pm 1.0^\circ\text{C}$ for -20°C to 0°C, 45°C to 60°C

$\pm 1.0^\circ\text{F}$ for 32°F to 113°F

$\pm 2.0^\circ\text{F}$ for -4°F to 32°F, 113°F to 140°F

LASER SPECIFICATIONS

Laser safety classification of Class 2

Wave Length:

Red (630~670nm)

Power out:

<1mW.

Sighting:

1-beam laser marker.

Operating Environment: -20°C to 60°C, (-4°F to 140°F) at <70% R.H.

Storage Temperature: -20°C to 60°C (-4°F to 140°F), 0 to 80% R.H. with battery removed from meter.

Temperature Coefficient: 0.1 times the applicable accuracy specification per °C out of 23°C $\pm 5^\circ\text{C}$, (73.4°F $\pm 9^\circ\text{F}$)

Auto power off: 10 minutes

Standby consuming current: <5 μA

Battery: 1.5Vx2pcs AAA size

Battery Life: 40 hours (continuity) typical. (contain Laser)

Low battery indication: The “ --- ” is displayed when the battery voltage drops below the operating level

Dimensions: 24.7mm(T) x 50.9mm(W) x 132.9mm(H)

Weight: Approx. 120g. (including battery)

OPERATIONS

There are 3 operation modes, namely Measurement Mode, Set Mode and Hold Mode.

1. Turning on and off the meter:

When power is off, a short push on “ ⏻ ” key turns on the meter and enter Measurement Mode.

When power is on, press and hold “ ⏻ ” key for 2 seconds turns the power off.

Right after power on, all the indicators on the LCD display lights up for one second.

2. Measurement Mode:

Press “▲” key, to start measuring and activate the Laser pointer.

While “▲” key is pressed, measurement reading refreshed every 0.5 second.

When “▲” key is released the display freezes with reading of last measurement and indicator “HOLD” shows in middle of display.

Backlight:

In measurement mode, a short push on “ ⏻ ” key turns on the backlight for dark environment, it goes off automatically after 15 seconds if without further operation.

3. Set Mode:


In set mode, user can select unit of temperature(°C/°F), turn on/off differential temperature(ΔT), adjust emissivity(ϵ) and turn on/off APO function.

(APO = Auto Power Off, when APO is ON, the meter power off automatically if no operation in 10 minutes).

When power is off, press and hold “ ⏻ ” key for 2 seconds to enter Set Mode.

In Set Mode, press “Mode” key each time move settable position/digit in following sequence (indicator of settable position/digit blinks.)

- 3.1 °C/°F Unit: short push on “▲” key switches between °C and °F. Push “MODE” key to save the setting, enter ΔT on/off setting mode.
- 3.2 ΔT on/off: short push on “▲” key switches between on and off. Push “MODE” key to save the setting, enter Emissivity setting mode.
- 3.3 Emissivity setting (0.10 to 1.00): Press “▲” key to change the blinking digit. Press “MODE” key to select save, and change to the next digit or enter APO on/off setting (for most right digit).
- 3.4 APO on/off: short push on “▲” key switches between on and off.
- 3.5 Push “MODE” key to save the selection, exit set mode and Enter Measurement Mode (Please refer to the section of Measurement Mode.)

※**Note:** To turn off power in Set Mode abandon the current setting and previous settings remain unchanged. If “” indicator appeared, the setting value can works till power off but did not save to meter.

4. Hold Mode:

In Measurement Mode, short push “Mode” key to enter Hold Mode with indicator “**HOLD**” shows at upper left corner of LCD.

Right after entering this mode, shown in the LCD is the last measurement and the reading will not be updated with new measurement.

Push “Mode” key each time the display changes in following sequence:

- 4.1 Last Measurement: with indicator “HOLD”.
- 4.2 Maximum value recorded: with indicator “HOLD” + “MAX”.
- 4.3 Minimum value recorded: with indicator “HOLD” + “MIN”.
- 4.4 Maximum-Minimum value recorded: with indicator “HOLD” + “MAX-MIN”.
- 4.5 Average of values recorded: with indicator “HOLD” + “AVG”.
- 4.6 Exit the Hold Mode and return to Measurement Mode.

To clear the recorded values:

In Hold Mode and during viewing **MAX**, **MIN**, **MAX-MIN** or **AVG**, press and hold “Mode” key for 2 seconds, to clear the recorded data and return to measurement mode.

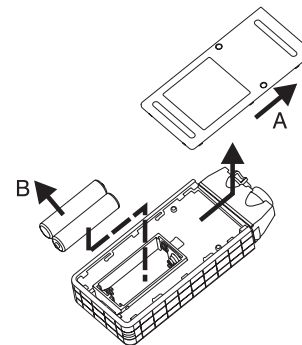
Measurement Considerations

1. Theory of Measurement
Every object emits infrared energy in accordance with its temperature. By measuring the amount of this radiant energy, it is possible to determine the temperature of the emitting object.
2. About Infrared
Infrared radiation is a form of light (electromagnetic radiation), and has the property that it passes easily through air while it is easily absorbed by solid matter. With an emission thermometer which operates by detecting infrared radiation accurate measurement is possible, irrespective of the air temperature or the measurement distance.
3. Emission Thermometer Structure
Infrared radiation which has been emitted from the object is focused upon an infrared radiation sensor, via an optical system. This includes a lens which is transparent to infrared radiation. And 5.3 μ m cut off filter. The output signal from the infrared radiation sensor is input to an electronic circuit along with the output signal from a standard temperature sensor (Thermopile).
4. Emissivity
All objects emit invisible infrared energy. The amount of energy emitted is proportional to the object's temperature and its ability to emit IR energy. This ability, called emissivity, is based upon the material that the object is made of and its surface finish. Emissivity values range from 0.10 for a very reflective object to 1.00 for a black body. Factory set emissivity value of 0.95, which cover 90% of typical applications.


Substance	Thermal emissivity	Substance	Thermal emissivity
Asphalt	0.90 to 0.98	Cloth (black)	0.98
Concrete	0.94	Human skin	0.98
Cement	0.96	Lather	0.75 to 0.80
Sand	0.90	Charcoal (powder)	0.96
Earth	0.92 to 0.96	Lacquer	0.80 to 0.95
Water	0.92 to 0.96	Lacquer (matt)	0.97
Ice	0.96 to 0.98	Rubber (black)	0.94
Snow	0.83	Plastic	0.85 to 0.95
Glass	0.90 to 0.95	Timber	0.90
Ceramic	0.90 to 0.94	Paper	0.70 to 0.94
Marble	0.94	chromium oxides	0.81
Plaster	0.80 to 0.90	Copper oxides	0.78
Mortar	0.89 to 0.91	Iron oxides	0.78 to 0.82
Brick (red)	0.93 to 0.96	Textiles	0.90

MAINTENANCE

Installing and Replacing Battery



- A. Battery Cover
- B. Battery

1. Power is supplied by 2pcs 1.5V (AAA SIZE).
2. The “” appears in the display when battery replacement is needed.
3. Push the Battery Cover and lift it in the direction as shown in the figure.
4. Remove the batteries from battery compartment.
5. Replace with 2 new AAA batteries with polarity as indicated on the bottom of Battery Compartment.
6. Replace the Battery Cover.

Cleaning

Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents.