

# Thermal Imaging Camera Manual



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## 1. Introduction

HT-02 is a thermal Imaging Camera which combines the functions of surface temperature measurement and real-time thermal imaging.

The traditional thermal Imaging Camera shall measure each component one by one but this instrument does not need to. Therefore, it helps to save our customers' time. Even the potential problems can be clearly displayed on the color screen which helps customers quickly locate the central point to measure cursor and temperature.

To improve recognition, this product is equipped with a vision camera. Based on practical requirements, it can turn thermal image into visual image. Thermal image and visual image can be stored in the dismountable memory card. Adjust the images and store them in PC which are used to generate report or for printing. HT-02 is easy to operate. After seconds it can be tested. This product is the optimum product for electrician and maintainer. It can quickly find out the problem area.

The following functions help to improve the accuracy and usability of product:

- Adjustable radiation coefficient and reflection background compensation help to improve the accuracy of the measurement of semi-reflective surface.
- The marking of hot spot and cold spot can help user to locate the hottest and coldest area of thermal imaging temperature.
- Options of color palette

## 2. Safety

To ensure the accuracy of measured results, please carefully read this manual before operation.

Please strictly follow this manual to operate our product. In case of any problems due to operational errors, the maintenance cost will be charged.

Do not use our product under the explosive or damp or corrosive atmosphere.

If our product is damaged, broken or has just been repaired, the measurement results might be inaccurate.

Please refer to radiation coefficient to get the actual temperature.  
The measured temperature might be lower than the actual temperature because of reflective surface. These surfaces might be the potential burning hazard for user.

### 3. Performance indexes

|                                     |                                                                                               |
|-------------------------------------|-----------------------------------------------------------------------------------------------|
| Display screen                      | 2.4" full-angle high resolution color screen                                                  |
| Resolution of infrared image        | 60*60 (3600 pixels)                                                                           |
| Resolution of visible image         | 0.3 mega pixels                                                                               |
| Field angle/shortest focal distance | 20*20/0.5m                                                                                    |
| Thermal sensitivity                 | 0.15°C                                                                                        |
| Range of temperature measurement    | -20°C to +300°C                                                                               |
| Accuracy of temperature measurement | ±2% or ±2°C (±2% or ±4°F)                                                                     |
| Emissivity                          | Adjustable 0.1-1.0                                                                            |
| Image capturing frequency           | 6Hz                                                                                           |
| Range of wave length                | 8-14um                                                                                        |
| Focal distance                      | Fixed focal distance                                                                          |
| Color palette                       | Iron red, rainbow, rainbow high contrast, gray scale (white glow) and gray scale (black glow) |
| Vision option                       | 25% step infrared to visional to infrared and visional image                                  |
| Memory card                         | Mini SD card                                                                                  |
| File format                         | bmp                                                                                           |
| Power supply                        | AA battery * 4                                                                                |
| Battery life                        | 6 hours                                                                                       |
| Auto power-off time                 | 12 minutes                                                                                    |
| Authentication                      | CE (EN61326-1:2006)                                                                           |
| Dimension of product (L*W*H)        | 212mm*95mm*62mm                                                                               |
| Weight                              | 320g                                                                                          |
| Warranty period                     | 2 years                                                                                       |
| Operating temperature               | -5°C to ±40°C                                                                                 |
| Storage temperature                 | -20°C to ±50°C                                                                                |
| Relative humidity                   | 10% RH to 80% RH                                                                              |

### 4. Product description

Press "start-up" key for 5 seconds and the instrument starts up.  
Press "menu" key for 1 second to enter into the mode of the setting of basic functions. There are only five options on the display screen.  
Press "up" or "down" key to scan the menu and select the yellow option box.  
Press "select" key and select "menu" option and edit the value.  
Press "up" or "down" key to edit the value. After adjustment, confirm the new value and press "menu" key to exit the edit mode.

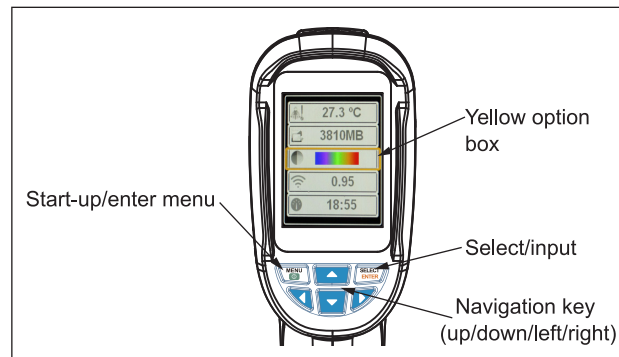


Figure 1- Basic Functions

5. Structure

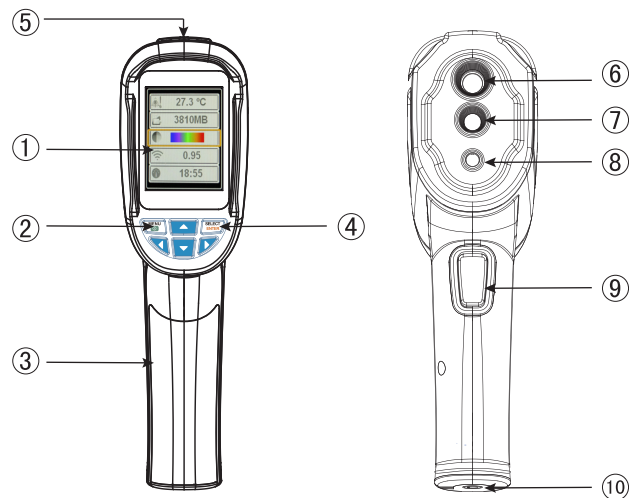


Figure 2 – Structure of Product

| Item | Description                      | Item | Description                              |
|------|----------------------------------|------|------------------------------------------|
| 1    | TFT high definition color screen | 6    | Infrared imaging sensor                  |
| 2    | Start-up/menu key                | 7    | Visible light camera                     |
| 3    | Battery cover                    | 8    | LED                                      |
| 4    | Select/enter key                 | 9    | Image capturing key                      |
| 5    | Small SD card                    | 10   | Interface for the installation of tripod |

6. Menu Description

| Icon |         | Description                    |
|------|---------|--------------------------------|
|      | 12:12   | Time setting                   |
|      | 5000    | Save image                     |
|      | 50%     | Background light setting       |
|      | °C      | Temperature unit setting       |
|      | 25°C    | Background temperature setting |
|      | 11088MB | Capacity of memory card        |
|      |         | Color palette setting          |
|      | 0.95    | Emissivity setting             |

Figure 3 –Menu's Icons and Description

## 7. Battery cover installation method

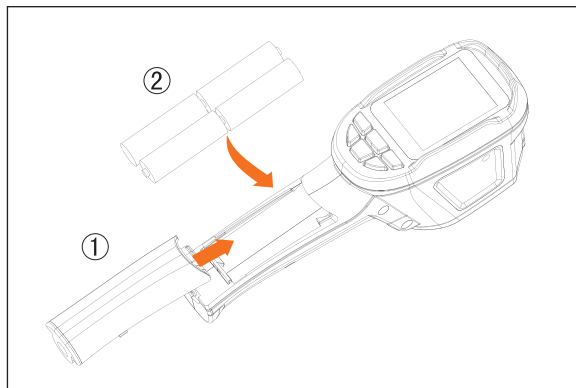
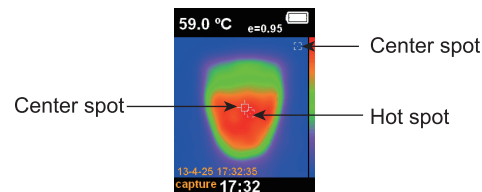


Figure 4 – Replace Battery

1. Do not mistakenly install the battery.
2. Slide the battery cover to the accurate position.

## 8. Measurement

The measured temperature of the center of pixel is displayed in the upper left corner of display screen. The setting of radiation coefficient is also displayed in the upper right corner of display screen. Move the product until hot spot or cold spot coincides with the center of pixel. Direct the product to the object whose temperature is higher or lower than the surrounding temperature to get the optimum measured results.



## 9. Focal distance

This product is the fixed-focal thermal Imaging Camera. The applicable distance is 50cm (20min).

Image storage

## 10. Elimination of noise

Start up the instrument and then put the head of sensor close to the worktop. Press “up” key for 5 seconds to eliminate the noise.

## 11. LED light

Press “image capturing” key for 5 seconds to turn on LED light to cooperate with the working of visible camera.

## 12. Color palette

"Color palette" menu can change the fake color of the infrared image displayed on the screen or captured. A series of color palette is available for usage. Some color palettes are more applicable to the special areas, so they are set as required options. Gray-scale color palette provides balanced linear color, so it can help to fully reveal details. High-contrast color palette can emphasize the displayed color. This color palette is applicable to the hot-cold contrast situation. It is used to improve the color contrast of high-temperature and low-temperature. Iron red and rainbow color palettes provide a mixed high-contrast gray-scale color palette.



High contrast



Iron red



Rainbow

## 13. Temperature of reflective background

The background temperature can be set between 0°C and +36°C. Set the temperature compensation for reflective background in the option of background. Over-hot or over-cold object may influence the object or the surface temperature and measurement accuracy of measured object. When the radiation coefficient of the surface of the measured object is low, this phenomenon is obvious. Under many situations, adjust the temperature of reflective background to get the optimum measured result.

## 14. Marking of spot temperature

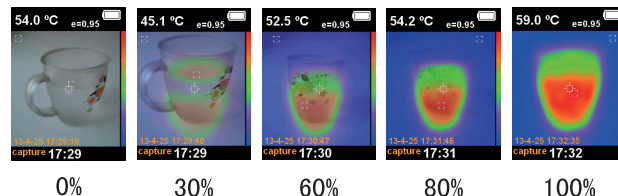
Turn on or off the marking of spot temperature. If turning on, the marking of spot temperature indicates that the hot spot or cold spot in the screen needs additional appraisal. If turning off, it indicates that user can focus on the measured pixel per time.

## 15. Unit of temperature

The product displays the temperature in unit of °C or °F.

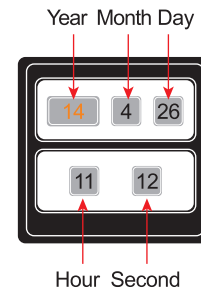
## 16. Image mixing

Use the aligned visible image and infrared image. The mixed image makes the understanding of infrared image become easier. The product can capture the visible image of each infrared image to accurately display the temperature distribution of target area. It helps to share with others. If this mixing function is used, press "left" or "right" key to adjust the mixed image from 0% to 100%.



## 17. Time setting

In clock menu, use can set time and date. Press "menu" key to enter into "menu" mode. Press "up" or "down" key to select "clock" menu. Press "select" key to enter into the mode of clock calibration. Press "left" or "right" key to select the aimed time parameter. Press "up" or "down" key to add or subtract the value. After setting, press "menu" key to exit.



## 18. Image Capture and Storage

This product can be stored for up to 25,000 images on the micro SD card. Press image capturing button and the symbol of "store photos yes no" will display on the screen. Press "MENU" key to store image. Press "SELECT" key to delete the captured image. If "NO SD" displayed at the lower left corner of screen, it indicates SD card is not installed. If "FULL" is displayed at the lower left corner of screen, it indicates that SD card is full.

## 19. Check internal storage

1. Press "menu" key to enter into the mode of "menu".
2. Select the image storage module using the arrow keys.
3. Press the "SELECT" button to select the picture you want to view.
4. Press the arrow keys to view other pictures.
5. Press the SELECT button to view pictures.
6. Press the above key on the screen will display "Delete photo yes no", then press the MENU key to delete the picture, Press "SELECT" to cancel.
7. Press the MENU button to exit Review.

## 20. Notes

All the objects have the radiated infrared energy. The radiated quantity of infrared energy is based on the actual temperature and radiation coefficient of surface. Our instrument can sense the infrared energy on the surface of object and estimate the temperature based on the sensed value of infrared energy. Many objects (e.g. coated metal, wood, water, skin and texture) can radiate energy, so it is easy to get the accurate measured value. As to the surface which is easy to radiate energy (high radiation coefficient), the radiation coefficient is greater than 90% (0.90). This simple method is not applicable to the glossy surface or coated metal because their radiation coefficient is less than 60% (0.06). These materials are not easy to radiate energy so they are classified as the low radiation coefficient materials. To accurately measure the low radiation coefficient materials, calibrate the radiation coefficient. Adjustment of radiation coefficient is to make the product more accurately calculate the estimated value of actual temperature.

## 21. Emissivity

For the emissivity within the step length of 0.01, it can be adjusted from 0.10 to 1.00. Set the default value to 0.95. The accurate value of emissivity is very important to the accurate measurement of temperature. The surface emissivity has great impact on the measured temperature of our product. To know the emissivity of the measured surface helps to get more accurate result of temperature but this is not always true.

## 22. Emissivity of normal materials

| Materials | Thermal radiation | Materials     | Thermal radiation |
|-----------|-------------------|---------------|-------------------|
| Asphalt   | 0.90~0.98         | Black cloth   | 0.98              |
| Concrete  | 0.94              | Human skin    | 0.98              |
| Cement    | 0.96              | Bubble        | 0.75~0.80         |
| Sand      | 0.90              | Charcoal dust | 0.96              |
| Soil      | 0.92~0.96         | Paint         | 0.80~0.95         |
| Water     | 0.92~0.96         | Matt paint    | 0.97              |
| Ice       | 0.96~0.98         | Black rubber  | 0.94              |
| Snow      | 0.83              | Plastic       | 0.85~0.95         |
| Glass     | 0.90~0.95         | Wood          | 0.90              |
| Ceramic   | 0.90~0.94         | Paper         | 0.70~0.94         |
| Marble    | 0.94              | Chromic oxide | 0.81              |
| Gypsum    | 0.80~0.90         | Copper oxide  | 0.78              |
| Mortar    | 0.89~0.91         | Ferric oxide  | 0.78~0.82         |
| Brick     | 0.93~0.96         | Texture       | 0.90              |

## 23. Maintenance

Use wet cloth or liquid soap to clean the shell. Do not use abrasive compound or isopropyl alcohol or solvent to clean the shell or lens or window.