Entry Level Thermal Camera

D160-Pro

User's manual

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Version 2.2

About this IR Camera User Guide

Symbols Used

This mark denotes issues that may affect the IR camera's operation.

This mark denotes additional topics that complement the basic operation procedures.

Thumb Index

Introduction of camera components.

Preparing the IR Camera

Describes basic functions, learning how to turn on/off the IR camera and work with the control panel and LCD monitor.

Basic function

Describes working with the camera, from each analysis settings to using the camera's various analysis tools.

Shooting

Explains how to review recorded images, erase images and playback voice memos.

Playback and erase

Explains how to transfer images or video to a computer.

Connection and download

You must read this section before connecting your camera to a computer.

Table of Contents

Read This First

Test Shots

Before you try to shoot important subjects, we highly recommend that you shoot several trial images to confirm that the IR camera is operating and being operated correctly.

Please note that SATIR, its subsidiaries and affiliates, and its distributors are not liable for any consequential damages arising from any malfunction of an IR camera or accessory that results in the failure of an image to be recorded or to be recorded in a format that is machine readable.

Warning Against Copyright Infringement

Safety Precautions

Before using the camera, please ensure that you read and understand the safety precautions described below. Always ensure that the IR camera is operated correctly.

The safety precautions noted on the following pages are intended to instruct you in the safe and correct operation of the IR camera and its accessories to prevent injuries or damage to yourself, other persons and equipment.

Warnings

Read on to learn about using IR camera properly.

Avoid damaging eyesight

> ***Warning:*** Do not trigger the laser pointer in human or animal eyes. Exposure to the laser produced by the laser pointer may damage eyesight.

Do not disassemble

Do not attempt to disassemble or alter any part of the equipment that is not expressly described this guide.

Stop operating immediately if it emits smoke or noxious fumes

Failure to do so may result in fire or electrical shock. Immediately turn the IR camera's power off, Unplug the power cord from the power outlet. Confirm that smoke and fume emissions have ceased.

Stop operating immediately if it is dropped or the casing is damaged

Failure to do so may result in fire or electrical shock. Immediately turn the IR camera's power off, Unplug the power cord from the power outlet.

Do not use substances containing alcohol, benzene, thinners or other flammable substances to clean or maintain the IR camera

The use of these substances may lead to fire.

Remove the power cord on a regular periodic basis and wipe away the dust and dirt that collects on the plug, the exterior of the power outlet and the surrounding area

In dust, humid or greasy environments, the dust that collects around the plug over long periods of time may become saturated with humidity and short-circuit, leading to fire.

Do not handle the power cord if your hands are wet

Handling it with wet hands may lead to electrical shock. When unplugging the cord, ensure that you hold the solid portion of the plug. Pulling on the flexible portion of the cord may damage or expose the wire and insulation, creating the potential for fires and electrical shocks.

Do not cut, alter or place heavy items on the power adapter cord.

Any of these actions may cause an electrical short circuit, which may lead to fire or electrical shock.

Use only the recommended power accessories.

Use of power sources not expressly recommended for this IR camera may lead to overheating, distortion of the IR camera, fire, electrical shock or other hazards.

Use only recommended accessories.

Disconnect the compact power adapter from both the IR camera and power outlet after recharging and when the IR camera is not in use to avoid fires and other hazards.

Continuous use over a long period of time may cause the unit to overheat and distort, resulting in fire.

If your camera is used for prolong periods, the IR camera body may become warm

Please take care when operating the IR camera for an extended period as your hands may experience a burning sensation.

Once the equipment reach end of live

2012/19/EU (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: www.recyclethis.info

Prevent Malfunction

Read on to learn about preventing malfunction of IR camera.

Avoid damaging the detector of the IR camera

> ***Warning:*** Do not aim the IR camera directly into the sun or at other intense heat source which could damage the detector of the IR camera.

Avoid Condensation Related Problems

Moving the IR camera rapidly between hot and cold temperatures may cause condensation (water droplets) on its external and internal surfaces.

You can avoid this by placing the IR camera in the plastic case (bundle) and letting it adjust to temperature changes slowly before removing it from the case.

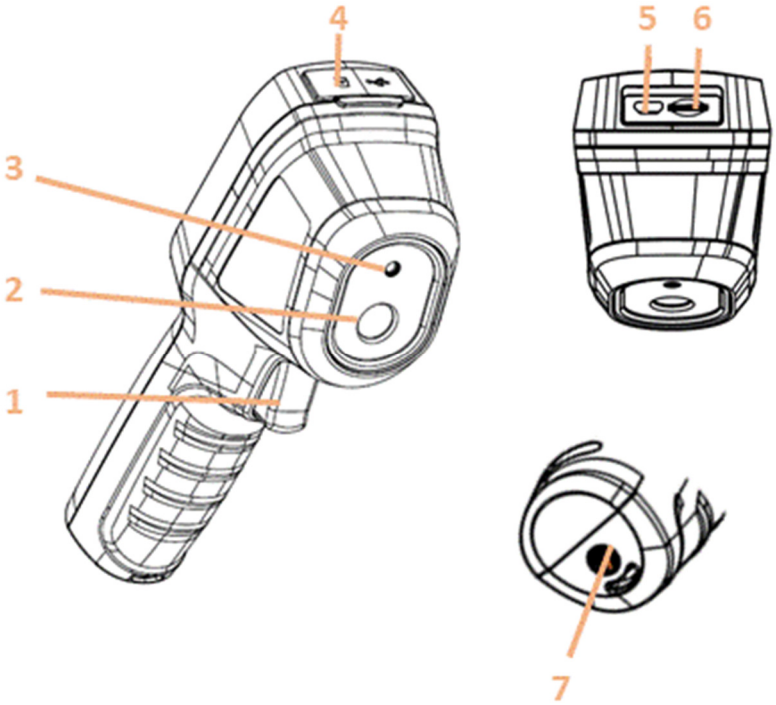
If Condensation Forms Inside the IR Camera

Stop using the camera immediately if you detect condensation. Continue to use may damage the IR camera. Remove the PC card, and a household power source, from the IR camera and wait until moisture evaporates completely before resuming use.

Right Reserved

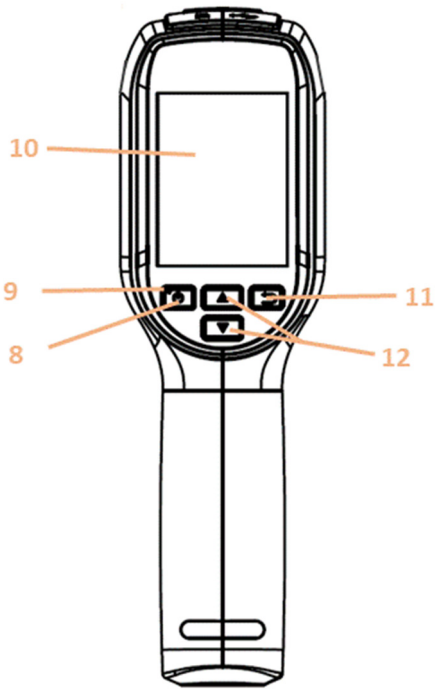
Component Guide

Front View



Number	Description Component
1	Trigger
2	IR Lens
3	Laser
4	Interface Cover
5	USB Interface
6	Micro SD Card
7	Tripod connector

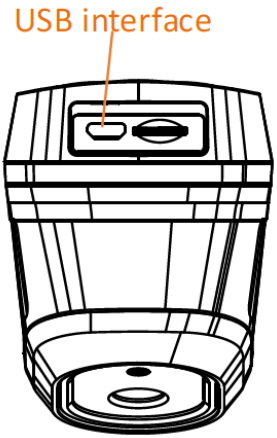
Side / Top View



Number	Description Component
8	On / Off , Menu, OK Button
9	Power indicator
10	Screen
11	Back Button
12	Navigation Buttons

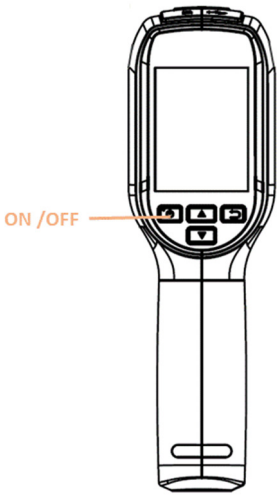
Preparing the IR Camera

Charging the device



1. Open the top cover of the camera as shown above.
2. Connect the USB interface cable supplied to the supplied power adaptor

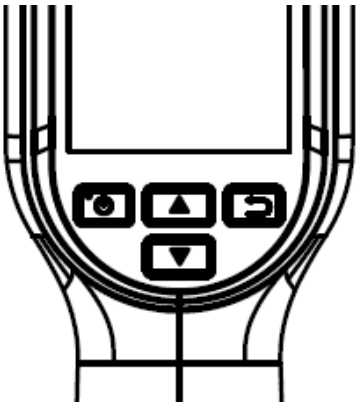
Turning the Power On / Off



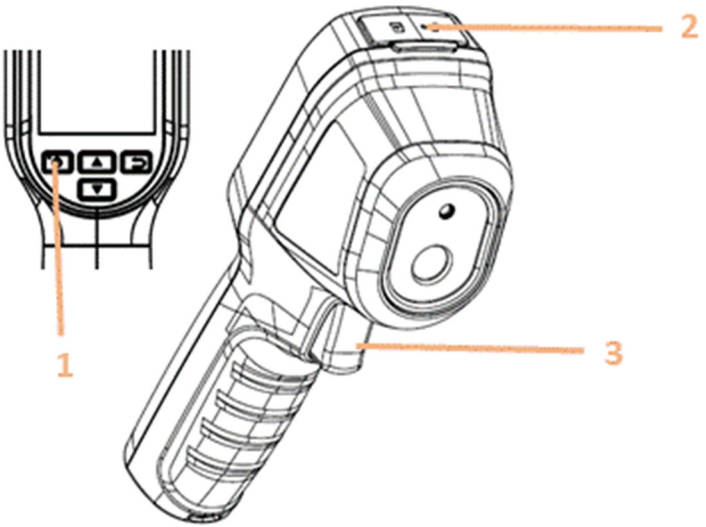
Press and hold  to turn ON or turn OFF the Power.

Basic Functions

Menu Operation



Description Component	Function
	Hold: Power On/OFF Press: Display Menu and confirm operation
	Press: Exit the menu or return to previous Menu
 	Navigation Buttons ● Press △, ▽ Buttons to select parameter. ● Press  to start digital zoom.

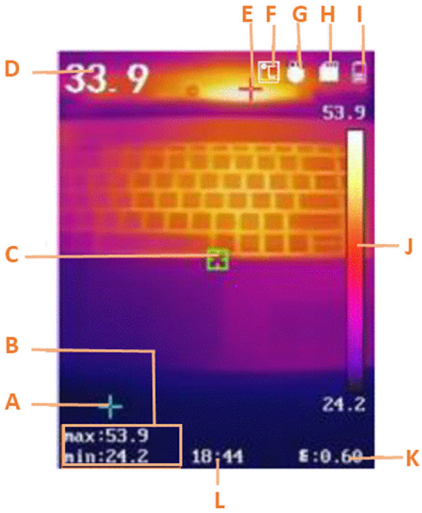


No.	Description Component	Function
1	Charging Indicator	When the device is charging, the LED indicator will turn Red. When it is fully charger the LED indicator will turn Green
2	USB Interface	Charging the Battery and exporting the saved Images with the USB Cable
3	Trigger	Press the trigger to capture a snapshot / image. When the laser function is turned on, press the trigger to turn on/off the laser light

Note

The laser should not be pointed at or near to the eyes

Menu Description



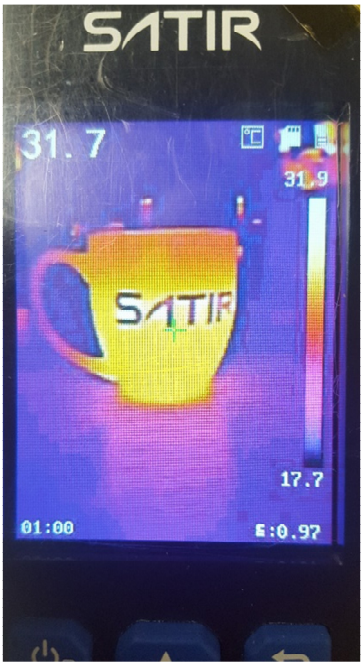
Letter	Description Component	Function
A	Min Temperature location	Cold spot tracker
B	Max and Min Temperature reading	Readings from location E , A
C	Center spot Location	
D	Center spot temperature	
E	Max Temperature location	Hot spot tracker
F	Unit display	C or F
G	LED status	Light ON or OFF
H	SD Card	Indicated if SD card is Installed
I	Battery Status	Level are battery charge
J	Color temperature Bar	Selectable
K	Emissivity Setting	Adjustable between 0- 1
L	Time	Time

Shooting

IR camera Adjustment

Focus

This camera is fitted with a fixed focus.
If the image appears out of focus, then the user will have to change position in order to optimise the image.

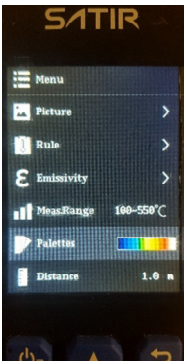


Palettes Setting

The palettes allow you to select the desired colours.

Steps

1. Select



2. Tap on the icons to select a palette type.

White Hot

The hot part is light-coloured in view.

Black Hot

The hot part is black coloured in view.

Rainbow

The target displays multiple colours, it is suitable for scene without obvious temperature difference.

Ironbow

The target is coloured as heated iron.

Red Hot

The hot part is red coloured in view.

Fusion

The hot part is yellow-coloured, and the cold part is purple-coloured in view.

Rain

The hot part in the image is coloured, and the else is blue.

3. Press ⮌ to exit the setting interface.

Temperature Measurement

The thermography (temperature measurement) function provides the real-time temperature of the scene and display it on the left of your screen. The thermography function is turned on by default.

Set Thermography Parameters

You can set thermography parameters to improve the accuracy of temperature measurement.

1. In the view Interface Press ⏻ button which will show the Menu bar
2. Press △,▽ buttons to select the desired function.
3. Press ⏻ button to go to the setting interface.

Emissivity

Set the emissivity of your target. This is the effectiveness in infrared energy emitted from the target surface. Normally between zero and one,.[0.9 is a good start point for beginners]

Temperature

Set the average temperature of the environment.

Distance

Set the distance between the target and the device, in a straight line. Recommend around 0.2 to 5m for a 160x120 camera.

Laser Setting

The Laser will help to identify and match up the thermal and visual imager for the end user.

1. In the live view interface, press button show the menu bar.
2. Press △/▽ buttons to select **Laser**.
3. Press buttons to turn on / turn off laser light function.
4. Press button to save and exit.
5. In live view interface, press and hold the trigger to turn on the Laser, release the trigger to turn off the laser.

Caution

The laser radiation emitted from the device can cause eye injuries, burning of skin or inflammable substances. Before enabling the Light Supplement function, make sure no human or inflammable substances are in front of the laser lens.

Analysis

Set Thermography Rules

You can set thermography parameters to improve the accuracy of temperature measurement.

Other parameters are set the same way as the laser.

Temperature, measurement range, Unit, Palettes etc

Save a snapshot

Insert memory card into the device, then you can capture snapshots, and mark and save important data.

1. In the live view interface, pull the trigger to capture snapshot. The live view freezes and device displays the snapshot with temperature information.
2. Press  button to save the picture
3. Press  button to cancel it.

Note:

You can not capture when the device is connected with PC.

Reviewing save snapshot

1. Go to **Menu > Picture** to view the capture snapshots.
2. Press  button to view the selected picture, press / button to switch pictures.
3. (Optional) Press  button to delete picture in picture view interface.

File Manager

Connect the device to your PC with supplied cable, you can export the recorded videos and captured snapshot.

Steps

1. Open the cover of cable interface.
2. Connect the device to your PC with cable and open the detected disk.
3. Select and copy the videos or snapshots to PC to view the files.
4. Disconnect the device from your PC.

Note

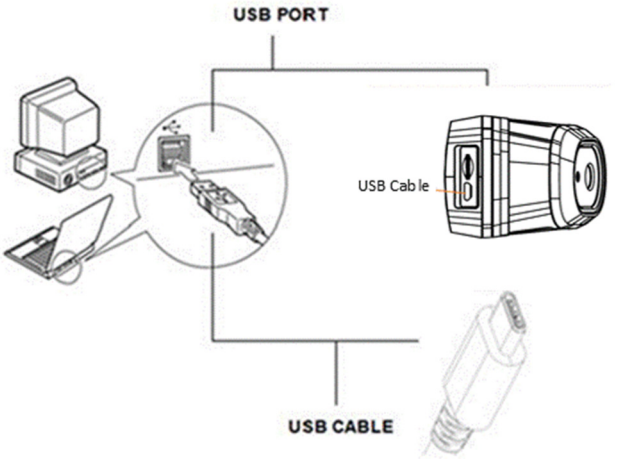
For the first time connection, the driver will be installed automatically.

Connection and Download

Connect to a Computer

Connection

Connect the USB cable to the computer's USB port and the multi-functional dock's terminal.



- **You do not need to turn off the computer or camera when making this connection.**
- **Please refer to your computer manual for information regarding the location of the USB port**

Maintenance

Upgrade Device

Steps

1. Connect the device to your PC with cable and open the detected disk.
2. Copy the upgrade file and paste it to the root directory of the device.
3. Disconnect the device from your PC.
4. Reboot the device and then it will upgrade automatically. The upgrading process will be displayed in the main interface.

Note

After upgrading, the device reboots automatically. You can view the current version in **Menu > About**

Troubles Shooting

Default Setting

Problem	Cause	Solution
Camera will not operate	Power is not turned on	• Turn on the camera. See *Turning the Power On / Off*
	Insufficient battery voltage	• Fully charge the battery.
Camera will not record	Internal memory is full	• If required, download the images to a computer and erase them to make some space.
Battery pack consumed quickly	Battery pack capacity reduced because of disuse for one year or more after being fully charged.	• Replace the battery pack with a new one.
	Battery life exceeded.	• Replace the battery pack with a new one

Appendix

Camera Care and Maintenance

Use the following procedures to clean the camera body, lens, LCD monitor and other parts.

Camera Body	**Wipe the body clean with soft cloth or eyeglass lens wiper.**
Lens	**First use a lens blower to remove dust and dirt, then remove any remaining dirt by wiping the lens lightly with soft cloth.** • Never use synthetic cleaners on the camera body or lens.
LCD monitor	**Use a lens blower brush to remove dust and dirt. If necessary, gently wipe the LCD monitor with soft cloth or an eyeglass lens wiper to remove stubborn dirt.** • Never rub or press forcefully on the LCD monitor. These actions may damage it or lead to other problems.

Never use thinners, benzene, synthetic cleaners or water to clean the camera. These substances may distort or damage the equipment.

Emissivity table

Material	Temperature (°C)	Emissivity approximation
Metal		
Aluminum		
Polished aluminum	100	0.09
Commercial aluminum foil	100	0.09
Electrolytic chromeplate alumina	25 ~ 600	0.55
Mild alumina	25 ~ 600	0.10 ~ 0.20
Strong alumina	25 ~ 600	0.30 ~ 0.40
Brass		
Brass mirror (highly polished)	28	0.03
Brass oxide	200 ~ 600	0.61 ~ 0.59
Chrome		
Polished chrome	40 ~ 1090	0.08 ~ 0.36
Copper		
Copper mirror	100	0.05
Strong copper oxide	25	0.078
Cuprous oxide	800 ~ 1100	0.66 ~ 0.54
Liquid copper	1080 ~ 1280	0.16 ~ 0.13
Gold		
Gold mirror	230 ~ 630	0.02

Emissivity table (cont.)

Material	Temperature (°C)	Emissivity approximation
Polished cast iron	200	0.21
Processed cast iron	20	0.44
Polished tempered Iron	40 ~ 250	0.28
Polished steel ingot	770 ~ 1040	0.52 ~ 0.56
Raw welded steel	945 ~ 1100	0.52 ~ 0.61
Surface ferric oxide	20	0.69
Completely rusty surface	22	0.66
Rolled iron plate	100	0.74
Oxidized steel	198 ~ 600	0.64 ~ 0.78
Cast iron (Oxidizing at 600°C)	198 ~ 600	0.79
Steel (Oxidizing at 600°C)	125 ~ 520	0.78 ~ 0.82
Electrolytic ferric oxide	500 ~1200	0.85 ~ 0.89
Iron plate	925 ~ 1120	0.87 ~ 0.95
Cast iron, heavy ferric oxide	25	0.80
Tempered iron, ferric oxide	40 ~ 250	0.95
Melting surface	22	0.94
Melting cast iron	1300 ~ 1400	0.29
Melting mild steel	1600 ~ 1800	0.28
Liquid steel	1500 ~ 1650	0.42 ~ 0.53
Pure liquid iron	1515 ~ 1680	0.42 ~ 0.45

Emissivity table (cont.)

Material	Temperature (°C)	Emissivity approximation
Lead		
Pure lead (Non-oxidization)	125 ~ 225	0.06 ~ 0.08
Mildly oxidized	25 ~300	0.20 ~ 0.45
Magnesium		
Magnesia	275 ~ 825	0.55 ~ 0.20
Magnesia	900 ~ 1670	0.20
Hg	0 ~ 100	0.90 ~ 0.12
Nickel		
Electroplate polishing	25	0.05
Electroplate	20	0.01
non-polishing		
Nickel wire	185 ~ 1010	0.09 ~ 0.19
Nickel plate	198 ~ 600	0.37 ~ 0.48
Nickel oxide	650 ~ 1255	0.59 ~ 0.86
Nickel alloy		
Nickel-chrome (heat-resistance) alloy wire (shining)	50 ~ 1000	0.65 ~ 0.79
Nickel-chrome alloy	50 ~ 1040	0.64 ~ 0.76
Nickel-chrome (heat resistance)	50 ~ 500	0.95 ~ 0.98
Nickel-silver alloy	100	0.14
Silver		
Polished silver	100	0.05

Emissivity table (cont.)

Material	Temperature (°C)	Emissivity approximation
Stainless steel		
18-8	25	0.16
304(8Cr,18Ni)	215 ~ 490	0.44 ~ 0.36
310(25Cr,20Ni)	215 ~ 520	0.99 ~ 0.97
Tin		
Commercial tin plate	100	0.07
Strong oxidization	0 ~ 200	0.60
Zinc		
Oxidizing at 400°C	400	0.01
galvanized shining iron plate	28	0.23
Ash zinc oxide	25	0.28
Non-metal materials		
Brick	1100	0.75
Fire brick	1100	0.75
Graphite(lamp black)	96 ~ 225	0.95
Porcelain enamel (white)	18	0.90
Asphaltum	0 ~ 200	0.85
Glass (surface)	23	0.94
Heat-resistance glass	200 ~ 540	0.85 ~ 0.95
Calcimine	20	0.90
Oak	20	0.90

Emissivity table (cont.)

Material	Temperature (°C)	Emissivity approximation
Carbon piece		0.85
Isolation piece		0.91 ~ 0.94
Sheet metal		0.88 ~ 0.90
Glass pipe		0.90
Loop type		0.87
Porcelain enamel products		0.90
Porcelain enamel designs		0.83 ~ 0.95
Solid materials		0.80 ~ 0.93
Ceramics (vase type)		0.90
Film		0.90 ~ 0.93
Mica		0.94 ~ 0.95
Flume mica		0.90 ~ 0.93
Glass		0.91 ~ 0.92
Semiconductor		0.80 ~ 0.90
Transistor (plastics sealed)		0.30 ~ 0.40
Transistor (metal) Diode		0.89 ~ 0.90
Transmitting loop		
Pulse transmission		0.91 ~ 0.92
Level chalkiness layer		0.88 ~ 0.93
Top loop		0.91 ~ 0.92

Emissivity table (cont.)

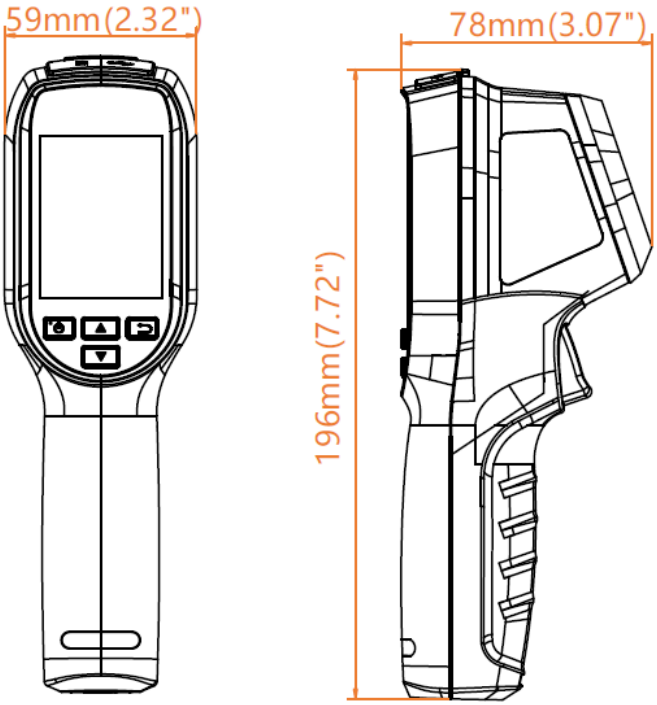
Material	Temperature (°C)	Emissivity approximation
Electric materials		
Epoxy glass plate		0.86
Epoxy hydroxybenzene plate		0.80
Gilded sheet copper		0.30
Solder-coated copper		0.35
Tin-coated lead wire		0.28
Brass wires		0.87 ~ 0.88
Block talcum terminal		0.87

Specification

All data is based on SATIR's testing standard. Subject to change without notice.

Type	H10
Image performance	
FOV/Min.focus distance	50° x 38.3°/0.15m
Spatial resolution	1.7 mrad
Thermal sensitivity	≤0.05°C@25°C
Resolution	160x120 (17μm)
Spectral range	8-14μm
Focus	Fixed
Image presentation	
Image mode	IR
LCD Display	2.4" touch screen 320x240 Resolution
Visible pixels	8 million pixels
Video output	NTSC (60Hz) or PAL (50Hz) composite video
Temperature measurement	
Measurement range	-20℃ ~ +350℃, (-4°F ~ +662°F),
Accuracy	±2° or ±2% of readings
Measurement mode	movable spots, auto hot/cold spot, profile, area boxes,

Correction	Emissivity, ambient temperature, distance, relative humidity,
Alarm	Yes
Image storage	
Type	8GB Removable Micro SD card
File format	.JPG(thermal/Visual)
Power system	
Battery type	Built-in rechargeable lithium-ion battery
Charge interface	Micro USB
Battery operating time	>8 hours
Charging time	<3Hrs
Environment specification	
Operating temperature range	-10°C to +50°C
Storage temperature range	-40°C to +70°C
Humidity	10% to 95%, non-condensing
Encapsulation	IP54
Shock	25G
Vibration	2G
Drop resistance	2 meter
Physical characteristic	
Size	196x78x59mm
Weight	Less than 350g
Tripod mounting	1/4"_20


59mm(2.32")
78mm(3.07")
196mm(7.72")

Contact Us

Manufacturer Information

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