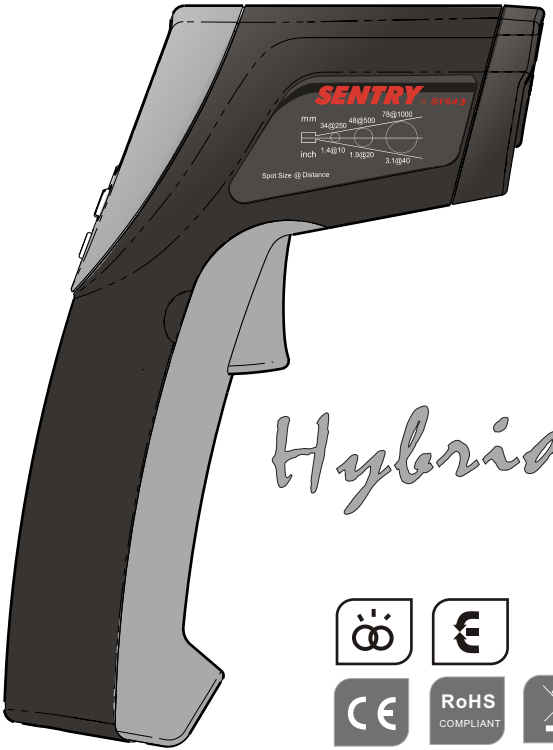
SENTRY®

SENTRY OPTRONICS CORP.

INFRARED THERMOMETER

Intelligent Infrared Thermometer with Emissivity Smart and Color Identification Signal

ST-643



Hybrid

Infrared Thermometer
Instruction Manual

Version-01 07/NOV.

Table Contents

1. Product Introduction

Thank you for purchasing this infrared thermometer.The Infrared Thermometer is an intelligent non-contact infrared temperature measuring instrument. To measure a temperature, point the unit at the object until the temperature is read, pull the measuring trigger and hold. Beyond the conventional types,two novel functions are built-in.With the E-smart function,it is highly beneficial for users to measure the target temperature without knowing and checking the emissivity of material (properties of surface). Moreover, the noticeable color signs alert the users when the temperature over the setting point of alarm temperature.

1-1 Features

It features with broad temperature and high DS ratio.These allow user to monitor the target temperature for a long distance, far away from the potential risk.

- E-smart: Smart Emissivity automatic measurement.
- CIS:Noticeable color signs alert the users when the temperature over the setting point of alarm temperature.
- Ultra low power consumption in shutdown mode.
- Extended long time measuring reliability.
- Laser sighting On/Off is switchable.
- °C or °F selectable.
- Electronic trigger lock function.

1-2 Applications

- Manufacturing processes of semiconductor technology.
- Automotive repair and maintenance.
- Food safety and processing.
- Perform HVAC energy audits.
- Electrical troubleshooting.
- Test terminals on circuits.
- Science experiment.
- Air conditioner.

2. Safety Information

Read the following safety information carefully before attempting to operate or service the meter.Only qualified personnel should perform repairs or servicing not covered in this manual.

Laser Warning Note!

Do not point laser directly at eye. Use caution a round reflective surfaces. Keep out of reach of children.

2-1 Cautions!

- DO NOT submerge the unit in water.
- This product is not designed for use in medical evaluations. The product can only be used to measure body temperature simply for reference. They are meant for industrial and scientific purposes.

2-2 Safety symbols


Dangerous, refer to this manual before using the meter.

CE Certification

This instrument conforms to the following standards:

EN61326: Electrical equipment for measurement, control and laboratory use.
IEC61000-4-2: Electrostatic discharge immunity test.
IEC61000-4-3: Radiated, radio-frequency, Electromagnetic field immunity test.
IEC61000-4-8: Power frequency magnetic field immunity test.

Tests were conducted using a frequency range of 80-1000MHz with the instrument in three orientations. The average error for the three orientations is ±0.5°C (±1.0°F) at 3V/m throughout the spectrum. However, between 781-1000MHz at 3V/m, the instrument may not meet its stated accuracy.

RoHS Restrict to use of six substances within electrical and electronic equipment (EEE), thereby contributing to the protection of human health and the environment.

The device may not be disposed of with the trash. It promotes the re-use recycling and other forms of recovery of used materials and components, and to improve the environmental performance of all operators (manufacturers ,traders ,treatment facilities) involved in the life cycle of products. Dispose of the product appropriately in accordance with the regulations in force in your country.

3. Specification

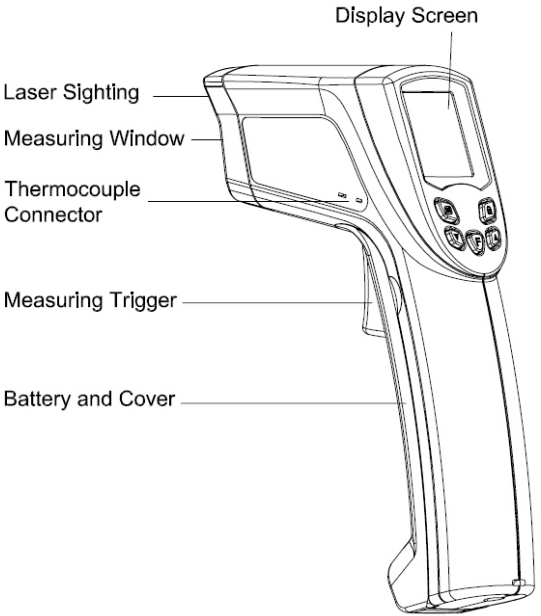
Distance/Spot Ratio	12:1
Temperature Range	-32~760 °C(-25~1400°F)
Accuracy (@ ambient temperature of 25°C/77°F)	±3°C(±5°F) within -32~-20°C(-25~-4°F) ±2°C(±3°F) within-20~100°C(-4~212°F) ±2% within 100~760°C(212~1400°F)
Thermopile	5~14μm
Repeatability	±1 °C (±2 °F)
Resolution	0.1°C (0.1 °F)
Response Time	500 ms.
Operation Temp.	0~50°C(32~122°F),10~95%RH
Auto Power Off	Automatically after approx. 6 sec.
Emissivity	Adjustable 0.1~1.0
E-Smart	YES
Thermocouple K Type	YES
Thermocouple Range	-200 ~1380°C
Thermocouple Accuracy	±1.5%+1degree
℃/℉ Switchable	YES
LCD Backlight	YES
CIS	YES
Laser Sight Switchable	YES
Audio Alarm	YES
Dual Display	YES
Lock Function	YES
Max/Min/Avg	YES
10 point Memory	YES
Dimensions	180x130x40mm (7.09″x5.12″x1.57″)
Battery Type	9V(006P, IEC6F22, NEDA1604)
Weight	195g Approx.
Accessory	9V Battery, Instruction manual, Carrying case.

4. Operations of Instrument

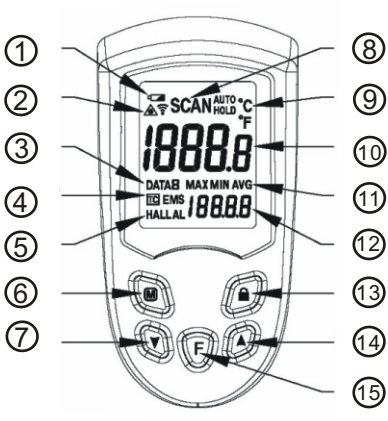
4-1 Quick Start

To measure a temperature, point the unit at the target you want to measure, pull the trigger and hold. Be sure to consider the target area inside the angle of vision of this instrument.The single spot of laser is used for aiming only.

4-2 Unit Diagram



LCD & Control panel



① Low Battery

② Laser / Buzzer On / Off

③ Data Log

④ Thermocouple / Emissivity

⑤ High / Low Alarm

⑥ Memory Key

⑦ Down Button

⑧ SCAN / HOLD / AUTO

⑨ °C / °F Indication

⑩ Primary Display

⑪ Max / Min / Avg

⑫ Secondary Display

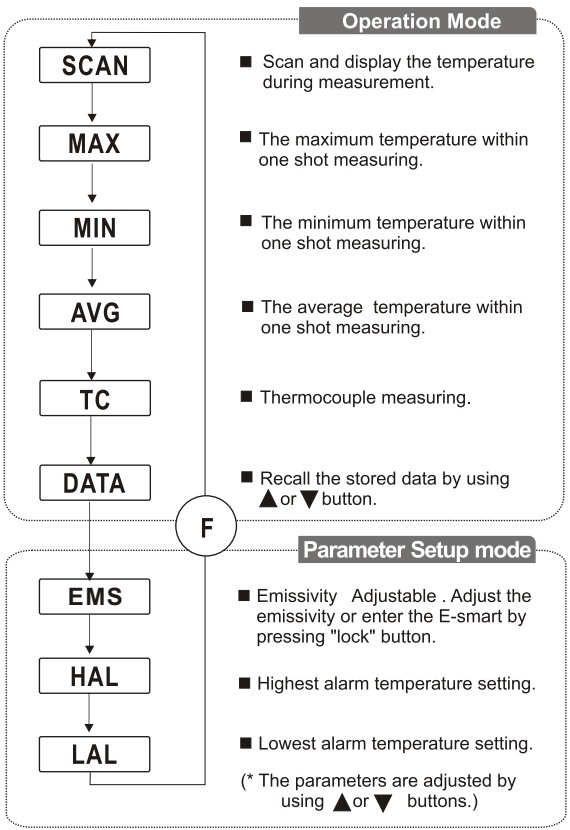
⑬ Lock Key

⑭ Up Button

⑮ Function Key

4-3 Operation Functions

To operate more advanced functions, it is simply by using “F” button to change. The sequential operations and the corresponding explanations are shown in the following flow-chart.



Operation Remarks

Thermocouple: Activate the functions just by connecting to the connector and switch to TC function.

E-smart: 1. In Emissivity mode, push the button to enter the E-smart function.
2. Contact the target surface with thermocouple.
3. Point the target with infrared thermometer and push the measure trigger till the buzzer beep.
The cross-reference Emissivity value will be memorized in the unit.
4. Press the " F " button to leave the E-smart function.

CIS: The color of backlight will change when the target temperature exceeds the setting point of alarm temperature.

Memory: Activate the record function by push the "M" button. To delete all the records, press up or down button to DATA 0 and press "M" button.

Lock: Push the button to continuously measure and display the temperature without pull the measuring trigger.

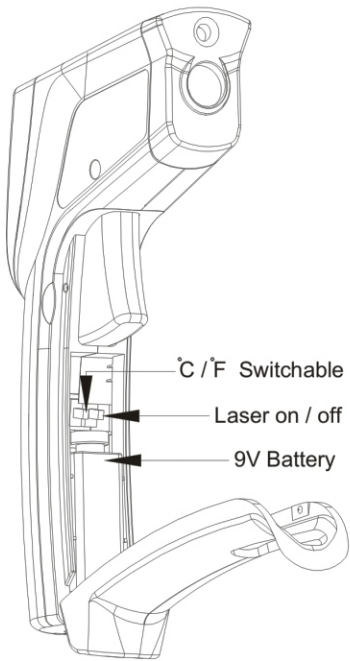
Function: The above functions can be activated always in any step of operations mode in flow-chart.

Scan/Hold: In SCAN mode, the LCD displays both the current temperature in Celsius or Fahrenheit. The unit will HOLD the last reading for 6 seconds after the trigger is released.
When the battery is low, the battery icon shows and the unit will continue to function.

Data: While DATA# flashes on the left button , the value on the Main Temperature Display can be recorded in "#" log. Simply press "M" button.

4-4 °C/°F , Laser Switch and Battery Change

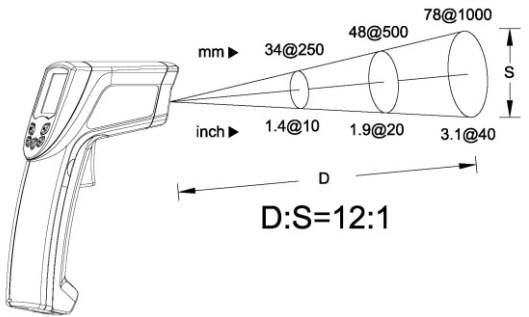
The unit is powered by a 9V battery and displays temperatures in either °C or °F. The user has to replace the battery when the battery voltage drops below the voltage for reliable operation and at the same time the low battery symbol will appear.To change the 9V battery, pull and open the unit's handle by using the finger. Change the 9V battery with a new one and push the battery cover back.



5.Techniques of Infrared Thermometer

5-1 Field of View (FOV) ratio =Distance to Spot Ratio

The field of view is the angle of vision at which the instrument operates, and is determined by the optics of the unit.The FOV is the ratio of the distance from the target to the target diameter. The smaller the target,the closer you should be to it. When the target diameter is small, it is important to bring the thermometer closer to the target to insure that only the target is measured, excluding the surroundings.



5-2 Emissivity

Emissivity is the ability of an object to emit or absorb energy. Perfect emitters have an emissivity of 1, emitting 100% of incident energy. An object with an emissivity of 0.8 will absorb 80% and reflect 20% of the incident energy. Emissivity is defined as the ratio of the energy radiated by an object at a given temperature to the energy emitted by a perfect radiator at the same temperature. All values of emissivity fall between 0.0 and 1.0.

Non-contact temperature sensors measure IR energy emitted by the target, have fast response, and are commonly use to measure moving and intermittent targets, targets in a vacuum, and targets that inaccessible due to hostile environments, geometry limitations, or safety hazard. The cost is relatively high, although in some cases is comparable to contact devices.

6. Maintenance

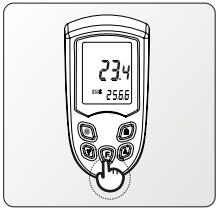
Cleaning the lens: Blow off loose particles using clean compressed air. Gently brush remaining debris away with a camel's hair brush. Carefully wipe the surface with a moist cotton swab. The swab may be moistened with water.

NOTE:
DO NOT use solvents to clean the lens.
Cleaning the housing:
Use soap and water on a damp sponge or soft cloth.

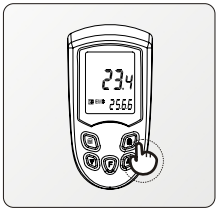
Emissivity Table (for reference)

Material	Temp ˚C/˚F	Emissivity
Gold(pure highly polished)	227/440	0.02
Aluminum foil	27/81	0.04
Aluminum disc	27/81	0.18
Aluminum household(flat)	23/73	0.01
Aluminum (polisned prate 98.3%)	227/400	0.04
	577/1070	0.06
Aluminum(rough plate)	26/78	0.06
Aluminum(oxidized @599˚C)	199/390	0.11
	599/1110	0.19
Aluminum surfaced roofing	38/100	0.22
Tin(bright tinned iron sheet)	25/77	0.04
Nickel wire	187/368	0.1
Lead(pure 99.95-unoxidized)	127/260	0.06
Copper	199/390	0.18
	599/1110	0.19
Steel	199/390	0.52
	599/1110	0.57
Zinc galvanized sheet iron(bright)	28/82	0.23
Brass(highly polished):	247/476	0.03
Brass(hard rolled-polished w/lines):	21/70	0.04
Iron galvanized(bright)	-	0.13
Iron plate(completely)	20/68	0.69
Rolled sheet steel	21/71	0.66
Oxidized iron	100/212	0.74
Wrought iron	21/70	0.94
Molten iron	1299-1399/3270-2550	0.29
Copper(polished)	21-117/70-242	0.02
Copper(scraped shiny not mirrored)	22/72	0.07
Copper(Plate heavily oxidized)	25/77	0.78
Enamel(white fused on iron)	19/66	0.9
Formica	27/81	0.94
Frozen soil	-	0.93
Brick(red-rough)	21/70	0.93
Brick(silica-unglazed rough)	1000/1832	0.8
Carbon(T-carbon 0.9% ash)	127/260	0.81
Concrete	-	0.94
Glass(smooth)	22/72	0.94
Granite(polished)	21/70	0.85
Ice	0/32	0.97
Marble(light gray polished)	22/72	0.93
Asbestos board	23/74	0.96
Asbestos paper	38/100	0.93
	371/700	0.95
Asphalt(paving)	4/39	0.97

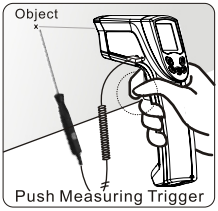
E-smart



1.Push “F” button to choose the Emissivity mode.



2.Push the button to enter the E-smart function.



3.Contact the target with thermocouple , point the target with infrared thermometer, and then push the measuring trigger.

When the buzzer beeps , the processes finish. User can press the “F” button to leave the E-smart function.

Note

Recommend the operation of E-smart function with target temperature over 100 ℃, if not, the emissivity may not be derived and it will remain the last value without modification.

SENTRY®

SENTRY OPTRONICS CORP.
3F, No.122, Sec.1, Sanmin Road,
Ban-Ciao, Taipei 220, Taiwan, R.O.C.
TEL:886-2-2956-8198
FAX:886-2-2956-7662
http://www.sentrytek.com.tw

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