Sonel®

OPERATING INSTRUCTION

NON-CONTACT INFRARED THERMOMETER

DIT-500

$C\:\epsilon$

Version 1.6

Main features of the DIT-500 device are the following:

- rapid detection of temperature changes,
- precise non-contact measurements,
- dual laser lighting,
- modern housing design,
- automatic Data Hold,
- ºC / ºF switch,
- emissivity digitally adjustable from 0.10 to 1.00,
- MAX, MIN, AVG, DIF temperature displays,
- backlight LCD display,
- automatic selection range
- display resolution 0.1ºC (0.1ºF),
- trigger lock,
- set high and low alarms,
- data logger (LOG),
- transmit data to pc with USB.

WIDE RANGE APPLICATION:

Temperature measurements of electric devices, food preparation, safety and fire inspectors, plastic molding, asphalt, marine and screen printing, measure ink and dryer temperature, Diesel and fleet maintenance.

1 Introduction

Thank you for purchase of the IR Thermometer DIT-500. This is capable of non-contact (infrared) temperature measurements at the touch of a button. The built-in laser pointer increases target accuracy while the backlight LCD and handy push-buttons combine for convenient, ergonomic operation.

The Non-contact Infrared Thermometers can be used to measure the temperature of objects' surface that is improper to be measured by traditional (contact) thermometer (such as moving object, the surface with electricity current or the objects which are uneasy to be touched.)

Proper use and care of this meter will provide years of reliable service.

In the present manual we apply three kinds of warnings. These are texts in frames, which describe possible dangers both for the user and the meter itself. The messages starting from the word '**WARNING:'** describe situations which imply a risk for life or health should the recommendations presented in the present manual not be observed. The word **'ATTENTION!'** introduces a description of a situation where non-observance of the recommendations presented in the present manual may imply damage for the meter. Indications of possible problems are preceded by the word '**Attention:**'.

WARNING:
Before using the instrument acquaint yourself with the present manual and observe the safety regulations and recommendations specified by the manufacturer.

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2 Safety

In order to guarantee proper operation and correctness of the obtained results it is necessary to observe the following recommendations:

• Use extreme caution when the laser beam is turned on.

- Do not let the beam enter your eye, another person's eye or the eye of an animal.
- Be careful no to let the beam on a reflective surface strike your eye.
- Do not allow the laser light beam impinge on any gas which can explode.
- It is prohibited to operated the meter:
    - ⇒ If it is damaged and completely or partially out of order.
    - ⇒ If it has been stored for an excessive period of time in inadequate conditions (e.g. if it is humid).
- Before commencing a measurement make sure the correct measurement function has been selected.
- Repairs must be realised solely by an authorised service workshop.

CAUTION

LASER RADIATION
DO NOT STARE INTO BEAM

DIODE LASER
<1mW Output at 675nm
CLASS II LASER PRODUCT

3 Functional description

3.1 Device description
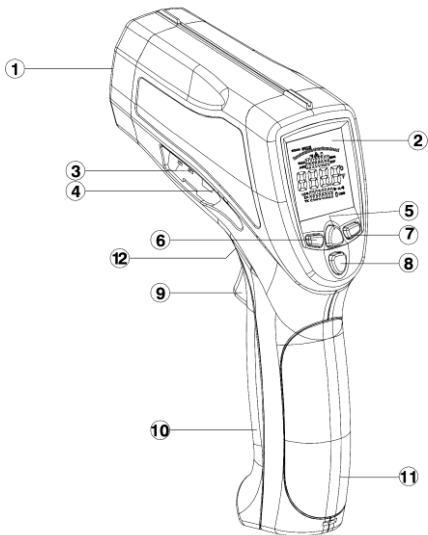
① IR sensor
② LCD Display
③ TYPE K IN
④ USB IN
⑤ LIGHT/LASER BUTTON
⑥ UP BUTTON
⑦ DOWN BUTTON
⑧ MODE BUTTON
⑨ MEASUREMENT TRIGGER
⑩ BATTERY COVER
⑪ HANDLE GRIP
⑫ BATTERY COVER BUTTON

3.2 LCD symbols
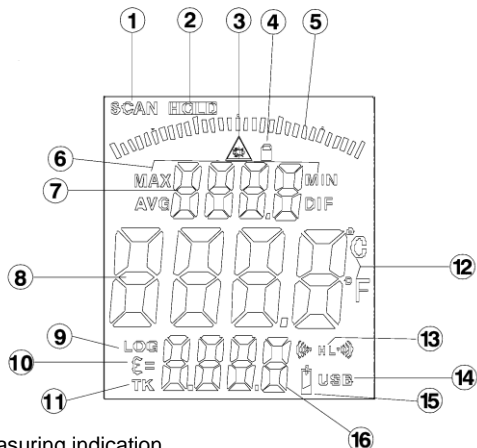
① Measuring indication
② Data hold
③ Laser "on" symbol
④ LOCK symbol
⑤ Analogue scale
⑥ MAX, MIN, AVG, DIF symbols
⑦ Temperature values for the MAX, MIN, AVG, DIF
⑧ Current temperature value
⑨ Data logger symbol
⑩ Emissivity (ε) symbol
⑪ Probe Type K symbol
⑫ $^{\circ}$C or $^{\circ}$F symbols
⑬ High alarm (HAL) and low alarm (LAL) symbols
⑭ USB symbol (transmit data to PC)
⑮ Low battery symbol
⑯ Emissivity value, temperature from Type K probe or temperature from memory

8

3.3 Buttons
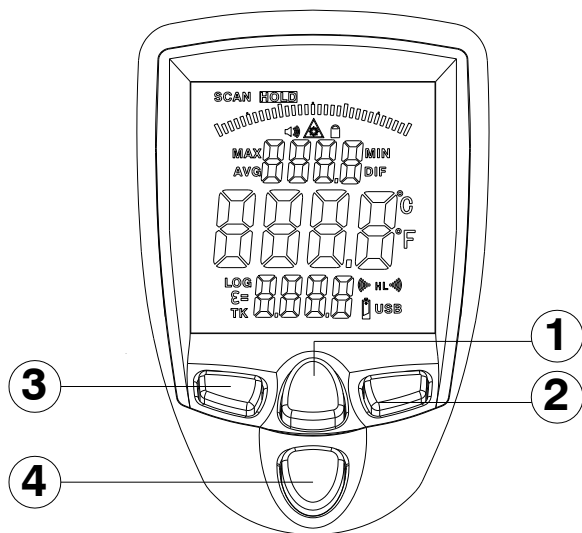
① Laser/Backlight on/off button
② Down button (for ε, HAL, LAL)
③ Up button (for ε, HAL, LAL)
④ Cyclic MODE button

3.4   Distance and spot size

As the distance (D) from the object increases, the spot size (S) of the area measured by the unit becomes larger. The relationship

between distance and spot size for each unit is listed below. The focal point of unit is 914mm (36").

25.4mm@1270mm   50.8mm@2540mm

D:S= 50:1

S

1in@50in   2in@100in

D

4 How it works

- *Infrared*
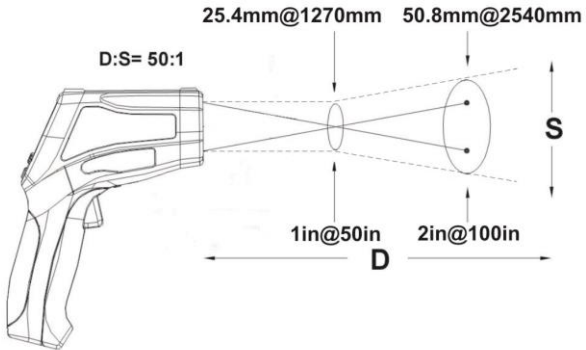 Infrared thermometers measure the surface temperature of an object. The unit's optics sense emitted, reflected, and trans-mitted energy, which is collected and focused onto a detector. The unit's electronics translate the information into a tempera-ture reading, which is display on the unit. In units with a laser, the laser is used for aiming purposes only.
- *Field of View*
  Make sure that the target is larger than the unit's spot size. The smaller the target, the closer you should be to it. When accuracy is critical, make sure the target is at least twice as large as the spot size.
- *Distance and spot size*
  As the distance (D) from the object increases, the spot size (S) of the area measured by the unit becomes larger.
- *Locating a hot Spot*

To find a hot spot aim the thermometer outside the area of interest, then scan across with an up and down motion until you locate hot spot.

- ***Reminders***

  - Not recommended for use in measuring shiny or polished metal surfaces (stainless steel, aluminum, etc.). See **Emissivity.**

  - The unit cannot measure through transparent surfaces such as glass. It will measure the surface temperature of the glass instead.

  - Steam, dust, smoke, etc., Can prevent accurate measurement by obstructing the unit's optics.

- ***Emissivity***

  Emissivity is a term used to describe the energy-emitting characteristics of materials.

  Most (90% of typical applications) organic materials and painted or oxidized surfaces have an emissivity of 0.95 (preset in the unit). Inaccurate readings will result from measuring shiny or polished metal surfaces. To compensate, cove the surface to be measured with masking tape or flat black paint. Allow time for the tape to reach the same temperature as the material underneath it. Measure the temperature of the tape or painted surface.

  The DIT-500 can compensate additional error of emissivity other than 0.95. In this purpose, enter correct value of measured substance emissivity.

Emissivity values

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	0,93 to 0,96	Textiles	0,90

5 Measurement operation

- Hold the meter by it's handle grip and point it toward the surface to be measured.
- Pull and hold the trigger to turn the meter on and begin testing. The display will light if the battery is good. Replace the battery if the display does not light.
- Release the trigger and the HOLD display icon will appear on the LCD indicating that the reading is being held. In HOLD status, press the ① button to turn on/off the laser and turn on/off backlight.
- The meter will automatically power down after approximately 7 seconds after the trigger is released (unless the unit is locked on).

Note: Measurement considerations

Holding the meter by its handle, point the IR Sensor toward the object whose temperature is to be measured. The meter automatically compensates for temperature deviations from ambient temperature. Keep in mind that it will take up to 30 minutes to adjust to wide ambient temperatures are to be measured followed by high temperature measurements.

Some time (several minutes) is required after the low (and before the high) temperature measurements are made. This is a result of the cooling process, which must take place for the IR sensor.

6 Functional design

6.1 Functionality

- In the measuring time, pressing MODE keys to display MAX value, MIN value, DIF value , AVG value or LOG value.
- In the measuring time, if the Type K thermocouple is not connected, you can adjust ε by pressing up/down key.
- In the HOLD mode, you can adjust $^{O}C/^{O}F$ by pressing up/down key.
- You can turn on/off the backlight/laser by pressing LIGHT/LASER key ① at any state.
- To set values for the high alarm (HAL), low alarm (LAL) and emissivity (ε), press the MODE button until the appropriate code appears in the display, press the UP and DOWN buttons to adjust the desired values.

6.2 Functions of MODE button

In the HOLD mode, press the mode button also allows you to access the set state: MAX, MIN, DIF, AVG or LOG display -> emissivity (ε) -> lock on/off (continuos measuremet) -> high alarm (HAL) on/off -> HAL adjustment -> low alarm (LAL) on/off -> LAL adjustment -> $^{O}C/^{O}F$.

Each time you press set you advance through the mode cycle. The diagram shows the sequence of functions in the mode cycle.
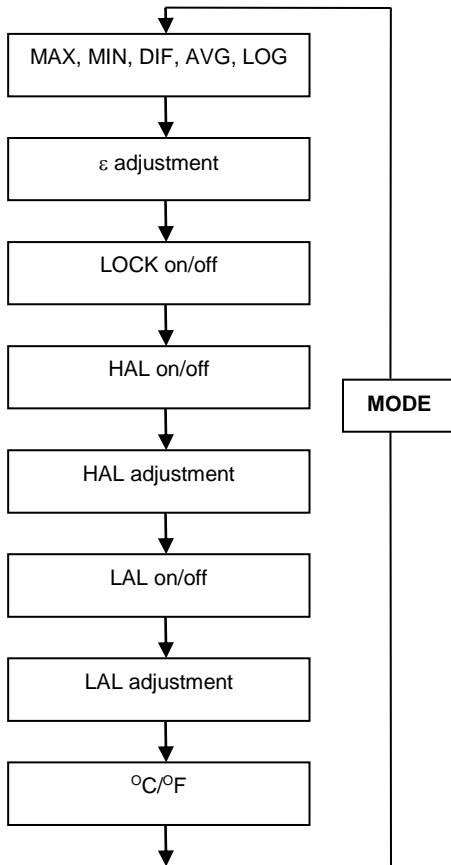
Fig. 1. Sequence of MODE button.

6.2.1 MAX, MIN, DIF, AVG display

MAX (maximum) - Maximum value of measurement.
MIN (minimum) - Minimum value of measurement.
DIF (difference) - Difference value of measurement.
AVG (average) - Average value of measurement.

Adjustable display by pressing UP/DOWN button

6.2.2 Emissivity (ε) adjustment

The emissivity (ε) digitally adjustable from 0,10 to 1,0 by pressing UP/DOWN button.

6.2.3 Continuous measurement (LOCK) on/off

The lock mode is particularly useful for continuous monitoring of temperatures. Press the UP button or DOWN button to turn on or off. Press the measurement trigger to confirm the lock measurement mode. The IR thermometer will continuously display the temperaure until press again the measurement trigger.

6.2.4 High alarm (HAL) on/off

Turn on or off high alarm by pressing UP/DOWN button.

6.2.5 HAL adjustment

Please adjust high alarm value by pressing UP/DOWN button.

6.2.6 Low alarm (LAL) on/off

Turn on or off low alarm by pressing UP/DOWN button.

6.2.7 LAL adjustment

Please adjust low alarm value by pressing UP/DOWN button.

6.2.8 ºC/ºF

Pressing UP/DOWN button to change the temperature unit (℃ or ℉).

6.3 Data logger

6.3.1 Saving data to memory

Your thermometer is capable of storing up to 100 measurements.

To store data from an infrared reading, pull the trigger. While holding the trigger, press the MODE button until LOG appears in the lower left corner of the display (a log location number will be shown in upper display).

Aim the unit at the target area you want to record and press the LASER/BACKLIGHT button. The recorded temperature will appear in the lower display. To select another log location, press the UP or DOWN keys.

If no temperature has been recorded in the shown LOG location, four dashes will appear in the lower display.

6.3.2 Recalling data from memory

To recall stored data after the unit shuts off, press the MODE button until blinking MAX appears on the LCD. Press the UP or DOWN button to call blinking LOG symbol on LCD. Press trigger to accept.

A LOG location number will be shown on upper display and the stored temperature for that location will be display on lower display.

To move to another LOG location, press the UP or DOWN keys.

6.3.3 Memory clear function

This function can only be used when the unit is in LOG mode. You should only use the LOG clear function if you want to clear all the Log location data that is stored in unit's memory. The "LOG clear" function works as follows:

- while in LOG mode, press and hold the trigger, and then press the DOWN arrow button until you reach LOG location "000".

Note: This can only be done when the trigger is pulled. LOG location "000" cannot be accessed, by using the UP arrow button.

- when LOG location "000" shows in the display, press the LASER/BACKLIGHT button. A tones will sound, and the LOG

location will automatically change to "001", signifying that all data locations have been cleared.

6.3.4   USB function

This device affords transmitting the IR and Type K measurement data to the PC via USB.

For turn on or off USB function: press LIGHT/LASER button until "USB" sign appears in the right lower corner of the LCD. The USB function turn on. Then, press the LIGHT/LASER button again until "USB" sign disappears. Thus, the USB function shut off.

7 Battery replacement

① LOW battery indicator
② Push this button
③ Open the battery cover
④ Replace 9V battery
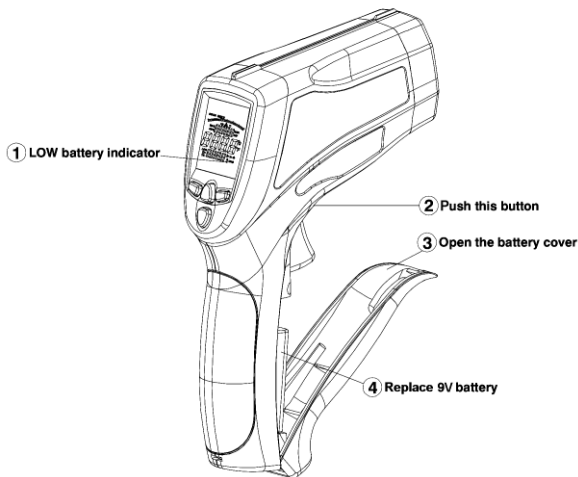
As battery power is not sufficient, LCD will display " 🔋 ". Replacement with one new battery type 9V is required.

> **Attention:**
> **When making measurements with a battery's mnemonic on, one must take into account additional indefinite measurement uncertainty or unstable working of the meter.**

Open battery cover, then take out the battery from instrument and replace with a new 9-Volt battery and place the battery cover back.

8 Cleaning and maintenance

- Repairs or service are not covered in this manual and should only be carried out by qualified trained technician.
- Periodically, wipe the body with a dry cloth. Do not use abrasives or solvents on this instrument.
- For service, use only manufacturer's specified parts.

9 Storage

In the case of storage of the device, the following recommendations must be observed:

- Make sure the meter and its accessories are dry.
- In the case the meter is to be stored for a prolonged period of time, the batteries must be removed from the device.

10 Dismantling and utilization

Worn-out electric and electronic equipment should be gathered selectively, i.e. it must not be placed with waste of another kind.

Worn-out electronic equipment should be sent to a collection point in accordance with the law of worn-out electric and electronic equipment.

Before the equipment is sent to a collection point, do not dismantle any elements.

Observe the local regulations concerning disposal of packages, worn-out batteries and accumulators.

11 Attachments

11.1 Technical data

Type K temperature range

Temperature range	*Resolution*	*Basic accuracy*
-50,0…999,9℃ -58,0…999,9℉	0,1℃ 0,1℉	±(1,5% m.v. + 3℃) ±(1,5% m.v. + 5℉)
1000…1370℃ 1000…2498℉	1℃ 1℉	±(1,5% m.v. + 2℃) ±(1,5% m.v + 3,6℉)

IR temperature range

Temperature range	*D:S*	*Reso-lution*	*Basic accuracy*	
-50,0…999,9℃ -58,0…999,9℉		0,1℃ 0,1℉	-50…20℃ -58℉···68℉	±2,5℃ ±4,5℉
1000…1600℃ 1000…2912℉	50:1	1℃ 1℉	20…400℃ 68···752℉	±(1,0% m.v. + 1℃ or 1,8℉)
			400…800℃ 752…1472℉	±(1,5% m.v. + 2℃ or 3,6℉)
			800…1600℃ 1472…2912℉	±2,5% m.v.

Operating temperature of: 23 to 25℃ (73 to 77℉)

"m.v." means measured value of standard.

Other technical data

a) response time ……………………….………...……150ms
b) spectral response ……………………………………8…14µm
c) emissivity…………………...digitally adjustable from 0.10 to 1.00
d) over range indication……..………...…………LCD will show "----"
e) polarity……………….…..automatic, (-) sign for negative polarity
f) diode laser……………output <1mW, wavelength 630~670nm, class 2 laser product
g) operating temperature……….………...0 to 50℃ (32 to 122℉)
h) storage temp…………………….……..–10 to 60℃ (14 to 140℉)
i) relative humidity…………………….…..10%~90% RH operating …………………………………………………<80% RH storage
j) memory………………………………………………100 cells
k) PC interface………………………………………………USB
l) power supply……………9V battery, NEDA 1604A or IEC 6LR61
m) safety…………………………………"CE" Comply with EMC
n) weight 350g
o) size..………………………………………… 230 x 155 x 54mm

11.2 Standard equipment

The standard set provided by the manufacturer includes the following components:
- The DIT-500 meter,
- 9V battery (1 piece),
- USB cable,
- PC software,
- K Type probe,
- mini tripod,
- carrying case,
- user manual,
- warranty card.

11.3 Manufacturer

The manufacturer of the device, which also provides guarantee and post-guarantee service is the following company:

SONEL S. A.
ul. Wokulskiego 11
58-100 Świdnica
Poland
Tel: +48 74 858 38 60
Fax: +48 74 858 38 09
E-mail: export@sonel.pl
Web page: www.sonel.pl

Note:
Service repairs must be realised solely by the manufacturer.

Made in China for SONEL S.A.