Infrared Thermometer

Noncontact Temperature Measurement

Maintenance of electrical equipment

Hot spot detection on bearings, transmission and motors

Measurement of moving objects in manufacturing processes

Detection of energy losses on heat insulations

Inspection of critical components on vehicles

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Introduction

Infrared thermometers measure contactless. They determine the temperature on the basis of the emitted infrared radiation from an object.
These thermometers enable the user to detect the temperature of inaccessible or moving objects without difficulties.

Please read this manual completely before the initial operation.

Optics

Due to the precision glass optics the measuring beam of the instrument has a diameter of 13mm at any distance within 140mm (260mm at model Pro). The object must be at least as large as the spot size.
The diagram shows the distance (D) to spot (S) ratio.
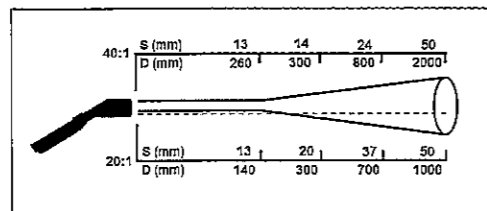
D:S = 40:1 [Pro]/ 20:1 [Plus]

Scope of Supply
- Unit with wrist strap
- 9V alkaline battery
- Manual
- USB interface cable [only Pro]

Specifications

Technical Data	Plus	Pro
Temperature range	-32...530°C (-20...980°F)	-32...760°C (-20...1440 °F)
Accuracy	± 1% or ± 1°C (0...530°C)	± 1% or ± 1°C (0...760°C)
		± 1°C ± 0,07°C/°C (0...-32°C)
Repeatability	± 0,5% or ± 0,7°C (0...530°C)	± 0,75% or ± 0,75°C (0...760°C)
	± 0,7°C ± 0,05°C/°C (0...-32°C)	± 0,75°C ± 0,075°C/°C (0...-32°C)
Optical resolution	20:1/ 13mm spot size in ≤140mm	40:1/ 13mm spot size in ≤260mm
Resolution (display)	0,1°C (0,1°F)	
Response time (95%)	300 ms	
Ambient temperature	0...50°C	
Storage temperature	-20...60°C (without battery)	
Spectral range	8...14µm	
Emissivity/ Gain	0,100...1,000 adjustable	0,100...1,500 adjustable
Functions	MIN, MAX, HOLD, °C/°F, Offset	
Alarm functions	Visual and acoustic HIGH- and LOW-alarm	
Laser	< 1mW laser class IIa, laser beam with 9mm offset	
PC interface	-	USB interface, PC software
Data logger	-	for 20 values
Input	-	for t/c probe type K
Weight/ Dimensions	150g, 190x38x45 mm	180g, 190x38x45 mm
Battery	9V alkaline battery	
Battery life time	20h (laser and backlight on 50%)/ 40h (laser and backlight off)	
Relative humidity	10-95% RH, non condensing at ambient temperature < 30°C	

- PC software [only Pro]
- t/c insertion probe [only Pro]
- Tripod mount [only Pro]
- Pouch
- optional: Calibration certificate

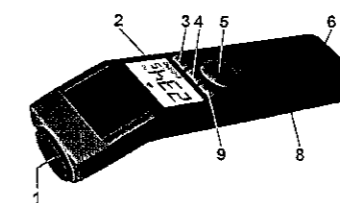Make sure to insert the unit into the pouch as shown to avoid unintended operation.

Functional elements

1. Precision glass optics
2. LCD display
3. Down button/ LCD backlight
4. Mode button
5. Trigger
6. Thermocouple input [Pro]
7. USB interface [Pro]
8. Battery chamber
9. Up button/ Laser

Display

A. Display backlight
B. MAX or MIN value
C. Laser symbol
D. HIGH and LOW alarm indication
E. t/c value [Pro]
F. current temperature value
G. Emissivity
H. HOLD function

Important Notes

Do not point the laser directly at the eye or indirectly off reflective surfaces as this may cause serious damages!

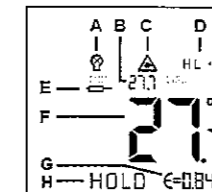Please protect the instrument from the following:
- Electromagnetic fields (EMF)
- Static electricity
- Abrupt changes of the ambient temperature

Insertion of Batteries

In order to exchange the battery just press the cover lid on the bottom side of the unit downwards. Please make sure to insert the battery in the correct direction.

Please exchange the battery if the low battery symbol is shown in the display.

Basic Operation

TEMPERATURE MEASUREMENT
Please aim with the unit at the target and press the TRIGGER.
HOLD function: After release of the TRIGGER all display values will be shown for 7 seconds.
Shut down: If you do not press any button during the HOLD mode the unit shuts down automatically after 7 seconds.

DISPLAY BACKLIGHT
Please press the DOWN button while the TRIGGER is pressed to switch the display backlight on or off.

LASER
Please press the UP button while the TRIGGER is pressed to activate/ deactivate. The current status will be shown in the display.

NOTES
Infrared thermometers measure the surface temperature of objects only. They cannot measure through transparent material such as glass or plastic.
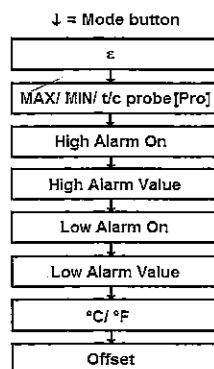Keep the optics clean of dirt (cleaning with a humid tissue or a mild commercial cleaner).

Unit Settings

With the MODE button you can select the different setting functions. The unit must be in the HOLD mode. The respective function will be flashing in the display. With the UP and DOWN buttons you can change parameters or activate/ deactivate functions.
To save the settings you have to press the MODE button again (will also switch to the next function) or the TRIGGER.
If you have not activated any button for 7 seconds, the instrument will not save the current modification and shut down.

↓ = Mode button

- ε
- MAX/ MIN/ t/c probe [Pro]
- High Alarm On
- High Alarm Value
- Low Alarm On
- Low Alarm Value
- °C/ °F
- Offset

EMISSIVITY
The intensity of infrared radiation, which is emitted by each body, depends on the temperature as well as on the radiation features of the surface of the measuring object.
The emissivity (ε = Epsilon) is used as a stable factor of the material, with which to describe the ability of the body to emit infrared energy.

If the emissivity chosen is too high, the infrared thermometer will display a temperature value which is much lower than the real temperature. The measurement of metallic surfaces, in particular, requires a careful emissivity adjustment (see also table on page 11).
Setting the emissivity: Press the MODE button (during HOLD mode) – with UP and DOWN you can adjust the value.
The shown temperature value corresponds to the emissivity adjustment. This allows a correction of ε even after the measurement has been done.

MAX/ MIN/ T/C PROBE [PRO]
With this function you can select if the maximum, minimum or t/c probe value [only Pro] will be shown permanently in the display. After a measurement (during the HOLD mode) you can also recall the respectively none shown values by pressing the UP button.
The t/c probe value will be displayed only if a probe is connected. During the HOLD mode this value will also be frozen.

ALARM FUNCTIONS
◄ﺍ)) The alarm function is activated as soon as the display shows this sign.
The alarm values can be adjusted using the UP and DOWN button. If the temperature exceeds the selected high value or falls below the selected low value an acoustic and visual signal will appear.

°C/ °F SETTING
Selection of the temperature unit.

OFFSET
With this function you can set a linear offset (+/-) to the temperature reading. It allows a field calibration of several units showing exactly the same values.

Reset Function
The unit can be reset to the factory default values by pressing the MODE and UP button simultaneously (during HOLD mode). The Data logger [Pro] will not be deleted by this procedure.

Data Logger [Pro]
STORING DATA
After the measurement release the TRIGGER – the unit is in the HOLD mode. Pressing the DOWN button will show the next free data logger position (flashing) and a disc icon in the display. With UP and DOWN you can change the data logger position manually. Pressing MODE will store the data into the logger (confirmed by a twofold acoustic signal).

RECALL OF DATA
Please press the TRIGGER and MODE simultaneously. The next free data logger position and a disc icon (flashing) will be shown in the display. With UP and DOWN you can select any data logger position. To switch between IR temperature value and t/c probe value please press the MODE button.

RESET OF THE DATA LOGGER
Please press the DOWN button during the HOLD mode. Select logger position 0 and press MODE again. A threefold acoustic signal confirms the successful reset.

Software [Pro]
INSTALLATION
System requirements:
- Windows XP, 2000
- USB interface
- Hard disc with at least 30 MByte free space
- 128 MByte RAM at least
- CD-ROM drive

If the auto run option on your computer is activated the installation wizard will start automatically. Otherwise please start **setup.exe** on the CD-ROM. Follow the instructions of the wizard until the installation is finished.

CONNECTION TO THE PC
Please connect the unit via the special USB adapter cable. The installation of the driver software from the CD-ROM will start automatically.

STARTING THE SOFTWARE
After you have started the software and connected the unit the successful communication will be shown in the status line (below the time axis).
If you cannot establish a communication in spite of correct connection between unit and computer please choose the correct COM port under **[Menu: Setup\ Interface]**. If the USB adapter cable is connected this port is marked as **[Infrared Thermometer Adapter]**.

DATA LOGGER FUNCTIONS
To download the logger data from the unit please press the LOGGER button **[Menu: Measurement\ Download logger data]**. All data from the logger will be displayed in an extra window as a table. Date and time correspond to the time of the download.

STARTING A MEASUREMENT
You can start a measurement by pressing the START button in the tool bar **[Menu: Measurement\ Start]**.

STOP MEASUREMENT/ SAVE
The STOP button will finish the current measurement **[Menu: Measurement\ Stop]**. The SAVE button **[Menu: File\ Save as]** opens an explorer window for selection of file name and location.

The menu item options **[Menu: Setup\ Options]** enables settings for data protection.

DEVICE SETUP
The menu item **[Menu: Device\ Setup]** opens a dialog window for setup of the following parameters: Emissivity, Alarm, Temperature unit, Display backlight, Laser, Buzzer.

You will find a detailed software description after start of the program under [Menu: ?\ Help].

Emissivity Table

Material		typical emissivity
Aluminium	oxidized	0,2-0,4
Asphalt		0,95
Basalt		0,7
Carborundum		0,9
Ceramic		0,95
Concrete		0,95
Copper	oxidized	0,4-0,8
Glass		0,85
Gold		0,01-0,1
Grit		0,95
Ice		0,98
Iron	oxidized	0,5-0,9
Lead	oxidized	0,2-0,6
Paint	non alkaline	0,9-0,95
Paper	any color	0,95
Plastic >50 µm	non transparent	0,95
Rubber		0,95
Sand		0,9
Snow		0,9
Soil		0,9-0,98
Steel	oxidized	0,7-0,9
Textiles		0,95
Water		0,93
Wood	natural	0,9-0,95

Troubleshooting

Error/ Code	Problem	Action
HHH	object temperature above range limit	choose object within measuring range
LLL	object temperature below range limit	choose object within measuring range
battery indicator	low battery	replace battery
no display	low battery	replace battery
laser does not work	low battery	replace battery
	laser deactivated	activate laser

WARRANTY
Each single product passes through a quality process. Nevertheless, if failures occur please contact the customer service at once. The warranty period covers 24 months starting on the delivery date. After the warranty is expired the manufacturer guarantees additional 6 months warranty for all repaired or substituted product components. Warranty does not apply to electrical circuit breakers, primary batteries and damages, which result from misuse or neglect. The warranty also expires if you open the product. The manufacturer offers a 3 months warranty for rechargeable batteries. The manufacturer is not liable for consequential damage. If a failure occurs during the warranty period the product will be replaced, calibrated or repaired without further charges. The freight costs will be paid by the sender. The manufacturer reserves the right to exchange components of the product instead of repairing it. If the failure results from misuse or neglect the user has to pay for the repair. In that case you may ask for a cost estimate beforehand.

The product complies with the following standards:
EMC: EN 61326-1
Safety Regulations: EN 61010-1:1993/ A2:1995
The product accomplishes the requirements of the EMC Directive 89/336/EEC and of the low-voltage directive 73/23/EEC.

CE