IF324

IF300 - 2008 Series

Combo Digital Thermometer
For measurement No-contact & with Thermocouple Type K
IR Range -50.0 ÷ 1600.0 °C - Range T/C Tipo (K) -50.0 ÷ 1370 °C
With a double Laser Pointer – USB Gate – Software Ms. Windows
Art. 5A808

Operating Manual

Cod. IF324_5A808_UK_M1

English Language

Product Rev: 1.0 - Manual Rev: 1.2

General Index:

1 – Before Beginning

Before Using the product, we suggest to read carefully this manual, moreover once you learned to use the instrument we suggest always to make some test to familiarize with its functions, and only after being mastery of its use going on with the real using.

For more information please contact the CEAM customer service

RECURRENT TECHNICAL TERMS GLOSSARY:		
Term	**Meaning**	**Abbreviation or Example**
Target	With this term it is identified the point of the measurement, that is the body, the product or the point we intent to make the measurement.	
Spot	This term indicates the area, circle of a variable diameter, in function of the distance, inside which the instrument receives the instrument infrared radiation, which allows to make the measurement of the average temperature	Attention the shape of the Spot is circular when the instrument is positioned vertical on the Target, but in case the instrument would be positioned oblique, the Spot shape will be elliptical
Optical Ratio	The optical ratio indicated by two digit divided by two points (12:1) indicates the ratio between Distance of the TARGET and Diameter of the SPOT which the optical of which is provided the instrument allows, it is very important to have clear this concept to be able to obtain always reliable measurements, but over all really representatives of the Target	Let's do an example: with Optical Ratio 12:1, it means for instance that at the Distance of 1200 mm the Spot will have a diameter of 100 mm (Fig. 1), and at the distance of 12 meters the spot will have a diameter of 1 meter, of course this ratio is true also for intermeddle or superior measures to the mentioned values.
Laser Pointer	The Laser ray is used only to simplify the measurement pointing, allowing identifying with precision the exact point where the operator is making the measurement, and it is not used at to make the measurement, which uses just the infrared radiation.	It is important to remind that the little red point of a constant diameter identifies simply and indicatively the centre of the measure Spot, and it is not the only point where the measure is done, while the diameter of the spot is variable in function of the distance as above explained
Wavelength Or Spectrum Response	The Wavelength of an instrument is in few words the frequency range inside which the instrument obtains the infrared radiation which later it transforms in a temperature value	This kind of thermometer, obtains a radiation of electromagnetic waves exactly as the radio we listen in into the car, where the variation of frequency determines a different emitter radio to be listen, the difference between the radio and the thermometer is that this last one instead of an antenna has got an infrared sensor and that instead of the music, it retransforms the received energy by the sensor in a temperature value, the wavelength determines the range inside which the instrument is operative. To be noticed that inside the infrared range there are several different range more restricted which typically are indicated as plus or minus right to specific application and to define also the working temperature level.

Instrument Specifical Technical Terms Glossary		
Abbreviation	**Description**	**What it is for**
ε	Emissivity Abbrev. (EMS)	It Identifies the Emissivity Value which must be correctly set up to be able to make the infrared Temperature measurement (Ref. Par. 2.1.4)
MAX	Max Temp. Reached	It Identifies the max reached value memorized during the measurements
MIN	Min Temp. Reached	It Identifies the min reached value memorized during the measurements
DIF	Differential Temp.	It Identifies the differential obtained value memorized during the measurements
AVG	Average Temp.	It Identifies the average obtained and memorized value during the measurements
HAL	HIGH Alarm	It Identifies the High set up alarm value
LAL	LOW Alarm	It Identifies the Low set up alarm value

Summary of the General Precautions:

Attention: The Instrument is provided by a double Laser Class II @ 675 nm source
Use the maximum attention when the laser rays are lit on
Never point it directly to people or animal eyes
Keep particular attention not to pointing the laser ray on reflecting surfaces which could the ray in an uncontrolled way
Never point the Laser ray on gas or inflammable and/or explosive liquids

You should never exceed the operative limits written on this manual, reminding also that a respectable using extend the product's life

The product is not hermetic and it cannot stand humidity, steams and liquids which could damage both the electronic and the optical side.

Avoid letting have to the instrument quick temperature ranges which could generate condensate inside or even just on the optical side.

Never clean the optical, mainly with systems and abrasive products, solvents, oily products, and everything could damage or even just dirt or opacity it, the damage of the optical makes the product unusable, in case it get dirty, it is possible to try a light cleaning using water base products, that you can find in some seller of optical and photo equipments.

Attention: each cleaning operation is at total risk of the customer.

Do not try to open the product, opening it, warranty will be immediately void

Never use spare parts or accessories not original or certified by CEAM

Attention: regarding the Batteries, being consumable material, we remind that they are not included in the warranty covering, and that each intervention and/or substitution is on charge of the customer.

2 – Technical Specifications

2.1 – General Characteristics:

- Combo Thermometer for Measurements without any contact (Infrared) & With Thermocouple (Type K)

General Characteristics Common to the two Measurement Technologies:

- Back enlightened Display
- Measure Unity °C & °F to be set up
- Automatic Selection of the Measure Range
- Automatic Selection of the Visualized Decimal
- Visualization of the Minimum – Maximum Temperature (MIN – MAX)
- Average (AVG) and Differential (DIFF) Temperature Calculation
- Setting up of the High and Low Temperature Alarms
- Function Data hold which allows freezing the Measure at the release of the Trigger
- Energy save Function with Automatic Power OFF
- Operative Conditions: 0 ÷ 50 °C (32 ÷ 122 °F) - 10 ÷ 90 %UR
- Stocking Conditions: -10 ÷ 60 °C (14 ÷ 140 °F) – 5 ÷ 80 %UR
- Power Supply: Battery 9V – NEDA 1604A – IEC 6RL61 or Equivalent

Characteristics Measures without Contact (Infrared):

- Infrared Measure Range -50…1600 °C (-58.0 ÷ 2912 °F)
- Optical Ratio 50:1 (to the Distance of 50 cm it has a Spot Diameter 1 cm)
- Accuracy: Look at Table Ref. Par. 2.3
- Wave Length 8 ÷ 14 µm
- Configurable Emissivity within 0.10 ÷ 1.0
- Response Time: 150 ms
- Provided by a Double Laser Pointer to localize approximately the position of the Measure Spot
- Laser Type: No. 2 Diodes < 1 mW – Wave Length 630 ÷ 670 nm – Class II (2) Laser Product

Characteristics Measures with Thermocouple:

- Compatible Thermocouple: Type K
- Connection: Male Mignon Connector
- Infrared Measure Range -50…1370 °C (-58.0 ÷ 2498 °F)
- Accuracy: Look at Table Ref. Par. 2.3

2.1.1 – Application Fields:

The instrument for its characteristics is very flexible and easy to be used, then it is proper for a general use and we indicate some typical application:

- Industrial Sector
- Food Sector
- Seasoning
- Painting
- Security and Firing prevention Sector
- Plastic moulding and plastic materials working
- Asphalt Working in Covering & Street Applications
- Typographic and Packaging Sector
- Food Cooking and Drying
- Service Sector
- Electric Installation and Servicing
- Building Sector
- Insulating Materials Installation and processing

2.1.3 – Optical Ratio (Optical Vision Field @ of the Infrared measure):

F324 is a combo thermometer, which serves then to measure the temperature, but differently form other kind of thermometers, this kind of instrument thanks to its technology succeed in making the measurement both in a traditional way with a thermocouple and without physical contact with the product to be measured, this is possible thanks to the particular used technology, which is based on the survey of the infrared radiation inside a specifically frequency range, also called wavelength, which all bodies plus or minus emit in function of their nature and of the temperature they are.

The instrument "catches" these radiations, invisibles to the human eye, through a special electronic sensor, and thanks to a powerful circuit provided by a micro-processor, able to make complex calculations, it converts the radiations in a precise temperature measure.

Then as it should be clear, the instrument act itself as an optical "Passive" device, with a result that the major will be the distance between the instrument and the Target (Target = Point of Measure) and major will be the dimension of the SPOT and vice versa, as explained in the below graphic example.

Attention: the two laser rays visible during the measurement are only the pointer which makes easier the estimate individuation of the point and of the measurement area, they don't have any function in the measurement, it is very important keeping in mind this detail, because it can be to find a case in which making for instance a measurement through a glass, the laser will pass through it, letting you think the measurement is through the glass, while in reality the infrared measurement will be on the surface of the glass, this detail is explained by the fact that on the operative Laser frequency, the glass is transparent, while on the thermometer infrared wave length the glass is absolutely opaque, that means impenetrable.

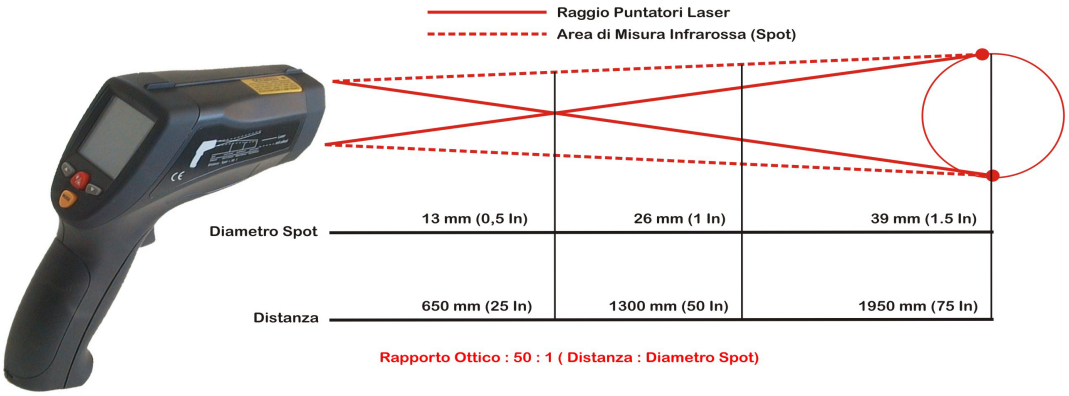


Fig.1

2.1.4 - Emissivity:

The correct conversion of the infrared radiation in a temperature value is made by mathematical formula (Law of PLANCK) which for a correct conversion, asks the set up of a constant called "Emissivity" which changes in function of the kind of material we are going to measure, the emissivity of the instrument described in this manual, is changeable from 0.10 up to a 1.00
For further details please read the specific next chapters

2.2 – Range – Resolution – Precision @ Thermocouple Measurement:

Table: Range & Precision for the Measurements with the Thermocouple				
Range °C	Range °F	Precision	Repeatability	Display Resolution
-50 ÷ 1000	-58 ÷ 1832	± 1.5 % of the reading ± 3°C (± 5 °F)	± 1.5 % of the reading	0,1
1000 ÷ 1370	1832 ÷ 2498	± 1.5% of the reading ± 2°C (± 3.6 °F)	± 1.5 % of the reading	1
Rif. Conditions @ Environmental Temp. 23 ÷ 25 °C (-73 ÷ 77 °F)				

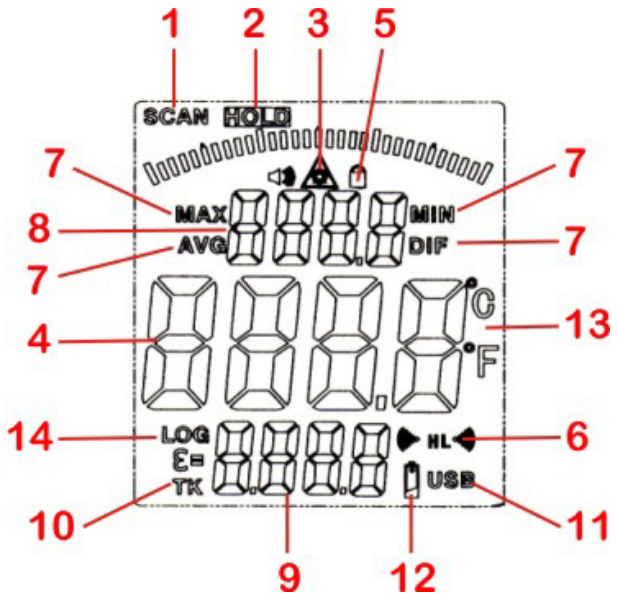
2.3 – Range – Resolution - Precision @ Measurement without contact, with infrared:

Table: Range & Precision for the Measurements without Contact with Infrared				
Range °C	Range °F	Precision	Repeatability	Display Resolution
-50 ÷ 20	-58 ÷ 68	± 2.5 °C (4.5 F)	± 1.3 °C (2.3 °F)	0,1 @ < 1000 1 @ > 1000
20 ÷ 400	68 ÷ 752	± 1.0% ± 1.0 °C (1.8 °F)	± 0.8% ±0,5 °C (0.9 °F)	
400 ÷ 800	752 ÷ 1472	± 1.5% ± 2.0 °C (3.6 °F)		
800 ÷ 1200	1472 ÷ 2912	± 2.5%		
1200 ÷ 1600	1472 ÷ 2912	± 2.5%	± 1.2% ±1,0 °C (1.8 °F)	
Rif. Conditions @ Environmental Temp. 23 ÷ 25 °C (-73 ÷ 77 °F)				

3 – Instrument General Key:

1) Optics & Infrared Sensor (Detector)
2) Display LCD
3) Type “K” Thermocouple Input (Left side of Instrument)
4) USB Gate (Left side of Instrument)
5) Backlighting Display & Laser Managing Key
6) UP Key
7) DOWN Key
8) MODE Key
9) Measurement Trigger
10) Battery Room Cover
11) Handle Grip

4 – Display



1) Indicator of the Present Measurement
2) Data Hold Indicator
3) Laser ON
4) Indicator of the measured Temperature
5) Lock Abbreviation
6) High Alarm and Low Alarm Abbreviation
7) Symbols MAX – MIN – AVG – DIF
8) Indicator of the Temperature MAX – MIX – AVG - DIF
9) Indicator of Value Emissivity Or Temp. T/C
10) Indicator Abbreviation Emissivity Or T/C
11) USB Abbreviat. (Active gate to transmit data to the PC)
12) Low Power Indicator
13) Indicator °C / °F
14) Data Logger Function Abbreviation

5 – Keyboard

1) Key On-Off Backlighting & Laser
2) Key UP (EMS – HAL – LAL)
3) key DOWN (EMS – HAL – LAL)
4) Key MODE – Rotation Instrument Functions and Display

5.1 – Instrument General Functionalities

5.1.0 – Preamble, The instrument can be activated in the following modalities:

MEASURE: This modality is activated simply pressing the trigger (Ref. Cap. 3 – Pos.9), during this period the instrument visualize on the display the word **SCAN** (Ref. Cap. 4 – Pos.1), for short this period would be denominated **MEASURE**

HOLD: This mode activates itself automatically, when you release the trigger (Ref. Chap.3- Pos.9) after the measurement, and if you don't press any key during this time, and you did not disable the energy save function, the instrument automatically turns off after few seconds, during this phase the instrument visualize its state through the word **HOLD** on the display (Ref. Chap.4 – Pos. 2), for short, this phase can also be called HOLD

5.1.1 – During the **MEASURE**, pressing again and again the key MODE (Ref. Chap.3 - Pos.8) you visualize in sequence the values got respectively: MAX (Maximum), MIN (Minimum), DIF (Differential), AVG (Average), LOG.

5.1.2 – During the Infrared **MEASURE** (Without Inserted Thermocouple), it is possible to adjust the value of Emissivity, pressing the arrow keys UP – DOWN (Chap.5 – Pos. 2 & 3); the modified value is visualized on the display (Ref. Chap.4 – Pos.9)

5.1.3 - When in **OLD**, you can select the temperature display in °C or °F pressing the keys UP & DOWN (Ref. Chap.5 – Pos.2 &3)

5.1.4 – To switch on or off the backlight of the Display or the Laser Pointer, both in MEASURE and in HOLD press again and again the central red key (Ref. Chap. 5 – Pos. 1)

The activation of the backlight is highlighted by the backlight itself, while the activation or the deactivation of the Laser pointers is marked by the visualization of the abbreviation LASER on the display (Ref. Chap.4 – Pos.3) the visualized indication means pointer ON.

5.1.5 – To be able to set the value HAL (High Alarm) LAL (Low Alarm) and Ɛ (EMS =Emissivity) press again and again the key MODE (Ref. Chap.5 – Pos. 4) until on the display it appears the desired symbol (Ref. Chap. 4 – Pos. 6 & 9), once you select the symbol of the parameter you want to set, proceed through the keys UP & DOWN (Ref. Chap.5 – Pos.2 & 3)

5.2 – Functionality MODE key

During the modality HOLD, press the key MODE again and again, to enter in a sequential way to the visualization of the following data logged and/or calculated during the measurements:

LOG

MAX = Maximum Visualization reached during the measurement

MIN = Minimum Visualization reached during the measurement

DIF = the Thermal difference between MAX & MIN reached during the measurement

AVG = the average temperature reached during the measurement

Note: To scroll the above parameters, press the keys UP & DOWN (Ref. Chap.5 - Pos.2 & 3)

Continuing

And to the configuration of the parameters in sequence:

Ɛ EMS = Emissivity Set for the infrared measurement

LOCK On-Off = Activation / Deactivation Keyboard Lock

H (HAL On-Off) = Activation / Deactivation High temperature Sound Alarm

H (HAL Set Point) = Value Set Set-Point High temperature Alarm

L (LAL On-Off) = Activation / Deactivation Low temperature Sound Alarm

L (LAL Set Point) = Set Visualization Temperature °C/°F

Note: To Scroll the vales to be set press repeatedly the key MODE, to set up the values, use the keys UP & DOWN

5.3 – Functionality LOG (Data Logger)

5.3.1 – Memory Capacity

The thermometer IF324 is supplied by 100 independent memory areas, where logging the data of the temperature to be taken.
Note: for each area it is possible to log a single temperature value, if we log several values on the same memory cell, the value logged will always be the last one.

5.3.2 – Storage Measurement IF (Infrared) Data

To store these data proceed as follows:
In MEASURE, then with the trigger pressed, press repeatedly the key MODE, until the abbreviation LOG will appear on the (Ref. Chap.4 – Pos.14)

Select the storage area where we desire to store the data; using the keys UP & DOWN always in condition of MEASURE, the selected area, from 0 up to 100, will be visualized on the display (Ref. Chap. 4 – Pos. 8)

Once selected the memory cell, you can proceed to store the desired value, pressing the red key of the Backlighting/Laser (Ref. Chap. 5 – Pos. 1), the stored value will be visualized on the display in little on the low side (Ref.Chap.4 – Pos.9)

5.3.3 – Re-Reading Stored Data in LOG - Measure IF (Infrared)

To read again these data proceed as follows:

Keeping pressed the measurement trigger (Ref. Chap.3 – Pos.9), press repeatedly the key MODE until on the display it appears the abbreviation LOG (Ref. Chap.4 – Pos. 14), at this point release the trigger, and operating on the keys UP & DOWN, it is possible to scroll the several memory positions, visualizing them from 1 to 100 on the display in little on the high side (Ref.Chap.4 – Pos.8) , the stored temperature corresponding to the memory cell is visualized on the display in little on the low side (Ref. Chap.4 – Pos.9)

Note: Not touching anymore any key for at least 7 seconds the instrument switch itself off

5.3.4 – Erasing of the LOG Storage

This function allows to erase quickly all the stored data in the LOG, and to proceed execute the following procedure:

The erasing can be made only when the instrument is in LOG, this state is confirmed by the visualization of the abbreviation on the (Ref. Chap. 4 – Pos. 14), if the display does not visualize this abbreviation, always in MEASURE, with pressed trigger, press repeatedly the key MODE (Ref.Chap.5 – Pos.4) until it appears the abbreviation LOG.

Once assured to be in LOG, always keeping pressed the trigger, pressing repeatedly the key DOWN up to arriving in visualizing the memory cell 0, visualized on the display little in the high side (Ref.Chap. 4 – Pos.8), without releasing the trigger, press shortly the red key Backlighting/Laser (Ref. Chap.5 – Pos.1), the instrument will confirm the erasing with a double sound note, and the display will visualize the memory cell 1, ready to begin a new storage

5.3.5 – Activation –Deactivation USB Gate to download data

The instrument is supplied by a digital communication USB gate, through which it is possible to download the stored data to visualize them on the PC.

Activation USB Gate: To activate it, it is necessary that the instrument is in the state MAX-MIN-DIF-AVG, with one of these abbreviations visualized on the display (Ref. Chap.4 – Pos.7), then keep pressed for few seconds the red key Backlighting-Laser (Ref. Chap.5 – Pos.1) until the abbreviation USB appears in the low right corner of the display (Ref. Chap.4 – Pos.11).

Deactivation USB gate: To deactivate the function, it is necessary that the instrument is in the state MAX-MIN-DIF-AVG, with one of these abbreviations visualized on the display (Ref. Chap.4 – Pos.7), then keep pressed for few seconds the red key Backlighting-Laser (Ref. Chap.5 – Pos.1) until the abbreviation USB disappears from the low right corner of the display (Ref. Chap.4 – Pos.11).

6 – Measurement Procedure

6.1 – Switching on the Instrument
The instrument will switch on automatically, simply pressing the measurement trigger (Ref. Chap.3 – Pos.9).

Note: Be sure the instrument has got its battery and that the battery is charge

6.2 – Light SCAN Measurement Active
The instrument advice the measurement active, visualizing on the display the abbreviation SCAN (Ref. Chap.4 – Pos.1), typically with pressed trigger.

6.3 – Light HOLD Measurement not Active
The instrument, through the abbreviation HOLD (Ref.Chap.4 – Pos.2) advice that the measurement is not active and it is visualizing the last measured value, this condition comes releasing the measurement trigger.

6.4 – Automatic Switching Off (Power Saving)
The instrument switches off automatically if the trigger is released and any other key is pressed in 7 seconds.

Attention!!!
6.5 – Important Considerations for the Measurements

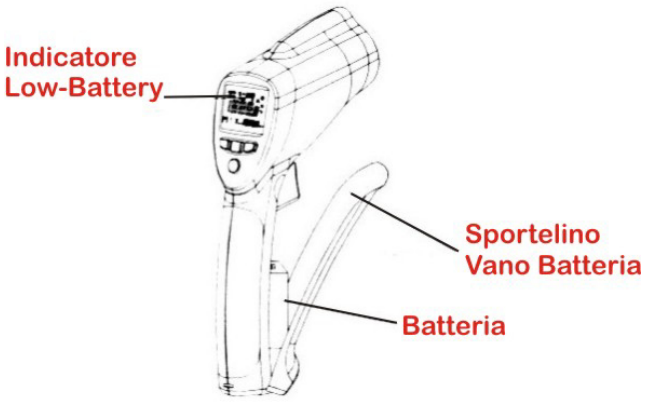
A) keep always well pointed the instrument on the body to be measured, keeping attention that the product and/or the material to be measured was compatible with the instrument, and over all that the distance of the TARGET is such that the SPOT should be completely covered, in fact we remind that in case of partial covering, the instrument make anyway the measurement making a thermal average of the surface, in case even one single part of the SPOT would be with a different temperature and outside the body to be measured, the result would be in proportion distorted.

B) the measurement infrared sensor needs the environmental temperature compensation, which the instrument makes automatically, but to obtain reliable measurements it is necessary to allow to the instrument to adapt itself thermally to the environment where it is, especially if before it was in a place with different temperature, in this case it is necessary to place the instrument where we intend to make the measurement, and wait at least 30 minutes for its stabilization, and only after that going on with the measurement.

7 – Battery Substitution

7.1 – When on the display will appear the abbreviation (Low Battery) it means that the battery is flat (Chap.4 – Point 12) since this moment the measurements are not reliable anymore even if the instrument go on working, and it is necessary to change it with a new one, or load them again if the instrument is furnished by the optional rechargeable battery.

7.2 – Open the cover of the battery room making it roll ahaead, as indicated by the picture on the side (Chap. 3 - Ref. 10), take out the flat battery, putting in the new one making attention to connect the right polarity.



Attention: After having taken out the old battery, check always that the room is clean, and that there are no trail of acid from the old battery, in case you can see even little traces of acid, remove them immediately with a dry brush and send the instrument in repair to CEAM service to avoid that the acid contamination would corrode also the circuit making the instrument useless.

8 – Operative Notes

HOW IT WORKS: As already explained in the previous chapters, the instrument measures the temperature through the conversion in a temperature value, of the infrared radiation taken, inside a specific frequency gamma or wave length, which is taken by the Optical infrared Detector, which works exactly as an antenna. This energy is directed in the centre of the optical "Focus" of the detector thanks to special transparent lens to the radiation, in function of which it is determined the optical ratio of the instrument, that is the dimension (the diameter) of the spot at a definite distance.

THE SIGHT FIELD: The infrared energy taken, is directed to the centre of the optical "Focus" of the detector thanks to special transparent lens at the radiation wave-length, the optical dimensioning of the lens determines the optical ratio of the instrument, that is the ratio between the dimension (the diameter) of the SPOT that you obtain at a definite distance between the instrument and the TARGET, as already largely explained in the previous chapters , it is very important that the dimension of the SPOT must be largely smaller then the TARGET surface to be measured, in a different case you would obtain measurement errors in function of the thermal proportion in function of the area.

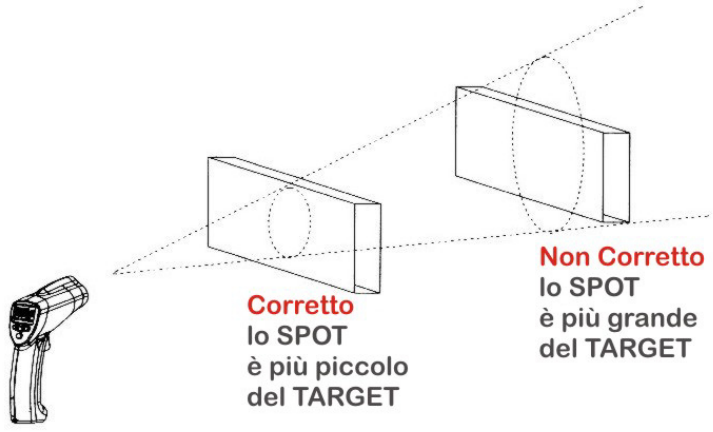
Besides on the bases of the optical Ratio it is important to remind that bigger will be the distance between the instrument and the TARGET and bigger will be the Dimension / Diameter of the SPOT , then smaller will be the distance and smaller will be its Dimension / Diameter as showed clearly in Pict. 1 of Chapt. 2.

Attention: The SPOT is always defined as a round area, but this is data on theory and it is true only in case the instrument is perfectly vertical on the TARGET and with this last one perfectly flat, on the contrary if the instrument is in a inclined position, the shape of the SPOT will be elliptical, while if we are measuring irregular bodies, the shape of the SPOT will assume irregular shapes as consequence.

IDEA: To have an idea of how it works, it is enough to use an electric torch which produces a light cone, which besides its dimension (Optical Ratio) if you position it in a vertical way it will produce a round lighted area, besides if you position it in a slanting way, the shape of the lighted area will be modified, and the same will happen making different experiments.

LASER POINTER: to avoid any misunderstanding, we want to remind that the laser pointer, in this case, double, does not represent the measured surface, but just a perfunctory referring point where the instrument makes the measurement, then it must be always the operator, that on the base of the instrument optical ratio, also printed on the side of the pyrometer, to calculate on the base of the distance, the approximate dimension of the SPOT, to verify that it is totally contained inside the measurement TARGET.

Here below a simple but clear example where you can find both the correct using , where the TARGET contains all the spot, and an example of incorrect using where the TARGET does not contain all the spot, in this case the instrument will display a temperature which represents the thermal average of the read surface, in this case not totally represented by the TARGET , then as already explained, not representative of the real temperature of the Target.



If the TARGET would be of little dimension, and there is the risk that the spot would not be completely covered, and as the optical is with fixed focus, it is always wise where possible to bring the instrument near to reduce the dimension of the SPOT making then the measurement compatible and more reliable.

DIFFICULT OR IMPOSSIBLE MEASUREMENT: just for the used technology, and not for a fault and/or shortage of the instrument, there are measurement which cannot be made and that can even damage the instrument in an irreparable way, let's begin from these last ones:

Never point the instrument in front of the sun, the quantity of energy radiating and received by the instrument is such to damage the instrument in an irreparable way.

Attention: this kind of damage, moreover quite frequent and typical, is not covered by the warranty.

Also the measurement on surfaces glossy, reflecting, chromium-plated, Aluminium, Bright Stainless Steel are always very difficult to be done, and are not reliable, both for the nature of the materials, and also because of the Emissivity constant, look at the paragraph Emissivity here below.

It is not possible to make measurements neither through mineral glass sheets, as this element operates on a wave length different then the human eye, and if for the eye the glass is transparent, for this instrument it is opaque as an Iron plate, then even if the laser pointer will go beyond it (its wave length allows it), the instrument will be able to measure just the superficial temperature of the glass, and not over it.

Also Steam, Warm air, Smoke and similar cannot be measured, as they are not solid bodies, besides the operator should keep attention in this kind of measurements, because drawing to much the instrument up you could dirty the instrument and its optical side, producing measure errors, or even making it useless.

EMISSIVITY: As already explained before, in the infrared temperature measurements, it is necessary to set a constant which is named Emissivity and which is typical and specific for the various kinds of materials to be measured. Here following it is published a summary table of Emissivity of the most common materials.

ATTENTION! In case you desire to measure with more accuracy all the materials, but in particular the most difficult ones or even impossible ones to be measured, you can do it with a simple trick, in practice it is enough to create some point of measure (TARGET) where the surface to be measured has been modified, or where there is applied a piece of compatible material, for example some adhesive tape well stuck, or for higher temperature it is possible to paint beforehand these points with opaque Black Paint, it is perfect the muffler paint which you can find on the market in chip and practical Aerosol bombs, for further information and suggestions contact the customer service CEAM , here following anyway we publish a short table with the Emissivity values of the main materials families

EMISSIVITY COEFFICIENT TABLE

Material	Emissivity		Material	Emissivity
Asphalt	0.90 ÷ 0.98		Cloth	0.98
Concrete	0.94		Human Skin	0.98
Cement	0.96		Leather	0.75 ÷ 0.80
Sand	0.90		Coal (Powder)	0.96
Land	0.92 ÷ 0.96		Paint	0.80 ÷ 0.95
Water	0.92 ÷ 0.96		Matte Paint	0.97
Ice	0.96 ÷ 0.98		Black Rubber	0.94
Snow	0.83		Wood	0.90
Glass	0.90 ÷ 0.95		Plastic	0.85 ÷ 0.95
Ceramics	0.90		Paper	0.70 ÷ 0.94
Marble	0.94		Oxidized Chrome Steel	0.81
Gypsum	0.80 ÷ 0.90		Oxidized Copper	0.78
Malta	0.89 ÷ 0.91		Oxidized Steel	0.78 ÷ 0.82
Brick	0.93 ÷ 0.96		Fabric	0.90

Other eventual material get by experimental way

Material	Emissivity		Material	Emissivity

9 – Maintenance

The instrument especially if used correctly does not requires particular service intervention besides the periodical substitution of the consumable parts, as the battery, or the thermocouple probes, which are subject to wear.

Besides, also for the side of measure T/C, but in particular for the side of the IF, we suggest to verify the correct calibration at least twice a year, using a calibration oven "Black Body / Grey Body" as the ones at disposal among the optional (Ref Series C400 / C600), a major frequency of verifying it is suggestible in case the level of critical state of the measurement to be made is High.

10 – The Software

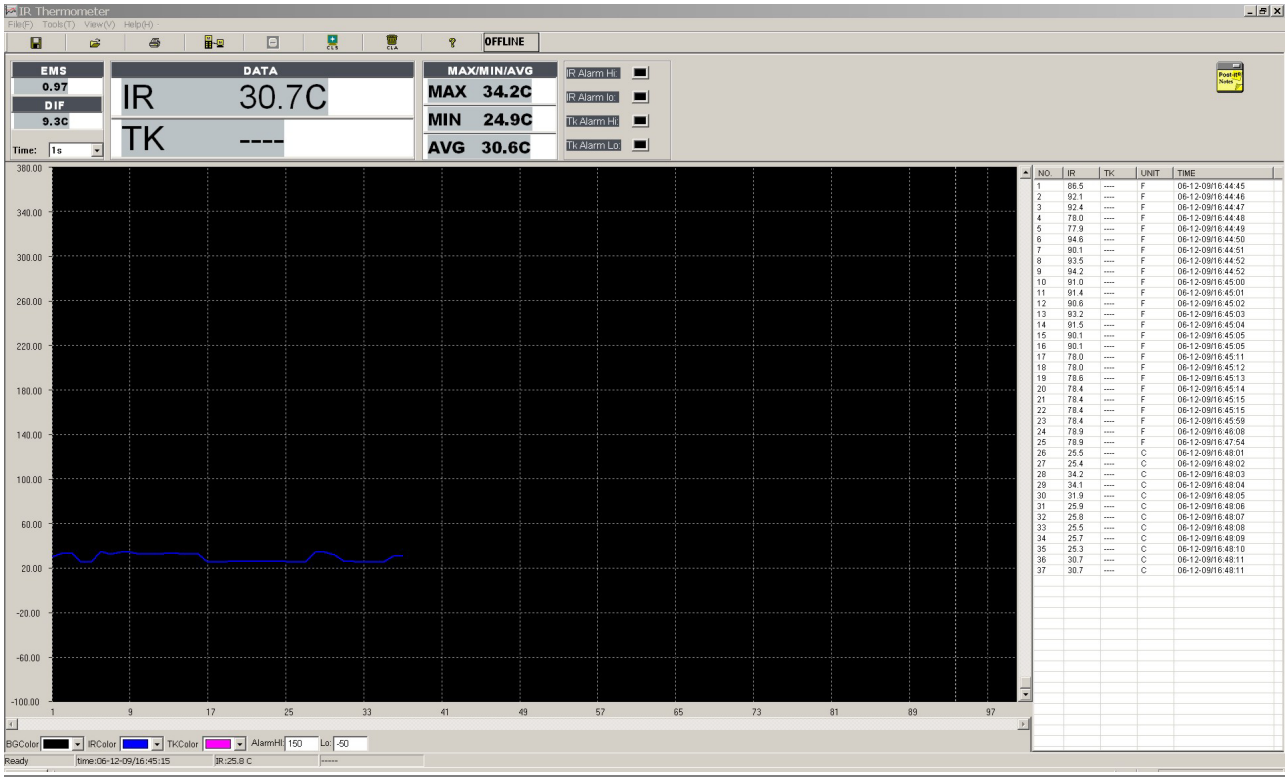
The Thermometer IF324 is equipped by a Software Utility extremely simple and intuitive, which through its USB gate allows acquiring the data taken through a PC, as well as other several functions.

At the moment the software which is supplied for free is at disposal only in English language, as it is typical for this kind of utility products, but as it is so simple it will not be difficult to be used also from people who do not speak English.

Before proceeding in using the software, it is necessary to install it into the PC you intend to use, the procedure is totally automatic, you need first to install the software, and then connect the thermometer to the USB gate, activating before its gate (Ref. Par 5.3.5) and then follow the eventual request of the system.

At the end, once you install it correctly, pressing the Trigger of the thermometer, it will be possible to see on the PC the data taken by the thermometer, both those with technology IF and those taken by the thermocouples if connected.

If everything has been well done, you will see the screen showed here below, where the track in this case blue you can see on the diagram, represent in this case the value of the temperature taken during time, while on the above part you can see the actual value, as you can see by the image from the PC it will be possible to visualize also many other information, relevant to alarms etc etc..



The software is provided by an on line manual, where you can enter in clicking on the icon with the question mark.

11 – Codes to Order Optional & Spare Parts

Art. 5A808 - IF324 – Handy Combined infrared Thermometer IF + TCK
Double Laser Pointer – USB Gate
Range IF -50.0 ÷ 1600 °C
Range TCK -50.0 ÷ 1370 °
Included Accessories:
Rigid Plastic Case
Thermocouple Type K - Art. 6006 (Low Temperature Version)
USB Cable
Software Windows

Other Version of the Series IF300 - 2008:

IF311 – Infrared Portable Thermometer for Sanitary using Range -30 ÷ 60 °C – Art. 5A804

IF321 – Handy infrared Digital Thermometer - Range -50 ÷ 380 °C – Art. 5A805

IF322 – Handy Infrared Thermometer -50 ÷ 550 °C – Art. 5A806

IF323 – Handy infrared Thermometer -50 ÷ 1600 °C – Art. 5A807

IF301D – Multi-purpose Infrared Thermometer + Thermocouple Input – Range 0 ÷ 650 @IR - 0 ÷ 1700 °C @T/C

Accessory:

Rechargeable NiMh Battery - Size 6LR61 – Art. 0942
Universal Net Battery Charger 230 Vac – 50 Hz – Art. 0943

C430-A – Calibration Kiln Black Body – Range 50 ÷ 350 °C
C430-B – Calibration Kiln Black Body – Range 50 ÷ 500 °C
Technical Note: Kilns for the verifying of the Calibration of infrared Thermometers To be used not only with the model presented on the manual, but also with other models

Optional Services:

Service of Verify of ISO Calibration
SIT Calibration Service

11 – Warranty Terms

Attention!!

The present handbook is merely indicative, and it is subject to changes in any moment, without giving any notice.

The not respecting strictly the indication found on this handbook, the opening and tampering the product, the incorrect use, the wrong wiring, the using of spare parts or optional not original CEAM Control Equipment, the removing of the labels, of the identification marks put by CEAM Control Equipment, and the hidden export to Extra CE counties, they make immediately lose the responsibility over the product and the warranty right!

WARRANY TERMS: **the product is under warranty for a period of 12 Months (Art. 1490 C.C. and following) starting by the delivery note date, also in case it is in vision, and then transformed in selling, the complete text of the warranty conditions offered by CEAM Control Equipment in conformity to the actual laws, are published, and are at disposal of any people which demand for them, the document is registered both in paper form and in electronic form, to the CEAM Control Equipment, headquarter, and to see it, it is sufficient to make a written request, specifying the title of the applicant.**

The warrany cover:

The products and the components which bad functioning is referable for sure to production defects, the eventual defect met gives only the right to repair it, and not to substitute the product, besides the eventual production defect, does not give any right to resolute the contract, or to suspend the payment if not expressly agreed in written by CEAM.

The warranty does not cover:

Defects generated by incorrect or improper use of the product
Defects generated by using spare parts or consumables products not original CEAM
Defects generated by environmental and/or atmospheric problems and/or natural calamity
Products and/or services tampered or modified even partially
Products and/or services to which have been taken off, or tampered, even partially, labels and lot codes original CEAM

In any case, the warranty does not cover:

Batteries, magnetic devices, perishable products and/or consumable products
The components of Third parts, to which it must answer directly, the assistance service of the same, with the modalities provided from them.
The technical time used to verify and/or to repair the products
The travelling allowance, and the technical intervention on the place, if effected.
The packaging and shipping cost of the products there and back.
All the additional costs supported by CEAM to fulfil the warranty.

Clause of responsibility exclusion

CEAM does not assume any responsibility, regarding eventual damages, direct or in direct, caused to people or things, or damages for non production and/or incorrect production and/or eventual damage, in some way referable to the product and/or to this handbook service.

CEAM does not assume any responsibility regarding eventual damages caused to people or things because of the eventual not conformity to the product and/or service of the present handbook, which is merely indicative, and that can be changed by CEAM in any moment without giving any notice.

RoHS Compliant

Conformity

Company With Quality System Certified

UNI EN ISO 9001:2008

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