SYNERGYS
TECHNOLOGIES

# 2019 – YEAR of innovation:

# T°SHOOTER®

***Guy MONIER – 23/08/2019***

***SYNERGYS TECHNOLOGIES***

# 1. Introduction to temperature measurement

- **Why do we need to measure temperature in the industry?**

**Because we need to know the general situation of the:**

- ❑ **ELECTRICAL INSTALLATIONS**
- ❑ **MECHANICAL INSTALLATIONS**
- ❑ **PROCESS INSTALLATIONS**
- ❑ **BUILDING**

**For a better security, efficiency, quality, MTBF…**

# 1. Introduction to temperature measurement

- **ELECTRICAL PROBLEMS**
  - ❑Unbalanced loads
  - ❑Problems in wiring
  - ❑Component failures
  - ❑Overloaded systems with excessive current
  - ❑Loose or corroded connections
  - ❑Problems with winding insulation in electric motor
  - ❑Underspecified component
  - ❑Power quality problems

# 1. Introduction to temperature measurement

- **MECHANICAL PROBLEMS (especially rotating machinery)**
  - ❑ Friction problems
  - ❑ Misalignment problems
  - ❑ Bearing damages
  - ❑ Lubrication problems
  - ❑ Excessive loads
  - ❑ Unbalance problems
  - ❑ …

# 1. Introduction to temperature measurement

- **PROCESS PROBLEMS (with or without fluids)**
  - ❑ Refractory insulation problems (oven or else)
  - ❑ Problems with broken or worn pipes (leak or else)
  - ❑ Problems with steam traps or valves (leak or else)
  - ❑ Problems with heat flow
  - ❑ …

# 1. Introduction to temperature measurement

- **BUILDING PROBLEMS**
  - ❑Problems with insulation (improperly installed or missed)
  - ❑Problems of heat loss
  - ❑Air leakage or bypasses
  - ❑Problems with HVAC installation
  - ❑Leaks in buried steam or water lines
  - ❑Problems with moisture
  - ❑…

# 1. Introduction to temperature measurement

- **How can we measure temperature?**
  - ❑ **Thermometer with contact sensor (penetration, immersion, single contact, air…) > ONE POINT MEASUREMENT**

***The most popular are:***

***- Thermocouple K, T, J, … > voltage variation***
***- PT 100, PT 1000 > resistance variation***

# 1. Introduction to temperature measurement

- **How can we measure temperature?**
  - ❑ **Thermometer (pyrometer) with non contact sensor (infrared) > ONE POINT MEASUREMENT**

***The most popular are:***

***- Infrared pyrometer***
***- Infrared sensor***

# 1. Introduction to temperature measurement

- **How can we measure temperature?**
  - ❑ **Camera with non contact sensor (infrared camera or thermal imaging camera) > MULTI POINTS MEASUREMENT**

***The most popular are:***

***- Uncooled micro bolometer infrared camera***

# 1. Introduction to temperature measurement

Today, the most practical, economical and flexible way to check or measure about temperature in the industry is a:

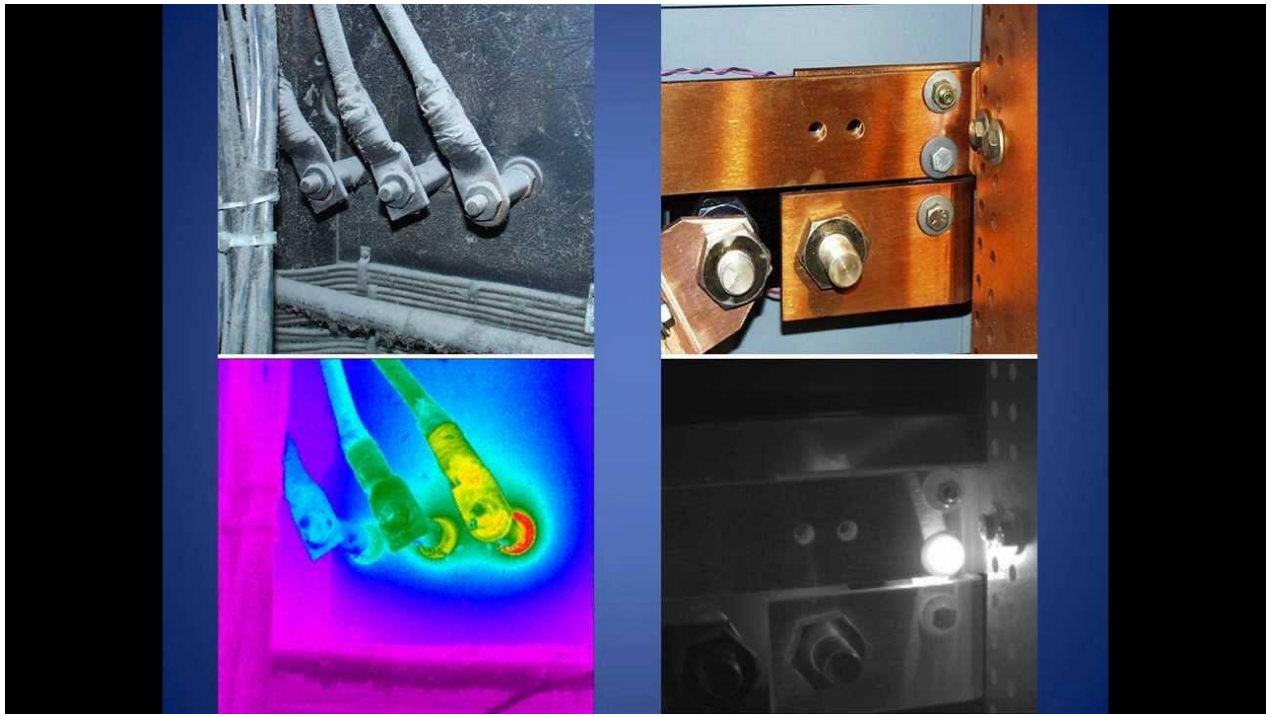
**THERMAL CAMERA**

# 2. What is a THERMAL CAMERA?

THERMAL CAMERA is a device (portable or fixed) in which you will find a thermal sensor, electronics, software and screen to make the infrared light visible for human. If the sensor is radiometric, you can also measure temperature.

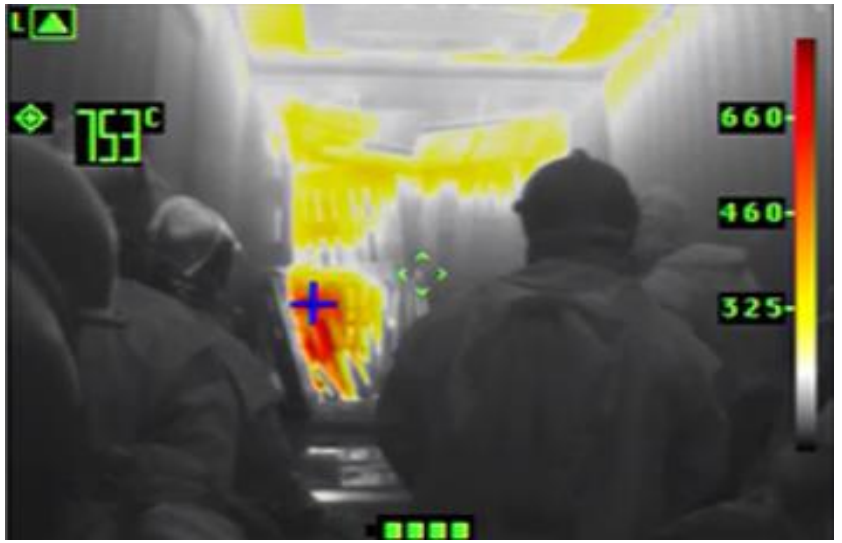
# 2. What is a THERMAL CAMERA?

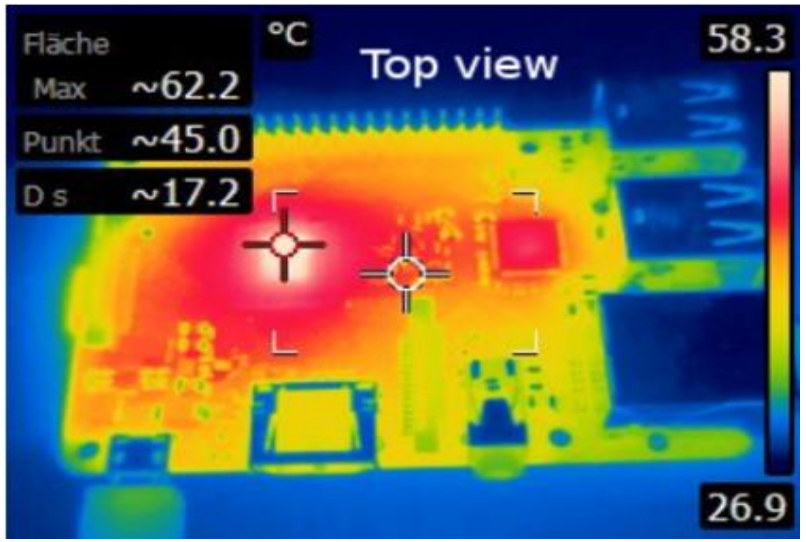
With a thermal camera you can see a scene with the “temperature” colors which are a conversion of the infrared energy coming from the different scene objects.



# 2. What is a THERMAL CAMERA?

With a thermal camera you can measure **some pixels** of the scene with fixed, movable or tracking (Hot/Cold) spot cursors.

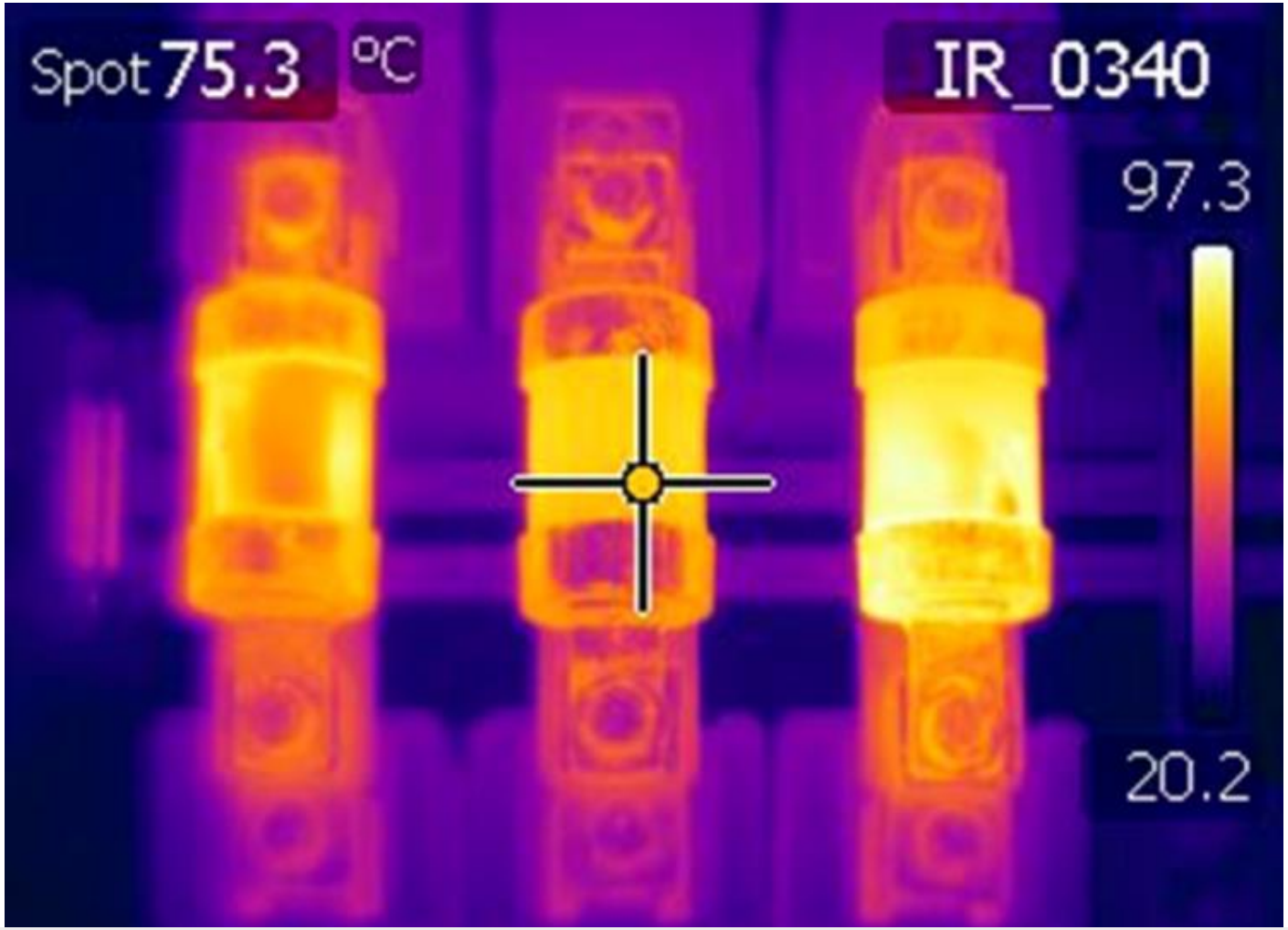


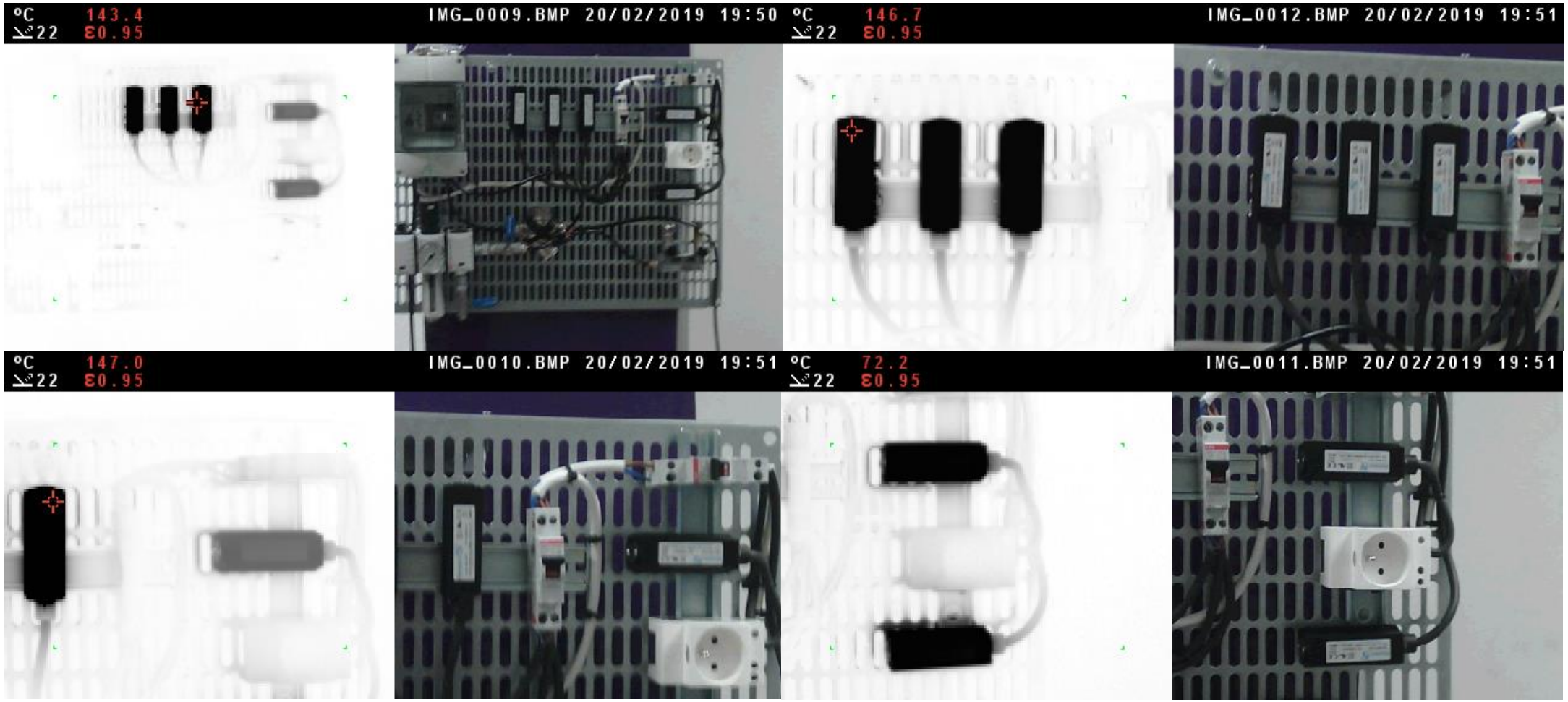

If you need more Informations about different temperature points, or if you need to check if your temperature are OK or not, **you need to move the camera, you need to look colors, you need to place cursors…a lot of work…these are manual**

# 3. New approach

Imagine you want to check if you have potential dangerous T° on a scene. For example, you would like to show T° >60°C. If you look here at the photo, **you need to move and put cursor on different place to check it**. If you look the 3 different phases, it is not evident to see if all fuses are > or < 60°C only by looking vertical color bargraph…



# 3. New approach

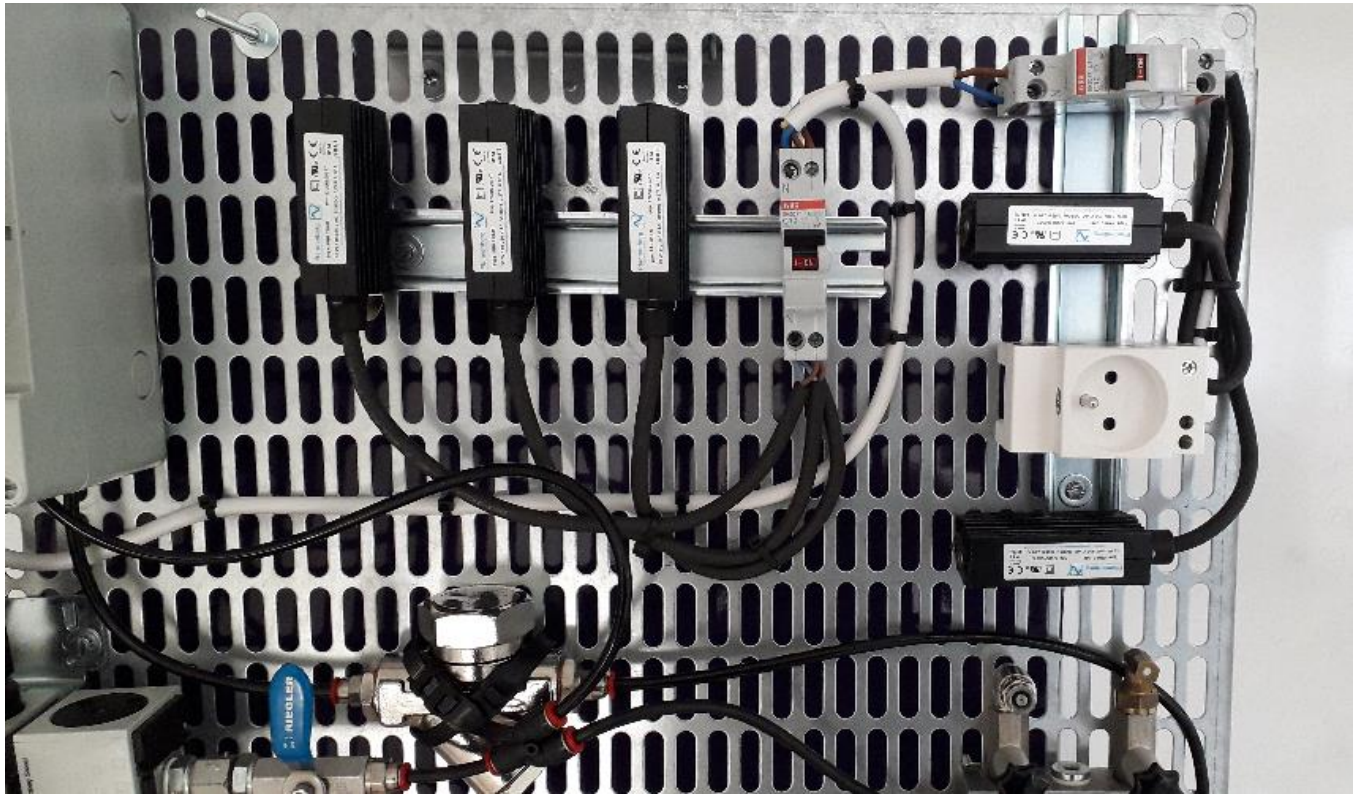



Because of AUTO SCALE (MAX-MIN), when you move in a scene, different T° can have same colors…Sometimes it is not easy to interpret (here 147°C and last 72°C are black)…

# 3. New approach

So, imagine a scene, where you only want via a visible image to check if your temperature are OK or not (> or < T°reference) and if not, where are they placed in it?

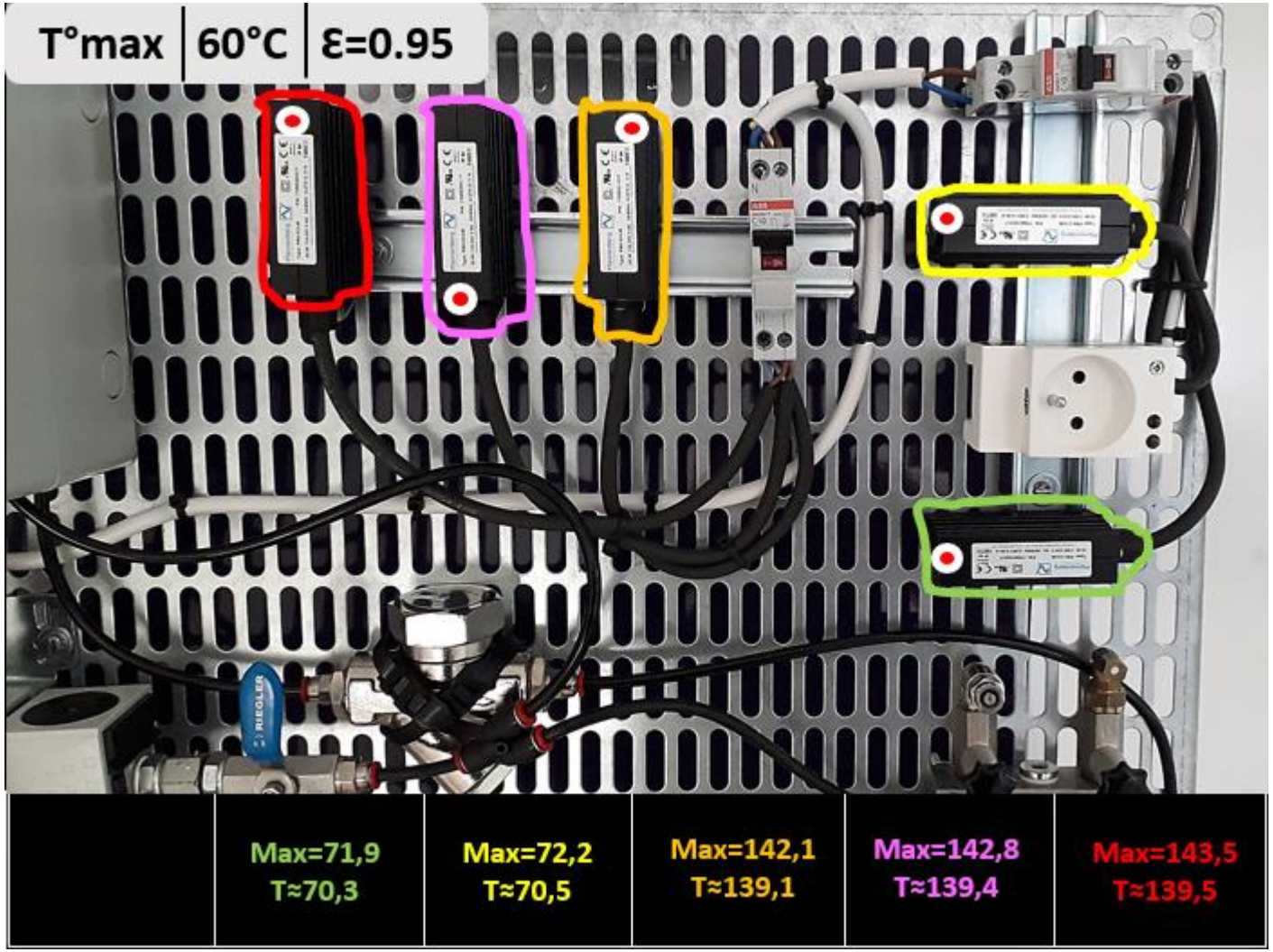
?



?

# 4. New concept of Thermal Contour Camera (Patent Pending)-1

T°**SHOOTER®** automatically analyze **all scene pixels, check temperature values and compare to a reference (T°max or T°min).** Abnormal areas are shown on the visible scene **with colored CONTOURS including T° values information (Max and Average).** Automatic, easy to use and easy to understand…no thermal image to analyze…**And to make it more fun, it also vibrate.**

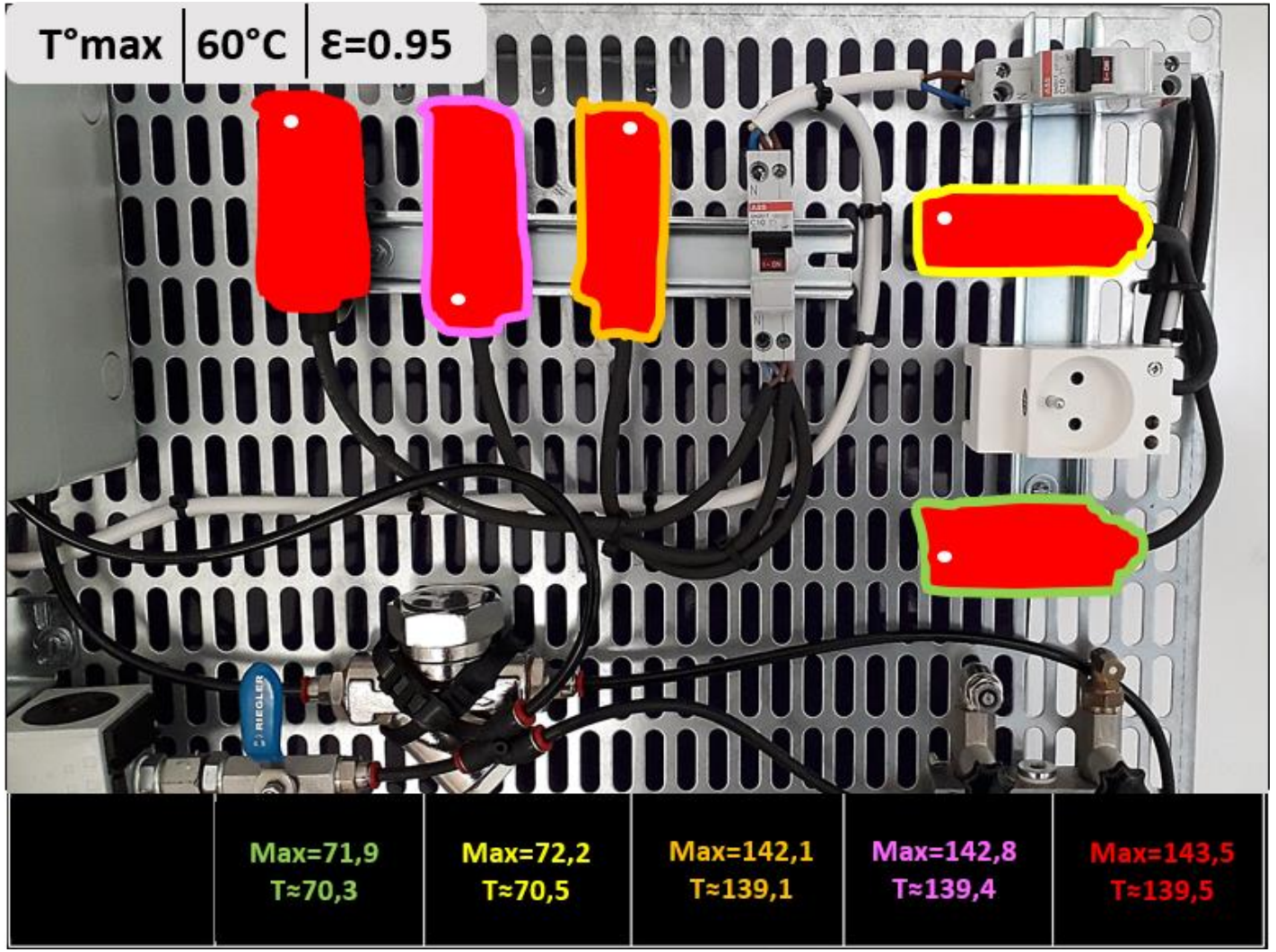



**« CONTOUR MODE »**

# 4. New concept of Thermal Contour Camera (Patent Pending)-2

T°**SHOOTER®** has also another mode which is easy to use, the Isotherm with contours. Always shown on visible scene.

Everything which is abnormal will be **red** for T°max threshold setting and blue for T°min threshold setting.



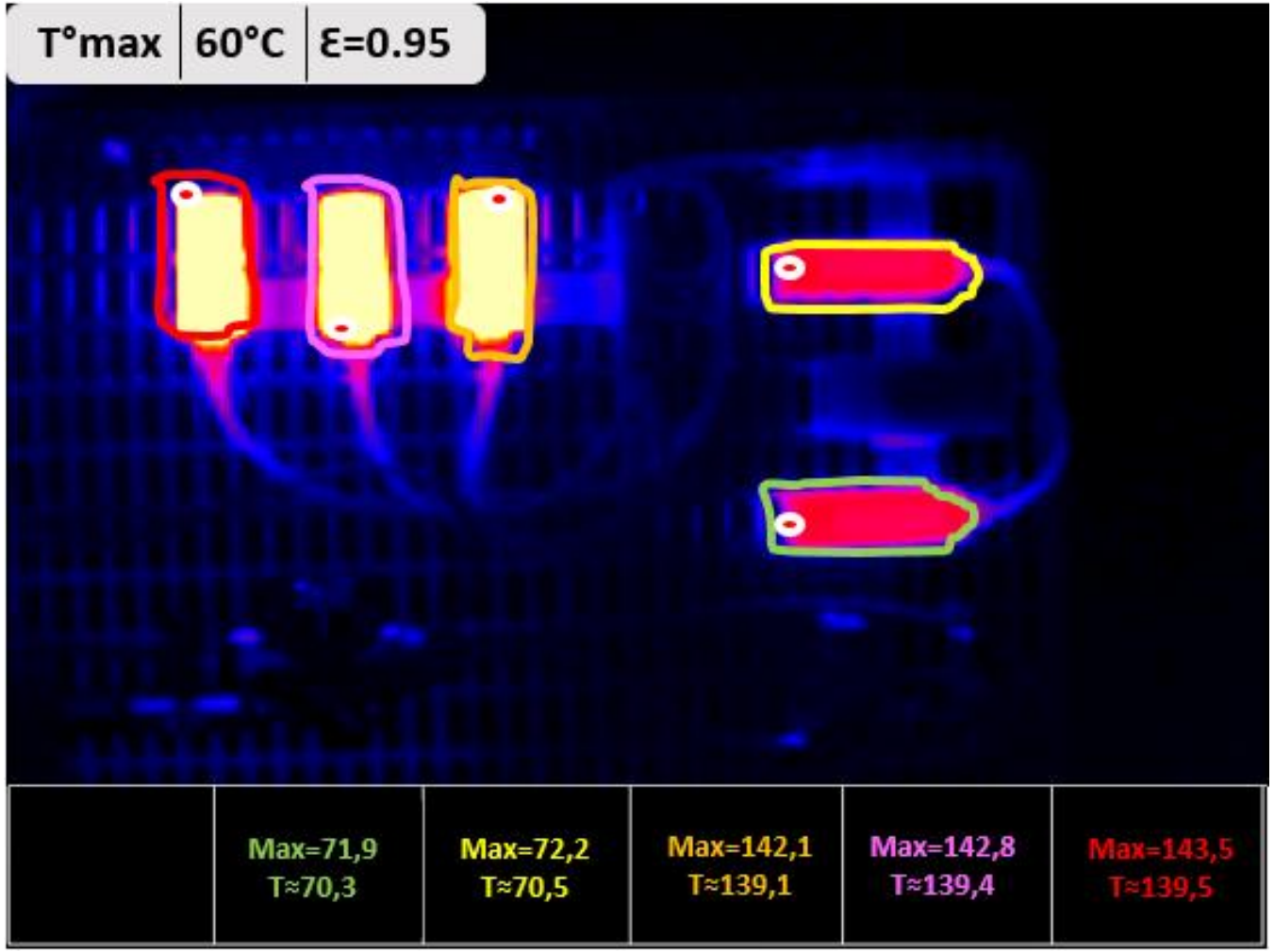

**« ISOTHERM MODE »**

# 4. New concept of Thermal Contour Camera (Patent Pending)-3

Of course, T°**SHOOTER®** can also show you **the thermal scene with contour.**

With Iron or Rainbow or B&W palette color capabilities.

You can switch between visible and thermal with icon in the main MENU.




« With Iron thermal palette »

New concept!

Easy to use!

# T°SHOOTER®

## THERMAL CONTOUR CAMERA

***(Patent Pending)***

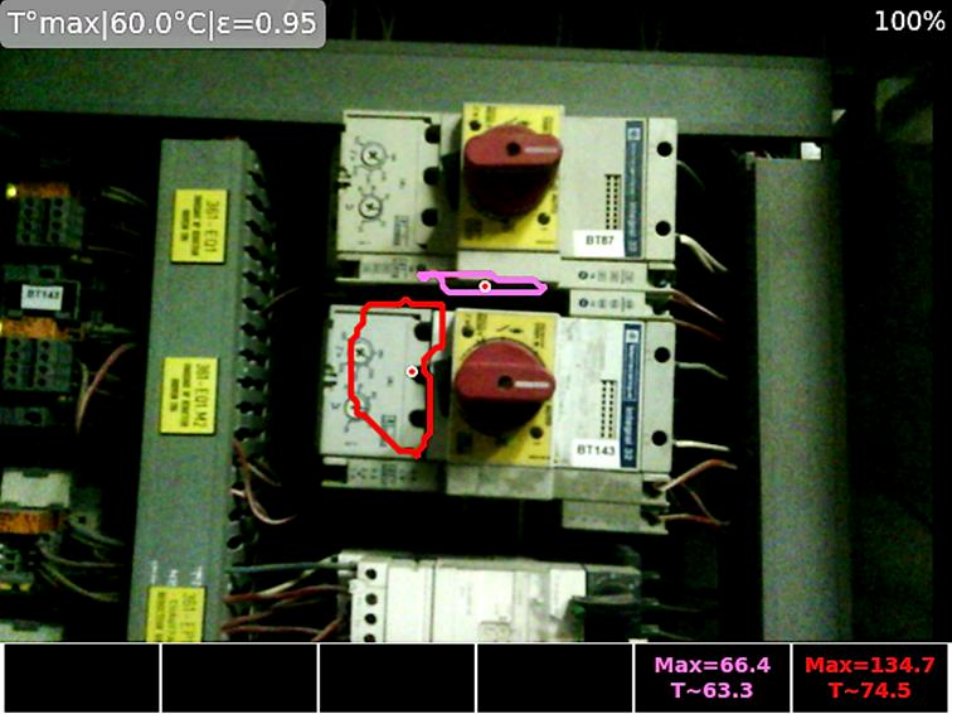
Unique in the world!

Competitive price!

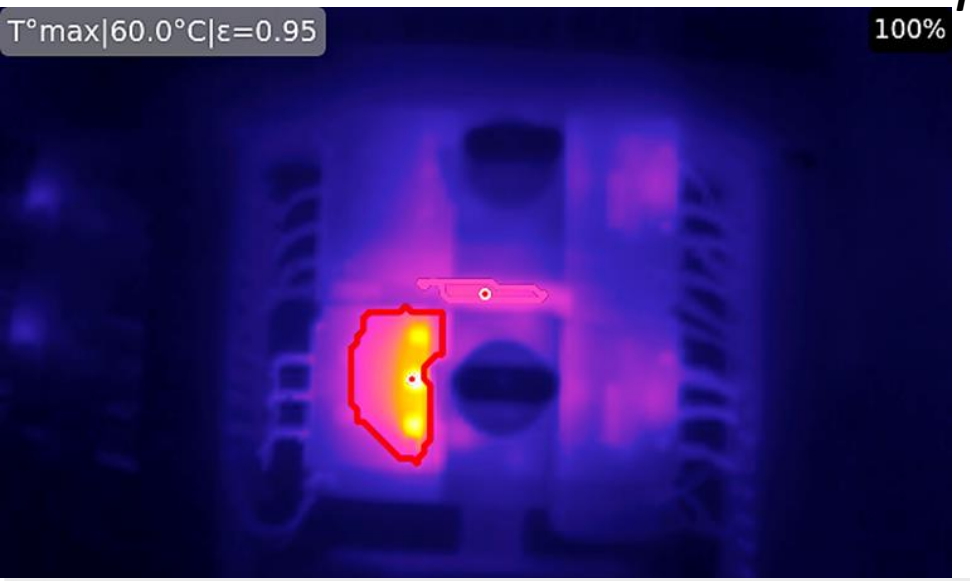
T°SHOOTER® TS1000
T°max|60.0°C|ε=0.95
100%
Max=66.4
T~63.3
Max=134.7
T~74.5

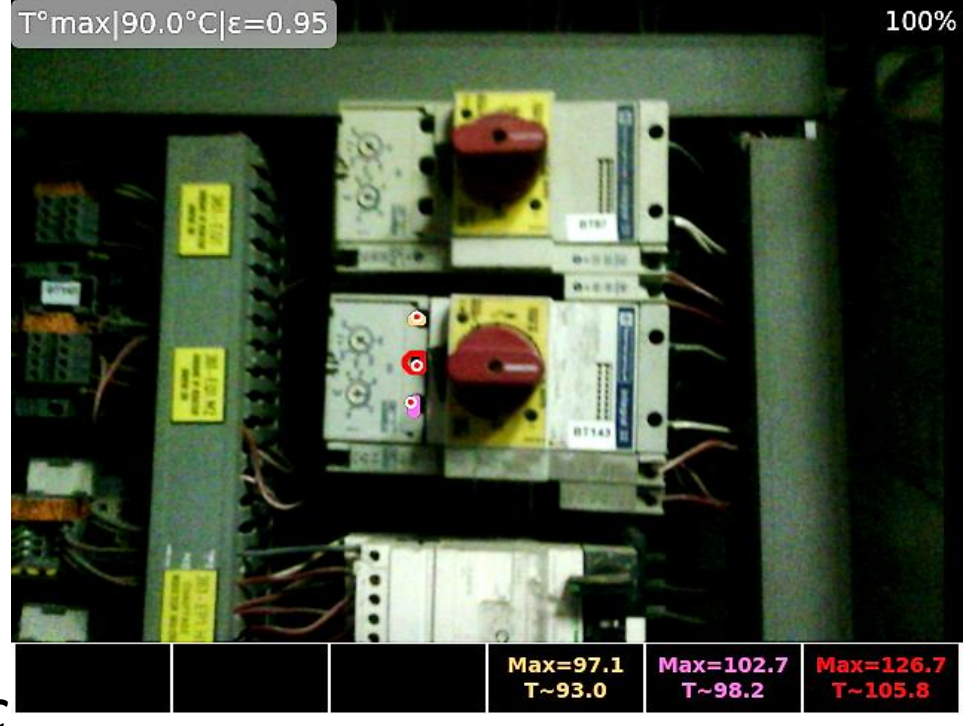
T°SHOOTER® TS1000
T°max|60.0°C|ε=0.95
100%
Max=66.4
T~63.3
Max=134.7
T~74.5
OK

SYNERGYS
SN°:
P = 12W

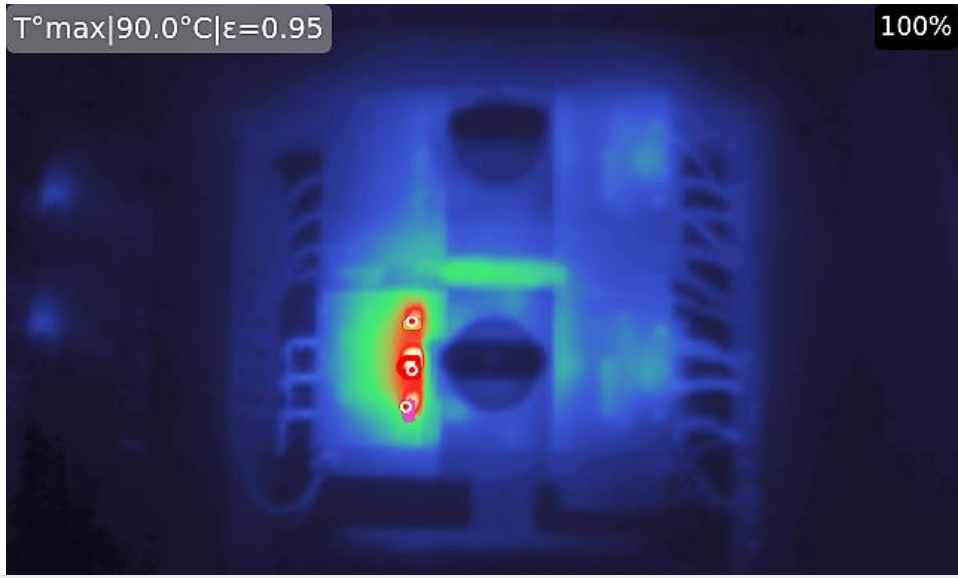



*FOR T>60°C*



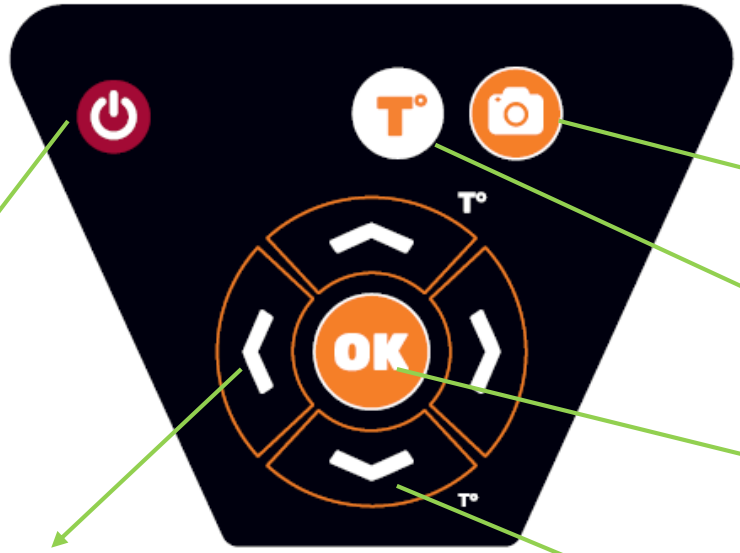

*FOR T>90°C*



Power 12V-1.5A

Micro USB for PC

Embedded vibrator « BIZZZZ-BIZZZZ-BIZZZZ »




On/Off

Photo capture

Treshold setting (T°max-T°min)

Validation OK or MENU

Emissivity value (Left and right)

Treshold value (Up and Down)

Hole for hand strap

Not used (black lens)

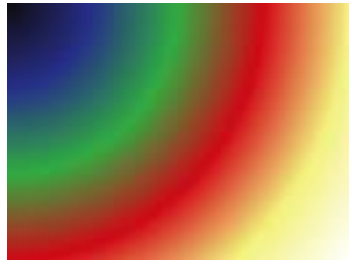
White LED light

“Visible” camera sensor

“Thermal” camera sensor-FLIR LEPTON 3.5 160x120 pixels

6x rechargeable battery cells NiMH high capacity (about 4 hours capacity)

# MAIN ICONS USED IN T°SHOOTER®-1



Thermal palette colors (Iron-Rainbow-B&W)

Emissivity setting

White LED light ON/OFF

Embedded vibrator activation ON/OFF

# MAIN ICONS USED IN T°SHOOTER®-2

Threshold value setting (<T°min or >T°max)

Working modes (Contour-Isotherm-Standard)

AUTO OFF settings

VISIBLE/THERMAL image switch

# MAIN ICONS USED IN T°SHOOTER®-3

Memory to access to stored photos (Visible+IR)

Temperature unit

Clock & date settings

# How does it works? - T°SHOOTER®

- Just choose your threshold mode (> T°Max or < T°min) with T° keyboard button

- Set your T° value with Up or Down button and valid with OK keyboard button

- Scan your visible scene with or without detected Thermal Contour(*) and T° measurement values (Max, Average)
- Switch to thermal view if needed with Switch keyboard icon
- Capture photo (visible + IR) with photo keyboard button

(*) Thermal Contour (Patent Pending) is created with special algorithms working with the thermal pixels and aligned and mixed on the visible scene. We can have up to 6 contours for the same visible scene! Of course, if there are more than 6 abnormal zones on a visible scene, you will only show the 6 more important of them.
If 1 to 6 Thermal Contours are detected, you will also have a intermittent vibration felt in the device.

# Technical specifications - T°SHOOTER®

| | |
|---|---|
| Thermal sensor | FLIR LEPTON 3.5 160x120 pixels, range of -10°C to 400°C (± 5°C)<br><50 mK sensitivity, 9Hz frame rate, 57° HFOV |
| Color palettes | Iron – Rainbow - B&W |
| Working modes | Contour - Isotherm (Only with B&W) - Standard |
| Emissivity setting | From 0.01 to 1 |
| Camera sensor | Embedded 5 MP visible photo camera |
| Display | LCD VGA color 5.7” 640 x 480 pixels |
| Pictures | VGA JPEG, number, name, date and time (thermal & visible) |
| Measurements | T°C or T°F |
| Memory | Up to 500 pictures, can be uploaded to PC |
| Communication | USB cable supplied |
| Autonomy | About 4 hours |
| Power supply | Rechargeable Nickel-metal hybrid batteries (NiMH) |
| Power charger | Universal DC 12V-1.5A |
| Temperature use range | -10°C to +50°C |

# Pack T°SHOOTER®- Detail

(Including MANUFACTURER CONFORMITY CERTIFICATE)
CALIBRATION CERTIFICATE (optional)