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# AEMC® Instruments

## Model 1954 Thermal Camera



**AEMC ONE SOURCE®**

For All Your Electrical Test & Measurement Instruments

# Contents

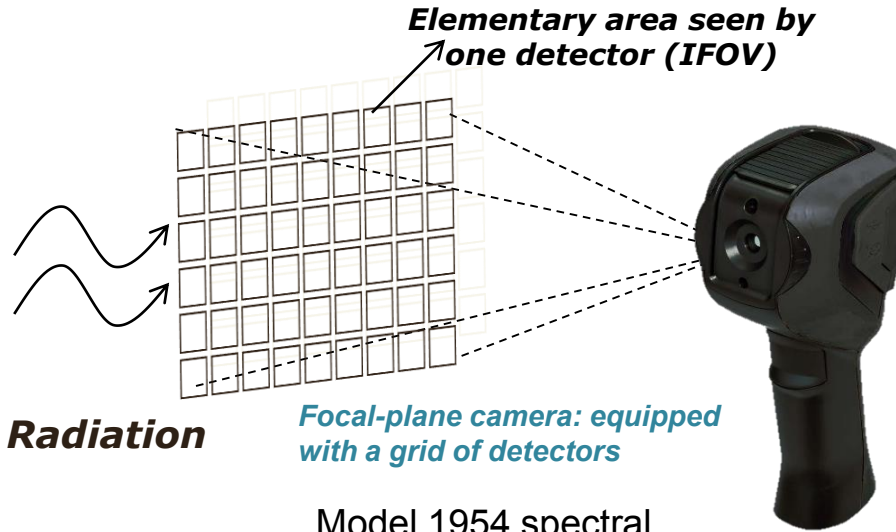
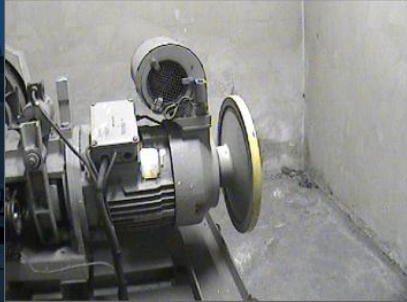
- ✓ Thermography Overview
- ✓ Model 1954 camera
  - Strengths / Operation / Specifications*
  - Competitive Sales Arguments*
- ✓ Target Markets and Users
- ✓ Comparative Analysis
- ✓ Marketing Material
- ✓ Glossary of Terms



# Thermography Overview

## Measurement Principle

*Thermal situation*



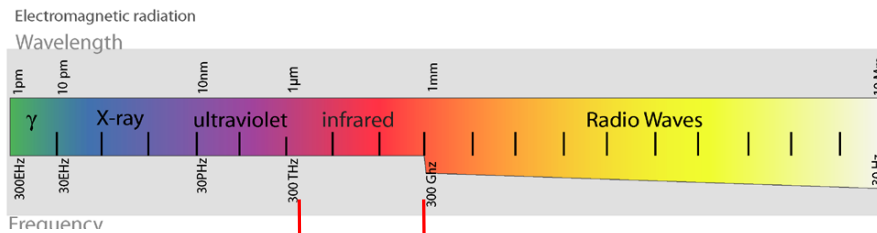
**Radiation**

*Focal-plane camera: equipped with a grid of detectors*

Model 1954 spectral range is 8 to 14  $\mu\text{m}$

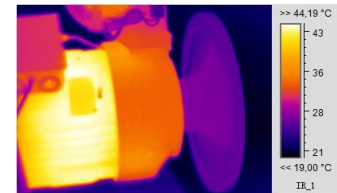
*Capture radiation emitted from the object and the radiation environment*

*Conversion into temperature using calibration curves and Influencing quantities, (emissivity, environmental temperature, etc.)*



**classic spectral band for infrared thermography**  
700 nm – 1mm

**Thermal image + temperature scale = thermogram**



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# Thermography Overview

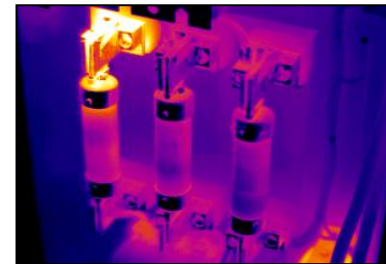
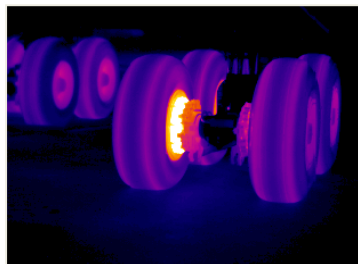
- **Quick implementation**
  - Comfortable grip*
- **Remote detection**
  - No installation shutdown needed*
  - Increased safety*
- **Operation in real time**
  - Immediate data display*
- **Precise fault location**
  - Locate problems before failure occurs*
  - Target corrective action*
  - Avoid costly production shutdowns*
- **Trustworthy results**
  - Proof of the conditions of an installation*



# Thermography Overview

## Industrial Maintenance & Repair

Electrical maintenance (unbalance, faulty contacts, incorrect sizing).  
Detection of mechanical faults such as wear, shaft misalignment or lubrication problems.



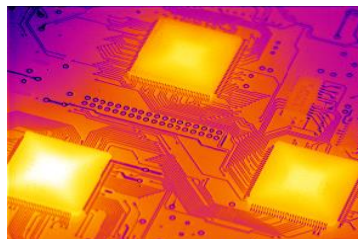
## Building Inspection

Detection of heat losses, infiltration, leaks, etc.



## Industrialization / Manufacturing

End-of-line testing  
R&D applications  
Electronics, etc.



# Introducing The Model 1954 Thermal Camera



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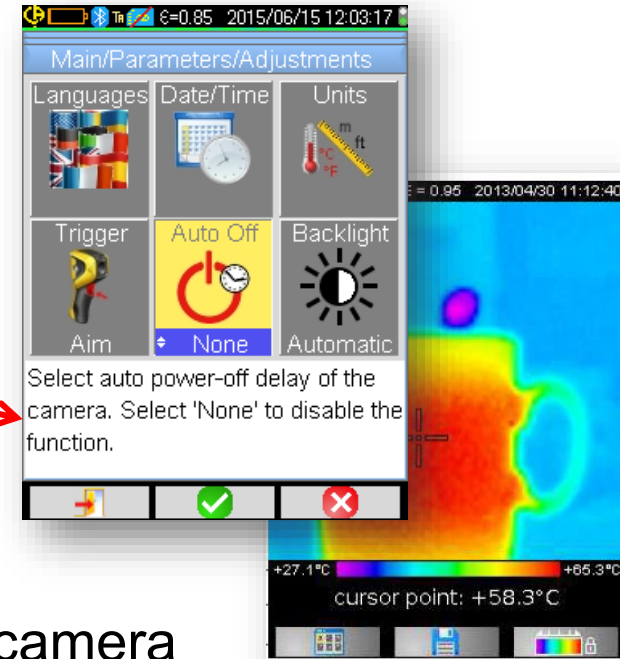
# Model 1954 Thermal Camera

- ✓ Designed and manufactured by Chauvin Arnoux in France (not privately labeled)
- ✓ **Focus-free** with 38° x 28° field of view
- ✓ **Thermal Resolution** 160 x 120
- ✓ **Real Image** 640 X 480 pixels
- ✓ **IFOV** spatial resolution 4.1 mrad
- ✓ **Laser pointer** for easy target line up
- ✓ **N.U.C** built in non-uniformity correction
- ✓ **9-hour** battery life
- ✓ **Voice** recording (Bluetooth earphone supplied)
- ✓ **Communication** with F407 and F607 power clamps, 3293-BT multimeter and the models 1110, 1227 and 1246 environmental data loggers
- ✓ **Start-up** in 3 seconds
- ✓ **Screen** wide 2.8-inch screen



## Model 1954 Thermal Camera

- ✓ Temperature:  
Manual and automatic cursor, area, temperature profile and isotherm
- ✓ Easy to use with contextual help
- ✓ Withstands drops of up to 6 feet on all surfaces
- ✓ All accessories included with the camera in a rugged case
- ✓ And!  
*Automatic brightness, modifiable emissivity table, renameable files, software with automatic report generation, etc. Recording as .bmp files which can be processed on a tablet by transferred using a SD card.*





# Model 1954 Thermal Camera

## Front Panel Elements

Construction



480 x 640 pixel graphical display

Built-in brightness sensor  
Automatically adjusts brightness  
according to the environment

Multifunction softkeys linked to the  
display

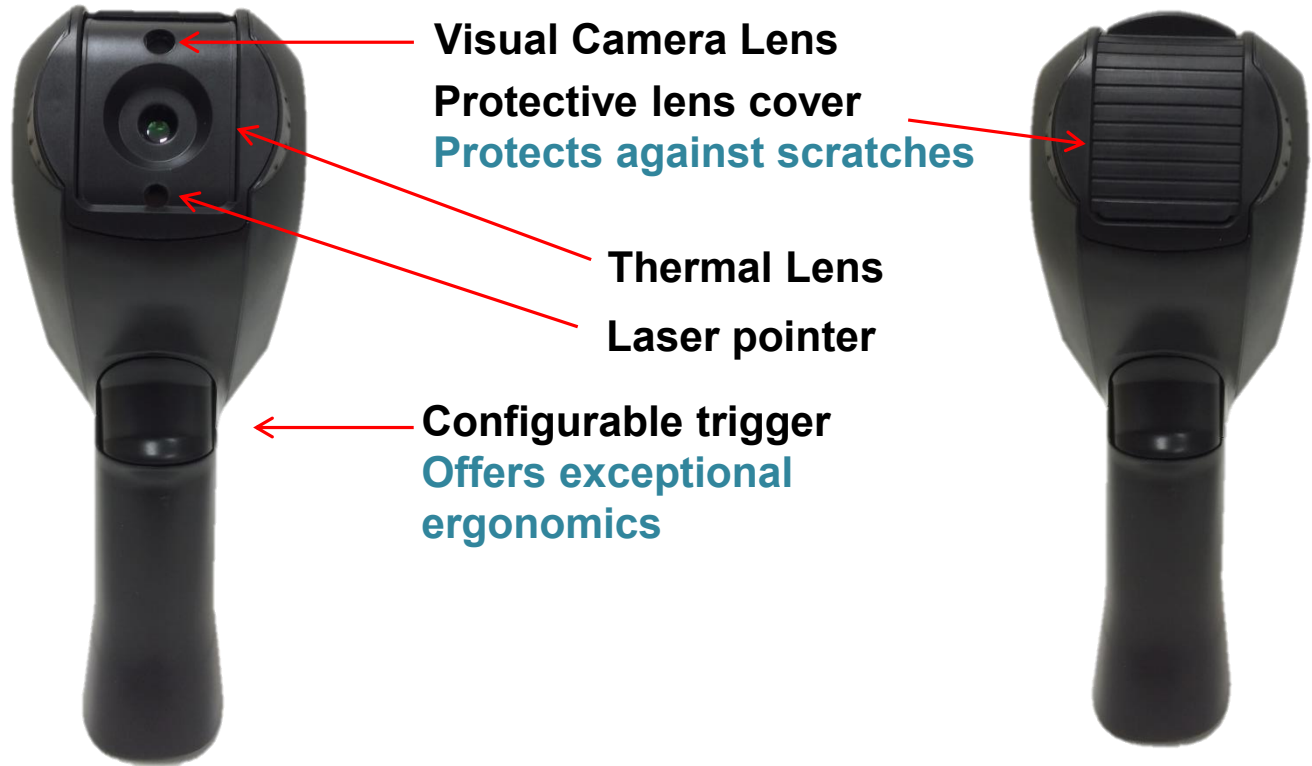
Power On/off (startup in 3  
seconds)

Navigation keys

# Model 1954 Thermal Camera

Construction

## Front View



Balance guaranteed: the camera stands on its own!

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# Model 1954 Thermal Camera

Side View

Base View



Mini USB port

Elastomer flap,  
Provides IP54  
ingress protection

SD card slot



Battery  
compartment

Tripod mount  
insert

Construction

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# Model 1954 Thermal Camera

## Display / Menu Contents



Model 1954 Thermal Camera Display / Menu Contents

**Status Bar**  
Battery status, Trigger function, Emissivity, Fixed image: red, Dynamic: green

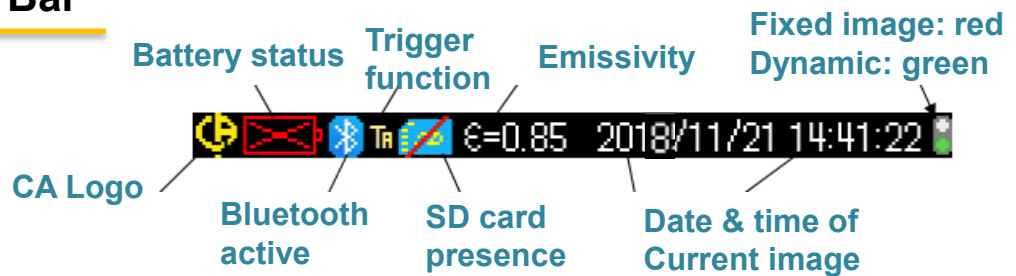
**Menu**  
Main/Parameters/Adjustments  
Languages, Date/Time, Units, Trigger, Auto Off, Backlight, Aim, None, Automatic

Select auto power-off delay of the camera. Select 'None' to disable the function.

**Contextual help**

Function keys linked to selected menu choice or camera image

### Status Bar



### Menu

Selectable using navigation keys



### Contextual help

This display area updates based on the menu item selected



Function keys linked to selected menu choice or camera image

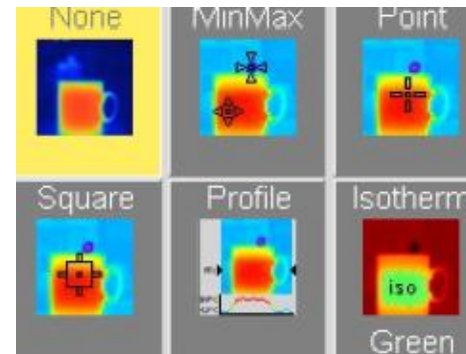
# Model 1954 Thermal Camera

## Measurement Display / Components of an acquisition

Image saved in enhanced .BMP format, can be processed with software for reports and modification of the influencing parameters or directly via a PC/tablet viewer



### Available Cursor tools



← Temperature scale

Temperature at cursor  
Bluetooth measurement display



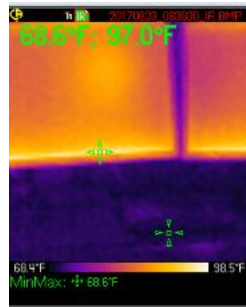
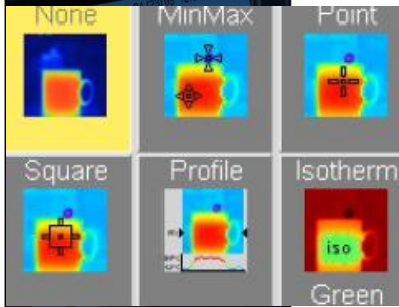
Automatic or manual scale  
with locking capability

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# Model 1954 Thermal Camera

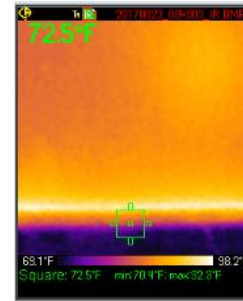
## Available Cursor tools



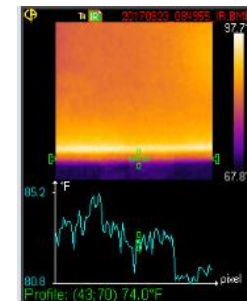
**Min/Max**



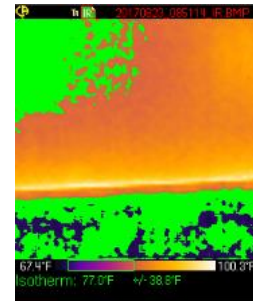
**Point**



**Square**



**Profile**



**Isotherm**

- None – no cursor display, temperature evaluation is determined by color palette only
- Min/Max – displays the cold and hot spot values at the Min and Max cross hair cursor positions
- Point – displays the value at the cross hair cursor, cursor is movable using the navigation keys
- Square – Displays the Min and Max values within the box. Box size and location is user adjustable
- Profile – Displays the temperature profile of a horizontal line defined by the cursor. Cursor can be moved along the line to get an individual temperature
- Isotherm – Displays points that fall in the same temperature range in the same color. User picks green, red or brown as the display color and defines the range and tolerance

# Model 1954 Thermal Camera

## Programmable Trigger Functions



- **Aim (TA)** – Trigger toggles between infrared image and camera image



- **Freeze (TF)** – Pressing the trigger stops the continuous updating of the display. Both infrared image and camera image are frozen



- **Save (TS)** – Pressing the trigger freezes both the infrared and camera images and saves them to the micro SD card



- **Laser Pointer (TL)** - Configure the laser pointer to turn on when the trigger is pressed. Releasing the trigger turns off the pointer.

**Configurable trigger**

User programmable trigger functions are provided to assist in the most common operations.

# Model 1954 Thermal Camera

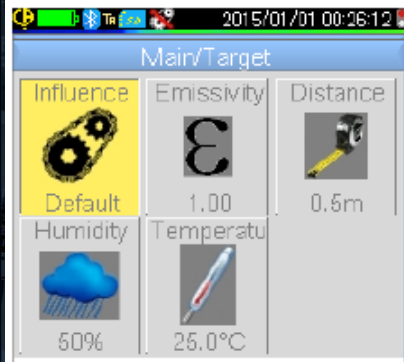
## Compensating for environmental factors



- **Emissivity** – can be chosen from a stored list or entered manually
- **Distance** – Can be set from 0.5 to 999 m (1.6 to 3280 ft)
- **Humidity** – Can be set from 0 – 100%
- **Temperature** – Can be set from 15 to 55°C (5 to 132°F)
- **Default** – Restores factory settings of Emissivity – 0.85, Distance = 6.6”, Humidity = 55%, Temperature = 77°F

## User programmable environmental conditions

User can customize the environmental conditions to match the application for improved accuracy where they differ from the defaults







# Model 1954 Thermal Camera



- Audio communication through a headset
- Electrical power measurements using a model 407 or 607 power clamp meter
- General electrical measurements using a 3293-BT multimeter
- Environmental loggers measuring light, wind speed, humidity and dew point and temperature

MODEL 1950      MODEL 1954

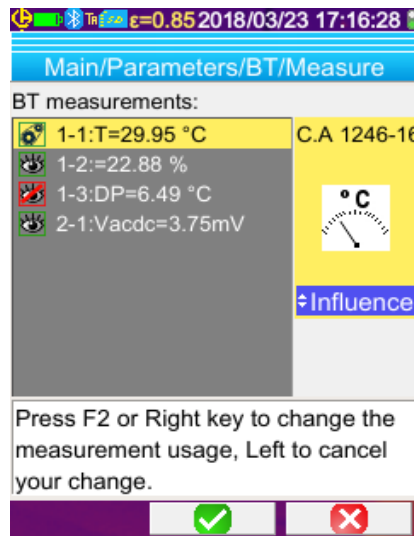
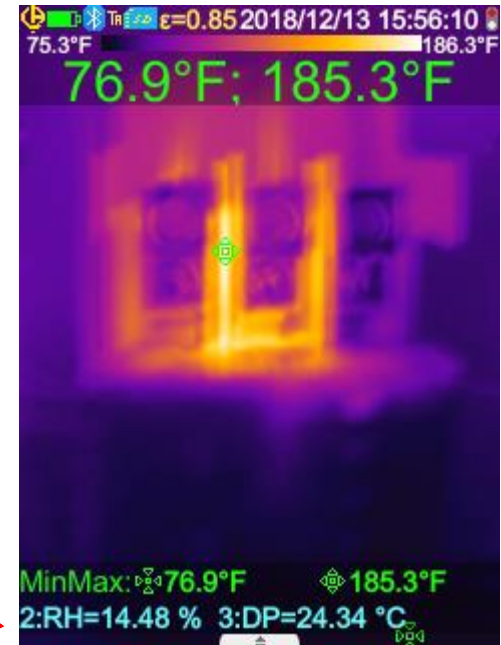
INSTRUMENT COMPATIBILITY	MODEL 1950	MODEL 1954
407 Power Clamp meter	✓	✓
607 Power Clamp meter	✓	✓
MTX3293BT Multimeter	✓	✓
1110 Lightmeter Data Logger		✓
1227 Thermo-Anemometer Data Logger		✓
1246 Thermo-Hygrometer Data Logger		✓
1821 Thermocouple Thermometer Data Logger		✓
1822 Thermocouple Thermometer Data Logger		✓
1823 RTD Thermometer Data Logger		✓



Provides for recording and display of electrical and physical parameters to be stored with thermal images and the ability to dictate information to be stored with the test.

# Model 1954 Thermal Camera

Bluetooth Communication



- Typical data from a thermo-Hygrometer included with the thermogram through a Bluetooth connection

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# Model 1954 Thermal Camera

## Specifications

### MODEL 1950

### MODEL 1954

IR DETECTOR	
Type	UFPA microbolometer
Spectral Range	8 ~14µm
Resolution	80 x 80
	160 x 120
IMAGING PERFORMANCE	
NETD	<80mK @ 86°F (30°C) (0.08 @ 30°C)
Frequency	9Hz
Field of View	20° x 20°
	38° x 28°
I FOV (spatial resolution)	4.4mrad
	4.1mrad
Minimal Focal Distance	1.3 ft (0.4m), fixed focus
	0.3m
FOCUSING	
Adjustment	Fixed
VISUAL IMAGE	
Resolution	320 x 240 pixels
	480 x 640 pixels
Minimal Focal Distance	11.8" (30cm)
PRESENTATION OF IMAGES	
Images Displayed	Infrared image and real image with automatic parallax compensation
LCD Screen	2.8" (71cm)
Image Display	Multiple palettes selectable
FUNCTIONS	
Image Freezing	Animated or fixed image
Storage	Micro SD card
MEASUREMENT	
Temperature Range	-20°C to 250°C
Accuracy	±2°C or ±2% of reading
ANALYSIS FUNCTIONS	
Analysis Tools	Manual cursor, automatic detection, min/max/avg on adjustable area, temperature profile, and isotherm
Adjustment	Automatic or manual adjustment of the minimum/maximum palette
Correction	Emissivity, environmental temperature, distance, relative humidity
Isotherm Display	Color display of a temperature range adjustable by the user
Voice Recording	Yes, via Bluetooth (headset supplied)

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# Model 1954 Thermal Camera

## Specifications

### MODEL 1950

### MODEL 1954

ENVIRONMENTAL SPECIFICATIONS		
Operating Temperature	-4° to 122°F (-15° to 50°C)	
Storage Temperature	-40° to 158°F (-40° to 70°C)	
Humidity	10% to 95%	
Drop Resistance	6' (2m) on all sides	
Impact Resistance	25G	
Vibration Resistance	2G	
Protection	IP54	
GENERAL SPECIFICATIONS		
Safety	EN 61326-1: 2006, EN 61010-1 Ed.2	
Power Supply	4 x AA (1.5V) Alkaline or NiMH rechargeable batteries with charger included	Ni-MH, low discharge, 1.2V, 2500mAh
Laser	-	Class 2
Laser Output	-	< 1mW
Laser Wavelength	-	645-655nm
Software	Automatic report generation in .pdf or .docx (Word) format	
Battery Life	13.30 hrs typical (11 hours minimum)	9 hrs typical (7 hours minimum)
Dimensions/Weight	8.86 x 4.92 x 3.27" (225 x 125 x 83mm) / 25oz (700g) with rechargeable batteries	
Bluetooth Product Communication	407,607 clamps and MTX3293 dmm	407,607 clamps, MTX3293 dmm environmental models 1110, 127, 1246

Languages (camera, software & User Manual): French, English, German, Spanish, Italian, Dutch, Polish, Romanian, Czech, simplified Chinese, Portuguese, Swedish, Finnish.

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# Model 1954 Thermal Camera

- ✓ **Designed and manufactured by Chauvin Arnoux**
- ✓ **Ecologically designed**  
Use of recyclable and reusable materials, reduction in size of PCBs, reduced consumption. Approach formalized by an environmental file (compliance, dismantling datasheet, etc.)
- ✓ **Direct After-sales service, support**



# Model 1954 Thermal Camera

## "Long-lasting and responsive"



**9-hour battery life!!**

*The standard average battery life of the cameras on the market is 3 hours*



**Startup in 3 seconds**

*Unrivalled quick response because your customer's time is important*



# Model 1954 Thermal Camera

## "Communication"



**Intergrate data from 407 / 607 Clamps & 3293-BT Series -BT DMMs, Environmental loggers**  
it is important to correlate the temperature, load-level data and environmental conditions.



**Addition of voice comments (earphone supplied as standard)**

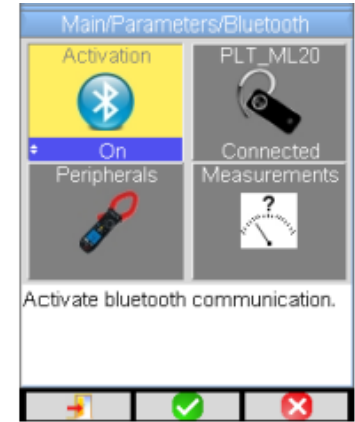
No need for hand written notes :



**Comments & measurements attached to the thermogram. They facilitate post-processing when played back in the software & allow you to add extra data concerning the environment.**



**Equipped with removable SD card**  
Easily transfer data

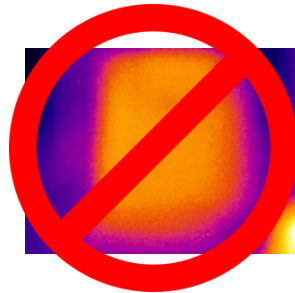


# Model 1954 Thermal Camera

## "User-friendly with unequaled ergonomics"

- ✓ Fixed optic: no more manual focusing: all the objects appear sharp at 40cm or more.

No more unusable, blurred thermograms  
No risk of errors at the metrological level.



- ✓ Balance guaranteed!  
Even when standing on a table, the camera doesn't move.  
Perfect balance: no difficulty stabilizing during use.



# Model 1954 Thermal Camera

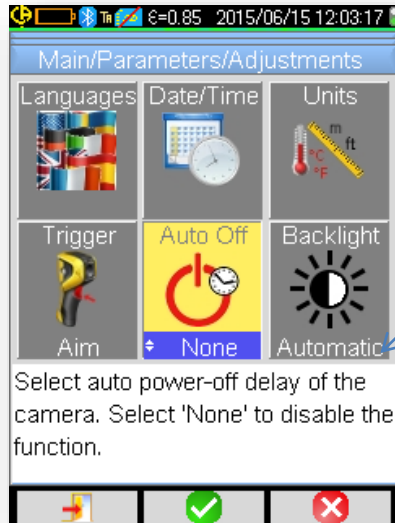
Selling-points

"User-friendly with unrivalled ergonomics"

Focus-free with 38°x28° field of view

Contextual help

Constant help for users without consulting the manual!

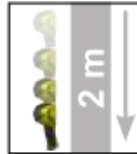


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# Model 1954 Thermal Camera

## "Rugged"



Camera capable of withstanding falls of up to 6 feet (2 m) on all surfaces



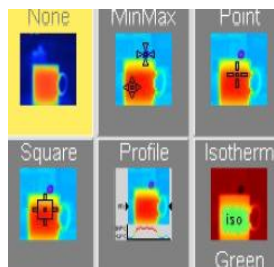
Compact, built-in protective Lens cover  
Convenient to use, no losses,  
no scratches

IP 54 protection



All-terrain camera.  
Worry-free use indoors or outdoors

# Model 1954 Thermal Camera



## "High-performance"

Numerous measurement tools (movable cursor, hot spot, cold spot, isotherm, temperature profile, area)

Thermal and real images (recorded simultaneously)

Auto-merge in the report



Measurement from  $-20^{\circ}\text{C}$  to  $+250^{\circ}\text{C}$

NETD  $<0.1^{\circ}\text{C}$

Accuracy  $\pm 2^{\circ}\text{C}$  or 2%

A comprehensive professional measuring instrument for all applications. Real image: framing / survey of the environment provide additional details. Isotherm linked to a dew-point temperature can be used to reveal areas which may be affected by condensation and or mold. Temperature profile significantly assists inspections and work in relative mode (on a partition or between contacts for example).

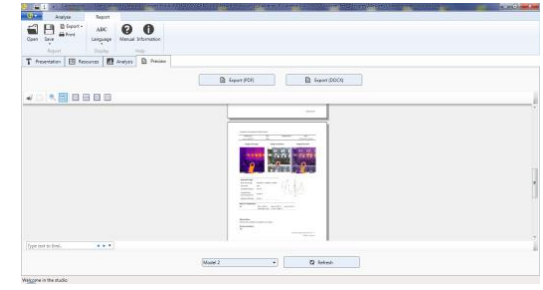
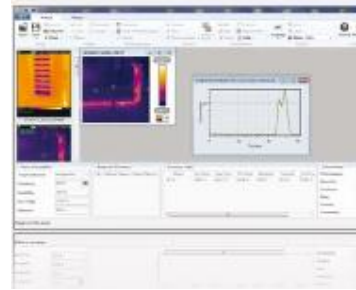
# Model 1954 Thermal Camera

Matériaux	Emissivité
Bois chêne raboté	0.90
Brique rouge	0.93
Brique réfractaire	0.75
Calimine	0.90
Caoutchouc dur	0.95
Chrome poli	0.08-0.36
Cuivre brillant	0.05
Cuivre oxydé	0.60-0.70
Cuivre fortement oxydé	0.78
Cuivre liquide	0.16-0.13
Eau	0.96
Email (blanc)	0.90
Étain fer-blanc commercial	0.07
Étain forte oxydation	0.60
Fer et Acier fortement oxydé	0.88
Graphite (noir de fumée)	0.95
Laiton brillant (polissage extrême)	0.03
Laiton : oxyde de laiton	0.61-0.59

## "Help with post-processing"

### CAMReport software supplied as standard

- + Automatic merging of thermal and real images
- + Emissivity table which can be enhanced by users
- + Automatic report generation and export possible as .docx or pdf



To justify work in-house or on a customer site, a thermography report is essential.

This automatic generation function means you can generate reports quickly and simply.

# Model 1954 Thermal Camera



## "Help with post-processing" (cont'd)

The thermal image is recorded in enhanced .BMP format.

It contains data on emissivity, time/date-stamping and temperature tools

The image can be viewed directly or processed using a standard desktop computer or, on a tablet if the image is transferred via the micro SD card).

Saves time because no format conversion is necessary to display the image.

All of the context and necessary data are present (emissivity, temperature, time/date-stamping and Bluetooth measurements).

# Model 1954 Thermal Camera

The model 1954: delivered in a rugged field case including 4 NiMH batteries, battery charger, 1 micro SD HD card, 1 USB cable, 1 Bluetooth earphone, CAMReport software on CD-ROM, user manuals and test report

Ruggard case for transporting in all conditions.

No extra options needed or hidden costs to take full advantage of the product .

Test report for metrological status.

# Model 1954 Thermal Camera

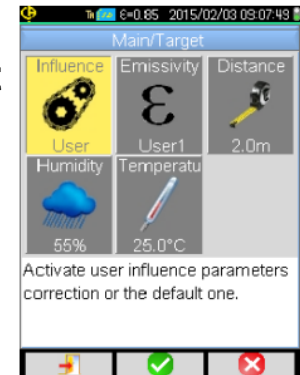
## "The advantages which make the difference"

**Built in brightness sensor for automatic adjustment to suite the environment**

**User modifiable emissivity table**



**User renamable thermogram backup files**



**When you change environments or go outdoors, the brightness increases to adapt to the conditions.**

**The work involves multiple materials, some of which may be specific: no need to remember everything as you can save them on the camera. The images can therefore be saved by site or by part to facilitate post-processing.**

# Model 1954 Thermal Camera

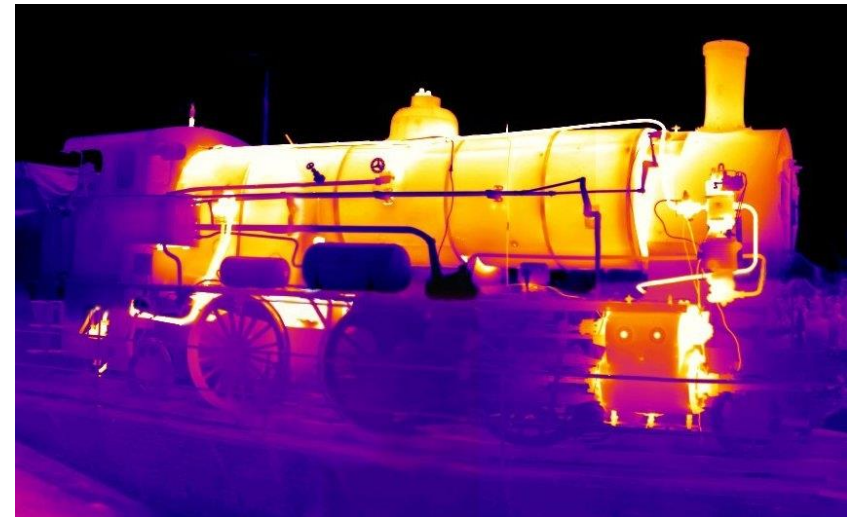
What's Included

- Camera
- Rugged case
- 4 NiMH batteries
- Battery charger
- 1 micro SD HD card
- 1 USB cable
- 1 Bluetooth earphone
- CAmReport software on CD
- Operating manual





# Target Markets & Users



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# Target Markets & Target Users

**Target Markets**

**Building Energy Efficiency**

**Maintenance Industrial Repairs**

**Who?**

**Installers and electrical contractors in the building sector  
Auditors  
General services**

**Maintenance staff  
Technicians / workers on electrical and mechanical installations**

**Why**

**Self-inspection: design assistance  
Renovation assistance, deciding on priorities for action => assistance with selling services  
Savings from checking insulation, tightness, thermal bridges, heating leaks, etc.**

**Affordable equipment with a very quick *payback period*  
Identification before failure / production shutdown / fire**

**Ideal equipment for work after inspections by certification organizations**

# Glossary of Terms

- **Blackbody** - An ideal thermal radiator that absorbs all of the radiation incident thereon, and the radiant emission from which is quantified by Planck's Radiation Law.
- **Emissivity** - At a given wavelength the ratio of infrared energy radiated by an object at a given temperature to that emitted by a blackbody at the same temperature. The emissivity of a blackbody is unity at all wavelengths.
- **Field of View** - The area or solid angle viewed through an optical or infrared instrument. Typically expressed by giving the spot diameter of an instrument and the distance to that spot. Also expressed as the angular size of the spot at the focal point. See Optical or Infrared Resolution.
- **IFOV** - Instantaneous Field of View is the angular resolution of an imaging (Field of View) instrument that is determined by the size of the detector and the lens. For a point instrument the IFOV and FOV are the same.
- **Infrared [IR]** - The infrared spectrum is loosely defined as that portion of the electromagnetic continuum extending from the red visible (0.75  $\mu\text{m}$  to about 1,000  $\mu\text{m}$ ). Because of instrument design considerations and the infrared transmission characteristics of the atmosphere, however, most infrared measurements are made between 0.75 and 20  $\mu\text{m}$ .
- **Isotherm** - A continuous line (not necessarily straight or smooth) on a surface (or chart) comprising points of equal or constant temperature. Displays points that fall in the same temperature range in the same color.

# Glossary of Terms

**Milliradian [MRAD]** - One thousandth of a radian (1 radian =  $180^\circ / \pi$ ); a unit used to express instrument angular field of view; an angle whose tangent is equal to 0.001; 1 mrad = 0.05729578

**MFOV** – Measurement field of view. a.k.a spot size ratio

**N.E.T.D.** - Noise Equivalent Temperature Difference or the change in temperature of a blackbody target that fills the radiometer FOV which results in a change in the radiometer signal equal to the rms noise of the instrument.

**N.U.C.** – Non-uniformity correction. Corrects for internal temperature adjustments

**Thermogram** -a graphic or visual record produced by thermography

**Thermal Radiation** - The mode of heat flow that occurs by emission and absorption of electromagnetic radiation, propagating at the speed of light. Unlike conductive and convective heat flow, it is capable of propagating across a vacuum. The form of heat transfer that allows infrared thermography to work since infrared energy travels from the target to the detector by radiation

Test Equipment Depot - 800.517.8431 - 99 Washington Street Melrose, MA 02176

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