

- THERMAL CAMERA

Model 1950



Statement of Compliance

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments certifies that this instrument has been calibrated using standards and instruments traceable to international standards.

We guarantee that at the time of shipping your instrument has met its published specifications.

An NIST traceable certificate may be requested at the time of purchase, or obtained by returning the instrument to our repair and calibration facility, for a nominal charge.

The recommended calibration interval for this instrument is 12 months and begins on the date of receipt by the customer. For recalibration, please use our calibration services. Refer to our repair and calibration section at www.aemc.com.

Serial #: _____

Catalog #: _____

Model #: _____

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____



Chauvin Arnoux® Inc.
d.b.a. AEMC® Instruments
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INTRODUCTION



Do not aim the camera at the sun or other sources of powerful thermal radiation.

Thank you for purchasing a **Model 1950** thermal camera.

For best results with your camera:

- Read these operating instructions carefully.
- Comply with the precautions for use.

Symbols:

	WARNING: Risk of damage to the instrument.
	Information or useful tip.
	The CE marking indicates compliance with the European "Low Voltage" and "Electromagnetic Compatibility" directives (2006/95/EC and 2004/108/EC).
	In the European Union, this product is subject to selective collection and recycling at end-of-life as waste electrical and electronic equipment under directive 2002/96/EC (WEEE): this equipment must not be treated as ordinary household waste. The spent batteries must not be treated as household waste. Take them to the appropriate collection point for recycling.
	This product is designed to allow recovery and recycling of most of its constituents.

Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

Ordering Information

Thermal Imaging IR Camera Model 1950..... **Cat. #2121.40**
Includes carrying case, external battery charger, USB cable, four NiMh rechargeable batteries, SD card, Bluetooth headset, quick start guide, and a USB thumb drive containing the user manual, analysis software, and software manual.

Replacement Parts:

Case – Carrying Case with Foam Insert..... **Cat. #2121.60**
Adapter – US External Battery Charger **Cat. #2121.64**
Cable – USB (Type A to 5-pin Mini-B)..... **Cat. #2126.49**

1. GETTING STARTED

1.1. Safety Precautions

- **Never aim the camera at the sun or other strong source of thermal radiation.**
Direct exposure to sunlight or other strong thermal radiation can impair camera operation and/or damage its infrared sensor. To avoid accidental exposure, close the lens flap when the camera is not in use.
- **Avoid exposure to dust with the lens flap open.**
Dust on the lens can absorb thermal flux and cause spurious diffusion. It can also degrade image sharpness. To clean the lens, refer to [§ 9.2](#).
- **Do not touch the lens with your fingers.**
Acids from human skin can damage the lens and its coatings.
- **Avoid jolting or dropping the camera.**

1.2. Battery Installation



The camera accepts AA batteries of two types:

- Alkaline
- NiMH rechargeable

The latter must be recharged with an external charger.

When the batteries are removed, the internal clock has enough power for 15 hours. The batteries are inserted through the end of the handle. Open the cover using a coin while pressing down on the locking tab:



1.3. SD Memory Card Installation



Camera files (images, audio, and setup) are stored in the micro SD memory card located on the left side of the head (see photo on left). If this card is not installed, an error message appears when the camera attempts to access it. (This card is provided with the product package.)

Before installation, the memory card must be formatted in one of the following:

- FAT16
- FAT32

To insert the card, open the rubber flap and push the card into its slot. If the card cannot be inserted, ensure that:

- The card is facing in the correct direction
- The card slot is empty

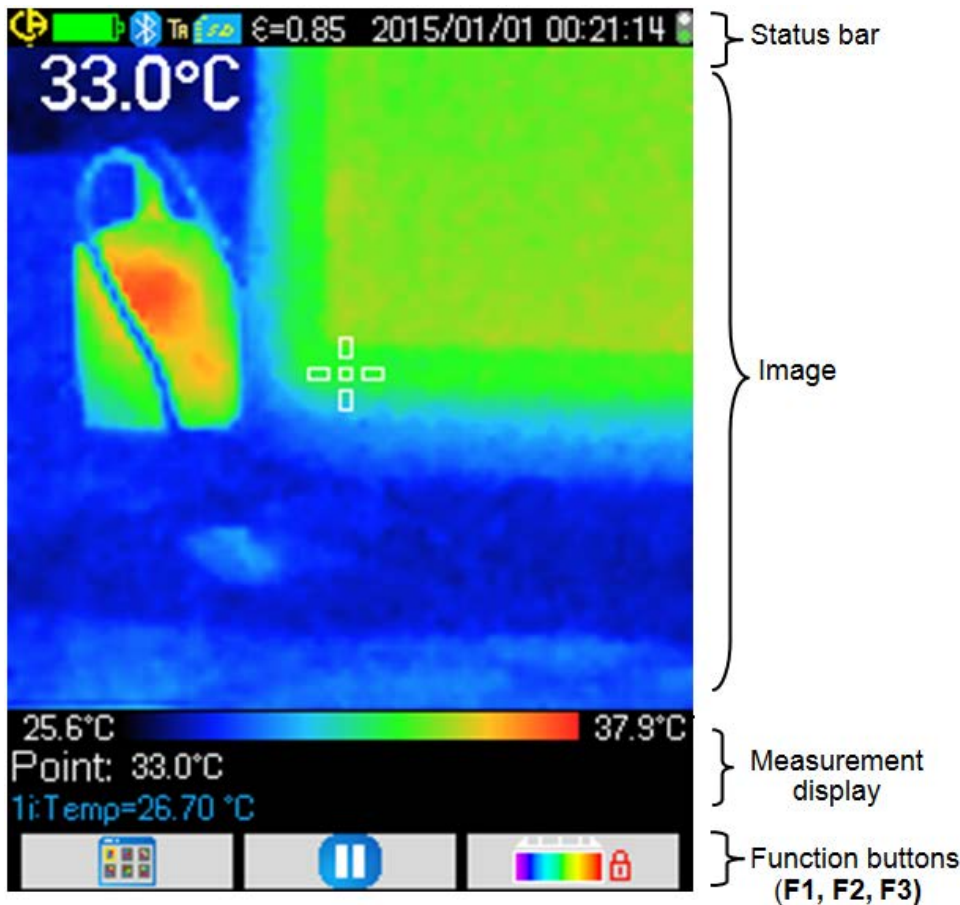
1.4. Camera Display

In normal operation, the camera starts up:

- at the Main screen (see below)
- in continuous acquisition mode
- with the configuration setup loaded when it was last turned OFF





1.4.1. Main Screen





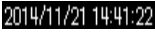


The Main screen is organized as shown below:











1.4.1.1. Status Bar

Normal operation:

Battery (see § 1.4.2)	
no display	(Default Battery Management mode only) Batteries OK
	(Advanced Battery Management mode only) Batteries OK
	(Advanced Battery Management mode only) Batteries low
	Batteries discharged
Bluetooth (§ 6)	
	Bluetooth enabled
no display	Bluetooth disabled
Trigger function (§ 1.5.4)	
TA	Aim
TF	Freeze
TS	Save

SD Card (§ 1.3)	
	Card detected
	Card not detected
Emissivity correction (§ 3.2)	
	User-defined correction in effect
	Default correction in effect
Date/time (§ 1.5.2)	
	Date and time of acquisition of the current image
Acquisition status	
	Continuous acquisition
	Acquisition stopped (image frozen)

When an image is recalled from memory and displayed:

Battery (§ 1.4.2)	
no display (Default Battery Management mode only) Batteries OK	
	(Advanced Battery Management mode only) Batteries OK
	(Advanced Battery Management mode only) Batteries low
	Batteries discharged
Bluetooth (§ 6)	
	Bluetooth enabled
no display Bluetooth disabled	
Trigger function (§ 1.5.4)	
TA	Aim
Image recall (§ 4)	
	IR image recall in progress
	Visible image recall in progress
Emissivity correction (§ 3.2)	
no display User-defined correction in effect	
	Default correction in effect
Image filename (§ 4.1.1)	
	Name of currently displayed image file

1.4.1.2. Image

The central part of the Main screen displays the image. This can be either infrared (thermogram) or visible light.

At the bottom of the image area is the color palette. This identifies the temperatures of colors in the thermogram. By default, temperature/color assignment is performed automatically as a function of the minimum (black) and maximum (red) temperatures detected in the image. In this mode the palette appears as follows:



You can also “freeze” the palette by defining minimum and maximum temperatures (see [§ 2.2](#)). When the palette is frozen, it appears as follows:


















1.4.1.3. Measurements Display

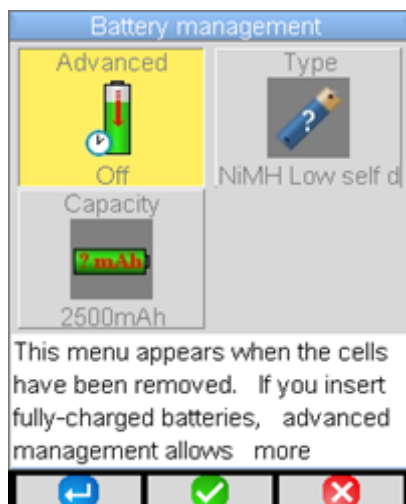
Below the image area the Main screen displays the temperature measurement for the point or region in the image defined by the cursor(s). If there is sufficient space, this area also shows the measurement(s) currently being detected by the peripheral(s) (if any) connected to the camera via Bluetooth (see § 6.3).

1.4.1.4. Function Buttons (F1, F2, and F3)

The camera includes three function buttons, labelled **F1**, **F2**, and **F3**. The functions performed by these buttons depend on the camera mode. The current function for each button is identified by an icon that appears on the display screen just above the button. Several icons represent multiple tasks, depending on mode:


	Opens the Main configuration menu Re-opens the last menu opened
	Closes all open menus
	Selects the highlighted item Closes a message Adds the selected character
	Closes a menu Cancels an entry
	Freezes the image
	Restarts continuous acquisition (unfreezes image)
	Saves the current image
	Validates the entry in the text editor or the selection in the working directory
	Deletes the selected file or folder
	Opens the selected file or folder
	Exits from image recall
	Displays information for the displayed file
	Freezes the color palette
	Edits the minimum or maximum value of the palette Restores automatic mode
	Displays the infrared image
	Displays the visible image
	Plays back the vocal message
	Records a new vocal message
	Stops playing or recording the vocal message
	Searches for new Bluetooth peripherals
	Connects all Bluetooth peripherals in the current list


1.4.2. Battery Management




If the batteries have been replaced, the Battery Management screen appears when the camera starts up. This menu can also be displayed by pressing and holding down the **F2** button when the camera is powered ON.


In battery management mode, the function buttons perform the following:




F1  confirms the information entered, closes the window, and initializes the battery manager with the settings.

F2  edits and confirms entry of the selected item.

F3  cancels an entry or closes the window without resetting the battery manager.

The battery manager can operate in one of two modes:

Advanced Off (Default) is display-only; you cannot change any settings in this mode. In default mode, the battery indicator  only appears when battery power is low. When this indicator appears, the camera will operate for approximately 30 minutes and then shut down automatically.


Advanced On allows more precise tracking of battery energy consumption, including the type of batteries used and their estimated capacity. In Advanced mode, the battery icon indicates how much charge is left in the batteries. Initially this icon is green: . When the remaining charge is low the icon appears yellow: . When 30 minutes of charge remains, the icon appears as it does in Default mode: .



If you consistently use the same set of rechargeable batteries, we recommend operating the camera until it automatically switches off due to low batteries. This automatically recalculates and adjusts the estimated capacity of the batteries. The new capacity is displayed by default the next time the Battery management menu is displayed.

1.5. Configuring the Camera

When the camera is first started up, all parameters are set to their default values. You can modify these settings. The changes can be stored in the camera's memory; these settings will then be used every time the camera is subsequently turned ON. Note that configuration settings can be saved in a Setup file. This file can then be recalled and applied (see [§ 5](#)).


To enter configuration mode, press **F1**  in the Main screen. This displays the Main configuration menu. The Main configuration screen displays six options. Each option displays a submenu:




- **Display** sets options that control how the display of data appears on the camera screen.
- **Files** displays options for storing, recalling, and working with images and other files.
- **Setup** saves and recalls configuration files.
- **Target** sets parameters associated with the camera's target, such as distance and temperature.
- **Parameters** configures camera settings such as language, date/time, and others.
- **About** displays information about the camera.


Use the camera's arrow buttons to navigate through the menu options. Selected options appear highlighted in yellow. (See Appendix A for the camera's complete configuration menu tree.)



In configuration mode, the function buttons perform the following:

F1  closes all open menus without action, and returns to the Main screen.

F2  either:

- opens the corresponding sub-menu
- (for editable settings) modifies the selected parameter

F3  closes the current window without action, and returns to the previous menu or screen.






When an editable parameter is selected, it appears on a blue background with the symbol  to the left. This symbol allows you to view available options, which you can scroll through using the up and down buttons. After you select an option, press **F2**  to accept it.

Note that parameters that cannot be modified appear shaded.

1.5.1. Language








To change the language in which the camera menus appear:



1. In the Main screen, press **F1**  to display the Main configuration menu.
2. Use the arrow buttons to highlight Parameters, and then press **F2**  to display the Parameters menu.
3. Select Adjustments and press **F2**  to display the Adjustments menu (shown on left).
4. Select Languages  to display a list of available languages.
5. Use the up and down buttons to scroll through the available languages. When the desired language is highlighted, press **F2** . All menus will now appear in the selected language.




1.5.2. Date and Time

Accurate date and time data is critical for correct camera operation. For example, by default files stored in the camera are named with date and time information (see [§ 4.1](#)). To set the date and time:

1. In the Main screen, press **F1**  to display the Main configuration menu.
2. Highlight Parameters and then press **F2**  to display the Parameters menu.
3. Select Adjustments and press **F2**  to display the Adjustments menu.
4. Select Date/Time  and press **F2**  to display the Date/Time menu.
5. Use the left and right navigation buttons to select the parameters to modify.
6. To edit a selected setting, press **F2**  and use the up and down buttons to change the setting.
7. Press **F2**  to save the setting.








Note that the Date/Time menu opens automatically at start-up if the power supply of the internal clock has been interrupted.

1.5.3. Units of Measure (Temperature and Distance)

1. Open the Adjustments menu by pressing **F1**  in the Main screen and selecting Parameters > Adjustments.
2. Select  to display the units in which temperature and distance are displayed:
 - Temperature: Fahrenheit (°F) or Celsius (°C)
 - Distance: feet (ft) or meters (m)
3. Select the desired units and press **F2**  to save the settings.




1.5.4. Trigger Function

The camera trigger can be configured to perform different tasks when pressed.

1. Open the Adjustments menu by pressing **F1**  in the Main screen and selecting Parameters > Adjustments.
2. Select **Trigger**  to display the Trigger menu. This lists the following options.
 - **Aim**  configures the trigger to toggle the display from the infrared image to the visible camera image. When this option is selected, the **TA** icon is displayed in the status bar at the top of the screen. When an image is recalled, the trigger is automatically assigned this function. When you exit the recalled image, the user-selected function is restored.
 - **Freeze**  configures the trigger to stop the continuous updating of the display and “freeze” the image. Both the infrared and visible images are frozen; you can toggle between them by pressing **F3**. When this option is selected, the **TF** icon is displayed in the status bar. Pressing the trigger again restarts continuous acquisition.
 - **Save**  configures the trigger to freeze the infrared and visible images, and then record them on the micro SD card (if one is present). When this option is selected, the **TS** icon is displayed in the status bar. Each press results in another save, creating derivative files if image acquisition is not restarted between presses. To restart continuous acquisition, press **F2**  and then press **F2** .




1.5.5. Automatic Camera Shutdown Time

To save battery power, the camera automatically turns OFF after a period of inactivity. The duration of this period can be set to between 15 (default) and 60 minutes. This feature can also be disabled. To change this setting:

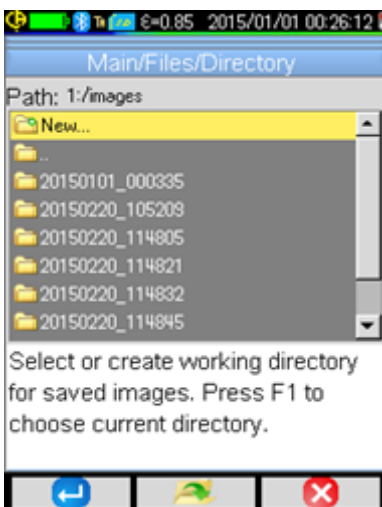
1. Open the Adjustments menu by pressing **F1**  in the Main screen and selecting Parameters > Adjustments.
2. Select  to display the shutdown time setting.
3. Use the up and down buttons to change settings. You can also select None to disable automatic shutdown. When None is selected, the camera turns off only then battery power is too low to continue operation.
4. When the desired setting is displayed, press **F2** .

1.5.6. Screen Brightness

You can adjust the screen brightness level to ensure good visibility in varying lighting conditions. By default, the camera is configured in automatic mode: a luminosity sensor adjusts the lighting level at all times. To change this:

1. Open the Adjustments menu by pressing **F1**  in the Main screen and selecting Parameters > Adjustments.
2. Select  to display the screen brightness setting. Use the up and down buttons to change this setting. Options are Automatic (the camera automatically adjusts the screen brightness), or a percentage of full screen brightness (15%, 25%, 50%, 75%, or 100%).
3. When the desired setting is displayed, press **F2** .






1.5.7. Image Storage Directory






The working directory in which image files are stored must be located on the micro SD card, which must be present in the camera. By default this is "1:/images."

We suggest organizing records into several directories and limiting the number of files in each. This will reduce the time needed to display the content of each directory.

To change the working file storage directory:

1. Press **F1**  in the Main screen and select  to display the Files menu.
2. Select  to display the Directory menu (left).
3. Use the up and down buttons to navigate through the listed folders. To open a folder to browse subfolders, highlight it and press **F2** .
4. You can select an existing folder as the working directory, or create a new one. To create a new folder, open  New. This displays the Create new directory dialog (see below):







5. Select a letter using the arrows, and add it with **F2** . You can also select  to insert the date and time. The name can be up to 20 characters long.
6. When the directory name is complete, save it by pressing **F1** .



We recommend creating a directory in the root of the SD card to store images. For FAT16 formatting, if long names are used, only 256 entries are available in the root (any combination of 256 files and directories). The card will therefore very quickly be considered full, even though its full capacity has not been reached.



1.5.8. Color Palettes

The camera has three palettes of colors for displaying thermograms. To select a new palette:

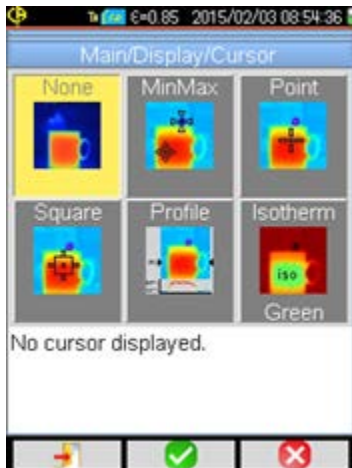
1. Press **F1**  in the Main screen and select  to open the Display menu.
2. Select  to display a list of available palettes. Choices are Grayscale (black through white), Rainbow (full-color spectrum), and Steel (black-purple-yellow-white).
3. Select the desired palette and save it by pressing **F2** .

2. BASIC OPERATION





To display a thermal image (thermogram), ensure the camera's lens flap is in the up position, exposing the IR lens. Then turn ON the camera and point it at the target object. The thermogram appears in the camera's main screen (see § 1.4.1).

When default settings are in effect, to stop data acquisition and freeze the image on the display, press **F2** . When the image is frozen, the **F2** button function becomes . Press this button to unfreeze the image and resume data acquisition.


2.1. Measurement Cursor



Below the image is the Measurements area of the display (see § 1.4.1.3). The displayed measurement data depends on the measurement cursor setting. By default, no measurement cursor is selected, resulting in no measurement data displayed in the screen. To change the cursor setting:

1. Press **F1**  in the Main screen and select  to open the Display menu.
2. Select  to display the Cursor menu (left).
3. Select the desired cursor type. The following sections describe what measurement data is displayed when each type of cursor is selected.
4. Save the cursor setting by pressing **F2** .

2.1.1. No Measurement Cursor

By default, no measurement cursor is selected (the  icon in the Cursor menu is highlighted). Note that even with no displayed measurements, you can still estimate temperature from the color palette. The color distribution between minimum and maximum palette temperatures is linear, so simply interpolating based on the position of the color in the palette provides an estimated temperature.

For example, to estimate the temperature at a specific point in the thermogram, find the location of its color in the palette. If the color appears to be in the center of the palette, the temperature is approximately:

$$T_{\min} + (T_{\max} - T_{\min}) * \frac{1}{2}$$

or

$$(T_{\min} + T_{\max}) / 2$$


...in other words the mean of the minimum and maximum temperatures of the palette.

If the color lies in the 1st quartile:


$$T_{\min} + (T_{\max} - T_{\min}) / 4$$

...and so on.


2.1.2. MinMax

The **MinMax**  cursor option displays two cursors on the screen. One shows the location of the warmest spot on the image, the other shows the coldest spot. These minimum and maximum temperatures are also displayed in the Measurements area of the screen.


2.1.3. Point

The **Point**  cursor option displays a single cursor along with the temperature at the current cursor location. You can move the cursor with the directional buttons to display the temperature at different points in the thermogram.


2.1.4. Square


The **Square**  cursor option displays a square on the screen, with the maximum and minimum temperatures detected within the square also displayed. Use the directional buttons to move the square on the screen. You can also resize the square by pressing the up and left buttons simultaneously to reduce the size, or down and right to increase the size.

2.1.5. Profile

The **Profile**  cursor option displays the temperature profile of the horizontal line defined by the cursor on the screen. The profile is displayed as a graph in the lower part of the screen. This cursor also identifies a point on this line and indicates its temperature.

2.1.6. Isotherm

The **Isotherm**  cursor option displays points that fall within the same temperature range in the same color. When you choose this icon, you are prompted to choose the color (green, red, or brown) to display the points.

After you press **F2**  to save the color selection, the screen displays the thermogram. You are then prompted to enter the reference temperature (via the up and down buttons) and tolerance size (via the left and right buttons). Both the reference temperature and the temperature range (defined as \pm the tolerance setting) are displayed at the bottom of the screen. In addition, the palette graphically displays the temperature range. All points in the image whose temperature falls within this defined range will be displayed in the selected color.


2.2. Freezing Palette Colors

By default, thermogram colors are recalculated for each image, based on the warmest and coldest spots in the image, and assigned accordingly. As a result, the same color may not represent the same temperature in different images.



You can “freeze” the palette to ensure each color represents the same temperature in all images. When the palette is frozen, a red padlock appears on the palette. The minimum and maximum values are also displayed in red.

To enter frozen palette mode, do either of the following:




- Press **F3** when its function is displayed as .
- Press **F1**  in the Main screen and select Parameters. Then select the  icon and choose the option Manual.

When you enter frozen palette mode, the minimum temperature setting on the left end of the palette enters edit mode for a few seconds (highlighted in blue with the  symbol) so you can modify this setting via the up and down buttons.

To modify the maximum temperature setting, press the right button when the minimum setting is in edit mode. This highlights the maximum value, which remains in edit mode for several seconds. Use the up and down buttons to change the value. If there is no action on the keypad for a few seconds, edit mode terminates.

To change the minimum or maximum palette temperature value, pressing **F3** with the  icon displayed (or selecting  in the Parameters menu) returns the minimum value to edit mode.

To exit frozen palette mode, do one of the following:

- Not in edit mode: press **F3** twice while the  icon is displayed.
- Edit mode: Press **F3** once while the  icon is displayed.
- Open the Parameters menu and select . Then select Automatic.

3. ADVANCED OPERATION

3.1. Best Practices

- Make the measurement in the central zone of the screen.
- Aim straight on, not at an angle.
- Measure targets that are as large as possible. Avoid point-like targets.
- If the ambient temperature changes significantly, allow the camera to stabilize.
- If batteries have warmed up during charging, wait for them to cool down to ambient before putting them back in the camera.

3.2. Compensating for Environmental Factors

The flux received by the camera can be influenced by:

- **emissivity** of the target object
- **temperature** of the environment
- **distance** to the target
- **relative humidity** of the air

Emissivity is the most crucial factor. This defines the efficiency with which a material radiates infrared energy. Different materials have different emissivity values. A perfect “blackbody” has an emissivity of 1.00 (the theoretical maximum), while a material that emits no infrared energy has an emissivity of 0.00.

The higher the relative humidity and the greater the distance, the larger the relative humidity influence is.

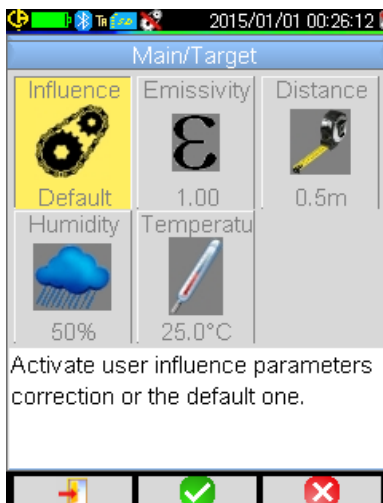
The relative humidity, ambient temperature, and distance are likely to vary more significantly outdoors.



The camera default settings may not be suitable for the present environmental factors, resulting in significant measurement errors. In these situations, we recommend adjusting the camera settings that compensate for these factors. These are set through the Target menu (see below).




Incorrect settings can produce inaccurate results that may be less reliable than using default settings.

3.2.1. Default Compensation Settings



Compensation settings are managed through the Target menu. To display this menu, press **F1**  in the Main screen and select Target .

The Target menu (left) lists default compensation settings for target emissivity and distance, as well as for ambient humidity and temperature.

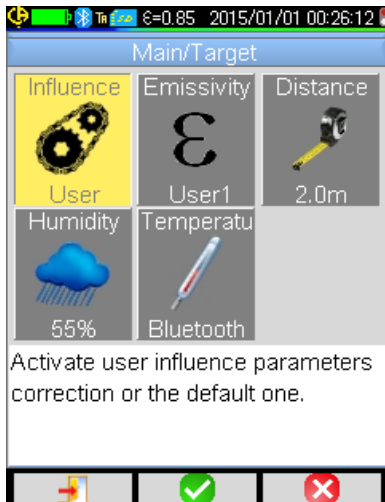
If the distance and emissivity of the object being observed and current environmental factors closely match these settings, the parameters cannot be customized and appear shaded in the Target menu. Also, the emissivity correction setting in the status bar appears as . In this situation, the default compensation settings are used for all calculations performed by the camera.

You can use default settings for applications where high precision measurements are not required, such as detecting a thermal bridge or temperature difference.

3.2.2. Custom Compensation Settings

Environmental settings should be adjusted from their defaults when:

- Environmental conditions are significantly different from default settings for emissivity and relative humidity
- High measurement accuracy is required



To change these settings, select Influence in the Target menu and then press **F2** . Then use the up or down button to change the setting to User. This enables you to change the following parameters:

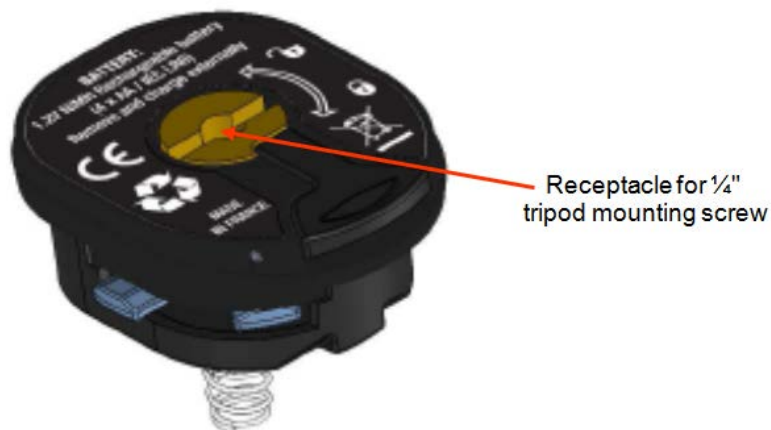
- **Emissivity:** Choose from a list of materials or enter a value. You can modify three “user” values by pressing the right button to enter the value, the up/down buttons to change it, and **F2** to save. After you save the emissivity value, it appears in the status bar. Allowable emissivity values are 1.00 to 0.05.
- **Distance** can be set from 0.5 to 999.9m (1.6 to 3280'). Default is 2m (6.6').
- **Humidity** can be set from 0 to 100%. Default is 55%.
- **Temperature** can be set from -15° to +55°C (5° to +132°F). Default is 25°C (77°F).

Note that you can also use measurement data provided by peripherals to compensate for environmental factors. This requires connecting the peripherals to the camera via Bluetooth. For information about connecting a peripheral and using its measurement data for environmental compensation, see [§ 6.3](#).

3.3. Tripod

The camera can be mounted on a tripod equipped with a standard ¼-inch mounting head. This provides more stability than can usually be achieved via hand-held photography.

Attach the camera to the tripod by screwing the tripod mounting screw into the threaded receptacle in the battery compartment cover on the base of the camera handle (see below).



4. SAVING AND RECALLING IMAGES

When the micro SD memory card is inserted into the camera, you can store and later recall the current image and displayed measurements.

4.1. Image Files

4.1.1. Naming Conventions

The camera has two objective lenses, one for infrared images and the other for visible light images. When an image is saved, two files are created. The infrared image is saved using the filename convention:

yyyymmdd_hhmmss_IR.BMP

...where “yyyymmdd_hhmmss” is the date and time the image was acquired. The visible image is saved using the same naming convention, but without the “IR” designation. This naming convention requires accurate date/time settings (see [§ 1.5.2](#)).

An audio file can also be included with the two images. This allows you to record a description and other information relevant to the images. This requires a Bluetooth headset to be connected to the camera (see [§ 6.2](#)). This file is given the same name as the associated IR image, with the extension .WAV instead of .BMP (for example yyyymmdd_hhmmss_IR.WAV).

After you save an image, you can create copies of it by:

- Saving the same frozen image multiple times
- Recalling the original saved image from the camera’s memory and saving it again ([§ 4.4.1](#))

These copies are called “derived” images. To differentiate derived image files (which all have the same date of acquisition) an index letter is added after the date (for instance 20141020_131254a_IR.BMP). When all letters from “a” to “z” have been used, the letter “z” is re-used and the existing file with this name is overwritten.






When erasing visible images other than via the camera's file manager, take care not to create “orphan” IR images.

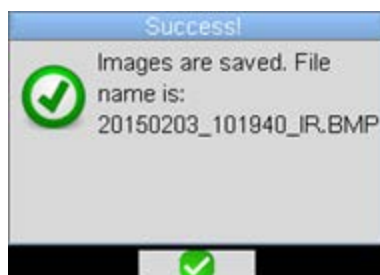
4.1.2. Directories

Image files are saved in the working directory defined in the Directory menu (see [§ 1.5.7](#)). The working directory must be located in the micro SD card installed in the camera. If the card is missing, an error message appears when you attempt to save an image.

4.2. Saving an Image

You can save an image when a micro SD memory card is inserted into the camera. To save a new image file:

- If the trigger function setting is Aim or Freeze (see [§ 1.5.4](#)), you must first stop acquisition. If trigger function = Aim, press **F2**  to freeze the image and then press **F3** . If trigger function = Freeze, press the trigger and then press **F2** . In either case the current image is saved in the working directory.
- If the trigger function is set to Save, each press freezes the image (if it is not already frozen) and saves it in memory.



When the file has been saved to the SD card, a message displays the name of the file that has just been created (see the example on left).

If acquisition is stopped, each additional press of the trigger creates a new “derived” image (same date of acquisition), differentiated by an index letter added to its name (see [§ 4.1](#)).

In addition, you can create a new derived image from a recalled image, as explained in [§ 4.4.1](#).

Depending on the situation, 1, 2, or 3 files are saved:

1 file is created when you save a derived image with no headset connected. The visible image associated with the derived image already exists, so only an IR file is created.

2 files are created when saving:

- An original file with no headset attached (the IR image and its visible image).
- A derived image with a headset attached, and you create a voice recording ([§ 4.3](#)) for the derived image.

3 files are created when you save a new image with the headset attached, and you create a voice recording (IR image, visible image, and voice).


4.3. Voice Recording

4.3.1. Creating a Voice Recording







You can create a voice recording to be associated with the image. This requires a Bluetooth headset to be connected to the camera (see [§ 6.2.1](#)). The recording can be up to 30 seconds long.

The voice recording can be added only after you have created the image file. After the message appears displaying the name of the new file, if the headset is connected another message prompts you to record a voice message (left).

Press **F2**  to display the Record vocal screen.





In the Record vocal screen, **F1**, **F2**, and **F3** perform the following functions:

-  start recording (or adding another message)
-  stop recording or playback
-  play back the message
-  close the window (without creating a file if the button is pressed before or during the recording)

4.3.2. Changing the Voice Recording for an Existing Image

The only way to change a voice recording for an existing image is to create a new image file, add a new voice recording, and delete the old image file. To do this, ensure the headset is connected to the camera. Then proceed as follows:




1. Recall the image (see [§ 4.4](#)).
2. Press **F1**  to display the Recall menu (left).
3. Select **Save**  in the Recall menu. A new derived image (with a new index letter) is created (see [§ 4.4.1](#)).
4. After you confirm the save, a message prompts you to create an associated voice recording.
5. Create the new recording.
6. Delete the original image (see [§ 4.5](#)).



4.3.3. Playing Back a Voice Recording



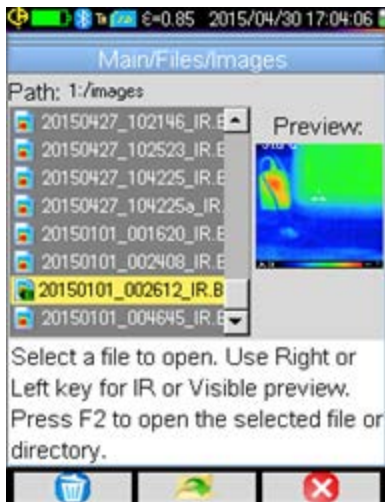
A voice recording is played back using the Bluetooth headset, which must be connected to the camera (see § 6.2.1).

To play back the recording associated with an image, the image must be recalled (see § 4.4). Then press **F3**  to open the About file... window (shown on the left).




The **F2** button then performs the following functions:

-  play back the recording
-  stop play back



4.4. Recalling an Image






To recall a stored image, ensure the SD card is installed in the camera. Then do the following:

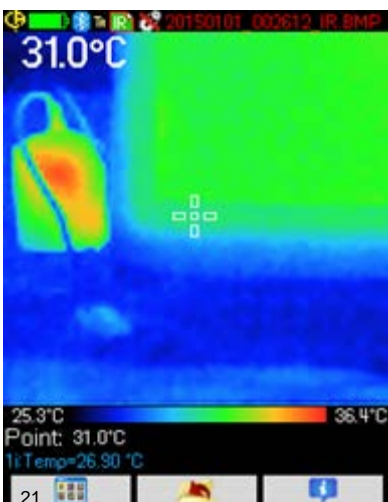
1. Open the Files menu by pressing **F1**  in the Main screen and selecting .
2. Select  to open the Images menu (left). This menu lists infrared images generated by the camera bearing a name in the form `yyyymmdd_hhmmssX_IR.BMP`. The menu also lists folders to allow browsing the SD card directory tree.


A preview of the selected image appears to the right of the file list.

Images with an associated voice recording are identified by the  icon. Other images are identified by the  icon.

In the Images menu **F1**, **F2**, and **F3** function as follows:

F1 	Deletes the selected file or directory. Note that only empty directories can be deleted.
F2 	Recalls the selected file. Opens the selected directory.
F3 	Closes the Images menu.




To recall the selected file, press **F2** . This closes the Images menu and displays the image on the screen (see example on left).

The status bar changes (see § 1.4.1.1) and includes the image file name, which appears in red.

When viewing a recalled image, pressing the trigger toggles between the IR and visible light versions of the image.




Pressing  when viewing a recalled image displays the Recall menu (left). This presents six options:

- **Cursor** displays the Cursor menu for selecting the cursor function ([§ 2.1](#)).
- **Palette** displays a menu of available color palettes ([§ 1.5.8](#)).
- **Show** toggles between the IR image and visible light image.
- **Save** creates a derived image (see below).
- **Target** displays the Target menu ([§ 3.2](#)).
- **BT measurements** displays the measurements associated with this image from connected Bluetooth devices (if any) ([§ 6](#)).

4.4.1 Derived Files from Recalled Images

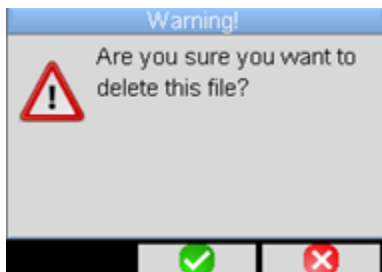
You can change the settings for a recalled image (such as cursor function and palette) that affect how the image is displayed. You can then save this as a “derived” image, without changing the original. You can also create derived images by saving the same frozen image multiple times.


To create a new derived image from a recalled image, select  in the Recall menu. The image will be saved with a new filename consisting of the recalled image filename with a letter appended to the end (see [§ 4.1.1](#)).

Note that a visible image is not created for the derived file, since the visible image associated with the original file also applies to the derived file.

If a Bluetooth headset is connected (see [§ 6.2.1](#)), after you confirm the save a second message prompts you to add a voice recording to this file ([§ 4.3.1](#)).

4.5. Deleting an Image



To delete an image, select it in the Images menu and press **F1** .

A message appears (left) asking you to confirm the deletion.

This action deletes the:

- selected IR file
- associated audio file (if any)
- visible light image (if there are no more IR images associated with it)

4.6. Downloading an Image to a Computer

Saved images stored in the camera’s micro SD memory card can be downloaded to a computer.



An image that is modified and/or renamed on the computer may become unusable on the camera due to:

- Part of the information contained in the image may disappear.
- The camera file manager cannot recognize the file as an image.

4.6.1. Downloading Directly from the Micro SD Memory Card

The micro SD memory card can be removed from the camera and inserted into a computer equipped with a micro SD card reader. The image files can then be copied from the SD card directory and pasted into one or more other directories on the computer.

4.6.2. Via USB Cable

1. Connect one end of a USB cable to the camera and the other to a computer. The USB slot on the camera is next to the SD card slot.
2. If this is the first time you have connected the camera to the computer, wait until the drivers load (a message appears on the screen informing you when the drivers are loaded).
3. Turn ON the camera.
4. The camera should now be listed among the computer's drives. Copy the image file(s) you want to store on the computer, and paste them into the appropriate folder(s) on the computer.

Note the following:

- If the Images menu on the camera is open and the computer modifies the content of the SD card, the Images menu must be re-opened so that it can apply the modifications.
- Conversely, any modifications done on the camera requires disconnection/reconnection of the USB cable to force an update on the computer.

4.7. CAmReport Image Analysis and Report Generation

The camera comes with the free **CAmReport** analysis software. This enables you to perform post-processing and data analysis on images taken with the camera and downloaded to the computer. The application also lets you create reports from the downloaded data.

For instructions about how to use CAmReport, consult its separate User Manual.

5. SETUP FILES

Camera configuration settings ([§ 1.5](#)) can be saved to a setup file. The file can later be opened and its settings used to configure the camera. This enables you to create and re-use custom configurations, for example for specific targets and environments.

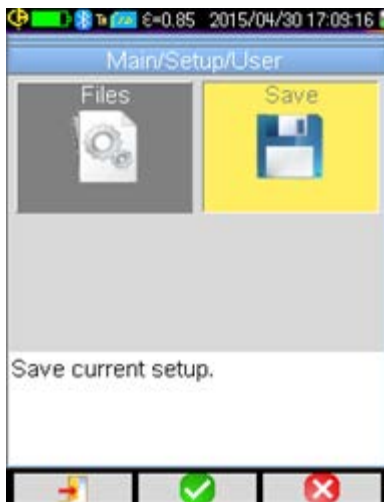
You can also reset the camera to its original “factory” configuration settings.








In addition to configuration settings, a setup file also stores the list of connected Bluetooth peripherals, along with their status information.

5.1. Creating a Setup File

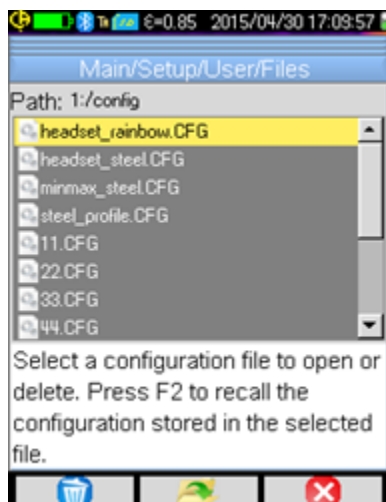
As with image files, the setup files are saved in the micro SD card. Setup files are stored in a single directory named "1:/config/" in the root of the memory card.

You must name each setup file when you create it. All setup filenames include the extension .CFG.





1. Press **F1**  in the Main screen to display the Main configuration menu.
2. Select  to open the Setup menu.
3. Select  to open the User menu (left).
4. Select . When you press **F2**  a full “qwerty” style keypad appears on the screen
5. Use the directional buttons to navigate to the first character in the filename, and press **F2**  to save the character.
6. Enter the remaining characters in the filename as described above. Do not include the .CFG extension; this is added automatically.
7. When you have finished entering characters, press **F1**  to save the filename. A message appears informing you that the file has been successfully saved.
8. The file will now be listed when you open the Main/Setup/User menu and select Files.


5.2. Recalling a Setup File



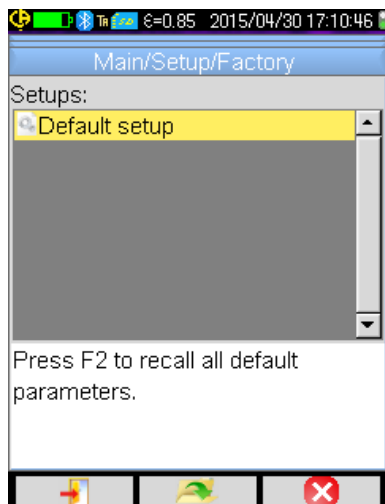
To recall a saved setup file:

1. Open the User menu and select Files . This displays a list of all configuration files (extension .CFG) in directory 1:/config/ (left).
2. Use the up and down buttons to navigate to the desired file.
3. Press **F2**  to reset all camera parameters to the settings contained in the selected setup file.




5.3. Deleting a Setup File

To delete a setup file, select it in the Files menu. Use the up and down buttons to navigate to the desired file. Then press **F1** . A message appears asking you to confirm the deletion.

5.4. Restoring Original Default Settings



You can at any time restore the camera to its original default factory settings. To do this:

1. Open the Setup menu, select Factory , and then press **F2** .
2. Select the default setup file by pressing **F2** .
3. All camera configuration parameters are reset to their original default settings.

6. BLUETOOTH









6.1. Bluetooth Activation/Deactivation

The camera uses Bluetooth to wirelessly communicate with the headset and measurement instrument peripherals.

6.1.1. Activating Bluetooth




By default, Bluetooth is disabled on the camera to prolong battery life. To activate Bluetooth:

1. In the Main screen, press **F1**  to display the Main configuration menu.
2. Highlight Parameters and then press **F2**  to display the Parameters menu.
3. Select  and then press **F2**  to display the Bluetooth menu (left).
4. Select  and then press **F2** . Then use the up and down buttons to turn Activation to On.
5. Press **F2**  to save the setting. The Bluetooth icon  appears in the status bar at the top of the screen (see [§ 1.4.1.1](#)).

If measurement peripherals or a headset have already been identified during a previous Bluetooth activation, the camera attempts to reconnect to them during this activation. This automatic reconnection sometimes fails; you must then restart the peripheral(s) as described later in this chapter.

6.1.2. Deactivating Bluetooth

To deactivate Bluetooth, open the Bluetooth menu, select , and change its setting to Off. All communicating peripherals are then disconnected. Their identification data is stored in memory, and upon the next activation the camera will attempt to reconnect them.

6.2. Headset

The camera comes with a headset for creating and/or playing back voice recordings. Note that the camera can only connect to one headset at a time.

6.2.1. Headset Connection





To connect a headset, Bluetooth must be activated on the camera (see above). The procedure for connecting a Bluetooth headset differs depending whether or not the headset is a known peripheral that has already been connected to the camera.

6.2.1.1. First Time Connection


When connecting for the first time, the headset is not yet “known” to the camera. It must therefore provide the camera the information necessary for connection.



To do this, the headset must be started in the coupling or pairing mode. (See the separate headset data sheet for information on how to select this mode.) Then do the following:


1. Open the Bluetooth menu, select Headset , and Press **F2** .
2. Use the up and down buttons to change the setting to New (if it is not already displayed).
3. Press **F2** . The pairing starts; after a few seconds, the connection is made.
4. The  icon changes; the name of the headset is displayed and its setting becomes Connected.

6.2.1.2. Headset is a Known Peripheral

If the headset is known, there is no need for pairing; simply power up the headset. Then open the Bluetooth menu, select , and select Connect. The headset should connect after a few seconds (the icon status is displayed as Connected).

If connection fails, switch the headset off and back on and repeat the operation.



If the name of the headset does not appear in the title of the  icon, pairing has failed and you must try again.

6.2.2. Changing Headsets

To change headsets, switch OFF the currently connected headset. Then connect the new headset as an unknown peripheral, as instructed in [§ 6.2.1](#).

6.2.3. Headset Disconnection

The procedure for disconnecting a headset depends on whether or not other Bluetooth peripherals are connected to the camera:

- **Measurement peripherals are connected to your camera and you want to leave them connected.**
The simplest solution is to switch off the headset. You can also disconnect it via the Bluetooth menu by changing the status to Disconnect.
- **No other peripheral is connected to your camera.** We recommend deactivating Bluetooth as explained in [§ 6.1.2](#). Deactivating Bluetooth significantly reduces energy consumption and prolongs battery charge.

6.3. Measurement Peripherals

In addition to the headset, you can connect up to three AEMC measurement peripherals to the camera via Bluetooth. The following AEMC peripherals are supported:

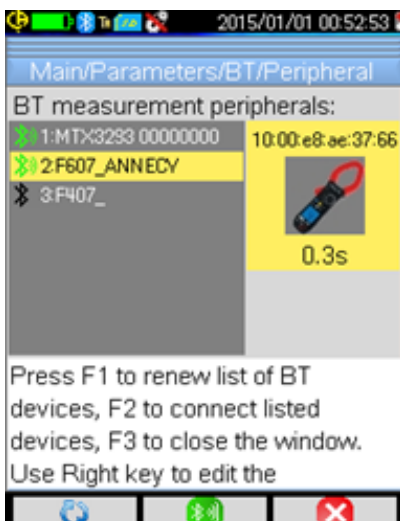
- Multimeter Model MTX 3292/3293 BT (1 measurement read)
- Current Clamp Model 607 (3 measurements read)
- Current Clamp Model 407 (3 measurements read)







Measurement data from connected peripherals can be displayed on the screen, and saved along with the image. They can be viewed when the image file is recalled (see [§ 4.4](#)). Measurement data can also be used to compensate for environmental factors.

To maintain consistency between the Bluetooth measurements and the displayed image, measurements are refreshed continuously during image acquisition. The refresh frequency is defined by the measurement polling period setting. When you freeze the image, displayed measurements also freeze.

6.3.1. Peripheral Connection




To connect a measurement peripheral, it must be powered ON with Bluetooth enabled. Bluetooth must also be enabled on the camera ([§ 6.1.1](#)). Then do the following:



1. In the Bluetooth menu, select Peripherals  to display the Peripheral screen (left).
2. The Peripheral screen lists all previously and currently connected peripherals (if any). Connected peripherals are identified by the  and disconnected peripherals are preceded by . The new peripheral should appear with the  icon next to its name. To refresh this list, press **F1**  (and then **F2**  to confirm) to search for available Bluetooth devices.
3. The highlighted peripheral's information appears to the right of the list. This includes the peripheral's:
 - Icon identifying instrument type
 - Bluetooth address
 - Polling period

Use the up and down buttons to select the desired peripheral.


F1, F2, and F3 in this screen function as follows:

F1 	Search for Bluetooth peripherals. Peripherals already connected remain on the list. Those having the highest signal levels are added and connected until the three connected peripherals maximum is reached.
F2 	Reconnect all peripherals in the list.
F3 	Close the Peripheral screen.





If the screen is frozen when you connect a peripheral, measurements from the peripheral will not appear in the Measurements screen until you unfreeze the image and start the next image acquisition.

6.3.2. Replacing Peripherals

1. Disconnect the peripheral to be removed by turning it OFF.
2. Wait until the disconnection takes effect on the camera (a message appears informing you of this).
3. Turn ON the new peripheral to be connected.
4. With the peripherals screen displayed, start a new search by pressing **F1** . This overwrites the current list (currently connected peripherals remain). The new peripheral should be included in this list.

6.3.3. Peripheral Polling Period

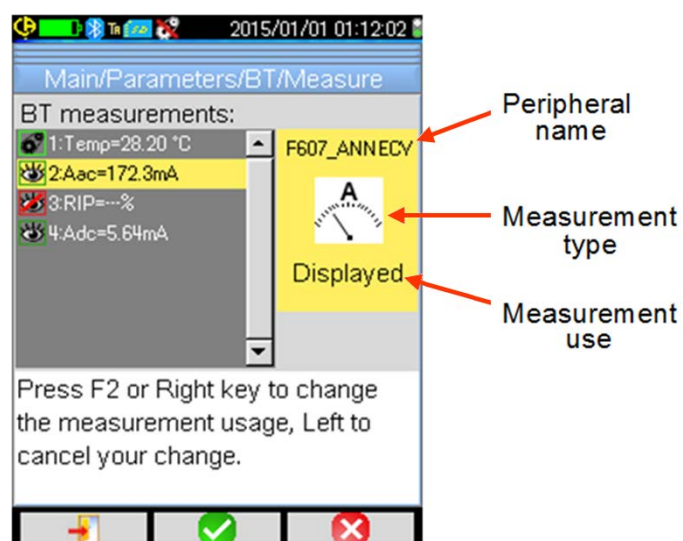
The polling period (see above) defines the frequency with which the camera “polls” the peripheral for the latest measurement data. To change this:

1. In the Peripherals screen, select the peripheral in the list and press the right button. The polling period is highlighted in blue, with the symbol  indicating that it can be changed.
2. Use the up and down buttons to select a new polling period. Options range from 0.3s up to 50 minutes.
3. When the desired polling period is highlighted, press **F2**  to save.

6.3.4. Peripheral Measurements Display

You can view measurement data from connected peripherals. To do this, open the Bluetooth menu and select

Measurements . This displays the Measurements menu.



This menu displays measurements received from the connected peripherals during the last acquisition.



If no measurement is listed, ensure the measurement setting on the peripheral is set to a measurement type supported by the camera (see the table below). If the measurement still does not appear, change the setting on the peripheral and then change it back to the desired setting to reset the measurement type.

When a measurement is selected via the up and down buttons, the image identifies the:

- **Bluetooth name** of peripheral that made the measurement.
- **Measurement type.** This is defined by the measurement setting on the peripheral; the camera automatically reads and displays this setting. Options are listed in the table below. In the preceding illustration, measurement type is set to current (A).

	temperature		impedance (ohms)
	current		capacitance (farads)
	power (watts)		relative humidity (%)
	voltage		target distance
	frequency (hertz)		other measurement

- **Measurement use.** Options are **Hidden** (the measurement does not appear among other measurements displayed at the bottom of the Main screen), **Displayed** (the measurement is added to the list of measurements displayed at the bottom of the main screen), and **Influence** (the measurement is added to the list of measurements displayed at the bottom of the main screen and is used in the compensation for environmental factors, as explained in § 6.3.5). In the list of measurements, use is represented by the following icons: Hidden: , Displayed: , Influence:

If a measurement is assigned the use Displayed or Influence it will appear in blue on the last line of the measurement zone of the screen (unless the profile cursor is activated, which limits screen space).



If the number of measurements is too large, some may not be visible in continuous acquisition. However, if the image is frozen, all measurements associated with the image are displayed.

Each measurement's number is displayed as it appears in the Measurements menu, followed by:

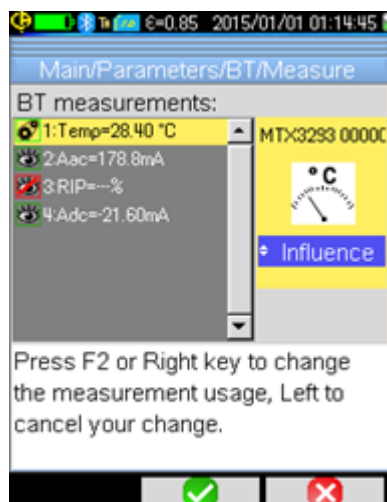
- "i" (if the measurement is used as an influence)
- ":" separator
- name of the measurement
- value

Measurements are separated by two spaces.

If you change a peripheral configuration setting, all measurements from this peripheral are changed to type Hidden . You must open the Measurements menu and change the measurement type to resume display of the peripheral's measurements.

6.3.5. Using a Measurement to Compensate for Environmental Factors

As explained in § 3.2, three environmental factors can influence the accuracy of thermograms: ambient temperature, the distance to the target, and the ambient relative humidity. If not compensated for, these factors can introduce inaccuracies into the camera's measurements.

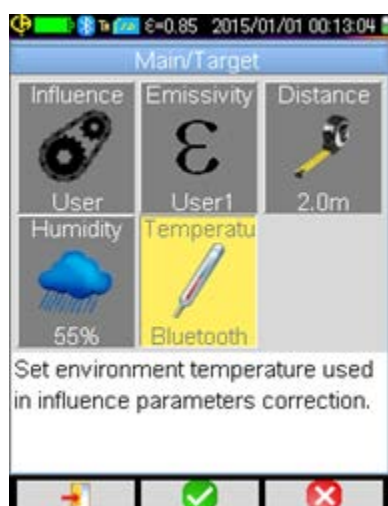


You can use a measurement from a connected peripheral as an “influence” to compensate for an environmental factor. The measurement will be used to calculate the amount of correction that needs to be applied. Note that this option is available only for temperature, humidity, and distance measurements.

For the measurement to be used as a compensation factor:

1. Select the measurement in the Measurements menu.
2. If the measurement is of temperature, humidity, or distance, you can select the option Influence by pressing the right button. (For other types of measurements, this option is not available.)
3. Press **F2** to save.

Only one measurement per type can be selected as an influence. If a measurement of the same type is already assigned this option, its use is changed to Displayed and the new measurement becomes Influence.



The measurements replace the user data entered in the Target menu (left), provided that the Influence setting is User (see [§ 3.2.2](#)).

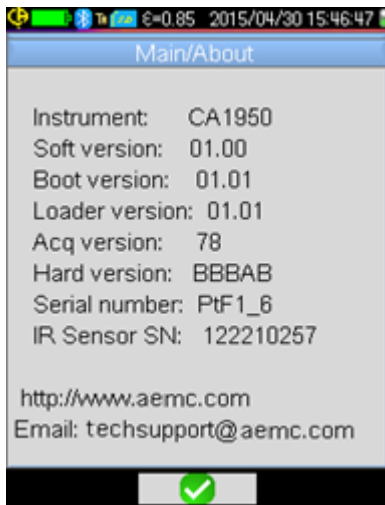
If a Bluetooth measurement is used as an influence, the corresponding influence value in the Target menu displays the value "Bluetooth."


The value actually applied is displayed on the main screen, in the list of Bluetooth measurements (with the index letter "i" after the measurement number).



Ensure all measurements designated as “Influence” are consistent with the uses to which they will be applied.

7. FIRMWARE UPDATES



To view the current version of the camera's firmware, select **About**  from the Main configuration menu. This displays information about the camera (see example on left). The version number appears on the "Soft version:" line.

To check whether a more recent version of the camera firmware is available, go to the AEMC web site at <http://www.aemc.com> and open the Software and Firmware Updates link. This lists products for which firmware is available, including the camera.

If the version listed in the web site is more recent than the version in the camera, download and install it per the instructions in the AEMC site.

8. TROUBLESHOOTING

8.1. IR Image is a Single Solid Color

8.1.1. Color Palette Frozen

Ensure the low and high temperature limits of your palette are consistent with the temperature range in your environment. To check this, unlock the palette (see [§ 2.2](#)).

8.1.2. Inconsistent "User" Influencing Parameters

An incorrect emissivity value can result in measurement errors. Check the influencing parameters in the Target menu (see [§ 3.2](#)). If you question any of the settings, restore the default parameters (see [§ 3.2.1](#)).

8.2. Contrast of IR Image is Incorrect

- Ensure that Isotherm measurement is not activated (see [§ 2.1.6](#)).
- If the palette is frozen, ensure that the low and high temperature limits are consistent with the temperature range in your environment. To check this, unlock the palette (see [§ 2.2](#)).
- If the temperature range of the image is very large (hot and cold points are very far apart), so the linear distribution of the colors between the minimum and maximum temperatures is in large steps, the contrast of the image will be impaired. To address this, do one of the following:
 - Freeze the palette and set the limits to the temperature range of highest interest.
 - Keep the hot or cold point of lower interest outside the field of view of the camera, to reduce the temperature range of the image.

8.3. Unable to Save Current Image

- Ensure that the micro SD card is correctly inserted in its slot, and that the status bar indicates the card is present (see [§ 1.4.1.1](#)).
- Check the micro SD card to see if it is full (with FAT16 formatting, check the number of entries in the root; see [§ 1.5.7](#)).
- Ensure the micro SD card is not corrupted and that you can read/modify its content on a computer via the USB cable or a card reader (see [§ 4.6](#)).

8.4. Slow Opening of Files

The access time to the SD card is relatively long. To shorten it, you can create new directories to store images and limit the number of files per directory. We suggest regularly uploading your images to a host computer via the USB cable or a card reader.

8.5. Headset Cannot Connect to Camera


- Ensure the headset is powered ON and that it is not connected to another instrument with which you have already paired it.
- Switch the headset OFF and repeat the connection procedure described in [§ 6.2.1](#).
- If the problem persists, deactivate Bluetooth on the camera (see [§ 6.1.2](#)), re-activate it, and then attempt to connect.

8.6. Bluetooth Peripheral Cannot Connect to Camera

- Ensure the peripheral is powered ON with Bluetooth activated, and not already used by another instrument.
- Turn OFF the peripheral and repeat the connection procedure (see [§ 6.3](#)).
- If the problem persists, deactivate the Bluetooth function on the camera (see [§ 6.1.2](#)), re-activate it, and then attempt to connect.

8.7. Bluetooth Measurements Not Displayed/Refreshed

If continuous acquisition is activated, measurements appear the Measurements menu ([§ 6.3.4](#)). If measurements do not appear as expected:

- Ensure the peripheral is powered ON and is in the desired measurement mode, and that data acquisition on the camera has not been stopped (in other words, the image is frozen). To preserve consistency between the image displayed and the Bluetooth measurements read on the peripherals at the time of acquisition, the measurements are refreshed only when there is a new acquisition. If a peripheral is connected, but acquisition has been stopped, its measurements will not be displayed until there has been another acquisition.
- Following an incorrect reading, the measurement read and the measurement expected may not be consistent. This can prevent refreshing. To eliminate this, change the measurement function on the peripheral and then change it back to the original function.
- If the problem persists:
 1. Switch OFF the peripheral.
 2. Wait until this disconnection is detected on the camera.
 3. Turn the peripheral back ON (with Bluetooth mode activated).
 4. Go to the Peripherals menu ([§ 6.3.1](#)) and press **F2**  to attempt reconnection.

9. MAINTENANCE

9.1. Camera Cleaning



WARNING!
The camera is not waterproof.

- Housing: To avoid any spattering on the lens, close the camera's lens protection flap. To clean, use a cloth moistened with soapy water or with alcohol.
- Screen: To avoid scratching, use a soft, lint-free cloth.

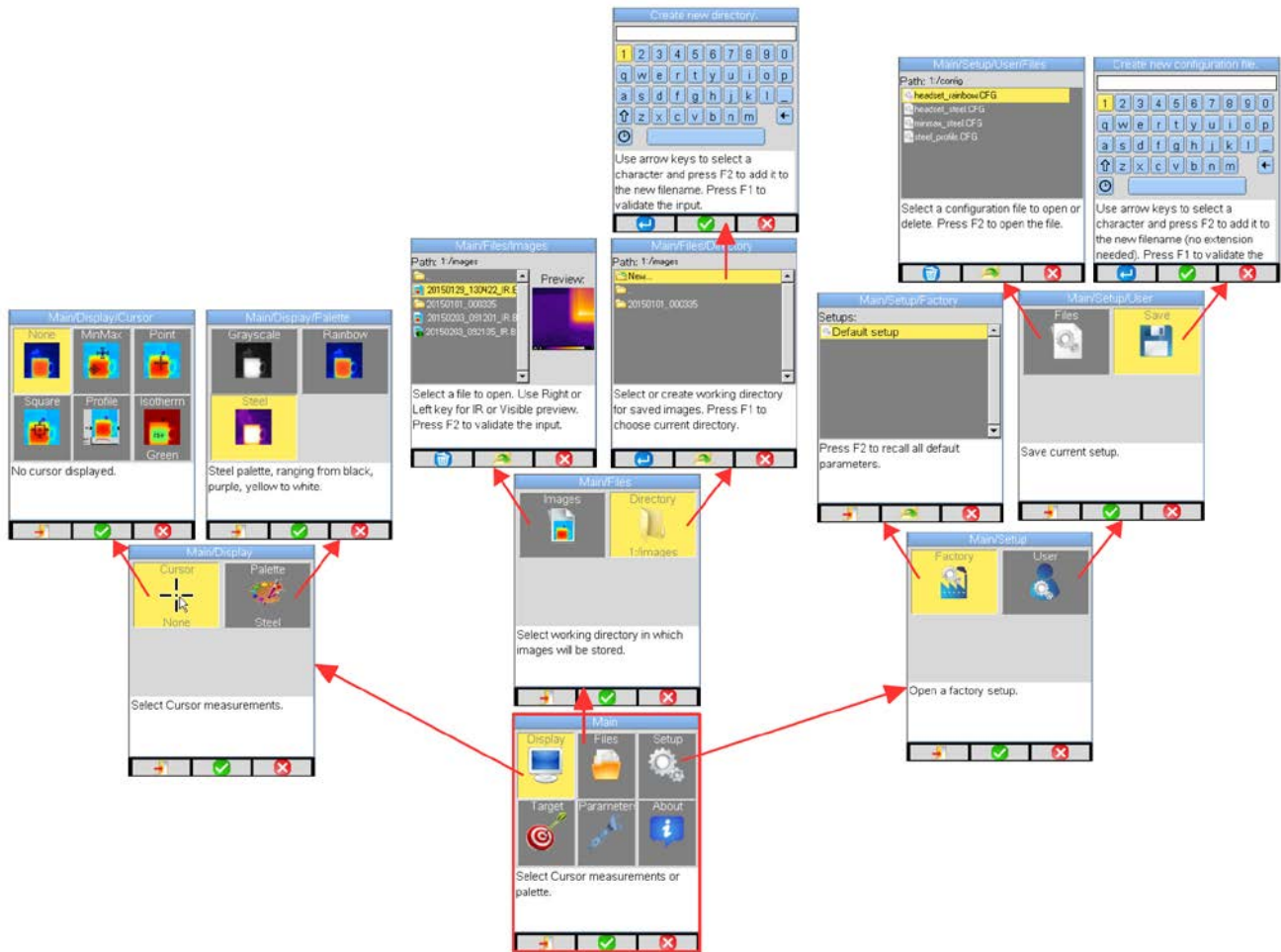
9.2. Infrared Optics Cleaning



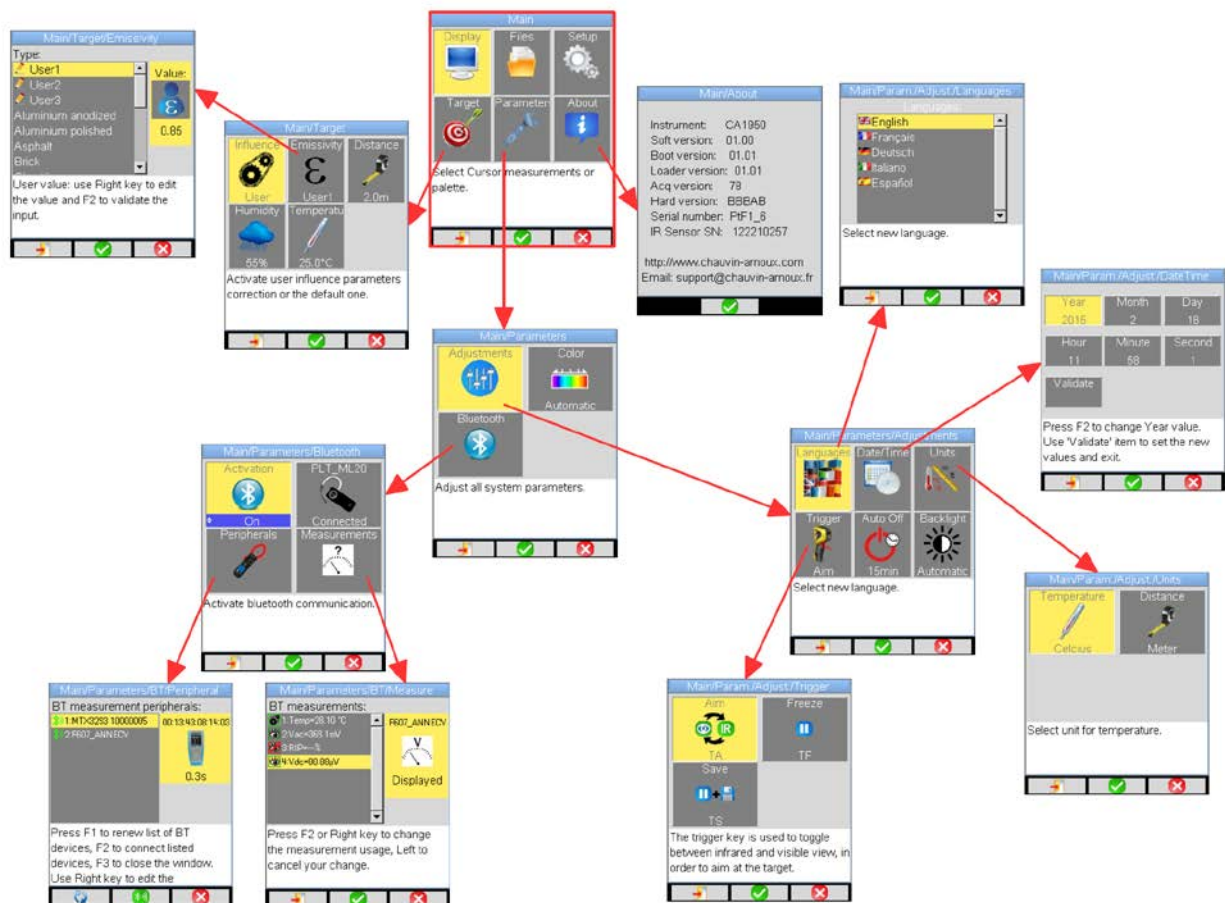
WARNING!
The infrared lens coating is very fragile.

- Avoid leaving fingerprints on the lens.
- Avoid rubbing the lens unnecessarily.
- If there is dust on the lens, if possible use non-contact cleaning methods such as compressed dry nitrogen, an air bulb, and so on.
- If you must wipe the lens, first use air to blow away as much dust as possible. Then clean the lens with a soft, absorbent, lint-free optical lens cleaning paper.

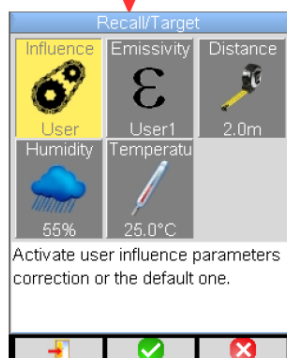
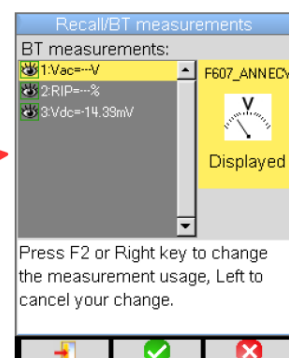
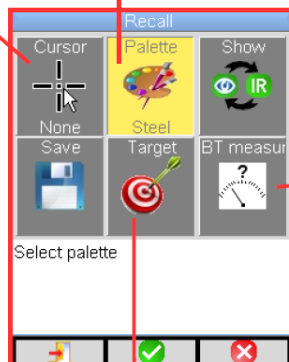
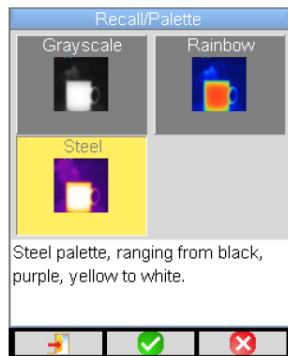
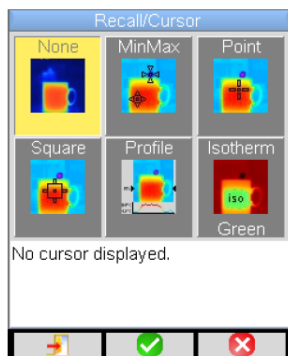
APPENDIX A: MENU TREE



Display, Files, and Setup Menus



Target, Parameters, and About Menus



Recall Menus

APPENDIX B: EMISSIVITY TABLE

Material	Specification	Temp. °C	Spectrum	Emissivity	Ref.
Aluminum	Polished aluminum	100		0.09	
	Commercial aluminum sheet	100		0.09	
	Oxidized anodized aluminum-chromium	25~600		0.55	
	Slightly oxidized aluminum	25~600		0.10~0.20	
	Highly oxidized aluminum	25~600		0.30~0.40	
	Anodized, light grey, matte	70	LW : 8 - 14µm	0.97	9
Asphalt		4	LLW : 6.5 - 20µm	0.96	8
Brass	Shiny brass (extreme polishing)	28		0.03	
	Brass oxide	200~600		0.61~0.59	
Brick	Red	20	T : total spectrum	0.93	2
	Refractory brick	1100		0.75	
Calcimine		20		0.9	
Chromium	Polished chromium	40~1090		0.08~0.36	
Concrete		20	T : total spectrum	0.92	2
Copper	Shiny copper	100		0.05	
	Highly oxidized copper	25		0.78	
	Liquid copper	1080~1280		0.16~0.13	
	Oxidized	50	T : total spectrum	0.6 - 0.7	1
Enamel (white)		18		0.9	
Glass	Surface	23		0.94	
	Refractory	200~540		0.85~0.95	
Gold	Shiny gold	230~630		0.02	
Graphite (carbon black)		96~225		0.95	
Iron and steel (non-stainless)	Highly oxidized	50	T : total spectrum	0.88	
Lead	Pure lead (without oxidation)	125~225		0.06~0.08	
	Slightly oxidized	25~300		0.20~0.45	
Magnesium	Magnesia	275~825		0.55~0.20	
		900~1670		0.2	
	Mercury	0~100		0.09~0.12	
Nickel	Polished by anodizing	25		0.05	
	Electrolyzed	20		0.01	
	Nickel wire	185~1010		0.09~0.19	
	Nickel foil (oxidized)	198~600		0.37~0.48	
	Nickel oxide	650~1255		0.59~0.86	
Nickel alloys	Nickel-chromium alloy wire (shiny) (refractory)	50~1000		0.65~0.79	
	Nickel-chromium alloy	50~1040		0.64~0.76	
	Refractory nickel-chromium	50~500		0.95~0.98	
	Nickel-silver alloy	100		0.14	
Paint	8 different colors and grades	70	LW : 8 - 14µm	0.92 - 0.94	9
Plaster	Unfinished covering	20	T : total spectrum	0.91	
	Plaster tile			0.87	
Plastic	PVC, plastic flooring, matte, structured	70	LW : 8 - 14µm	0.93	9
Rubber	Hard	20	T : total spectrum	0.95	
Stainless steel	18-8	25		0.16	
	304(8Cr, 18Ni)	215~490		0.44~0.36	
	310(25Cr, 20Ni)	215~520		0.90~0.97	
Terra cotta tile				0.88	10
Tin	Commercial tinplate	100		0.07	
	High oxidation	0~200		0.6	
Water				0.96	
Wood	Planed oak	20	T : total spectrum	0.90	2
Zinc	Oxidation at 400°C	400		0.01	
	Shiny plate of galvanized iron	28		0.23	
	Oxidized zinc powder	25		0.28	

APPENDIX C: TECHNICAL SPECIFICATIONS

Description	Characteristics	Value
IR detector	Type	UFPA microbolometer
	Spectral range	8~14μm
	Resolution	80x80
IR imaging performance	Noise Equivalent Temperature Difference (NETD) (sensitivity)	100mK at 30°C (86°F)
	Frequency	9Hz
	Objective	20°x20°
	Instantaneous Field of View (IFOV) (spatial resolution)	4.4mrad
	Minimum focal distance	0.4m (1.3')
Focusing	Adjustment	Fixed focus
Visual image	Built-in digital video	240x240
	Minimum focal distance	0.05m (2")
Image presentation	Images displayed	Infrared image Visible light image
	LCD screen	7.1cm (2.8")
	Display colors	Pseudo-colors, multiple palettes
Functions	Freezing image	Moving or frozen image
	Storing files	Micro SD and SD HC card
Measurement	Temperature range	-20 to 250°C (-4 to 482°F)
	Accuracy	±2°C (±3.6°F) or ±2%
Analysis functions	Analysis tools	Point cursor Area cursor Temperature profile Minimum/maximum Isothermal
	Adjustment	Automatic or manual adjustment of the minimum/maximum palette
	Correction	Emissivity, target distance, ambient temperature, relative humidity
	Isotherms	Display in color of a temperature range adjustable by the user
	Voice recordings	Via Bluetooth headset
Software	CAMReport	Data analysis and report writing software
Battery system	Type	NiMH, low self-discharge Alkaline
	Life	13h30 typical, 11h minimum
Conformity	Electromagnetic compatibility	EN61326-1
	Safety	EN61010-1-Ed.02
Environmental specification	Temperature range, operation	-15 to 50°C (-4 to 122°F)
	Temperature range, storage	-40 to 70°C (-40 to 158°F)
	Humidity	10% to 95%
	Drop resistance	2m (6.56') on all sides
	Impact resistance	25G
	Vibration resistance	2G
	Protection	IP54
Physical characteristics	Weight	700g (24.7oz) with batteries
	Dimensions	225 x 125 x 83mm (8.86 x 4.92 x 3.27")

REPAIR AND CALIBRATION

To ensure your instrument meets factory specifications, we recommend that it be scheduled to be sent back to our factory Service Center at one-year intervals for recalibration, or as required by other standards or internal procedures.

For instrument repair and calibration:

You must contact our Service Center for a Customer Service Authorization Number (CSA#). This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration, or a calibration traceable to N.I.S.T. (Includes calibration certificate plus recorded calibration data).

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

(Or contact your authorized distributor.)

Costs for repair, standard calibration, and calibration traceable to N.I.S.T. are available.

NOTE: You must obtain a CSA# before returning any instrument.

TECHNICAL AND SALES ASSISTANCE

If you are experiencing any technical problems, or require any assistance with the proper operation or application of your instrument, please call, fax, or e-mail our technical support team:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
Phone: (800) 343-1391 • (508) 698-2115
Fax: (508) 698-2118
E-mail: techsupport@aemc.com

LIMITED WARRANTY

The IR Camera Model 1950 is warranted to the owner for a period of three years from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the unit has been tampered with, abused or if the defect is related to service not performed by AEMC® Instruments.

Full warranty coverage and product registration is available on our website at: www.aemc.com/warranty.html. Please print the online Warranty Coverage Information for your records.

If a malfunction occurs within the three-year period, you may return the instrument to us for repair, provided we have your warranty registration information on file or a proof of purchase. AEMC® Instruments will, at its option, repair or replace the faulty material.

REGISTER ONLINE AT: www.aemc.com.

Warranty Repairs

What you must do to return an Instrument for Warranty Repair:

First, request a Customer Service Authorization Number (CSA#) by phone or by fax from our Service Department (see address below), then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

Ship To: Chauvin Arnoux[®], Inc. d.b.a. AEMC[®] Instruments
15 Faraday Drive • Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

Caution: To protect yourself against in-transit loss, we recommend you insure your returned material.

NOTE: You must obtain a CSA# before returning any instrument.

NOTES:

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