Mi-TIC

argus
thermal imaging from e2v

User Manual

www.argusdirect.com

CONTENTS

This manual contains information covering operation of the system and operating techniques, user maintenance and care of the product.

1. SAFETY AND REGULATORY INFORMATION

Before using this product, the customer shall read and understand all the instructions and warnings. e2v technologies does not accept responsibility for damage or injury resulting from failure to follow the instructions provided.

Refer to Product Safety datasheet PSD776352A for safety and warning notes

1.1 FCC COMPLIANCE INFORMATION (US)

When using the Argus® Mi-TIC camera or charging the Argus® Mi-TIC camera and battery in the Charger (charge mode), these modes have been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

When downloading data from the Argus® Mi-TIC camera / Charger (data download mode), this mode has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Any modification not approved by e2v could void the user's authority to operate this equipment.

1.2 TUV Label

See the product label
for EU and other
regulatory information

1.3 NFPA 1801

The following camera models

- MI-320-1-NFPA
- MI-329-1-NFPA
- MI-320-3-NFPA
- MI-329-3-NFPA

comply with the requirements of NFPA 1801 standard on Thermal Imagers for the Fire Service 2013 edition and bear the appropriate labelling.

To maintain NFPA 1801 / ANSI 12.12.01 compliance, cameras must be used with the ARG_MI_BLPSN battery.

1.4 ANSI 12.12.01 Class I Div2 Groups C & D Non-Incendive

All Argus® Mi-TIC camera models, when marked, are suitable for use in Class 1, Division 2, Groups C, D or Non-Hazardous Locations only.

These cameras are supplied with batteries of type ARG_MI_BLPSN which are also marked for use in hazardous locations and must always be used with the camera in hazardous locations.

Warning - explosion hazard - substitution of Argus camera and/or Argus battery pack components may impair suitability for Class 1, Division 2

1.5 CAMERA WARNINGS/CAUTIONS

- All users should familiarise themselves with the correct operation, functionality and features of the camera before use.

- Argus® Mi-TIC cameras are safe when handled and used according to the guidelines included here, in the product safety data sheet PSD776352AA and within the environmental operating environment specified in the data sheet (see section 9).

- The cameras are an aid to fire, search and rescue operations. They are not intended to provide a safety function or as a replacement for established safety procedures.

- The Argus® Mi-TIC camera can only be serviced by authorised personnel.

- Where the camera is used at an ambient temperature greater than +40 °C, suitable protective gloves shall be worn to hold the camera; these should have a temperature rating at least 20 °C above the ambient temperature.

- e2v technologies recommends that the Argus® Mi-TIC camera is stored in the supplied package or an alternative case supplied by e2v technologies

- If users wish to mark or apply identification labels to their cameras they should ensure that their marking does not create a hazard (e.g. flammable) or obscure certification information. Avoid the use of solvents as these may degrade the camera housing. Users may prefer to use the custom splash screen as an alternative, see section 5.1

2. INTRODUCTION

The Argus® Mi-TIC is the latest generation of the Argus® Thermal Imaging Camera (TIC) from e2v technologies. With over 30 years experience in fire-fighters' thermal imaging, e2v technologies continues to produce high quality, affordable systems designed for fire and heat detection for use with civilian, industrial and military rescue services.

The Argus® Mi-TIC has been designed with digital imaging technology for a sharper picture and uses the highly successful Amorphous Silicon (ASi) Microbolometer Detector that is in use by many of the world's fire brigades.

Every Argus® Mi-TIC is supplied with a unique dual use desktop / in-truck charger station which securely retains and charges both the thermal imager and a spare battery. The charger stations can be daisy-chained together up to a maximum of six units.

The Argus® Mi-TIC is a simple, small, lightweight but robust, self-contained camera system, which has fully automatic operation; no control or adjustment is required in use. Through proper use, the user will be able to:

- See through dense smoke and in darkness.
- Detect and display the relative temperatures of objects within the scene.
- Locate the seat and spread of the fire.
- Move swiftly in search and rescue of casualties.
- Have the ability to see in zero visibility conditions.
- Significantly improve safety and mobility.
- Monitor temperatures for preventive maintenance and condition monitoring of equipment.

The Argus® Mi-TIC is designed to withstand the high temperatures, knocks and driving spray often encountered in the fire-fighting environment and has many features that can be customised by the end user. These features include:

- Direct Temperature Measurement.
- Toggle between application specific colour modes (Fire or Overhaul/Search).
- Customisable Start-up Screen.
- x2 Zoom (also x4 Zoom on 320 sensor models).
- Time and Date.
- Configurable function buttons
- User Replaceable Germanium window.
- Optional: Image capture/playback and video capture with embedded storage of up to 1000 images and 8 hours of video.

The following versions are subject to export controls.
An export licence will be required if exported outside the EU.
MI-nn0-x

The following versions are exempt from export controls.
MI-nn9-x

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nn = 16 (160 Sensor) or 32 (320 sensor); x = 1 (1 button) or 3 (3 button)

3. OPERATION AND USE

3.1 System Configuration (Camera Rear)

1. 2.7" LCD Display
2. Function button 1 (Zoom*)
3. Function button 2 (Application Mode*)
4. Battery
*default settings

5. Lanyard Loops
6. Display Bumper
7. ON/OFF Button
8. Docking latch
9. Docking connector

3.2 System Configuration (Camera Front)

1. Replaceable Germanium Window
2. Window Release Latch

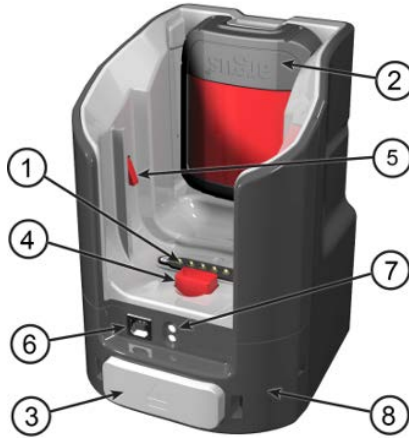## 3.3 System Configuration (Accessories)

1.   M3 x 8 screws
2.   MIL-STD-1913 (Picatinny) rail
3.   M4 x 30 shoulder screws
4.   Double lanyard loop
5.   Pocket Clip

6.   Sun/smoke shroud*

* purchased separately

3.4 System Configuration (Charger Front)

1. Docking bay 1 (camera with battery)
2. Docking bay 2 (spare battery)
3. Camera release button
4. Camera eject mechanism
5. Camera lock mechanism
6. USB port (front)
7. Charging status LEDs
8. Front cover (removable)

Up to six chargers can be powered in a "daisychain" configuration. Connections should be made via the green power connectors located underneath the removable front cover. The "daisychain" power circuit contains a replaceable 10 A fuse. This is also located underneath the removable front cover. See section 4.3 for installation details.

3.5 System Configuration (Charger Rear)
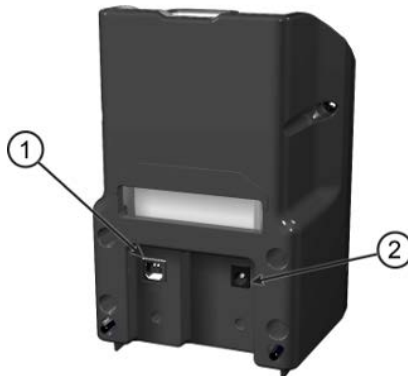
1. USB port (rear)
2. Power connector

3.6 Display
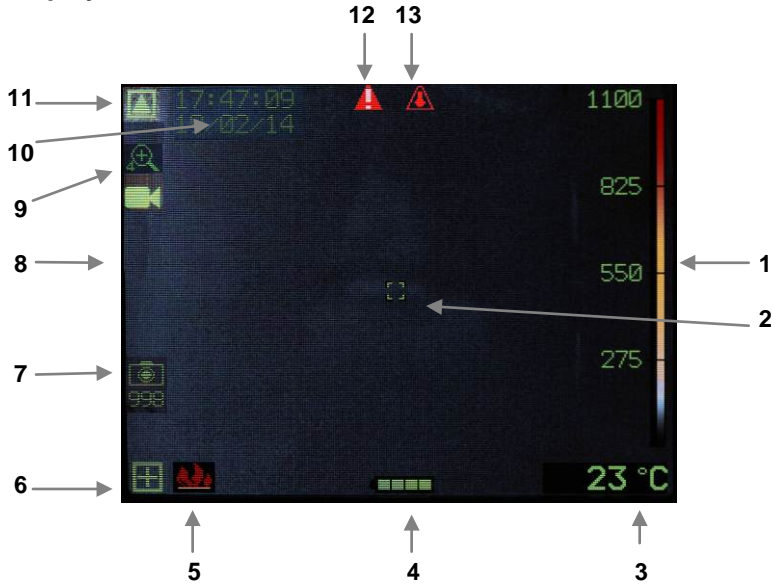
1. Colour reference bar
2. Spot Temperature Target
3. Spot Temperature Value
4. Battery Bar
5. Application mode indicator
6. Operational Format Indicator
7. Image Capture*

8. Video Capture*
9. Zoom indicator
10. Time and Date
11. Low Sensitivity Mode Indicator
12. General System Failure Warning
13. Over Temperature Warning Indicator

optional features

3.7 Getting Started

The packing case contains the following items (see Quick Start Guide):

- Camera with lanyard loops
- Charger Station
- Quick Start Guide
- Two rechargeable battery packs
- USB Lead
- Retractable lanyard
- Power Supply Kit:
    - Mains power supply
    - Set of interchangeable plugs
    - Vehicle power lead (12 V)
- Pocket Clip
- Picatinny rail accessory with 2 mounting screws
- Universal Mounting Plate for Charger with 2 mounting screws
- 3 mm hex key
- 2.5 mm hex key

Basic Operation

- Turn the camera on with a short press of the green button.

- After about one second a start-up image will appear on the screen. (This image may be changed – see section 5.1). After a few more seconds the display will show the thermal image.

- The time and date will be displayed for a further 5 seconds.

- Always check the battery indication to verify adequate power and check that a good thermal image is displayed before commencing operational use.

- While the camera is in operation, it will recalibrate to maintain its performance and image quality. During recalibration, an internal shutter closes and the image will briefly freeze while the internal electronics optimises the performance of the sensor. This occurs more frequently when first turned on, then the calibration interval increases as the internal temperature of the camera stabilises.

- To turn the camera off, press and hold the green button for two seconds until the camera turns off.

3.8 Camera Features Numerous Screen Images below to be updated

3.8.1 Application Modes

The Argus® Mi-TIC has two application modes:

o   FIRE

A white-hot grey and colour scale, with the brightness expanded to cover the dynamic range of the scene.
Colourisation is added gradually at scenes temperatures above 150 °C

The colour reference bar is marked with 4 graduations allowing the temperature to be quickly assessed.

The colouration is fixed and independent of camera sensitivity mode.

Colour	Range °C	Range °F
Greyscale	below 150°C	below 300°F
Yellow	150°C – 500°C	300°F - 930°F
Orange	500°C – 600°C	930°F - 1100°F
Red	600°C – 1100°C	1100°F – 2000°F

Image detail remains visible throughout the range by changes in brightness and colour saturation.

o   SEARCH or OVERHAUL

A white-hot grey scale, expanded to cover the dynamic range of the scene.

Red colourisation is added to the hottest 2% scene, regardless of absolute temperature.

Yellow colourisation is added to the next hottest 5% of the scene regardless of absolute temperature

Where there is no significantly warmer area, no red shows.

The colour reference bar has no temperature scale.

This function is part of the TI BASIC PLUS operational format (see 3.11)

The camera starts up in Fire mode*. On 3-button cameras, to toggle between the application modes, press the function button assigned to application mode toggle. By default, this is the centre function button.

*Except the camera type MI-160-S which starts up in search mode.

3.8.2 Direct Temperature Measurement
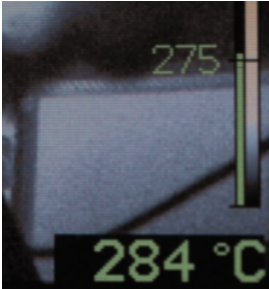
The camera allows the operator to view the average temperature of the centre spot of the scene (defined by the target markings). The temperature reading is displayed in the bottom right-hand corner of the display. This system is intended to give the operator the ability to detect possible hazards such as hot gas bottles or tanks, heat signatures of people of objects, and to compare temperatures.

The temperature measurements feature can be changed between degrees Celsius or degrees Fahrenheit by using the PC Configuration Tool software (see section 6).

In 'Fire' application mode, a green column against the temperature reference scale also shows the spot temperature.

Notes:

- The camera can measure scene temperatures between 0 and +1100 °C (32 and +2000 °F).
- The object being measured must fully fill the target marks to get a good reading.
- If the temperature is higher than the maximum, the display will show "1100+C" in red.
- If the temperature is lower than the minimum, the display will show "----"
- Different types of materials have different infrared emission characteristics. This will affect the accuracy of the temperature reading. Variations can also be caused by the distance from the object. This temperature measurement must be regarded as an indication and not a guaranteed reading.

3.8.3 Tri-Mode Sensitivity

The Argus® Mi-TIC has three levels of sensitivity: High, Low and Extended Low. These levels provide the user with a thermal image over the widest possible temperature range. The Argus® Mi-TIC will switch to the optimum level of sensitivity automatically and will indicate when it is not in high sensitivity mode by displaying a green coloured solid triangle symbol at the top left of the display.

- High Sensitivity Mode

The Argus® Mi-TIC will operate in High Sensitivity mode under normal operating conditions. This mode produces a clear image with lots of

detail and low levels of noise. The temperature range for this mode is between −40 °C and 150 °C (−40 °F and 302 °F).

- Low Sensitivity Mode

The Argus® Mi-TIC will automatically switch to Low Sensitivity mode when higher temperatures have been detected, a small green triangle symbol will be displayed in the top left corner to indicate this. The image produced will still be clear with lots of detail, although some additional noise will be visible in the cooler areas of the scene. The temperature range for this mode is up to 400 °C (750 °F).

- Extended Low Sensitivity Mode

The Argus® Mi-TIC will automatically switch to Extended Low Sensitivity mode when higher temperatures have been detected, a small green triangle symbol will be displayed in the top left corner to indicate this. The image produced will still be clear with lots of detail, although even more noise will be visible in the cooler areas of the scene. The temperature range for this mode is up to 1100 °C (2000 °F).

3.8.4 Zoom

A short press on the left-hand function button operates the zoom feature. The zoom symbol, magnifying glass, will appear on the left-hand side of the display.

The temperature measurement sample window is also expanded to suit.

Note: x4 zoom is only provided on 320 camera types.

This function is part of the TI BASIC PLUS operational format (see 3.11)

3.8.5 Time and Date

On start-up, the time and date are displayed at the top of the screen for 5 seconds.

The date format and time can be adjusted using the software configuration tool (see section 6).

3.9 Display Warning Graphics

The Argus® Mi-TIC is equipped with an advanced microprocessor based control and user warning system. In addition to controlling the automatic operation of the camera to ensure the best possible picture at all times, the control system provides graphics on the display to alert the user to certain conditions as follows:

3.9.1 Over-temperature Warning

The internal temperature of the camera is above the correct operating range. The camera must be turned off to cool down and prevent permanent damage.

If the user ignores this warning and continues to operate the camera in very high temperatures, the warning symbol will flash.

When the flashing temperature warning is present, the camera is very close to its absolute operating limit and the image will start to degrade considerably. The user must remove the unit from the high ambient temperature at this time; failure to comply may result in permanent damage to the unit. Failure to act upon this level of warning may result in serious damage to the system and may invalidate the warranty.

3.9.2 General System Failure Warning

The control system has detected an internal camera fault. Turn the camera off for five minutes and turn back on again. If the warning symbol is still present, or the symptoms return, contact your e2v representative.

Failure to act upon this level of warning may result in serious damage to the system and may invalidate the warranty.

3.10 Camera Features (optional)

3.10.1 Image Capture

Up to 1,000 images can be captured. Images are stored in the camera embedded storage. These images can then be viewed or deleted using the camera or by downloading on to a PC (see section 5).

To capture an image, press the function button assigned to image capture (see section 6.6 for function button set-up).

The image capture symbol appears for a short time on the left-hand side of the LCD display. The number of the images remaining will be indicated on the display.

Images are stored on the camera in compressed **.jpg** format.

This function is part of the TI BASIC PLUS operational format (see 3.11)

3.10.2 Video Capture

Videos are stored in the camera's embedded storage in Motion JPEG format in an **.avi** file. The files have a maximum length of 10 minutes to simplify transfer to a computer.

The camera will automatically start a new file every 10 minutes.

Video files can be copied to a computer using the USB lead. 10 minutes of video typically generates a 100 MB file.

This function is part of the TI BASIC PLUS operational format (see 3.11)

3.11 NFPA1801 'TI BASIC' and 'TI BASIC-PLUS' operational formats

When switched on the Argus® Mi-TIC camera complies with the requirements of NFPA BASIC operational format providing temperature related colour imaging.

A short press of the green button will also always revert the camera to this condition.

Certain features are beyond the scope of NFPA basic mode, and when activated the symbol shown here will show in the bottom left of the screen. These are activated by pressing one of the black function buttons on a 3-button camera

The following Argus® Mi-TIC features are 'PLUS' features

- The 'SEARCH' Application Mode as detailed in section 3.8.1
- Zoom as detailed in section 3.8.4
- Image Capture(optional) as detailed in section 3.10.1
- Video Capture (optional) as detailed in section 3.10.2

Button functions can be changed or removed using the Argus® Mi-TIC Configuration Tool detailed in section 6.

Note: The MI-160-S camera variant starts in 'Search' application mode by default and is not an NFPA1801 approved camera.

3.12   Operating Notes

- **Interpreting The Image – Relative Temperatures**
  The image displayed is simply a black and white picture of the infrared energy entering the lens. The camera displays relative temperature differences between individual objects and their surroundings irrespective of overall ambient temperature.
  The camera is set up to display objects at various shades between black for cooler items and white for hotter bodies, e.g. in a room at 20 °C a cold drink would appear black whilst a hot radiator would appear white. However, in a room at 250 °C, it is possible that the same hot radiator may appear darker than, for example, burning materials. Depending upon the application mode selected, the image may be coloured according to actual temperature (Fire mode) or relative temperature (Search mode).

- **Identification of Fire and Hotspots**
  The camera will represent zones of very high temperature as white or red within the picture. When sufficient heat has been detected, e.g. a large area of fire, the camera will automatically enter low sensitivity mode. This will extend the dynamic range of the camera and allow the image of surrounding objects to remain clearly visible.

- **Hidden Fires**
  It is possible that fires may be burning or smouldering behind doors, in ducting or in wall or floor cavities. In such circumstances, the operator should look for areas that appear whiter when compared with the surroundings. Search mode is particularly useful in this situation, as it would colour the hottest areas red.
  For example, a fire behind a door will cause the door to appear whiter against the background. Similarly, a white area on an otherwise dark wall could indicate an area of fire behind the masonry.

- **Search for Persons and Objects**
  The camera is not restricted to locating fires. In many cases, the fire-fighter will be using the camera to search for casualties, to seek out dangerous items such as fuel tanks or gas cylinders and also as an aid to navigation through unknown premises.

- **Image Clarity**
  The sharpness and clarity of the image provided is related to the temperature of the scene and objects in view. A cold room provides little infrared energy and less detail is detected than in a warm environment where objects give off significant energy. In general, the warmer the scene, the more thermal contrast and hence the greater detail in the picture.

- **Heat Layers in Closed Spaces**
  In a major fire, a layer of hot gases may build up in the upper region of the closed space. Attempting to use the camera in this hot layer will cause the image to become featureless. By bringing the camera down beneath this layer, the unit is able to provide the fire-fighter with a clearer picture of the scene ahead.

- **Windows and Polished Surfaces**
  Glass is not transparent to long wavelength infrared energy and it is not possible for the operator to use the camera to look through a window. A white window would indicate that the window itself is relatively warm and may be being heated by a fire behind it. Just as we see reflections in glass under normal circumstances, it is possible that the camera can detect infrared reflections in glass, mirrors and polished or painted surfaces. Care must be taken to ensure that the image seen is not simply a reflection. Experience will give the operator added confidence.

- **Control of Water Streams/Jets**
  When viewed through the camera, water streams from hose reels will appear black against the background scene. The control and direction of a water flow can be monitored by viewing its flow and effect on the fire through the camera. It may be necessary, if employing a water wall, to drop the wall momentarily to view the effects of the extinguishing stream.

- **Smoke Types**
  The camera will provide vision through all types of smoke and steam.

- **Lens Cleaning During Operation**
  The camera lens, like the BA visor, may become obscured during use. The lens may be cleaned with a glove or cloth if necessary.

4. BATTERIES AND CHARGING

The Argus® Mi-TIC camera is supplied with two Argus® Mi-TIC Lithium Iron Phosphate Rechargeable Battery Packs (ARG_MI_BLPS, ARG_MI_BLPSA, ARG_MI_BLPSN). All types power the camera for over 2 hours from a full charge regardless of operating mode (e.g. video recording) and camera type (320 or 169). Batteries must be fully charged before first use.

The optional high capacity battery (ARG_MI_BLPL) gives over 5 hours use from a single charge.

Typical battery run times from a full charge are as follows:

ARG_MI_BLPS ARG_MI_BLPSA ARG_MI_BLPSN	ARG_MI_BLPL (Optional)	ARG_MI_BAA (Optional)
2h50	6h25	5h00

Run times of a partially charged battery will be proportionally less. Always ensure adequate power before commencing operational use.
Use at very low temperatures will also reduce battery run time.

4.1 Indications on Charger

No power applied or no battery fitted

Charging

Battery fully charged.

Battery too warm/cold for charging or other fault

4.2 Battery Life Indicator

With a new, fully charged battery, the battery indicator will show full with a solid green bar.

The battery indicator represents the normal run time of the battery, 2 hours for the standard battery and 5 hours for the optional large battery (ARG_MI_BLPL).

When the battery symbol turns orange, there is approximately half of the battery life remaining.

When the battery symbol turns red, there is approximately a quarter of battery life remaining.

When the battery symbol starts to flash, the time remaining will typically be 10 - 15 minutes.

4.3 Argus® Mi-TIC Charger Station Fixed / Vehicle Installation

The Argus® Mi-TIC Charger Station can be mounted on any surface either horizontal or vertically using the universal mounting plate and mounting screws supplied. Note: fixings for attaching the mounting plate to the surface are NOT supplied.

Up to six (6) charger stations can be powered in a "daisychain" configuration.

4.3.1 Horizontal Mounting
- Charger Station
- Universal Mounting Plate
- 3 mm hex key
- M4 x 30 mounting screws (2)
- AWG 18 gauge wire (Red and black) (not supplied)
- Small flat bladed screwdriver (not supplied)
- Large flat bladed screwdriver (not supplied)
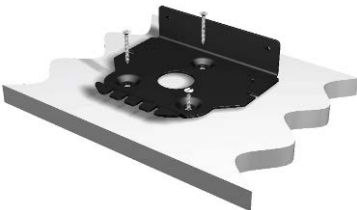
1. Using the universal mounting bracket as a template, mark out the drill-hole positions and drill holes.
2. Using suitable fixings, attach the mounting plate to the chosen horizontal surface. Up to six (6) charger stations can be powered in a "daisychain" configuration. The mounting plates are designed so they can be mounted next to each other as shown below.
3. Remove the front panel of the charger station using a small flat tool e.g. small flat screwdriver (not supplied).
4. Hook the charger station on to the universal mounting plate.
5. Fasten the charger station to the universal mounting plate with the M4 x 30 mounting screws using the 3 mm hex key as shown.
6. Replace the front panel on the charger station.

4.3.2 Vertical Mounting

Follow the same procedure as for a horizontal mounting, but on a vertical surface.

4.3.3 "Daisychaining" Electrical Installation

Connections should be made via the green power connectors located underneath the removable front cover. The "daisychain" power circuit contains a replaceable 10A fuse. This is also located underneath the removable front cover.
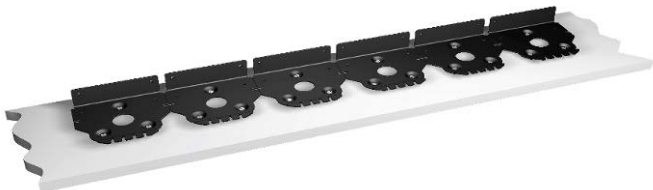
1. Remove the front panels of the charger stations to be connected.

2. Using 18 AWG wire or thicker, connect the terminals as shown overleaf, ensuring that the positive (+ve) terminals are connected together and that the negative (-ve) terminals are connected together.
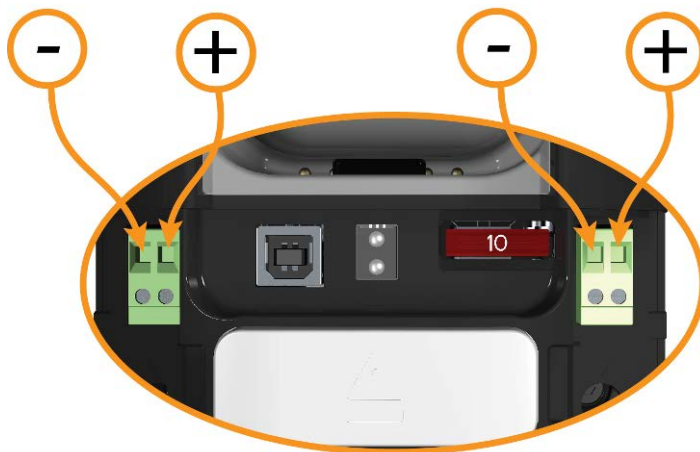
3. Replace the front panels on the charger stations.

Note:
**Do not use the rear power connector when in the 'daisy-chain' configuration.
All power must be supplied through the front hard wiring connectors.**

5.   CONNECTING THE CAMERA TO A PC

The camera has 4 GB of embedded storage. This is used for:

- Changing the start-up image
- Storing images (optional)
- Storing videos (optional)
- Storing camera diagnostic information
- Updating the camera software
- Storing a copy of the Configuration Tool Software (see section 6)
- Storing a copy of the manual

5.1 Changing the Start-Up Image

A custom start-up image can be loaded into the camera as follows.

1.   Generate an image file on a computer in the following format:

Name: Splash.bmp
File format: Bitmap
Dimensions (HxV):   320 x 240 pixels
Bit depth   24 Bit
File size: 230,454 bytes

It is recommended to use MS Paint to create the image file.

2.   Turn the camera on.
3.   Connect the camera to the computer via the Argus® Mi-TIC Charger Station and the supplied USB lead.
4.   The computer should recognise the memory card as a 'Mass Storage Device' and open a file explorer window.
5.   Copy the image file from the computer to the top level 'ARGUS TIC' directory.
6.   Close the window.
7.   On computers running MS Windows® it is recommended to select 'Safely Remove Hardware' before disconnecting the camera.
8.   Remove the camera from the Argus® Mi-TIC Charger Station.
9.   Turn the camera off and back on. The camera will read the new image file when it turns on.
10.   Wait until the displayed status message clears.
11.   Turn the camera off and back on again, the new splash screen image will appear at start-up.

Keep a copy of the image file on your computer. The camera will rename the image file on the memory card to XSPLASH.BMP after it has been successfully loaded into the camera.

In the event that the splash screen fails to load into the camera, the camera will rename the image to ERRSPLASH.BMP. Providing the settings described

above are adhered to, the custom start-up image can be loaded into the camera.

5.2 How to Copy the Memory Card Contents to a PC

Images and videos can be copied to a PC as follows:

1. Turn the camera on.
2. Connect the camera to the computer via the Argus® Mi-TIC Charger Station and the supplied USB lead.
3. The computer should recognise the memory card as a 'Mass Storage Device'. If an explorer window does not open automatically, select 'My Computer' to locate the memory card.
4. Files can be copied from this window to directories on the computer.
5. Close the window.
6. Remove the camera from the Argus® Mi-TIC Charger Station.

Directory Structure of Camera Memory

ARGUS TIC
    Images
        I00023

A0002300.jpg	*Each directory may contain*
A0002301.jpg	*up to 100 images.*
A0002302.jpg	*Maximum 1000 images in total.*

        I00024
        I00025
    Videos
        V00017

A0001700.avi	
A0001700.avi	*Each directory may contain*
A0001700.avi	*up to 100 videos*

        V00018
        V00019

MInnnnnn.txt	Diagnostic file
Mi-TicConfig.exe	Configuration tool
Mi-TicManual.pdf	Manual

5.3 Diagnostic File

The diagnostic file can be found in the top level 'ARGUS TIC' directory on the memory card. The name of the file is:

MInnnnnn.txt

(**nnnnnn** is the camera serial number)

The diagnostic file contains information about the camera which may be useful to e2v in diagnosing any camera faults. e2v may ask you to copy this file from the memory card to a computer and send it by email to e2v for fault finding.

6. CONFIGURATION SOFTWARE

The Argus® Mi-TIC Configuration Tool is supplied on the camera's embedded storage.

The Configuration Tool runs on a PC with Windows XP / Vista / Win7. This allows the user to perform the following tasks:

- Set the temperature units to either °C or °F.

- Set the time and date format and synchronise the time and date with the PC

- Enable "black box" video recording *

- Customise the operation of the camera's function buttons.

6.1 Running the Configuration Tool

To run the software, connect the Argus® Mi-TIC to your computer using the Argus® Mi-TIC Charger Station and the supplied USB cable. The camera is recognised as a removable disk.

Navigate to the removable disk and open it.

Note: If the camera is not recognised as a removable disk, check that the camera is connected to the PC and correctly docked in the charger station and switch the camera off and back on again.

Run 'Mi-TicConfig.exe'
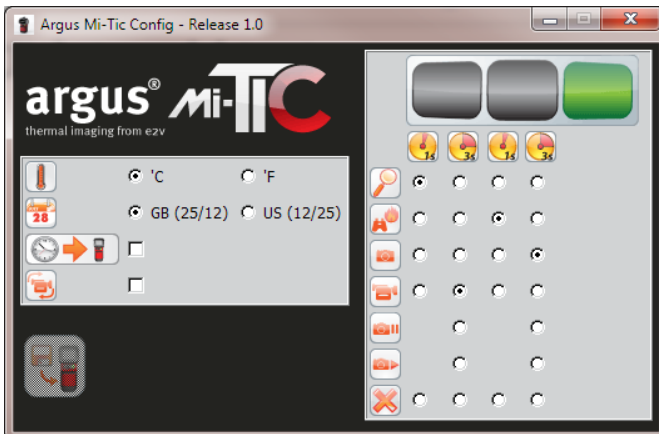
6.2 Setting the Temperature Units

Select either C or F, then click the 'Save Changes' button circled in red below. Eject the camera from the charger dock. Do not switch the camera off and back on again. The new settings will be enabled.
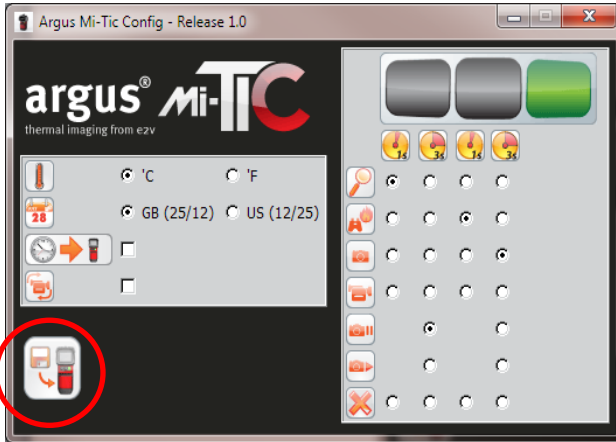
6.3 Setting the Time and Date Format

Select either GB or US, then click the 'Save Changes' button. Eject the camera from the charger dock. Do not switch the camera off and back on again. The new settings will be enabled.

6.4 Synchronising the Time and Date with the PC

Check the "Synchronise time and date" box, then click the 'Save Changes' button. Eject the camera from the charger dock. Do not switch the camera off and back on again. The new settings will be enabled.

6.5 "Black Box" Video Recording*

Check the "Black Box Video Recording" box, then click the 'Save Changes' button. Eject the camera from the charger dock. Do not switch the camera off and back on again. The new settings will be enabled.

Note: When "Black box" video recording is enabled, image capture, video record and image playback functions are disabled.

6.6 Camera Function Button Set-up

The following camera functions can be assigned to either of the two function buttons. Functions can be activated by either a short press (less than one second), or a long press (three seconds).

- Zoom
- Application Mode (Fire or Search/Overhaul)
- Image Capture*
- Video Record*
- Image Freeze*
- Image Replay*

To assign functions to buttons, select the desired combinations and then click the 'Save Changes' button. Eject the camera from the charger dock. Do not switch the camera off and back on again. The new settings will be enabled.
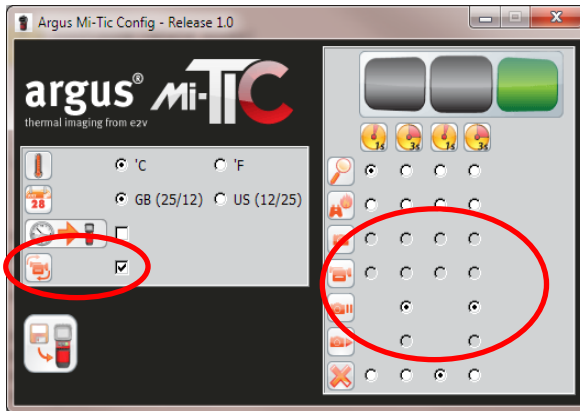
* These functions are not available as standard. The additional image and video options can be obtained by upgrading your camera with the 'image & video upgrade' token (ARG_MI_IV).

7. CLEANING, MAINTENANCE AND REPLACEABLE PARTS

7.1 Cleaning / Inspection After Use

After use and prior to stowing, the camera should be cleaned. This is best carried out using a cloth soaked with warm soapy water.

Check the camera for any signs of damage that may have occurred during the preceding use, for example front / rear window damage or case cracking due to extreme impacts or case damage due to extreme heat.

Do not use coarse abrasives on the window surfaces, and ensure that any grit is removed before rubbing to dry.

In cases of contamination or infection risk, seek expert advice in accordance with the hazard encountered (e.g. foul water, Hazchem)

Solvents should not be used. If in doubt, contact your supplier.

7.2 Maintenance

No routine maintenance is required for the camera. If it is not in regular use, it should be switched on for a period of ten minutes every month to check correct operation.

Batteries should be recharged every 6 months if not used.

Battery capacity can be expected to reduce over time. The Argus® Mi-TIC rechargeable batteries use $LiFePO_4$ cells which age to approximately 70% of original capacity after 2000 cycles under test conditions. Users should therefore expect to replace the batteries during the camera lifecycle.

There are very few other 'lifed' components in the Argus® Mi-TIC camera and repair / replacement of these will be offered via e2v technologies or an authorised repair centre subject to component availability.

7.3 Replaceable Parts

The following items may be substituted by the user:

Item	Description
USB Lead	USB cable with Type B connector (2 metres)
Vehicle Charger Lead Fuse	250 V 2 A Fast Acting Fuse, UL Certified. 1.25 x 0.25 inch (32 x 6 mm). **Do not use any other fuse type or rating.**

The following items are available as spares and accessories from e2v:

Part No.	Description
ARG_MI_BLPS	Mi-TIC Rechargeable Battery Standard (2.5 hours)
ARG_MI_BLPA	Mi-TIC Rechargeable Battery ANSI (2.5 hours)
ARG_MI_BLPN	Mi-TIC Rechargeable Battery NFPA (2.5 hours)
ARG_MI_BLPL	Mi-TIC Rechargeable Battery Pack Large (5 hours)
ARG_MI_CS	Mi-TIC Charger Station
ARG_MI_PSU	Mi-TIC Power Supply
ARG_MI_SS	Mi-TIC Sunshroud
ARG_MI_RL	Mi-TIC Retractable Lanyard
ARG_MI_LL	Mi-TIC Double Lanyard Loop
ARG_MI_RW	Mi-TIC Replacement Window
ARG_MI_RAIL	Mi-TIC Picatinny Rail
ARG_MI_PCLIP	Mi-TIC Pocket Clip
ARG_MI_DB	Mi-TIC Display Bumper
ARG_MI_USB	Mi-TIC USB Lead
ARG_MI_BAA	Mi-TIC AA battery

THERE ARE NO OTHER USER SERVICEABLE PARTS. If any damage beyond these parts occurs, return the camera to e2v technologies or an authorised repair centre. Any attempt at repair by unauthorised personnel may cause serious damage and will invalidate the warranty.

7.4 Replacing the Germanium Window Assembly

7.4.1 Removal

Using a small flat tool, e.g. a small flat head screwdriver, depress the window release latch and turn the Germanium window assembly clockwise. Note the Germanium window assembly contains a reverse bayonet coupling.
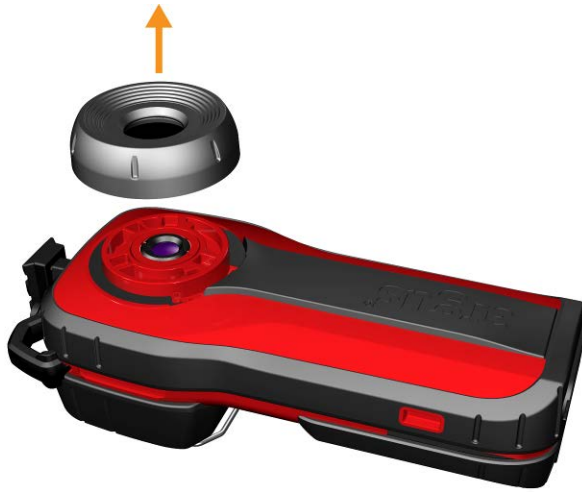
7.4.2 Refitting

Locate the window assembly on the front of the camera and turn the window assembly anti-clockwise until a click is heard.

8. WARRANTY TERMS

8.1 Express Warranty

e2v technologies ("e2v") warrants that this product is free from mechanical defects or faulty workmanship for two (2) years from the date of shipment, with the exception that the warranty period for the rechargeable battery pack is one (1) year from that date, provided it is maintained and used in accordance with e2v's instructions and/or recommendations.

This warranty does not apply to expendable or consumable parts whose normal life expectancy is less than one (1) year. Replacement parts and repairs are warranted for ninety (90) days from the date of shipment.

e2v shall be released from all obligations under this warranty in the event that persons other than its own or authorised service personnel make repairs or modifications, or if the warranty claim results from misuse of the product. No agent, employee or representative of e2v may bind e2v to any affirmation, representation or modification of this warranty concerning the goods sold under this contract.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF. e2v SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

8.2 Exclusive Remedy

It is expressly agreed that the Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of e2v, or for any other cause of action, shall be the repair and/or replacement, at e2v's option, of any equipment or parts thereof, that after examination by e2v are proven to be defective. Replacement equipment and/or parts will be provided at no cost to the purchaser, F.O.B. e2v's plant. Failure of e2v to successfully repair any non-conforming product shall not cause the remedy established hereby to fail of its essential purpose.

8.3 Exclusion of Consequential Damages

PURCHASER SPECIFICALLY UNDERSTANDS AND AGREES THAT UNDER NO CIRCUMSTANCES WILL e2v BE LIABLE TO PURCHASER FOR ECONOMIC, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES OF ANY KIND WHATSOEVER INCLUDING, BUT NOT LIMITED TO, LOSS OF ANTICIPATED PROFITS AND ANY OTHER LOSS CAUSED BY REASON OF THE NON-OPERATION OF THE GOODS. THIS EXCLUSION IS APPLICABLE TO CLAIMS FOR BREACH OF WARRANTY, TORTIOUS CONDUCT OR ANY OTHER CAUSE OF ACTION AGAINST e2v.

9. SPECIFICATIONS

DATA SHEET
CAMERA SPECIFICATION

Mi-TIC

CAMERA ORDER CODES

Code	Resolution	Buttons	Frame rate
MI-160-1	160x120	1	30Hz
MI-169-1	160x120	1	9Hz
MI-160-3	160x120	3	30Hz
MI-169-3	160x120	3	9Hz
MI-320-1	320x240	1	30Hz
MI-329-1	320x240	1	9Hz
MI-320-3	320x240	3	30Hz
MI-329-3	320x240	3	9Hz

WARRANTY

24-month warranty as standard (Rechargeable battery pack excluded - Warranty for 12 months).

Warranty can be extended for up to an additional three years at the time of purchase (exclusions apply).

ENVIRONMENTAL DATA

Thermal conditions	The camera has been designed to operate: • continuously between -20°C (-4°F) and +85°C (185°F) or • 150°C (300°F) for 15 minutes • 260°C (500°F) for 7 minutes
Sealing	IP67, will withstand short-term immersion in water
Impact	The camera will withstand a drop from a height of 2m (78 inches) onto concrete
Storage	It is recommended that for maximum effective operational life, the storage temperature is kept between -20°C (-4°F) and +40°C (104°F)

OPTICAL DATA

Detector

Sensor type	Un-cooled Microbolometer
Sensor material	Amorphous Silicon (ASI)
Resolution	MI-160 : 160 x 120px; MI-320 : 384 x 298px
Pixel size	25µ
Spectral response	8 – 14µm
MDTD	70 mK (0.07°C) typical (Minimum Discernible Temperature Difference)
Dynamic range	-40°C to 1100°C (-40°F to 2000°F)
Refresh rate	120Hz for 160x120 sensor, 60 Hz for 384x288 sensor
Direct Temperature Measurement (DTM)	-40°C to 1100°C (-40°F to 2000°F)

Lens

Lens material	Germanium
Focal length	1m to infinity, optimised at 4m (3 ft to infinity, optimised at 13 ft)
Aperture	f/1.0
Field of view	50° horizontal, 37.5° vertical

Display

Type	High grade, industrial, colour TFT active matrix LCD
Size	69mm (2.7 inches)
Pixel format	QVGA 320 x 240, (each pixel RGB format, total pixels 230,400 pixels)
Video input	Sensor synchronised direct digital drive
Backlight	400cd/m2

MECHANICAL DATA

Camera dims (H x W x D)	203mm x 96mm x 85mm (without Picatinny rail)
Camera weight	600g (21 oz) without battery 765g (27 oz) with std battery 855g (30 oz) with high capacity battery
Battery dims (H x W x D)	87mm x 76mm x 28mm (std battery) 87mm x 76mm x 35mm (high capacity battery)
Battery weight	165g (6oz) (std battery) 255g (9oz) (high capacity battery)
Charger dims (H x W x D)	167mm x 112mm x 120mm
Charger weight	550g (1lb and 3 oz)
Main camera body	Radel®R-5100 and Santoprene®
LCD window	Ultrason® E 2010 HC
LCD bumper	Santoprene®
GE Window collar	Radel®R-5100 and Santoprene®
Lens window	Germanium (2mm thick) with durable coating

ELECTRICAL DATA

Power consumption	<3 W typical
Start-up time	5 seconds typical
Battery type	Lithium Iron Phosphate Rechargeable Battery
Battery capacity	1100 mAh, 6.6V (std battery); 2500mAh, 6.6V (high capacity battery)
Std Battery life	In excess of 2hrs @ ambient temperature (22°C, 72°F)
Std Battery charge time	Less than 2 hours
High Capacity Battery Life	In excess of 5hrs @ ambient temperature (22°C, 72°F)
High Cap, Battery charge time	Less than 4.5 hours
Battery recharge cycles	Over 1000 cycles
Battery sealing	IP67
Battery charging temp.	5°C to 40°C (41°F to 104°F)
Charger input voltage	11V – 30V DC (12V and 24V vehicle systems)
Charger operating temp.	0°C to 40°C (32°F to 104°F)

COMPLIANCE DATA

Safety	IEC 60950-1 and related national standards (Tamb +90°C max) ANSI/ISA 12.12.01:2007 Class I, Division 2, Groups C, D T4. -25°C (-13°F) to +70°C (158°F)
Emissions RFI/EMC	BS EN 61000-6-3:2007 + A1:2011, BS EN 50498:2010, ICES-003(2012), FCC CFR-47 Subpart B, AUS/NZ 4251.1
Immunity	BS EN 61000-6-2:2005, BS EN 50498:2010
Vibration/Shock	BS EN 60721-3-2 Class 2M3
RoHS	All parts of the system are compliant with EU directive 2011/65/EC

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DATA SHEET
CAMERA SPECIFICATION

CAMERA ORDER CODES

Code	Resolution	Buttons	Frame rate
MI-320-1-NFPA	320x240	1	30Hz
MI-329-1-NFPA	320x240	1	9Hz
MI-320-3-NFPA	320x240	3	30Hz
MI-329-3-NFPA	320x240	3	9Hz

WARRANTY

24-month warranty as standard (Rechargeable battery pack excluded - Warranty for 12 months).

Warranty can be extended for up to an additional three years at the time of purchase (exclusions apply).

ENVIRONMENTAL DATA

Thermal conditions	The camera has been designed to operate: • continuously between -20°C (-4°F) and +85°C (185°F) or • 150°C (300°F) for 15 minutes • 260°C (500°F) for 7 minutes
Sealing	IP67, will withstand short-term immersion in water
Impact	The camera will withstand a drop from a height of 2m (78 inches) onto concrete
Storage	It is recommended that for maximum effective operational life, the storage temperature is kept between -20°C (-4°F) and +40°C (104°F)

OPTICAL DATA

Detector

Sensor type	Un-cooled Microbolometer
Sensor material	Amorphous Silicon (ASI)
Resolution	384 x 288px
Pixel size	25µ
Spectral response	8 – 14µm
MDTD	70 mK (0.07°C) typical (Minimum Discernible Temperature Difference)
Dynamic range	-40°C to 1100°C (-40°F to 2000°F)
Refresh rate	60 Hz
Direct Temperature Measurement (DTM)	-40°C to 1100°C (-40°F to 2000°F)

Lens

Lens material	Germanium Composite
Focal length	1m to infinity, optimised at 4m (3 ft to infinity, optimised at 13 ft)
Aperture	f/1.0
Field of view	50° horizontal, 37.5° vertical

Display

Type	High grade, industrial, colour TFT active matrix LCD
Size	69mm (2.7 inches)
Pixel format	QVGA 320 x 240, (each pixel RGB format, total pixels 230,400 pixels)
Video input	Sensor synchronised direct digital drive
Backlight	400cd/m2

MECHANICAL DATA

Camera dims (H x W x D)	203mm x 98mm x 71mm (without Picatinny rail)
Camera weight	580g (21 oz) without battery 755g (27 oz) with std battery 835g (29 oz) with high capacity battery
Battery dims (H x W x D)	88mm x 76mm x 27mm (std battery) 88mm x 76mm x 35mm (high capacity battery)
Battery weight	175g (6 oz) (std battery) 255g (9 oz) (high capacity battery)
Charger dims (H x W x D)	167mm x 112mm x 120mm
Charger weight	550g (19 oz)
Main camera body	Radel®R-5100 and Santoprene®
LCD window	Ultrason® E 2010 HC
LCD bumper	Santoprene®
GE Window collar	Radel®R-5100 and Santoprene®
Lens window	Germanium (2mm thick) with durable coating

ELECTRICAL DATA

Power consumption	<3 W typical
Start-up time	5 seconds typical
Battery type	Lithium Iron Phosphate Rechargeable Battery
Battery capacity	1100 mAh, 6.6V (std battery); 2500mAh, 6.6V (high capacity battery)
Std Battery life	In excess of 2hrs @ ambient temperature (22°C, 72°F)
Std Battery charge time	Less than 2 hours
High Capacity Battery Life[1]	In excess of 5hrs @ ambient temperature (22°C, 72°F)
High Cap, Battery charge time[1]	Less than 4.5 hours
Battery recharge cycles	Over 1000 cycles
Battery sealing	IP67
Battery charging temp.	5°C to 40°C (41°F to 104°F)
Charger input voltage	11V – 30V DC (12V and 24V vehicle systems)
Charger operating temp.	0°C to 40°C (32°F to 104°F)

COMPLIANCE DATA

Performance	NFPA 1801 - 2013 Standard on Thermal Imagers for Fire Services
Safety	IEC 60950-1 and related national standards (Tamb +80°C max) ANSI/ISA 12.12.01:2007 Class I, Division 2, Groups C, D T4. -25°C (-13°F) to +70°C (158°F)
Emissions RFI/EMC	BS EN 61000-6-3:2007 + A1:2011, BS EN 50498:2010, ICES-003(2012), FCC CFR-47 Subpart B, AUS/NZ 4251.1
Immunity	BS EN 61000-6-2:2005, BS EN 50498:2010
Vibration/Shock	BS EN 60721-3-2 Class 2M3