

Mi-TIC User Manual

argus[®]
thermal imaging from Avon Protection

Mi-TIC **E**[™]

Mi-TIC **S**[™]



www.argusdirect.com

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1 SAFETY AND REGULATORY INFORMATION

Before using this product, the customer shall read and understand all the instructions and warnings. Avon Protection 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 Avon Protection 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
- MI-320-1-E
- MI-329-1-E
- MI-320-3-E
- MI-329-3-E

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 ARG_MI_BLPN, ARG_MI_BLPYN or ARG_MI_BLPXN batteries.

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_BLP SN, ARG_MI_BLP YN or ARG_MI_BLP XN 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.
- Avon Protection recommends that the argus® Mi-TIC camera is stored in the supplied package or an alternative case supplied by Avon Protection.
- 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
- LASER Warning and Safety Measures

Observe all appropriate country-specific safety measures for the use of class 3R laser equipment. Never aim the laser at a person's eyes as this may cause permanent damage. This Laser must only be used by properly trained personnel.



2 INTRODUCTION

The argus® Mi-TIC E and Mi-TIC S are the latest generation of the argus® Thermal Imaging Camera (TIC) from Avon Protection. With over 35 years experience in fire-fighters' thermal imaging, argus 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 E and Mi-TIC S have 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 E and Mi-TIC S are 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 E and Mi-TIC S are 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 E and Mi-TIC S are 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 up to 1100°C / 2000°F (Mi-TIC S, Mi-TIC); 760°C / 1400°F (Mi-TIC E)
- Up to 7 application specific colour modes (Fire, Overhaul, Size Up, Inspection, White Hot, Missing Persons and Black Hot)
- Customisable Start-up Screen
- X2 and X4 Zoom
- Time and Date
- Configurable function buttons
- User Replaceable Germanium window.
- Image capture/playback and video capture with embedded storage of up to 1000 images and 8 hours of video.
- Laser Pointer (Mi-TIC S only)
- Electronic Compass (Mi-TIC S only)
- Heat and Cold Seeker (Mi-TIC S only)

**The following versions are subject to export controls.
An export licence will be required if exported outside the EU.
MI-320-n-xxxxx**

**The following versions are exempt from export controls.
MI-329-n-xxxxx**

n = 1 (1 button) or 3 (3 button); xxxx = NFPA, E or S

3 OPERATION AND USE

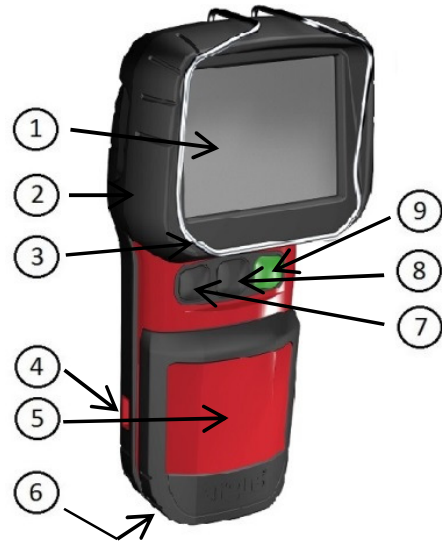
3.1 System Configuration (Camera Rear)

Mi-TIC E



1. 2.7" LCD Display
 2. Display Bumper
 3. Pocket Clip (removable)
 4. Docking latch
 5. Battery
 6. Docking connector
 7. Function button 1 (Zoom, Video *)
 8. Function button 2 (Application Mode, Image*)
 9. Green ON/OFF Button
 10. Lanyard Loops
- *default settings

Mi-TIC S



1. 3.5" LCD Display
2. Display Bumper
3. Pocket Clip (removable)
4. Docking latch
5. Battery
6. Docking Connector
7. Function button 1 (Zoom, Video *)
8. Function button 2 (Application Mode, Image*)
9. Green ON/OFF Button

3.2 System Configuration (Camera Front)

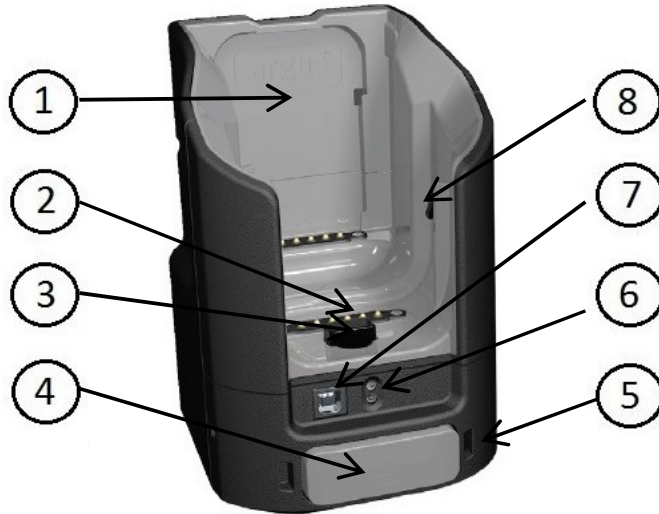


1. Replaceable Germanium Window
2. Window Release Latch



1. Laser pointer
2. Lanyard Loops
3. Replaceable Germanium Window
4. Window Release Latch

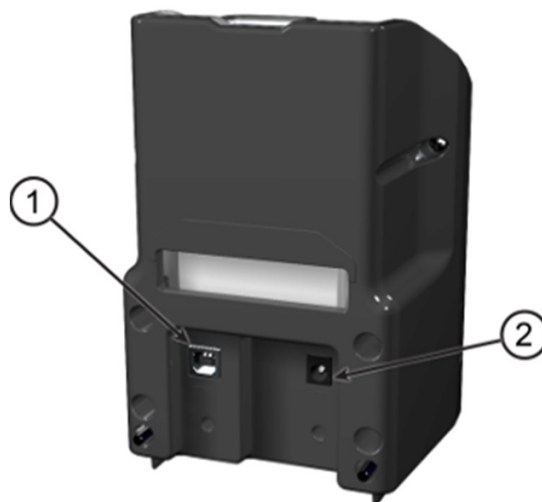
3.3 System Configuration (Charger Front)



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

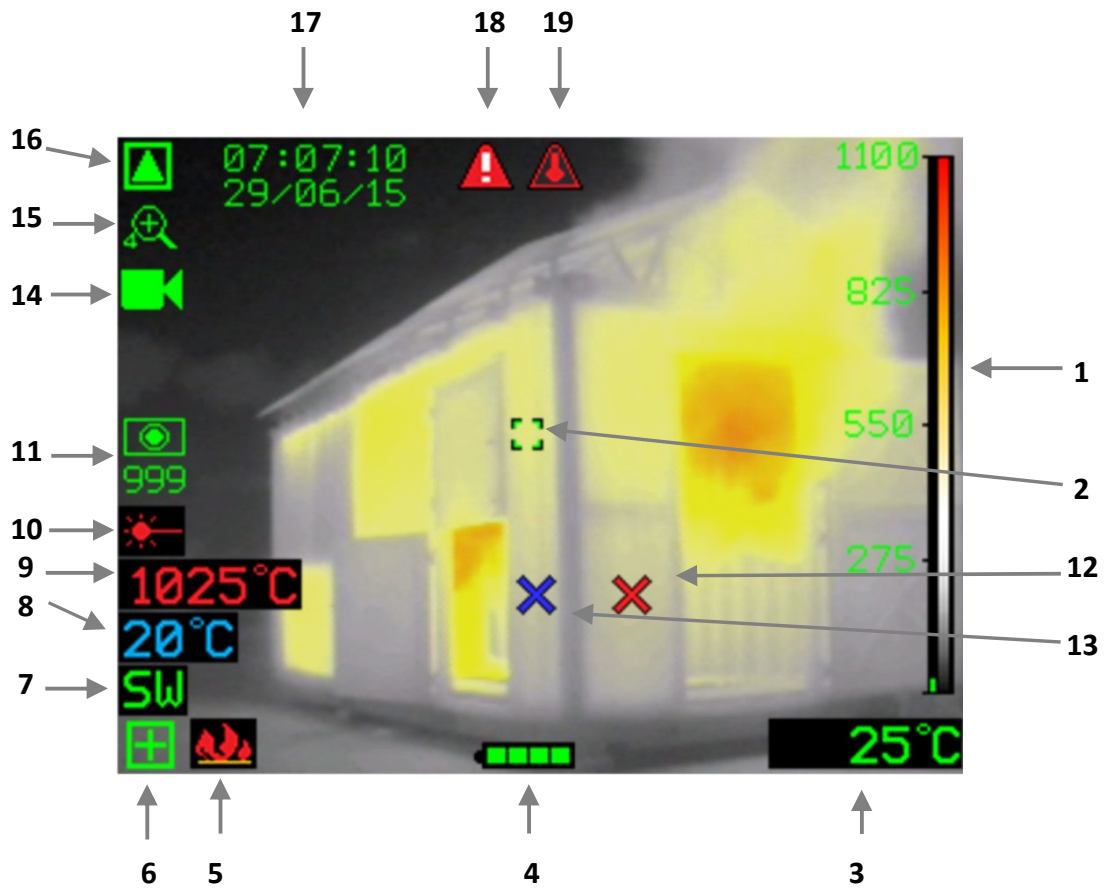
Up to six chargers can be powered in a “daisy chain” configuration. Connections should be made via the green power connectors located underneath the removable front cover. The “daisy chain” power circuit contains a replaceable 10 A fuse. This is also located underneath the removable front cover. See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

3.4 System Configuration (Charger Rear)



1. USB port (rear)
2. Power connector (single charger only)

3.5 Display



- | | |
|-------------------------------------|------------------------------------|
| 1. Colour reference bar | 11. Image Capture |
| 2. Spot Temperature Target | 12. Heat Seeker Marker* |
| 3. Spot Temperature Reading | 13. Cold Seeker Marker* |
| 4. Battery Bar | 14. Video Capture |
| 5. Application mode | 15. Zoom |
| 6. Operational Format | 16. Low Sensitivity Mode |
| 7. Compass* | 17. Time and Date |
| 8. Cold Seeker Temperature Reading* | 18. General System Failure Warning |
| 9. Heat Seeker Temperature Reading* | 19. Over Temperature Warning |
| 10. Laser Pointer* | |

* Mi-TIC S only

3.6 Getting Started

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

- Camera with pocket clip fitted
- 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)
- Universal Mounting Plate for Charger with 2 mounting screws
- 3 mm hex key (for attaching charger to Universal Mounting Plate)
- 2.5mm hex key (for attaching Picatinny rail – Mi-TIC only)
- 2 mm hex key (for attaching pocket clip and lanyard loop – MI-TIC and Mi-TIC E only)

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.

3.7 Camera Features

3.7.1 Application Modes

The argus® Mi-TIC E and Mi-TIC S have up to seven application modes:

FIRE



Used for attack and rescue in large, fully developed fires.

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 / 300°F.



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

The colourisation is fixed and independent of camera sensitivity mode.

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

Colour	Range °C	Range °F
Greyscale	-40°C - 150°C	-40°F - 300°F
Yellow	150°C – 500°C	300°F - 930°F
Orange	500°C – 600°C	930°F - 1100°F
Red	600°C – 760°C (Mi-TIC E) 600°C – 1100°C (Mi-TIC) 600°C – 1100°C (Mi-TIC S)	1100°F – 1400°F (Mi-TIC E) 1100°F – 2000°F (Mi-TIC) 1100°F – 2000°F (Mi-TIC S)

OVERHAUL



Used for checking for hot spots after the fire is out.

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.



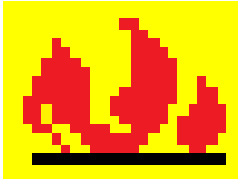
Where there is no significantly warmer area, no red or yellow shows.

The colour reference bar has no temperature scale.

	Range °C	Range °F
Red	Hottest 2%	
Yellow	Next hottest 5%	
Dynamic range	-40°C - 760°C (Mi-TIC E) 600°C – 1100°C (Mi-TIC) 600°C – 1100°C (Mi-TIC S)	-40°F - 1400°F (Mi-TIC E) 1100°F – 2000°F (Mi-TIC) 1100°F – 2000°F (Mi-TIC S)

This function is part of the TI BASIC PLUS operational format (see 3.10)

SIZE UP



Used to easily locate the fire from outside of a structure.

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

This mode features a limited dynamic range of 250°C / 480°F so that yellow colourisation comes in earlier at 80°C / 180°F.



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

The colourisation is fixed and independent of camera sensitivity mode.

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

Colour	Range °C	Range °F
Greyscale	-40 °C – 80 °C	-40 °F – 180 °F
Yellow	80 °C – 180 °C	180 °F – 360 °F
Orange - Red	180 °C – 250 °C	360 °F – 480 °F

This function is part of the TI BASIC PLUS operational format (see 3.10)

INSPECTION



Used for predictive maintenance to check equipment and buildings to help prevent fire.

A white hot, full colour scale (black, blue, purple, orange, yellow through to white), expanded to cover the dynamic range of the scene.



The colour reference bar has no temperature scale.

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

	Range °C	Range °F
Dynamic range	-40°C - 760°C (Mi-TIC E)	-40°F - 1400°F (Mi-TIC E)
	600°C - 1100°C (Mi-TIC)	1100°F - 2000°F (Mi-TIC)
	600°C - 1100°C (Mi-TIC S)	1100°F - 2000°F (Mi-TIC S)

This function is part of the TI BASIC PLUS operational format (see 3.10)

WHITE HOT



Used for general search, with no colourisation.

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



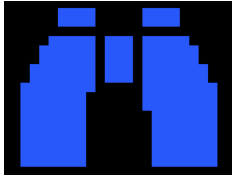
The colour reference bar has no temperature scale.

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

	Range °C	Range °F
Dynamic range	-40°C - 760°C (Mi-TIC E) 600°C – 1100°C (Mi-TIC) 600°C – 1100°C (Mi-TIC S)	-40°F - 1400°F (Mi-TIC E) 1100°F – 2000°F (Mi-TIC) 1100°F – 2000°F (Mi-TIC S)

This function is part of the TI BASIC PLUS operational format (see 3.10)

MISSING PERSONS



Used for searching for people in landscapes, buildings or traffic accident scenes.

A blue-hot grey scale, expanded to cover a limited dynamic of the scene between -40°C - 80°C (-40°F - 180°F).



The colour reference bar has no temperature scale.

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

	Range °C	Range °F
Blue	Hottest 10%	
Dynamic range	-40°C - 80°C	-40°F - 180°F

This function is part of the TI BASIC PLUS operational format (see 3.10)

BLACK HOT (only available on -C variant)



Used for general search

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

The colour reference bar has no temperature scale.

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

	Range °C	Range °F
Dynamic range	-40°C - 760°C (Mi-TIC E) 600°C – 1100°C (Mi-TIC) 600°C – 1100°C (Mi-TIC S)	-40°F - 1400°F (Mi-TIC E) 1100°F – 2000°F (Mi-TIC) 1100°F – 2000°F (Mi-TIC S)

Note: The camera always starts up in FIRE mode. On 3-button cameras, to cycle through the application modes, press the function button assigned to application mode. By default, this is the centre function button.

This function is part of the TI BASIC PLUS operational format (see 3.10)

3.7.2 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 or 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 6.2).

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 -40°C and $+1100^{\circ}\text{C}$ (-40°F and $+2000^{\circ}\text{F}$).
- 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.

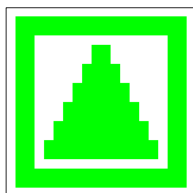
3.7.3 Tri-Mode Sensitivity

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

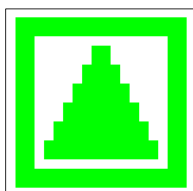
The Argus[®] Mi-TIC will operate in High Sensitivity mode under normal operating conditions. This mode produces a clear image with lots of detail and low levels of noise. The temperature range for this mode is between -40°C and 150°C (-40°F and 302°F).

- Low Sensitivity Mode



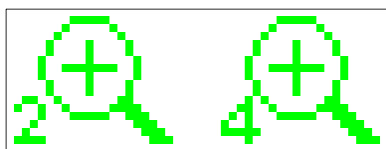
The Argus® Mi-TIC will automatically switch to Low Sensitivity mode when higher temperatures have been detected, a small green triangle symbol will be displayed in the top left corner to indicate this. The image produced will still be clear with lots of detail, although some additional noise will be 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 (Mi-TIC S, Mi-TIC); 760°C / 1400°F (Mi-TIC-E).

3.7.4 Zoom

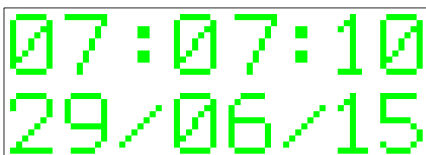


A short press on the left-hand function button operates the zoom feature. The zoom symbol, magnifying glass, will appear on the left-hand side of the display.

The temperature measurement sample window is also expanded to suit.

This function is part of the TI BASIC PLUS operational format (see 3.9)

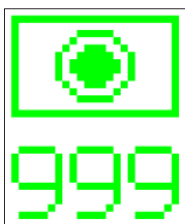
3.7.5 Time and Date



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).

3.7.6 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).

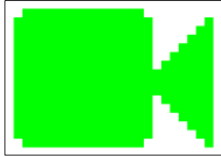
To capture an image, press the function button assigned to image capture (see section 6.9 for function button set-up).

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 3.9)

3.7.7 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 3.9)

3.7.8 Image Freeze

Image freeze allows the fire-fighter to pause the image on the screen to analyse in more detail. This can be assigned to both short and long button functions.

On a short press the image is frozen until the button is pressed again, or a timeout of 15 seconds is reached.

On a long press the image is frozen until the button is released.

This function is part of the TI BASIC PLUS operational format (see 3.9)

3.7.9 Image Playback

Image playback allows fire-fighters to review images at the scene.

Once in image playback mode, the following button functions will apply

Left button press	Previous image
Left button hold	Skip backwards 5 images
Centre button press	Next image
Centre button hold	Skip forwards 5 images
Green button	Return to normal operation(TI BASIC mode)

This function is part of the TI BASIC PLUS operational format (see 3.9)

3.7.10 Video Playback

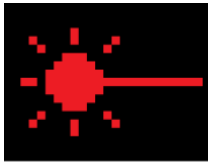
Video playback allows fire-fighters to review video at the scene.

Once in video playback mode, videos will play automatically and the following button functions will apply

Left button short press	Restart current video
Left button double press (within 3 seconds)	Previous video
Left button hold	Skip backwards 5 videos
Centre button press	Next video
Centre button hold	Skip forwards 5 videos
Green button	Return to normal operation(TI BASIC mode)

This function is part of the TI BASIC PLUS operational format (see 3.9)

3.7.11 Laser Pointer



A built-in laser pointer to aid fire-fighters with communication when identifying hot spots.*

This function is part of the TI BASIC PLUS operational format (see 3.9)

For safety reasons the laser has a 10 second timeout

*Mi-TIC S only

3.7.12 Electronic Compass




An electronic compass provides improved situational awareness by displaying N, NE, E, SE, S, SW, W or NW depending on which way the camera is pointing.*


*Mi-TIC S only

The compass will work within 45 degrees from vertical in both axes.

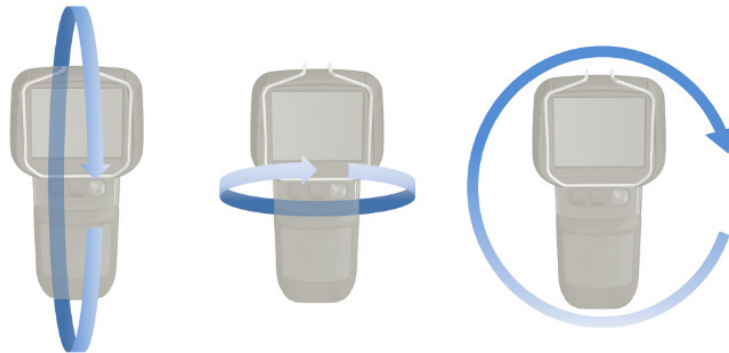


When the camera is tilted past 45 degrees, the tilt symbol  is displayed instead of the heading.

The Camera's compass must be calibrated with each battery, to compensate for any magnetic offsets.

When a compass requires calibration the calibrate symbol  is displayed.

The camera must then be rotated through all axes, as shown below.



When the calibration has been successful, the heading will be displayed in yellow for 10 seconds, and then turn back to the standard green heading.

These settings will be saved for future use, therefore when the camera is restarted the compass will be displayed immediately.

If during use the compass is rotated through all the axes and a completed calibration is performed, the compass will save the new calibration and turn yellow for 10 seconds.

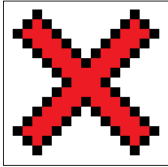
If during use, the compass appears inaccurate, this recalibration routine can be performed to ensure accuracy.

Warning:

The accuracy of the magnetic compass will depend on correct calibration and isolation from external magnetic interference. Interference can be caused by, but not limited to, soft iron structures and electrical equipment. The compass should be used as an aid only and not relied on as a primary means of navigation.

This function is part of the TI BASIC PLUS operational format (see 3.9)

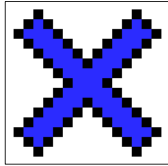
3.7.13 Heat Seeker and Cold Seeker



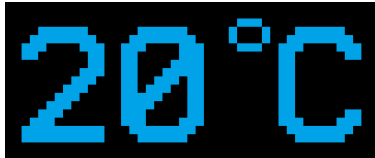
The red crosshair immediately indicates the hottest part of the scene. The temperature of the hottest part can be reported.*



1025°C



The blue crosshair immediately indicates the coldest part of the scene. The temperature of the coldest part can be reported.*



20°C

*Mi-TIC S only

The reported temperature can be configured to display either the tracker temperatures or the standard center spot temperature

The camera can be configured to display the hot tracker, cold tracker, or both simultaneously. These can be set to scroll through on a button press using the configuration tool (see section 6.7).

This function is part of the TI BASIC PLUS operational format (see 3.9)

3.8 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:

3.8.1 Over-temperature Warning

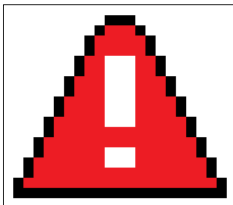


The internal temperature of the camera is above the correct operating range. The camera must be turned off to cool down and prevent permanent damage.

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.

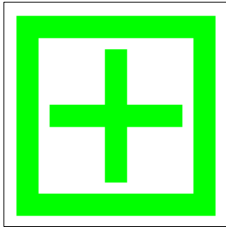
3.8.2 General System Failure Warning



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 Avon Protection representative.

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

3.9 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 'OVERHAUL' Application Mode as detailed in section 3.7.1
- The 'SIZE UP' Application Mode as detailed in section 3.7.1
- The 'INSPECTION' Application Mode as detailed in section 3.7.1
- The 'WHITE HOT' Application Mode as detailed in section 3.7.1
- The 'MISSING PERSONS' Application Mode as detailed in section 3.7.1
- The 'BLACK HOT' Application Mode as detailed in section 3.7.1
- Zoom as detailed in section 3.7.4
- Image Capture as detailed in section 3.7.6
- Video Capture as detailed in section 3.7.7
- Laser Pointer as detailed in section 3.7.8
- Electronic Compass as detailed in section 3.7.9
- Heat Seeker and Cold Seeker as detailed in 3.7.10

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

3.10 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 or Size Up mode) or relative temperature (Overhaul, Inspection, WH, Missing Persons or BH 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. Overhaul 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_BLPYN or ARG_MI_BLPSN). These battery type power the camera for over 2 hours from a full charge regardless of operating mode (e.g. video recording) and camera type. 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:

	Battery Type		
Camera Type	ARG_MI_BLPYN ARG_MI_BLPSN ARG_MI_BLPXN	ARG_MI_BLPL Optional non NFPA approved	ARG_MI_BAA Optional non NFPA approved
MI-32X-X-S	2h10	5h10	4h20
MI-32X-X-E MI-32X-X-NFPA	2h30	6h00	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.



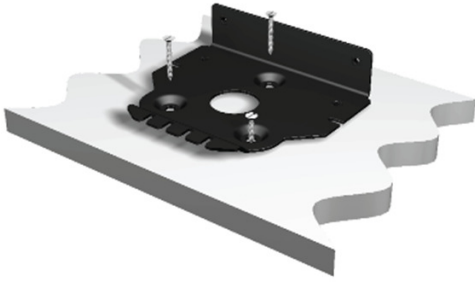
4.3 Argus® Mi-TIC Charger Station Fixed / Vehicle Installation

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 “daisy chain” 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 “daisy chain” 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 as shown e.g. small flat screwdriver (not supplied).

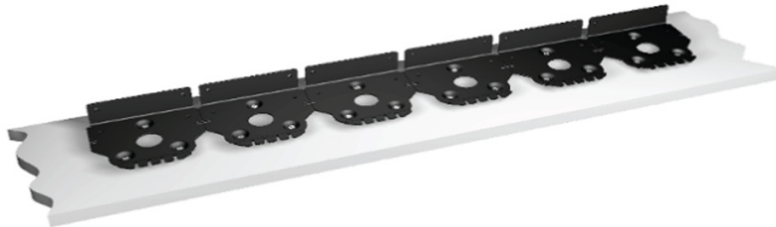


4. Hook the charger station on to the universal mounting plate.
5. Fasten the charger station to the universal mounting plate with the M4 x 30 mounting screws using the 3 mm hex key as shown.
6. Replace the front panel on the charger station.

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

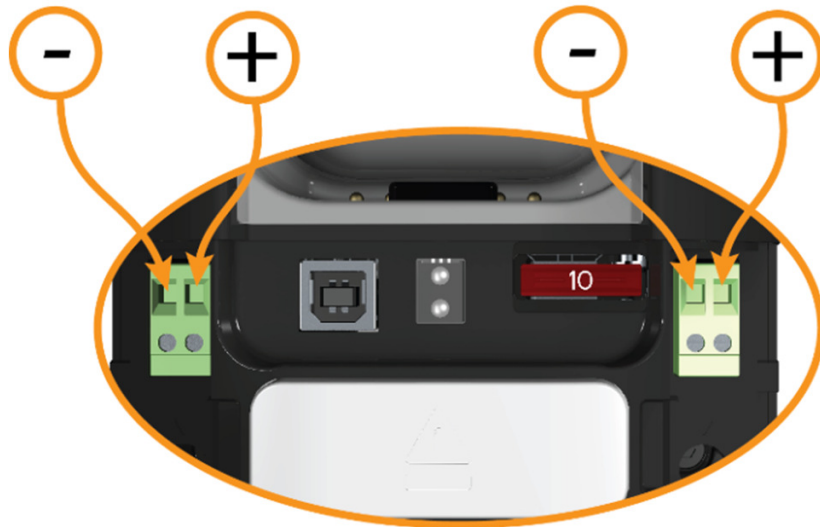


Connections should be made via the green power connectors located underneath the removable front cover. The “daisy chain” power circuit contains a replaceable 10A fuse. This is also located underneath the removable front cover.



1. Remove the front panels of the charger stations to be connected.

- 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.



- 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 embedded storage which is used for:

- Changing the start-up image
- Storing images
- Storing videos
- 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.

- 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.

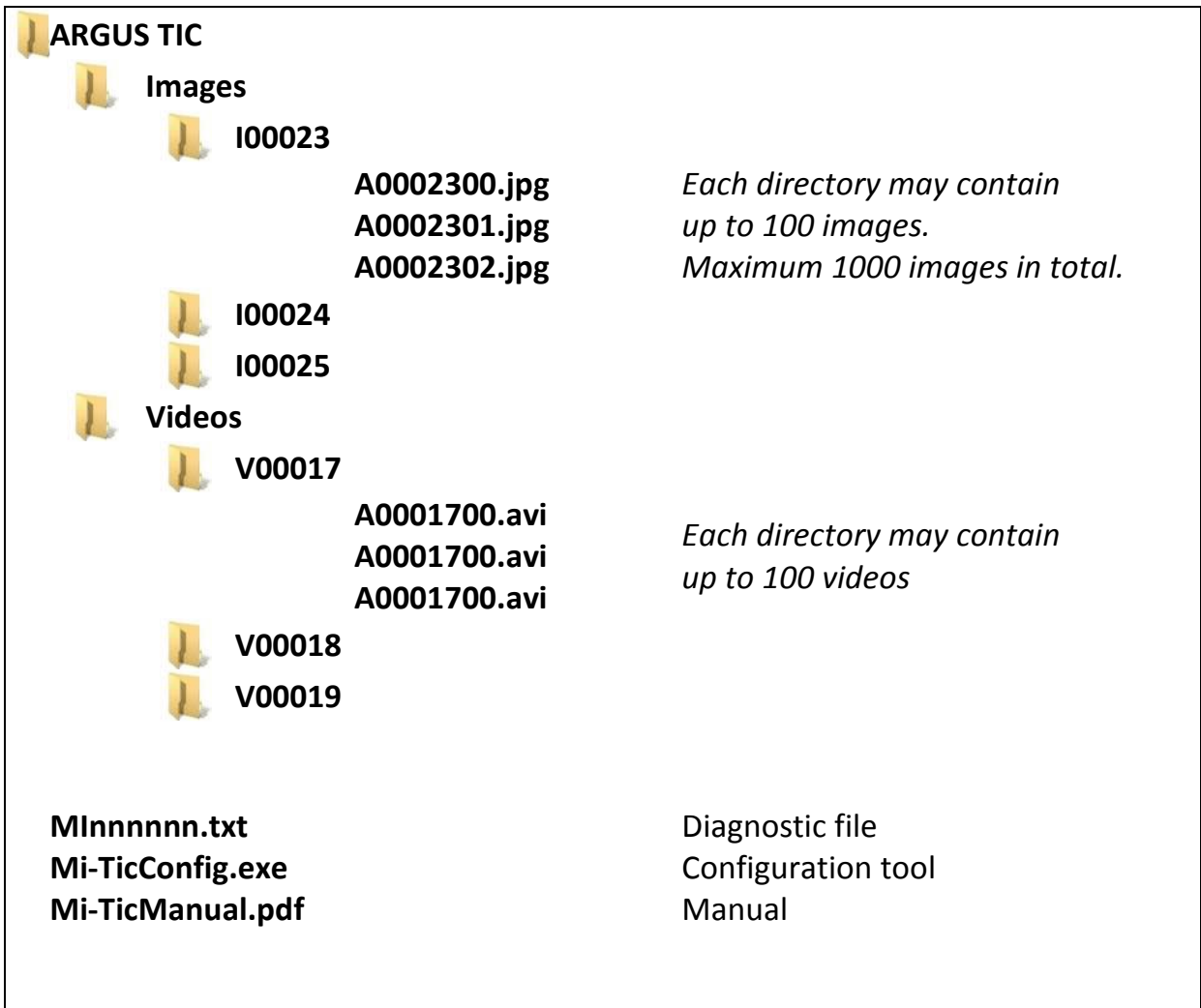
In the event that the splash screen fails to load into the camera, the camera will rename the image to ERRSPLASH.BMP. Providing the settings described above are adhered to, the custom start-up image can be loaded into the camera.

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



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:

MIxxxxxx.txt

(xxxxxx is the camera serial number)

The diagnostic file contains information about the camera which may be useful to Avon Protection in diagnosing any camera faults. Avon Protection may ask you to copy this file from the memory card to a computer and send it by email to Avon Protection 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 / Win 8. This allows the user to perform the following tasks:

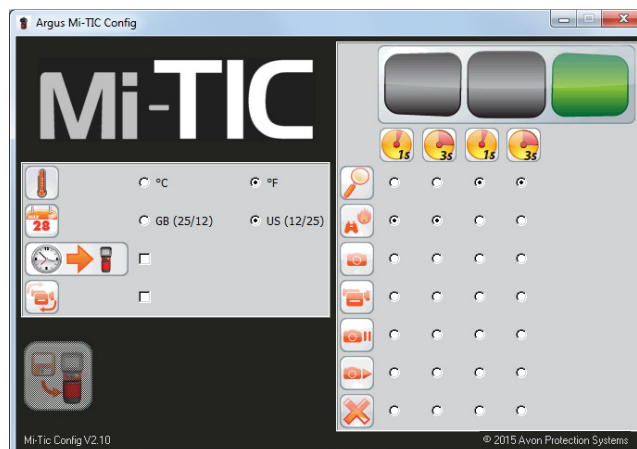
- Set the temperature units to either °C or °F.
- Set the time and date format and synchronise the time and date with the PC
- Enable "black box" video recording
- Enable electronic compass
- Enable Heat Seeker and Cold Seeker
- Customise the operation of the camera's function buttons to control:
 - Zoom
 - Fire, Overhaul, Size Up, Inspection, White Hot, Missing Persons or Black Hot (-C variant only) Application Modes
 - Image Freeze
 - Image Capture
 - Video Record
 - Image Playback
 - Video Playback
 - Laser Pointer*

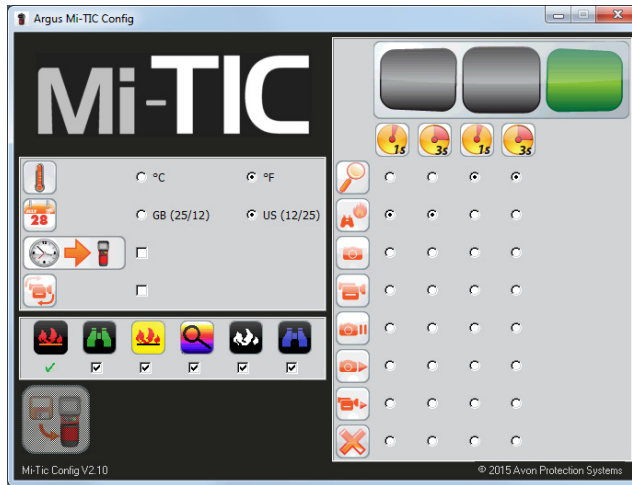
6.1 Running the Configuration Tool

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'. The camera type is automatically recognised.





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 Synchronizing the Time and Date with the PC

Check the "Synchronize 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

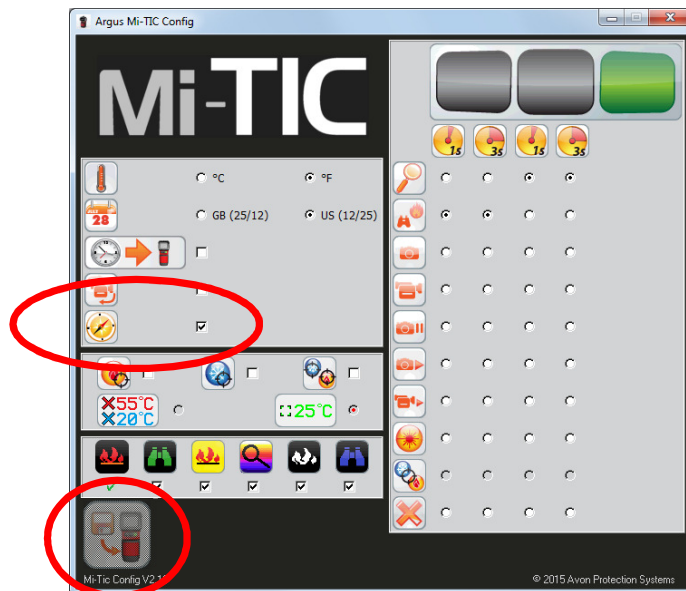
Check the “Black Box Video Recording” box, then click the ‘Save Changes’ button. Eject the camera from the charger dock. Do not switch the camera off and back on again. The new settings will be enabled.

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



6.6 Electronic Compass

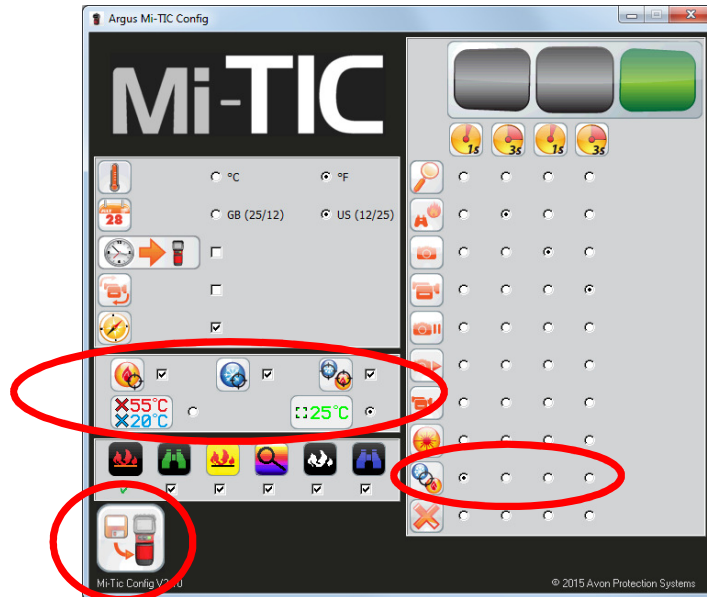
Check the “Black Box Video Recording” box, then click the ‘Save Changes’ button. Eject the camera from the charger dock. Do not switch the camera off and back on again. The new settings will be enabled.



Warning: When the compass is ENABLED, the camera will start up in TI BASIC PLUS MODE

6.7 Heat Seeker and Cold Seeker

Check the “Heat Seeker” box, “Cold Seeker” box or “Heat and Cold Seeker” box to enable trackers. Check the Tracker Temperature box or Spot temperature 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.



6.8 Application Modes

Check the application modes to be enabled, 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.



6.9 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
- Cycle through selected Application Modes (Fire, Overhaul, Size Up, Inspection, White Hot, Missing Persons or Black Hot (-C variant only))
- Image Freeze
- Image Capture
- Video Record
- Image Playback
- Video Playback
- Laser Pointer*
- Heat Seeker / Cold Seeker*

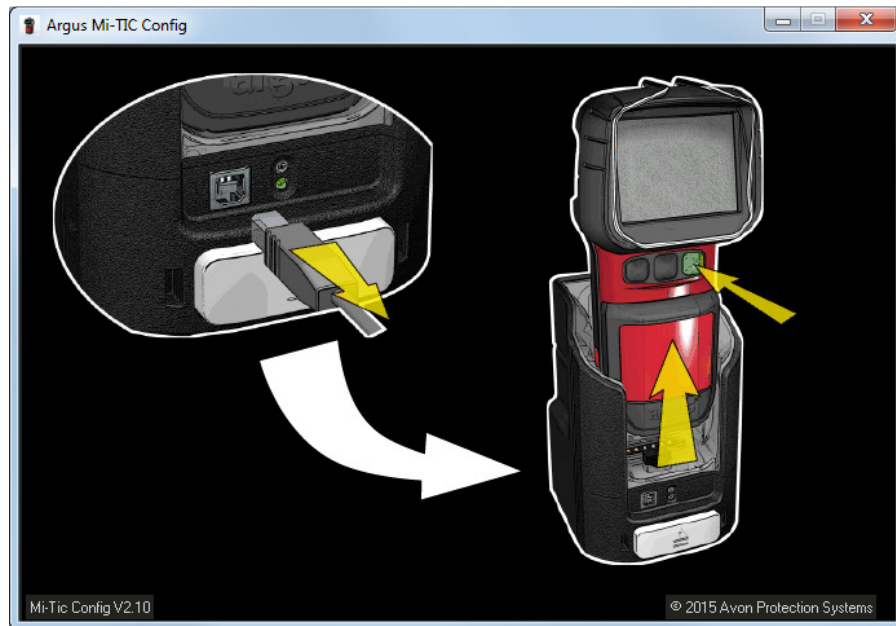
*Mi-TIC S only

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.



6.10 Restart

If the Configuration Tool cannot identify the camera, remove the camera from the docking station and restart the camera. This will update the camera identification.



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 LiFePO₄ 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 Avon Protection 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 Avon Protection:

Part No.	Description
ARG_MI_BHC	Mi-TIC Black Hard Carry Case
ARG_MI_BLPSN	Mi-TIC Rechargeable Battery
ARG_MI_BLPXN	Mi-TIC Rechargeable Battery Xtra
ARG_MI_BLPYN	Mi-TIC Rechargeable Battery Yellow
ARG_MI_BLPL	Mi-TIC Rechargeable Battery Large
ARG_MI_BAA	Mi-TIC AA battery
ARG_MI_CS	Mi-TIC Charger Station
ARG_MI_DB	Mi-TIC 2.7" Display Bumper
ARG_MI_DB_S	Mi-TIC 3.5" Display Bumper
ARG_MI_LL	Mi-TIC Double Lanyard Loop
ARG_MI_MB	Mi-TIC Charging Shoe Mounting Bracket
ARG_MI_PSU	Mi-TIC Power Supply
ARG_MI_RAIL	Mi-TIC Picatinny Rail
ARG_MI_RL	Mi-TIC Retractable Lanyard
ARG_MI_RWS	Mi-TIC Replacement Ge Window (Short)
ARG_MI_SS	Mi-TIC 2.7" Sunshroud
ARG_MI_PCLIP	Mi-TIC Pocket Clip
ARG_MI_PCLIP_S	Mi-TIC S Pocket Clip
ARG_MI_USB	Mi-TIC USB Lead
P7030NS	Argus Neck Strap
P7030SC	Argus Soft Carry Case

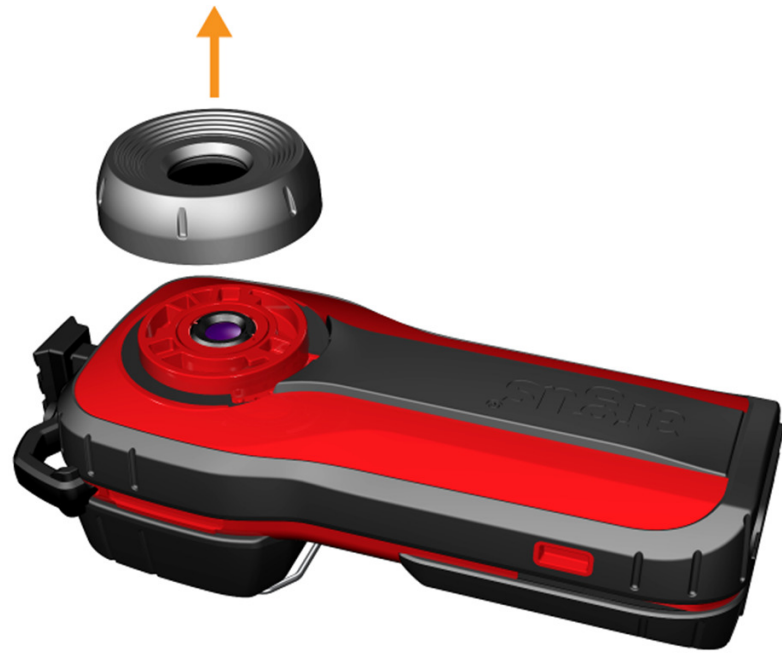
THERE ARE NO OTHER USER SERVICEABLE PARTS. If any damage beyond these parts occurs, return the camera to Avon Protection or an authorised repair centre. Any attempt at repair by unauthorised personnel may cause serious damage and will invalidate the warranty.

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 SPECIFICATIONS

DATA SHEET

CAMERA SPECIFICATION



CAMERA ORDER CODES

Code	Resolution	Buttons	Frame rate
MI-320-1-E	320x240	1	30Hz
MI-329-1-E	320x240	1	9Hz
MI-320-3-E	320x240	3	30Hz
MI-329-3-E	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: <ul style="list-style-type: none"> • continuously between -20°C (-4°F) and +85°C (185°F) or • 150°C (300°F) for 15 minutes • 260°C (500°F) for 5 minutes
Sealing	IP67, will withstand 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	25µm
Spectral response	7.5 – 14µm
MDTD (Full camera system sensitivity)	70 mK (0.07°C) typical (Minimum Discernible Temperature Difference)
NETD (Sensor sensitivity)	<50mK (<0.05°C)
Dynamic range	-40°C to 760°C (-40°F to 1400°F)
Refresh rate	60 Hz
Direct Temperature Measurement (DTM)	-40°C to 760°C (-40°F to 1400°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 96mm x 71mm
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 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 RF/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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CAMERA ORDER CODES

Code	Resolution	Buttons	Frame rate
MI-320-3-S	320x240	3	30Hz
MI-329-3-S	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: <ul style="list-style-type: none"> • continuously between -20°C (-4°F) and +85°C (185°F) or • 150°C (300°F) for 15 minutes • 260°C (500°F) for 5 minutes
Sealing	IP67, will withstand 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	25µm
Spectral response	7.5 – 14µm
MDTD (Full camera system sensitivity)	55mK(0.055°C) typical (Minimum Discernible Temperature Difference)
NETD (Sensor sensitivity)	<50mK (<0.05°C)
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	Highgrade, Industrial, colour TFT active matrix LCD
Size	90mm (3.5 inches)
Pixel format	QVGA 320 x 240, (each pixel RGB format, total pixels 230,400 pixels)
Video input	Sensor synchronised direct digital drive
Backlight	350 cd/m²

MECHANICAL DATA

Camera dims (H x W x D)	216mm x 112mm x 82mm
Camera weight	705g (25 oz) without battery 870g (31 oz) with std battery 960g (34 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 (1 lb 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	<3W 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 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 (T _{amb} +80°C max)
Emissions RFI/EMC	BS EN 61000-6-3:2007 + A1:2011, BS EN 50498:2010, ICES-003(2012), FCC CFR-47 Subpart B, A US/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
Laser	IEC/EN 60825:2014 & 21 CFR 1040.10 & 1040.11 except for deviations pursuant of Laser Notice No. 50, dated June 24, 2007

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