

User Manual

TT-Type



P-Type



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 the Product Safety Sheet PSD776213A for safety and warning notes for the P Type.

Refer to the Product Safety Sheet PSD774946A for safety and warning notes for the TT Type.

1.1 FCC Compliance Information (US)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

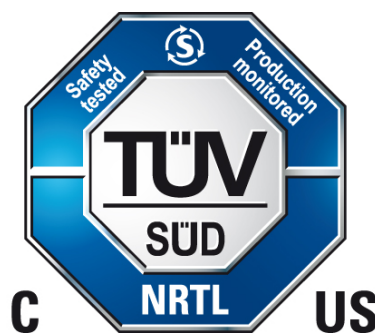
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

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

1.2 Canada Compliance Information

This Class B digital apparatus complies with Canadian ICES-003

1.3 TUV Label



See the product label for EU and other regulatory information

1.4 Camera Warnings/Cautions

- All users should familiarise themselves with the correct operation, functionality and features of the camera before use.
- The camera can only be serviced by authorised personnel. There are no end-user serviceable parts except those described in the maintenance section of this manual.
- Use only the mains power supply or vehicle power leads supplied by Avon Protection.
- Avon Protection technologies recommends that the camera is stored in the supplied package or an alternative case supplied by Avon Protection.
- The lens on P-Type cameras should only be changed in dry conditions to prevent water penetration into the camera.

2 Introduction

The Argus® TT-Type and P-Type are the latest generation of the Argus® Security Thermal Imaging Cameras (TIC) from Avon Protection. With over 30 years experience in thermal imaging, Avon Protection continues to produce high quality, affordable systems designed for person, vehicle and object detection in civilian and industrial security applications.

The Argus® TT-Type and P-Type cameras have been designed with digital imaging technology for a sharper picture and superior performance and use proven uncooled Amorphous Silicon (ASi) Microbolometer Detector technology.

The Argus® TT-Type and P-Type cameras are simple to operate, robust and self-contained with fully automatic operation. No control or adjustment is required in use. They are small, lightweight, ergonomic cameras which can be used for:

- Search and rescue operations involving casualties and fugitives.
- Seeing in zero visibility conditions.
- Detecting border incursions even under the cover of darkness, smoke and various weather conditions.
- Collecting evidence, occupancy evaluation and collision investigation.
- Detecting and displaying the relative temperatures of objects within the scene.

The Argus® TT-Type and P-Type are designed to withstand harsh environments, but contain many high-technology components and should be treated carefully. The cameras have many special features and can be set by the user. These features include:

- X2, X4 Zoom
- Adjustable brightness display
- Shuttered viewfinder with adjustable diopetre (P-Type).
- Direct Temperature Measurement.
- White Hot/Black Hot selection
- Time and Date.
- Customisable Start-up Screen.
- On screen set-up menu.
- Image and video capture/playback on removable memory card

This manual contains information covering operation of the system, user maintenance, care of the product and a full technical specification.

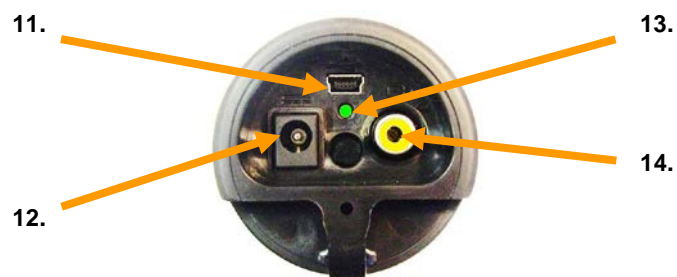
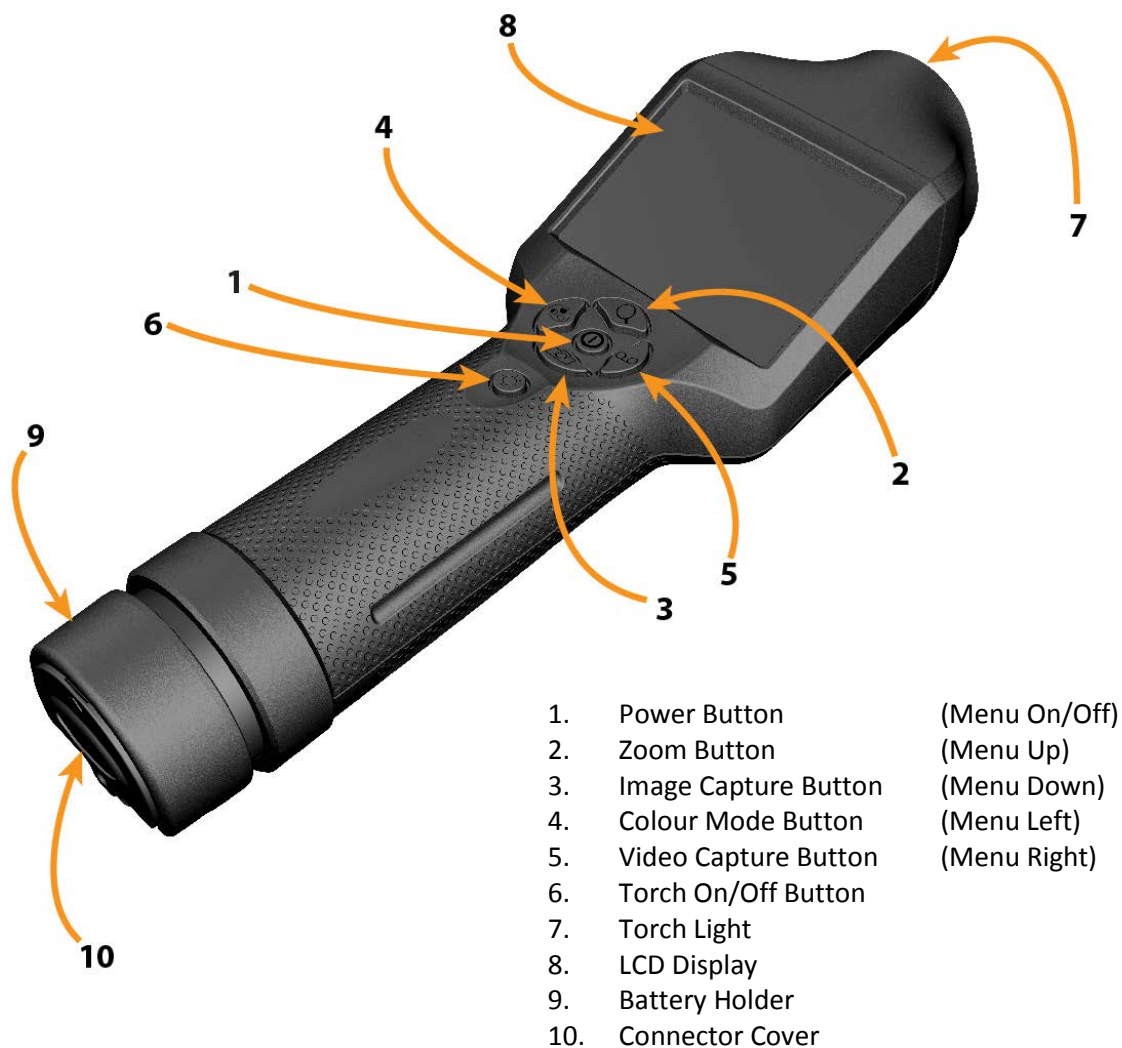
**The following versions are subject to export controls.
An export licence will be required if exported outside the EU.
T*320x or P*320**

**The following versions are exempt from export controls.
T*329x or P*329**

*** = T(Black), B(Black), G(Green) or Y(Yellow)
x = B or C (lens type)**

3 Operation and Use

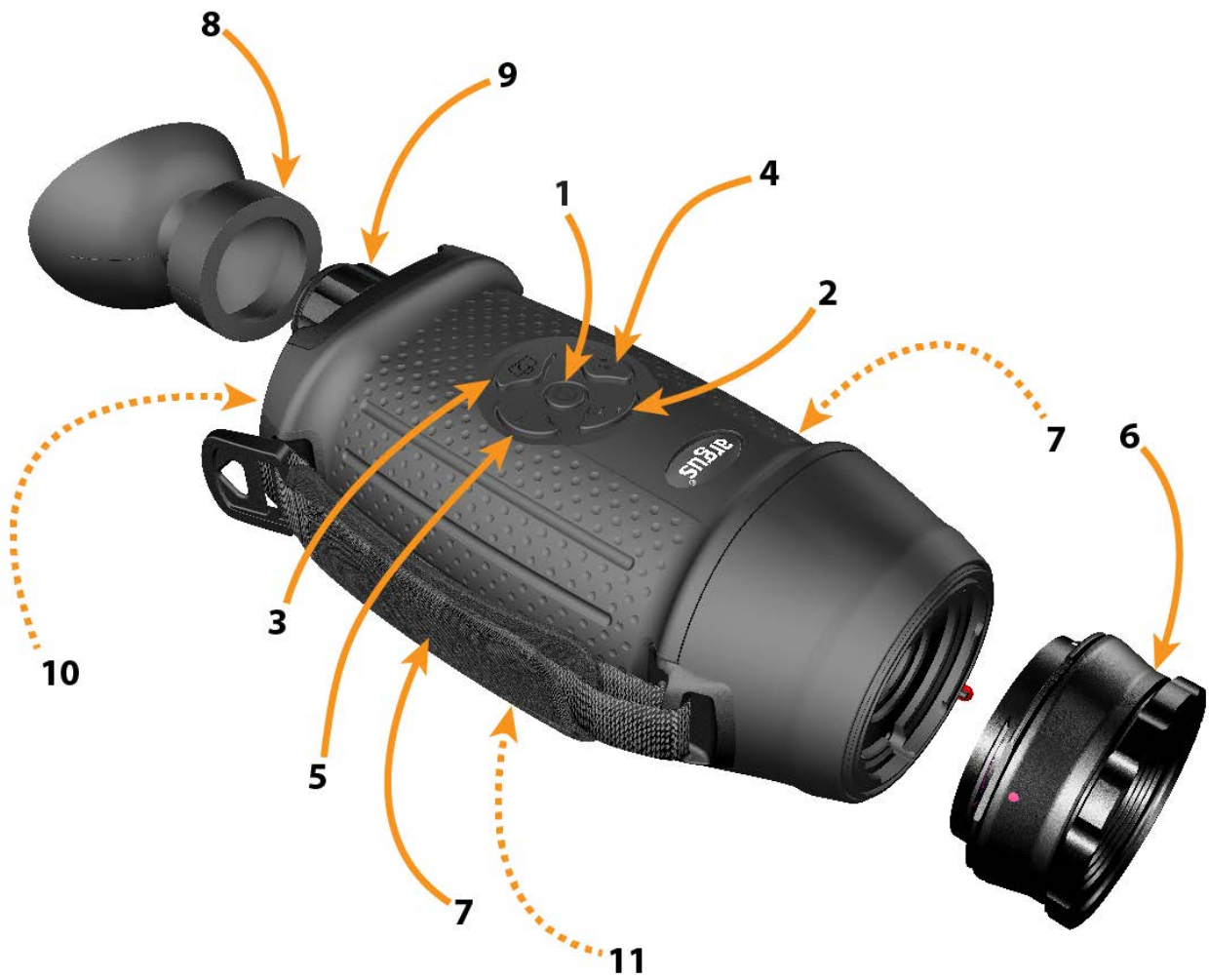
3.1 System Configuration (TT-Type)



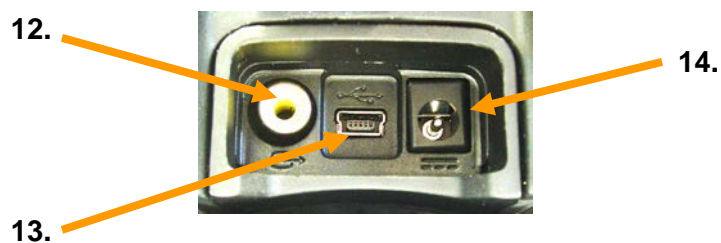
See section 4 for location of battery.

See section 3.12 for location of memory card.

3.2 System Configuration (P-Type)



- | | | |
|-------------------------------|----------------|----------------------------|
| 1. Power Button | (Menu On/ Off) | 7. Straps |
| 2. Zoom Button | (Menu Up) | 8. Eye Piece |
| 3. Image Capture Button | (Menu Down) | 9. Dioptre Adjust |
| 4. Colour Mode Button | (Menu Left) | 10. Connector Cover (side) |
| 5. Video Capture Button | (Menu Right) | 11. Battery Cover (under) |
| 6. Lens (supplied separately) | | |

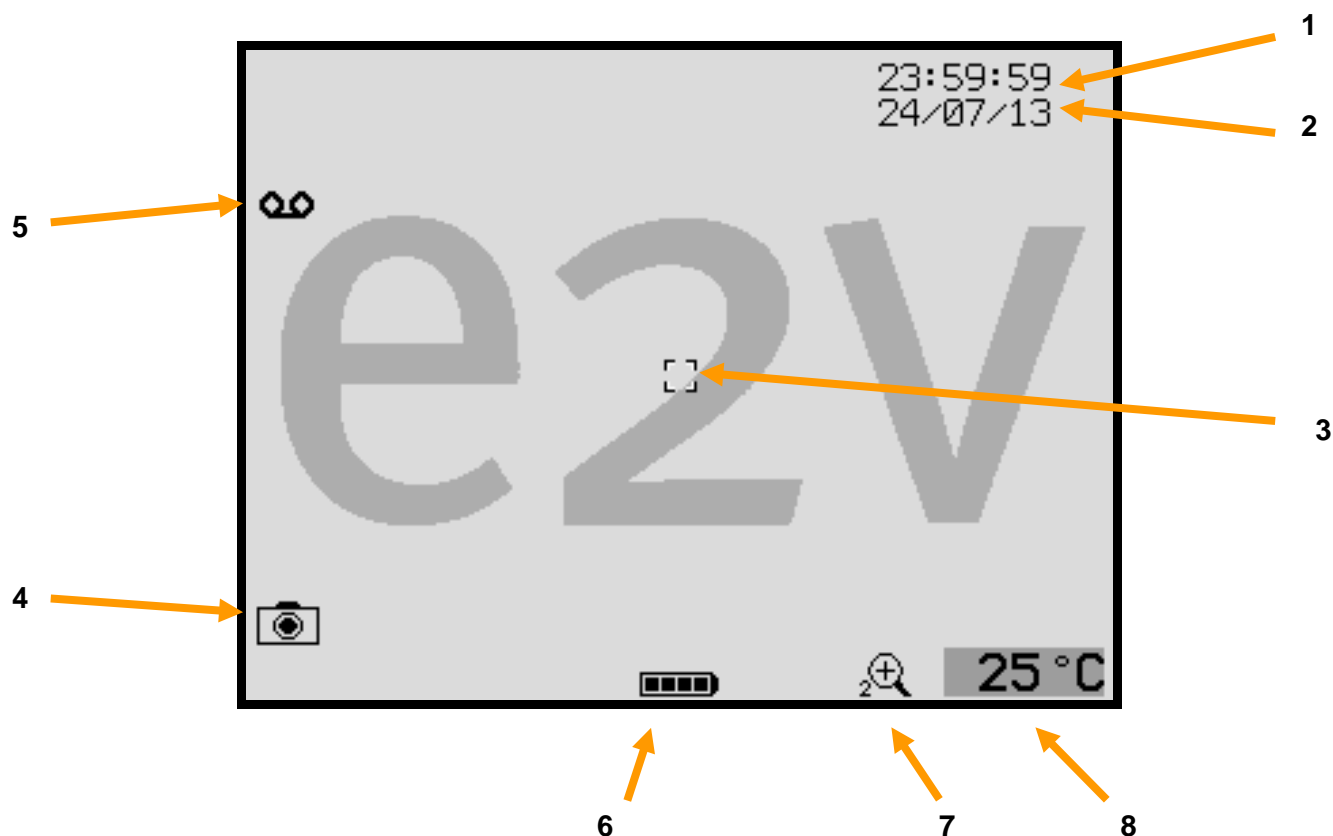


- | | |
|-----|--------------------------------|
| 12. | Video Output Connector |
| 13. | USB Connector |
| 14. | Power Input Connector (12V DC) |

See section 4 for location of battery.

See section 3.12 for location of memory card.

3.3 Display



- | | |
|--|---|
| 1. Time | 6. Battery Capacity |
| 2. Date | 7. Zoom Symbol |
| 3. Direct Temperature Measurement Target | 8. Direct Temperature Reading (only on TT-Type) |
| 4. Image Capture Symbol | |
| 5. Video Capture Symbol | |

3.4 Getting Started

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

- Camera (TT-Type or P-Type)
- Quick Start Guide
- Rechargeable Li-Ion Battery
- USB Lead
- Video Lead
- Neck Strap (P-Type)
- Wrist Strap (TT-Type)
- Lens Cleaning Cloth
- Power Supply Kit:
 - Mains Power Supply
 - Set of Interchangeable Plugs
 - Battery Charger Adapter
 - Vehicle Power Lead (12 V)
- A memory card is already fitted inside the camera

Lens

TT-Type cameras have an integrated lens which requires no focusing.

For P-Type cameras the lens is ordered separately and should be inserted into the front of the camera. Rotate the lens clockwise until it clicks into position and remove the supplied lens cap. Refer to section 5 for more information about changing the lens.

Battery

Insert the rechargeable Li-Ion battery into the camera as described in section 4. The rechargeable battery should be fully charged in the camera or external charger before turning on. This may take up to 4 hours using the mains power supply. The charging indicator will turn green when the battery is charged.

Three full charge/discharge cycles may be required for the battery to achieve full capacity. Please read the battery manufacturer's charging instructions provided with the battery.

Basic Operation

- Turn the camera on with a short press on the middle button.
- After about one second a start-up image will appear on the screen. (This image may be changed – see section 3.9). After a few more seconds the display will show the thermal image.
- 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.
- When the camera is turned on:
 - A long press on the power button will turn the camera off
 - A short press on the power button will enter the menu

Focus (P-Type Camera Only)

- **Viewfinder**

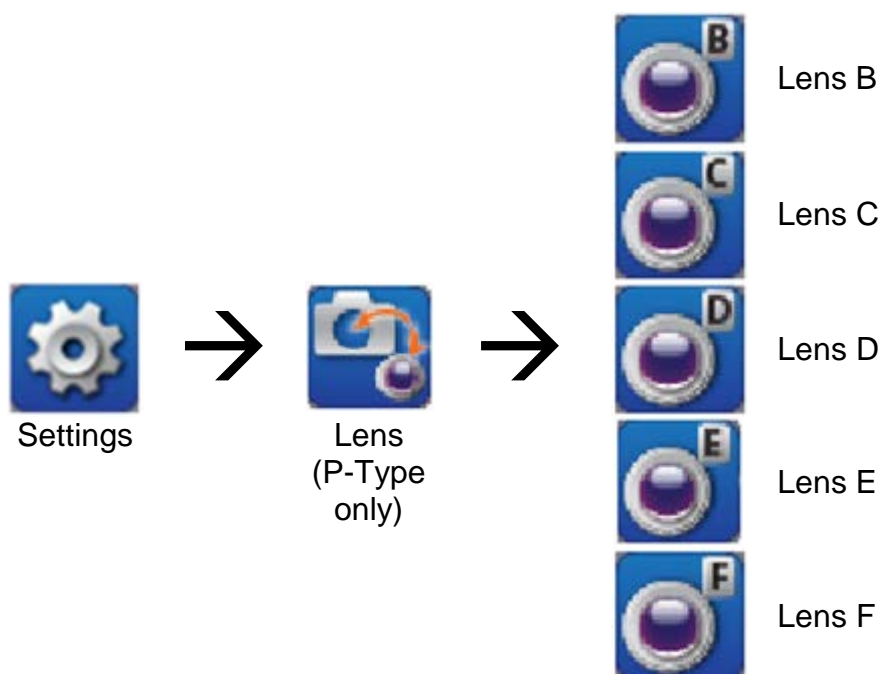
On P-Type cameras, first adjust the viewfinder (dioptre adjust) to give a sharp picture when looking at the icons such as the battery indicator. Operators who wear glasses may find it easier to remove the rubber eye-cup first. Alternatively they can remove their glasses and adjust the viewfinder. This can be adjusted for dioptres from approximately +2 to -4.

- **Front lens**

Next the front lens should be adjusted to give the sharpest picture. The lens may need to be adjusted again when looking at objects at different distances.

- **Set Lens Type**

Several lenses are available for the P-Type camera. Whenever the camera is used for the first time, or when the lens is changed to a different type, it is necessary to set the lens type on the camera menu. If this is not done it will affect the image quality. Press the middle button briefly to enter the menu.



LENS	B	C	D	E	F
→ Identification approx.	24 m	50 m	90 m	115 m	165 m
→ Recognition approx.	90 m	190 m	350 m	460 m	650 m
→ Detection approx.	230 m	500 m	950 m	1250 m	1750 m
Field of View (Horizontal) With 320 x 240 Sensor	50°	24°	13°	10°	7°

*Note: Identification as friend or foe at 6.25 cm/pixel;
Recognition as person/object at 25 cm/pixel;
Detection of person at 66.7 cm/pixel;*

3.5 Operating Notes

Interpreting the Image

The display shows the relative temperature differences between all the objects and backgrounds in the scene. When the colour mode is set to 'White Hot' hotter objects appear whiter and cooler objects appear blacker. When the colour mode is set to 'Black Hot' hotter objects appear blacker and cooler objects appear whiter. Changing between 'White Hot' and 'Black Hot' can be useful to make some details of the scene more obvious.

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 is available which will give greater detail in the picture.

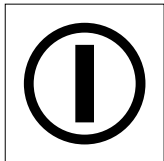
Glass, plastic and water are not transparent to long wavelength infrared energy so it is not possible to see through a closed window with the Thermal Imaging Camera. Just as a mirror will reflect visible light, polished surfaces (e.g. glass, polished wood and shiny materials) will reflect infrared radiation. Care must be taken to ensure that the image seen is not simply a reflection. Experience will give the operator added confidence.

Potential Applications

- **Building and Border Patrol:** *Quickly search both confined spaces and open areas.*
- **Collision Investigation:** *See tyre skid patterns at night; detect warmth from recently occupied seats; locate missing passengers or vehicle parts.*
- **Detecting Evidence:** *Locate items recently hidden or thrown away, in daylight or darkness. Detect voids and hidden compartments.*
- **Fugitive/Suspect Search:** *People hiding in dark corners or in bushes are visible by their heat signature.*
- **Occupancy Evaluation:** *Determine how many passengers were in a recently abandoned vehicle when the suspects have run away.*
- **Officer Safety:** *See in low light conditions to help identify threats to personnel, from suspects, animals or dangerous objects.*
- **Routine Patrols:** *General guarding and patrol of property. Detects hidden intruders, overheating equipment and leaking water.*
- **Routine Raids:** *Locate people hiding during a raid from their heat signature. Determine if rooms are empty in dark conditions.*
- **Search and Rescue:** *Large areas of land or water can be quickly searched on foot, from a vehicle or from a boat.*
- **Training and Assessing:** *Instructors can assess trainees in realistic night-time training exercises. The video recording option gives useful feedback when reviewing performance.*

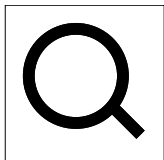
3.6 Button Summary

Power (and Menu)



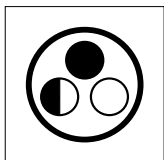
- A short press will turn the camera on. The start-up screen will appear after about one second.
- When the camera is on, hold this button down to turn the camera off. This will take several seconds.
- When the camera is on, a short press will display the menu.

Zoom



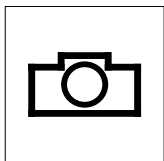
- This will cycle between 'normal', '2X Zoom' and '4X Zoom'
- When the camera is in zoom mode, a magnifying glass icon appears at the bottom of the display.
- Range Lock (Long press to lock/unlock. A lock symbol will appear at the bottom of the display)

Colour Cycle



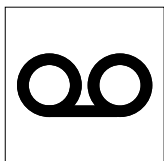
- This will cycle through the selected colour modes
- All cameras have 12 colour modes available
- The Set-Up menu or configuration tool can be used to add or remove each of the available colour modes to the colour cycle button

Image Capture



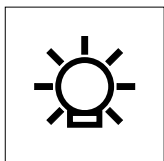
- Press this button to capture an image.
- If zoom is turned on, the image will be the full image, not the zoomed image.
- Images are normally stored on the memory card in compressed **.jpg** format. This can be changed in the set-up menu or configuration tool to and/ or **.raw** format which has higher depth of greyscale for more detailed analysis.

Video Capture



- Press this button to start or stop video recording. Videos are stored on the Memory Card.
- If zoom is turned on, the video will be the full image, not the zoomed image.
- Videos are stored in Motion JPEG format in a **.avi** file.
- The camera saves the video in maximum 10 minute segments.

Torch On/Off (TT-Type only)

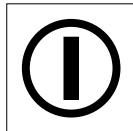


- Press this button to turn the torch light on or off.
- The torch will operate even when the camera is turned off.
- Using the torch for a long time will reduce the battery life.
- Warning: Do not look at the torch light from short range.

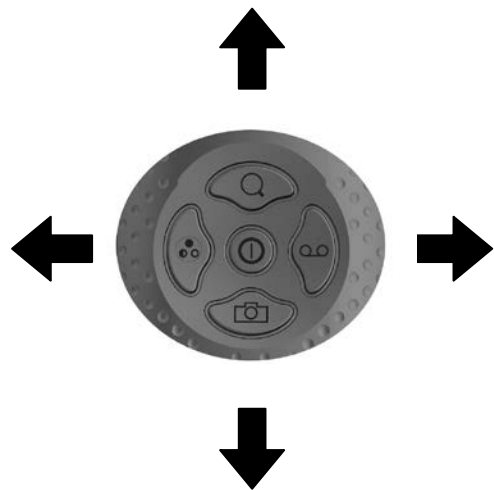
3.7 Menus

To enter the menu, press the 'Power' button briefly.

Press the 'Power' button again to select items in the menu.

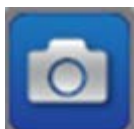


Press the left button at any time to exit a menu and return to the previous menu. To exit out of image and video playback the return icon has to be pressed.



Main Menu

View
Images



View
Videos



Settings



or



Settings Locked

- **VIEW IMAGES**

View images stored on the Memory Card.





- **VIEW VIDEOS**

View videos stored on the Memory Card.

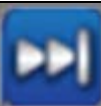




- **SETTINGS**

Entering the Settings menu allows many of the camera features to be customised. Settings Locked icon will appear if locked using the configuration tool. See next page for more information.






View Images

   	Next Image	Scroll through to the next image
	Previous Image	Scroll back to the previous image
	Delete	Delete the image being viewed
	Return	Go back to the previous menu

View Video

    	Next Image	Scroll through to the next video
	Previous Image	Scroll back to the previous video
	Play	Play selected video
	Delete	Delete the video being viewed
	Return	Return to the previous menu

Settings Menu









    	Colour Modes
	Display Settings
	File Settings
	Lens (P-Type Only)
	About Camera

- **Colour Modes**


The user can add or remove each of the available colour modes to the colour cycle button by ticking on the icon.

	Auto (White Hot)	Presents the image on a scale from black at the lowest temperature to white at the highest temperature.
	Auto (Black Hot)	Presents the image on a scale from white at the lowest temperature to black at the highest temperature.
	Proximity Search (White Hot)	Exaggerates the brightness of objects with temperatures beyond + or – 3°C of the spot temperature when in close range. White being the highest temperature.
	Proximity Search (Black Hot)	Exaggerates the brightness of objects with temperatures beyond + or – 3°C of the spot temperature when in close range. Black being the highest temperature.
	Compare (White Hot)	The camera will enhance anything that is significantly different from the locked temperature range effectively highlighting differences in the scene. White being the highest temperature.
	Compare (Black Hot)	The camera will enhance anything that is significantly different from the locked temperature range effectively highlighting differences in the scene. Black being the highest temperature.
	Heat Seeker	Colours the hottest temperature in the scene in red. Presents the image on a scale from black at the lowest temperature through white to red at the highest temperature.
	Inspection	Presents fine detail utilising a full colour scheme from blue through red and yellow to white.
	Night Vision Red (White Hot)	Protects the user's own night vision using a red hue. White being the highest temperature.
	Night Vision Red (Black Hot)	Protects the user's own night vision using a red hue. Black being the highest temperature.
	Night Vision Green (White Hot)	Protects the user's own night vision using a green hue. White being the highest temperature.
	Night Vision Green (Black Hot)	Protects the user's own night vision using a green hue. Black being the highest temperature.






- **Display Settings**

   	Brightness	   	Adjust the brightness level of the display from 1 to 7.
	Date		Adjust the day, month and year of the date. The date format can be changed using the configuration tool.
	Time		Change the time hours and minutes.
	Temperature Units		Change between Celsius and Fahrenheit.

- **File Settings**

	<p>The user can select whether to save images in .jpg and or .raw format. (Note: if both .jpg and .raw is selected the camera will save both formats with the same filename with a different file extension. This will reduce the amount of individual images saved as 2 images will be saved instead of 1.)</p> <p>Pressing the 'Delete All' icon will delete all images and video saved on the SD card.</p>
---	---

- **Lens (P-Type Only)**

	Selects B lens
	Selects C lens
	Selects D lens
	Selects E lens
	Selects F lens

- **About Camera**

```

MODEL      : TT320
S/N       : UK00746
LENS      : B - 8.6mm f/1.0
MAX TEMP  : 31°C
LENS TEMP : 23°C
RUNTIME   : 8
POWER     : 8.0V LITHIUM
SD CARD   :
IMAGES    : 1000 AVAIL
VIDEO     : 9.2 HRS AVAIL
SOFTWARE  :
DSP 02.77   FPGA 003
ARM 03.01   ARMU 01.42
E2V GROUP © 2014
  
```

This screen provides you with information about the camera. This may be of use if trying to diagnose a fault.

3.8 Configuration Tool

The argus[®] Security Configuration Tool is supplied on the camera's embedded storage. The Configuration Tool runs on a PC with Windows XP / Vista / Win7. Some of the tasks the tool allows the user to perform are as follows:

- Set the temperature to either °C or °F
- Set the time and date format and synchronise the time and date with the PC
- Set the colour modes
- Format the SD card

Running the Configuration Tool

To run the software, connect the argus[®] camera to your computer using the supplied USB cable. The camera is recognized 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 switch off and back on again.

Run 'SecurityConfig.exe'



1.	Click for colour mode preview	7.	Delete all images and video stored on SD card
2.	Tick to enable on Colour Mode Button	8.	Save settings (must be pressed to save changes)
3.	Colour mode preview	9.	Remove USB cable from camera
4.	Disable menu on camera	10.	Display camera information
5.	Format SD card	11.	Lens selection (P-Type only)
6.	Set camera to current PC time	12.	Disable functions from displaying on camera

3.9 Memory Card

The camera is supplied with a memory card already fitted. This is used for:

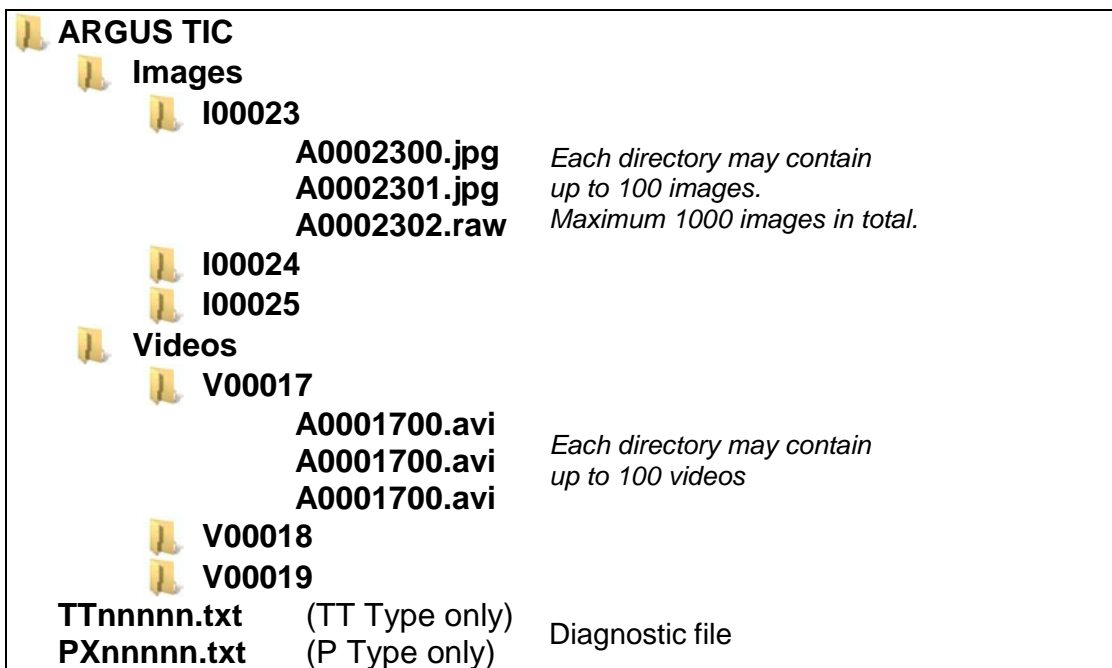
- Storing images
- Storing videos
- Storing camera diagnostic information
- Changing the start-up image
- Updating the camera software

How to Copy the Memory Card Contents to a Computer

There is no need to remove the memory card to transfer the contents to a computer. Follow the following instructions:

1. Turn the camera on.
2. Connect the camera to the computer using the 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 USB lead from the computer and camera.

The structure of the directories on the memory card is follows:



When large video files have to be copied, it will be quicker to remove the memory card and connect to the computer using a memory card reader.

How to Change the Camera Start-Up Image

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

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

Name:	Splash.bmp
Size:	320x240 pixels
Format:	24 Bit Bitmap

2. Turn the camera on.
3. Connect the camera to the computer using the USB lead.
4. The computer should recognise the memory card as a 'Mass Storage Device' and open an explorer window.
5. Copy the image file from the computer to the top level 'ARGUS TIC' directory.
6. Close the window.
7. On Windows computers it is recommended to select 'Safely Remove Hardware' before disconnecting the camera.
8. Remove the USB lead from the computer and camera.
9. Turn the camera off and back on. The camera will read the new image file when it turns on.
10. Turn the camera off and back on again. This time the new 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 after it has been successfully loaded into the camera.

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:

TTnnnnnn.txt (TT Type) or **PXnnnnnn.txt** (P Type)

(nnnnnn 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.

How to Replace a Memory Card

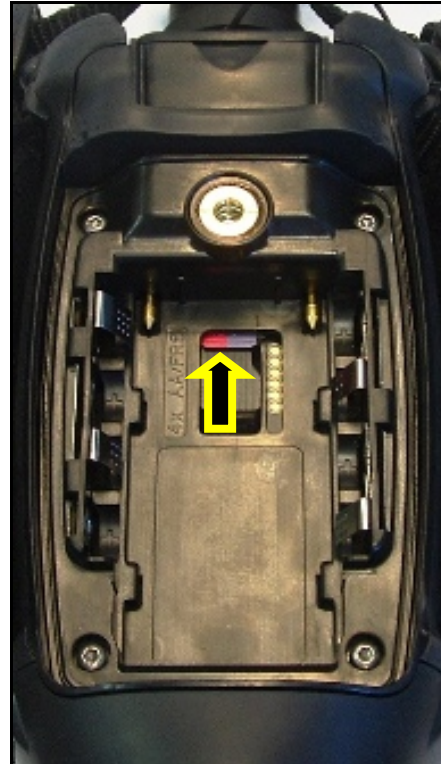
TT-Type

Remove the battery holder. The memory card can be found inside the camera, between the plastic case and the connector.



P-Type

Remove the battery cover and battery. The memory card can be found in a slot under the battery.



To replace a memory card it is necessary to push the card into the socket. It will then spring out.

The memory card can be replaced with a card compatible with Class 10 MicroSD™ and MicroSDHC™ memory cards. See section 6.3 for information.

Whenever a memory card is inserted into the camera for the first time, or if you experience problems with a memory card, the card should be reformatted using the configuration tool. Copy any data you want to keep from the memory card (the configuration tool must be copied or it will have to be downloaded from the website) to a PC using the camera USB link (see above). Make sure the memory card is inserted correctly into the camera. Select 'Format Memory Card' on the configuration tool. Press the 'Save' icon on the configuration tool and remove the USB lead.

The camera will automatically generate the directory structure after reformatting.

MicroSD™ and MicroSDHC™ are trademarks of the SD Card Association.

3.10 Temperature Indication

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, heat signatures of people or objects, and to compare temperatures.

The temperature measurement feature can be changed between Celsius (°C) and Fahrenheit (°F) using the camera menu:



Notes:

- The camera can measure scene temperatures between approximately -20°C and +150°C (-4°F and +300°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 '+++'.
If the temperature is lower than the minimum, the display will show '---'.

Caution: Different types of materials have different infrared emission characteristics. This will affect the accuracy of the temperature reading.

A perfect 'black body' has an emissivity of 1.0 and will give the most accurate reading. Most materials have an emissivity less than 1.0. Very reflective materials have very low emissivities and the temperature reading is strongly affected by the temperature of the object in the reflection. Very cold objects have very little infrared emission and it is difficult to determine their exact temperature with any degree of accuracy. Therefore the temperature reading should be used as an indication only and not relied upon for personal safety.

Typical Emissivities of Some Materials

Matt black surface	1.00	<div>Most accurate</div> <div>↑</div> <div>↓</div> <div>Least accurate</div>
Skin	0.98	
Water	0.95 – 0.98	
Concrete	0.85 - 0.97	
Rubber	0.95 – 0.97	
Asphalt	0.90 – 0.96	
Glass	0.80 – 0.95	
Plastic	0.84 – 0.94	
Brick (red, rough)	0.93	
Paper	0.93	
Sand	0.90	
Snow	0.80	
Cotton Cloth	0.77	
Aluminium foil	0.04 – 0.06	
Polished silver	0.02	

4 Batteries and Charging

The camera is supplied with a rechargeable lithium-ion battery. This must be fitted inside the camera and fully charged before first use.

A new and fully charged Li-ion battery will give about 5 hours of use. This time will be reduced when operating in very cold temperatures, continually using the torch-light (TT-Type only).

The capacity of rechargeable batteries declines with age. When this occurs it will be necessary to replace the rechargeable battery to achieve the normal operating time. Replacement batteries can be purchased from many electrical or photographic shops and websites. In case of difficulty, contact your Avon Protection representative.

The camera has been tested and certified for use with the following rechargeable lithium-ion batteries:

- Duracell DR5
- ENIX FML9051

4.1 Battery Removal and Replacement

TT-Type

Hold the camera with the display facing down and rotate the battery locking ring one quarter turn anti-clockwise. Carefully pull the battery holder out from the camera. Press down on the battery clip to slide out the old battery.

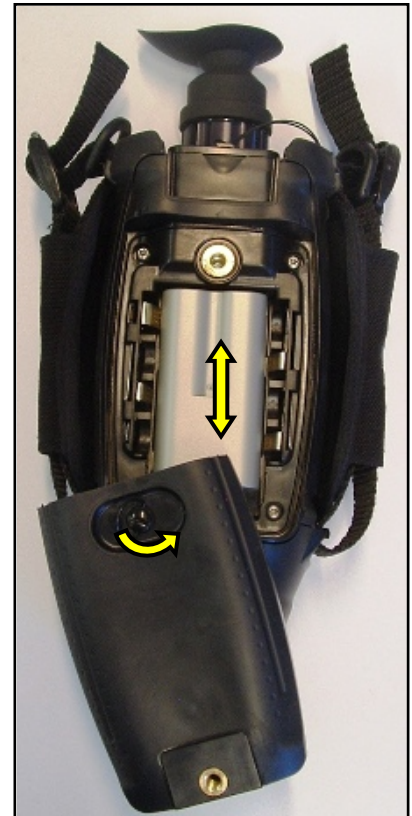
Slide in a new battery then carefully slide the battery holder back into the camera. Rotate the battery locking ring clockwise to the locked position.



P-Type

Turn the battery locking screw anti-clockwise by one quarter turn and pull to remove the battery compartment cover. Slide the battery away from the eye-piece to remove it.

Slide in a new battery and replace the battery cover. Turn the battery locking screw clockwise to lock the battery compartment



4.2 Charging the Battery Inside the Camera

Remove the connector cover. Plug in the mains power supply or vehicle adapter to the 12 V DC input. On the TT-Type there is a light next to the connector which will indicate the status of charging. On the P-Type there is a small light inside the viewfinder (above the image).

Off:	No power applied or no battery fitted
Yellow:	Charging
Green:	Battery fully charged
Red:	Battery too warm/cold for charging

A fully discharged battery will take about 4 hours to fully charge inside the camera. The camera can be operated normally while the battery is charging, but this will result in longer charging times.

4.3 Charging the Battery Outside the Camera

The battery can be removed from the camera to be charged. This allows the camera to be used with a spare battery while the first one is charging.

Remove the battery as described above.

Slide the battery onto the External Battery Charger and connect this to the mains power supply or vehicle adapter.

The 'STATUS' light is red when power is connected.

The 'CHARGING' light will indicate the status of charging:

Red:	Charging
Green:	Finished Charging

A fully discharged battery will take about 4 hours to fully charge using the External Battery Changer



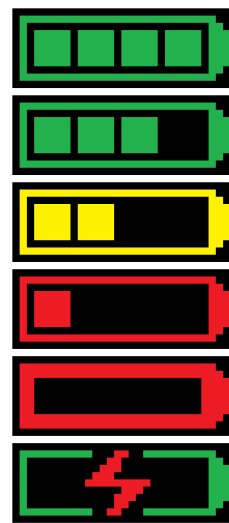
4.4 Battery Life Indicator

The battery symbol gives an indication of the remaining battery capacity.

When the battery symbol turns red and shows one bar, there is less than one hour of capacity.

When there are no bars and the battery symbol is flashing the camera will soon automatically turn off.

If the camera is turned on and the external power supply is connected, the battery indicator will show a red flash symbol.



4.5 Using Lithium AA Cells (Non-Rechargeable)

TT-Type

An alternative battery holder is available which allows the camera to be powered using four non-rechargeable Lithium AA cells.

The Lithium AA battery holder is intended to be used as a spare battery pack and does not allow external power/charging, video output or USB connectivity.



P-Type

Four non-rechargeable Lithium AA cells can be fitted inside the battery compartment instead of the Li-ion rechargeable battery. Be careful to insert the AA cells in the correct direction as shown inside the battery compartment.

Do not connect the mains power adapter to the 12 V DC input when AA batteries are fitted. The camera will always take its energy from the lithium AA cells if they are fitted and internally disconnect the 12 V DC input. The charging light will not come on.



Lithium AA cells will give about 5 hours of normal use. The camera has been tested and certified for use with the following types of Lithium AA cells:

- Energizer Lithium AA/L91
- Duracell Lithium AA LF1500

The camera will not operate correctly with other types of AA cells such as alkaline, Ni-MH, zinc carbon or zinc chloride.

WARNING: Do not attempt to recharge Lithium AA cells. Do not fit Lithium AA cells incorrectly.

5 Changing the Lens (P-Type)

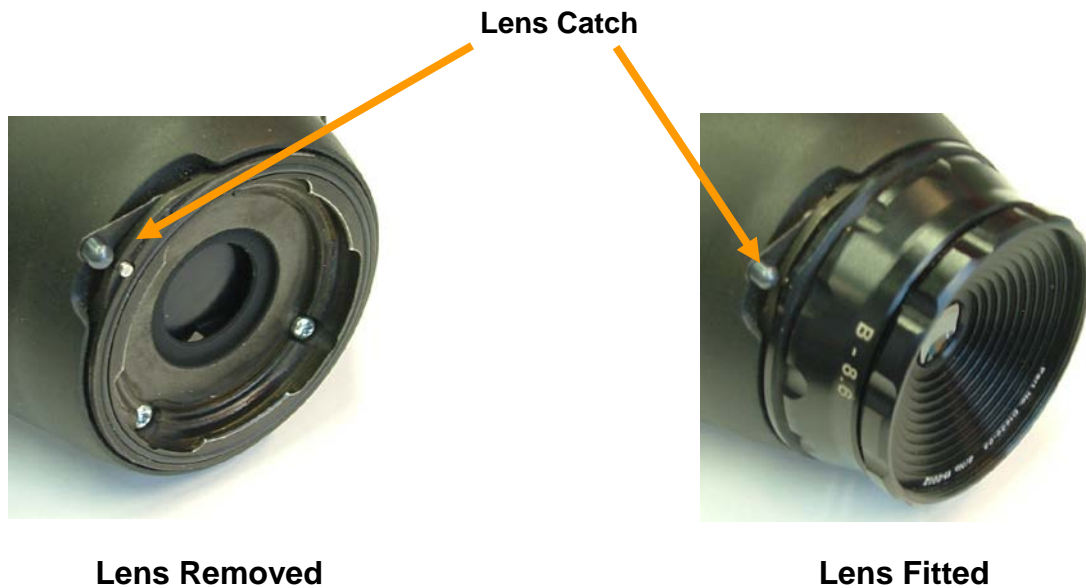
5.1 Fitting the Lens

For P-Type cameras the lens is ordered separately

- Remove the protective cover from the front of the camera
- Insert the lens into the front of the camera and rotate the lens clockwise until it clicks into position
- Set the lens type on the camera menu

5.2 Removing the Lens

Press and hold the lens catch shown below. At the same time, rotate the lens anti-clockwise.



5.3 Set Lens Type

Whenever the camera is used for the first time, or when the lens is changed to a different type, it is necessary to set the lens type on the camera menu. If this is not done, it will affect the image quality and the Direct Temperature Measurement may be incorrect. See section 3.4.

5.4 Camera Care

- The camera is not IP65 rated (waterproof) when the lens is removed. Do not change the lens in wet, damp or marine environments, to prevent water getting inside the camera.
- When the lens is removed the camera sensor and calibration shutter are exposed. Do not touch these to prevent damaging them.
- The lens should only be cleaned with a soft cloth or warm water. Do not use tools, hard brushes or solvents.

6 Maintenance

6.1 Cleaning

The camera may be cleaned with a cloth soaked with warm, clean, soapy water. **Do not use solvents or abrasive cleaners.** When cleaning the camera, prevent ingress of water by ensuring that the following parts are fitted: battery compartment, connector cover, front lens (P-Type). In marine environments, do not allow build-up of salt on the camera.

6.2 Maintenance

No routine maintenance is required for the camera other than to ensure the battery cover on the P-Type is regularly lubricated with the silicone grease as supplied. If it is not in regular use, it should be switched on for a period of ten minutes every month to check correct operation.

6.3 Replacement Parts

The following items may be replaced by the user:

Item	Description
Batteries	Use only the following batteries:
	Duracell DR5 (Rechargeable)
	ENIX FML9051 (Rechargeable)
	Energizer Lithium AA/L91 (Primary)
	Duracell Lithium AA LF1500 (Primary)
USB Lead	USB cable with mini-USB connector (2 metres)
Video Lead	Video cable with phono connector (2 metres)
SDCard	4G Class 10 MicroSD or MicroSDHC Memory Card (tested with Verbatim, Samsung and Transcend).
Vehicle Charger Lead Fuse	250 V 1 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.

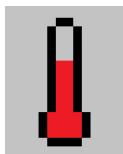
The following items are available as spares and accessories from Avon Protection:

Part No.	TT	P	Description
ARG_TTP_BP	✓	✓	Lithium Ion Rechargeable Battery
ARG_TTAA	✓	X	AA Battery Holder for TT-Type Cameras
ARG_TT_BHC	✓	X	Black, hard carry case for TT-Type Cameras
ARG_P_BHC	X	✓	Black, hard carry case for P-Type Cameras
ARG_TTP_SC	✓	✓	Black, soft carry case
ARG_TTP_PSU	✓	✓	Power Pack containing mains power supply and worldwide adapters, battery charger with adapter plate, vehicle power cable
ARG_TTRC	✓	X	Rechargeable Battery Carrier for TT-Type Cameras
ARG_TTH	✓	X	Holster for TT-Type Cameras
ARG_PLENSB	X	✓	Lens B (8.6mmFL, 160:26 deg FOV, 320:50 deg FOV, D=230m)
ARG_PLENSC	X	✓	Lens C (18.6mmFL, 160:12 deg FOV, 320:24 deg FOV, D=500m)
ARG_PLENSD	X	✓	Lens D (35mmFL, 160:6.5 deg FOV, 320:13 deg FOV, D=1000m)
ARG_PLENSE	X	✓	Lens E (46mmFL, 160:5 deg FOV, 320:10 deg FOV, D=1250m)
ARG_PLENSF	X	✓	Lens F (65mmFL, 160:3.5 deg FOV, 320:7 deg FOV, D=1750m)

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 Fault Finding

7.1 Display Warnings



Over Temperature:

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.



General 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 these warnings may result in damage to the system and may invalidate the warranty.

7.2 Batteries and Power

Battery charging LED is RED on camera

Battery is too hot or cold to be charged safely. Allow battery to cool or warm to ambient temperature and try again.

Battery capacity is lower than when new

All rechargeable batteries lose capacity over time. When capacity becomes lower than required for the application, obtain a new battery.

Camera does not turn on

Battery may be discharged. Power the camera with an external supply (mains or vehicle) and charge the battery.

7.3 Image Problems

Image will not focus (P type)

Adjust both the eyepiece and the front lens to obtain focus

Image quality poor (P type)

Check lens type on menu is the same as the lens type fitted

7.4 Memory Card Problems

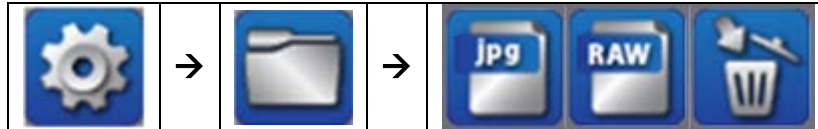
If problems are experienced in writing to or reading from the memory card:

- Reformat the memory card in the camera (not on a computer) using the configuration tool.
- Try removing the memory card (with the camera turned off), then replace the memory card in the socket.
- Try replacing the memory card with another good quality memory card.

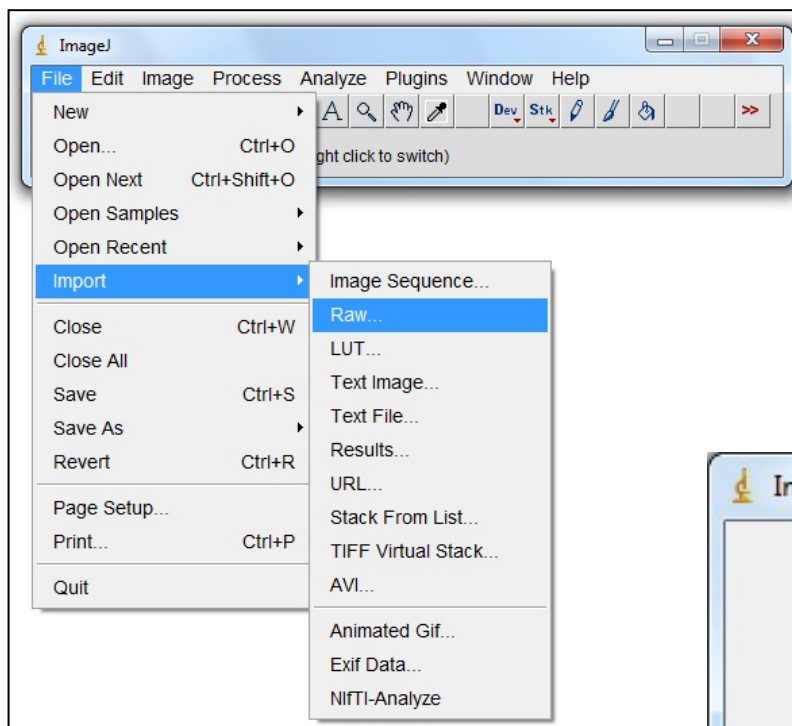
8 Appendices

8.1 Using Image .jpeg to View .raw Files

Images are normally stored on the memory card in compressed **.jpg** format. The format can be changed to **.raw** format to give uncompressed monochrome images with higher depth of greyscale for more detailed analysis. The **.raw** format is not supported by all computer image viewing programs. Avon Protection suggests using 'ImageJ' available at <http://rsbweb.nih.gov/ij/>. To change the format, use the camera menu:



.raw images can be imported into 'ImageJ' as follows:



1. Click on the menu:
File > Import > Raw

2. Select the .raw file from the correct directory.

3. Change the Import Settings as shown (right).

4. Click 'OK'

