Pengucam – Quickstart manual

OVERVIEW

PenguCam is designed for the deployment of free-ranging, diving animals like penguins or shags. The units are water-proofed and have been tested to a depth of 200 m. The camera is programmed wirelessly via Bluetooth using a mobile phone app which at this stage is only available for Android devices. Apple phones are not supported.

Camera recording is triggered after a programmable delay. The delay countdown can either be triggered manually (via the app) or by means of a salt-water switch, i.e. when the animal enters the ocean.

Pengucam with AA battery for scale

The camera records Full HD (1080p) video footage using a 135° wide-angle lens which is encoded on-the-fly to the H.264 Advanced Video Codec. The camera has an internal storage capacity of 64Gb which translates to approximately 5 hours of Full HD footage. However, when recording in continuous mode, the unit's batteries will be depleted after 3-3.5 hours.

Video data are downloaded after device recovery by connecting the unit to a computer via USB cable which mounts the unit's internal memory as an external hard drive allowing to view and copy

video data. The USB cable is also used to recharge the internal batteries so that the camera can be re-deployed.

PenguCam features several LED indicators:

- The GREEN LED indicates whether the camera is charging the battery while connected to a power source via USB. The LED will turn off once the battery is fully charged;
- The ORANGE LED indicates that the camera is switched on (always on) or off (LED off), or whether the unit is recording video (flashing);
- The RED LED located closer towards the lens indicates the Bluetooth state of the device and is flashing when it is ready to be connected and always on once connected to a mobile device.
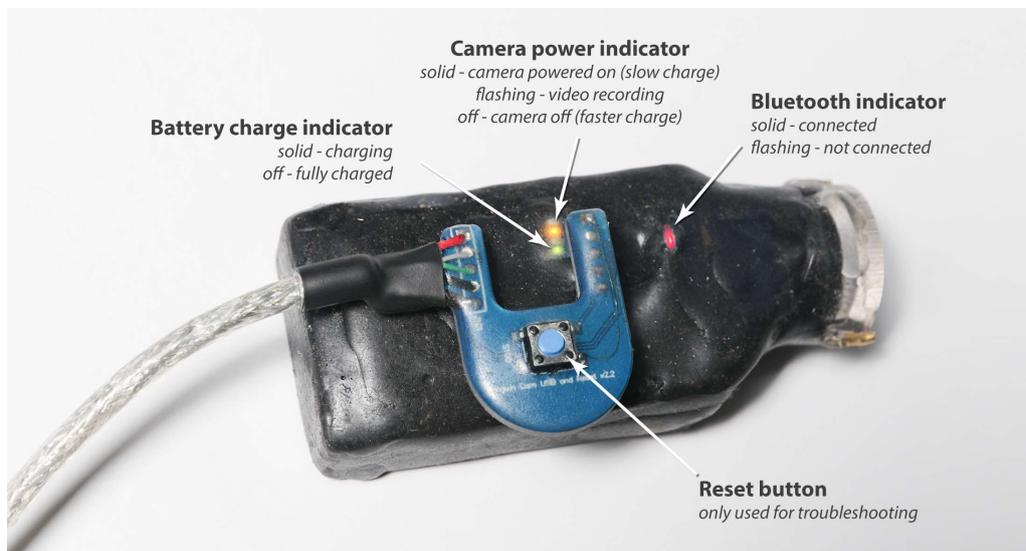
Overview of the LED indicators and placement of USB data cable

The gold terminals for the internal salt-water switch are located on the side of the lens. To ensure switch functionality, the terminals must remain uncovered during deployment.

Location of conductive terminals of the salt-water switch.

1. CHARGING THE UNIT'S BATTERY

PenguCams are shipped with empty batteries to avoid interference of the units' Bluetooth functions with other communication devices during transport.

Therefore, the devices need to be charged before first use. To charge the camera, plug in the data cable into the 5-pin connector on the top of the camera. Attach the cable plug so that the cable itself faces away from the camera lens and the recess clearance of the cable plug aligns with the LED window below the 5-pin connector.

Quickest charging is achieved by using a dedicated USB charger. The unit can also be charged attached to a USB port of a computer, albeit at a slower rate. The **GREEN** LED (Fig. 2) will turn off when the battery is fully charged.

Once a minimum charge is reached, the Bluetooth module of the camera will be activated, and the **RED** LED indicator will start flashing. The camera can now be accessed via the programming app.

Pengucam with attached USB data cable in charging mode

2. SETTING CAMERA TIME

If the camera battery is completely drained, the camera "forgets" the date and time. In this case, the internal clock will be reset to 1.1.2015 when charging the device.

To update the camera clock, you need to connect it to a computer via USB and execute the mSetup.exe software.

The software is stored on the *PenguCam*'s internal memory and can be executed after attaching the camera to a PC via the USB cable and opening the newly mounted hard drive in a file explorer.

If the software was accidentally deleted or is missing it can be downloaded via the following link:

https://pengu.cam/app/mSetup

1. Execute *mSetup.exe* to access to camera programming interface.
2. The camera information is displayed in the top frame of the software window. Highlight the camera by clicking on it:
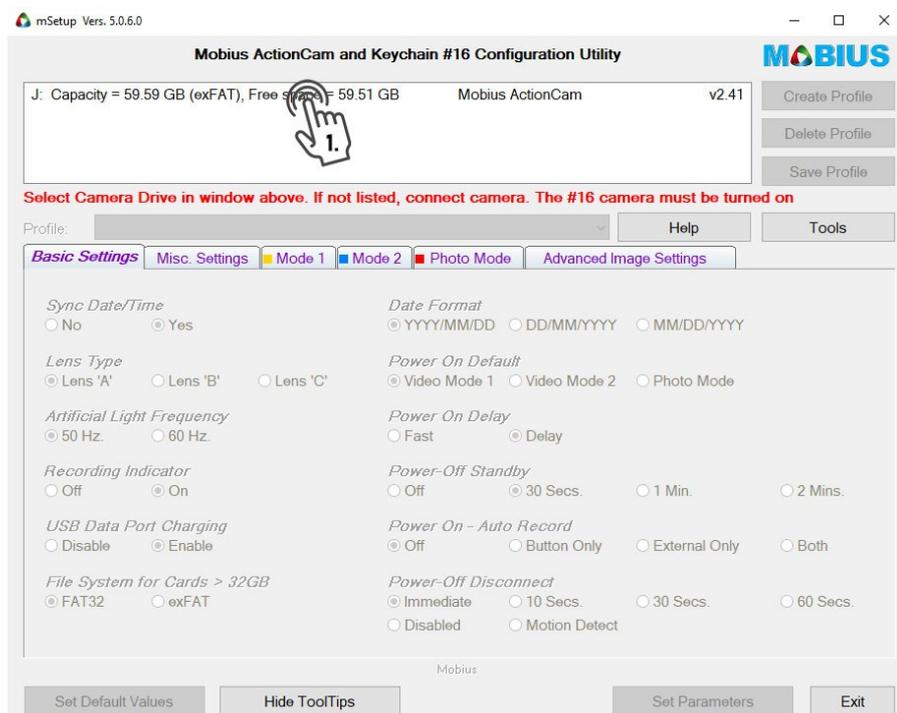
3. Ensure the *Sync Date/Time* option under the tab *Basic Settings* is set to **YES** and click the **Mode 1** tab:
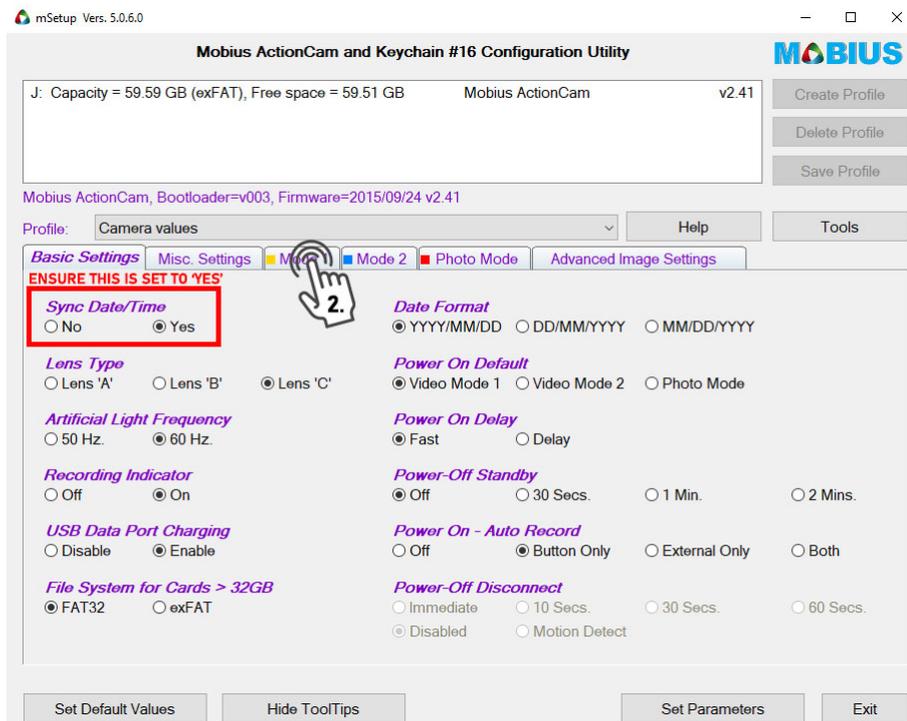
4. In the *Mode 1* screen, ensure the *Video Time Stamp* option is turned on. Then first click the **Set Parameters** button before you can exit the setup by clicking the **Exit** button.

   Do not change any of the other settings!
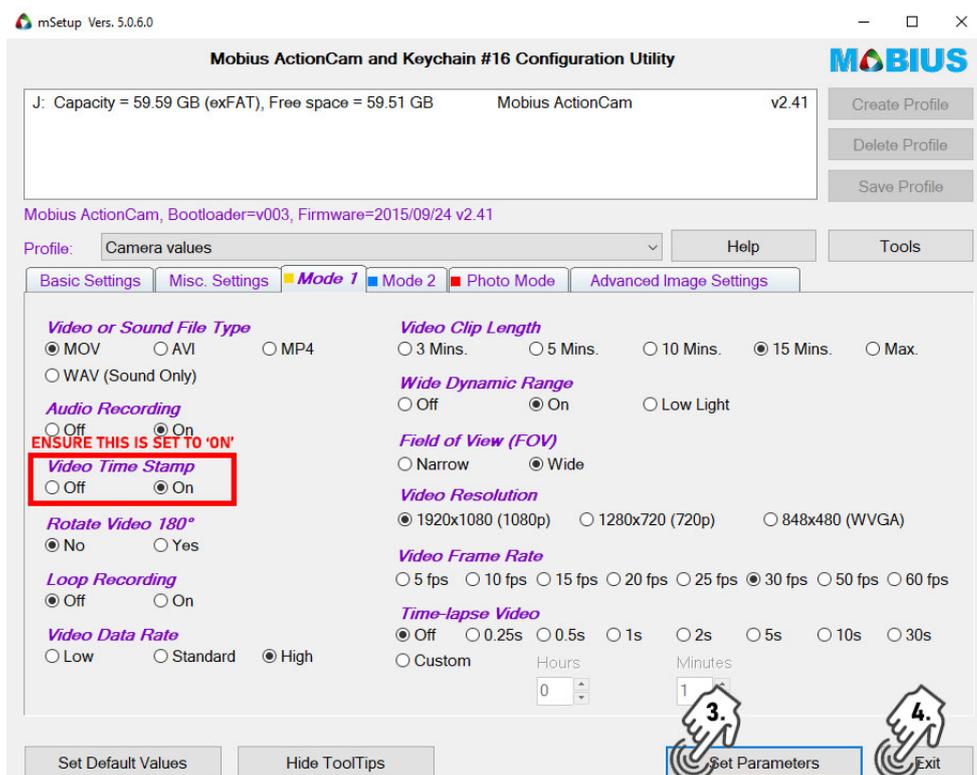
3. INSTALLING THE PENGUCAM APP (ANDROID ONLY)

The camera is programmed through the *PenguCam* app for Android devices. The latest version of the app can be downloaded here:

https://pengu.cam/app/

To install the app, download on the designated phone using the link scanning QR code above.

Once the download is complete, tap the downloaded file in your browsers download status bar (generally at the bottom of the screen) or navigate to you phone's download directory using a file explorer and tap the downloaded .apk file there.

If your mobile device asks for permission to install a software from an external source, confirm this and the app will be installed. The *PenguCam* app can now be started by tapping the app logo on the mobile device.

Pengucam app icon

4. COMMUNICATING WITH THE CAMERAS

- Start the *PenguCam* app on your Android device.

- If cameras are in flight mode (i.e. Bluetooth option switched off) you will see a blank screen with a small header bar that features a "Scan" button in the right corner. Connect the camera to a PC with the USB cable; this will activate the camera's Bluetooth module.
  The camera's serial number will now show up on the *PenguCam* app screen. A camera's serial number can be found on the bottom of the unit:

- If multiple cameras are within reception range of the mobile device, these will be listed accordingly. Each camera has to be programmed individually.

- Tap the row with the serial number that corresponds to the camera to access the programming interface.
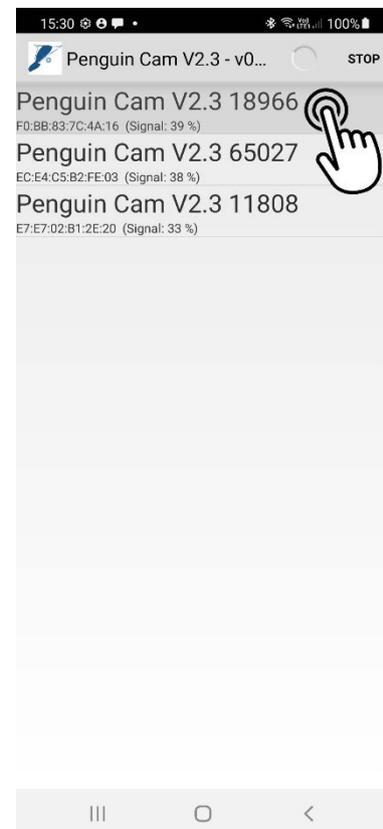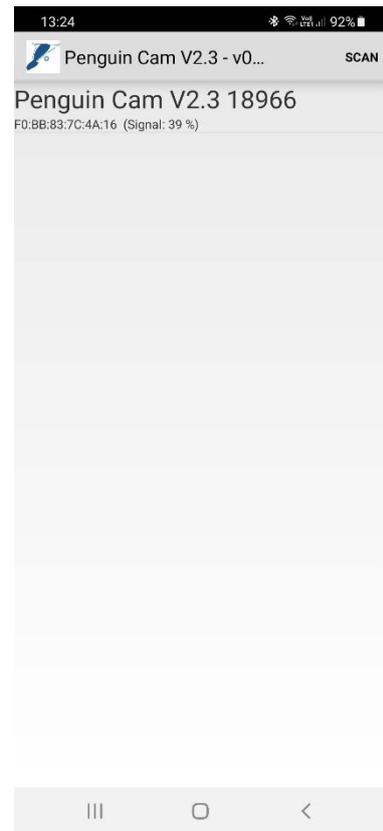
5. PROGRAMMING A CAMERA

The grey **Toggle** buttons activate or deactivate various functions:

- **Bluetooth on battery**

  If this option is activated (green circle), the camera can be accessed via the app even when the device is not connected to a USB cable. Deactivating this option (grey circle), will only allow a Bluetooth connection when USB connected.

- **Camera power**

  Activating this option starts video recording. Deactivating stops video recording.

- **Continuous recording mode**

  Toggles between continuous or intermittent/duty-cycled video recording (see below).

- **Salt-water switch enabled**

  Activated: delayed camera start after water immersion has been detected.

  Deactivated: delayed camera start after the "Deployed" function has been toggled.

- **Deployed**

  Activated: camera is ready for deployment and will start recording.

  Deactivated: camera will not start recording.

  Important: ensure this function is toggled on, before the animal is released, otherwise the camera will not record.

Following three basic programming scenarios for the cameras are shown:

    a. Continuous video recording with app-triggered delay

    b. Continuous video recording with salt-water switch triggered delay

    c. Duty cycled video recording
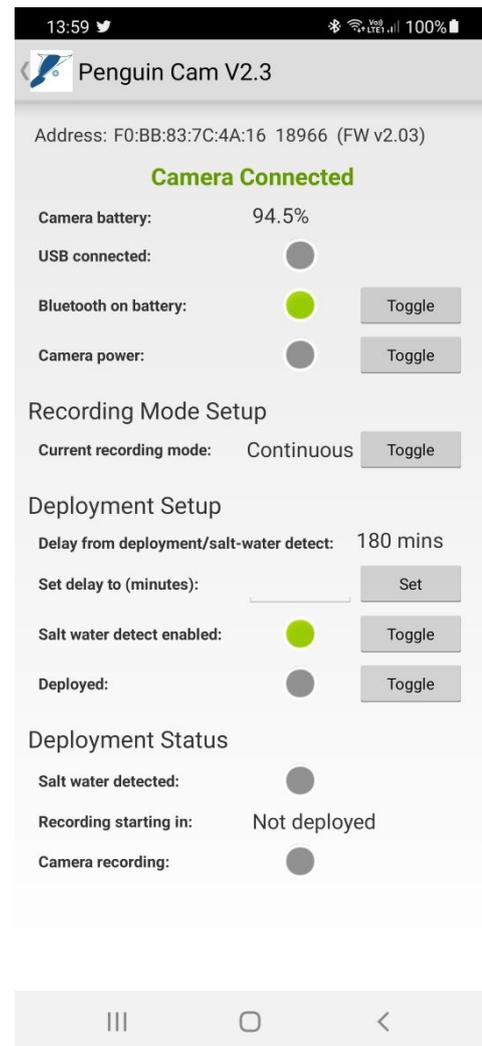
a. Continuous recording with app-triggered delay

In this scenario, the camera will start recording a set amount of time after the camera has been deployed via the app (i.e. the **Deployed** state is toggled). This means the user can initiate the delay countdown manually.
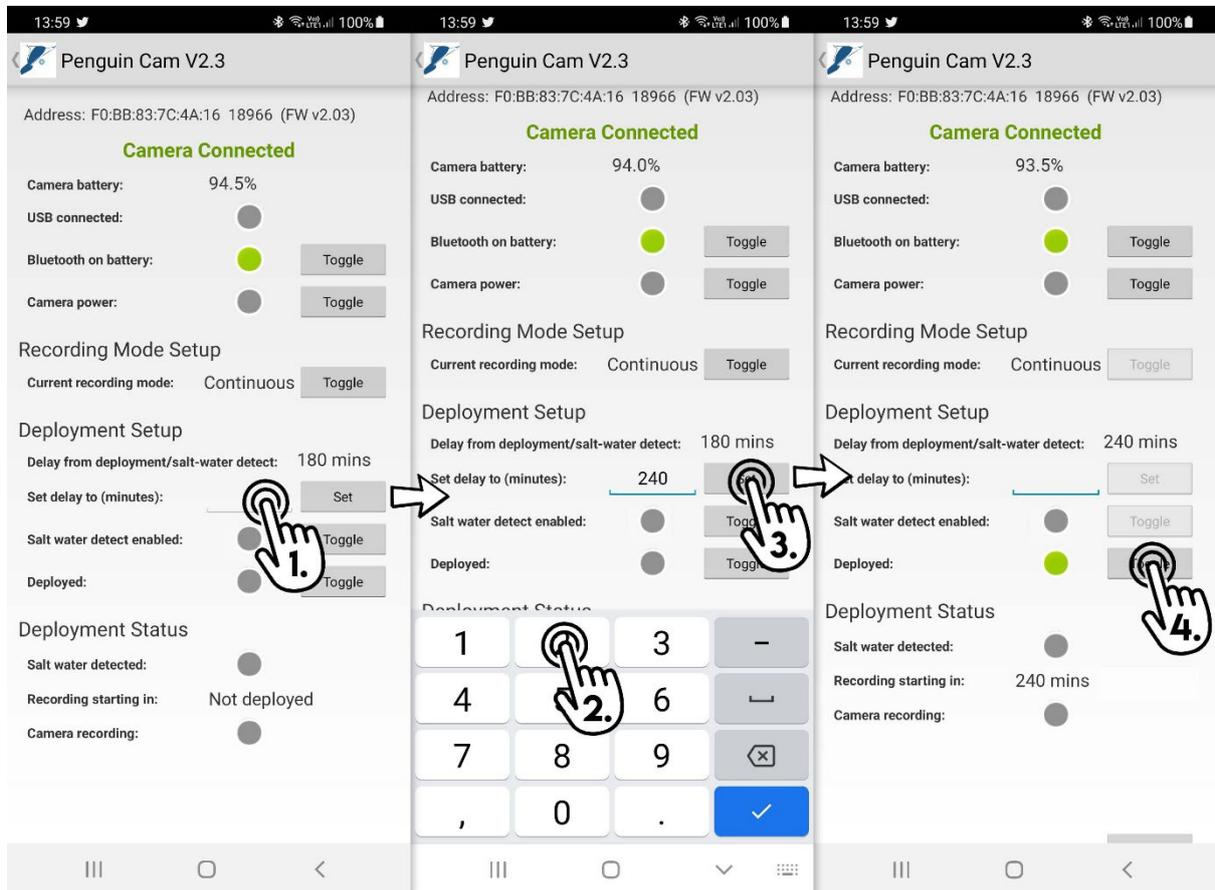
1. To set the delay period (in minutes) tap the number entry field next to the option **Set delay to (minutes)**.
2. Enter the desired delay period using the number entry pad that pops up at the bottom of the screen.
3. Tap the **Set** button next to the number entry field.
4. Tap the **Toggle** button next to the option Deployed to action the deployment. The camera will start after the programmed delay time has passed since the Toggle button was tapped.

b. Continuous recording with salt-water switch triggered delay

With the salt-water switch enabled, the camera will start recording a set amount of time after the camera has been immersed in water, i.e. once the animal enters the water.

Important: ensure that the salt-water terminals on either side of the camera lens are not covered in tape or glue.
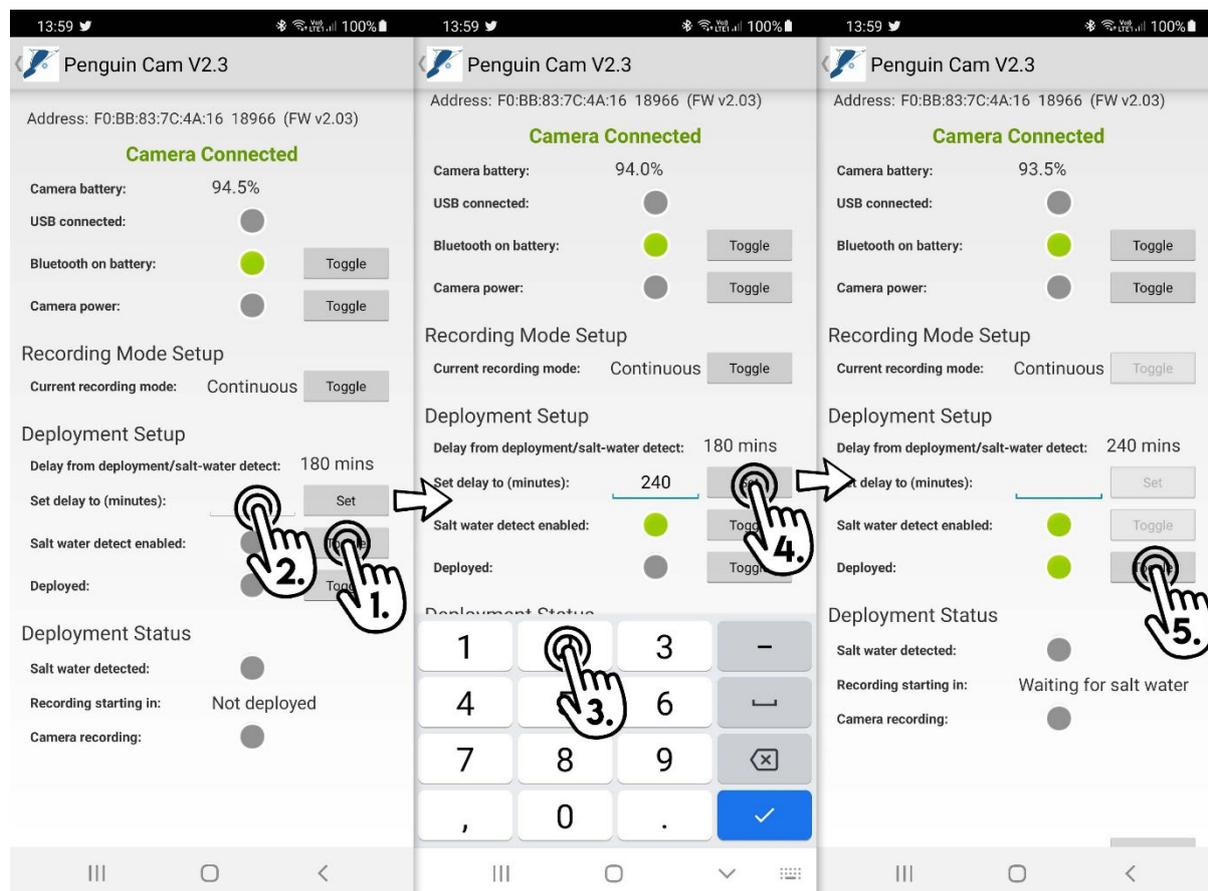
1. Tap the **Toggle** button next to the option **Salt water detect enabled** to activate the salt-water switch mode. Ensure the indicator icon next to the toggle button turns green.

2. Set the delay period tap the number entry field next to the option **Set delay to (minutes)**.

3. Enter the desired delay period using the number entry pad that pops up at the bottom of the screen.

4. Tap the **Set** button next to the number entry field.

5. Tap the **Toggle** button next to the option Deployed to action the deployment. The camera will start counting down the delay after salt-water was detected, i.e. the animal entered the water.

c. Duty cycled video recording

In this scenario, the camera will record for a set interval before it pauses recording for another set interval. In the below example, the camera is programmed to record for 30-minute intervals with intermittent pause-intervals of 60 minutes, so each cycle has a duration of 1.5 hours. With an estimated total video recording time of 3 hours (i.e. 6 cycles), the camera therefore will be operational for 9 hours.
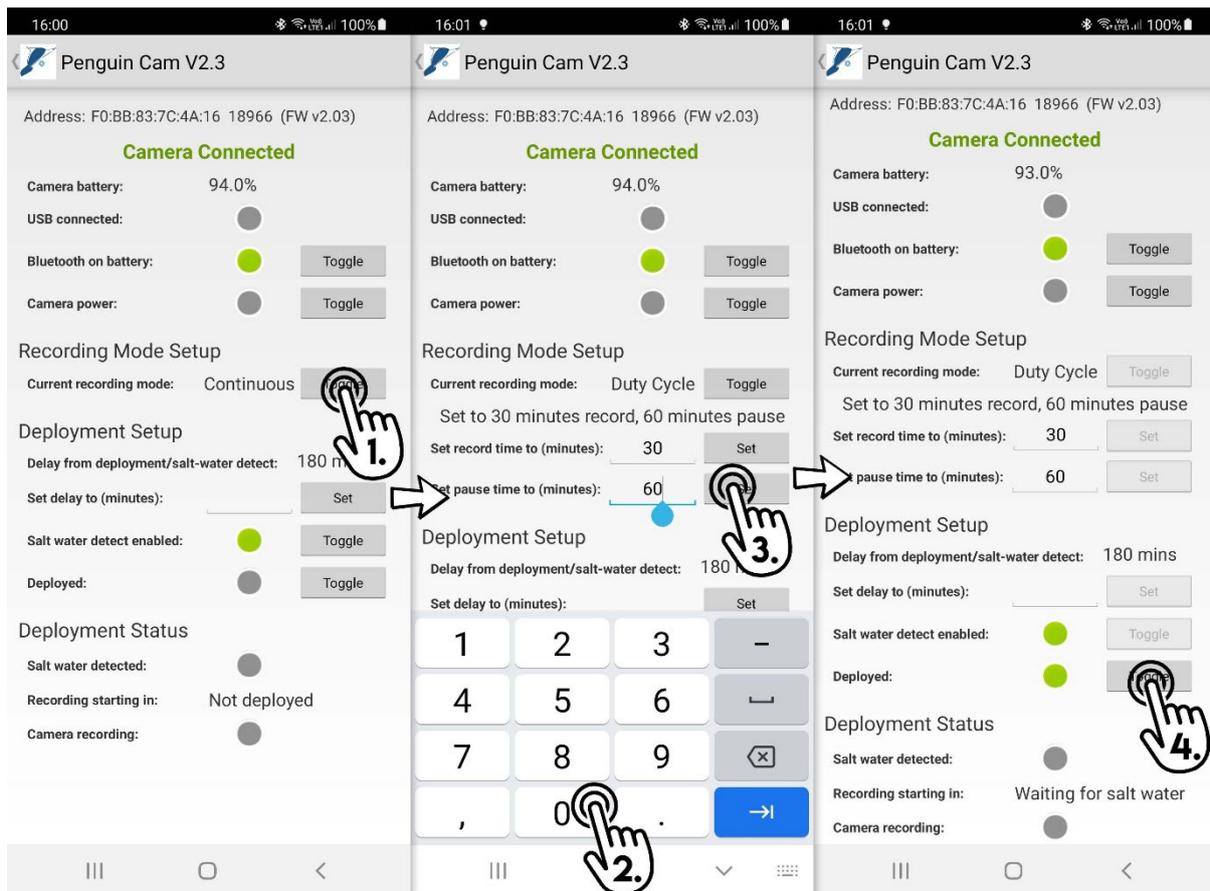
1. Tap the **Toggle** button next to the option **Current recording mode** to witch the recording mode to *Duty Cycle*. This will reveal two additional options.
2. Tap the number entry fields for either Set record time to (minutes) or Set pause time to (minutes) and use the number entry pad at the bottom of the screen to set desired recording and pause intervals.
3. Confirm new entries for either field by tapping the Set button next to the corresponding number entry field.
4. Tap the **Toggle** button next to the option Deployed to action the deployment.

Duty cycling can be used with either app (5a) or salt-water triggered (5b) recording delays.

6. DEPLOYMENT

In diving seabirds, like penguins, attachment of the programmed device can follow the conventional tape method. The camera lens is titled slightly forward allowing it to attach the unit to the lower back while still ensuring that the field of view will remain centred around the animal's head.

In larger species, cameras can be combined with traditional data loggers, be it TDRs or GPS dive loggers.

Previous deployments in penguins showed that the lens offers a leverage point to the animals that may allow them to remove the device. This can be counteracted by threading a cable tie under the feathers and tightening it with cable tie gun around the camera lens.

Pictured on the right is a PenguCam deployed in combination with a GPS dive logger on a Yellow-eyed penguin.

After attachment on the animal it is strongly recommended, to confirm all settings using the mobile app once more. Particular attention should be placed on ensuring that the camera is attached in a state where the **Deployed** toggle is activated.
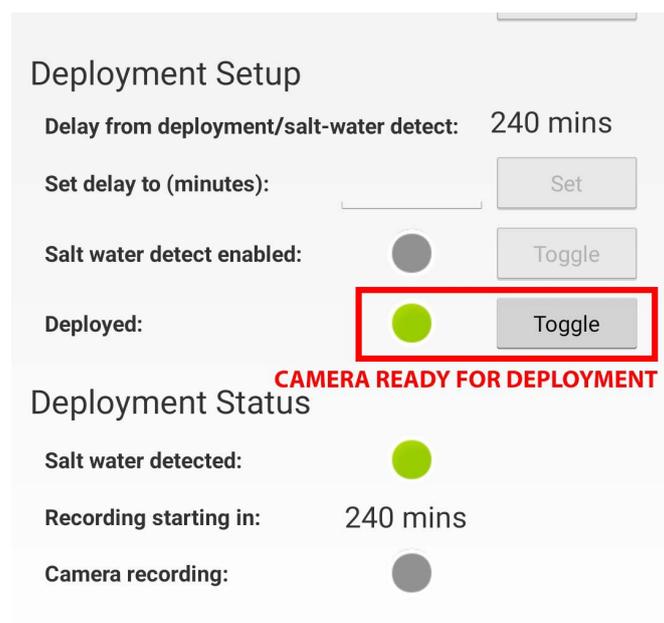
Note that all settings can be changed at any time as long as a Bluetooth connection can be established, i.e. even after attachment on the animal.

TROUBLESHOOTING

1. **Camera not recognized by computer after recovery from animal**

   The camera battery is likely completely drained when the device is recovered after a successful deployment on an animal. This may even be the case if the Bluetooth indicator is still flashing.

   Step 1: Attach the camera to a USB charger for 10 minutes before trying to download videos using the USB cable

   Step 2: If the camera after a 10 minute charge still does not mount as external hard drive on a PC, put the unit back on the USB charger and fully charge the device before trying to download videos.

   Step 3: If the camera is fully charged and still refuses to mount, attach the camera to a PC with the USB cable and press the blue button on the camera connector. The red Bluetooth indicator will stop flashing for a while while the camera's control board is reset. Once the red led is flashing again, disconnect the USB cable from the PC, wait 10 seconds and reconnect it.

   If the unit still does not mount, contact us via mailto:support@eudyptes.net.