User Manual
multiSPEC 4C camera
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senseFly
a Parrot company

multiSPEC 4C camera

User Manual

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Technical support

If you have questions on your *eBee* or your multiSPEC 4C camera please consult senseFly Ltd's technical support page at the following address:

http://www.sensefly.com/support/

multiSPEC 4C camera

Congratulations on your purchase of the *multiSPEC 4C* camera, an advanced payload for the *eBee* mapping drone that provides multispectral data for agricultural applications.

Note: This manual refers to version 2.4 of the *eBee*'s *eMotion* software and version 3.2 of *Postflight Terra 3D*. Check the software version included in your *eBee* and consult the Release Notes for potential changes included in more recent versions of the software.

Box contents

The camera package contains the following items:

- 1×*multiSPEC 4C* camera
- 1×calibration target
- 1×*multiSPEC 4C* camera User Manual (this manual)
- 1×SD memory card
- 1×cleaning tool
- 1×mounting kit for *eBee*s with serial number EB-02-...

Depending on your order, your package may also include additional items. Please verify upon delivery that your package is complete. In case of a missing item, please contact your reseller immediately.

Note: The *multiSPEC 4C* camera has magnetic clasps to fit *eBee*s with serial numbers EB-03-... without modification. The mounting kit provided adapts your *multiSPEC 4C* camera so that it can also be installed in *eBee*s with serial numbers EB-02-...

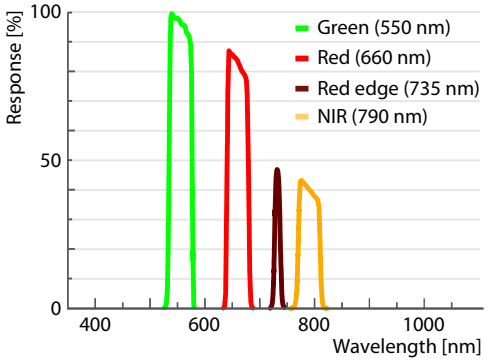
Contents

Part I

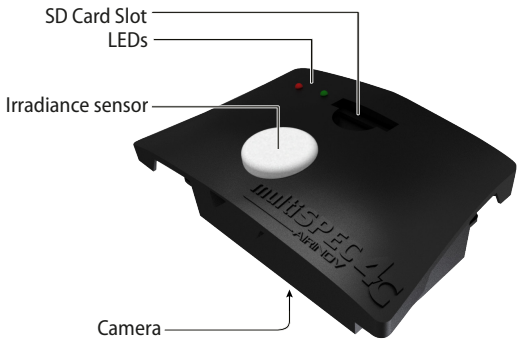
User Manual - *multiSPEC 4C* camera

1 The *multiSPEC 4C*

The *multiSPEC 4C* is a professional camera payload featuring four sensors, each able to detect a specific region of the light spectrum, carefully chosen for agricultural applications. The *multiSPEC 4C* produces images in the *green*, *red*, *red-edge* and *near-infrared* (NIR). The following figure illustrates the wavelength response of each sensor.



Thanks to the irradiance sensor on the top of the camera and its pre-flight calibration procedure, the *multiSPEC 4C* is able to provide absolute reflectance data at a wide range of light intensity levels.



2 Pre-flight procedure

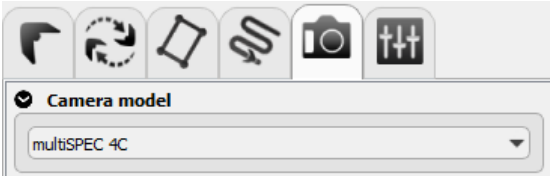
Before every flight:

- Perform a visual check of the lenses in order to ensure the best image quality. See the 'Care of Your *multiSPEC 4C*' section for lens cleaning instructions.
- Make sure that the SD memory card is fully inserted and has enough free space.
- Plug the *multiSPEC 4C* camera's cable into the connector marked in your *eBee*'s camera bay.
- Install the *multiSPEC 4C* into the camera bay of your *eBee*.

- Calibrate the *multiSPEC 4C*. See the 'Calibration' section for instructions.

2.1 *eMotion* settings

Once your *eBee* is connected to *eMotion*, verify that the correct camera model is selected in *eMotion*'s **Camera** tab:



If not, select *multiSPEC 4C*.

With the *multiSPEC 4C* camera selected, *eMotion*'s mission planner will automatically adjust flight altitude and other parameters to ensure the right ground sampling distance and display the image footprints correctly. Your camera selection is stored in the flight logs and later retrieved by the Flight Data Manager and used to select the appropriate image extraction method.

2.2 Calibration

In order to obtain absolute reflectance measurements from the images, you must perform a quick calibration before every flight

with the calibration target provided.

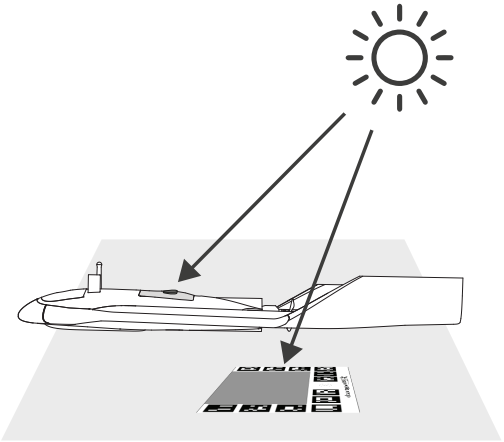
A message below the drone status in *eMotion* will remind you to perform this procedure and will disappear once it is successfully completed.

The following steps describe how to calibrate the reflectance using the calibration target provided. You can also find an illustrated guide on the back of the target.

Note: For a successful calibration, lighting conditions for both the *multiSPEC 4C* camera's irrandiance sensor and the calibration target must be the same as the lighting conditions the *eBee* will experience during its mission, that is, exposed to the open sky.

Note: During calibration, *eMotion* and your *multiSPEC 4C* camera will automatically capture several images, detect the target within the image and calibrate the *multiSPEC 4C* camera.

Note: Since you must lay your *eBee* flat on the ground out in the open during its startup sequence, you may find it convenient to lay the calibration target next to it, ready for calibration when the *eBee* is ready.

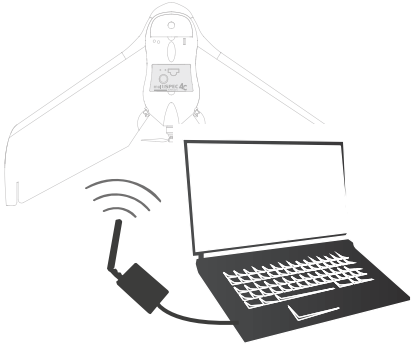


Step 1: Remove your calibration target from its protective cover.

Step 2: Lay the calibration target on a flat, level surface out in the open, exposed to the sky. Use the spirit level on the front of the target to make sure it is level.

Step 3: With your *multiSPEC 4C* camera installed in your *eBee*, start up your *eBee* and connect to *eMotion*, as per the instruc-

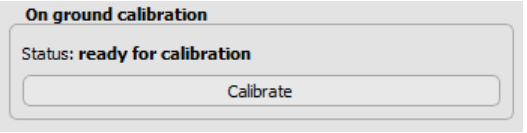
tions in the *eBee* user manual. The green LED will be on and the red LED off when the *multiSPEC 4C* camera is ready).



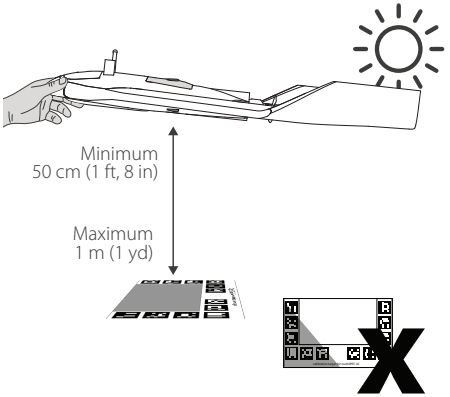
Step 4: In *eMotion*'s **Camera** tab, click Calibrate.

The red LED on the *multiSPEC 4C* will light up for a few seconds to show that it is ready for calibration.

Once you have clicked Calibrate, the *multiSPEC 4C* waits 10 seconds before starting the calibration to allow you time to get your *eBee* in position over your calibration target.



Step 5: Hold your *eBee* above the target, making sure that the *multiSPEC 4C* camera is between 50 cm (1.6 ft) and 1 m (3.3 fr) above the target and that no shadows are cast on either the target or the irradiance sensor on the top of the *multiSPEC 4C* camera.



Step 6: Ten seconds after you pressed the Calibrate button, calibration begins.

The *multiSPEC 4C* camera will take several pictures, with a pause of about 3 seconds between each picture until calibration is complete.

The green light blinks each time a picture is taken.

Once complete, the red LED switches on for a few seconds and a message appears in *eMotion*'s **Camera** tab confirming completion.

Step 7: Put the calibration target back into its protective cover. You are now ready to launch your *eBee*.

Pre-flight checklist:

1. *multiSPEC 4C* camera plugged in and correctly installed inside the *eBee*.
2. Correct camera model selected in *eMotion*.
3. *multiSPEC 4C*'s lenses clean.
4. Calibration procedure complete.

3 Launching the *eBee*

Follow the take-off procedure described in your *eBee* User Manual.

Caution: The *multiSPEC 4C* camera is heavier (+34 grams / 1.2 oz) than the *eBee*'s default payload (the IXUS/ELPH camera). Make sure you launch the *eBee* into the wind with a strong controlled thrown-ing action to help it during its first few seconds in the air.

4 Landing the *eBee*

When inserted into the *eBee*, the *multiSPEC 4C* camera's lenses are exposed to the ground on landing. Always land on a soft surface. Avoid landing on rocky surfaces to prevent irreversible damage.

5 In-flight performance

Flying with the *multiSPEC 4C* camera installed reduces the endurance when compared to the standard camera (IXUS/ELPH). This is due to both the additional weight and the fact that the camera drains power from the *eBee*'s main battery. As a result,

the maximum flight time of an *eBee* with *multiSPEC 4C* camera is approximately 30 min.

Note: Endurance can vary greatly depending on external factors such as wind, altitude changes and temperature.

6 Processing flight data and images

multiSPEC 4C images are imported in much the same way as images from other cameras, using *eMotion*'s Flight Data Manager.

Use *eMotion*'s Flight Data Manager to import the images from your flight into a folder and create a *Postflight Terra 3D* project following the instructions in your *eBee*'s User Manual Processing Image Data section.

You can find guidelines on the processing workflow of *multiSPEC 4C* data with *Postflight Terra 3D* on our Knowledge Base (https://my.sensefly

7 Care of your *multiSPEC 4C*

- If water droplets or dirt stick to the lenses, wipe them with a dry soft cloth, such as an eyeglass cloth. Do not rub hard or apply force.
- Use the cleaning tool provided to remove dirt and dust from the lens. Push the brush out to brush away grit and dust. Take the lid off the other end and use the pad for fine dust and dirt on the glass surface.
- To prevent condensation from forming on the *multiSPEC 4C* camera after sudden temperature changes (e.g., when the camera is transferred from a cold to warm environment), put the *multiSPEC 4C* camera in an airtight, resealable plastic bag and let it gradually adjust to the temperature before removing it from the bag.

Part II
Appendix

1 LED status

Green LED	Red LED	Status
ON	OFF	Standby
ON	ON	Powering up or down
OFF	Blinking	SD card not detected. Please verify that it is correctly inserted and that its write lock is off.
Blinking	OFF	A picture is being taken.

2 Specifications

Sensors	4×1/3″ CMOS
Image size	4×1.2 Mpix
Maximum f/number	f/1.8
Output formats	4-page 10-bit TIFF
Weight	Approx. 160 g (5.6 oz)