MARK ROBERTS MOTION CONTROL

TILTA
NUCLEUS-M
LENS MOTOR

QUICK START GUIDE

QSG Product Code: MRMC-2319
Product Covered: 26548

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Chapter 1 **Quick start**

Safety

- Do not use around flammable gas. All electrical equipment can generate sparks that can ignite flammable gas.
- Heads have powerful motors that can pinch, so take care not to get your hands trapped in the head or cabling.
- Keep the equipment dry. The system has **not** been made weatherproof. Do not use with wet hands.
- Keep cables tidy. Use cable ties to keep them out of harm's way. If you have a head with slip rings then make use of them; avoid running any cables between the base and the rotating head or camera.

Overview

Thank you for using the Tilta Nucleus-M Lens Motor for Mark Roberts Motion Control (MRMC) equipment. Nucleus-M Motors are produced by a company called Tilta. Their webpage is https://tilta.com/. They are sold as a kit which includes battery charger, hand controller and required cables. We refer to the hand controller as Tilta controller.

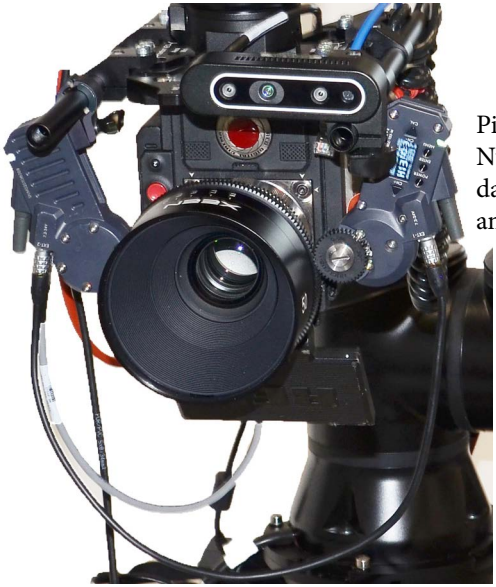
Connecting the cables

Quad Tilta Box

Tilta Nucleus-M Lens Motors (Daisy Chained - Both Lemo connectors on the motors are identical)

Note

The motors can be plugged and unplugged from the box without switching the power to the box off.



Picture of Tilta Nucleus-M Lens Motors daisy-chained for zoom and focus

Using the User Interface

Hand controller Wireless Control

The Tilta Hand controller can be used wirelessly to control the motors when Flair is not in use or even during the calibration process. To set up the wireless control of motors on the hand controller:

1. Disable the axis of interest in Flair before powering the Tilta controller on.
2. Power on the controller by pressing the power button.
3. Press the **MENU** button.
4. Select **Wireless** and press the **ENTER** button.

5. Select **2.4G** and press the **ENTER** button.

6. Select the same Channel number as that on the motor and press the **ENTER** button.

7. Press the **MENU** button again to exit the menu.

If you just setup the motor for focus, turning the focus pot should move the motor. For IRIS, there's a dial on the right of the Tilta controller.

Motors

In order to match the axis from Flair to motor numbers, the motor numbers need to be adjusted accordingly.

Here is the list of axis and their corresponding motor numbers:

Iris → Motor No 1

Zoom → Motor No 2

Focus → Motor No 3

To assign the motor number on the motor itself:

1. Press the **MENU** button.
2. Go to the motor number by pressing arrows.
3. Press the **ENTER** button.
4. Navigate through arrows and find the motor number you need.
5. Press the **ENTER** button to select.
6. Press the “Power” button to return to the main page.

Tilta Hand Controller

On the Tilta controller, corresponding motor number should be assigned to the axis. In order to do that:

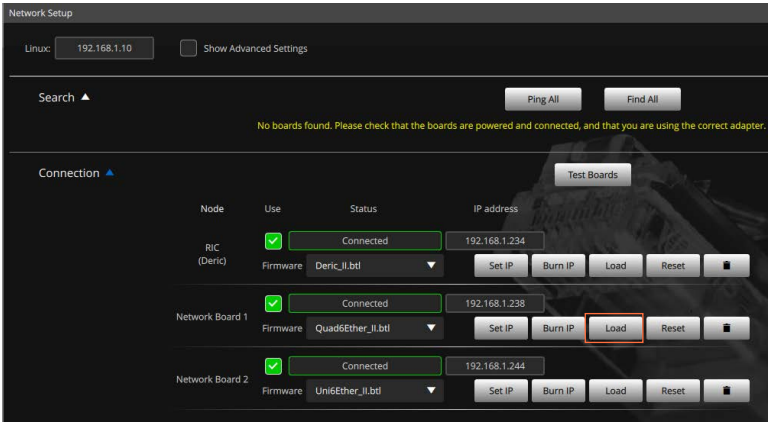
1. Press the **MENU** button.
2. Navigate to the **Motor** option and press the **ENTER** button.
3. Navigate to the axis you want to select: Iris, Zoom or Focus.
4. Navigate to the SYNC option and press the **ENTER** button
5. Navigate to the corresponding motor number.
6. Press the **ENTER** button and done.

Setting up a Lens in Flair v7 with Tilta Nucleus-M Motors

1. Mount the Tilta Nucleus-M Lens Motors on the camera platform to control focus and zoom. Use the *Camera Platform for Bolt Family of Robots Quick Start Guide* for instructions on how to mount the camera platform on the robot arm and to add the motors on to the matte bars.
2. Plug the cables for motors. Note that the motors are daisy chained.
3. Check if the lens motor(s) have power. If not, press the POWER button on the motor.

Note

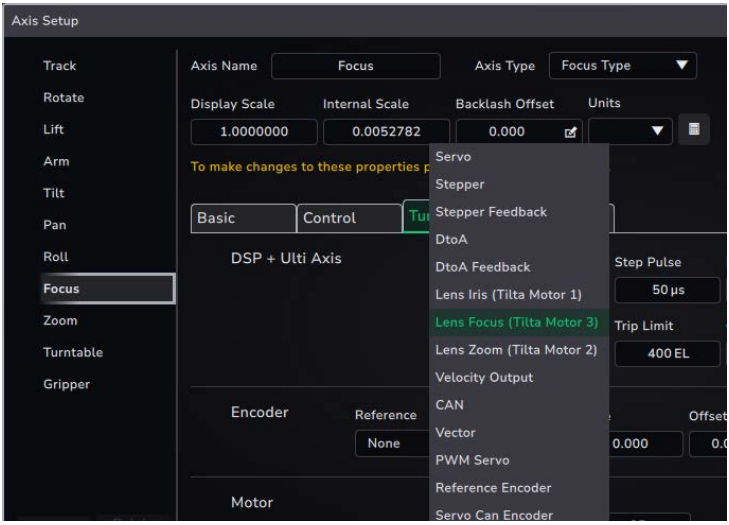
If Flair is already running, reload Node 1 from Network Setup dialog box.



4. The lens motors are run from Node 1 on your normal Ethernet network. Therefore, Focus is set to network node 1 port 5; zoom to network node 1 port 6. If you need to control iris with a external lens motor, assign it to network node 1 port 7. The following table shows the lens' axes and their corresponding motor number and node and port numbers to be assigned in Flair.

Axis	Tilta	Flair	
	Motor number	**Node**	**Port**
Focus	3	1	5
Zoom	2	1	6
Iris	1	1	7

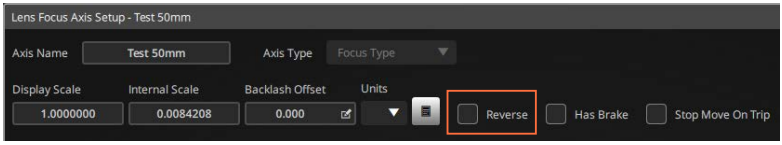
5. In Flair Axis Setup dialog box for the motor, in the 'Motor Type' drop-down list, select 'Lens Focus (Tilta Motor 3)'. This selection determines the index of the Tilta motor number to assign to.



6. On each motor, press the **Calibrate** button for 3 seconds and the motor will find both end stops and set the internal scale in Flair from 0-1 for the real travel between end-stops.

Once the calibration is done,

6.1 Drive the lens to ∞ and in Flair, check that Focus is at zero. (Focus must be set as 'Independent' at this stage.) Similarly, check that close focus is at 1. If the values are interchanged or negative, disable the Focus axis and go to Focus axis setup and reverse the motor direction.



6.2 Save the axis setup and exit.

6.3 Ensuring that the hand controller is off, enable the Focus axis.

6.4 Drive the focus axis to both ends until you notice a ‘jump’ in Flair. (This jump is because of the motor correcting its direction.)

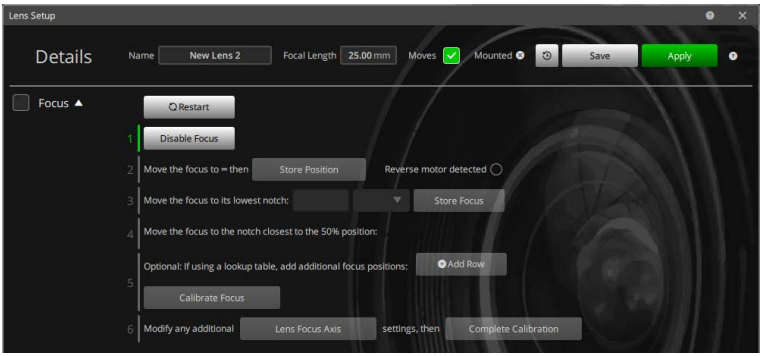
6.5 Once the direction is corrected, perform step 6.1 again.

7. In Flair, choose **Setups** → **Lens Setup** and choose any **Empty Lens**.

8. Specify a **Name** for the lens.

9. Add a **Focal Length** for your lens.

10. Check that the **Moves** option is checked.



11. You will be guided through the on-screen steps for focus calibration. In step 1, click **Disable Focus**.

12. For step 2, using the Flair main screen (in the Move view for Flair Lite and the Waypoint View for Flair), use the mouse left and right buttons move the focus to ∞, and click **Store Position**.

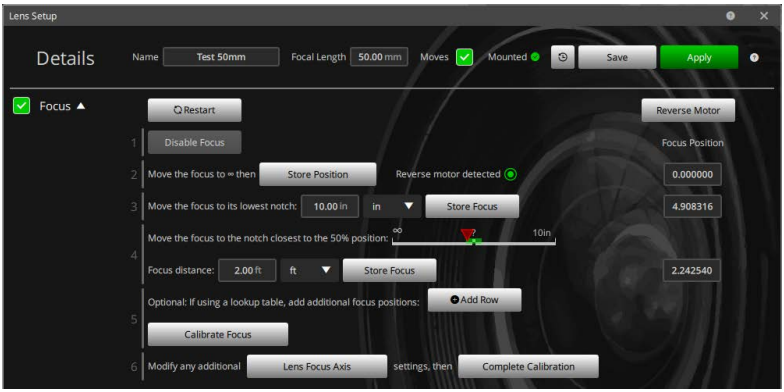
13. For step 3, move the focus on lowest notch and enter the reading on the lens in the box and select the units. Click **Store Focus**.

14. For step 4, move the lens to the mid-point mark in the lens travel and enter the reading on the lens in the **Focus distance** box and select the units. Click **Store Focus**.

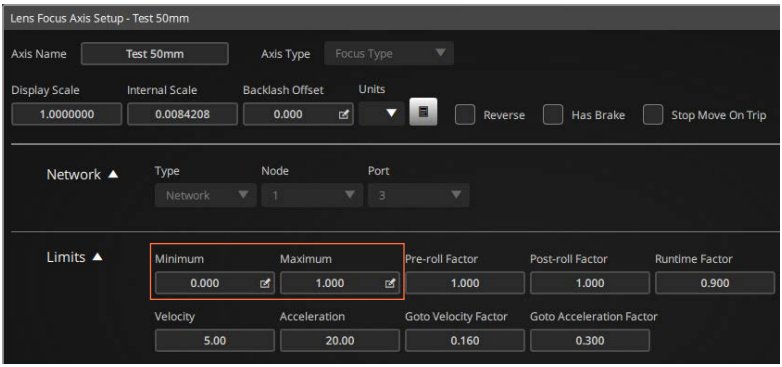
15. If you have lens in which the 3-point calibration will not suffice then you can add more rows by clicking ‘Add Row ‘button and repeat step 14.

> Note
>
> This method assumes that the notches in your lens are accurate. If they are not, refer to Flair Operator’s Manual for an alternative method for lens calibration.

16. For step 5, click **Calibrate Focus**.



17. For step 6, click **Lens Focus Axis** and in the Lens Focus Axis dialog box, **Minimum Limit** will be set to **0** and **Maximum Limit** to **1**. If not, type these in.



18. Click **Save** and Exit.
19. In the Lens Setup dialog box, click **Complete Calibration**.
20. Scroll down to Extras, measure the **X**, **Y** and **Z nodal offsets** according to the camera and lens positions and add these values in the respective boxes. Add the values for other offsets that apply. For more information on offsets, refer to the *Flair 7.3 Manual*.
21. Click **Save** and **Apply**. Close the Lens Setup dialog box.
22. Whenever an already calibrated lens is used, you only need to repeat step 6. Then, when the lens setup is loaded and applied from Flair files, the Focus calibration will be correct.

Notes

Appendix 1 **Connector Pinouts summary**

Note: All pin-outs for camera interfaces appear as seen by the user.

EXT-1/EXT-2

Connector ID: LEMO EEG.0B.307

PIN	SIGNAL	Description	Direction
1	7.2 to 24 Volts DC	Power to the Nucleus-M motor and batteries	In/Out
2	7.2 to 24 Volts DC	Power to the Nucleus-M motor and batteries	In/Out
3	TTL Rx	TTL receive	In
4	+5.0V	5 Volt (200mA Max)	In/Out
5	GROUND	Common ground	N/A
6	TTL Tx	TTL transmit	Out
7	GROUND	Common ground	N/A

Note that, 5V pin is an output of the motor and can be used to supply RS422-UART converter. Also, since the communication is at TTL, the wires should not be extended.

Appendix 2 **Firmware Update**

Updating Firmware Tilta Nucleus-M Lens Motor

In order to make the Tilta Nucleus-M Lens motor compatible with Flair, you will need to upgrade the firmware on the motor. To do this:

1. Check the current firmware version by following the steps below:

   1.1 Insert the micro USB cable into the side of the motor and the other end into the PC.

   1.2 When the display appears, double-press the MENU button.

1.3 Press the ‘CH+’ button to scroll until the arrow on the display points to the “Information” tab.

1.4 Press the ENTER button. The display should read as below. The line in the red box should be V:23.08.14.

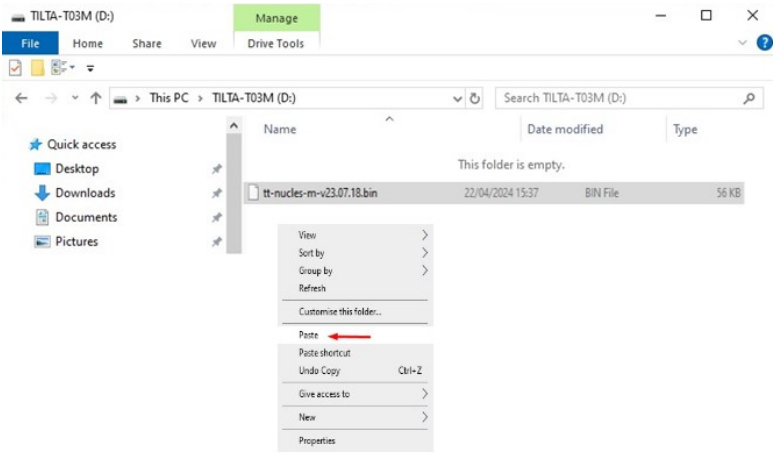
2. If not, follow the steps below to update the firmware:

2.1 Unplug the USB cable from the motor.

2.2 Press and hold down the CH+ and the CH-/CAL buttons simultaneously with one hand, as shown below.

2.3 While still holding the two buttons down, plug in the USB cable to the side of the motor. Keep holding the buttons down until the empty Tilta folder appears on the PC and the display on the motor changes as shown..

2.4 On the PC, download the new firmware file from **here** and paste it into the Tilta drive, **TILTA – T03M(x)**.



Tilta Lens drive firmware is now updated. After the update, the motors will need to be calibrated. Press the 'Calibrate' button for 3 seconds and the motor will find both end stops.

Notes

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