MARK ROBERTS MOTION CONTROL

CINEBOT MAX

QUICK START GUIDE

QSG Product Code: MRMC-2911-00
Products covered: MRMC-2335-00

CRANES AND RIGS | BROADCAST | HEADS & DSLR | PRODUCT PHOTOGRAPHY | RENTALS

Cinebot Max Quick Start Guide

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Chapter 1 **Quick Start**

Important safety instructions

To ensure the best from the product, please read this manual carefully. Keep it in a safe place for future reference.

To reduce the risk of electric shock, do not remove the cover from the unit. No user serviceable parts inside. Refer servicing to qualified personnel.

Power and connections

- This unit must be connected to a mains socket outlet with a protective earth connection.
- This unit is not disconnected from the AC power source as long as it is connected to the wall outlet.
- When not using the unit for a long period of time, ensure that the AC power cord is disconnected from the wall outlet.
- The AC wall outlet should be installed near to the unit and be easily accessible.
- Do not plug in or attempt to operate an obviously damaged unit.

General care

- Do not force switches or external connections.
- When moving the unit, disconnect the mains cable and then disconnect the long umbilical cable.
- Do not attempt to clean the unit with chemical solvents or aerosol cleaners, as this may damage the unit. Use a clean dry cloth.
- Do not use around flammable gas. All electrical equipment can generate sparks that can ignite flammable gas.
- Keep away from pets and children. The head has powerful motors that can pinch, so take care not to get your hands trapped in the head or cabling.

- 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.

Location

Installation of this unit should be away from sources of excessive heat, vibration, and dust.

Keep the brakes on caster wheels on when using the Cinebot Max on Pedestal.

Intellectual property

This product includes confidential and/or trade secret property. Therefore, you may not copy, modify, adapt, translate, distribute, reverse engineer, or decompile contents thereof.

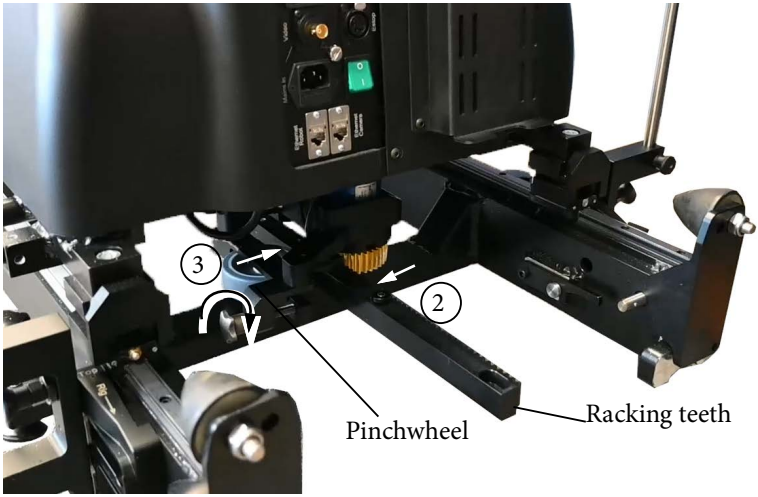
Overview

Thank you for using the Cinebot Max from Mark Roberts Motion Control (MRMC). Cinebot Max is designed for reliable day-in, day-out use in professional studio and Outside Broadcast environments. It is a larger version of the Cinebot Max lightweight Moco rig, using the larger Universal Robots UR20e collaborative robot on a pedestal or track. It provides motion control at limited speeds and travel range compared to the existing Bolt range, but adequate for limited complexity and lower speed shoots. Cinebot comes with optional 500mm and 300mm risers that can be used to raise the height of the arm

Cinebot Max on Track has a base designed to move along precision track. It has removable trolley wheels for moving between sets, and can also be held down with weights at temporary locations.

Attaching the Pinchwheel Assembly to Cinebot Max on Track

1. After removing the packaging and putting the Cinebot Max on Track from the crate, remove the cable tie on the Cinebot Max base underside that has been added to secure the pinch wheel assembly during transport.

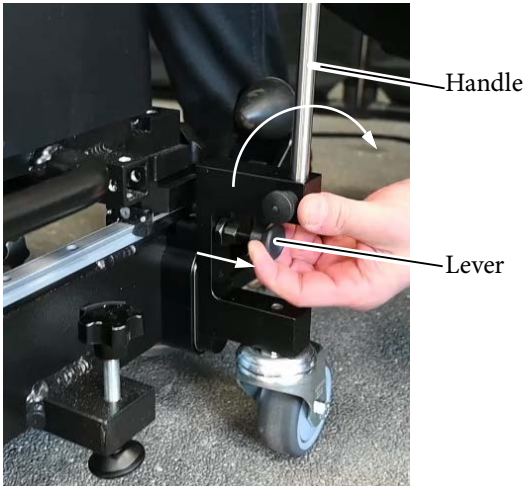


2. Push the track motor gear to the teeth of the racking so they are in mesh.
3. Slightly push the pinchwheel to the rear of the racking and use the star screw to finger tighten it.
4. Check that the base is now firm on the track and is not able to be pushed by hand.

Removing/Adding the Wheel Units on the Cinebot Max on Track

Cinebot Max on Track is transported over one length of track on 4 x wheel units. The 2 x smaller wheels are steering wheels to manoeuvre the rig and put it in the desired position. The 2 x larger wheels are fixed wheels. These units can be lowered or removed while the rig is in operation.

To lower the wheels, while pulling the lever on the wheel away from the rail and lower the handle down.



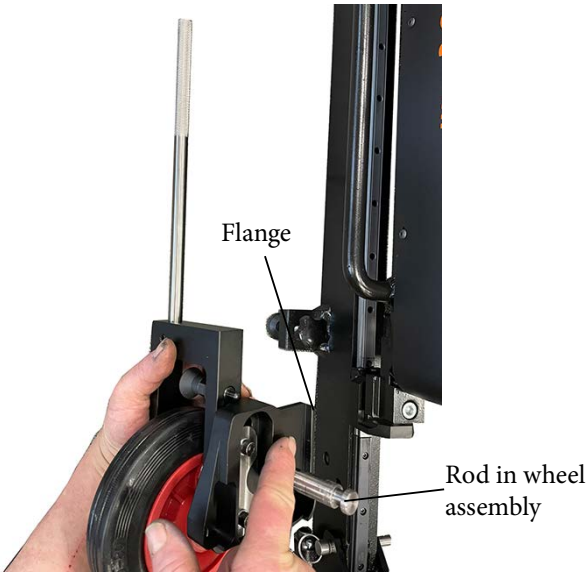
Similarly lower the other 3 x wheels.

To **remove the wheels**:

Remove the clip from the castor wheel bracket and detach the wheel assembly away from the rail.

To **add the wheels** to the rails:

1. Each wheel assembly can be attached to the rail only to the specific location on the track. Ensure you find the correct wheel assembly matching the side of the rail using the label on each. Adjust the bracket on the wheel so that the handle is lowered and parallel to the rail and flange on the wheel bracket can go under the rail.



2. Insert the rod in the wheel assembly into the cavity in the rails and clip it to the rail.

Laying the Track for Cinebot Max on Track

1. Lay the robot with the first track section on its feet.
2. Raise the two middle feet of the track section (1 on each rail) so they do not touch the ground, leaving the rail to rest on the four corner feet.

3. Level the track in both length and width directions using a spirit level, by adjusting the four corner feet of the track. Make sure all four corner feet are touching the ground (no wobble).

> Hint
>
> The four corner feet also determine the track height. If you are laying track on a level floor, try to use the middle of the height adjustment range so that subsequent sections have some leeway (in their feet) to cater for any unevenness in the floor.

4. Lower the two middle feet until they touch the ground (finger tight against the ground).

Laying subsequent track sections

1. Lay the next track section in line with the previously laid track section and as close to it as possible, making sure it is the right way around.
2. Loosen the rack clips so you can temporarily slide the rack along the track and out of the way when you are joining the track sections.
3. Raise the middle feet of the new track section so they do not touch the ground.
4. Adjust the height of the new track section to match that of the previous section by adjusting the two corner feet nearest to the joint (one on each rail).
5. Level the new track section with a spirit level by adjusting the two corner feet furthest from the joint (one on each rail).
6. Slide the new track section along the floor against the previous track section to firmly engage the ends of the rails. (Slide the new section

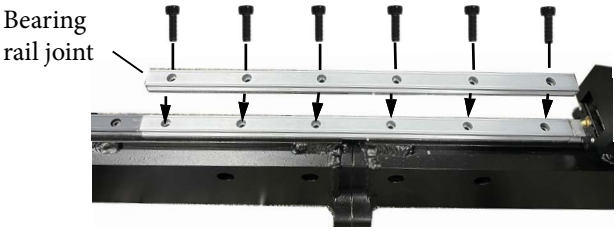
— not the previous section.) You might need to repeat steps 3 to 5 until you get good alignment of the rails at the joint.

7. Firmly tighten the two large bolts that hold the track sections together at the joint (one on each rail). You can also use these to help pull the track sections together, once they are at the same height.

8. On the new section, lower the six middle feet until they touch the ground (finger tight against the ground).

Mounting bearing rail joints

1. At one of the track joints, slide a track bearing (included in the spares) over the end of the bearing rails.
2. Add one of the long bearing rail joints onto the track.
3. Align the bearing rail joint with the existing rail by sliding the track bearing over the joint at each end.
4. Insert the screws and tighten them.



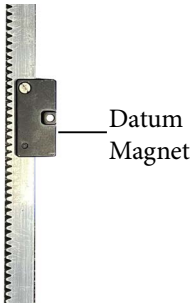
5. Slide the track bearings along the rail to the next joint and repeat steps 1 to 4 for all remaining joints. For the track ends you use the short bearing rail pieces (with only two holes) and one track bearing to help with alignment.

6. Make sure the rack joint has the correct spacing by clamping a rack matching block to it, teeth meshed, using a vice.

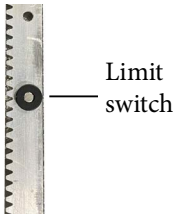
7. Tighten the rack clips to secure the racking on the rails.
8.
9. Remove the vice and rack matching block.

Datum Magnet

The track has a **Datum magnet** which can be detected by the Datum sensor under the pinchwheel in the track base. The Datum magnet defines a fixed reference point on the track for the electronics. The rig controller can then use this position as the home position or zero point, from which all positions, movements, and soft limits along the track are measured.



The **Limit Switch** consists of a magnetic sensor located on the track motor pinch wheel on the underside of the rig, and two magnets which you mount at each end of the rack. The position of the magnets along the rack defines the ultimate limits, along the track, for the rig electronics. You define the soft limits within the range of the Limit Switch magnets, so that if the soft limits fail for some reason and the rig reaches one of the Limit Switch magnets, the system electronics automatically shut down any further movement and apply the brakes.



Hint

If you move the Datum magnet to a different position along the track, remember to change the soft limits in your controller or Flair computer to cater for the new Home position.

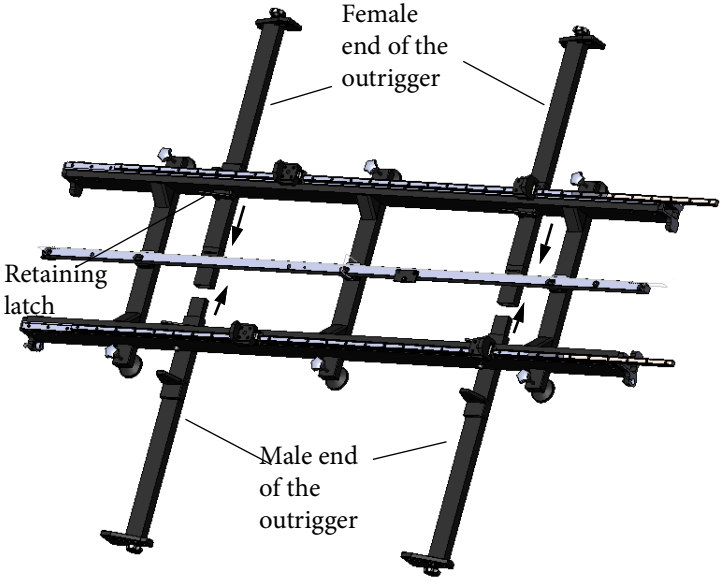
Note

Before putting the pinchwheel assembly out of mesh, ensure that the robot is not directly above the datum magnet when stopping it, for example for transport. Move the robot over along the track before putting the pinchwheel out of mesh.

Also, the robot will not pass over the datum magnet when the robot is out of mesh; the pinch wheel assembly will hit the datum switch. To avoid this, remove the datum switch before sliding the robot along the rail, out of mesh.

Adding the Outriggers

1. Slide the female part of the outrigger into the track and put the retaining latch on to secure it in place.
2. Similarly, slide the male end of the outrigger and secure using the retaining latch.

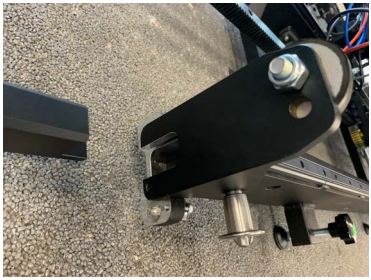


3. Add the four pairs of outriggers.

Adding the Anti-tip Device (Cinebot Mac on Track only)

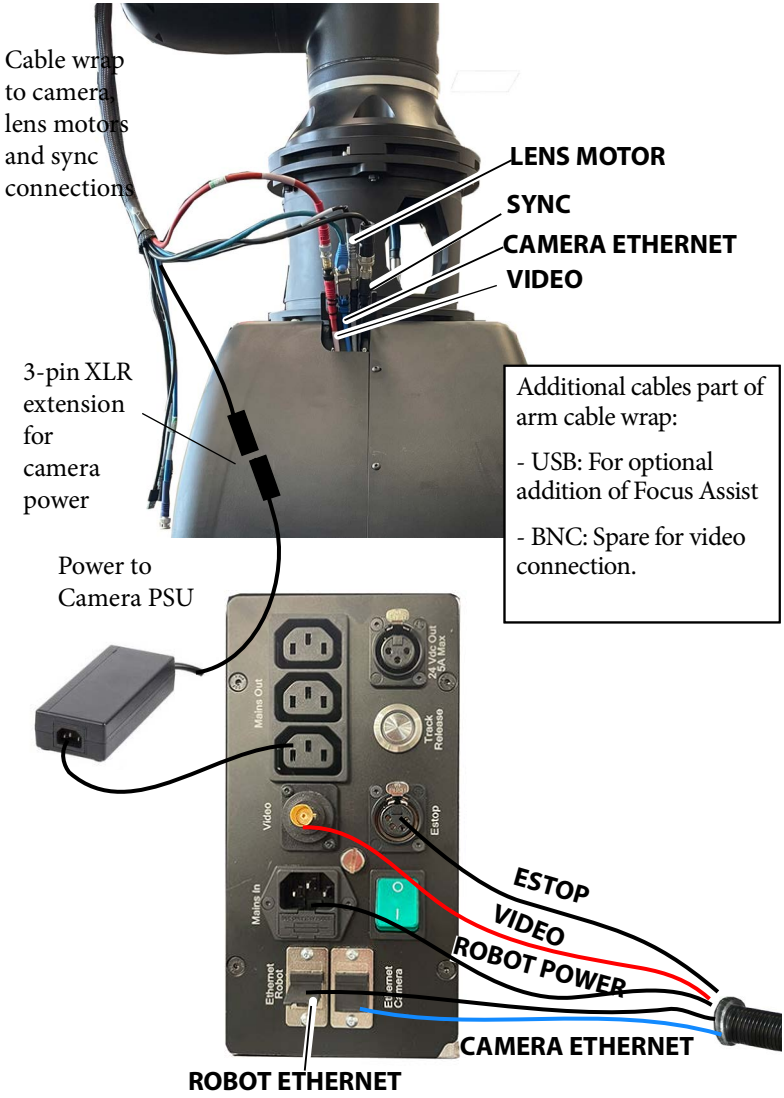
2 x anti-tip devices should be fitted on each each end of the rail. One in each modified buffer.

1. On the supplied anti-tip device, wind the foot in.
2. Slide anti tip device into rail, through the buffer, until it reaches a natural stop.

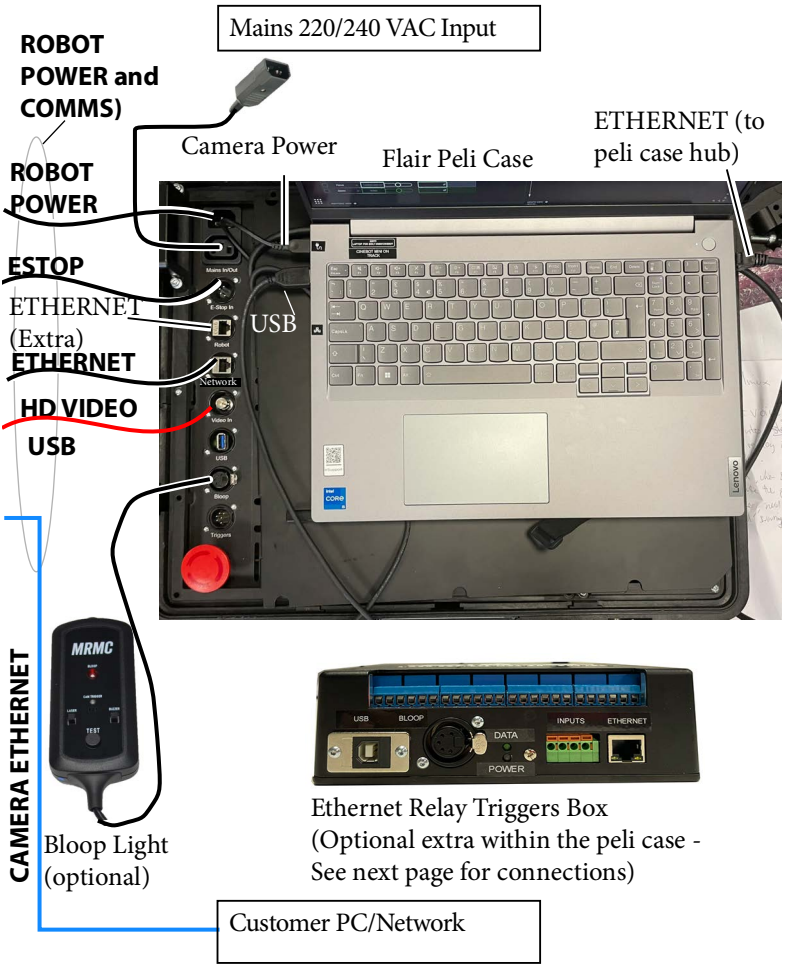


3. Wind down the foot until slight pressure is felt. Ensure that it is not wound too tight so as to raise the rail.

Connecting the cables (Cinebot Max on Track) – Robot Base - Robot Arm



Connecting the cables (Cinebot Max on Track) - Operator's Position



Warning!

Do not plug Camera Power into the Cinebot Max base **24vDC OUT** port.

Connecting the Ethernet Relay Triggers Box

At the bottom of the peli case connections is the **TRIGGERS** 6-pin port. The cable [32359] plugs into this port and is supplied with the optional extra triggers box kit. It has 4 plying leads on it, pins 1 and 2 are connected to the Output Trigger 1 and pins 3 and 4 are connected to Input Trigger 1 on the Ethernet Relay Triggers Box.

Cable [32359]

Picture of base connections - Cinebot Max on Track

Starting up the Cinebot Max on Track system

Once you have attached all the cables, power up the rig by switching on the components in the order described below.

1. Mount the camera on the Cinebot Max arm on the camera plate. Note that the camera plate can only be used to top-mount the camera and is the minimised version of the Camera Platform for Bolt Family. For more information on mounting the camera and lens motors, see the *Camera Platform for Bolt Family Quick Start Guide*.

2. Make sure you have secured the area around Cinebot Max on Pedestal. Put up guard rails around Cinebot Max on Pedestal as necessary, and tell others on the set that you are now powering up the rig.

3. With everything powered off including the laptop, connect all cables as detailed in the diagram on page 18.
4. Plug in the single IEC mains input into the flight case and switch it on. You should hear the fans of the controller indicating the controller booting process.
5. Power up the Flair laptop.
6. On the Flair laptop, start the Flair application by double-clicking on the Flair icon on the Desktop.

   Flair automatically loads the relevant firmware into all attached axis boards, including any interface boxes or model movers that are attached to the computer stack such as Turntable.

7. On the Flair laptop, set the payload mass from Flair using the instructions in *Setting the Payload for Cinebot Max* on page 25. You will need to set the payload only when it is altered.
8. Release the E-stop on the robot base, by turning the button clockwise until the red button pops up and green LED lights up.
9. In Flair, click on the **Engage Robot** button.
10. Engage and then zero the Track axis. Zero the other axes as required in Flair. The Cinebot Max on Track arm itself does not require zeroing but you need to zero other axes, such as
    - The Track: To do this you use the Zero > Home Axis > Track menu option. When zeroing the track axis is initiated, the rig will seek the datum limit sensor in the negative direction, so the rig must first be driven in a positive direction just past the datum magnet (sensors are on the pinch wheel assembly)
    - Any external Lens Control Motors (LCMs) that you are using. To zero these you first set the focus to infinity (∞), zoom to wide-angle (zoomed out all the way), iris/aperture to wide open and then use the relevant **Zero → Direct Zero Axis** menu option to set those lens positions as the zero points in Flair.
    - Any model movers

Cinebot Max on Track start-up summary

1. Secure the area
2. Switch on Cinebot Max on Track
3. Switch on the Flair PC
4. Start Flair
5. Release the E-stop on the desk

In Flair:

6. **Engage Robot**
7. Zero track and other axes

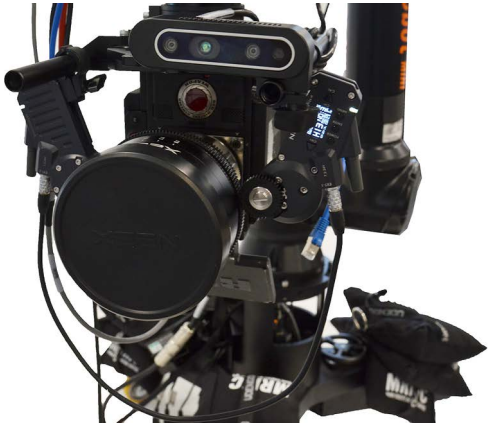
The rig is now ready to use.

Setting up a Lens in Flair Classic with Tilta motors

> Note
>
> To calibrate a lens motor for a lens without end stops, refer to *Tilta Nucleus-M Wireless Follow Focus System User Guide* page 21 section 1.2.

1. Mount the lens motors on the camera plate 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.

Picture of lens control motors on the camera platform



2. Plug the cables for motors. Note that the motors are daisy chained. They are powered up when the quad box in the robot base is powered up. Switch on the power to the robot.

3. The lens motors each have a number on them. In Flair, motors number 1 corresponds to iris, motor number 2 corresponds to zoom and motor number 3 corresponds to focus. They are run from a Quad Axis board that is a node on your normal Ethernet network. The port numbers on the network node in Flair can be set to any number as long as they do not conflict. For example, focus is set to network node 1 port 3; zoom to network node 1 port 4.

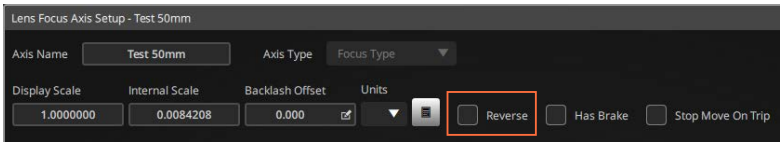
> Note
>
> Node 1 port 1 is set to track so it cannot be assigned to another motor. So if you need to control iris with a external lens motor, do not assign it to network node 1 port 4; you can assign it to network node 1 port 5.

4. 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.

Calibrate button

Once the calibration is done,

4.1 Drive the lens to ∞ and in Flair, check that Focus is at zero.
Similarly, check that closed 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.

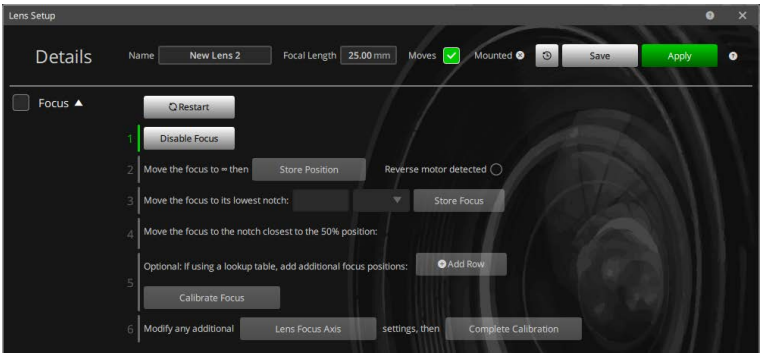


4.2 Save the axis setup and exit.

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

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

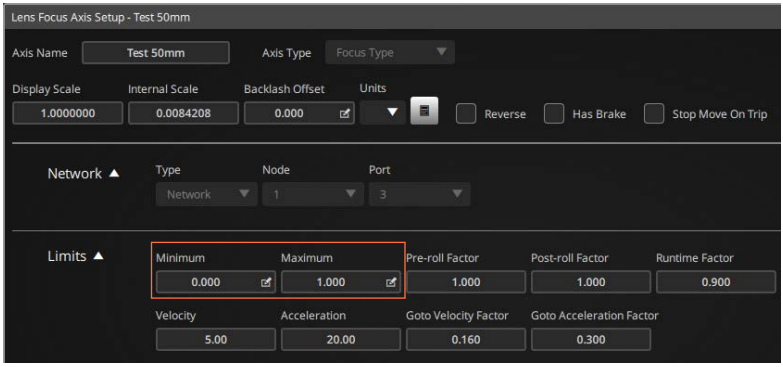
5. In Flair, choose **Setups** → **Lens Setup** and choose any **Empty Lens**.
6. Specify a **Name** for the lens.
7. Add a **Focal Length** for your lens.
8. Check that the **Moves** option is checked.



9. You will be guided through the on-screen steps for focus calibration. In step 1, click **Disable Focus**.
10. For step 2, using the Flair main screen, move the focus to ∞, and click **Store Position**.
11. 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**.
12. 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**.

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

14. 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.



15. Click **Save** and Exit.

16. In the Lens Setup dialog box, click **Complete Calibration**.

17. 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*.

18. Click **Save** and **Apply**. Close the Lens Setup dialog box.

19. Whenever an already calibrated lens is used, the Nucleus-M Lens Motor must be placed where it was on the Focus and it must have

the **Calibrate** button pressed on it to find end-stops of that lens. Then, when the lens setup is loaded and applied from Flair files, the Focus calibration will be correct.

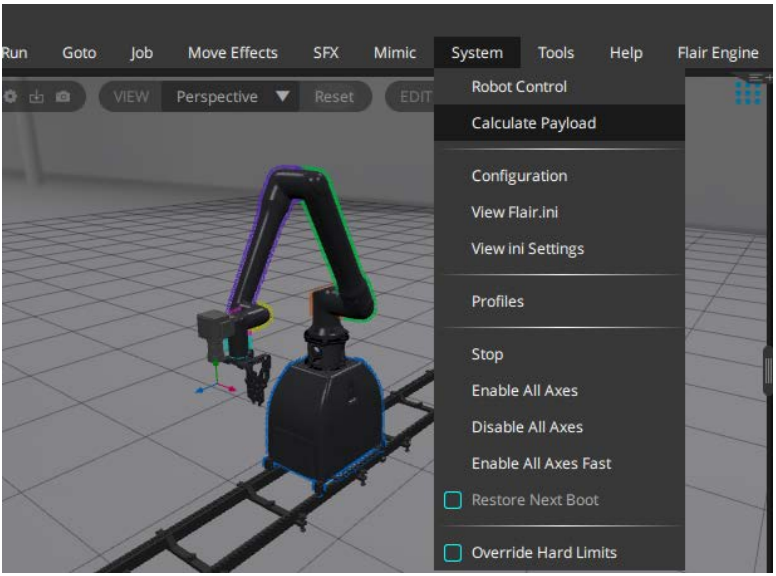
Setting the Payload for Cinebot Max

The robot allows the use of a special 'PushMoco' mode which allows the robot arm to be manually moved into desired positions and/or poses and to store waypoints either using Flair user interface or pressing a button on the Bluetooth Remote Control. When PushMoco is active, in order for the robot to function as desired and not drop unexpectedly, it is important that the payload and centre of gravity values are set up accurately. Once the value is set for a specific payload, you can toggle PushMoco on or off, as required.

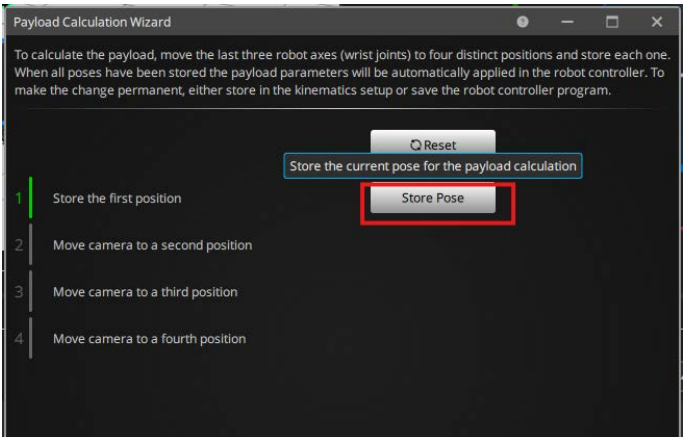
The correct payload value for the robot can be set using the wizard in the VNC Viewer program.

1. Ensure that the fields in the **Kinematics setup** in Flair are left as is, as shown:

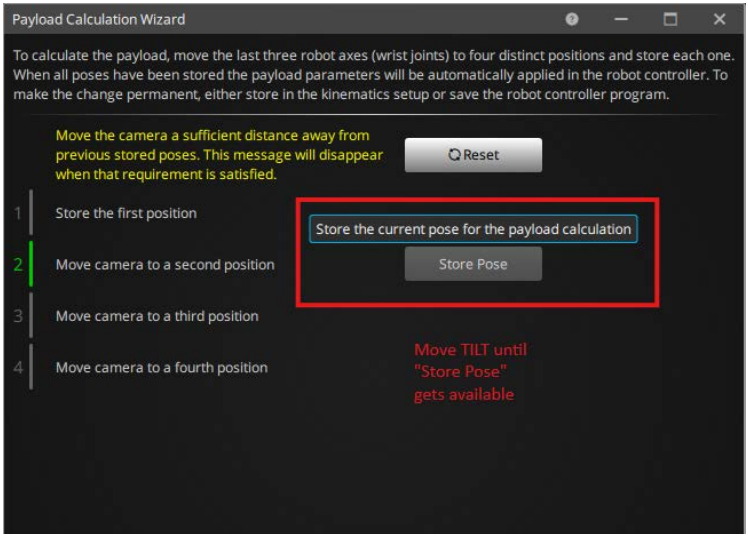
2. Select **System → Calculate Payload**.



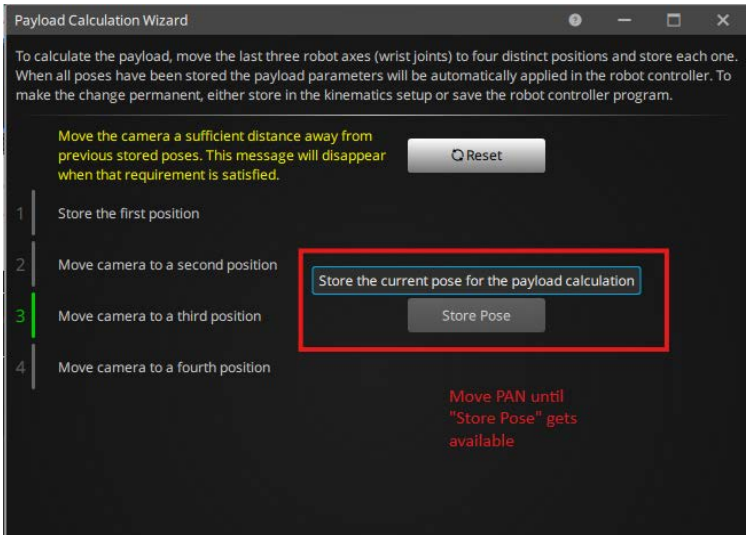
3. As stated on the screen, the robot can estimate the payload and centre of gravity with 4 different robot positions excluding any camera axes. When you have put the robot into first position, click **Store Position**.



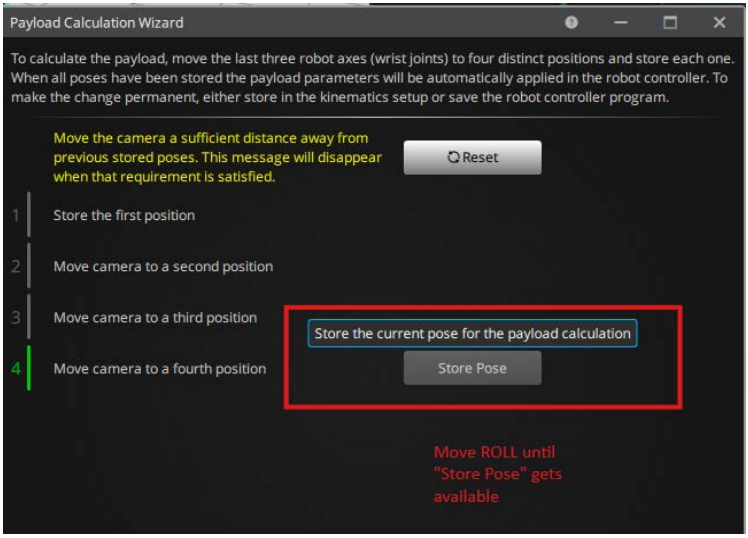
4. Put the robot in the second position and click **Store Pose**.



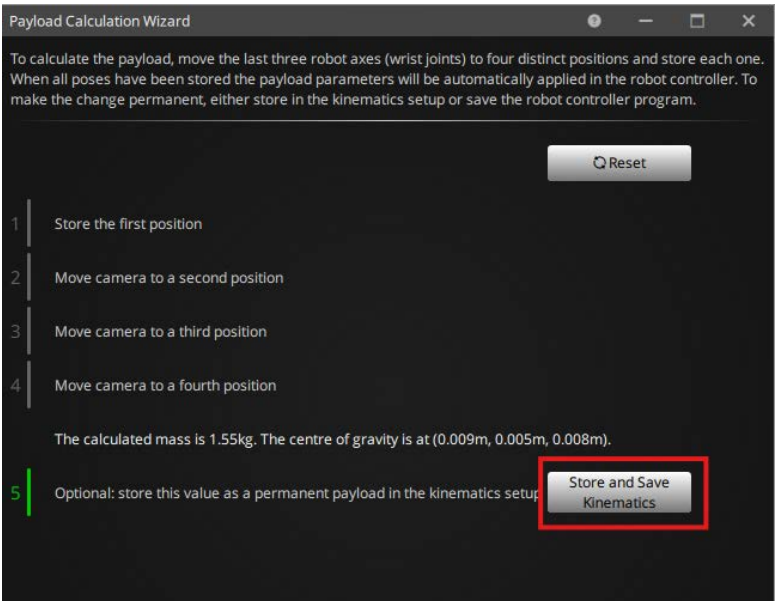
5. In Flair, main screenmove the Pan axis until the **Store Pose** button becomes available and then click it.



6. Similarly, using Flair move the Roll axis until the **Store Pose** button becomes available and then click it.



7. On the final screen, the estimated payload and centre of gravity measurements are shown. Click **Store and Save Kinematics** to store payload in the Kinematics Setup.



PushMoco

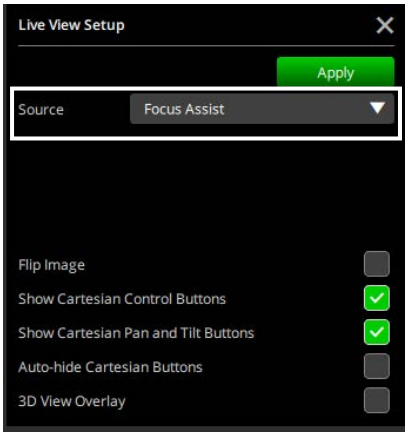
1. Toggle PushMoco on from main Flair screen. It turns green.

2. Manually move the robot arm to the desired position and use Flair or the Cinebot Max remote interface mounted at the end of the arm to store waypoints in Flair.

3. In Flair, after storing all desired positions, toggle PushMoco off.

Using Focus Assist with Cinebot Max

1. In the Flair LiveView window, click Setup icon to open the Live View Setup popup.
2. In the LiveView Setup dialog box, select **Focus Assist** from the Source drop-down list.



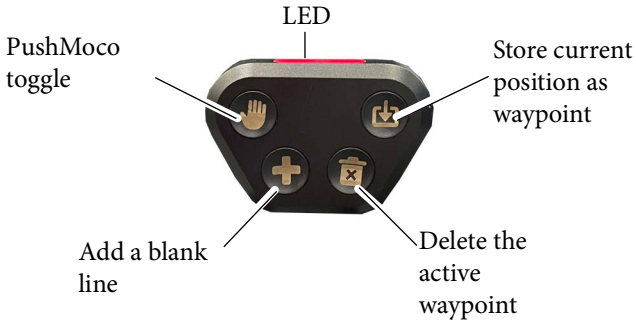
   The video from the Focus Assist will now appear in the LiveView area.

3. Click **Apply**.
4. Click **GOTO** in Live View. The GOTO button turns green. and moves the Focus Axis to do a Goto move when the Focus axis is in **Follow Target** or **Follow Object** (Focus Independent but calibrated).

Flair Constraints Feature

When storing a waypoint in PushMoco, you have an option of storing positions only for desired axes. By default all axes positions are recorded and are green. You can opt out of recording positions of axes by toggling them off so they turn grey. In the following example, the 'Z' translation axis position will not be recorded.

Cinebot Max remote interface functions



LED colour	Description
Red	Robot is engaged
Green	PushMoco is active
Amber	Estop active

Appendix 2 **Specifications**

Physical and Mechanical

Temperature range: 0-40 °C
Humidity tolerance: 0% to 85% relative humidity, non-condensing

Total payload (camera and platform): 10kg

Degrees of freedom: 6

Repeatability: +/- 0.02mm

Mass (including riser columns): 234kg

Mass (weight bags):

Mass (track section): 25kg

Max width (Cinebot Max on Track): 800mm/18”

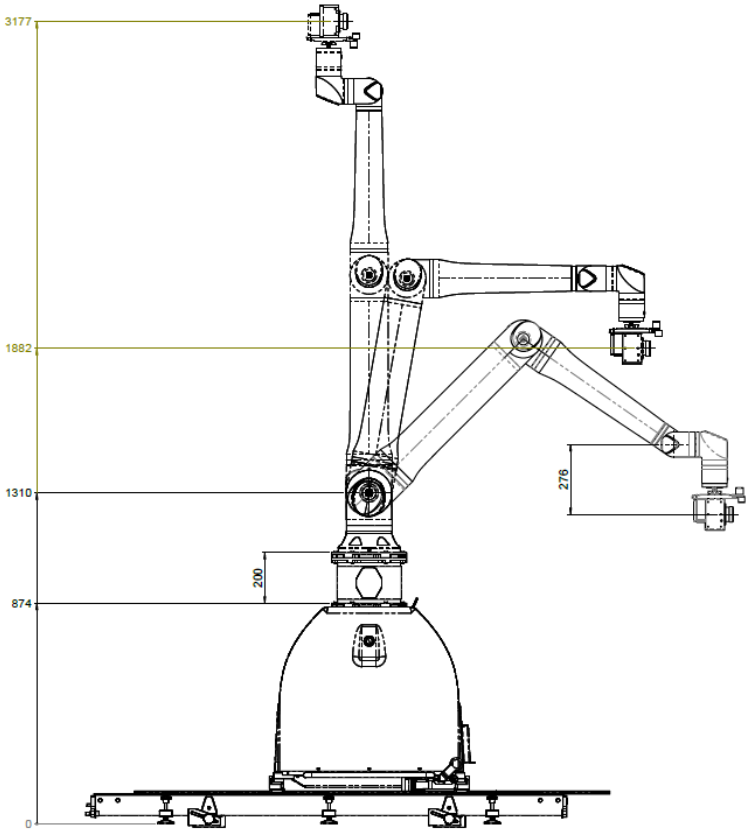
Power requirement: 240 VAC

Max Average Power Consumption: 750 W

Typical Average Power Consumption: 300 W

Controller Power Source100-240VAC, 47-440Hz

Cinebot Max on Track



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