MARK ROBERTS MOTION CONTROL

UR10 ROBOT MODEL MOVER

COMPACT LIGHTWEIGHT HIGH SPEED MODEL MOVER

QUICK START GUIDE

QSG Product Code: MRMC-2101-00

Products Covered: MRMC-2082-00

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UR10 Robot Model Mover Quick Start Guide

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Chapter 1 **Quick Start**

Overview

Thank you for using the UR10 Robot Model Mover from Mark Roberts Motion Control (MRMC). UR10 Robot Model Mover is designed for reliable day-in, day-out use in professional studio and Outside Broadcast environments. It has a small, lightweight robotic arm which can be used as model mover.

UR10 Robot Model Mover
can be attached to the floor or a suitable platform.

Safety procedures for using industrial robots

Note that the words **Robot** and **Rig** are completely interchangeable and identical in meaning, for the purposes of this document.

Motion Control rigs are potentially dangerous. It is important that you and everyone else on the set understand the safety notes on the following pages in order to stay safe.

You should use this document in addition to the normal Safety Manual instructions that are applicable to all motion control rigs, such as Milos. This section emphasises the safety concerns that are especially important around high-speed, high-acceleration, industrial-grade robots which can cause severe injuries, such as UR10 Robot Model Mover.

- Unlike traditional motion control equipment, UR10 Robot Model Mover can get to maximum speed in the blink of an eye - too fast for someone to be able to quickly move out of the way.
- It is ultimately the **operator** of the rig who is responsible for the safe use of the equipment so never bypass any of the safety points listed here.
- No one other than a highly trained operator should use the robot, no matter how simple it looks or is.
- This document is for the use of robots for carrying cameras or props, not people.

Assessing a site

Before setting up UR10 Robot Model Mover you need to **assess the site**, paying particular attention to the following points:

- Does the site have access? You need to make sure you can carry it there using a pallet truck or forklift.
- Does the site have a power source with sufficient capacity for the robot and the correct mains voltage?
  - UR10 Robot Model Mover requires a **240 Volts, single-phase power supply**.
  - The computer stack that controls UR10 Robot Model Mover (that is, the desktop computer and the power supply brick for the RT-14 interface box) are auto-switching and can run on 120-240 Volts AC.
- Does the site have unusual environmental attributes that require specialised protection from extreme temperatures, humidity, rain, or dust?

Installation safety

- Due to the large mass of the rigs and the accelerations they achieve it is important that they are securely mounted, with the recommended plates and bolts to a secure and concrete floor. Ensure the floor can support the load and the stresses (see above).
- Ensure the power supply is properly earthed (grounded) and of the correct voltage (see above).
- If the rig is mounted to something other than the floor then the mount should be heavy and strong enough to take the forces and not move or fall over during sudden starts and stops. Use the recommended minimum thickness steel plates. Check with MRMC if you are unsure of the exact requirements for your robot.
- Check that all cables are securely fixed and are not going to catch during motion.
- Ensure the camera, lens, focus motor, accessories, power supplies/batteries, etc. are all very securely mounted and will

not come off during sudden motions, to become lethal missiles.

- Ensure all safety accessories are securely attached and in working order, including emergency stops, safety sensors, etc.
- Clearly mark the area around the robot in which no persons are allowed to enter. As a bare minimum, use brightly marked tape on the floor, outside the reach of the robot, to indicate the "No Go Zone". Ideally, use physical safety barriers, and light guards/curtains.
- Keep stands, lights and accessories out of the No Go Zone, if possible. If not possible then try to take as much care with their positioning and the motion of the rig, as if they were a person. Remember a light, accidentally hit at high speed by the robot, can be just as dangerous to someone standing outside the No Go Zone as the robot is to someone standing in the zone.
- Where physical safety barriers are impractical, light guards should be used or similar alternatives such as laser scanners, to stop anyone entering the No Go Zone during motion.
- Ideally have the robot surrounded on all four sides by a safety barrier, but where that is not practical, ensure that the maximum number of sides feasible are closed off, and that any person having to stand within reach of the robot is located as far away as possible for the shot.

Software setup

- Always ensure you have the right configuration for the robot you are using, such as maximum axis speeds and accelerations.
- Prior to running moves, enter in and keep to a minimum all software axis and Cartesian limits. For example if the main axis only needs to travel +/-40 degrees then reduce the limit to +/-40 degrees even though it could do +/-180 degrees. This keeps the likelihood of operator or software errors to a minimum.
- Also check the Cartesian speed and acceleration limits are set to reasonable values.

Operational safety

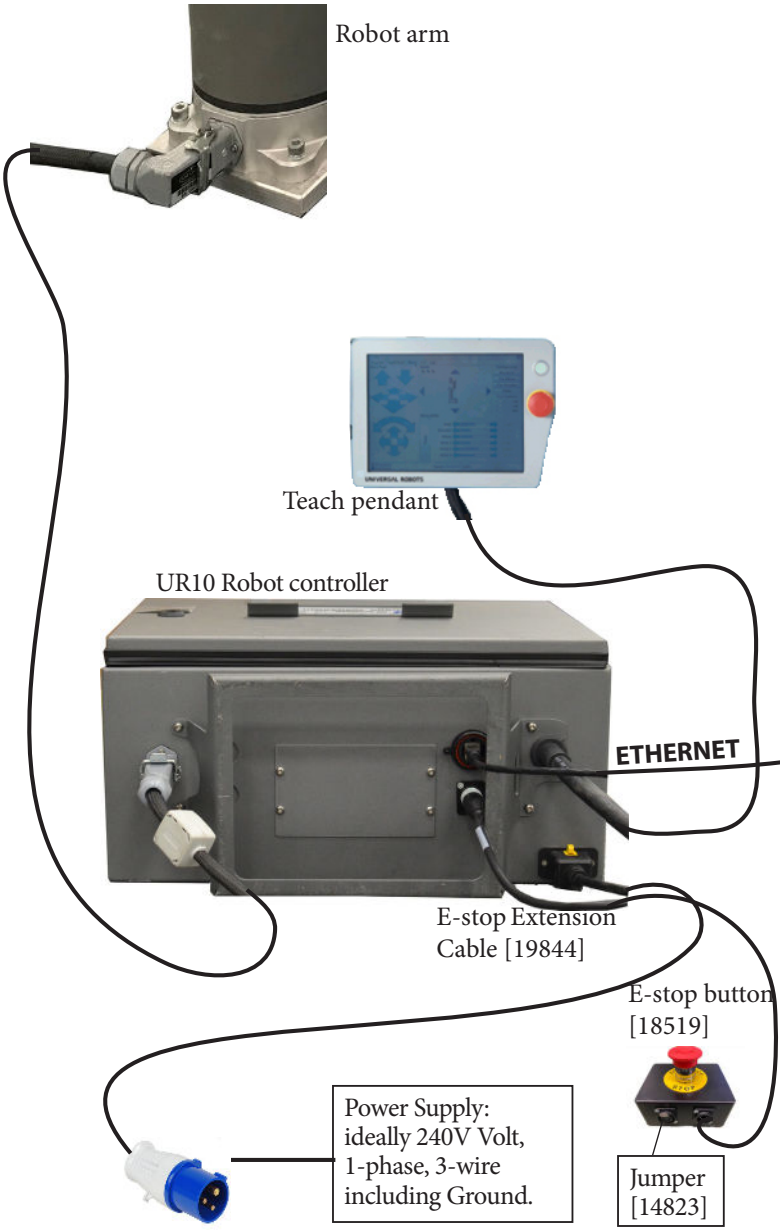
- Do not use around flammable gas. All electrical equipment can generate sparks that can ignite flammable gas.
- Keep the equipment dry. The system has **not** been made weatherproof. Do not use with wet hands.
- Always run moves only when standing within easy reach of the emergency stop.
- Always tell the production company and the crew to keep away from the robot and not approach it when any of its red lights are on which indicates it is powered up. Have them sign the appropriate safety documents and disclaimers to ensure they understand this and are indemnifying MRMC if anything happens.
- Always loudly and clearly indicate to others when the rig is about to move. Shout “Rig Moving!” if no other means exists.
- Always ensure the rig is disabled when someone has to enter the No Go Zone.
- Always run any move or adjusted move slowly at first to check the motion. Even if you have checked the move previously, if you make a minor change to it then you need to recheck it.
- Keep the software in “slow mode” unless the move has been tested and is now specifically doing a high speed pass.
- In the event that a person or Actor has to be within the no-go zone during a move (hand model etc.) ensure that they are

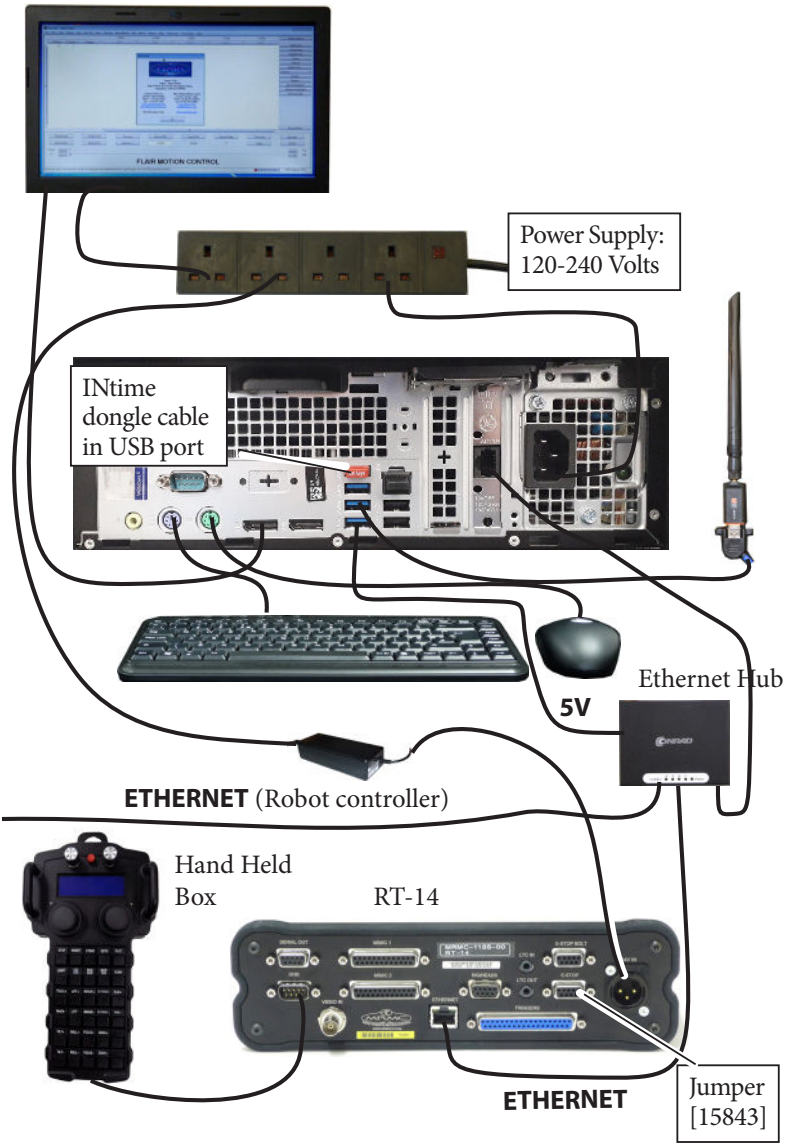
fully briefed on the safety requirements and that they know not to change their position or do anything other than the rehearsed moves without fully warning the operator. Any such person is to have a clear escape route to allow them to move safely away from the robot.

- During use, repeatedly check the rig mounting points, cables, camera mount, accessories etc. to ensure nothing has, or is, working its way loose.
- Never bypass any safety hardware or software.

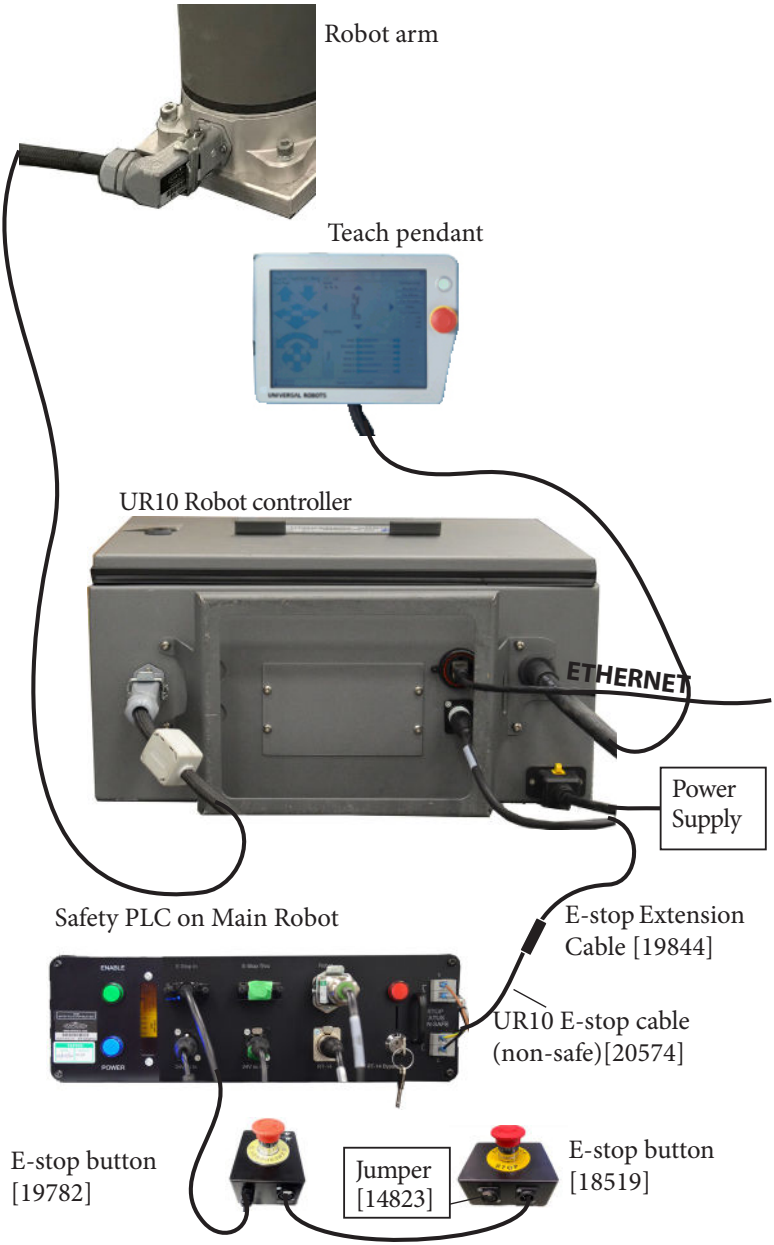
Notes

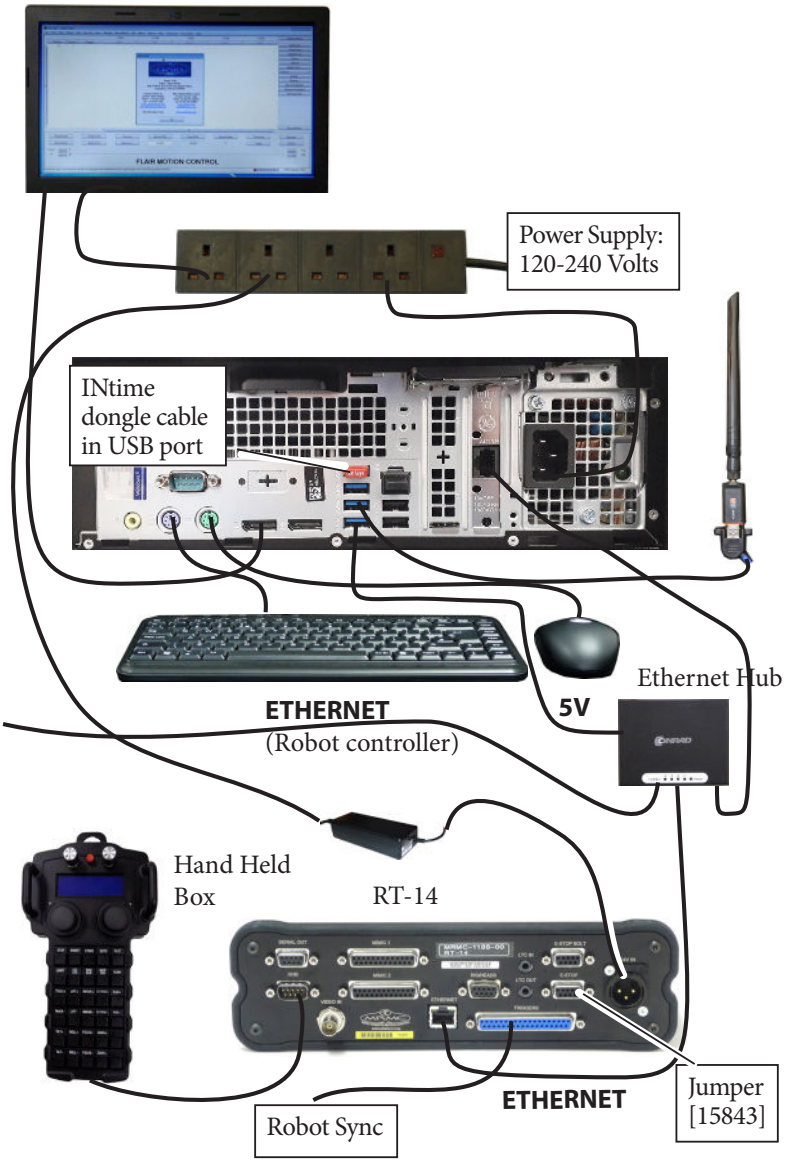
Connecting the cables when using as Stand-alone




Power Supply:
120-240 Volts
INtime
dongle cable
in USB port
Ethernet Hub
5V
ETHERNET (Robot controller)
Hand Held
Box
RT-14
ETHERNET
Jumper
[15843]

Connections when using Multiple Robots




Power Supply:
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Ethernet Hub
5V
ETHERNET
(Robot controller)
Hand Held
Box
RT-14
ETHERNET
Jumper
[15843]
Robot Sync

Starting up the UR10 Robot Model Mover system

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

1. Make sure you have secured the area around UR10 Robot Model Mover. Put up guard rails around UR10 Robot Model Mover as necessary, and tell others on the set that you are now powering up the rig.

2. Power up UR10 Robot Model Mover by pressing the Power button on the teach pendant.

3. On the Flair PC, start the Flair application by double-clicking on the Flair icon on the Desktop.

4. Release the E-stop that is plugged into the computer stack, by turning the button clockwise until the red button pops up and then pressing the Enable button.

5. In Flair, click on the **Engage Robot** button.

> Important
>
> Do not click the Engage Robot button in Flair when the E-stop button is pressed, otherwise a fault is generated.

6. In Flair, move the UR10 Robot Model Mover arm to its home position (rotated straight forward and tucked under).

> Hint
>
> If the UR10 Robot Model Mover arm is in a backward or reversed starting position, the arm might swing overhead or around the side to reach the home position, possibly striking the walls, ceiling, or other rigging! If the rig is in an enclosed space or near other equipment, it is recommended that you do the following:
>
>
>
> - Manually move the arm close to its home position before Homing it.
> - When you home the rig, have one hand ready on the E-stop in case you need to stop the rig quickly.

7. if you want to set additional restriction to the robot axes travel with respect to the maximum travel (default), set the soft limit in flair accordingly.

Shutting down the UR10 Robot Model Mover system

1. Move UR10 Robot Model Mover to its Home position.

   or...

   If you are going to transport UR10 Robot Model Mover to a new location, put the UR10 Robot Model Mover arm into its transport position. You can do this either by using Flair (although you might have to reset the soft limits to reach the transport position) or by moving the arm using the robot teach pendant.

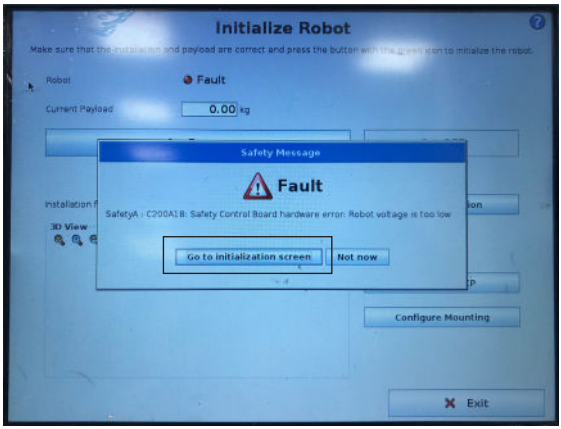
2. In the Flair software, click on the **Disengage Robot** button.
3. Press down the E-stop button.
4. Close the Flair software.
5. Shut down Windows on the Flair PC.
6. Press the Power button on the Teach Pendant for the UR10 Robot Model Mover as follows:

Appendix 1 **Troubleshooting**

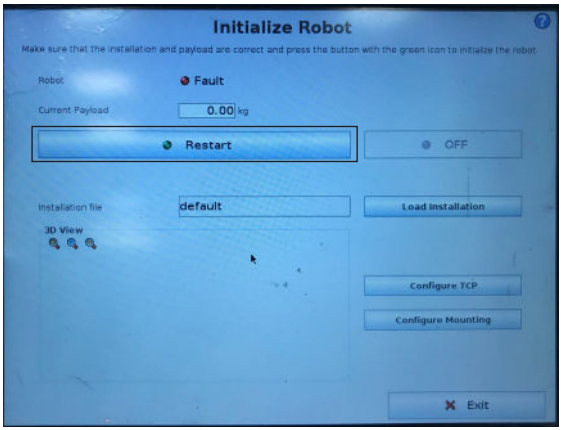
Clearing a Fault

When a fault occurs in the Robot, it cannot be cleared using the Flair software. In such situations, use the pendant to clear the fault.

1. Tap **Go to intialization screen** on the teach pendant.



2. On the Initialize Robot screen, tap **Restart**.



The following screen will appear, indicating that the robot is ready to be controlled by Flair.

Notes

Appendix 2 **Specifications**

Dimensions	UR10 Model Mover
Weight	33.5 kg / 73.9 lbs
Control box size (WxHxD)	475 mm x 423 mm x 268 mm / 18.7 x 16.7 x 10.6 in
Maximum payload	10 kg / 22 lbs
Reach	1300 mm / 51.2”
Axes	6
Axis ranges	+/- 360 degrees
Temperature range	0-50 °C
Power supply	100-240 VAC, 50-60 Hz
Power consumption	Approx. 350 watts

Rig Performance

Axis	Max Speed
Rotate (Base)	120°/ Second
Lift (Shoulder)	120°/ Second
Arm (Elbow)	180°/ Second
Pan (Wrist 1)	180°/ Second
Tilt (Wrist 2)	180°/ Second
Roll (Wrist 3)	180°/ Second

Notes

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