MARK ROBERTS MOTION CONTROL

QUAD BOX

QUICK START GUIDE

QSG Product Code: MRMC-2020-00
Product Covered: MRMC-1120-02

Quad Box Quick Start Guide

QSG Product Code: MRMC-2020-00
Product Covered: MRMC-1120-02
Modification date: 1 February 2024

© 2024 Mark Roberts Motion Control Ltd. All rights reserved.

No part of this publication may be reproduced, transmitted, or translated by any means — graphical, electronic, or mechanical — including photocopying, recording, taping, or storage in an information retrieval system, without the express written permission of Mark Roberts Motion Control.

Although every care has been taken to ensure that the information in this document is accurate and up to date, Mark Roberts Motion Control continuously strives to improve their products and may make changes to the hardware, firmware, and software described in this document. Mark Roberts Motion Control therefore cannot be held responsible for any error or omission in this document.

All product names mentioned herein are the trademarks or registered trademarks of their respective owners.

Contact information	
Mark Roberts Motion Control Ltd. Unit 3, South East Studios Blindley Heath Surrey RH7 6JP United Kingdom	
Telephone:	+44 (0) 1342 838000
E-mail:	info@mrmoco.com (sales and general enquiries) support@mrmoco.com (customer support)
Web:	www.mrmoco.com www.mrmocorentals.com

Contents

Chapter 1 Quad Box Panel 1

Introduction to Quad box connections 1
Notes on head-controller communication methods 1
Quad box connector summary 2
Quad box connector pin-out information 4
Stepper motor connector 4
Power 18-36 Volts connector 4
Serial RS232 connector 4
Trigger connector (trigger out and in) 5
Adding a Quad box in Flair 5
Adding a Stepper Motor Axis in Flair 7
Troubleshooting Finding Boards in Flair 10
Changing IP Addresses 10
Network Status 11

Appendix 1 Connecting Stepper Motors to Quad box 13

Connecting any other stepper motor to Quad box 13
Stepper drive pulse/direction 14
Step/direction inputs 14

Chapter 1 **Quad Box Panel**

Introduction to Quad box connections

Quad box is an MRMC axis box with a Quad card inside, usually used to drive **four stepper** motors.

The stepper motors can be of type:

- 23B
- 17B
- 34B

These motors run on a 48V voltage and can increase speed when supplied with higher voltage. The Quad box can handle 26-36V; for higher voltage of 48V, a Y cable can be added to supply extra power.

DO NOT plug in or unplug stepper motors when the Quad box is powered.

The Quad box has four stepper motor connectors. See *Quad box connector summary* on page 2.

Notes on head-controller communication methods

Three types of connections between the head and controller are in common use in MRMC equipment:

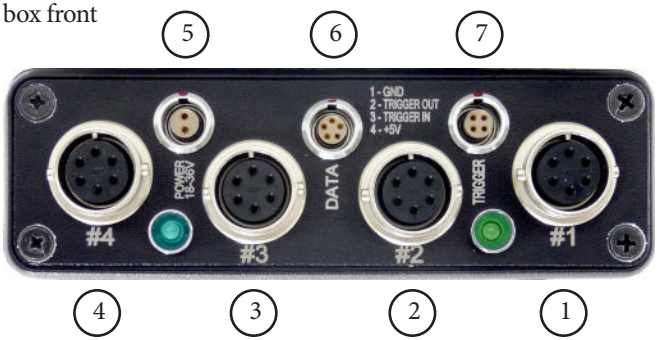
- Ethernet: This is the most modern preferred method, and uses standard Ethernet plugs, cables, hubs, and protocols.
- DataLink: This is an MRMC proprietary connection type based on a modified form of Serial RS232. You can connect several DataLink devices together in a daisy-chain. DataLink is robust and dependable and is still the preferred connection method in environments with high electrical interference that can cause problems on Ethernet networks.
- Serial RS232: This is based on standard computer serial RS232 hardware and protocols.

Although many MRMC devices have built-in hardware for two or three of the above connection methods, any controller that you use (such as the

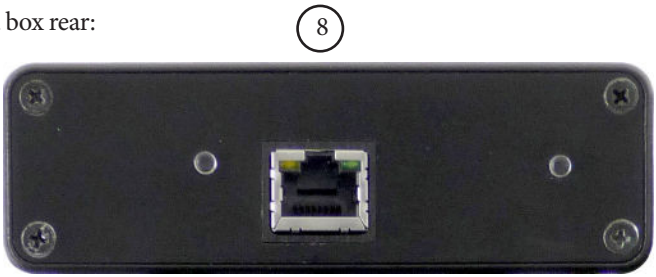
MSA-20 Handwheels, LFP, Joystick Controller, or Mini MSA) must be programmed at the factory for the connection method that you want to use.

Quad box connector summary

Quad box front



Quad box rear:



1-4. **#1 - #4** identical connectors for any stepper motors, such as **PAN** and **TILT** in the head, track motors, and external Lens Control Motors. For pin-out information see *Stepper motor connector* on page 4.

5. **POWER 18-36V** connector, for power input for the head. When the power is on, the LED next to the **POWER** connector lights up. For pin-out information see *Power 18-36 Volts connector* on page 4.

Power LED

6. **DATA** connector. This is a Serial RS232 connector, for connection to a controller using a Serial RS232 connection (as an alternative to an

Ethernet connection), and for updating the firmware in the Quad box. For pin-out information see *Serial RS232 connector* on page 4.

7. **TRIGGER** connector, for a bi-directional trigger signal between the head and camera. When the trigger is activated the LED next to the **TRIGGER** connector lights up. For pin-out information see *Trigger connector (trigger out and in)* on page 5.

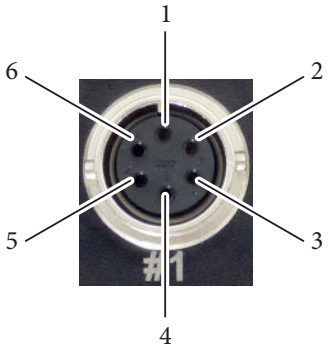
Trigger LED

8. **ETHERNET** RJ45 connector for controlling the head using an Ethernet network connection. This Ethernet port is rated at 100 Mbits/sec but can operate at lower speeds of 10 Mbits/sec or less.

Quad box connector pin-out information

Stepper motor connector

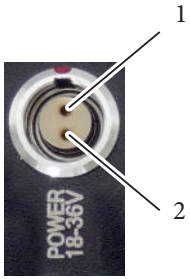
The Quad box has four connectors for stepper motors, typically used for Pan and Tilt plus two for auxiliary devices such as a track motor or Lens Control Motor (LCM).



1. GND
2. 24V
3. 5V
4. Homing Datum
5. Step
6. Direction

Power 18-36 Volts connector

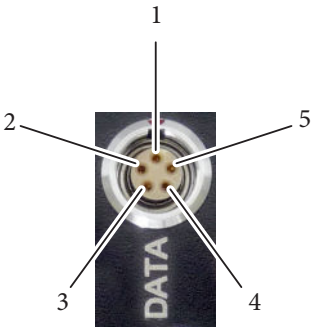
Two-pin DC input for powering the head.



1. GND
2. +24V

Serial RS232 connector

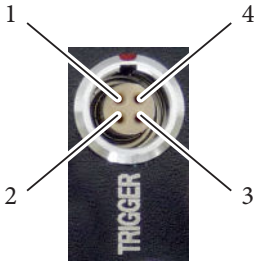
This is a 5-pin Serial RS232 connector. For usage see page 2.



1. Boot select
2. Tx (out)
3. Rx (in)
4. 5V
5. GND

Trigger connector (trigger out and in)

Trigger connection with Trigger Out and Trigger In connections.



1. GND
2. Trigger Out
3. Trigger In/Out
4. +5V

Pin 3 can be trigger input or output depending on a jumper setting in the box which is set during manufacture. DSLR applications typically use two trigger outputs, on pins 2 and 3; one for shutter and one for auto-focus. Video applications typically use pin 2 for trigger output and pin 3 for trigger input.

Adding a Quad box in Flair

When a new Turntable, other model mover or motor driven by a Quad box needs to be added to a Flair system, there is a set of steps that need to be followed to get this information on the nature of the item into Flair so the network can detect it and load it on bootup.

Devices are added to the network as nodes identified by their IP address, and it is possible that there may be duplicated IP addresses which will need to be handled before this is possible.

The additional Quad box will need to have an Ethernet cable connected to the Ethernet hub of the Flair system, and be powered.

1. Edit the file **`C:\Flair\Flair6\Flair.ini`**. This file is a text file that you can edit with any text editor such as Notepad, either directly or by using the Flair menu option **Help > View .ini File**. You need to add or edit some lines in the file similar to the following lines.

   ```
   *NetworkBoards: 3
   *NodeProgram3: Quad6Ether_II.btl
   ```

   The keywords used in the above table are described below:

   - **`*NetworkBoards`**: This line shows the number of network boards (nodes) in the system. You need to increase this by one

(1) to cater for the new Quad board. For example, if the number of network boards was 2 increase it by 1 to make it 3.

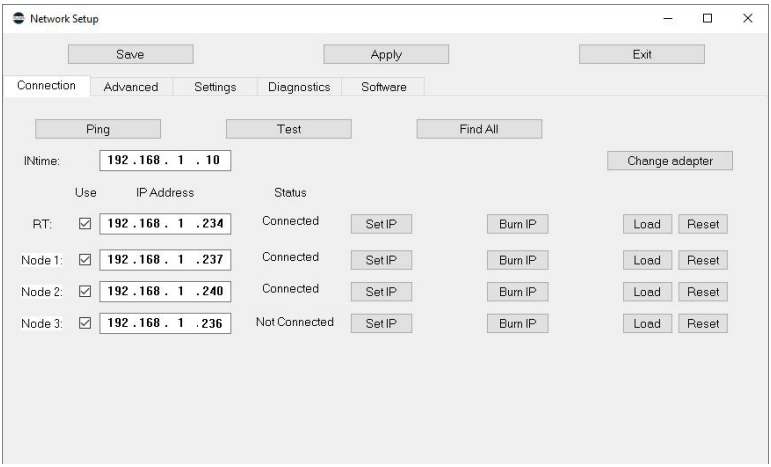
- **`*NodeProgram3`**: For the node that you are assigning the new board to (node 3 in this case), add a reference to the node program, or **`.btl`** file, that you want Flair to load on that node when starting up. The **`.btl`** file is already supplied with Flair so you don't need to copy or download it from elsewhere. For example, in this the new board is assigned to node 3, the **`.btl`** file will be added to **`NodeProgram3`**.

Remember to save the file after you have edited it. When this Flair is booted, Flair will attempt to load all the boards it has been informed about in Flair.ini. It may fail to do so until correct connections are made and correct IP addresses are set.

2. In the Flair menu, click on **Setups > Network Setup**. The first screen is the Connection tab.

3. In the pop-up, click on the **Find** button.

4. In the Find results, find the IP address of the Quad box (**192.168.1.236** in this example – this is normally written on the box at the factory), and copy it into the node that you assigned to the Quad (**Node 3** in this example):



5. In the Network Setup pop-up, click on the buttons **Save** and **Apply**.

6. Click **Load** and exit the Network Setup.

   If the IP address is correct and does not conflict with any other IP on the system, and you have put the correct software name in Flair.ini then clicking on the Load button will load the board. On the next restart, Flair should automatically recognise all the nodes and load the `.btl` files into them.

Even if the IP address is correct and there are no conflicts of address, the software may not be set correctly. If you now look at the Software tab it will give the PC address of the software it has tried to load, and if you click on **Select,** it will open the Btls folder and allow you to choose another software file to load. You can then Reload and it will attempt to load that new software. If this works you will need to put that software name into Flair.ini to enable it to work next time you boot Flair.

> Note
>
> Even though the specified .btl file might load, this does not guarantee that it is the correct software for your Flair setup. Older systems my need older versions of software loaded to work best.

Adding a Stepper Motor Axis in Flair

DO NOT plug in or unplug stepper motors when the Quad box is powered.

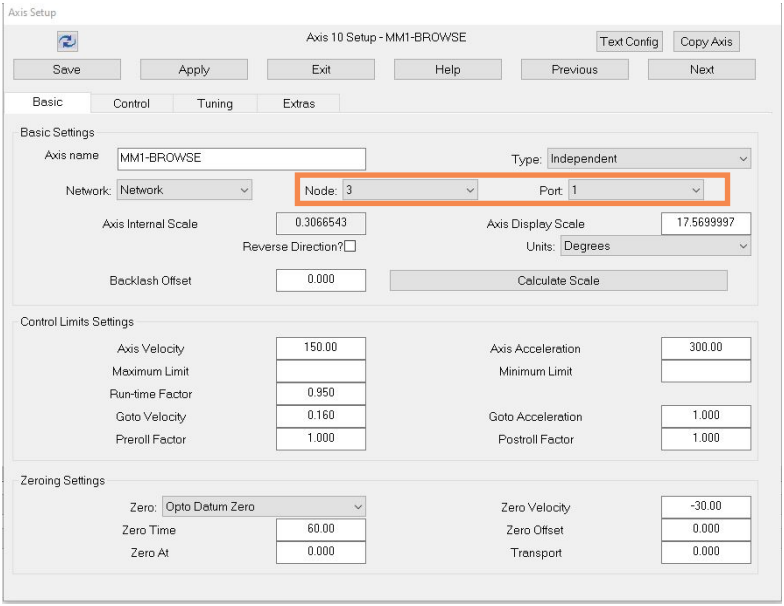
To add a stepper motor in Flair:

1. In Flair Classic, use the Flair menu option **Help > View .ini File** to open the Flair.ini file.
2. Increment the number of motors you are physically adding to the values of `*Axes` and `*Shownaxes.` For example, if you are adding 1 motor, increase the existing values of `*Axes` and `*Shownaxes` by 1. For 5 motors increase the existing values of `*Axes` and `*Shownaxes` by 5.

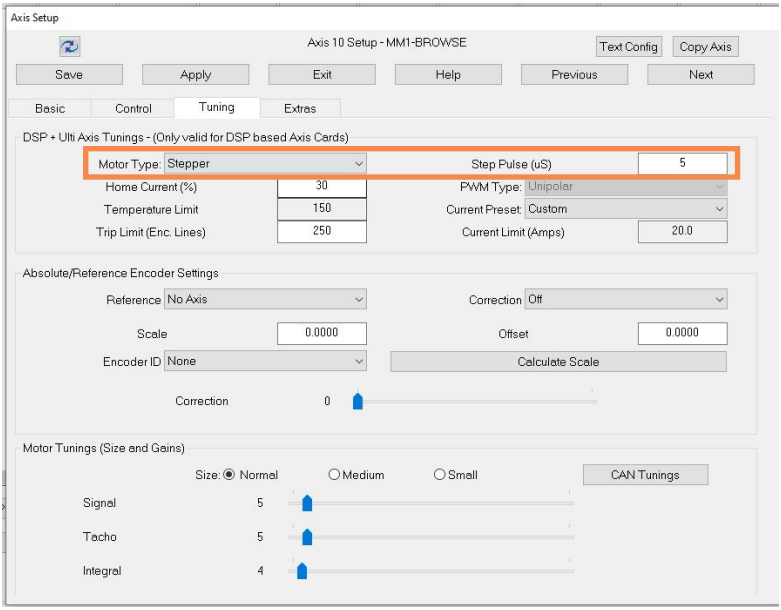
   - `*Axes`: This will give you how many axes you have

- **`*ShownAxes`**: This will be the shown axes and if it's less then the '**`axes`**' value, then you will have the slider bar at the bottom to scroll to the axes that are not visible.

3. Close the Flair.ini file and Flair application and relaunch it.
4. Right-click the appearing axis in the Flair Classic screen and select Axis Setup.
5. Add a desired name to the axis in the Name box.
6. In the Axis Setup dialog box, edit the node number and port number to match your Quad box. So, for example, if the Quad box is added in Network Node 3 and the motor is connected to Port#4 to the Quad box, select the following values in the **Node** and **Port** boxes.



7. In the Tuning tab, the **Motor Type** needs to be set as **Stepper** and the **Step Pulse** to **5**. The other settings in this menu do not apply to steppers and can be left unchanged.

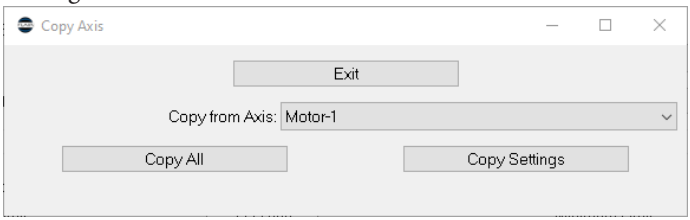


8. Save, Apply and Exit axis setup.

> Note
>
> Depending on how the motor that you have added is used, you will need to calibrate the scaling and speeds of the device. For more information, refer to Video *18 - Flair Axis Setup* at https://www.mrmoco.com/motion-control/knowledge-centre/videos/.

9. If required, similarly add additional axes. You can even copy settings from one axis to the other by clicking the **Copy Axis** button on top

of the Axis Setup dialog box for axis for which you want to copy settings from another axis.



10. Click the **Copy Settings** button to copy all setting except Name, Node and Port.

Troubleshooting Finding Boards in Flair

Once you have physically connected with an Ethernet cable and powered on the added board, and Network setups is open, if you click on Find, it will broadcast a signal to see all the boards on the system, and will tell you their IP address settings. If they do not appear, then they are not connected or not powered; Or there is an IP address duplicated on two boards!

> Note
>
> It may be necessary to unplug temporarily the other boards on the system for the new board to show up!

You may then find you have conflicts in that the board you want to connect will have the same IP address as the one already on the system. The Find button will not find two boards with the same IP address. This often occurs where you want to use the spare Ultibox from your Bolt as a model mover, and it has been set up to have the same IP, 192.168.1.237 as the present Ultibox mounted on the Bolt arm.

Changing IP Addresses

The facility to change an IP address is built into the system, but to work it must have the board you want to change already loaded.

If you find that whatever you do the new board does not appear, try cycling the power to the network hub. Sometimes a hub may not “look” for any additional devices unless rebooted.

Unfortunately, you cannot load two identical IP boards and then change one, you have to load the incorrect board by doing a Find with other boards not connected, to find its IP, then set that IP in the Network setup screen, with its duplicated IP board disconnected. When you are connected to it you can change the IP in Network Setups to a new IP and press Set IP to make that the IP address Flair looks for, and press Burn IP to burn that IP into the new board.

Once you have a new IP address burnt into the new board, put a new label on it for future reference, and you should then be able to plug back in any boards that were unplugged before making the change.

The list of IP addresses and boards loaded in sequence will be found in the Network.ini file.

Because you now have the new board written into your Flair.ini it will try to load every time you load Flair, and will give you a warning saying it did not load if it is not plugged in on later shoots. Of course this does not matter as the rest of the network will still work, you just need to know Flair looked for it and did not find it.

Network Status

Under the Status heading in Network Setup, 'Connected' appears if it is connected and being used by an axis in Flair. If it says 'Unassigned' it means it is connected but you have not assigned that board to any axis in Flair. Example, you have just added a node to be node 3 as a Quad box, but you have no axis assigned to Network Node 3 in the Flair Screen. You will need to assign your axes to that node for them to work.

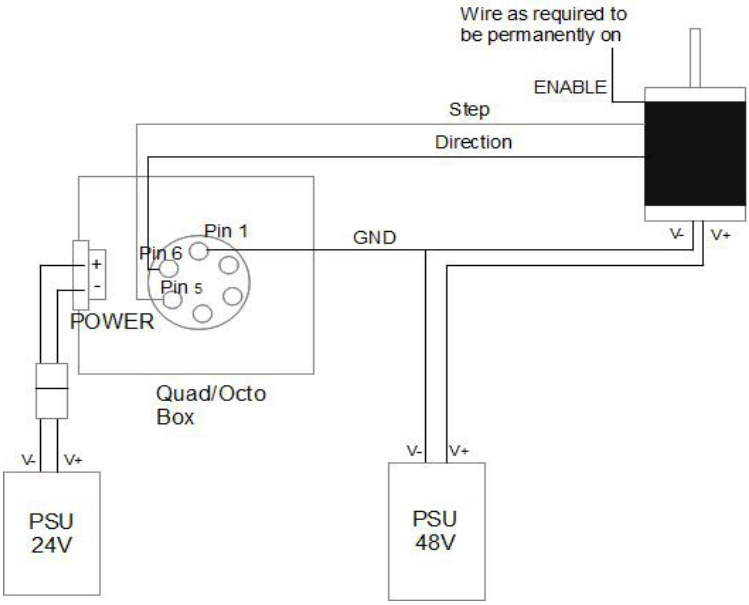
There are coloured blobs in the bottom right of the Flair screen. A red blob means its not connected to that node, a blue blob means its connected but not assigned, a green blob means its connected and in use by an axis.

Once you have added the board to Flair you may still need to set up the axes. Refer to Flair manual for further details or the video *"Flair Axis Setup"* in the Tutorial Videos section of Resources on www.mrmoco.com.

Appendix 1 **Connecting Stepper Motors to Quad box**

Connecting any other stepper motor to Quad box

For a Stepper motor requiring 24V input, connect the V- to Pin 1 and V+ to Pin 2 on the Stepper connector. For a Stepper motor that requires more than 24V use a Y cable, as follows. In this case, Pin 2 is not connected.



Also, if the motor driver requires 5V of Power, Pin3 in the stepper connector can be used.

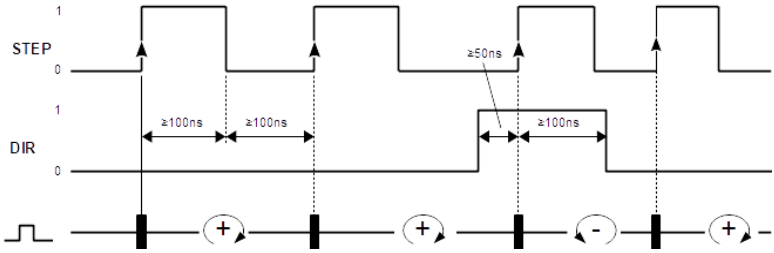
DO NOT plug in or unplug stepper motors when the Quad box is powered.

Stepper drive pulse/direction

The signal input of Step and Direction from the Quad box can be used for interfacing the pulse/direction input clock type. Note that the CW/CCW clock type is not supported by the Quad box.

Step/direction inputs

The motor angle step with the rising edge of the STEP signal, the direction of rotation is controlled by the DIR signal.

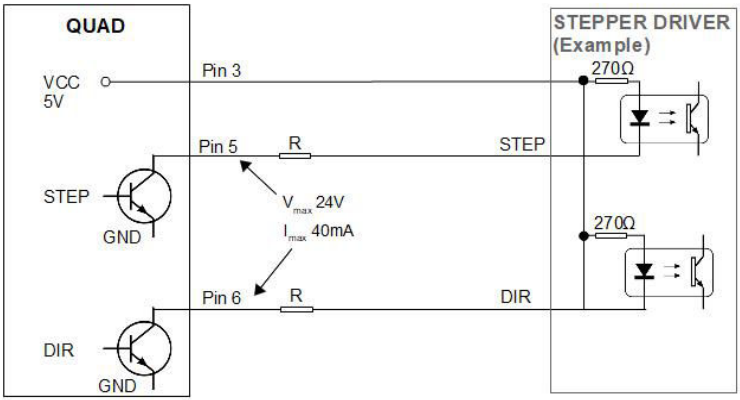


Signal	Signal value	Meaning
STEP	Rising edge	Angle step
DIRECTION	0/open 1	Clockwise direction Counter-clockwise operation

Step and Dir outputs from the four motor ports are open collector outputs. Absolute maximum current is 40 mA, so depending on what voltage you use, and on your stepper driver electronics (diagram only shows an example) you may need to add some resistance (R) on the cable.

It is possible to use higher voltage as long as the current is kept within the limit, but it is highly recommend to use 5V output from MRMC Quad board (pin3). Absolute maximum is 24V, and should never be exceeded.

There is no enable line, therefore the enable input on the driver needs to be wired permanently enabled.



Mark Roberts Motion Control Ltd.
Unit 3, South East Studios, Blindley Heath, Surrey RH7 6JP
United Kingdom
Telephone: +44 (0) 1342 838000
info@mrmoco.com
www.mrmoco.com