QUAD BOX

QUICK START GUIDE
Product Code: MRMC-1120-02
Part number: MRMC-2020-00
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Chapter 1  Quad Box Panel

Introduction to Quad box connections

Quad box is an MRMC interface box 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.

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

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.

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.

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.
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, the Pin3 in the stepper connector can be used.

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.

<table>
<thead>
<tr>
<th>Signal</th>
<th>Signal value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP</td>
<td>Rising edge</td>
<td>Angle step</td>
</tr>
<tr>
<td>DIRECTION</td>
<td>0/open 1</td>
<td>Clockwise direction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Counterclockwise operation</td>
</tr>
</tbody>
</table>

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.
Notes
Quad Box Quick Start Guide

Notes
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