

AMC-MDBOX controller Manual

for 4DOF Servo Kit (+ TL)

v5.1



Interface for connection to Simtools or other motion software

This manual was written for AMC-MDBOX HW1.5 Firmware 2.02

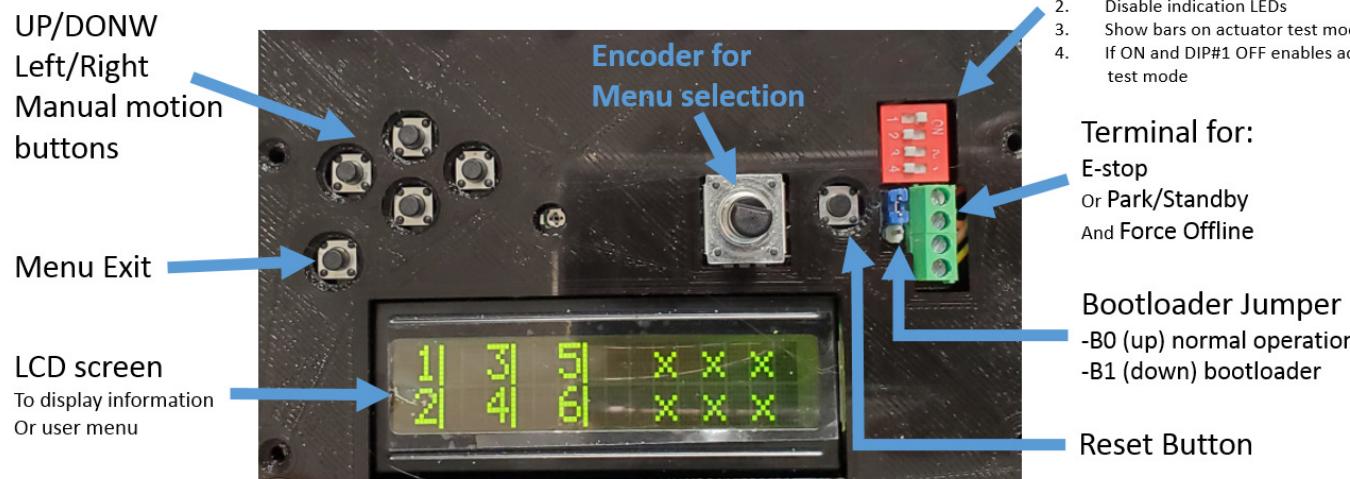
The AMC-MDBOX controller allows seamless and fast interface between the PC and the MDBOX servo drives. Using the AMC-MDBOX controller you can interface your linear servomotors to [Simtools](#), [X-sim](#) and [Ian's 6DOF BFF motion software](#). The connection to PC is a simple USB connection and the connection to the MDBOX is via RJ45 to 44pin cable that carries the control signals with zero latency.

There are no settings needed for the AMC-MDBOX controller unit, comes fully setup. The four button on the panel can be used to manually move the actuators to 15% and 85% for testing when the controller is not receiving motion data from the PC.

The AMC-MDBOX controller is powered from the USB cable. All voltages to control the MDbox servos are internally, no external PSU connection is necessary. The internal PSU has adjustable voltage with trimpot that has to be set to 15.5v.



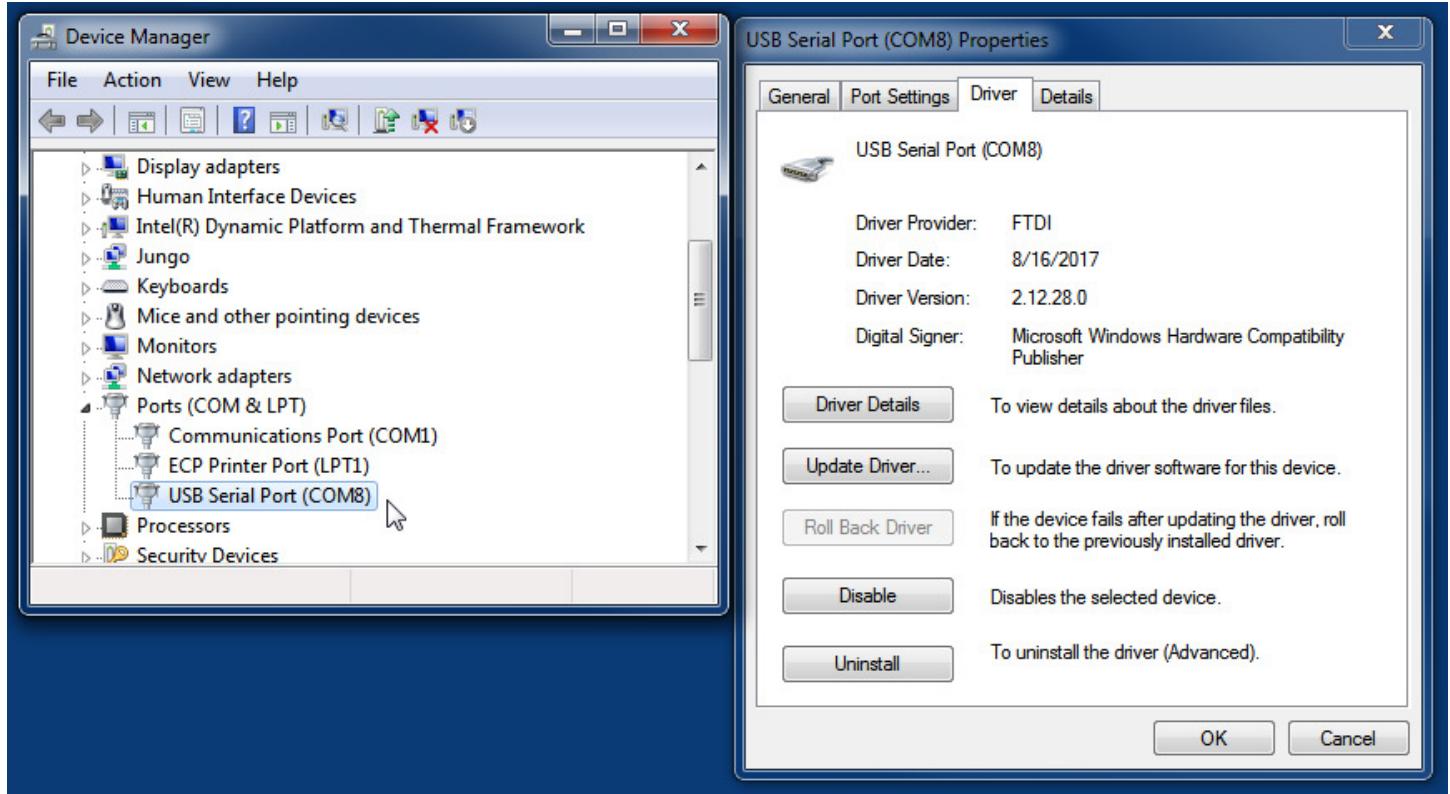
To increase the output voltage turn the trimpot screw counter-clockwise.



The USB Data connection requires FTDI driver that can be downloaded from the FTDI website:

<http://www.ftdichip.com/Drivers/VCP.htm>

The device appears in the PC Device manager as COM Serial interface device that then can be defined for use with Simtools or any other motion software that provides interface support for the AMC-MDBOX.



If your controller has older firmware you can visit the Github and get the latest firmware to update the controller.

https://github.com/tronicgr/AMC-MDBOX_FIRMWARE

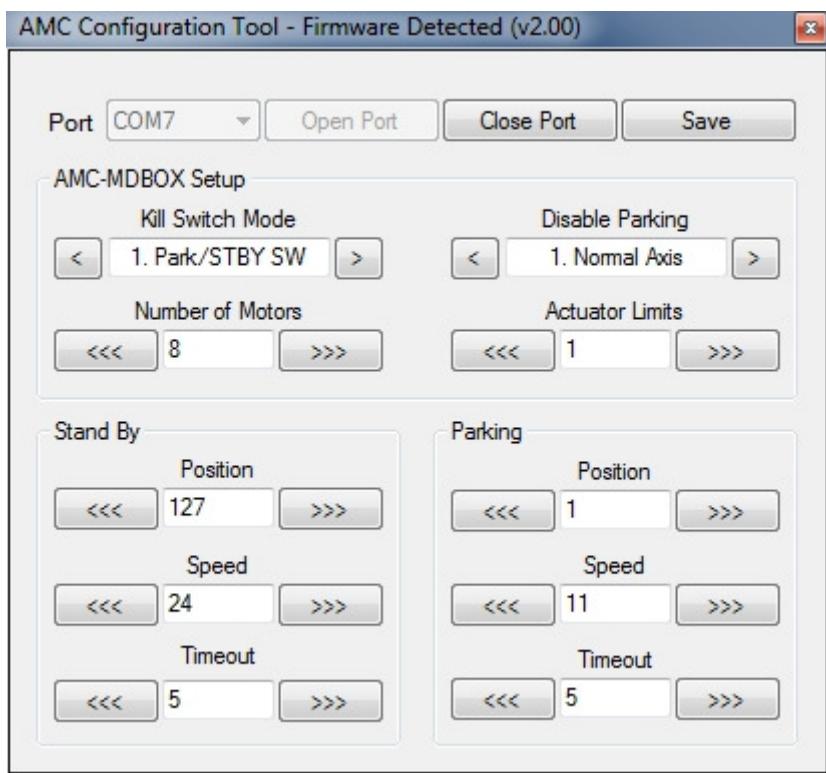
https://github.com/tronicgr/AMC-MDBOX_FIRMWARE/tree/master/Latest_firmware

Firmware Update procedure AMC-MDBOX:

<https://www.youtube.com/watch?v=13y8JGdSdX0>

You can use the AMC config tool to access and modify the parameters in the AMC-MDBOX:

https://github.com/tronicgr/AMC-MDBOX_FIRMWARE/blob/master/Simtools_interface_plugin/AMC_Config_Tool_1_1.zip

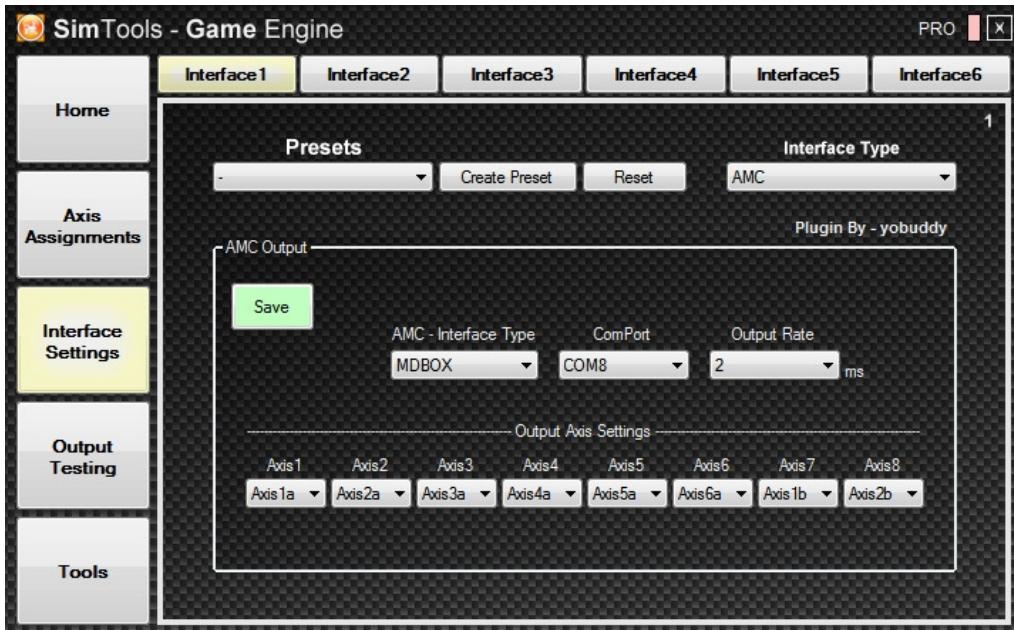


Simtools:

The Simtools v2.4 should already include the AMC interface plugin, if not you can find it on the Github and simply drag and drop the "[AMC_InterfacePlugin.dll](#)" into the Simtools PluginUpdater.
Start Simtools, you should see 8axis available now for the AMC-MDBOX interface plugin.



Interfacing the Simtools with direct axis is simple as seen on the below capture. It requires to select the AMC interface plugin, select the MDBOX interface type and select the COM Port that is assigned to the AMC-MDBOX in the PC device manager.



The axis assignments for each DOF provided is up to the user to mix and use as needed. The AMC-MDBOX can be configured to use any of the 8axis available or be reconfigured for 2axis, 3axis or 4axis output.



Two data cables on port1 and port3 for total 8 axis

To get the desired motion from the computer game to the actuators, you will have to create some profiles that mix the axis information from the game to the axis setup of the actuators. This can be done in the Axis Assignments section of the Game Engine of Simtools. If additional traction loss actuator is used, it can be assigned to Axis5a (extra1 for many games).

Setup example of the Axis assignments with various DOF (degrees of freedom) motion cues data inputs for combined motion:

The axis assignments for each DOF provided is up to the user to mix and use as needed. The AMC-MDBOX can be configured to use any of the 3axis, 4axis or 5axis outputs.

To get the desired motion from the computer game to the actuators, you will have to create some profiles that mix the axis information from the game to the axis setup of the actuators. This can be done in the Axis Assignments section of the Game Engine of Simtools. If additional traction loss actuator is used, it can be assigned to Axis5a (extra1 for many games).

Setup example of the Axis assignments with various DOF (degrees of freedom) motion cues data inputs for combined motion. The axis5a on the example uses just the “Extra1” that is traction loss usually:



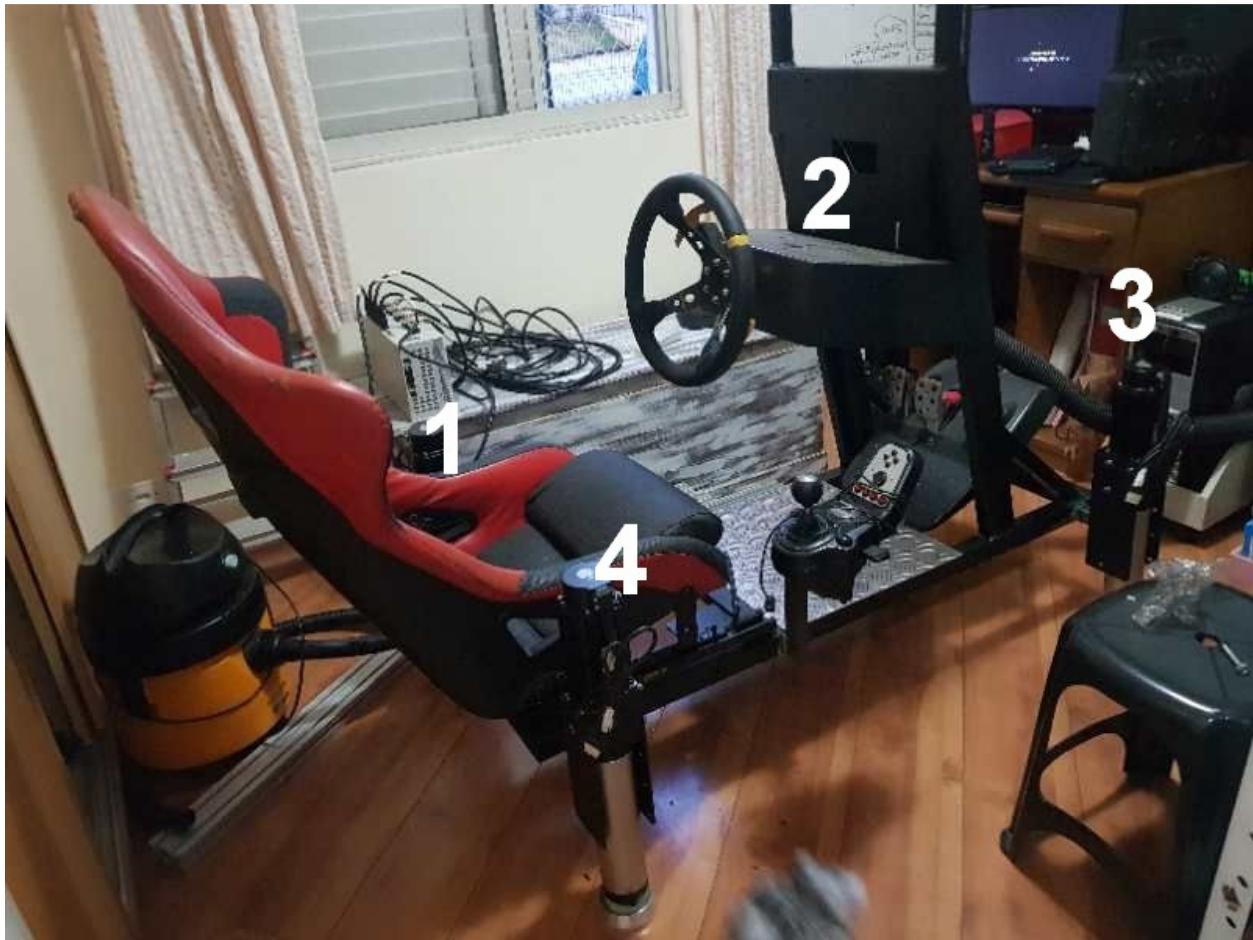
Physically you will need to arrange the order of connection of each actuator to the MDBOX controller to correspond to correct order described to the Axis assignments of Simtools. For 4DOF platform the order of connection of each actuator 1-4 is:

Rear left axis 1 of MDBOX Servo Power Unit

Front left axis 2 of MDBOX Servo Power Unit

Front right axis 3 of MDBOX Servo Power Unit

Rear right axis 4 of MDBOX Servo Power Unit



The AMC-MDBOX controller has total of 8 outputs that are arranged between three RJ45 output connectors as:

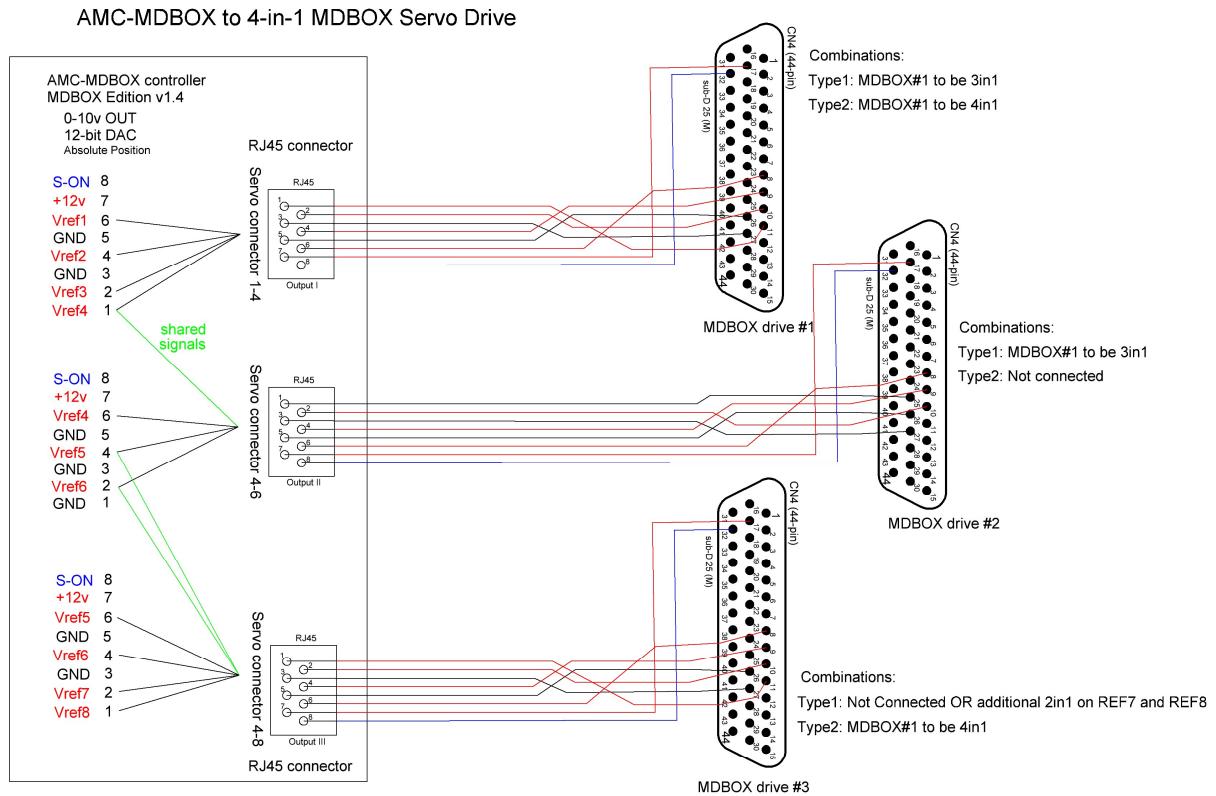
RJ45 Output1 – Axis 1,2,3,4: MDBOX 3-in-1 (3 actuators) or MDBOX 4-in1 (4 actuators)

RJ45 Output2 – Axis 4,5,6: MDBOX 3-in-1 (3 actuators)

RJ45 Output3 – Axis 5,6,7,8: MDBOX 4-in1 (4 actuators)

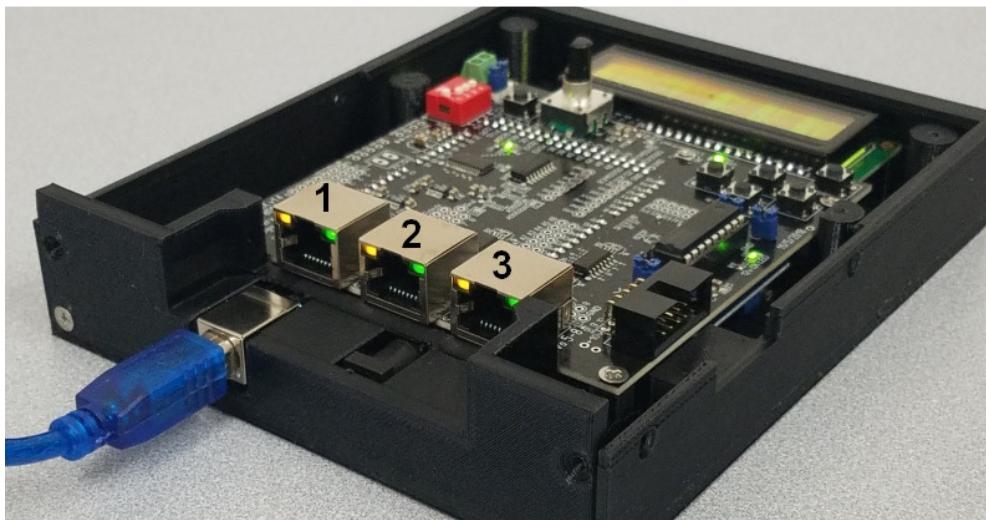
Combinations of the above can be used as long axis outputs do not overlap.

The connections between the AMC-MDBOX controller and the MDBOX 4-in-1 or 3-in1- Servo drives as detailed in the following connection schematic:

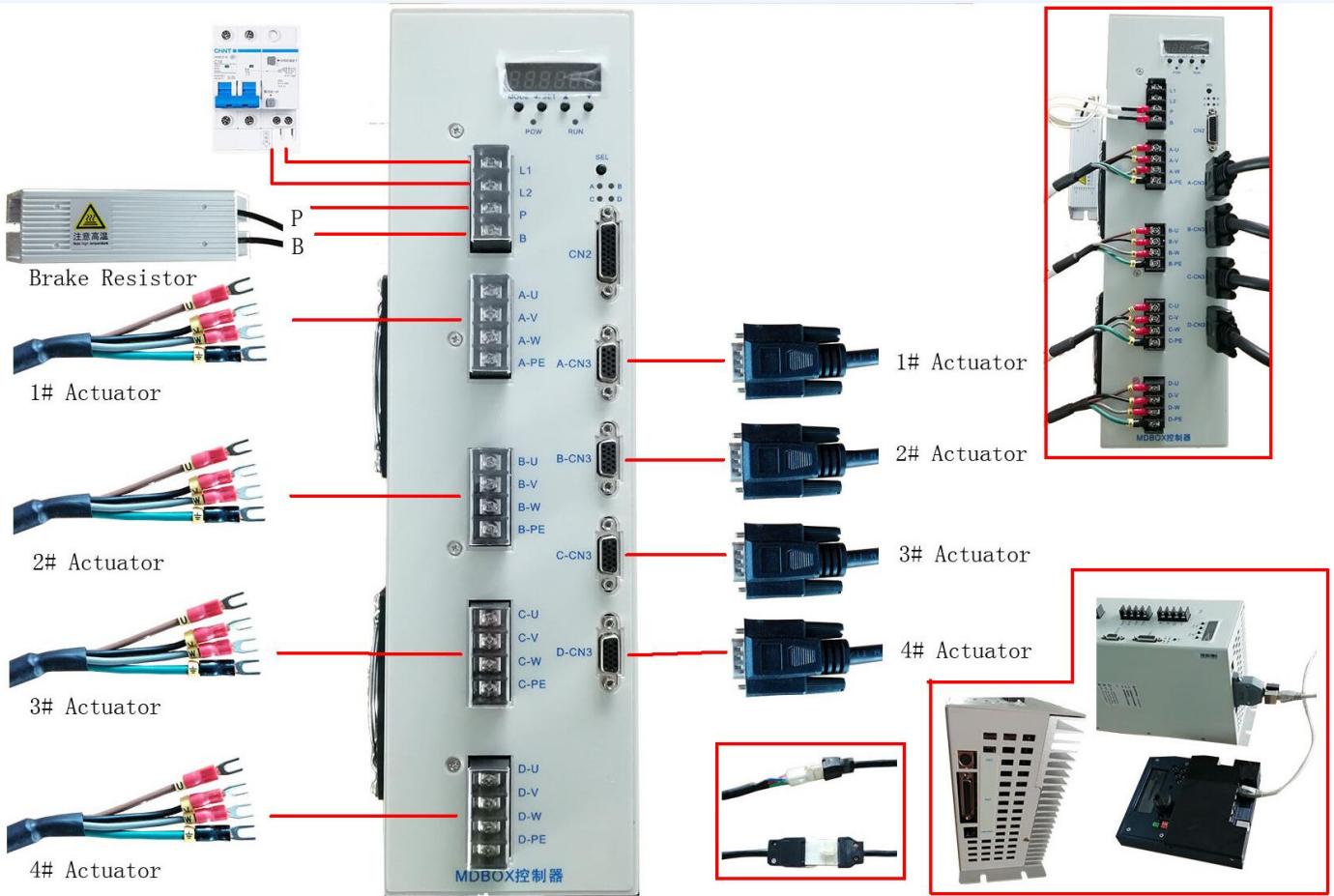


The controller cables that allow connection to the MDBOX come in two versions of the cable with only difference the 4-in-1 version has an additional signal for the extra axis in the on the connector. Combinations allow interfacing of up to two 4-in-1 MDBOX servo drives for total 8DOF.

The cables used are CAT7 SSTP patch cables with provided adapters from RJ45 to 44pin. Lengths is the CAT7 SSTP cables can be 6 feet or less to avoid signal quality loss.



Servomotor wiring info:



Programmer's information:

The data packet string now is 20 bytes long and includes additional spare motion data slots for up to 8axis

The ID is byte values 0xFF + 0xFF

Each Axis is 16bit wide.

LF+CR is required in the end (0x0A + 0x0D)

ID AXIS1 AXIS2 AXIS3 AXIS4 AXIS5 AXIS6 AXIS7 AXIS8 LF/CR

The parameters can be changed via terminal (250000 bps)

---List of commands---

Command Number	Display Parameter	Save Parameter
CMD01	Motornumber:	spv012-spv018
CMD04	Park Position:	spv04001-spv04254
CMD05	Park Move Speed:	spv05001-spv05100
CMD06	Park Move Timeout:	spv0601-spv0690
CMD07	Standby Position:	spv07010-spv07245
CMD08	Standby Speed:	spv08000-spv08100
CMD09	Standby Timeout:	spv0901-spv0990
CMD10	Disable park type:	spv111-spv115
CMD13	Actuator Limits:	spv1300-spv1350
CMD14	Kill switch mode:	spv141-spv142
CMD44	Display all parameters	

Command Number	Display Parameter	Save Parameter
CMD45	Print this help page	
CMD55	Print delimited parameter list for simtools	
spv45	Saves all parameters at once	
RQM	Displays model,revision and number of motors	
Park	Parks the actuators if in standby mode	

Some Commands may not change value - locked

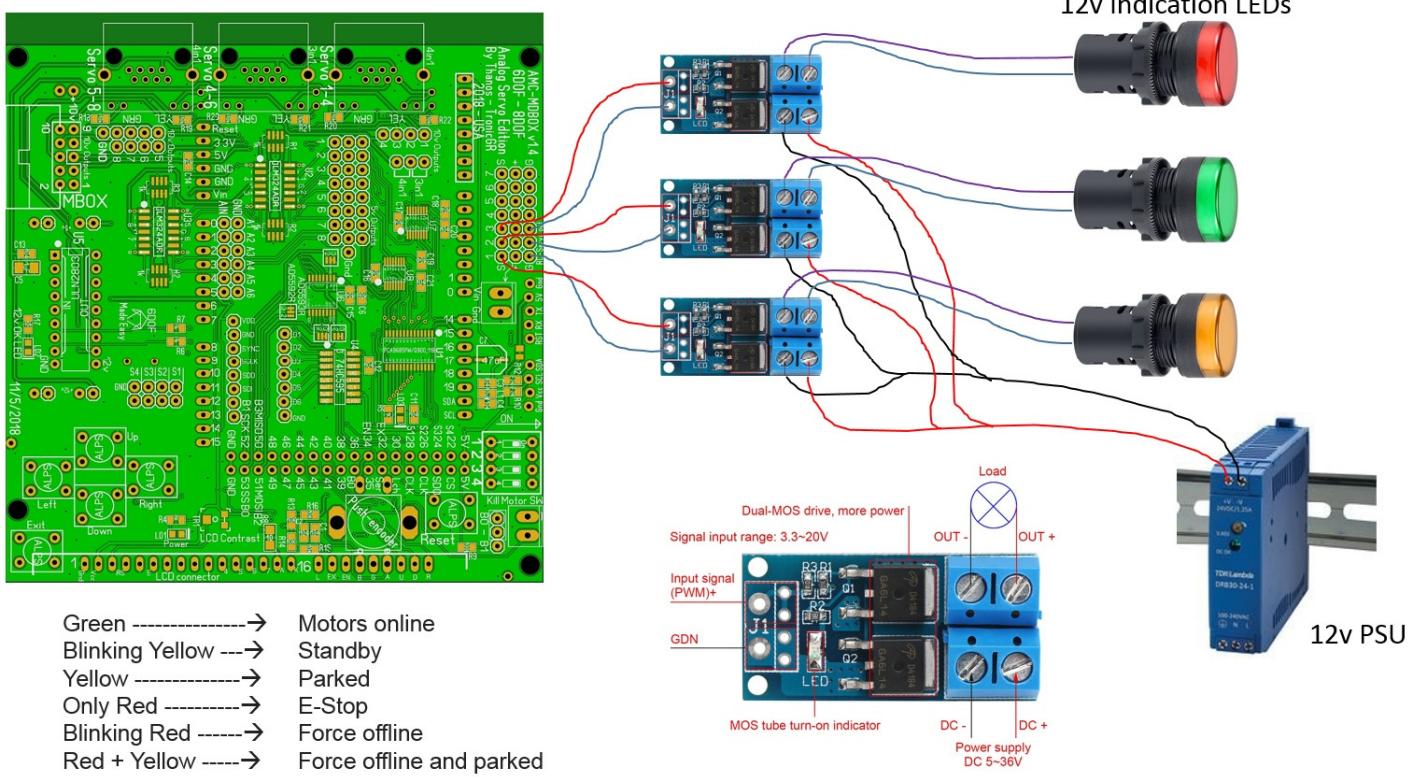
The CMD\$\$ displays each parameter, and spv\$## saves each parameter with the value indicated. To actually store the parameters in the flash memory you need to send "spv45" to save all parameters at once. The "\$\$" on the spv is the command number, and the "###" is the value, Some parameters have single digit value, some two digit value and some 3 digit value. All values are characters!

Here is a list of the default parameters values you should get when you issue the CMD44 command (if not like this, you may reset the default parameters via button combination)

```
01.Motornumber 2-8: 4
04.Park Position 0-254: 1
05.Park_Move_Speed 1-100%: 11
06.Park_Move_Timeout 1-90: 5
07.Standby Position 10-245: 127
08.Standby Speed 0-100%: 24
09.Standby Timeout 1-90: 5
10.Disable park type 1-5: 1
13.Actuator Limits 0-50%: 1
14.Kill switch mode 1-2: 1
```

CMD55 returns the following numeric values separated by colon (:) punctuation mark:
" data:" <MotorNumber> ":" <ParkPosition> ":" <ParkMoveSpeed> ":" <ParkMoveTimeout> ":"
<StandbyPosition> ":" <StandbySpeed> ":" <StandbyTimeout> ":" <DisableParkType> ":"
<ActuatorLimits> ":" <KillSwitchMode> ":" <FirmwareVersion> ":" <AMCModel>

Wiring Indication LEDs for AMC-MDBOX v1.4



Emergency E-stop, Standby/Park and Force Offline button-switches

