

XL Motion Controller

Datasheet

Version 1.3

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1. Introduction

The XL Motion Controller is a controller for timelapse and digital motion control for video and photo equipment. It allows to control one of two motor types (Clearpath BLDC motor or bipolar Stepper motor) and the triggering of shutter and focus of a connected camera. Most models of popular cameras are supported. Auxiliary input / output port for customer defined additional equipment is also available besides a 12Vdc stabilized output for powering of additional equipment like Art-Net Nodes or wireless equipment.

In addition to the Control Unit of the Standard Multislider System the XL Motion Controller allows the control via DMX protocol as well as connecting to an ethernet based IP system.

For control via Ethernet the PC Software Motion Control Software is offered.

1.1 Technical Data

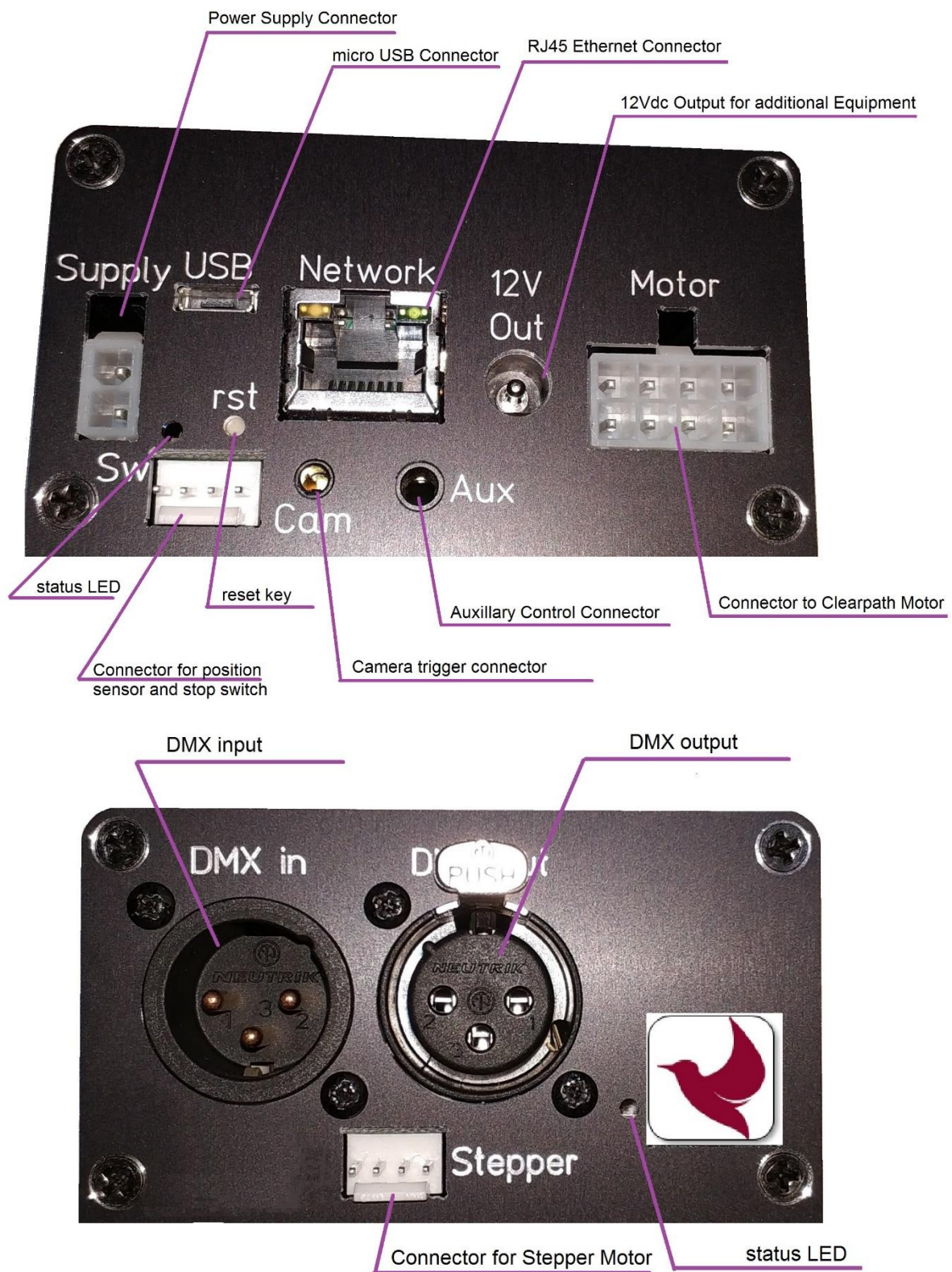
Housing	
Measurements	123 x 78 x 43mm without connectors and mounting brackets
Housing Material	aluminum, black anodized
Operating Parameters	
Temperature Range	-20°C to +40°C (-4°F to 104°F)
Maximum Relative Humidity	90%, noncondensing
Ports & Connection	
Supply Connector	Molex 039301020
Supply Voltage	12 –48 Vdc stabilized voltage
Supply Current	200mA without external load
12V Out	Stabilized 12Vdc Output. max output current 1,5A (if no Stepper Motor used) max output current 1A (if Stepper Motor used) output switchable and current monitored by Software can be used for auxiliary equipment on Slider, e.g. cameras, Wifi or RF equipment.
Motor Output 1	Molex 03930-1080 For connecting to a Teknic Clearpath SDK Series Motor
Motor Output 2	Molex 22-05-3041 For connecting a bipolar 4-wire stepper Motor, maximum output current 1A minimal isolation voltage of motor >16V



Camera Trigger Port	2,5mm (3/32") Stereo Jack / TRS Sleeve: GND, Ring: Focus, Tip: Shutter Internal pull-up 3,3V, max. external pullup Voltage: 5Vdc
Auxiliary Port	3,5mm (1/8") Stereo Jack / TRS Sleeve: GND, Ring: Aux 2 In/Out, Tip: Aux 1 In/Out Internal pull-up 3,3V, max. external pullup Voltage: 5Vdc
USB Port	USB Micro B Used for Firmware Updates and Parametrization 5Vdc supply for electronics, no supply of motors via USB
DMX in	3 -pole male XLR receptacle Input for DMX control signal. Standard DMX512 Signal with 250kbaud supported.
DMX out	3-pole female XLR receptacle Output for DMX control signal for additional equipment. Loop through of input signal.
Network	RJ45 Ethernet Connector for IP based control



1.2 Interface Definition





Power Supply Connector

The Power Supply Connector is the power source for the XL Motion Controller and the Stepper Motor. The Clearpath Motor is not powered from the XL Motion Controller but directly via power supply.

A stabilized DC voltage between 12-48 Vdc must be used (24-48V for Clearpath Motor). Typically, this voltage is supplied via an AC/DC power supply or via a Battery pack.

Camera Trigger Connector

Control Unit can control a camera through the wired remote shutter port with 2.5mm Stereo Jack (3/32" Male TRS) connector. Standard Cables are available for most camera models on the market.

The Camera Trigger Connector provides control over the focus and shutter trigger only, it is not possible to control ISO, aperture, or other settings of the camera over this port. If you set your camera to bulb mode, the control unit can control the shutter speed (if your camera supports this mode).

LED Indicator

The LED Indicator shows the current status of the Control Unit. If no light is visible the Control Unit is unpowered.

If the LED Indicator is flashing slowly the Control Unit is waiting for a connection to a Control device.

If the LED Indicator is constantly on, the Control Unit is connected and ready to be used.

If the LED Indicator is flashing quickly the Control Unit is in an error state.

USB Connector

The USB connector can be used for firmware updates. Powering the Control Unit via USB is only possible for firmware updates, no motor control is possible if no power is available on the Power Supply Connector.

Auxiliary Connector

This Port can be used to connect accessories like a manual knob or external controls e.g. to control a light that is switching on and off before and after the picture is taken for a long duration time-lapse.



Stop Switch Connector

To this Port the magnetic stop switch is connected to. This allows the automatic detection of slider length during reference run.

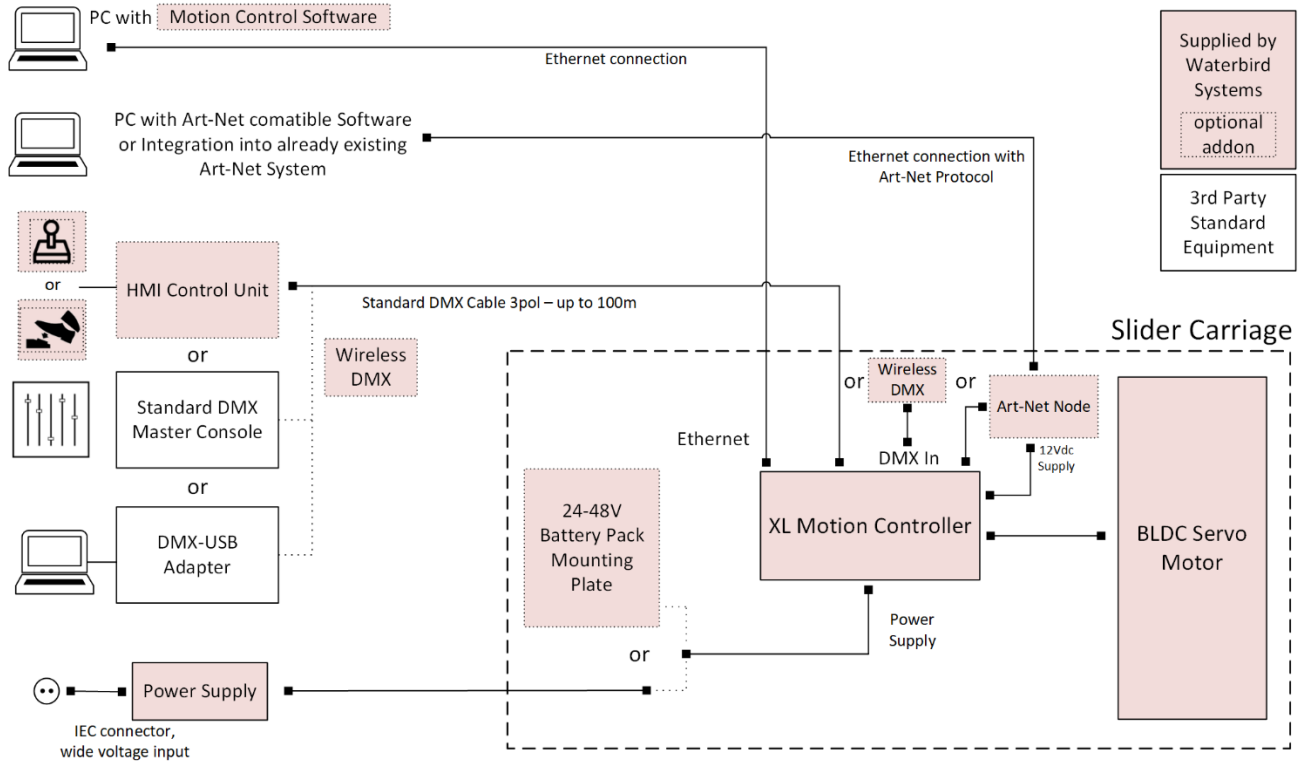
Reset

This button can be pressed to reset the internal processor of the Control Unit. This also causes a sudden stop of all connected motors.



1.3 Application Diagram

The Control Unit is typically used in the following Setup:





2. DMX Command List

The Control Unit uses 16-DMX channels. The start address of the DMX channels is per default address 1. The start address can be changed via a PC program via Control Unit Config tool, see chapter “Control Unit Communication Configuration”.

The commands are:

Channel	Value	Function
1	0..255	Target position of Slider
2	0..255	Fine setting Target position of Slider
3	0..255	Speed of Slider Movement
4	0..255	Fine setting Speed of Slider Movement
5	0..255	Acceleration of Slider Movement
6	0..255	Fine setting Acceleration of Slider Movement
7	0, 100	Mode of Slider Operation: 0 : Normal operation - Slider follows DMX target position 100: Automatic Ping-Pong Movement - Slider moves from start to end position and back continuously (target setting is ignored, speed and acceleration are used from DMX values) all other values: reserved - do not use
8	0, 100	Slider referencing: 0 : Normal operation 100: for more than 1 sec - starts the reference run of slider all other values: reserved - do not use
9	0..255	12V Output switching: 100 : Output is set off 150 : Output is set off for 1 sec and then switched on again (e.g. to reset an external Wifi device) 200 : Output is set on all other values: ignored - no state change
10	0..3	Cam trigger out: 0 : Cam outputs are off (high state) 1 : Cam Focus is on (pulled to ground) 2 : Cam Shutter is on (pulled to ground) 3 : Cam Focus + Shutter is on (pulled to ground) (info: most camera models need the focus also activated during shutter release) all other values: reserved - do not use
11	0	reserved for further use - set to 0
12	0	reserved for further use - set to 0
13	0	reserved for further use - set to 0
14	0	reserved for further use - set to 0
15	0	reserved for further use - set to 0
16	0	reserved for further use - set to 0



3. Control via Ethernet

The XL Motion Controller allows to control the Slider Movement and auxiliary functions via Ethernet. For this the Motion Control Software is available.

For control via Ethernet the XL Motion Controller needs to be attached to an Ethernet network and the IP address has to be set according to your network needs.

For setting the IP address see chapter “Control Unit Communication Configuration”.

At startup of the Motion Control Software the IP address of the XL Motion Controller needs to be entered and the connection is started by clicking the “Connect” button in the left bottom.



After successful connection, the Status in the connection area shows “Connected” and the slider can be referenced. For this click the “Start Reference Run” button – the slider moves to both ends to learn the length and position of the system.

After referencing, the Slider can be controlled manually to a certain position by dragging the virtual position slider on top of the user interface to a certain position or entering the desired position in the “Direct target input” box and pressing “goto” button.

Via the controls on the right the speed and acceleration of the slider movements can be changed.

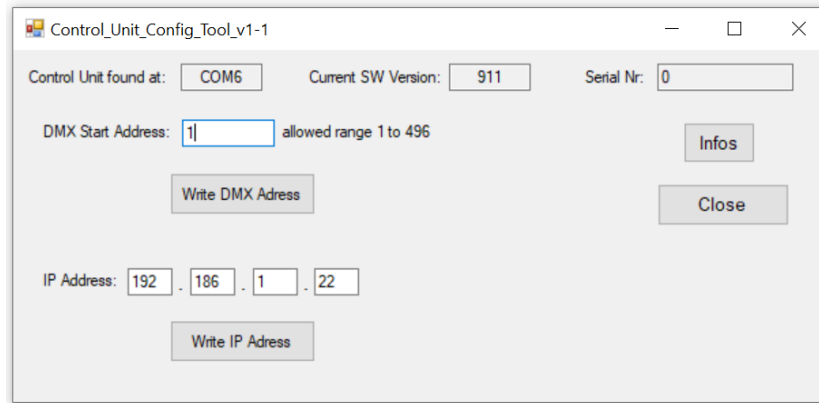
Current position can be saved by clicking on the small arrow buttons right to the “Goto Pos” buttons. To move again to the stored position, click in the corresponding “Goto Pos” button.

The “PingPong” button activates the automatic movement between the two end positions and allows to set a pause time between the movements.



4. Control Unit Communication Configuration

The Control Unit Config Tool allows to change the DMX start address and to change the IP address of the control Unit.



For changing the settings use a Micro-USB cable to connect the control Unit to a PC running MS Windows 10 and start the Control Unit Config Tool.

The current values will be shown on startup of the tool. In the white fields the values can be changed according to your application needs and then be written to the XL Motion Controller by clicking on the corresponding “Write” button.

The DMX Start address will be taken over instantly while the new IP address needs a power cycle of the XL Motion Controller to become active.



5. Handling and Safety Instructions

The Control Unit is designed to be mounted in the slider's carriage by 4 screws. Do not use another method of fixing the Control Unit to the Slider.

Do not use the Control Unit in wet or humid environment like rain, snow, spray or waterfalls without extra protection against humidity intrusion into the electronics.

Do not install this Unit near a heater, inflammable material or oily or dusty location or in a location continuously exposed to direct sunlight or in a location where gas may leak.

Do not cover the Control Unit with metal objects to ensure proper operation of the wireless communication.

Do not attempt to repair, disassemble, or modify the Unit by yourself. There are no serviceable parts inside and opening the Unit will void the warranty.

Remove all foreign substances such as dust or water from the terminals using a dry cloth on a regular basis. - Unplug all connectors and clean it with a dry cloth without alcohol or other solvents.

Do not pull or excessively bend the cables. Do not twist or tie the cables. Do not hook the cables over a metal object or place a heavy object on the cables. Do not pull the cables, when unplugging. Pull out the cable only by holding the plug. Do not put force on the cables in any direction when connected to the Control Unit, this can damage the Control Unit and connectors.

Before switching on the power to the Control Unit ensure that the Motors can spin freely and no harm to humans, animals or objects is possible in case the connected motors start moving.

Do not use the Control Unit if it is damaged, the isolation on the cables is damaged or it shows any abnormality like excessive heat dissipation.

It is normal that the Control Unit gets warm during operation. To avoid overheating do not cover the Control Unit with thermally insulating material and allow free airflow.



5.1 Troubleshooting

Camera does not trigger/focus when function is used.

- Please check the trigger cable if properly plugged into the control unit's CAM socket and to the camera.
- Check if the Camera is switched on.
- If focusing is not working check if the camera/lens is set to manual focus.
- Some cameras require settings in the menu to allow external trigger cable to be used, please check with the manual of your camera.

Motor does not start when function is used.

- Please check if the motor cable is properly plugged into the control unit's Motor socket and motor is supplied by required voltage.
- Check if the power supply is connected. If only USB is connected the Control Unit may connect to the App or PC program, but the motors will not work.
- Check if supply voltage is in range (The battery may be empty.)
- Check if any error information is shown in the PC program or App.



5.2 Regulatory Hints



INSTRUCTION ABOUT THE WEEE MARK

Correct Disposal of This Product (Waste Electrical & Electronic Equipment) (Applicable in countries with separate collection systems) This marking on the product, accessories or literature indicates that the product and its electronic accessories (cables, adapters,...) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

USA:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



Canada:

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage;
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

China:

注意！

依據 低功率電波輻射性電機管理辦法

第十二條 經型式認證合格之低功率射頻電機，

非經許可，

公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計

之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；

經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信規定作業之無線電信。

低功率射頻電機須忍受合法通信或工業、科學及

醫療用電波輻射性

電機設備之干擾。