



FREEFLY MŌVI

CONTROLLER

USER GUIDE

A circular icon containing a stylized circuit board or drone component, surrounded by decorative flourishes, positioned at the bottom center of the main title area.

WWW.FREEFLYSYSTEMS.COM



Freefly represents the intersection of art and technology. Our team consists of industry leading specialists all focused on one task—inventing solutions to allow unrestricted camera movement. Freefly initially created the CineStar line of multi-rotor camera platforms, which allowed smooth, stable and dynamic low-altitude aerial imagery. After years of research and development in camera stability, Freefly has created the MōVI stabilized camera gimbal. Our goal with the MōVI is to empower a new era of stabilized cinematography on a variety of platforms, from handheld to helicopters and everything in between.



COMPATABILITY

The MōVI Controller is compatible with the MōVI M5, M10, and M15 running firmware version 3.08 or later.

Download the latest MōVI firmware and update instructions at www.freeflysystems.com.

See Follow-Focus Integration section for information on wireless lens control system compatibility.





CONTROLLER SPECIFICATIONS

POWER INPUTS:		
External DC Supply or Battery	Controller Only (No Monitor), Power Level 4 Controller and Monitor, Max	13.0 V - 20.0 V 0.2A 13.0 V - 20.0 V 3.2A
USB	Controller only (No monitor), Power Level 4	4.75 V - 5.25 V 0.4A
POWER OUTPUTS:		
12V DC OUTPUT	Input 13.0 - 20.0V, Output Current < 3.0A Max. Current Output	11.4 V - 12.6 V 3.0A
USB 5V OUTPUT	Input 13.0 - 20.0V, Output Current < 2.0A Max. Current Output	4.50 V - 5.25 V 2.0A

RADIO TRANSMITTER:		
Frequency	All Channels	2.410 - 2.465 Ghz
Transmission Power	Power Level 0 (EU) Power Level 4	+10 dBm +1B dBm
Range	Power Level 0 (EU), Outdoor Line-of-Sight	1200 ft / 300 m

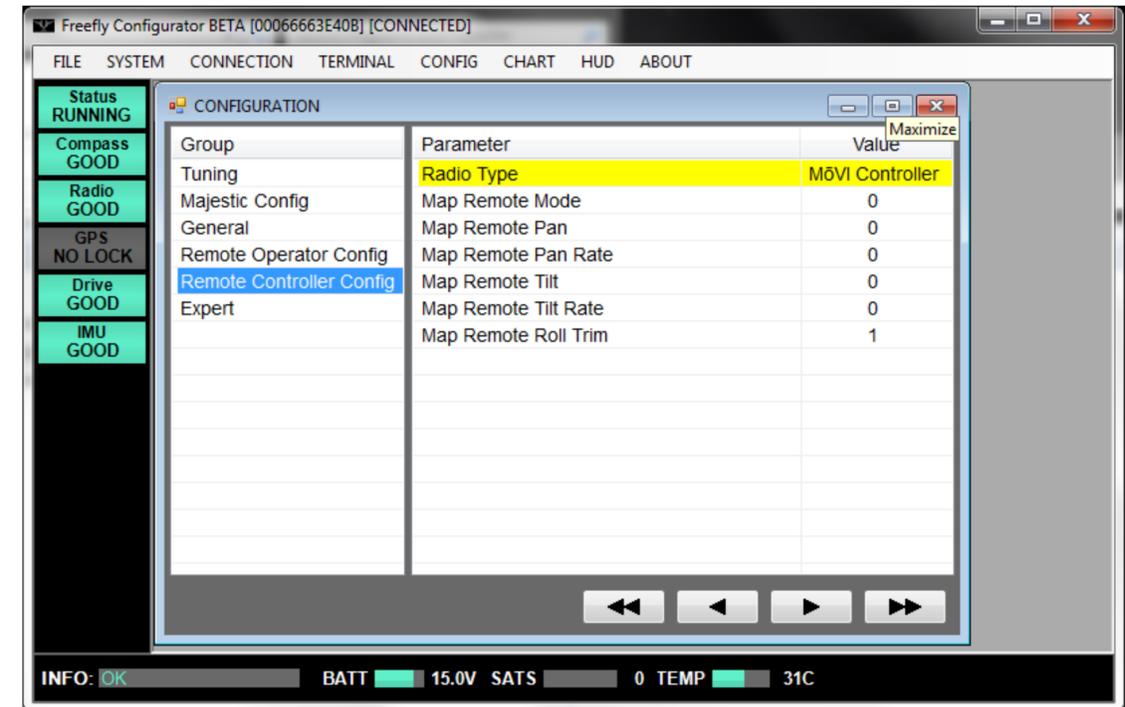
MōVI CONTROLLER PHYSICAL:		
Weight	Including Antenna, Excluding Monitor and Battery Plate	950 g
Dimensions	Including Antenna and Joystick, Excluding Monitor and Battery Plate	300mm X 175mm X 120mm
Receiver OUTPUTS:		
Weight	Excluding Wires and Mounting Tape	15 g
Dimensions	Excluding Wires, Mounting Tape, Antenna	33mm X 38mm X 15mm



CONTROLLER SPECIFICATIONS

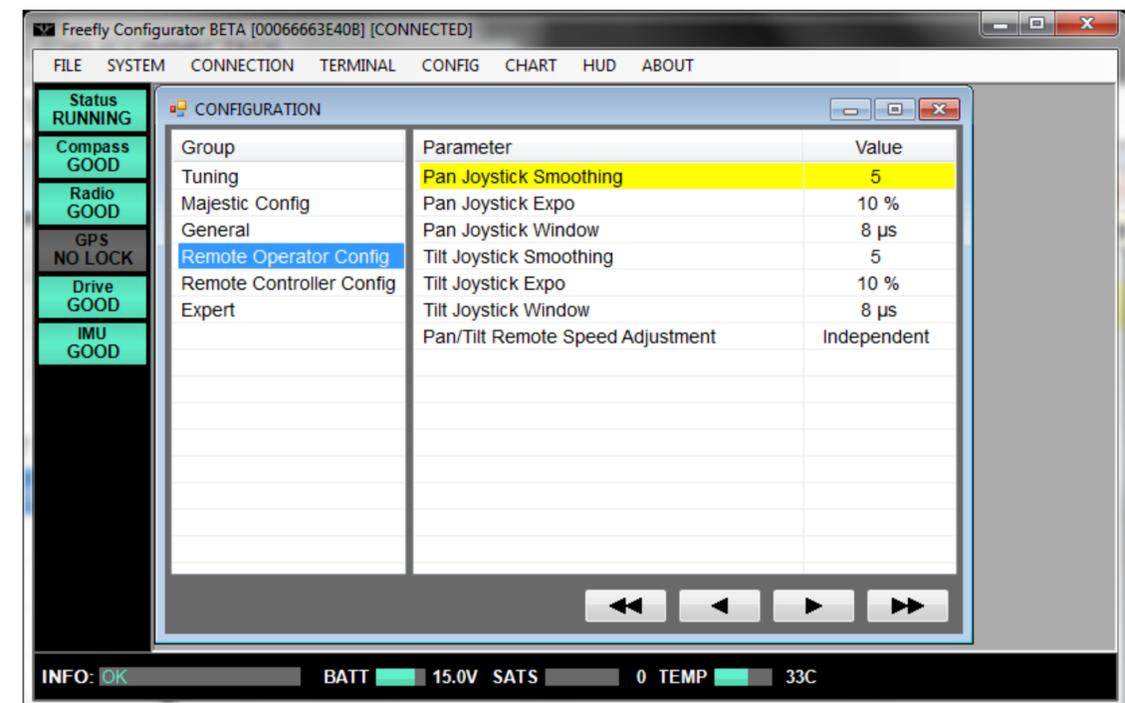
Any MōVI M5, M10, or M15 can be configured to work with the MōVI Controller. The MōVI must have firmware version 3.08 or later. The latest MōVI firmware, release notes, and update instructions are available at www.freeflysystems.com

Once running firmware v3.08 or later, change the MōVI Radio Type from the default (DSMX 2048) to MōVI Controller. This can be done from any of the Freefly Configurator apps (PC, Mac, Android) in the Remote Controller Config menu.

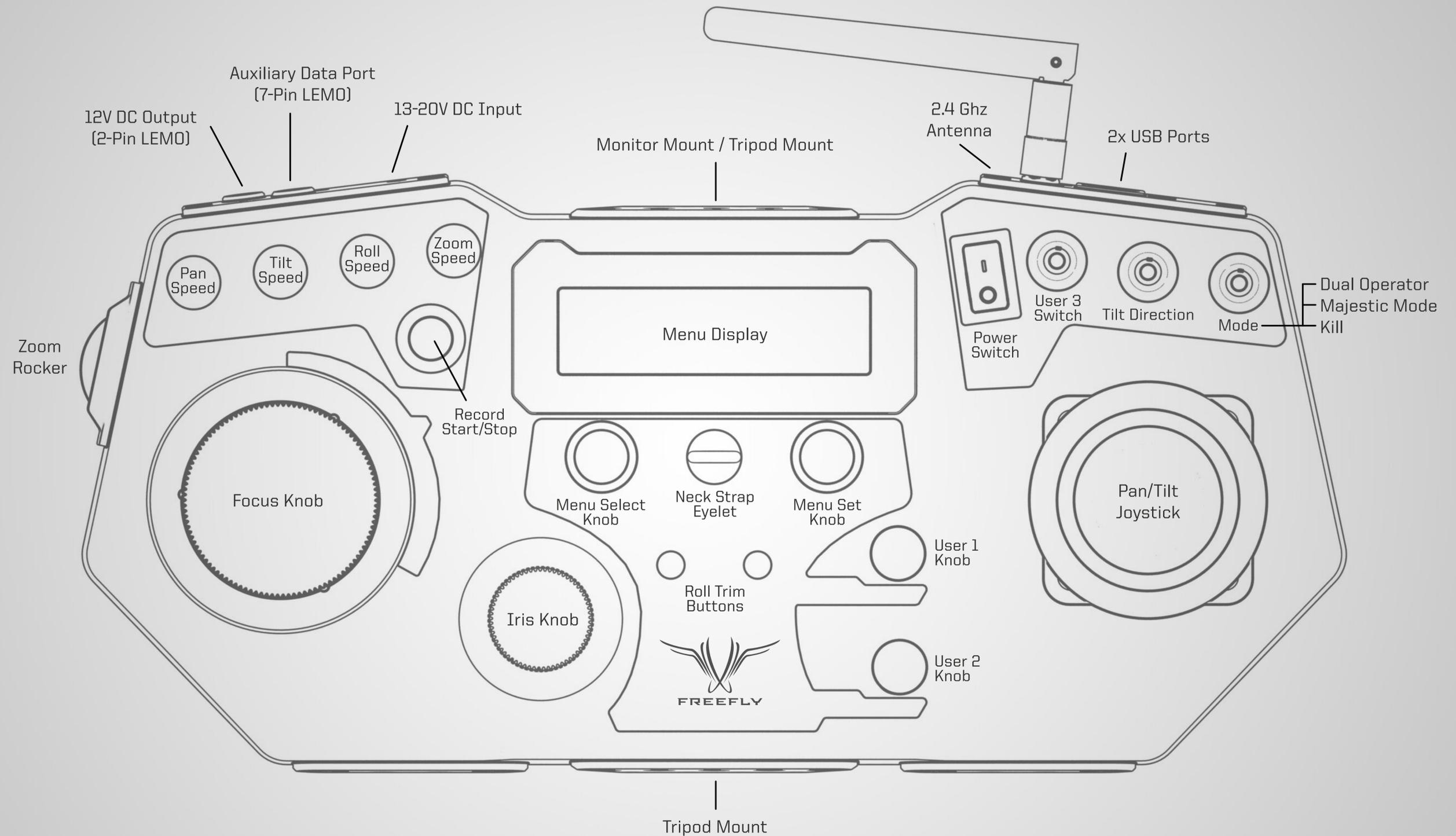


The values of the other parameters in this menu (Map Remote Mode, etc.) do not matter for this Radio Type and can be left at their defaults.

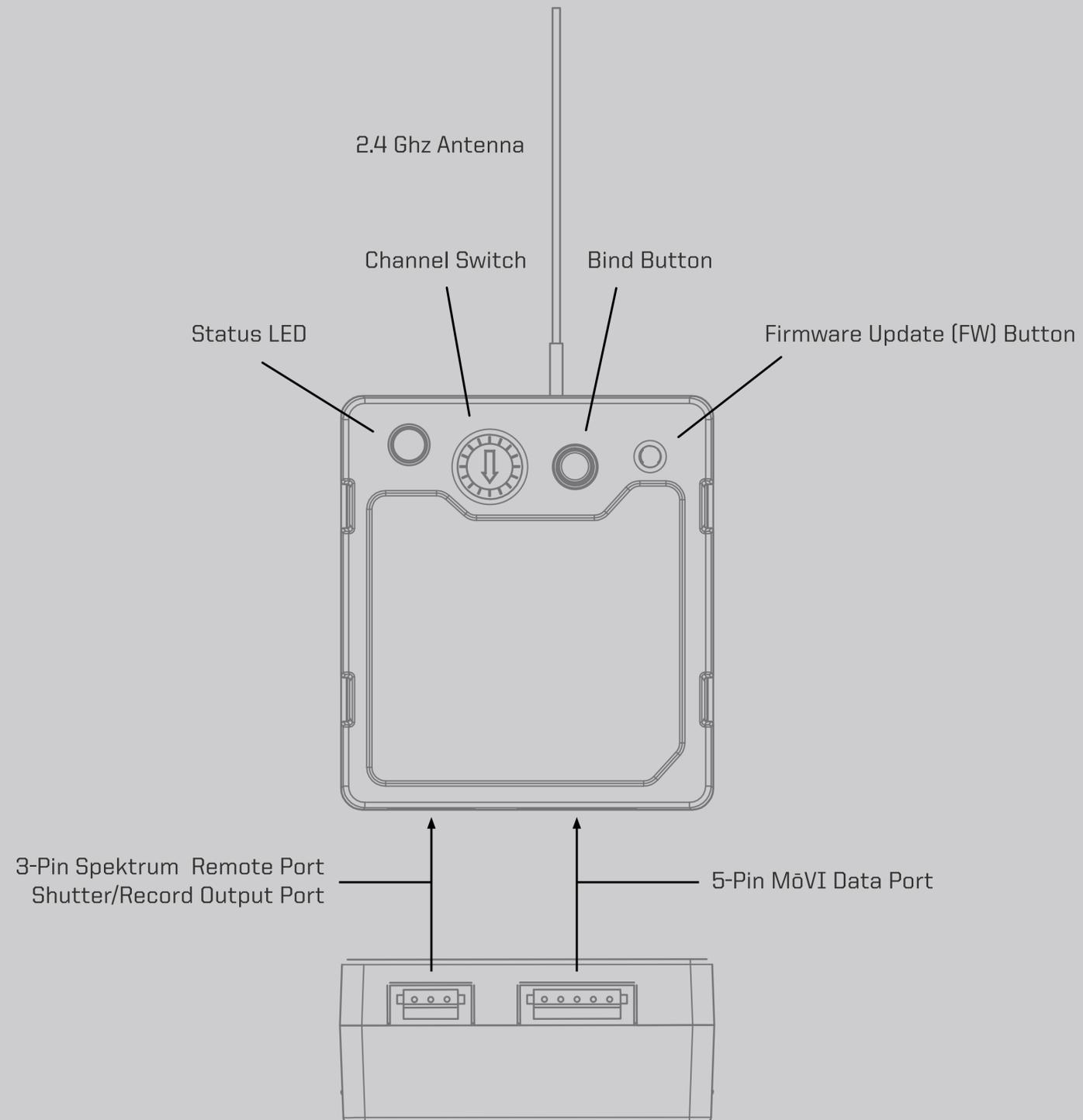
After installing the MōVI Controller Receiver (see Receiver Installation section below, or the Quick Start Guide included in the package) and configuring the MōVI Radio Type as above, the MōVI Controller is ready to send commands and receive data from the MōVI. As the Spektrum DX7/DX8 remote controller, the feel of the joystick can be adjusted from the Remote Operator Config menu.



MöVI CONTROLLER LAYOUT

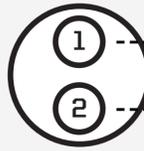


RECEIVER LAYOUT



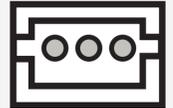
CONNECTORS AND PINOUTS

13-20V DC INPUT	
5.5mm OD 2.1mm ID Barrell Jack Connector Center Positive e.g. CUI Inc PP3-002A	

12V DC OUTPUT	
2-pin LEMO FGG.08.302.CLAD52	TYPE  307  <ul style="list-style-type: none"> 1 ----- 12V DC OUTPUT, 3A MAX 2 ----- GND (LOOKING IN TO CONTROLLER SIDE CONNECTER)

RECEIVER DATA PORT		
7-pin LEMO FGG.08.307.CLAD52	TYPE  307  (LOOKING IN TO CONTROLLER SIDE CONNECTER)	<ul style="list-style-type: none"> 1 - GND 2 - 5V Output, 1A max. 3 - GPIO1 (0.0V - 3.3V) 4 - GPIO2 (0.0V - 3.3V) 5 - GPIO3 (0.0V - 3.3V) 6 - Auxillary Data Out (3.3V digital output) 7 - Auxillary Data In (3.3V digital input, 5V tolerant)

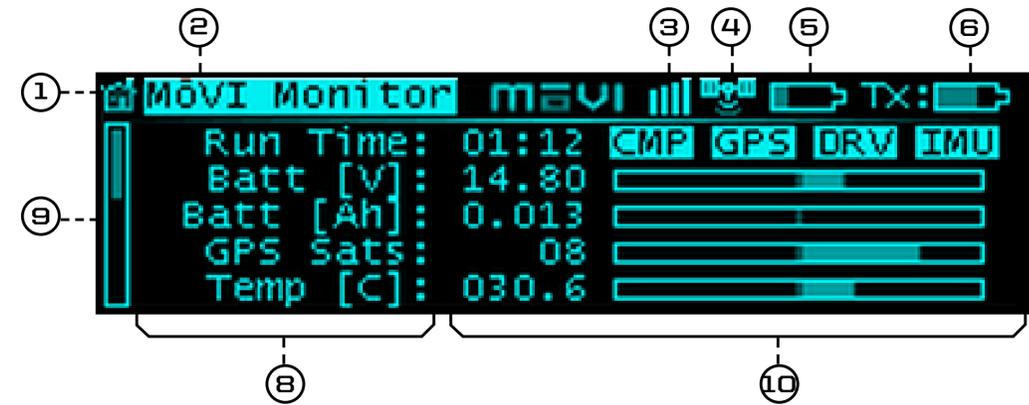
RECEIVER DATA PORT		
5-pin JST ZH ZHR-5	 1 2 3 4 5 (LOOKING IN TO RECEIVER SIDE CONNECTER)	<ul style="list-style-type: none"> 1 - GND 2 - 5V Input 3 - Data In (3.3V digital input, 5V tolerant) 4 - Data Out (3.3V digital output) 5 - GPIO1

RECEIVER SPEKTRUM / RECORD OUTPUT PORT		
3-pin JST ZH ZHR-3	 1 2 3 (LOOKING IN TO RECEIVER SIDE CONNECTER)	<ul style="list-style-type: none"> 1 - 3.3V Input 2 - GND 3 - Shutter/Record of Spektrum Date Out (3.3V digital output)

DISPLAY LAYOUT



HOME SCREEN



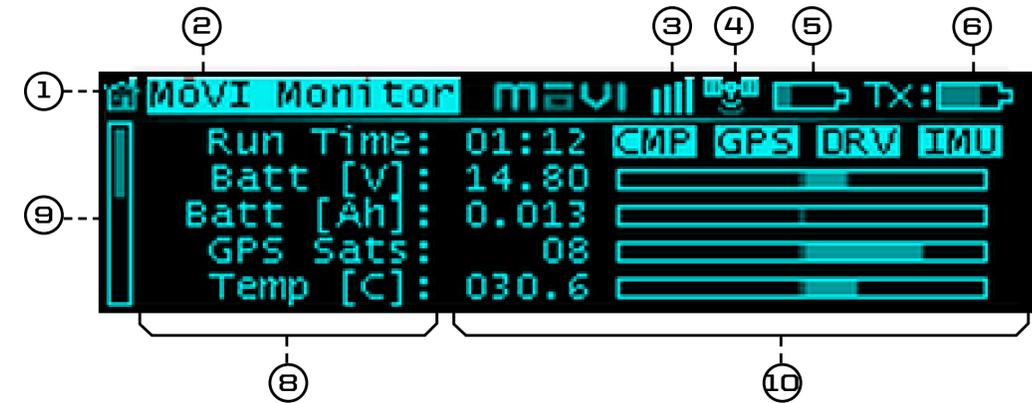
TYPICAL MENU SCREEN

①	HOME ICON	Return to the Home menu at any time by scrolling (with the Menu Select knob) to and clicking on the Home icon in the top left corner of the display.
②	MENU TITLE	The title of the currently active menu is displayed here.
③	MoVI Status	When connected to a MōVI, this icon will display the MōVI Status:
	Booting Error	The MōVI is starting up. Keep the camera stationary while this icon is displayed for the IMU to properly initialize. The MōVI is connected, but an error has occurred. Check the MōVI Monitor menu for more information on the error, or try restarting the MōVI.
	Connected	The MōVI is connected and running, and the MōVI Controller is receiving live telemetry.
④	GPS STATUS	When the MōVI acquires GPS lock, the GPS icon () is displayed and the GPS-based acceleration compensation (to minimize horizon drift during high-acceleration movement) is active.
⑤	MōVI BATTERY LEVEL	The state of charge of the MōVI battery. Check the MōVI Monitor menu for the exact battery voltage.

DISPLAY LAYOUT



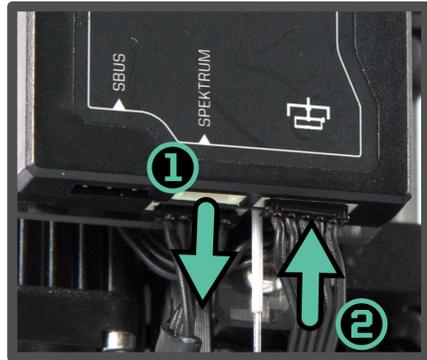
HOME SCREEN



TYPICAL MENU SCREEN

⑥	TRANSMITTER BATTERY LEVEL	The state of charge of the MoVI Controller battery. See Power section for details on what batteries can be used with the MoVI Controller.
⑦	MENU DESCRIPTION	A brief description of each menu accessible from the Home menu.
⑧	MENU LIST	A list of menu items. The highest-level menus appear on the Home menu. Individual menu items appear within their respective menu. Scroll through and select a menu item using the Menu SelectKnob.
⑨	SCROLL BAR	The scroll bar always appears on the left side of the display and shows the current scroll position, indicating if there are more menu items above or below the ones currently displayed.
⑩	MENU ITEM DETAILS	Within a menu, details for each menu item are shown on the right side of the display. These include status indicators and bar graphs for menu items that are read-only and adjustable values or options for menu items that can be modified. Use the Menu Select Knob to change values or select options where applicable. Refer to the individual menu descriptions in the Menu Structure section for details on each menu item.

MöVI CONTROLLER RECEIVER INSTALLATION: M10



1. Remove the Spektrum Receiver and 3-pin cable (if applicable).

2. Plug shorter 5-pin cable into MöVI Data port on the Gimbal Controller.



3. Plug the other end of the 5-pin cable into the MöVI Data port on the receiver.

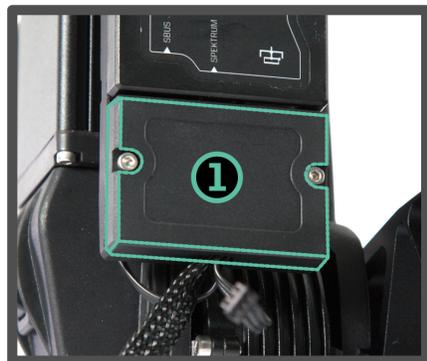


4. Remove the adhesive backing from the receiver.

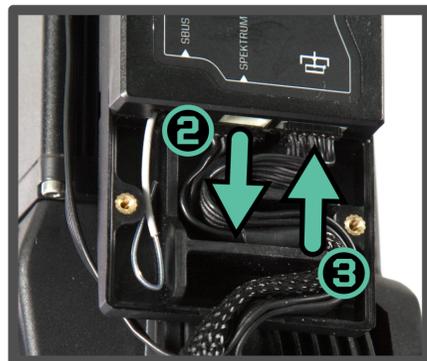


5. Attach the Receiver to the Gimbal Controller shown.

MöVI CONTROLLER RECEIVER INSTALLATION: M5 / M15



1. Remove the Strain Relief cover from the Gimbal Controller.



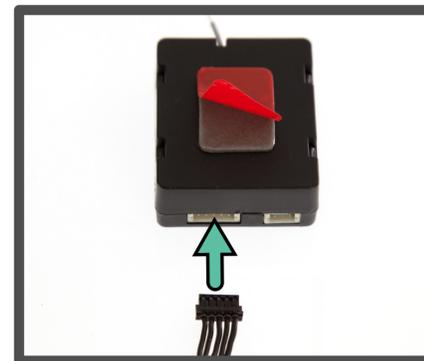
2. Remove the Spektrum Receiver and 3-pin cable (if applicable).

3. Plug longer 5-pin cable into MöVI Data port on the Gimbal Controller.



4. Route the 5-pin cable with the other wires through the Strain Relief track.

5. Replace the Strain Relief cover.



6. Plug the other end of the 5-pin cable into the MöVI Data port on the Receiver.

7. Remove adhesive backing from the Receiver.



8. Attach the Receiver to the Gimbal Controller shown.



RECEIVER STATUS LED

The Receiver Status LED conveys information about the state of the radio link between the MōVI Controller and the MōVI.

LED	CONDITION	NORMAL OPERATION	WHILE BINDING
	OFF	No Power.	No Power.
	FAST FLASHING GREEN	Connection starting.	Not used.
	SLOW FLASHING GREEN	Connection started. Waiting for data.	Not used.
	SOLID GREEN	Connected and receiving data from MōVI Controller.	Bind successful.
	FAST FLASHING ORANGE	Not used.	Bind started, searching for MōVI Controller.
	SLOW FLASHING ORANGE	Not used.	MōVI Controller found, waiting for permission to bind.
	SOLID ORANGE	Not used.	Not used.
	FAST FLASHING RED	Not used.	Not used.
	SLOW FLASHING RED	Auto channel search failed.	No MōVI Controller found.
	SOLID RED	Not used.	Bind failed.



BINDING TO A NEW MōVI CONTROLLER RECEIVER

The MōVI Controller comes with a Receiver already bound to it and ready for communication with a MoVI. This MōVI Controller and Receiver form a bound pair. Only that specific MōVI Controller can control that Receiver. However, it is possible to rebind the Receiver to a new MōVI Controller, or bind new Receivers to a single MōVI Controller for working with multiple MōVI systems.

Ensure that the MōVI Controller and Receiver are both set to the same channel, or both set to auto-select (Channel 0)

Set the channel in [Radio Config::Channel](#) on the MōVI Controller.

Apply changes with [Radio Config::Radio Action::Write](#).

Select the same channel on the Channel Switch at the Receiver.

Select a Device Group. Binding is specific to a Device Group; the receiver is joining the chosen group. See Radio Config menu description for more info.

Set the Device Group in [Radio Config::Device Group](#).

Apply changes with [Radio Config::Radio Action::Write](#).

Initiate Bind Mode on the MōVI Controller Receiver.

Press and hold the Bind button on the Receiver for at least two seconds. The Status LED will be fast-flashing orange to indicate the Bind Mode is active and it is seeking a MōVI Controller with which to bind.

After a few seconds, the Status LED will change to slow-flashing orange to indicate that a MōVI Controller has been detected and the Receiver is requesting permission to bind. A slow-flashing red Status LED at this point indicates that no MōVI Controller was detected.

Initiate Bind Mode on the MōVI Controller.

Allow the Receiver to bind by starting Bind Mode on the MōVI Controller with [Radio Config::Radio Action::Bind](#).

After a few seconds, the Receiver will indicate successful binding with a solid green Status LED. A solid red Status LED indicates a bind failure.

Following a bind, the receiver will reset. During this time the Status LED will return to flashing green momentarily as the connection starts. After a few seconds, the MōVI will be connected.

The receiver Status LED will return to solid green to indicate that it is receiving control data from the MōVI Controller.

The MoVI Controller will display a connection icon () and display MōVI battery voltage in the Status Bar to indicate that it is receiving data from the MōVI.

If the bind process fails, try repeating Steps 1-5. For further troubleshooting steps, refer to the Troubleshooting section.

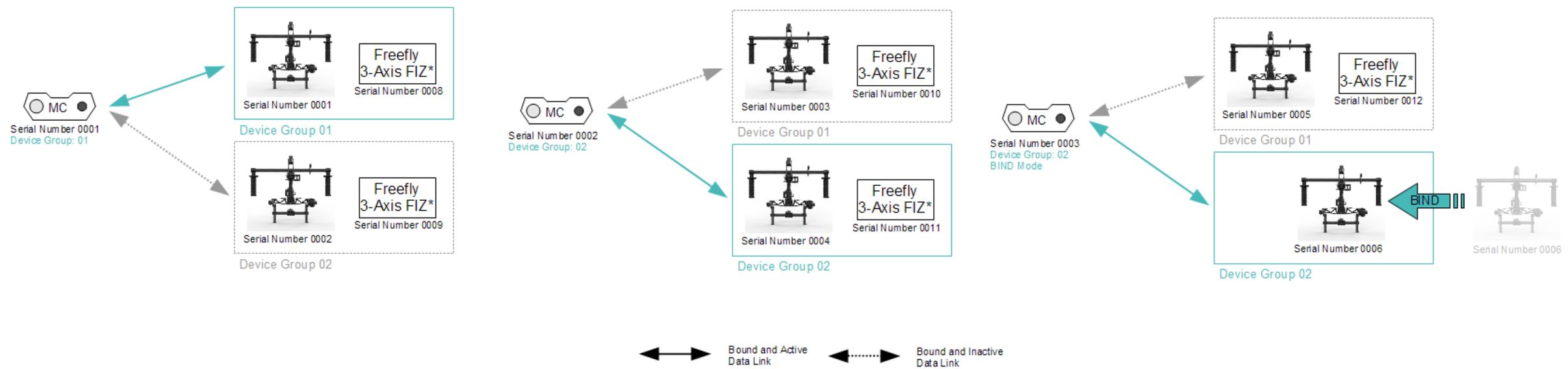
BINDING AND DEVICE GROUPS

The illustration below shows how a complex network of multiple MōVI Controllers, MoVIs, and Freely 3-Axis FIZ Receivers* might be configured. Each Device Group can consist of one or more MōVIs (with attached MoVI Controller Receivers) or Freely 3-Axis FIZ Receivers. This allows a single MōVI Controller to control both the MōVI and the Freely 3-Axis FIZ Receiver on one radio link.

Additionally, the MōVI Controller can bind up to 16 Device Groups. This allows selection from multiple sets of prebound devices. Only one Device Group is active at any given time. Devices in another Device Group will not be controlled, even if they are powered on and have been bound. The Device Group function is similar to "model memory" on an RC transmitter.

Arrows indicate binds, which are potential data links for control and telemetry. It is not possible for an unbound MōVI Controller/Receiver pair to communicate. For example, in the illustration below, MōVI Controller Serial Number 0001 cannot control MōVI Serial Number 0003, because they have not bound.

Binding is the act of joining a Device Group of one particular MōVI Controller. For example, setting MōVI Controller Serial Number 0003 to Device Group 02 and binding MōVI Serial Number 0005 according to the bind process described above causes MōVI Serial Number 0005 to join that Device Group. After that, it can be controlled by MōVI Controller Serial Number 0003 whenever Device Group 02 is selected.





POWER

DC INPUT:

The primary DC input is a 5.5mm O.D., 2.1mm I.D. center-positive barrel jack connector located on the back of the MōVI Controller. It is designed for a 15V power supply, but will accept voltages from 13V to 20V. It is reverse polarity protected up to 20V. However, supplying more than 20V will result in damage.

There are several battery options for powering the MōVI Controller. An optional IDX mounting plate can be fitted, which will supply power to the DC input from standard V-Lock batteries and provides one additional D-Tap output. An optional overcurrent-protected MōVI battery (LiPo) cable is also available. The MōVI Controller will go into low power sleep mode when the battery drains below 13V, but it is still important to turn off the power switch and remove the battery when not in use.

12V DC OUTPUT:

When supplied with a 13-20V DC input, the MōVI Controller generates a regulated 12V output for powering auxiliaries at up to 3A. The output is a 2-pin LEMO connector with standard polarity. (Pin 1 / red dot / key is positive. Note: This is reversed from the polarity of the Teradek Bolt.) The mating connector is FGG.0B.302.CLAD52.

USB:

The MōVI Controller USB ports are capable of supplying 5V at up to 2A for powering external devices such as wireless video receivers, tablets, or smartphones.

Note: Only the top USB port can be used for powering Apple devices.

The MōVI Controller can be powered at 5V through either of its USB ports. When powered by USB, the regulated 12V output will not be active. USB voltage may be noisy and vary significantly from host device to host device. This can cause noise or drift on the joystick axes. Always power the controller through the primary DC input when possible. Refer to the Tx Config menu description for tips on how to detect and remove joystick drift.

Note: Powering your MōVI Controller with both DC input and USB simultaneously will not cause any damage.



FOLLOW-FOCUS INTEGRATION

The MōVI Controller can integrate with wireless follow-focus systems from Redrock Micro and Hocus Products with an optional Auxiliary Transmitter. The Auxiliary Transmitter uses the same hardware as the MōVI Controller Receiver and communicates directly with the follow-focus system. It connects to the Auxiliary Data Port on the MōVI Controller. The range of the Auxiliary Transmitter is similar to that of the primary radio link to the MōVI (approx. 1200ft outdoor/line-of-sight).

REDROCK MICRO MICROREMOTE

To enable the Auxiliary Transmitter to communicate with a Redrock Micro microRemote Basestation:

1. Set the Auxiliary Transmitter to microRemote Auxiliary Transmitter mode by following the instructions in the Auxiliary Transmitter section.
2. Use the Channel Switch on the Auxiliary Transmitter to set the channel to be the same as that of the microRemote Basestation. This can and should be set to a different channel than the primary radio link to the MōVI to prevent interference. See the channel mapping table in the Radio Config section.
3. Select "microRemote" in [FIZ Config::System](#) on the MōVI Controller.

Note: Only channels 1 through C are available. Channels 0, D, E, and F are reserved for low-power transmitters.

HOCUS PRODUCTS AXIS 1

To enable the Auxiliary Transmitter to communicate with a Hocus Pocus Axis 1 Digital Receiver:

1. Set the Auxiliary Transmitter to Axis 1 Auxiliary Transmitter Mode mode by following the instructions in the Auxiliary Transmitter section.
2. Use the Channel Switch on the Auxiliary Transmitter to set the channel to be the same as that of the Axis 1 Digital Receiver. This can and should be set to a different channel than the primary radio link to the MōVI to prevent interference. See the channel mapping table in the Radio Config section.
3. Select "Axis 1" in [FIZ Config::System](#) on the MōVI Controller.

Note: Only channels 1 through C are available. Channels 0, D, E, and F are reserved for low-power transmitters.



MENU STRUCTURE

HOME

The home menu is the starting point for navigating through other MōVI Controller menus. You can always return to the Home menu by scrolling to and clicking the Home icon in the top-left corner of the display.

TX MONITOR

The transmitter (Tx) Monitor menu displays information about the transmitted user inputs. The Pan/Tilt Joystick, Focus Wheel, Zoom Rocker, Iris Knob, Record Button, and other knobs and switches report their position in this menu. This information can be useful for holding consistent pan, tilt, or zoom rates.

TX CONFIG

User inputs and the MōVI Controller operation can be customized from the Tx Config menu:

• TX ACTION: Load, Save, or Restore MōVI Controller Transmitter Configurations	
SAVE	Save Tx Configuration to non-volatile (flash) memory from here. <i>Settings changes not saved before powering down the MōVI Controller will be lost.</i>
LOAD	Load the most recently saved Tx Configuration from non-volatile (flash) memory. This can be useful for undoing changes made since the last power up.
DEFAULT	Temporarily restore the default factory Tx Configuration. Save this configuration permanently using Tx Action::Save as described above.
RE-ZERO	Reset the center point of the Pan/Tilt Joystick and Zoom Rocker. These inputs are zeroed on start-up. Check the center points in the Tx Monitor menu. If pan, tilt, or zoom has more than 1-2% of offset when the joystick and zoom rocker are in their center positions, it can create slow drift of the MōVI.
CALIBRATE	Re-calibrate the end points of the Focus Knob. See Calibration section for calibration instructions.

- **MAP ROLL INPUT:** Assign an input (Zoom Rocker, Iris Knob, etc.) to control the MōVI Roll Axis
- **FOCUS DIRECTION:** Reverse the direction of the Focus Knob input.
- **ZOOM DIRECTION:** Reverse the direction of the Zoom Rocker input
- **IRIS DIRECTION:** Reverse the direction of the Iris Knob input.
- **PAN DIRECTION:** Reverse the direction of the Pan/Tilt Joystick X-Axis (Pan). The Pan/Tilt Joystick Y-Axis (Tilt) can be reversed using the Tilt Direction Switch.



• RECORD TYPE: Change the shutter/record output on the MoVI Controller Receiver.	
MOMENTARY	The Shutter/Record Output is active only while the Record Start/Stop Button is pressed.
TOGGLE	The Shutter/Record Output switches between active and inactive each time the Record Start/Stop Button is pressed.

• RECORD POLARITY: Change the active state of the Shutter/Record Output signal from the MoVI Controller Receiver.	
NORMAL	The Shutter/Record Output is active high (3.3V digital output).
REVERSE	The Shutter/Record Output active low (0.0V digital output).

- **USER 3 Function:** Assign a function to the USER 3 switch. See User Functions table below.

• TILT REV Function: Configure the function of the TILT REV switch center position.	
NORMAL	The Center position is the same as the Up position (TILT FWD).
REVERSE	The Center position disables the Tilt Axis.

- **USER 1 Function:** Assign a function to the USER 1 knob. See User Function table below. The USER 1 function assignment has priority over USER 2 and USER 3.
- **USER 2 Function:** Assign a function to the USER 2 knob. See User Function table below. The USER 2 function assignment has priority over USER 3.



USER FUNCTION	DESCRIPTION	USER 1	USER 2	USER 3	NOTES
None		Default	Default	Default	
Pan Dir	Reverse Pan/Tilt Joystick X-Axis (Pan).	Yes	Yes	Yes	Threshold is 50% for USER 1 and USER 2 ¹ .
Focus Dir	Reverse Focus Knob input.	Yes	Yes	Yes	Threshold is 50% for USER 1 and USER 2 ¹ .
Zoom Dir	Reverse Zoom Rocker input.	Yes	Yes	Yes	Threshold is 50% for USER 1 and USER 2 ¹ .
Iris Dir	Reverse Iris Knob input.	Yes	Yes	Yes	Threshold is 50% for USER 1 and USER 2 ¹ .
Mode	Change MoVI Mode: Kill, Majestic, Dual Operator.	Yes	Yes	Yes	Disables the dedicated Mode Switch.
Pan Speed	Adjust maximum Pan Speed.	Yes	Yes	No	Disables the dedicated Pan Speed Knob.
Tilt Speed	Adjust maximum Tilt Speed.	Yes	Yes	No	Disables the dedicated Tilt Speed Knob.
Roll Speed	Adjust maximum Roll Speed.	Yes	Yes	No	Disables the dedicated Roll Speed Knob.
Zoom Speed	Adjust maximum Zoom Speed.	Yes	Yes	No	Disables the dedicated Zoom Speed Knob.

¹ When a knob is used to control axis direction, forward is defined as >50% (clockwise) and reverse is defined as <50% (counter clockwise) rotation.

<ul style="list-style-type: none"> • TX MODE: Configure whether the controller responds to physical movement (in Mimic mode), or by controls only. 	
MIMIC	Control the MōVI pan, tilt, and (optionally) roll by physically tilting the MōVI Controller.
NORMAL	Control the MōVI using standard controls (Knobs, Joystick, Zoom Rocker, etc.)

• **MIMIC MODE:** MIMIC Mode allows for intuitive control of the MōVI pan, tilt, and (optionally) roll by physically moving the MōVI Controller. Mount the MōVI Controller to a fluid head tripod for smooth pan bar-like control, or move it in your hands for dynamic yet stable operation.

• **COMPATIBILITY:** MIMIC Mode is available in MōVI Controller firmware v2.0 and later. It is compatible with any MōVI using firmware v4.2 or later. To check the current firmware version of the MōVI Controller, highlight the Home () icon on the Home screen.





• **SENSOR START-UP AND RE-ZERO:**

MIMIC Mode uses sensors in the MōVI Controller to measure its movement. These sensors are calibrated each time the MōVI Controller is turned on. The start-up calibration takes approximately five seconds. The MōVI Controller should be kept level and still during this time.

If the MōVI Controller was moving during start-up, or if one or more axes drift while using MIMIC Mode, the sensors can be re-zeroed at any time using from the Tx Config menu by selecting Tx Action: Re-zero and pressing the Menu Set button.



• **ACTIVATING AND DEACTIVATING MIMIC MODE:**

MIMIC Mode uses sensors in the MōVI Controller to measure its movement. These sensors are calibrated each time the MōVI Controller is turned on. The start-up calibration takes approximately five seconds. The MōVI Controller should be kept level and still during this time.

If the MōVI Controller was moving during start-up, or if one or more axes drift while using MIMIC Mode, the sensors can be re-zeroed at any time using from the Tx Config menu by selecting Tx Action: Re-zero and pressing the Menu Set button.



• **AXIS SCALING AND ROLL ENABLE/DISABLE:**

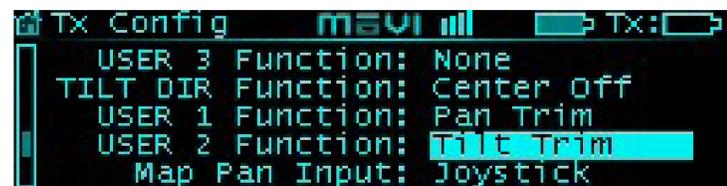
MIMIC Mode can translate MōVI Controller movement to the MōVI directly (1:1) or it can scale the movement on each axis. Use the Mimic Axis Scale values for Roll, Tilt, and Pan to adjust this behavior. Some examples:

- Roll is disabled by default (Mimic Roll Scale: 0.0). To enable the roll axis with a direct ratio of 1:1, set the Mimic Roll Scale value 1.0.
- Pan and Tilt Scale are set to 1.0 by default, but if the MōVI Controller is mounted on a fluid head tripod, it may be advantageous to use a higher Scale. For example, by setting Tilt Scale: 3.0, the Controller only needs to be tilted 30° up or down to move the MōVI tilt axis up or down by 90°.

• **JOYSTICK AND TRIM IN MIMIC MODE:**

While in MIMIC Mode, the joystick can still be used to reframe, for example to align the camera for the start of a MIMIC Mode shot. To disable the joystick input, set the Pan and Tilt Speed knobs to their minimum position.

Roll trim buttons are also still active in MIMIC Mode. The USER 1 and USER 2 Knobs can be optionally mapped to Pan and Tilt Trim, to cancel any small movements in these axes. (See the section on Sensor Start-up and Re-zero as well for other ways to cancel axis drift.)





MöVI MONITOR

Live telemetry from the MöVI is available in this menu. The first line displays MöVI run time since power-up, as well as the status of important MöVI systems: Compass (CMP), Global Positioning System (GPS), Motor Drive (DRV), and Inertial Measurement Unit (IMU).

The Compass (CMP) and Global Positioning System (GPS) are used to minimize the effect of high acceleration on the MöVI's tilt and roll axis stabilization. In indoor environments, they may not be available, but the MöVI will still operate.

The Motor Drive (DRV) and Inertial Measurement Unit (IMU) are critical systems and the MöVI will not operate without them. If DRV or IMU is not active, the following quick troubleshooting steps may help:

- + Motor Drive (DRV) Errors: Check for unplugged wires at the Motor Drive (MöVI M10). Check for wire damage in general.
- + Inertial Measurement Unit (IMU) Errors: The IMU may fail to start properly if the MöVI is moving during startup. Try rebooting the MöVI while stationary. If this fails, check for an unplugged wire between the IMU and the Gimbal Controller, or physical damage to the IMU.

Other telemetry values in this menu provide information about MöVI status and performance:

- + **Batt [V]:** The exact MöVI battery voltage is provided here. (An approximate fuel gauge is always available in the status bar.)
- + **Batt [Ah]:** An estimate of the battery capacity used since startup of the MöVI. Consult the battery labeling for the nominal full-charge capacity.
- + **GPS Sats:** The number of GPS satellite links acquired. A minimum of six is required for the MöVI to utilize GPS-based acceleration compensation. Not applicable in indoor environments.
- + **Temp [C]:** The temperature of the MöVI processor. (Typical values are under 50-60°C.)
- + **CPU [%]:** The MöVI processor utilization. (Typical values are under 60-70%.)
- + **Tilt/Roll/Pan [deg]:** The physical angle of each MöVI axis, referenced to the outside world. This can be useful for moving to exact positions, such as looking straight down (Tilt -90°).
- + **Tilt/Roll/Pan Motor:** The amount of motor torque used on each axis. This can be helpful during balancing: A well-balanced MöVI should show less than 3% torque on all three motors in any camera or handle position.



MōVI CONFIG

• SYSTEM OPTIONS	
SAVE SETTINGS	Save MōVI configuration to non-volatile (long-term) memory from here. Settings changes not saved before powering down or rebooting the MōVI will be lost.
REBOOT MōVI	Reinitialize the MōVI. This can be useful for clearing any Errors that occur during MōVI start-up.

- TILT/ROLL/PAN STIFFNESS**
 These settings control how much the motors are used to stabilize the camera on each axis. For best performance, each Stiffness value should be as high as possible without causing oscillation on its axis. Generally, heavier cameras allow for higher Stiffness settings. Reverse the direction of the Focus Knob input.
- AUTO TUNE**
 The MōVI is capable of automatically adjusting Stiffness settings once a camera payload has been attached and balanced. Select “Start” to begin the process.
- AUTO TUNE SET (%):**
 The Auto Tune process adjusts the Stiffness settings until oscillation is detected, then sets the final values to a fraction of the value at the onset of oscillation. This parameter adjusts the safety margin used. 50% is a good value for most applications (50% –MōVI M10 and 70% –MōVI M5) . A higher value may result in better performance. A lower value allows for more flexibility in adjusting focal length, changing lenses, or adding accessories without retuning.
- GYRO/OUTPUT FILTER**
 (Expert Settings) These settings adjust the strength of the filters applied to the MōVI’s gyro inputs and motor outputs, respectively. If the MōVI is experiencing oscillations that cannot be corrected by adjusting Stiffness settings, you can use the filters to further tune the gimbal and remove oscillations. As a general rule, if the oscillations are fast and rough in nature (buzzing/vibration), try increasing the filter values. If the oscillations are slow and smooth in nature (rocking), try decreasing the filter values. The following factory-default values work well in most cases:

	GYRO FILTER	OUTPUT FILTER
MōVI M5	3	3
MōVI M10	5	5



<ul style="list-style-type: none"> • MAJESTIC MODE: This configures the MōVI's single-operator mode, called Majestic Mode, and is enabled using the MODE switch (M, center position, for Majestic) or by turning off the MōVI Controller. There are two Majestic Mode options: 	
TILT LOCK	Allow the tilt axis to be positioned by hand, then holds that angle.
TILT ON	Allow the tilt axis to be controlled by pointing the MōVI handles.

- **MAJESTIC PAN/TILT SMOOTHING** In Majestic Mode, pan (and tilt, if enabled) are controlled by pointing the MōVI handles. An adjustable amount of smoothing is added to the camera movements here. Higher values will give smoother pan and tilt movements, but more lag. Lower values will force the camera to follow the handles more closely.
- **MAJESTIC PAN/TILT WINDOW** In order to eliminate unintentional pan/tilt movements and maintain stability, an adjustable window can be set within which Majestic Mode will ignore MōVI handle movements. A lower window will cause the camera to follow the handles more accurately, for slow, precise shots. A higher window will allow for handle movement without affecting stability, for dynamic running or jumping shots.

To access the full range of MōVI configuration settings, use the MōVI Configurator app available for PC, Mac, and Android at: <http://www.freeflysystems.com/>.

For a more detailed description of each MōVI configuration parameter, refer to the MōVI manuals available at: <http://www.freeflysystems.com/media/instruction-manuals.php>.

RADIO CONFIG

Settings for configuring the primary 2.4GHz radio transceiver are located here. You can also bind to a new Receiver in this menu.

<ul style="list-style-type: none"> • RADIO ACTIONS: Select an action to perform for configuring the primary radio. Start the action by clicking the Menu Set knob. Note: These actions will momentarily halt MōVI control and telemetry while the radio is being configured. The MōVI may briefly return to Majestic Mode during this time. 	
READ	Read the current Channel, Device Group, and Power Level from the radi.
WRITE	Write the modified Channel, Device Group, and Power Level to the radio.
BIND	Add a new receiver to the current Device Group. This will allow the MōVI Controller to communicate with the new Receiver. See Binding to a New MōVI Controller Receiver above.



• **CHANNEL**

The channel setting determines the physical RF channel used by the MōVI Controller's primary radio link. One of twelve channels in the 2.4GHz band can be chosen manually, or choose 0 (Automatic) to allow the MōVI Controller to automatically select the clearest channel at startup. The channel selected must match the channel on the MōVI Controller Receiver.

MOVI CHANNEL	CENTER FREQUENCY [GHZ]	REDROCK MICRO MICROREMOTE CHANNEL	HOCUS PRODUCTS AXIS 1 CHANNEL
0 (Auto)	Auto-Selecting	N/A	N/A
1	2,410	1	1
2	2,415	2	2
3	2,420	3	3
4	2,435	4	4
5	2,430	5	5
6	2,435	6	6
7	2,440	7	7
8	2,445	8	8
9	2,450	9	9
A	2,455	A	10
B	2,460	B	11
C	2,465	C	12
D ¹	N/A	N/A	N/A
E ¹	N/A	N/A	N/A
F ¹	N/A	N/A	N/A

¹ These channels are reserved for low-power transmitters and are not available on the MōVI Controller.

• **DEVICE GROUP**

The MōVI Controller can store up to 16 Device Groups. (This is akin to “model memory” on a standard RC transmitter.) Each device group can have one or more MōVI Controller Receivers bound to it. This can be useful for selecting between multiple MōVI systems that are on at the same time. For simple single MōVI use, the Device Group can be left at the default setting (0).

• **POWER LEVEL**

Configure the power level (from 10-18dBm) to ensure compliance with local RF regulations. Radios shipped outside of North America have only the EU (10dBm) option available. The range of the link has been tested at up to 300m line-of-sight at EU (10dBm) power.



• RADIO MODE	
MöVI/WEDGE	Allows for communication between MöVI, MöVI Controller and WEDGE
TETHER/RX FW	In this mode, the MöVI Controller relays raw data between the Receiver and a host computer via USB. This can be used to control the MoVI from a computer interface, or to update the Receiver firmware.

SPEKTRUM DSMX 2048 CHANNEL	MÖVI CONTROLLER FUNCTION
Aileron	Pan
Elevator	Tilt
Throttle	Pan Speed
Rudder	Roll Trim
Gear	TK Rec Start/Stop
Aux 1	TK Mode Switch (Dual, Majestic, Kill)
Aux 2	Tilt Speed

FIZ CONFIG

Configure the operation of wireless Focus-Iris-Zoom (FIZ) systems in this menu. For more information on supported systems, see the Follow-Focus Integration section.

- **SYSTEM** Choose between supported wireless follow-focus systems. See Follow-Focus Integration section for more details on supported systems. Choose None to disable the Auxiliary Transmitter and allow follow-focus control from a separate handset.
- **INPUT** Choose which user input axis is active on the Auxiliary Transmitter output. The Focus Knob, Zoom Rocker, and Iris Knob can each be optionally selected for output to a single-axis system. For direction reversal, see the Tx Config menu section above.

To save FIZ configuration settings, use [Tx Config::Tx Action::Save](#).



HARDWARE

MOUNTING TO TRIPOD

There are several options for mounting a tripod on the MoVI Controller.

MOUNTING PLATES	There are a series of mounting plates along the front of the controller with 1/4-20 threaded holes. To mount the MōVI Controller to a tripod using these plates, attach the tripod plate to any of the 1/4-20 threaded holes and rotate the tripod head to the desired angle.
HEAT SINK	The heat sink located on the back of the controller has a 1/4-20 thread that can be used to mount the MōVI Controller to a tripod when an IDX plate is not attached.
TRIPOD ADAPTER PLATE	The MōVI Controller comes with a tripod mounting plate installed. The tripod mounting plate is attached to the rear mounting plate and has both 1/4-20 and 3/8-16 tapped holes for mounting to a tripod.

ATTACHING MONITOR

The MōVI Controller comes with a Giottos mini ballhead mount and set screw for mounting a monitor. To install a monitor:

+ Insert the 1/4-20 x 1.25" set screw through the top, center hole of the tripod adapter plate into the mounting plate located on the back of the controller.
+ Tighten the set screw using a 1/8" or 3mm hex driver.
+ Make sure the knurled set screw on the Giottos mini ballhead mount is tight, and thread the monitor onto the 1/4-20 thread on the mini ballhead mount.
+ With the screen attached and the knurled set screw on the Giottos mini ballhead still tight, thread the mini ballhead mount onto the 1/4-20 set screw.
+ To adjust the screen position, loosen the knurled set screw and rotate the mini ballhead housing and adjust the monitor angle until the monitor is in the correct orientation.
+ Tighten knurled set screw to lock monitor in place.



TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Transmitter will not power on. (No display)	Incompatible power supply or low battery.	Ensure that the voltage supplied to the MōVI Controller is 13.0-20.0V (or 4.5-5.5V for USB power input). If using a battery, check that the battery is charged.
Cannot connect to a MōVI. Receiver Status LED: (None)	The Receiver is not powered.	Make sure the Receiver is installed correctly and the MōVI is powered on. See installation instructions in the Receiver section.
Cannot connect to a MōVI. Receiver Status LED:  (Fast-Flashing Green)	Unsupported MōVI firmware or incorrect radio type in MōVI Configurator.	Update to MōVI firmware v3.08 or later and configure the Radio Type to "FTX" in the MōVI Configurator App.
	The connection is still starting.	Wait for the connection to be established: Channel 1 thru C: < 5 seconds Channel O (Auto): < 15 seconds
	The MōVI Controller and Receiver are on different channels.	Set the Receiver to the same channel as the MōVI Controller (Radio Config::Channel), or to Channel O (Auto).
	The connection is still starting.	Change the MōVI Controller Device Group (Radio Config::Device Group) to the one into which the Receiver was bound. (The default Device Group is 00.)
	The Receiver is new and/or not bound to the MōVI Controller.	Follow the instructions for binding a new Receiver in the Receiver section.
Can control a MōVI, but the data/telemetry is not present or corrupted. Receiver Status LED :  (Solid Green)	Multiple bound MōVIs are on at the same time.	Turn off MōVIs that are bound to this MōVI Controller but not in use, or re-bind the other MōVIs into different Device Groups.

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Bind Failed. Receiver Status LED:  (Slow-Flashing Red) OR	MōVI Controller was not detected.	Make sure the MōVI Controller is powered on and in range. Turn off any other MōVI Controller that might be in range.
 (Solid Red)	MōVI Controller did not allow binding.	Use Radio Config::Radio Action::Bind to permit binding after the Receiver Status LED changes to slow-flashing orange:  (See binding instructions in the Receiver section.)
A user input (e.g. Pan Speed Knob, Mode Switch) is not working.	The input has been remapped in Tx Config.	Check the assignment of USER 1, USER 2, and USER 3 in the Tx Config menu to see if the user input in question has been remapped to one of these.
	The input is broken/damaged.	Many user inputs can be remapped. For example, the Mode Switch can be remapped to the USER 3 switch. See the Tx Config menu section for more information.
The Pan/Tilt Axes are not working	Pan/Tilt Speeds are at their minimum settings.	Increase these setting using the Speed Knobs.
	The MōVI is in Majestic Mode.	Change to Dual Op. mode using the Mode Switch.



AUXILIARY TRANSMITTER

The MōVI Controller Receiver can optionally be used as an Auxiliary Transmitter for controlling third-party wireless follow-focus systems. For more information on supported systems, see the Follow-Focus Integration section. To change modes:

- 1 - Move the Receiver Channel Switch to the position indicated in the table below.
- 2 - Hold down the FW Button and then press the Bind Button once.
- 3 - The new mode will be active after the next power cycle.

MODE	CONNECTS TO	DESCRIPTION
<p>MōVI Controller Receiver Status LED:</p>  <p>(Solid Green)</p> <p>Set Channel: 0 - C Press Bind Button while holding down FW Button.</p>	<p>MōVI Gimbal Controller, MōVI Data Port. (See Receiver Installation section.)</p>	<p>This is the normal operating mode for two-way communication from the MōVI Controller to the MōVI. The Receiver that comes included with the MōVI Controller is in this mode by default.</p>
<p>microRemote Auxiliary Transmitter Status LED:</p>  <p>(Slow-flashing green/orange)</p> <p>Set Channel: D Press Bind Button while holding down FW Button.</p>	<p>MōVI Controller Auxiliary Data Port.¹</p>	<p>In this mode, the MōVI Controller Receiver acts as an Auxiliary Transmitter for sending commands to a Redrock Micro microRemote Basestation.</p>
<p>Axis 1 Auxiliary Transmitter Status LED:</p>  <p>(Fast-flashing green/orange)</p> <p>Set Channel: E Press Bind Button while holding down FW Button.</p>	<p>MōVI Controller Auxiliary Data Port.¹</p>	<p>In this mode, the MōVI Controller Receiver acts as an Auxiliary Transmitter for sending commands to a Hocus Products Axis 1 Digital Receiver.</p>

¹ Auxiliary Transmitters and Auxiliary Data Port connector are sold separately.



The MōVI Controller Receiver included with the MōVI Controller is configured in MōVI Controller Receiver mode by default. It can be changed to an Auxiliary Transmitter mode if necessary by following the instructions above.

Auxiliary Transmitters purchased separately for follow-focus integration will be preconfigured in either microRemote Auxiliary Transmitter mode or Axis 1 Auxiliary Transmitter mode depending on the option selected at purchase. However, they can be changed to any other mode at a later date by following the instructions above.

FIRMWARE UPDATE

The MōVI Controller firmware can be updated using the included USB A-A cable. The latest firmware, release notes, and update instructions are available at www.freeflysystems.com.

CALIBRATION

User inputs can be recalibrated to fine-tune the center and end-points. Recalibration is not usually necessary, but can be done through [Tx Config::Tx Actions::Calibrate](#). The following table lists inputs that may be recalibrate by the user, as well as the calibration triggers for each.

USER INPUT	CALIBRATION TRIGGER
Focus Knob Right End Point	User 3 Switch Up, then press Menu Set while in Tx Config::Tx Actions::Calibrate
Focus Knob Left End Point	User 3 Switch Down, then press Menu Set while in Tx Config::Tx Actions::Calibrate

Verify that the focus knob end points are correct by viewing the Focus input in the Tx Config menu. It should move from 0.0 to 100.0 over the full range of the knob, with no dead spots or jumps. To save the new focus knob end-point calibration, use [Tx Config::Tx Action::Save](#).

Other inputs are factory-calibrated and cannot be changed at this time.



CERTIFICATIONS

The MōVI Controller transmitter and receiver contain radio modules and antennas that are certified for use internationally. The following agency certifications apply:

FCC

Contains FCC ID: OUR-XBEEPRO

CANADA (IC)

Contains Model XBee-PRO Radio, IC: 4214A-XBEEPRO

EUROPE (ETSI)

Radio module conforms to CE requirements.

Restrictions: When operating in Europe, XBee-PRO 802.15.4 modules must operate at or below a transmit power output level of 10dBm (Power Level 0).

JAPAN

ID: 005NYCA0378

Restrictions: Maximum transmit power output level of 10dBm (Power Level 0).

WEDGE

WEDGE LENS CONTROL SYSTEM

The Wedge is the perfect lens control system for use with MōVI.

Top Features

1. Designed for MōVI and ALTA.
2. The smallest and lightest 3 axis standard lens controller available.
3. 3 Axis lens mapping for physical unit display of focal distance, aperture and focal length.
4. Compatible with the majority of industry standard lens motors.
5. Full remote control and configuration.
6. Integrated MōVI top rail universal mount.
7. Manual and automatic calibration with torque sensing.
8. Configurable sub-range limits, dampening, speed, torque and focus scale stretching.
9. High powered radio for long range.
10. Camera control for most common cameras including Lanc and Sony Multiterminal.
11. Highly expandable architecture.

GENERAL OPERATION

The Wedge controls three industry standard lens motors, (one each for Focus, Iris and Zoom) and control of Run/Stop and other camera features remotely using the MōVI Controller. All configuration and control other than radio channel setting and binding is remotely controlled.

STATUS LED

Cycles through color combination on startup. During normal operation, it displays the same colors as the MōVI Receiver.

CONTROLLER RADIO CONNECTION (BINDING)

The Wedge connects to the MōVI Controller using the same process as described in the "BINDING TO A NEW MōVI CONTROLLER RECEIVER" section of this manual.



MENU STRUCTURE

The Wedge is controlled and configured by several dedicated MoVI Controller Screens described below. Primary navigation and control is achieved by scrolling and pressing the MENU and SET buttons.

FIZ MAIN

This is the typical "Home" screen for FIZ multi-axis operations. It shows the positions of all axes and provides access to the majority of common control commands.



FIZ (FOCUS, IRIS, ZOOM) MAIN SCREEN WITH PERCENTAGE SCALES



SCREEN WITH 3 AXIS LENS MAPPING ACTIVE

- **Positions of Each Axis:** Displayed in Percent or, when a Lens Map is selected, physical units. Units are changeable on the FIZ Config. Screen.
- **Z-Spd:** Zoom speed scaling.
- **CAM (Camera Status):** STBY/REC. This is the status of the output for simple output type run stop camera interfaces, (RED EPIC, RED ONE, ARRI RS) or status from the camera for serial interfaces (LANC, Sony MT, etc).
- **Limits:** Allows setup of motor range limiting. Move the motor to the position you would like the first limit to be set. Highlight the limits field. Press the SET button and keep it pressed. Move the knob to the second limit. Release the SET button. The entire range of the control knob will now cause motor motion in the limited range. Momentarily press and release the button again to turn off the limits.
- **Lock:** With this field selected, pressing the SET button locks the position so that knob movement doesn't move the motor. Press the SET button again to unlock.
- **CAL:** With this field selected, pressing the SET button requests an auto calibration to be performed on each axis.
- **RESET:** Clears Faults on any faulted axes. Axis reset to the un-calibrated state.
- **Lens:** The focal length of the currently selected lens.



FIZ AXIS DETAIL

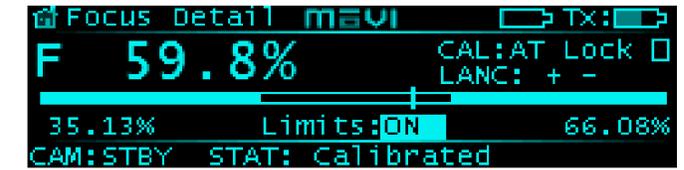
This screen shows detailed information for a single axis at a time. Each Axis can be viewed using this screen.



FOCUS DETAIL SCREEN,
AUTO-CALIBRATION TORQUE SENSING



FOCUS DETAIL SCREEN,
AUTO-CALIBRATION FINDING LIMIT 1



FOCUS DETAIL SCREEN,
AUTO-CALIBRATION FINDING LIMIT 1

- **F/I/Z Letter:** Highlight this field and scroll the SET button to change the axis for which you want to view the details for.
- **CAM:** (Camera Status) STBY/REC. This is the status of the output for simple output type run stop camera interfaces, (RED EPIC, RED ONE, ARRI RS) or status from the camera for serial interfaces (LANC, Sony MT, etc).
- **Position:** Units are changeable on the FIZ General Cfg Screen. A lens must be selected for real units to be displayed. The position is also indicated by the bar scale.
- **CAL:** Scrolling the SET button selects AUTO (AT) or MANUAL (MN) calibration mode. Pressing the SET button begins calibration. See the "How To" sections for calibration sequences.
- **Lock:** First press locks position movement on the axis. Second press unlocks.
- **LANC +/-:** Pressing the SET button on these Icons commands movement of the lens axis when connected to supported cameras/lenses via LANC connection to camera. Scrolling the SET button while either + or - is highlighted moves the axis one increment.
- **Limits:** Same as above. Also, the minimum and maximum range selected will be displayed under the progress bar in the selected axis units, and the bar is filled in where the range limits are.
- **STAT:** Shows which state the selected axis is currently in. Typically this is used to view the steps the axis is in during homing. The following are the states:
 - **Uncalibrated**
 - **Moving to Command Position**
 - **Calibrated**
 - **Auto Cal Sensing Torque**
 - **Auto Cal Finding Limit 1**
 - **Auto Cal Finding Limit 1**
 - **Manual Cal Set Min Limit**
 - **Manual Cal Set Max Limit**
 - **Faulted**

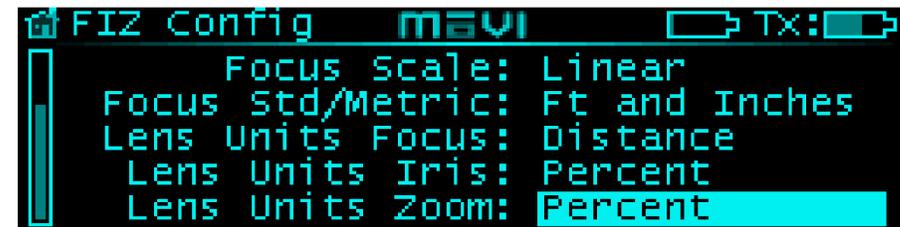


FIZ CONFIG

This screen is used for general configuration of the Wedge. It contains settings that are axis-specific but not common to all axes, and other non-axis related settings.



WEDGE CONFIGURATION SCREEN 1



WEDGE CONFIGURATION SCREEN 2

SETTINGS ACTION	Scrolling SET allows selection of Load Defaults/Load Saved/Save. Pressing SET performs the requested option. This only affects settings that are persistent and not state dependent. The units and scaling are not persistent.
CAMERA TYPE	This selects the type of camera that the FIZ is connected to. Note that the proper cable must be used to control the camera, and this setting must be set correctly.
FOCUS SCALE	Linear/Stretched. Setting this to Stretched causes more of the focus knob travel to be used in the longer focal distance range where the scale gets compressed. This allows greater fidelity of focal point as the focal distance grows.
FOCUS STD/METRIC UNIT	Selects between Feet/Inch or Meters to be used for focus distance measurements when the selected units for the focus axis is Distance.
LENS UNIT FOCUS (PERCENT/DISTANCE)	Setting this to distance shows the Focus position in physical units or percent. A lens must be selected to show physical units.
LENS UNITS IRIS (PERCENT/FSTOP)	Setting this to distance shows the Focus position in physical units or percent. A lens must be selected to show physical units.
LENS UNITS ZOOM (PERCENT/FOCAL LENGTH)	Setting this to Focal Length shows the Zoom position in physical units or percent. A lens must be selected to show physical units.



FIZ AXIS CFG

This screen allows configuration of axis specific settings that are present on each axis, but allows setting them independently. The Axis is selected using the 1st field. The rest of the settings then reflect the setting of the selected axis.



FIZ CONFIG MENU 1



FIZ CONFIG MENU 2

AXIS SELECT	Scrolling allows selection of Focus/Iris/Zoom.
SETTINGS ACTION	Scrolling SET allows selection of Load Defaults/Load Saved/Save. Pressing SET performs the requested option.
MOTOR MODEL	Sets control loop gains, fault settings and other settings that are specific to the motor. These are relatively small adjustments and motors generally work independent of this setting, but will not be optimized and protected as well.
DAMPENING	Changes the amount of low pass filtering of the input control knob or other interface.
KNOB DIRECTION	Changes the direction that the Knob (or other control interface) is interpreted. It can be used in conjunction with the Motor Direction setting to allow the preferred control interface direction while still ensuring the mapped units are correct. This setting is not persistent.
MOTOR DIRECTION	Normal/Reverse. Changes motor direction. This is especially important when using a mapped lens. If the lens is moving opposite of the physical units displayed on the screen, setting this to reverse will cause the motor to move with the units. This setting is persistent and is stored on the Wedge.
TORQUE LIMIT	Changes the amount of maximum current allowed. Note that these are relative current settings, and may be different between motors.
SPEED (SLEW RATE) LIMIT	This changes the maximum speed that the motor can reach. It provides a way to smoothly limit the motor speed if needed to ensure smooth operation and limited stress on the lens.
CONTROL INPUT (FOCUS/IRIS/ZOOM)	This allows changing the control input setting fo each axis to be changed. The following are the traditional inputs. Focus: Large Knob Iris: Small Knob Zoom: Rocker Swith
	Focus: Large Knob
	Iris: Small Knob
	Zoom: Rocker Switch



LENS MAPPING

The MōVI Controller has the ability to save a set of information about lenses that allows a lenses actual physical units to be displayed instead of a simple percentage of travel. This is called lens mapping, as it requires the user to save a set of lens position points along the travel of each axis. These position points are used by sophisticated curve fitting functions to accurately calculate the lenses' values in between, by interpolating these points anywhere in the lenses axis travel ranges.

SELECTABLE UNITS FOR EACH AXIS	
FOCUS	Percentage of Travel
	Focal Distance (Ft. + Inches or Meters)
IRIS	Percentage of Travel
	Aperture (F/T Stops)
ZOOM	Percentage of Travel
	Focal Length (mm)



LENS MAP FILE

Lens files contain data that is used to identify and map the lens. The files are stored in a folder-like organization consisting of:

/ Manufacturer / Model Name / Serial Number

The following is the data contained in each file:

- **Manufacturer:** Selectable from list of common manufacturers. "Other" can be used for those that are not in the list.
- **Model Name:** Selectable from a list of common lens models for each manufacturer. "Other" can be used for those that are not in the list.
- **Serial Number:** Up to 8 digit user-enterable serial number/unique ID.
- **Focal Length (FL):** Focal Length or focal length range of lens in mm.
- **Axes:** Selects which lens axes are mapped.
- **Focus Map Points:**
 - **Infinity Mark (Qty 1):** Point that approximates infinite Focus.
 - **Close Focus (Qty 1):** The shortest distance that is marked on the lens.
 - **Mapping Points (Qty 1 to 9):** Rocker Switch
- **Iris Map Points:**
 - **Maximum Aperture (Qty 1):** This is the smallest F Number marked on the lens.
 - **Minimum Aperture (Qty 1):** This is the largest F Number marked on the lens.
 - **Mapping Points (Qty 1 to 8):** Intermediate F Numbers between the smallest and largest.
- **Zoom Map Points:**
 - **Short Focal Length (Qty 1):** This is the shortest Focal Length marked on the lens.
 - **Long Focal Length (Qty 1):** This is the longest Focal Length marked on the lens.
 - **Mapping Points (Qty 1 to 8):** Intermediate Focal Length positions along the zoom scale.



LENS MAPPING SCREEN HIERARCHY

The following is the typical progression through the Lens Mapping Screens while adding a lens with F, I, and Z axes.

Lens Library Main ->

Mfg Select ->

Name Select ->

Lens Select/Add/Delete ->

Serial Number Entry ->

Axes Select ->

Focal Length Entry ->

Map Focus Infinity Point ->

Map Focus Closest Point ->

Map Additional Focus Points ->

Map Iris Maximum Aperture Value ->

Map Iris Minimum Aperture Value ->

Map Iris Additional Aperture Values ->

Map Zoom Maximum Zoom Value ->

Map Zoom Minimum Focal Length ->

Map Zoom Additional Focal Lengths ->



LENS LIBRARY MAIN SCREEN

This is the entry point into the Lens Editor and Selection Displays. It also shows the currently selected lens information.

Options	Current Lens	Axes
Select/Add	Mfg: Cooke	F <input checked="" type="checkbox"/>
	Type: S4	I <input checked="" type="checkbox"/>
	Ser#: 1	Z <input checked="" type="checkbox"/>
	F L: 100-150 mm	

- **Select/Add:** Allows adding or deleting a lens for use.
- **Current Lens:**
 - **Mfg:** Manufacturer
 - **Type:** Model name of the lens
 - **Ser# (Serial Number):** Can be used to store a unique identifier that allows the user to identify the lens.
 - **Axes:** This shows which axes are mapped in the selected lens file. Lenses do not need to have all axes mapped, even if they physically have them. This can be any combination of focus, iris and/or zoom.
 - **F L (Focal Length):** This is the Focal Length for prime lenses, or Focal Length Range for zoom lenses.



LENS MANUFACTURER SELECTION

Used for navigating lens folders. Numbers in parenthesis are the number of lens files present under that folder.



LENS NAME SELECTION

This allows the user to select the Model Name of the Lens. Numbers in parenthesis are the number of lens files present under that folder.



LENS SELECT/ADD/DELETE

Displays the saved Lens file of the specified manufacturer and model. Lenses can be added by selecting the "Add New" field. Lens files can be selected or deleted by highlighting the "Action" field of the desired lens and scrolling the SET button to "Select" or "Delete". The action can then be performed by pressing the SET button with the desired action selected. There is a warning screen that appears upon a Delete request to confirm the command.





SERIAL NUMBER ENTRY

This is the first screen used to enter Lens file data. Enter the serial number for the lens. Can be used to store any unique numeric identifier that allows the user to identify the lens.



AXES SELECT

Select the axes of the lens to enable mapping. If a specific axis is checked, that means that it is active.



FOCAL LENGTH ENTRY

Focal length entry for the lens in mm. A range is shown for zoom lenses while a single value is shown for primes. It is important to enter the actual focal length, as this is used in the focal distance calculations.



FOCUS MAPPING POINTS

These Screens are used to map the focus axis points. The Infinity, and close focus points must be added while the others are optional. The Controller suggests common mapping points that are typically marked on Cinema prime lenses of the selected focal length, however, these can be adjusted if necessary, and should certainly be adjusted if they are not marked on the lens. You will get the best mapping accuracy if you use all of the marked points if possible. After entering the close focus point, the values should increase towards the last marked point before infinity, which should be last mapped point.

The order they are added in is:

1. **Infinity:** This typically marked as the ∞ symbol on the lens.



2. **Close Focus:** This is the closest marked distance on the lens.



3. **Intermediate Focus points:** Recommended based on the focal length of the lens, and marks commonly found on cinema prime lenses of that length.



4. **Finish Early:** The "Finish" option should be used if there are no more marked positions on the lens and there are still points left.





IRIS MAPPING POINTS

These Screens are used to map the iris axis travel.

1. Iris Maximum Aperture (Low F-Stop)



```
< Lens Edit MAVI TX:
Iris Calibration Point 1 of 10:
Move the lens to a Known Aperature
Value, enter this value below
and press Next to continue
  2.00 F      Next
```

2. Intermediate Aperture Points



```
< Lens Edit MAVI TX:
Iris Calibration Point 5 of 10:
Move the lens to a Known Aperature
Value, enter this value below
and press Next to continue
  4.00 F      Next Finish
```

3. Iris Minimum Aperture (High F-Stop)



```
< Lens Edit MAVI TX:
Iris Calibration Point 10 of 10:
Move the lens to a Known Aperature
Value, enter this value below
and press Next to continue
 22.00 F      Finish
```



ZOOM MAPPING POINTS

These Screens are used to map the Zoom axis travel.

1. Zoom Minimum Focal Length



2. Zoom Intermediate Focal Length



3. Zoom Maximum Focal Length



HOW TO

HOW TO SET UP CAMERA RUN/STOP

1	Navigation: Home -> FIZ Config -> Camera Type (Scroll SET).
2	Settings Action: Save (Scroll SET).
3	Press SET Button.
4	Connect the selected camera connection cable.

HOW TO SET UP YOUR MOTOR TYPE

1	Navigation: Home -> FIZ Axis Cfg -> Motor Model (Scroll SET).
2	Settings Action (Scroll SET to Save).
3	Press SET Button.

AUTOMATIC CALIBRATION OF ALL AXES SIMULTANEOUSLY

1	Navigation: Main -> FIZ Main -> CAL.
2	Press SET Button.
3	Motors will test motion in both directions, then sense hard stops.

AUTOMATIC CALIBRATION OF A SINGLE AXIS

1	Navigation: Main -> FIZ Detail -> CAL: AT (Scroll SET to AT).
2	Press SET Button.
1	Motors will test motion in both directions, then sense hard stops.
2	Status is displayed in the "STAT:" field on the display.



HOW TO MANUALLY CALIBRATE A SINGLE AXIS

1	Navigation: Main -> FIZ Detail -> CAL: MN (Scroll SET to MN)
2	Press SET Button.
3	Use Zoom Rocker to move Motor to limit 1.
4	CAL: MN (Scroll SET to MN)
5	Press SET Button to save limit 1.
6	Use Zoom Rocker to move Motor to limit 2.
7	CAL: MN (Scroll SET to MN)
8	Press SET Button to save limit 2 and finish calibration.

SETTING SUB RANGE LIMITS

1	Move Motor to Limit End Point 1.
2	Navigation: Main -> FIZ Detail -> Limits or Main -> FIZ Main -> Limits
3	Press SET Button to Save Limit End Point 2.
4	Move Motor to Limit End Point 2.
5	Release SET Button to Save Limit End Point 2.
6	Press and Release SET again to clear limits.



HOW TO TUNE AN AXIS	
1	Navigation: Main -> FIZ Axis Cfg -> Damping
2	Set to desired level based on damping smoothness preference.
3	Navigation: Main -> FIZ Axis Cfg -> Torque Limit
4	Set to desired level. The ideal setting is the lowest level that doesn't cause the axis to limit current.
5	Navigation: Main -> FIZ Axis Cfg -> Speed Limit
6	Set to desired level. The ideal setting is where the axis doesn't stop sharply when coming to a stop after moving the knob quickly.
7	Settings Action: Save (Scroll SET)
8	Press SET Button.

HOW TO BIND WEDGE TO MOVI CONTROLLER	
1	Set desired Channel on WEDGE Rotary Channel Switch
2	Navigation: Home -> Radio Config -> Channel (Scroll SET) to match Wedge Channel
3	Navigation: Home -> Radio Config -> Radio Action -> Write (Scroll SET)
4	Press SET Button
5	Press BIND Button on the WEDGE
6	Navigation: Home -> Radio Config -> Radio Action -> Bind (Scroll SET)
7	Press SET Button
8	Wait approximately 20 seconds



CONTROLLER RADIO CONNECTION (BINDING)

The MōVI and Wedge must be bound together to communicate, much like the Receiver for the MoVI. Only that specific MōVI Controller can control that Wedge. However, it is possible to rebind the Wedge to a new MōVI Controller, or bind new Wedges to a single MōVI Controller for working with multiple MōVI systems (note: only one Wedge can be operated at a time with the MōVI controller).

1	Ensure that the MōVI Controller and Wedge are both set to the same channel, or both set to auto-select (Channel 0) (These should match what the MōVI Controller is set to) <ul style="list-style-type: none">• Set the channel in Radio Config::Channel on the MōVI Controller.• Apply changes with Radio Config::Radio Action::Write.• Select the same channel on the Rotary Channel Switch in the Wedge.
2	Select a Device Group. Binding is specific to a Device Group; the Wedge is joining the chosen group. See Radio Config menu description for more info. <ul style="list-style-type: none">• Set the Device Group in Radio Config::Device Group.• Apply changes with Radio Config::Radio Action::Write.
3	Initiate Bind Mode on the Wedge. <ul style="list-style-type: none">• Press and hold the Bind button on the Wedge until the Status LED will be flashing orange quickly to indicate the Bind Mode is active and it is seeking a MōVI Controller with which to bind.
4	Initiate Bind Mode on the MōVI Controller (no need to wait for a slow flashing light). <ul style="list-style-type: none">• Allow the Wedge to bind by starting Bind Mode on the MōVI Controller with Radio Config::Radio Action::Bind.• After a few seconds, the Wedge will indicate successful binding with a solid green Status LED. A solid red Status LED indicates a bind failure.
5	Following a bind, the Wedge will reset. During this time the Status LED will return to flashing green momentarily as the connection starts. After a few seconds, the Wedge will be connected. <ul style="list-style-type: none">• The Wedge Status LED will return to solid green to indicate that it is receiving control data from the MōVI Controller.
6	If the bind process fails, try repeating Steps 1-5. For further troubleshooting steps, refer to the Troubleshooting section.



SPECIFICATIONS

POWER INPUTS
Motors not running: 10.0 VDC - 28.0 VDC 0.1A
Single Motor Stalled Max Peak: 10.0 VDC - 28.0 VDC 3.1A
Single Motor Stalled Max Continuous: 10.0 VDC - 28.0 VDC 2.1A
Three Motors Stalled Max Peak: 10.0 VDC - 28.0 VDC 9.1A
Three Motors Stalled Max Continuous: 10.0 VDC - 28.0 VDC 6.1A
POWER OUTPUTS
CAN Port: Voltage = VBA IN, 5A Max Time Delay Fused
CAM/RS232 Port: 5VDC, 200mA Thermal Resettable Fuse
DIGITAL OUTPUTS
CAM/RS232 Port Pin 5: 200mA Thermal Resettable Fuse
CAM/RS232 Port Pin 6: 25mA Max
RADIO TRANSMITTER
Frequency: 2.410 - 2.465 GHz
Transmitter Power: Power Level 0 (EU): +10dBm, Power Level4: +18 dBm
CAM/RS232 Port Pin 6: 25mA Max
PHYSICAL
Weight: 111 grams (Including Antenna, exluding MōVI Top Rail Mount)
Dimensions: 122mm x 55mm (Including Antenna, exluding MōVI Top Rail Mount)

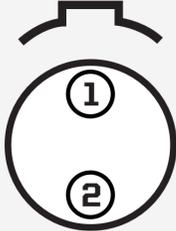


CONNECTORS AND PINOUTS

POWER INPUTS	
LEMO FGG.OB.302.CLAD52 ("JGG" Short Body)	Pin 1 - +VDC IN
	Pin 2 - GND
MOTOR	
LEMO FGG.OB.307.CLAD52 ("JGG" Short Body)	Pin 1 - Motor A
	Pin 2 - Motor B
	Pin 3 - Encoder CH A
	Pin 4 - Encoder +5V
	Pin 5 - Encoder GND
	Pin 6 - Encoder CH B
	Pin 7 - Motor ID Sense
CANBus*	
LEMO FGG.OB.304.CLAD52 ("JGG" Short Body)	Pin 1 - GND
	Pin 2 - CAN L
	Pin 3 - +VDC IN
	Pin 4 - CAN H
CAM/RS232	
LEMO FGG.OB.304.CLAD52 ("JGG" Short Body)	Pin 1 - GND
	Pin 2 - +5VDC
	Pin 3 - RS232 TXD
	Pin 4 - RS232 RXD
	Pin 5 - LANC SIGNAL / GPIO PULL DOWN OUT
	Pin 6 - +3.3VDC GPIO OUT

* For Future Expansion

LEMO CONNECTORS AND PINOUTS

Power Connector		
<p>LEMO 2-Pin FGG.OB.302.CLAD52</p>	 <p>(LOOKING INTO ALL RECEPTACLES ON THE WEDGE)</p>	<p>1 - +VDC IN 2 - GND</p>
Motor Connectors		
<p>Motor Connector FHG.1B.307.CLAD52 Wedge Connector FGG.OB.307.CLAD52</p>	 <p>MOTOR WEDGE</p>	<p>1 - Motor A 2 - Motor B 3 - Encoder CH A 4 - Encoder +5v 5 - Encoder GND 6 - Encoder CH B 7 - Motor ID Sense</p>
CAM / RS232		
<p>LEMO 6-Pin FGG.OB.306.CLAD42</p>		<p>1 - GND 2 - +5vDC 3 - RS232 TxD 4 - RS232 RxD 5 - LANC SIGNAL / GPIO PULL DOWN OUT 6 - +3.3vDC GPIO OUT</p>
CANbus		
<p>LEMO 6-Pin FGG.OB.304.CLAD42</p>		<p>1 - GND 2 - CAN L 3 - +VDC IN 4 - CAN H</p>



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