KINEFINITY

KINEFINITY INC.

MAVO 6K
OPERATION MANUAL

For KineOS 6.2

MAVO 6K BRIEF INTRODUCTION

Kinefinity Inc. has been developing cinema cameras covering optical design to FPGA, circuits and software, with assistance from filmmakers, broadcasting industry and academic schools.

The large format MAVO LF and MAVO S35 cameras are considered to be the flagship cameras by Kinefinity. MAVO, employing a S35 frame CMOS imaging sensor, 6K wide records up to 66fps, with 4K wide up to 100fps, can either shoot ProRes or RAW.

- S35 3:2 CMOS imaging sensor: With KineEnhancer, you will turn MAVO into a full frame camera;

- ProRes: In-camera ProRes recording at any fps, in-camera oversampling 6K to 4K/3K;

- Compressed RAW cDNG: The compression ratio of cDNG can be set to 3:1, 5:1, or 7:1, which is supported by DaVinci Resolve for editing or grading;

- Compressed RAW KRW 2.0: It might be enabled in firmware in 2019;

- High frame rate: Up to 192fps@2K Wide; up to 120fps@3K Wide; up to 100fps@4K Wide;

- 14+ stops with KineLOG3: Preserve highlight and shadow perfectly, provide maximum room for post;

- Custom LUT: Support third-party 3D LUT from shooting to post;

- 2.5-inch 7mm professional KineMAG SSD as Record Media, compatible with consumer-type SSD;

- KineMOUNT (Interchangeable mounting system) supports PL/EF/Sony E Mount and even EF/PL Mount with e-ND;

- Multiple monitoring outputs: Video port x2 and HD output x1 on the body; 3G SDI output X2 through KineBACK-W.

MAVO is also with a very compact and modular body, sharing most of the accessories with TERRA, suitable for both one-man job and film crew. ProRes codec enables fluent post workflow. With professional ports, MAVO is a powerful cinema camera that offers amazing footages while supporting an effective post workflow.

SAFETY TIPS

Please read all contents of the manual carefully:

- Pay attention to the **CAUTION** and **NOTE**;
- Do not use the camera near water in case of water droplets that can splash on the camera body;
- Do not expose the camera to severe vibrations;
- Do not use camera under direct sunlight; operating temperature should be from 0 ℃ to 40℃ ;
- Do not use the camera near strong magnetic field, pretty dust, high humidity or lighting storm places;
- Avoid condensation during transportation or transitions;
- Do not block the vent, or it will cause overheating that will damage the camera;
- Do not expose the LCD/OLED screen to harsh direct sunlight, and do not squeeze or hit the monitor in case of any damage to the screen;
- Only use accessories recommended by Kinefinity.

While using the camera, please:

- Turn off the camera when you try to attach or detach a Lens Mount, KineBACK-W or HDMI monitor;
- Avoid touching the OLPF when attaching or detaching an adapter, as the optical element is fragile. MAVO delivered after May 2018 is with an upgraded design, and OLPF can be changed by customers;
- The EF mounting adapter is a lever-locking (cine-type) EF mount. When mounting a lens to the camera, the position of red dot in the mount is DIFFERENT from a DSLR camera. Secondly, it is a LOCKING RING rotation, NOT a lens rotation. Make sure the EF lens is aligned pogo-pin contact inside of EF mount, now you can firmly lock the lens in place by rotating the locking ring on the lens mount (the arrow on the mount suggests which direction);
- Hold the lens while detaching it from the lens mount, to prevent from accident.
- We strongly recommend inserting or removing the SSD only after camera is powered down. If you like to hotswap, you must Deactivate the SSD at first (SSD section in UI shows SSD: Ins), and then push up the SSD latch to get the SSD out.
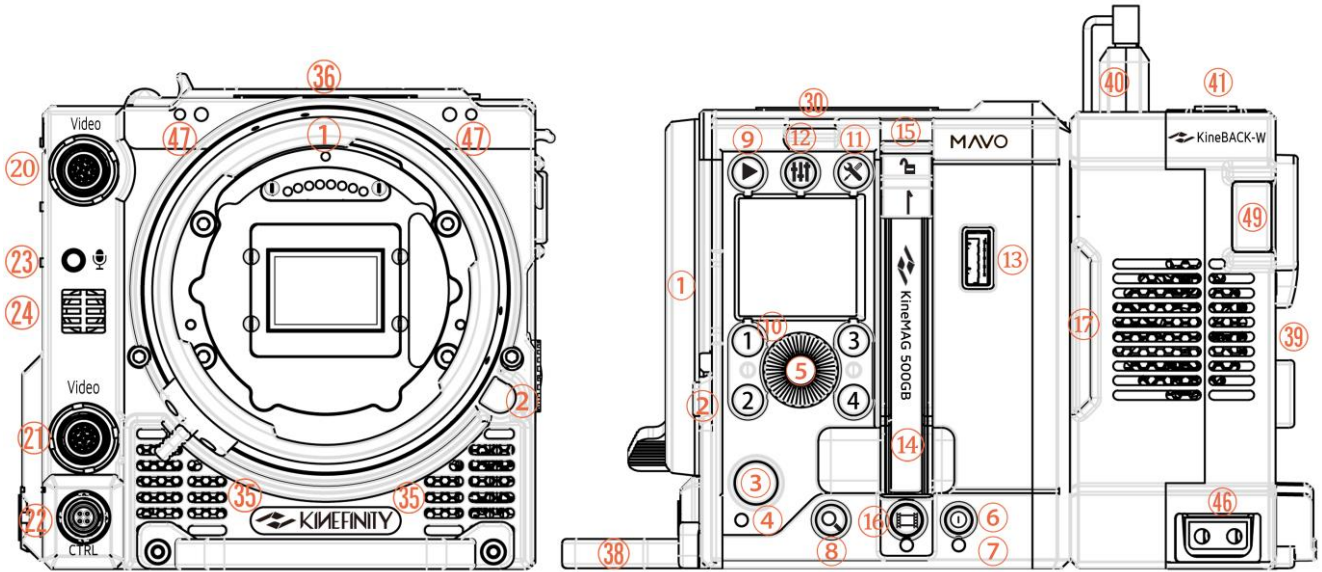
CONTENTS

1. OVERVIEW

1.1 Interfaces and Buttons

MAVO features a native KineMOUNT, which works together with Mounting Adapters to adapt different lenses. Only the lenses that are tailored for KineMOUNT can be mounted directly.

Front View (KineMOUNT)   Left View of Body with KineBACK-W (KineMOUNT)

#	Name	#	Name	#	Name
1	KineMOUNT	7	Power Status LED	13	USB Port
2	KineMOUNT Release Button	8	Zoom Button	14	SSD Slot
3	REC Button	9	Playback Button	15	SSD Latch
4	Tally LED	10	Shortcut Button 1~4	16	SSD Button
5	Wheel	11	Configuration / Play Button	17	Air Intake (Rear)
6	Power Button	12	Audio Button	18	KineBACK-W Port

More details about the professional ports on KineBACK-W is introduced in the buttons review.

CAUTION Do not cover the air intakes at both front and rear of the body as well as the air vents at top and right side of the body.

CAUTION Camera has a new quick release port on the back, please be careful when installing/removing the KineBACK to/from the camera body.

Back View   Right View of Body with KineBACK-W (KineMOUNT)
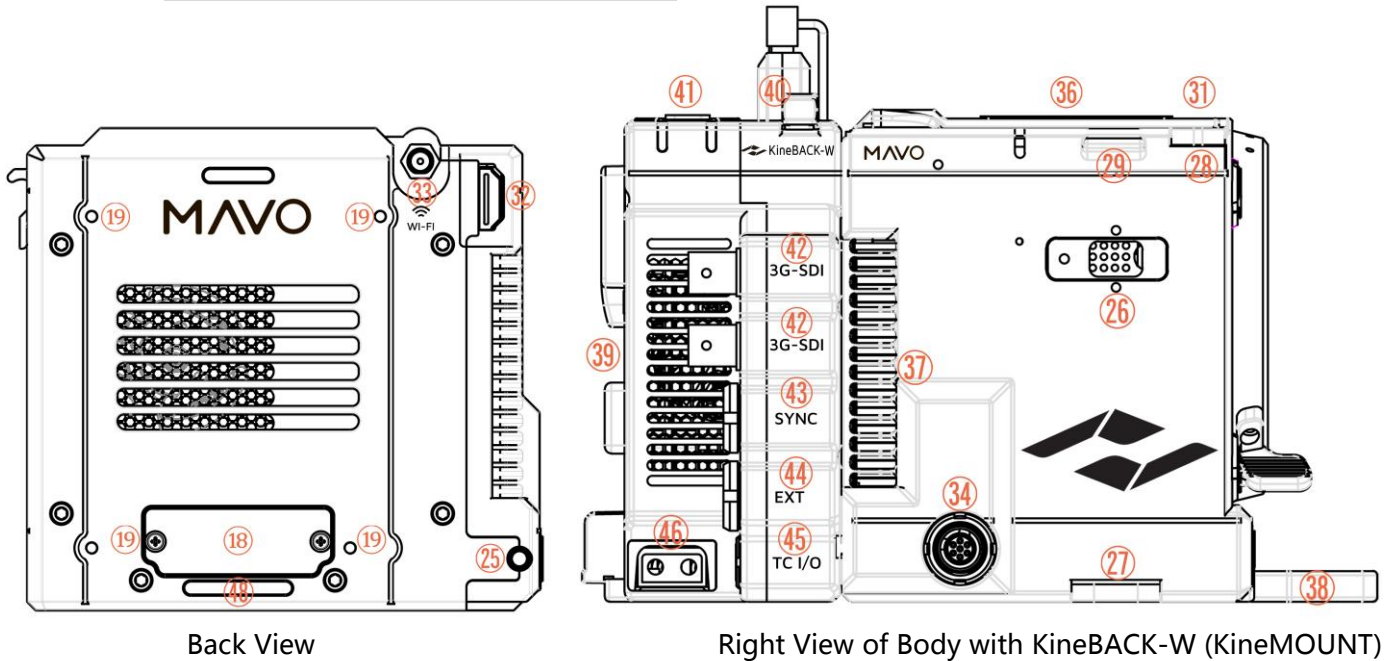
#	Name	#	Name	#	Name
19	KineBACK-W Screw Holes (M3)	31	Optical Mark (M2.5)	41	Audio XLR Port x2 (KineBACK-W)
20/21	Video Port	32	HD Type-A port	42	3G-SDI Port x2 (KineBACK-W)
22	CTRL Port	33	WIFI Antenna Port	43	SYNC Port (KineBACK-W)
23	3.5mm MIC Port	34	DC Input	44	EXT Port (KineBACK-W)
24	In-camera MIC	35	Air Intake (Front)	45	TC Port (KineBACK-W)
25	3.5mm Headphone Jack	36/37	Side Air Vent	46	D-Tap Power Output x2 (KineBACK-W)
26	SideGrip Port	38	Front Support (Detachable)	47	KineMON Screw Holes (M3)
27/28	SideGrip Screw Holes (M2.5)	39	V-mount Battery Plate (KineBACK-W)	48	KineBACK-W Positioning Hole
29/30	Shoulder Strap Hole	40	DT Wireless Card Slot	49	Battery Release Button (KineBACK-W)

For the definition of ports, please refer to 5.2 Connectors. SYNC and Video prots are proprietary.

1.2 Functions of Buttons

Under Liveview Mode, set the parameters by shortcut button [1-4] and the [Wheel]; under Playback Mode, select and switch between clips by shortcut button [1-4].

| Operation	Function	Note
Rotate the Wheel	Iris Control/Select	Only for Lenses in White List
Cental Button	Switch Displays	Display with core parameters -> Display with Waveform , or Confirm
Button 2 Once	ISO/EI	Set ISO/EI Value
Button 3 Once	ND	Set ND (only with e-ND adapter)
Button 1 Once	Shutter	Shutter Angle or Speed
Button 4 Once	Color Temp	Set Complete List by menu
Button 2 Twice	FPS	Shooting (Sensor) FPS different from Project FPS
Button 3 Twice	LUT	Choose LUT (with e-ND adapter)
Button 1 Twice	Preset List	Also play footage under Playback or cancel operation
Button 4 Twice	Resolution	Set the resolution under the format
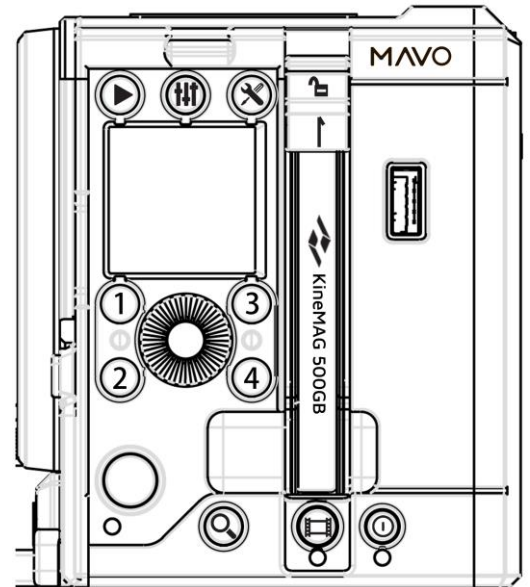
Buttons and wheel on SideGrip are basically the same as on the body, functions:

Button	Function	Note
●	REC	REC; Switch from Playback to Liveview
<	Preset List	Also play footage under Playback or cancel operation
🔍	Zoom	Switch between 1:1/1:2/1:8, or disable the zoom in menu; press for 3 seconds to enter/quit lock mode
▶	Playback Mode	
✕	Configuration Menu	Also play footage under Playback mode
🎚	Volume	Press twice to set audio
🌙	Sleep Mode	Only on SideGrip, low-power standby mode
🎞	SSD Button	Activate, deactivate or format SSD
⏻	Power on/off	Press twice to power off; press for 5 sec + to power off compulsorily
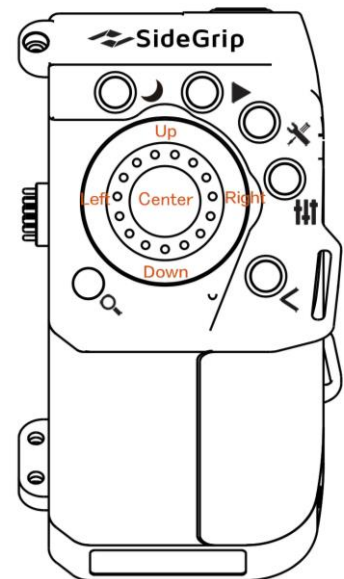
NOTE SSD Button is only on camera body; Sleep Mode Button is only on SideGrip. [Multifuction Wheel→Up] on SideGrip equals [Button 1]; [Multifuction Wheel→Left] to [Button 2]; [Multifuction Wheel→Right] to [Button 3] and [Multifuction Wheel→Down] to [Button 4].

1.3 Interface and Parameters

Once the camera is powered it enters into the Liveview mode right away: parameters of current scene are displayed on the top and bottom. Press [Wheel→Central Button] to show/hide Waveform.

#	Name	#	Name
1	Display Mode: Liveview/Playback/REC	11	Highlight Stops
2	Image Format	12	ND Value (only with e-ND adapter)
3	Record Resolution	13	Clip Name
4	CMOS Imaging Sensor FPS	14	SSD Status/Capacity
5	Shutter Speed/Shutter Angle	15	Record Format/Codec
6	Iris Number (If Applicable)	16	Time Code
7	Monitoring LUT	17	Real-time Power Voltage
8	Color Temperature	18	Real-time Core Temperature
9	ISO/EI Exposure Mode	19	VU meter
10	ISO/EI ASA	20	Waveform

NOTE **CMOS Imaging Sensor FPS** is the actual capturing FPS of the sensor, set by shortcut button [2] and [Wheel]; Project FPS is the playback FPS of the footage in post work, set by [Configuration].

NOTE **EF Iris control** is only for lenses in the White list; other lenses might not be recognized or controlled.

1.4 Default Settings

The list below features the default setting of MAVO:

Type	Name	Default	Type	Name	Default
Shooting	Image Format	S35	Settings	SSD System Format	HFS
	Resolution	6K 6016*3172		Time Code	Free Run
	Sensor FPS	25fps		ND set	0.03
	Project FPS	25fps		WIFI Power	ON
	Shutter	1/50s		Threshold Voltage	13.3V
	ISO	ISO 800		Language	English
	Highlight Stops	4.3		Start Display	Brief
	Color Temperature	5600K Daylight		Fan Speed	40%
	LUT	KC_NEUTM		Fan Stop	Never
	Codec	ProRes 422HQ		Clip End	Loop
	Active Mount	Enhanced	SYNC	Tally Lamp	ON
	Project Blanking	None		Beeper	ON
Liveview	Video Output FPS	60P	Audio	MIC Level	30dB
	Waveform	LUT		Playback/Monitoring Level	0dB
	Zebra Pattern	90%		KineAudio	OFF
	Color Temperature List	Brief		Phantom 48V	OFF
	Shutter Mode	Time		KineAudio Source	CH1/CH2
	Anamorphic Lens	None		KineAudio Level	30dB

NOTE   When the camera is powered with an e-ND adapter attached, default value will be 0.6 (2 stops).

How to restore to factory settings:

[Configuration→ System→ Factory Reset]

NOTE   When the camera is powered with a USB storage device plugged in before powering, it will automatically revert to factory settings while booting.

2. QUICK GUIDE

2.1 Power Supply

The camera allows different types of power supplies:

DC IN

- **GripBAT 45Wh** (compatible with BP-U30) fits MAVO with SideGrip. Single GripBAT 45Wh is able to power MAVO for 100 mins. SideGrip is connected to the "SideGrip Port" on camera body by three M2.5 screws, which enables a kind of "DSLR" shooting style.

1. DC IN as VDD

2. Ground

- **Supper Compact V battery KineBAT 120Wh** (compatible with V-mount batteries) fits MAVO with KineBACK-W. Single KineBAT 120Wh can power MAVO for more than four hours. KineBACK-W only comes in a V-mount version, and does work with other V-mount batteries. The EXT port of KineBACK-W has one EXT port providing 12V outputs and also two D-TAP ports. For the definition of EXT port, please refer to Chapter 5.2.3.

- Use different power cords to the 2-pin power port of camera body:

  - D-Tap Power Cord: connect the D-Tap plug to the D-Tap socket of battery/battery plate, and connect 2-pin push-pull plug to the 2-pin power socket of camera body;

  - XLR Power Cord: connect the 4-pin standard XLR plug to the XLR socket on storage battery (11~19V), and connect the 2-pin push-pull plug to the 2-pin power port on camera body;

  - Kine AC Power Adapter: connect the adapter to a power bar, and plug 2-pin push-pull plug to the 2-pin power socket of camera body.

CAUTION The input range for MAVO is 11~19V, don't go above or the camera might be burned.

CAUTION Please pay attention to the direction of 2-pin DC IN port on the camera body while pulling/plugging the power cords: please align the red dots.

NOTE A V-mount to Anton-Bauer Plate Adapter is needed if you want to use Anton-Bauer (golden mount) broadcast batteries.

NOTE When two of the three power supplies are available at the same time, MAVO will automatically chooses the source with higher voltage, and allows hot-swap of batteries.

NOTE Since KineOS 6.2, if the voltage detected is too low to continue shooting, the camera will automatically stop recording to avoid damage on the clip. However, for sudden power failure due to accident during the recording of a file, the last clip might be damaged, and please refer to Chapter 2.5 SSD MAG.

2.2 Mount

MAVO is designed with a native KineMOUNT, which needs a Mounting Adapter II to attach a lens to the camera. The available adapters include EF Mounting Adapter II, EF Mounting Adapter II with KineEnhancer, EF Mounting Adapter II with e-ND, PL Mounting Adapter II, PL Mounting Adapter II with e-ND, and also SONY E Mounting Adapter.

There are only three steps to install a "Lens Mouting Adapter II" to the KineMOUNT, we take EF adapter as an example, turn off the camera and then:

1. **Release**: keep pressing the KineMOUNT Release Button and rotate the locking ring of the KineMOUNT counter-clockwise → then take off the KineMOUNT cover;
2. **Install**: there is a positioning slot above the electronic contacts of the KineMOUNT, please align the arcuate protrusion on the adapter with the locating slot of KineMOUNT when attaching the mounting adapter to the camera;
3. **Lock**: rotate the locking ring of KineMOUNT clockwise to fasten the adapter to KineMOUNT firmly.

Power on MAVO after mounting the adapter. Press [Configuration] and check the bottom of this menu, if it presents EF sys 9(or other number), it means you have mounted the adapter successfully.

CAUTION	Power off camera when swapping different adapters, else camera or adapters may get burned.
CAUTION	As the FFD of KineMOUNT is very short, please don't try to attach any lens directly to KineMOUNT, or it will cause permanent damage to CMOS imaging sensor and OLPF, except lenses tailored for KineMOUNT.
NOTE	MAVO's New KineMOUNT only works with Mounting Adapter II.
NOTE	When install the EF Mounting Adapter II with KineEnhancer or e-ND, please don't touch the optical glass. Any damage caused to the glass is irreversible, and the glass has to be replaced.
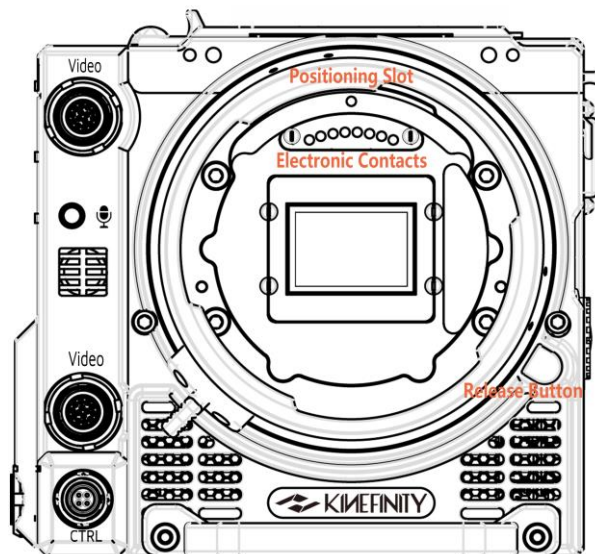
2.3 Lens

No matter if you attaching a DSLR still lens or PL cine lens, MAVO employs a lever-locking (Cine-style) mounting system, rather than a DSLR camera mount.

Steps to attach EF lenses

1. **Release**: Rotate the locking ring of the EF mount clockwise, take off the cover and lens cover;

2. **Install**: Align the "red dot" on the lens with the "red dot" on the mounting adapter. Make sure that the pin on mount engages with the hole in the mount of the lens. For EF-S lens, align the white square on lens with the one on the mount.

3. **Lock**: Rotate locking ring (NOT lens) counter-clockwise (follow the arrow of "lock sign" on mount) until it is fastened firmly.

CAUTION The mounting adapter might be burned if a lens/adapter with all-metal rear end is attached directly to the camera body. In this case, please keep electronic iris control off: [Configuration→Settings→ Active Mount→Disable].

NOTE The following mount lenses with electronic contacts: **Sigma18-35 T2.0** and **Canon18-80 T4.0**, may show iris value on UI, but please do not change the value by the Wheel, or it will cause the malfunction of the camera or the lens, we strongly recommend turning off the electronic iris control. [Configuration→Settings→ Active Mount→Disable].

KineEnhancer

MAVO 6K can use adapters with KineEnhancer that virtually change the S35 1.5 crop factor into a full frame.(with shallower depth of field, and even one more stop of light)

NOTE EF-S lens can NOT be used on the KineEnhancer as it has a longer rear end than a EF lens and will touch and damage the optical glass. Lenses that need to move the rear element for focusing can NOT be used on KineEnhancer as well.
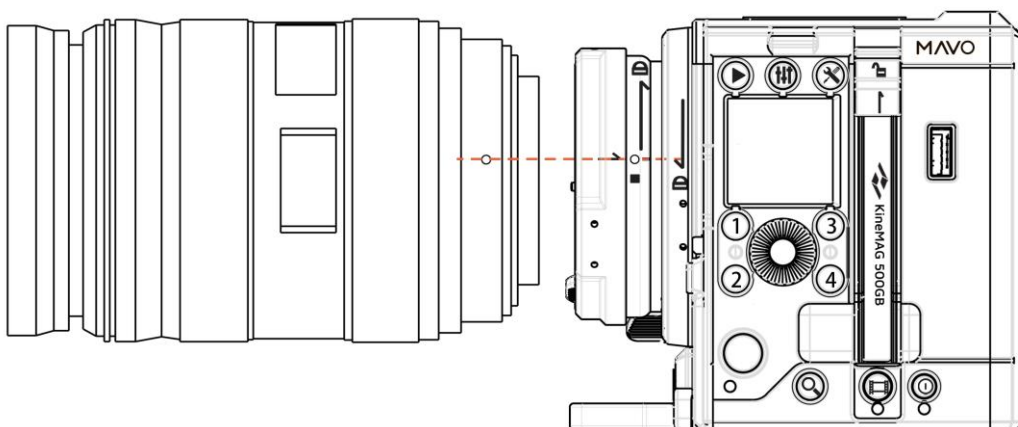
2.4 Monitoring

Please choose a recommended EVF or Field Monitor with Video, 3G-SDI (Not HD-SDI) or HD digital input, and connect the input port of EVF or monitor to output port of the camera body with a high quality cable. Suggestions for monitoring:

- KineMON 5″ Full-HD Monitor: with the Kine Video Cord our monitor gets both power supply and video signal through the same cable. There are many appropriate accessories available to firmly mount the monitor according different needs.
- SmallHD Monitors 500 series and 700 series: can be connected to the HD Type-A port and two 3G-SDI ports on the KineBACK-W.
- FSI broadcasting/cine monitor or other monitor with 3G-SDI port as director monitor or DIT monitor.

For the current firmware, HD Type-A port is only for video monitoring, but SDI port also supports audio signal: output audio during the playback of files.

CAUTION   Connect the monitors to the camera by HD video cable or SDI cable (75Ω) before they are turned on, and please also pay attention to the direction of the D-TAP cord.

NOTE   Please choose the LP-E6 Battery Coupler (7.4V) when using the 3rd-party monitors.

NOTE   MAVO video output is only for monitoring, not recording. The monitoring FPS is different from CMOS imaging sensor FPS; therefore, the external recorder cannot get the clips with the same FPS and resolution as CMOS imaging sensor.

Functions of Buttons on KineMON

- PEAK: peaking focus, show the red line peaking as an overlay on a black-and-white image;
- CLIP: marks clip exposure, show the overexposure and underexposure area;
- False: marks false color exposure: overexposure/underexposure areas and the area between;
- Wheel: press the wheel to trigger backlight setting, and rotate the wheel to set the level of backlight.

NOTE   Turn off the KineMON to save the power for longer duration.
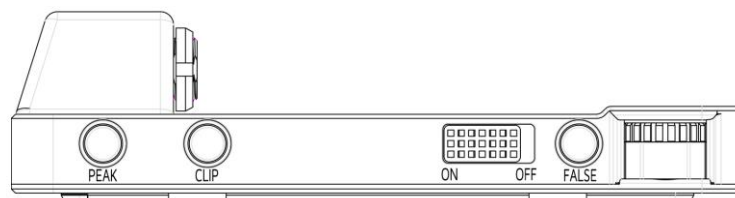
2.5 Record Media Mag

Please insert the KineMAG 500G/1T SSD or other 2.5" 7mm SSD to SSD slot before powering the camera. The SSD slot has a secure latch: push the latch **upwards** before inserting or pulling out the KineMAG. The button under the slot controls the operation of the SSD, and the LED indicator beneath the button shows the status of the SSD.

Check the SSD status on the monitoring screens:

- Blinking red [No SSD]: the SSD indicator is off, which means that there is no SSD in the slot, you can not shoot. Insert the SSD into the slot and reboot the camera;
- Blinking yellow [SSD: Ins]: the SSD indicator is red now, which means that there is a SSD detected but hasn't been activated, you still can't shoot under this status. You need to:
  - Activate the SSD: press [SSD] button, and choose [SSD Maintenance → Activate] or twice-quick press on SSD button; if the SSD has been formatted into HFS or NTFS, it will be activated successfully showing SSD capacity and green [SSD: Act].
  - Rebuild SSD: if fail to activate SSD, please rebuild it in camera. Press [SSD] button, choose [SSD Maintenance → Rebuild]. Then activate SSD, SSD status displays green [SSD: Act].
- Green [SSD: Act] with SSD available capacity and total capacity: SSD indicator is Green which means the SSD is ready for shooting and the clips will be recorded onto it.

Please make sure that the SSD is deactivated before taken out: press SSD button, [SSD Maintenance → Deactivate] or press the SSD button twice, SSD status turns into [SSD: Ins], then push the latch upwards and pull out the SSD.

CAUTION	Data can't be recovered after the SSD rebuilt/formatted; please backup all data before formatting.
CAUTION	Due to the protrusion on case of Samsung 860 Pro, the door of SSD slot may be damaged when taking this SSD from the slot.
NOTE	Please insert the SSD before the camera is powered on, or the SSD will not be detected.
NOTE	We only recommend KineMAG. Performance of 3rd-party on data spec are not guaranteed. No technical support or help on recording issues such as frame drop or data loss for 3rd-party SSD. In addition, some 3rd-party SSD may damage the blade of SSD slot, such as Samsung 860 PRO.
NOTE	Please prepare backup SSD cards in case of emergency on the set.
NOTE	If it shows red "Flush" during recording, please try a KineMAG. If the issue still exists, please contact us by email: sales@kinefinty.com or your local dealer.

SSD File System Formats: NTFS & HFS

MAVO supports both NTFS and HFS format for SSD. The default format is HFS, but for Windows platform, you can set it to format in NTFS by:

[Configuration→Settings→SSD File System] choose NTFS

Then reboot the camera and rebuild the SSD in camera, the file system of the SSD will be NTFS.

NOTE   For Mac platform, you can still use NTFS: since MacOS 10.12 Sierra, MacOS can access NTFS files. Do not write data or format SSD on Mac or Windows.

NOTE   Rebuild/format the SSD in camera ONLY.

NOTE   When the file system format of the camera is set to NTFS, the SSD of HFS can not be activated in the camera. Here are two solutions for such situation: change the format of the camera into HFS and then reboot to take effect; or back up your SSD on a computer, and then rebuild/format the SSD in camera as NTFS. MAKE SURE to backup your clips before you format SSD.

NOTE   If there is power failure accident while recording, the NTFS SSD may not be activated when the camera is powered on again. Please back up your clips and then rebuild the SSD, or you have to use another SSD to continue the shoot. While HFS SSD can be activiated after powering the camera, but the last clip may need to be recovered by special software in Windows.

NOTE   To recover the cDNG/ProRes clip damaged by power failure, please refer to Chapter 4.13.

2.6 Audio

There are three audio recording methods:

- In-camera MIC: record audio by using the in-camera MIC even if there is no KineAudio or 3.5mm MIC;
- 3.5mm Plug-in-power port: suited for 3.5mm MIC;
- KineAudio dual XLR ports with Phantom 48V: KineAudio is a high quality pre-amp audio module with Phantom 48V, and it is integrated into KineBACK-W. Also it has dual industry-standard XLR ports for professional condenser microphones. KineAudio CH1 and CH2 channel can be set independently since KineOS 6.112.

If the camera has no KineBACK-W or KineAudio is disabled, audio is recorded by 3.5mm MIC if a microphone is connected to the 3.5mm port; if no microphone is connected, audio will be recorded by the in-camera MIC.

NOTE　The audio will be packed into mov file only when the project FPS is the same as sensor FPS, or it will be recorded into a separate mov file. For example, if the project FPS is 25.000, when the sensor FPS is set to 30.000, it will show yellow 30.000 on the UI.

If a microphone needs Phantom 48V, you need to set the KineAudio: press the Audio button twice

[Audio Button→Audio Management→] [KineAudio: ON] and [Phantom 48V: ON]

Three modes for audio tracks:

- Two audio tracks as CH1: recorded two tracks as CH1;
- Two audio tracks as CH2: recorded two tracks as CH2;
- Stereo: recorded two tracks as CH1 (Default: left track) and CH2 (Default: right track) separately.

Generally, the camera audio can be set as one input if just using one MIC.

CAUTION　When using microphones that don't need, please turn off the Phantom 48V.

2.7 Playback

While in Liveview mode, press [Playback] button and enter into Playback mode, and [Preset List] button and [Configuration] button act as Play/Pause button. Playback of the current clip is looped by default. Press shortcut button [2] to the previous clip; press shortcut button [4] to the next clip. You can also fast forward or fast reverse by rotating [Wheel]. Please note that the parameters in Playback mode are different from the ones in Liveview mode. Press [REC] button or [Playback] to switch back to Liveview mode.

NOTE　Playback clip of 4K or lower resolution in the camera is fluent, but it may suffer some stutter when playback clip with higher resolution.

2.8 Codec

MAVO has two in-camera recording codecs in current firmware, set the default codec:

[Configuration→Shooting→Default CODEC→ ProRes (.mov) /cDNG(.dng)】]

We recommend shooting ProRes as MAVO supports in-camera ProRes recording at all resolution and fps: 6K/5K/4K/3K/2K even 4K Wide 100fps for 422 format. Besides ProRes422HQ, MAVO also supports ProRes4444XQ, 4444 and keeps all dynamic range of ProRes clips with KineLOG3, while the monitoring LUT will not be burned into the clips.

MAVO can in-camera record compressed RAW as well with cDNG format, and the compression ratio is configurable, from 3:1, 5:1 to 7:1. DaVinci Resolve natively supports cDNG, so that you can directly import, edit and grade the cDNG footage shot by the camera in DaVinci Resolve! No matter what compression ratio 3:1, 5:1 or 7:1, every format is able to achieve super high quality image and room for post-production.

NOTE   No need to reboot the camera when switching between codecs, but the screen will be black with a cross in the center for 3 seconds during the switch.

NOTE   MAVO only supports ProRes4444XQ recording to 4K up to 48fps, ProRes4444 to 6K up to 30fps due to maximum write speed of SATA interface.

Duration Reference

Settings	Duration @KineMAG 500GB	Duration @KineMAG 1TB
2K@25fps ProRes422HQ	5 hours and 30 mins	11 hours
3K@25fps ProRes422HQ	2 hours and 50 mins	5 hours 20 mins
3K@25fps cDNG(7:1)	5 hours 20 mins	11 hours
4K@25fps ProRes422HQ	1 hour 20 mins	2 hours 40 mins
4K@25fps cDNG(7:1)	2 hours and 40 mins	5 hours 20 mins
5K@25fps ProRes422HQ	53 mins	1 hour and 40 mins
5K@25fps cDNG(7:1)	1 hour and 40 mins	2 hours and 40 mins
6K@25fps ProRes422HQ	42 mins	1 hour and 20 mins
6K@25fps cDNG(7:1)	1 hour and 20 mins	2 hours and 40 mins

2.9 Downscale and Crop Mode

In comparison with the discontinued and older TERRA 6K, MAVO 6K doesn't need the HiSpeed mode to be able to record high fps, and the sensor doesn't suffer from noisy images, aliasing and moire.

Oversampling/Downscale

Oversampling/Downscale: recording (output) resolution is less than actual sampling resolution by CMOS imaging sensor, while the image format of recording is the same with the image format of sampling. As all effective area of imaging sensor is used, there is lower noise level and sharper image. Oversampling at S35 is 4K/3K.

For most cases, downscale 4KProRes at S35 is recommended.

NOTE Due to the downscale in-camera process, there is no 4K/3K RAW at S35.

Cropping Mode

Cropping means that the CMOS imaging sensor only utilizes a center part of the image as effective sampling area. Cropping mode boosts frame rate higher than full resolution sampling:

- Output 6K Wide full resolution sampling, up to 66fps;
- Cropping Mode, 3K Wide (M4/3), up to 120fps;
- Cropping Mode, 2K Wide (S16), up to 192fps.

Oversampling + Cropping = infinity combination of resolution, fps and framing. Select Cropping Mode by:

Press shortcut button [1] twice or [Configuration→Shooting→Image Format]

2.10 Access clips on PC/MAC

Access SSD on PC/MAC

To access Clips from SSDs on PC/MAC, a SATA to USB3.0 reader is used to connect SSD to the workstation:

- MAC platform (MacOS Sierra) can access SSD with either NTFS or HFS file format;
- Windows platform can only access SSD with NTFS file format (format must be set as NTFS in camera).

NOTE   Only the reader that supplied by Kinefinity is recommended to access SSD as some 3rd-party reader may not work.

Play Clips on PC/MAC

All dynamic range of KineLOG3 ProRes clips is retained, and monitoring LUT will not be burned into the clips. Therefore, it is LOG clips retain all of their dynamic range and color information While playbacking the footage at an computer use the LUT file that was used inside the camera and the image looks identical to the one while monitoring during the recording.

When using Windows you need to install Quicktime7 to access ProRes mov file, while other DI softwares such as SCRATCH, DaVinci Resolve do not need to install Quicktime7 to work with those files. MAC platform can access or play ProRes files without other software tools.

Clip Folder

Each clip is saved in the SSD. The folder name is nearly the same as the clip name, just no file extension, for example: folder PRJ-0002-003-A2_5D8A (meaning of clip name, see 3.1 Footages and Projects Information) includes:

- PRJ-0002-003-A2_5D8A.mov: is ProRes mov file.
- PRJ-0002-003-A2_5D8A-L.wav and PRJ-0002-003-A2_5D8A-R.wav: are the uncompressed audio files of CH1 and CH2.
- ***.cube and ***.look are the LUT while monitoring, format is cube or look format.
- PRJ-0002-003-A2_5D8A_snapshot.bmp: the snapshot of this clip, resolution 1/2x1/2.
- PRJ-0002-003-A2_5D8A-slate.txt: contains most of the information when shooting the clip, like shutter speed, ISO, highlight, color temp, etc.
- 0.mt: internal camera information when recording.

Please send slate.txt and 0.mt to Kinefinity if clip files show abnormal.

NOTE   If Project FPS is the same with Sensor FPS (shooting FPS), audio is embedded into ProRes mov file, else audio is not embedded into mov file. But the camera always records audio into two wav files at the same time, no matter slow-mo, quick-mo or regular speed.

NOTE　　　When importing mov files into editing software, enter and search *.mov by the dialog box, all mov files will be listed automatically, then press CTRL+A / ⌘+A to select all mov files and drag them inside your NLE.

Post Workflow on cDNG

The camera can in-camera record compressed RAW as cDNG format, and the compression ratio is configurable, from 3:1, 5:1 to 7:1, each is able to achieve super high quality image and room for post-production. DaVinci Resolve natively supports cDNG, so that you can directly import, edit and grade the cDNG footage shot by the camera in DaVinci Resolve! And cDNG is also natively supported by SCRATCH V9.0. The LUT used on site is automatically applied when you import the cDNG clip into SCRATCH, and the audio track is also connected automatically.

For RAW files, they might look different in DI tools. But SCRATCH V9.0 has optimized the process for clips of Kine cameras, it applies the LUT you used automatically to the clip. After disabling the LUT, you will get the right RAW clip embedded with native KineLOG3, which looks the same as the ProRes clip with KineLOG3, and you can add Kine NeutM LUT or other LUT into it. Since DaVinci Resolve doesn't have such optimization for the clips, the color will be quite different when import cDNG file into Resolve. But we can adjust the RAW decoding settings to get the actual RAW clip embedded with KineLOG3.

1. Set RAW Project: open Resolve, then [Project Settings→Camera RAW];

2. Set decoding method: select [RAW Profile→CinemaDNG], and then choose [Decode Using→Project];

3. Set decoding details:

   a) White Balance: choose [Cloudy];

   b) Gamma: select [Linear];

   c) Lift: set to 3.20;

   d) Tint: unboxed, and use the default as 10.00

After the settings are done, you can import cDNG files and get the clip with KineLOG3.

NOTE　　　Compressed RAW is only supported by DaVinci Resolve and SCRATCH, but Adobe and other DI tools don't support cDNG yet.

3. SETTINGS AND ADVANCED OPERATIONS

3.1 Footages and Slate

When starting a new project, please make sure:

- Project FPS: the fps used by playback clips, editing clips or delivery matches up with the project FPS of the camera. For example: 24fps for feature movie, and 25fps for TV (PAL). Project FPS should not be changed after project kicks off;
- Slate information: set clip name, director name, DoP and so forth on to the project, and you can find all the information in slate.txt.
- Codec: choose in-camera ProRes or cDNG RAW;
- Project Blanking: choose from 2.4:1, 2:1, 17:9, 16:9, 4:3 or Instagram ratio 1:1, also 9:16 and 1:2 for smartphone screens. Project Blanking is also applicable for anamorphic shooting.

Codec: choose based on the project, post workflow:

- In-camera ProRes: most of the projects can be recorded in ProRes 422HQ (visually lossless), and in-camera oversampling to 4K/3K ProRes with high image quality, efficient and reliable;
- Compressed RAW cDNG: in-camera record compressed RAW with CinemaDNG format (compression ratio 3:1, 5:1 and 7:1) which is natively supported by DaVinci Resolve.

Set the project information, such as Project Name, DoP Name, Roll Num, Take Num and so on, in [Configuration]

- Set Project FPS: [Configuration→Shooting→Project FPS]
- Set Slate: [Configuration→Shooting→Slate]
- Set Project Blanking: [Configuration→Shooting→Project Blanking]

Use the shortcut button [1~4] to change the information. Everything will be listed on the Slate and the SSD Roll Label, see eg:

Before a new project, we suggest setting Scene Num, Roll Num and Take Num as "1". Then Roll Num of the SSD card will be incremented by 1 each time of shooting after formatted in the camera, convenient for DIT backing-up clips.

NOTE Project Blanking only acts as a reference for monitoring, camera records the full active image.

NOTE For 3D shooting or multi-cam SYNC, please refer to 3.9 3D and SYNC.

Menu Operation

Change Project FPS

[Configuration→Shooting →Project FPS]

Menu Operation

Set Project Information

[Configuration→Shooting →Slate]

Clip Name

PRJ-0002-003-A2-5D8B

- PRJ: Project Name;
- 0002: Scene Num;
- 003: Take Num;
- A: Camera Unit;
- 2: Camera Num;
- 5D8B: random numbers

SSD Roll Label

A002_6D09B6

- A: Camera Unit;
- 002: Roll Num;
- 6D09: First Four Digits of Serial Number;
- B6: Random numbers

3.2 Exposure and White Balance

The color temperature is tuned by directly adjusting RGB channels of sensor to change original RAW data, rather than apply a digital LUT. Although you can modify white balance of RAW data or change color temperature by post processing, all the modifications are based on the data you shoot previously. In order to minimize the distortion in post processing, it is important to gain as accurate color temperature as possible in shooting stage.

3.2.1 Color Temperature List

The camera has two types of color temperature lists for white balance: Simple List and Complete List.

- Simple List: with typical color temperatures such as 2800K, 3200K, 4300K, 5500K, 5600K, 6400K and User WB. Among them, UserWB is user-defined value, which is automatically generated when do the Auto WB manually.

- Complete List: complete color temperatures according to the portfolios of color temperatures (in accordance with the 100K for a step) and lighting types. You can simply choose the one to match with your shooting condition.

To change color temperatures: [Configuration→Liveview→ Color Temperature List]

3.2.2 Auto White Balance

For most cases, the Complete List of color temperature will meet the needs. However, if the color temperatures listed in the built-in lists are not enough to meet complex shooting lighting conditions, use a gray card or white card to do Auto WB to achieve specific color temperature. To do the Auto WB:

1. Put a gray card at front of the camera;
2. You may Zoom to make the gray/white card cover the whole display;
3. Choose: [Configuration→Liveview→ Custom White Balance]

The camera corrects the white balance parameters, and writes the color temperature value to the UserWB. Once the UserWB is set, it can be used anytime later on.

Menu Operation

Change Color Temperature List

[Configuration→Liveview → Color Temperature List]

Maunal Operation

Auto WB

[Configuration→Liveview →Custom White Balance]

3.2.3 Waveforms

Waveforms, zebra and histogram help cinematographers determine the exposure of images. Waveform indicates the brightness of images over the horizontal direction, while histogram shows the statistical information on the brightness of whole image.

The Waveform matches the images by default, and shows the LUT NeutM, too. Waveform will change according to the different LUT. You can also choose to check the waveform without LUT by

<div align="center">[Configuration→Liveview→Waveform]</div>

You can choose different displays for waveforms and:

- LUT: The waveform information displays distribution of RGB, which is based on RAW data after the processing of monitoring LUT loaded.
- LOG: The waveform information display R/G/B three color channels distribution based on the RAW data with KineLOG3.

NOTE   When over 100% on the waveform of LUT, images do not mean overexposure definitely, only over clipping line on the waveform with LOG, images are sure to be overexposed.

Menu Operation

Switch between different

resources

[Configuration→Liveview→

Waveform]

3.2.4 Zebra

Zebra strip is a very straightforward way to show the overexposed area in an image.

For Kine cameras, the zebra calculation is based on RAW data: RAW data is overexposed when the zebra appears. So observe carefully to avoid unintentional over-exposure in most cases, as it is the "dead white" in the post workflow.

Zebra threshold value can be set at different values:

[Configuration→Liveview→Zebra Pattern].

The default threshold value is 90%: it means that it displays zebra when the light exceeds 90% of the maximum range.

Menu Operation

Set Zebra Threshold

[Configuration→

Liveview→Zebra Pattern]

3.2.5 e-ND

E-ND refers to electronic ND (Electronic Neutral Density Filter), it is based on modern liquid crystal materials and optics controlled electronically, which is completely unlike conventional technology such as a rotating filter wheel or polarising ND Filters. It covers a wide range from 0.6 to 3.0 (2 stops to 10 stops), and brings sharp images with color fidelity.

Seamless adjustment brings a very important feature: accurate exposure stop, which is what traditional glass ND filters don't have. You can also set the accuracy to one stop (0.3) for each rotate, but the default set is seamless adjustment by 0.1 stop (0.03).

Menu Operation

Set e-ND

[Configuration→

Settings→ND Adjust]

NOTE   E-ND is only embedded to EF/PL adapters, but not inside the camera body.

3.3 Slow-Mo and Quick-Mo

3.3.1 Two Types of FPS

Sensor fps: It is the capturing fps of the sensor. Shown on the up center on the UI as well as on the slate, it can be set by the shortcut button [2].

Project fps: It is the fps that is used for playback clips, editing clips or delivery. You can choose one of them based on your need. For example: 24fps for movie and 25fps for TV release (PAL). Set the Project FPS:

[Configuration→Shooting→Project FPS]

When the Project fps is set to 25fps, whatever you set your sensor fps, clips will be played at 25fps in post-production or in-camera playback. For example: we usually choose 22fps Sensor fps for shooting action movies, but choose 25fps for playback. It makes the actions seems faster when playback. The factory setting of project fps is 25fps.

3.3.2 User-defined Sensor FPS

Regular fps, like 24, 25, 30, 48, 50, 96, 200, are available in FPS Shortcut List; you may also customize other fps in menu:

[Configuration→Shooting→Custom Sensor FPS].

You can define three fps to any value between minimum fps (0.2fps) and the max fps of current resolution w/ accuracy 0.001fps.

- Define the sensor FPS to 22fps, there will be 22fps option in the sensor shortcut list at any resolutions;
- Define the sensor FPS to 149fps, the 149fps option would not appear at S35 4K resolutions, but will appear in the Sensor fps menu at S35 M4/3 3K resolutions.

You can delete the customized Sensor fps by modifying it to 24 fps.

NOTE   When shoot slow-mo or fast-mo (Sensor FPS is different from Project FPS), the audio track will not be packaged into mov file if the record codec is ProRes mov, but instead two uncompressed audio files are in the clip folder.

Shortcut List

Change Sensor FPS

Shortcut Button [2] twice

Menu Operation

Change Project FPS

[Configuration→Shooting →Project FPS]

Menu Operation

Custom sensor FPS

[Configuration→Shooting →Custom Sensor FPS]

3.4 Custom LUT

MAVO supports custom LUT perfectly: from shooting to post with custom LUT. There is one in-camera preset LUT: KC_NeutM. KC_NeutM has more accurate highlight and details in shadow than Kine709 and covers balanced tone with normal saturation and contrast.

You can upload a LUT to MAVO, switch different LUT/Look instantly when monitoring. While recording cDNG or ProRes with custom LUT; it does not get burned into the footage: RAW is RAW, on-site LUT for monitoring is dumped to clip folder, and can be used by the editor for a quick grade. You can upload 3rd-partyLUT to the camera as many as you want; supporting up to 33x33x33 3D LUT Cube, SCRATCH and DaVinci Resolve can output cube LUT.

3.4.1 Upload Custom LUT

It just needs three simple steps:

1. Output from DI software and rename it, rename the LUT into four letters in English, like CAN1.cube;
2. Copy the LUT into root folder of USB stick as FAT/FAT32;
3. Upload to MAVO: insert USB stick to USB port: [Configuration→LUT→Load Custom LUT]; it only takes one second. Reboot the camera, and the new LUT will be shown in the LUT shortcut list if press shortcut button [3].

NOTE   The LUT will be overwritten, if the name is same, and there should be no blank in the name and not more than four letters.

3.4.2 Erase Custom LUT

Erasing the uploaded custom LUT is also intuitive,

[Configuration→LUT→Clean Custom LUT]

Then all custom LUT will be deleted in a second, and only native KC_NeutM will be remained.

Menu Operation

Load Custom LUT

[Configuration→LUT→

Load Custom LUT]

Menu Operation

Erase custom LUT

[Configuration→LUT→

Clean Custom LUT]

3.5 Firmware Update and Option Upgrade

Updating firmware is easy and quick: download firmware from Kinefinity website, prepare a USB thumb as FAT32. Besides, you can also downgrade to the previous firmware version.

3.5.1 Firmware Update

The firmware version is shown at the bottom of Configuration menu, for example, firmware: KineOS V6.2 (02), means KineOS version is 6.2 with building number of 6202. Upgrade the firmware as following steps:

1. **Download**: Download the latest firmware, and copy it to the root folder of a FAT32 USB disk; insert the USB disk into USB socket of MAVO; there will be an USB label in the UI;

2. **Update**: do [Configuration→System→Update Firmware]. Confirm to upgrade, wait about fifteen minutes till the successful display comes out;

3. **Reboot**: Power down, and get USB disk out. Power on, and then the new firmware takes effective.

If the camera shows the USB information but cannot update the firmware, please refer to MAVO FAQ.

<mark>Menu Operation</mark>

Update Firmware

[Configuration→System→ Update Firmware]

CAUTION   Do NOT take any other operation and Never lose power when update firmware, else it may lead to failure of firmware update, even camera has to be sent to Kinefinity for repair.

CAUTION   Remove any lenses before updating the firmware.

NOTE   It is highly recommended that user should restore to factory settings and do black balancing after the update.

3.5.2 Black Balancing

Every Kine camera has calibrated black balancing before shipping, which is done under Calibration Mode. After a long period of usage, please do the balancing again, and factory reset would not change the balancing data.

Please do as following:

1. Enter into Calibration Mode: hold configuration button when press and release power button, after three seconds, release [Configuration] button;

2. Calibration: put on lens cover or mount cover to make sure a total black display, then [Configuration →System→Black Balancing], it will take about 5 mins;

3. Factory Reset: [Configuration→System→ Factory Reset], then reboot camera.

CAUTION   Please do reset to factory settings, or camera will stay in calibration mode after reboot.

NOTE   After black balancing, there is no dead pixel in normal ISO, but there might be a few red/green/blue spot when ISO is extremely high.

NOTE   If there is white dot in some frames, it may be due to the cosmic rays, not the malfunction of CMOS imaging sensor.

Menu Operation

Black Balancing
[Configuration→System→

Black Balancing]

3.6 TimeCode and SYNC

Timecode is one of key features of cinema camera. MAVO shows time code in the Liveview and Playback state. Timecode is written into recorded clips. For ProRes, the mov file contains a single timecode track; for RAW, every single frame contains a specific timecode.

MAVO supports three types of timecode:

- Free run: timecode runs all the time, no matter if you recording or not, and the timecode is embedded into recorded clips;

- Record run: timecode runs only when recording. We suggest to set timecode to 00: 00: 00: 00 when a new project begins;

- External TC: MAVO can use timecode from external device like Ambient NanoLockit as timecode of camera: using special cable to connect timecode generator to the TC port (on KineBACK-W) of MAVO, then set timecode source as external in MAVO menu.

To set the timecode:

[Configuration→Settings→TimeCode]

Choose the timecode mode or reset the timecode.

Menu Operation

Set the TimeCode

[Configuration→Settings →TimeCode]

3.6.1 TC port and TC cord

The TC port is MOCO 0B 5-pin port as definitions right side. It is compatible with ARRI Alexa camera TC port for LTC IN and OUT.

For timecode generator based on Ambient timecode system, such as NanoLockit, also a 0B 5-pin port; check the TC cord on Kinefinity website or contact sales@kinefinity.com.

In addition, camera can output timecode to other devices: connect the TC input port of the device to the TC output port of MAVO by a special TC cord.
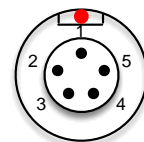
NOTE   The external mode doesn't support Jam TC input.

Port Definition

1. GND

2. LTC IN

3,4. NC

5. LTC OUT

3.6.2 External TC

There are three kinds of frame rates when using external TC: Project FPS of TERRA, Sensor FPS of TERRA and External FPS of TC generator. From KineOS 6.1, make sure that the Sensor FPS is an integral multiple of the External FPS.

Timecode on UI will be green if you successfully set the system. If there is no external timecode feeding into the camera, it will automatically employ the internal timecode of the camera and show Yellow. If the timecode blink green/red/yellow, you need to check if there is:

- Improper settings on the frame rates
- Poor cable connection;
- Power loss of external timecode device;
- Special settings needed for the timecode device. For example, NanoLockit TC output needs to be activated manually.

3.6.3 Beeper and SYNC

The beeper has two usages:

- It makes a tone of 1KHz and 2KHz respectively when trigger on/off record, to give signal to crew in the field. You can disable the beeper by:

    [Configuration→SYNC→Beeper: on/off]

- It records a tone of 1KHz and 2KHz at the beginning of the video and end of the video when trigger on/off record, as pilot for post-workflow. Disable the function by:

    [Configuration→SYNC→Recording Beeper: on/off]

Menu Operation

Set Beeper

[Configuration→SYNC→

Beeper: on/off]

Menu Operation

Set recording of Beeper

[Configuration→SYNC→

Recording Beeper: on/off]

3.7 Configure Camera

You can save settings to the camera: preset list, body fan speed, EI/ISO mode, shutter mode, etc. When power on with USB disk, the camera will do factory reset.

3.7.1 Preset

In-Camera Presets are a set of parameters for recording and shooting:

Image Format; Resolution; FPS; Shutter Speed; Record Format

Moreover, there are eight in-camera presets, and it provides quick switch for these presets: press shortcut button [1] twice to pop up the Preset list.

Besides, customers can define and save these in-camera presets. After setting these parameters in Liveview state, then:

[Configuration→Shooting→Save as Preset]

You will find the preset you save on the list.

3.7.2 Shutter Display Mode

There are two modes for shutter display: Shutter Speed and Shutter Angle:

[Configuration→Liveview→Shutter Mode: Time/Angle]

Calculation between Speed and Angle, if Shutter Speed is 1/50s, and fps is 25, and then the shutter angle is:

25*360*(1/50) = 180 Degree.

The Shutter Angle ranges from 0.7~358 Degree; the Shutter Speed has min value 1/2000, and the max value depends on the FPS.

Besides, Shutter Speed List does NOT match Shutter Angle List.

NOTE Set appropriate shutter speed to avoid flickering: for example, 1/50s, or 172.8 Degree.

Menu Operation

Change Presets

[Configuration→Shooting →Save as Preset]

Menu Operation

Change Shutter Display

[Configuration→ Liveview→Shutter Mode: Time/Angle]

3.7.3 Camera Fan and Core Temperature

Core Temperature is the real-time temperature of core processor, not the body temperature. It is shown in the Liveview and bottom of Configuration menu, so that users can monitor it. If the core temperature reaches up to 80 degrees, the temperature indicator turns into yellow; up to 90 degrees, indicator turns red, camera needs to be cooled down or even turned off for safety, else it may bring permanent damage to camera body.

Two fans inside the camera for cooling:

- Core Fan: cools the Core Processor; the fan runs quietly for most of time, and can NOT be set manually;
- Body Fan: cools the whole camera body, can be set manually.

You can adjust the body fan speed (factory set: 40%) from 30% to 100% or even turn off:

[Configuration→Settings→Fan Speed].

Besides, you can choose to stop the Body Fan while recording, and there will be less noise; the fan will be turned on automatically when stop recording:

[Configuration→Settings→Fan Stop].

Menu Operation

Change Fan Speed

[Configuration→ Settings→Fan Speed]

Manu Operation

Stop Fan

[Configuration→ Settings→Fan Stop]

3.7.4 ISO and EI

EI / ISO is a group of settings to capture light on the Sensor. MAVO supports ISO and EI mode, and the EI / ISO value is displayed at the upper right corner of the main interface.

ISO Mode

Nominal value of ISO is ISO ASA, takes effect on the RAW data, applying different gain on the CMOS imaging sensor. The default mode is ISO mode, ISO800, highlight level (Highlight, that is from 18% gray to ADC Clip) is 4.3 stops.

Highlight Stops

As the name suggests, more highlight stops means less shadows details. Less shadows may mean more noises. If you want to retain more highlight details, we suggest increasing to higher than 4.3 stops or use EI mode. Changing ISO does not change highlight stop.

To set the Highlight stops:

>   [Configuration→Shooting→ISO Highlight Stops],

choose from 3.3~5.6 stops. For highlight stop, camera has minimum ISO value, for example: highlight stop is 3.6, minimum ISO is 200, while for 4.3 stop, minimum ISO 320.

EI Mode

The nominal EI value is similar with the setting in Alexa or RED cameras. Changing value of EI affects the Highlight and shadow stops, image brightness adjusted by digital gain while analog gain of the CMOS imaging sensor remains unchanged.

Change EI: sensitivity and dynamic range unchanged, while highlight and shadow stops changed, and image brightness changes. Switch between EI/ISO:

>   [Configuration→Shooting→Sensitivity Mode].

Menu Operation

Set Highlight

[Configuration→Shooting →ISO Highlight Stops]

Menu Operation

Change Sensitivity Mode
[Configuration→Shooting → Sensitivity Mode]

Difference between ISO mode and EI mode: in ISO mode, changing the ISO value means using analog gain on the camera, which changes the sensitivity of CMOS imaging sensor, but the highlight stop remains unchanged; in EI mode, changing the value doesn't change the sensitivity of the CMOS imaging sensor, but use digital gain on the camera, which changes highlight as a result.

NOTE   At Liveview, 18% gray matches E/I value to maintain the same brightness for shooting and post work.

NOTE   Suggest shooting at ISO mode if you are not completely understand the EI and ISO mode.

3.8 Control Cameras with iPad (KineRemote)

If the camera is configured with WIFI option, you can use iPad (iOS 10 or below) to control MAVO.

Current KineRemote APP is only available in App Store (New APP might be launched in later 2019), search Kinefinity or KineRemote, then download and install.
Turn on WIFI: [Configuration→Settings→WIFI Power: On].

How to use KineRemote:

1. Set camera: Plug in Antenna to WIFI socket, and turn on the camera. A wireless hotspot (AP) will be generated by camera automatically such as kinefinity_5D8A, 5D8A stands for the first four digits of the camera serial number.

2. Set iPad: Run KineRemote App installed on iPad: [Setting→WIFI], and choose to connect kinefinity_5D8A.

3. Open the APP: open the KineRemote, if you see the Timecode running, it means you have successfully connected the camera to your iPad.

You can directly modify a parameter in KineRemote App by finger tap. For example, to changes shutter, tap shutter Angle to pop up shutter setting list, tap the Up or Down button with your finger to desired value, and click blank space to confirm and exit.

NOTE   LOOK is for Iris if attached an EF lens.

NOTE   You need close the KineRemote in background when KineRemote does not show parameter properly. Then open it again.

3.9 3D and SYNC

Two cameras with <u>KineBACK-W</u> can implement real 3D shooting; you can shoot multiple cameras in total sync with more cameras and KineSYNC box.

For Kine cameras in sync state, the sensors are almost completely synchronized: time code synchronization, frame synchronization and scanning synchronization with less than 5us mismatch. You need to prepare:

1. Each camera equipped with KineBACK-W (3D shooting option embedded); all cameras with the exact same firmware;

2. One or more 3D SYNC cables;

3. For multi-cam SYNC, a KineSYNC box is a must.

NOTE   One KineSYNC Box can help a Master to synchronize seven slaves. To synchronize 32 cameras, you will need 32/7=5 KineSYNC Boxes.

Menu Operation

Set Project Information

[Configuration→

Shooting→Slate]

3.9.1 Steps to set the two cameras

For 3D shooting:

1. **Connect** the cameras: power off the two cameras, and connect them with 3D SYNC cable to their SYNC ports on KineBACK-W;

2. **Settings**: mirror shooting parameters for both of the cameras to the same, such as: shutter, sensor fps, project fps, resolution, ISO, highlights, etc. (suggest factory reset at first);

3. **Naming the clip**: [Configuration→Shooting→Slate] Please set the Lens number of Master to 0001, and slave one to 0002, which represent the left eye clips and the right eye clips. All the other clip parameters must be set exactly the same, except clip names;

4. **Auto WB** with gray or white card for two cameras respectively, so that they gain consistent color temperature;

5. **SYNC**: choose one camera to set: [Configuration→SYNC→3D Master], and the other one: [Configuration→SYNC→3D Slave], then a sync confirmation will pop up to confirm the serial number of the Master camera.

Menu Operation

Set 3D Master

[Configuration→SYNC→
3D Master]

Menu Operation

Set 3D Slave

[Configuration→SYNC→
3D Slave]

After confirming the connection, Master/Slave in Green font appears on the upper left corner of the screen, then press REC button of the Master Camera, two cameras shoot fully consistent clips, which match the left eye and right eye respectively.

3.9.2 Playback and Change Parameters

In current firmware version, playback is yet not supported in 3D, and you can only playback in 2D mode. Therefore, you have to exit 3D settings firstly:

If you want to change parameters, please exit from SYNC mode and set the parameters before you SYNC the camera again when in Liveview mode.

Here are the steps:

1. Exit from SYNC: please press Configuration or Playback button on the Master Camera, choose [Disconnect 3D Sync] in the pop-up window. The Master Camera turns into 2D/Single operation mode, and the SLAVE enters SYNC mode: Green <mark>Slave</mark> will become Yellow <mark>SYNC</mark> indicating that the Slave Camera enters into the standby state.

2. Change parameters: set the parameters for shooting or play back clips;

3. Sync again: set the 3D menu of the Master Camera, and connect the Slave Camera again.

During the process, you don't have to set the Slave Camera, meanwhile, the 3D SYNC cable keeps connecting the two cameras.

Menu Operation

Exit from SYNC mode

[Configuration→

Disconnect 3D Sync]

3.9.3 Clip Name for Post Workflow

After the 3D shooting, the names of Master Camera and Slave Camera will be:

- PRJ-0002-003-A1-5D8B.mov
- PRJ-0002-003-A2-5D8B.mov

They represent the Left eye clip and Right eye clip. A1 and A2 stand for lens number just as you set before shooting, A1 is the Master camera, A2, the Slave Camera.

In this case, even you put all clips under one folder, there won't be naming conflicts, and all the right eye clips are adjacent to the corresponding left eye clips naturally.

For the naming of clips in details, please refer to Section 3.1.

3.10 Anamorphic Lens Support And 4:3 Recording

Anamorphic was a technical choice for filming, but now an aesthetic preference. Echo to more affordable anamorphic lenses, TERRA 4K, MAVO and MAVO LF are also good choices for anamorphic shooting, as the CMOS imaging sensors are all 3:2.

For MAVO 6K, the usable sensor altitude is up to 16mm, which allows:

- 4:3 anamorphic: 5376×3984; with 2x anamorphic lens, the desqueezed resolution is 10752×3984;

- 6:5 anamorphic: 4864×3984; with 2x anamorphic lens, the desqueezed resolution is 9728×3984;

- Open Gate: 6016×3984, all pixels of the CMOS imaging sensor are captured, leave maximum room for post processing.

MAVO supports 2x, 1.8x, 1.75x, 1.5x, 1.33x, 1.25x, 0.5x anamorphic shooting, which falls into almost all anamorphic lenses in the market.

When use 2x anamorphic lens:

Format	Resolution	FPS	De-Squeezed
3:2 Open Gate	6016x3984	40	12032x3984
4:3 Ana	5376x3984	40	10752×3984
6:5 Ana	4864x3984	40	9728×3984

Menu Operation

Set Anamorphic Lens

[Configuration→Liveview → Anamorphic Lens]

For monitoring when shooting at 4:3 with anamorphic lens, you can de-squeeze the images into normal image by setting anamorphic lens factor in Configuration menu. For example, anamorphic lens factor is 2, set the factor in camera to 2, then you can get 2.66:1 instead of normal view of 4:3.

Set the ratio:

[Configuration→Liveview→ Anamorphic Lens]

NOTE   The recorded clips are 4:3 instead of de-squeezed and monitoring depends on the ratio you set. To get normal monitoring, you need to set de-squeeze factor to match lens, but the actual clips are still 4:3.

4. FAQ

If there is an issue about the camera or accessory, please check the related chapter in this manual. If the issue still exists, please make a short video and fill in the issue report on issue report page. We will contact you within one working day. The issues below are mostly due to improper operation of accessories or camera settings.

1. Windows OS cannot get access to SSD:

- Please check if the file system of KineMAG is NTFS. To change the format into NTFS before recording, you need to set: [Configuration→Settings→SSD file system: NTFS], then rebuild the SSD in the camera.
- Try another SSD reader.

2. Press REC button, camera does not record, no tally light.

Please insert the SSD into the camera before power on, rebuild the SSD into NTFS or HFS and activate it, the SSD is ready for recording only when the SSD indicator is green.

3. Camera stop recording automatically after a few seconds when recording:

- Check if your SSD has no capacity, and it shows red on the UI;
- Check if you use KineMAG SSD: if you use 3rd-party SSD, its speed may not be fast enough.

4. No signal on Monitor:

- Power off camera and connect output ports on the camera body to the input ports of monitors with high quality cable. Power on the camera and monitors after all parts set up well.
- Power off the monitor and reconnect the video cable.

5. Liveview seems dropping or skipping frames, stutter when camera pans:

It is normal for monitoring when panning, but recorded clips do not drop any frame if using KineMAG SSD.

- Skipping frame on monitoring: monitoring signal from Kine camera is based on 25fps progressive (or other CMOS imaging sensor fps), not 50i;
- Skipping frame when playback on workstation: if recorded clips are 25fps, less than 30fps, the clips will show it. If recording 50fps, and playback at 50fps, it will be much better.

6. No images from SDI on KineBACK-W:

- Check if the monitor supports 3G-SDI, as the SDI output of KineBACK-W is 1080p;

- Restore to factory reset: [Configuration→System→ Factory Reset], or power on the camera with a USB thumb connected to USB port.

7. No audio when playback the clip

Please check if the project fps is the same with sensor fps, if not, the audio will not be packed into the ProRes mov, but be saved as two wave files to the clip folder. For details, see section 3.3 Slow-Mo and Quick-Mo.

8. Iris of electronic EF lens cannot be adjusted:

- Make sure attach EF lens to EF mount in right way: please refer to Section 2.3 Quick Guide – Lens;

- Make sure that the Active EF mounting adapter is assembled well: please refer to 2.2 Mount. EF mounting adapter will show the "ef sys" + version number at the bottom of the menu;

- Make sure the EF lens is compatible with Kine cameras: Whitelist for lens;

- Make sure the iris control enabled: [Configuration→Settings→Active Mount→Enhanced]

9. There is no sound after inserting with XLR MIC of KineBACK-W:

- Make sure there is a good connection between XLR port and the MIC;

- Turn on KineAudio: press twice on Audio button or [Configuration→Audio→KineAudio: ON];

- Turn on Phantom 48V if using phantom powered MIC: press twice on Audio button or [Configuration→Audio→Phantom 48V: ON]

10. Camera cannot update camera with new firmware:

- Check whether [USB] shown in the UI after USB stick is inserted to the USB socket of camera, else change another USB socket to try it;

- Check USB disk is FAT32, not NTFS, nor HFS;

- Check if the firmware is stored at the root folder of USB disk, and no other firmware files in the same place;

- Rebuild the USB disk as FAT applying MBR partition.

11. Black screen with a cross while switch between the codecs:

You don't have to reboot the camera when switching between codecs, but the screen will be black with a cross in the center for a few seconds, this is not a failure or a bug.

12. Black screen after upgrading failure:

Please try to enter into Calibration Mode: hold configuration button when press and release power button, after three seconds, release configuration button. You can also upgrade the firmware under this mode. But if you can not enter into calibtation mode, please contact us by sales@kinefinity.com, or contact your local dealer.

13. Recover the footage due to power failure:

Power failure during shooting may damage the currect footage, and footage can not be played back in camera or computer. For ProRes footage, please use the method below. Please work in Windows and that Quicktime 7 is installed. Download KineRecovery.zip to your PC, and then:

1. Copy files: unzip the file and copy KineRecovery.exe and QTCF.dll to the folder of footage, like PRJ-0002-003-A2_5D8A;

2. Run: run the KineRecovery.exe to start the recovery;

3. Complete: the recovered mov file will be generated in the footage folder, name starting with "r".

5. TECH & SPEC AND CONNECTORS

5.1 Tech Parameters

The following are typical settings, for latest complete list, please refer to SPEC of MAVO on the website.

Camera Type	S35 Film-Style Digital Cinema Camera			
Imaging Sensor	6K 3:2 -S35 Format CMOS			Size: 24x16mm Crop factor over FF: 1.85
Lens Mount	Native KineMOUNT as omni mount to be PL/EF/SONY E by solid mounting adapters			*PL, PL e-ND *EF, EF e-ND, EF Enhancer *Sony E
ISO	**Native/Base ISO**		**Max**	
	800		20480	
Dynamic Range	>14 stops			
Record Res	**6K(Open Gate)**	**4K**	**3K**	
	6016x3984	4096x2160	3072x1620	*5376x3984, 4:3
Max FPS	66@6K Wide	100@4K Wide	150@3K Wide	*Wide, 2.4:1
Record Format	**Codec Type**	**Codec Format**	**Bit Depth**	
	Compressed cDNG	cDNG(.dng)	12bits	3:1/5:1/7:1
	Compressed KineRAW 2.0	KineRAW(.krw)	12bits	2:1-10:1, *release in 2019
	ProRes422HQ/422/422LT/Proxy	ProRes(.mov)	10bits	
	ProRes4444	ProRes(.mov)	12bits	up to 6K 30fps
	ProRes4444XQ	ProRes(.mov)	12bits	up to 4K HD 48fps
Shutter Angle	0.7°~358° Rolling Shutter			
Monitoring	Video Port x2	HD Port x1	SDI x2*	*Applicable on KineBACK-W
Sync Function	Tally, AutoSlate, Beeper, Trigger, SMPTE LTC*, 3D/Multi-cam Sync*			*Applicable on KineBACK-W
LUT	Preset: Neutral , Support Custom 3D LUT			
Audio Capture	In-camera MIC; 3.5mm MIC-in; KineAudio* with 48V Phantom Power XLR			*Applicable on KineBACK-W
Record Media	2.5" SSD with 7mm Height			
Power	**Power in**		**Consumption**	
	DC IN 11~19V/SideGrip/V-Mount*		23W	*Applicable on KineBACK-W
Body Color	Titanium Gray			
Weight	2.1 lb/990g			*Only Body
Size	4.5x4.3x3.7" / 115x110x95 mm			*W/o projections, WxHxL
Operating Temp	0 ~ 40°C			

All specifications shown are preliminary and subject to change without notice.

The following chart contains resolution, frame rate and codecs:

Image Format	Format	Resolution	Max FPS	Codec
S35	6K Wide	6016x2520	60	ProRes or RAW
	6K DCI	6016x3172	50	ProRes or RAW
	6K HD Wide	5760x2400	66	ProRes or RAW
	6K HD	5760x3240	50	ProRes or RAW
	6K Open Gate	6016x3984	40	ProRes or RAW
	4:3 Anamorphic	5376x3984	40	ProRes or RAW
	6:5 Anamorphic	4864x3984	40	ProRes or RAW
	5K Wide	5120x2160	74	ProRes or RAW
	5K DCI	5120x2704	58	ProRes or RAW
	4K HD Wide (Oversample)	3840x1600	66	ProRes
	4K HD (Oversample)	3840x2160	50	ProRes
	3K HD Wide (Oversample)	2944x1227	66	ProRes
	3K HD (Oversample)	2944x1620	50	ProRes
M43	4K Wide	4096x1720	92	ProRes or RAW
	4K	4096x2160	74	ProRes or RAW
	4K HD Wide	3840x1600	100	ProRes or RAW
	4K HD	3840x2160	74	ProRes or RAW
S16	3K Wide	3072x1280	120	ProRes or RAW
	3K	3072x1620	99	ProRes or RAW
	3K HD Wide	2944x1227	130	ProRes or RAW
	3K HD	2944x1620	99	ProRes or RAW
16mm	2K Wide	2048x860	180	ProRes or RAW
	2K	2048x1080	144	ProRes or RAW
	2K HD Wide	1920x800	192	ProRes or RAW
	2K HD	1920x1080	144	ProRes or RAW

NOTE   Oversampling/DownScale is only for ProRes. The downscaled images are sharper and have less noise.

NOTE   Any frame rate can be defined between minimum fps (0.2fps, in current firmware) and the maximum sensor fps of current resolution. Accuracy can be 0.001fps.

NOTE   Due to limitation of SSD SATA interface, ProRes4444XQ is up to 4K 48fps; ProRes4444 is up to 6K 30fps.

5.2 Connectors

This chapter introduces specification and pin-out of some connector/ports on camera body and <u>KineBACK-W</u> including DC IN, CTRL, EXT and TC.

5.2.1 DC IN

DC IN is on the lower right of camera body, a 1B 2-pin MOCO socket. The voltage range for camera is 11V~19V, DO NOT use power source higher than 19V, or the camera will be burned. Also, please note that:

- Max current of external power is 3A;
- Max consumption of camera body only is 25W;
- With KineMON, max consumption is 30W.

NOTE   Red dot and groove on the socket should match pin #1.
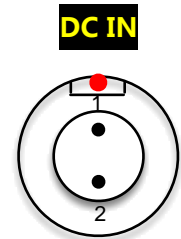
DC IN

1. DC IN as VDD
2. Ground

5.2.2 CTRL

CTRL is on the lower front of the camera body, a 0B 4-pin MOCO socket.

- Short pin #1 and pin #3 can trigger on/off;
- Pin #2 outputs 3.3V, max 1A. Pin #2 and #3 can be used for power supply;
- Pin #4 is reserved.

CAUTION   The camera will shut down if the current through Pin #2 is higher than 1A..
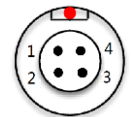
1. REC;
2. 3.3V output;
3. GND;
4. Reserved

5.2.3 EXT

EXT port is on KineBACK-W, a 1B 6-pin MOCO socket. It outputs 12V, max current 1A, or even outputs power from V-lock battery plate when a battery is attached. Meanwhile, EXT port is also used to provide power and control to Movcam motor for follow-focus (UM4).

CAUTION   The camera will shut down if the current through Pin #4 is higher than 1A.

NOTE   CAN_L and CAN_H are for the control of Movcam motor.
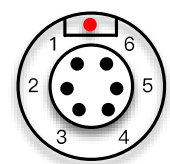
1. Detect
2. CAN_L
3. CAN_H
4. 12V output
5. Battery output
6. GND

5.2.4 TC

TC port is on KineBACK-W, a 0B 5-pin MOCO socket for timecode in or out. For different timecode generators, such as Ambient timecode generator Nano Lockit, or SoundDevice recorder which has TC system, the physical spec and definition is the same.
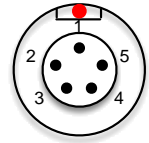
1. GND

2. LTC IN

3,4. NC

5. LTC OUT

5.3 Mechanical Drawings

5.3.1 Physical Parameters for Body with KineMOUNT

Front View of Body with KineMOUNT

Dimensions are shown in mm.
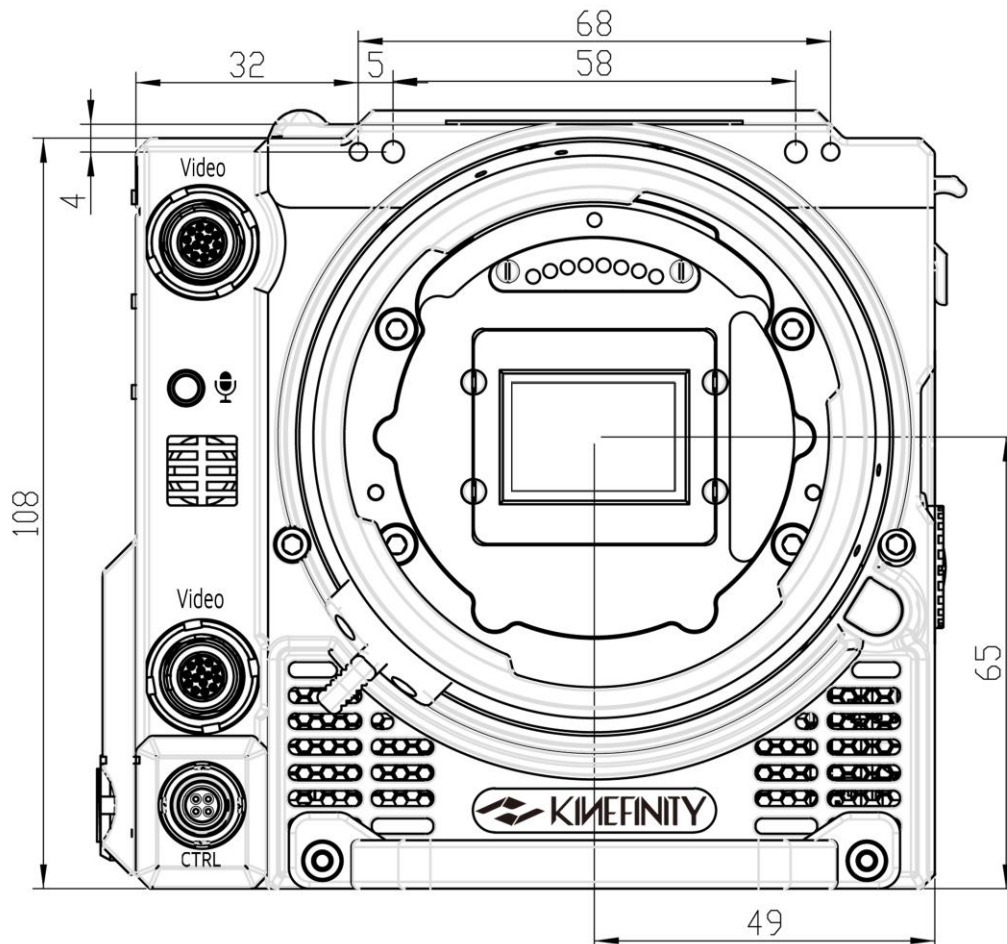
Front View of Body with KineMOUNT (with SideGrip)

Dimensions are shown in mm.
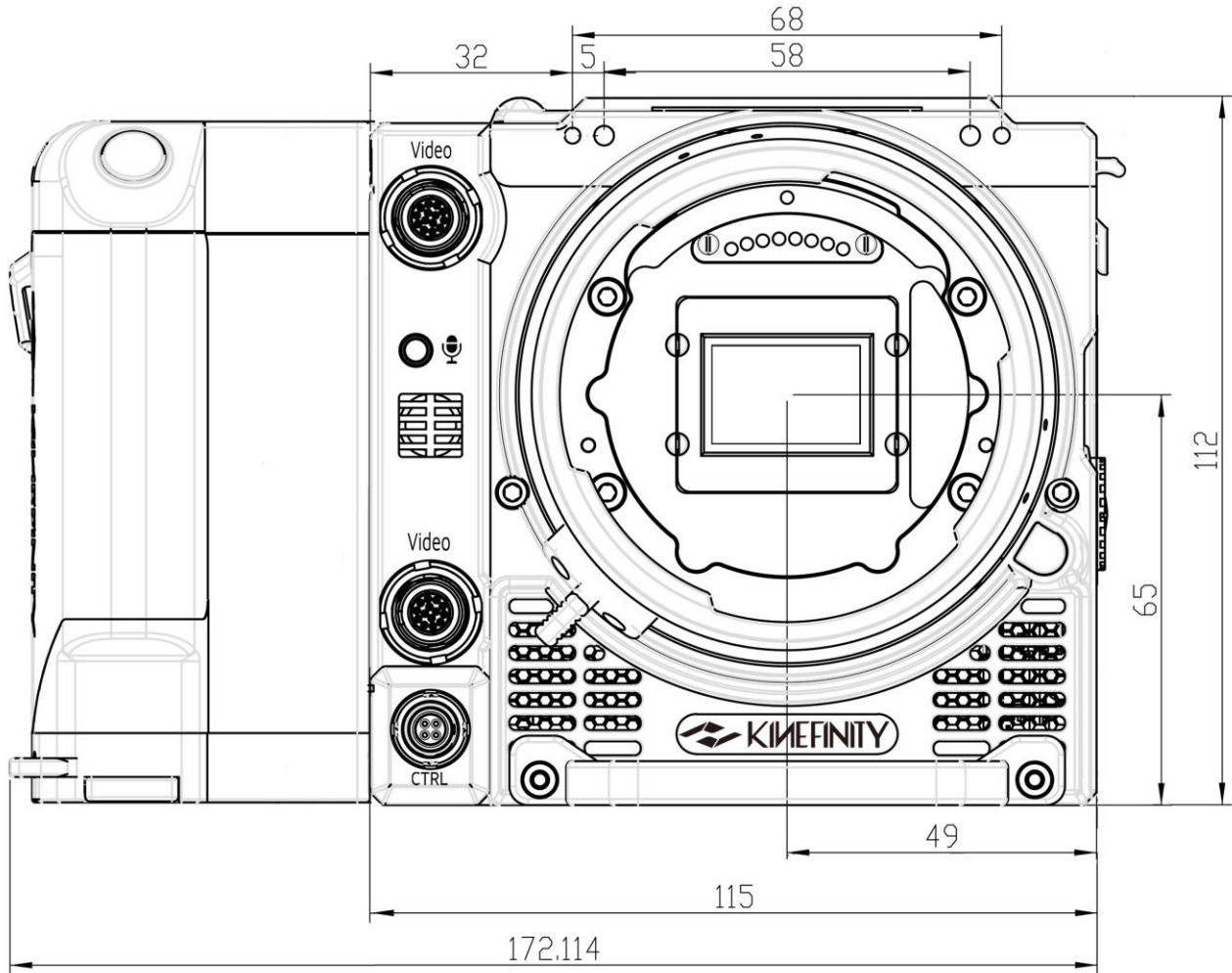
Top View of Body with KineMOUNT

Dimensions are shown in mm.
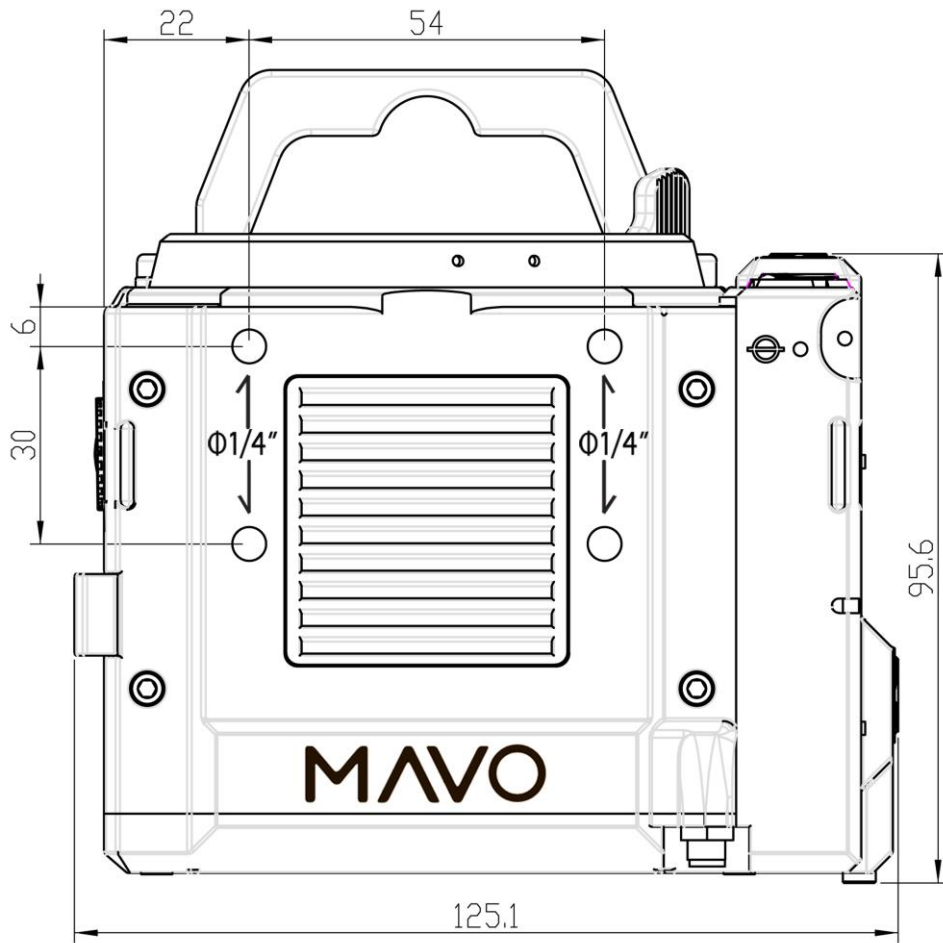
Bottom View of Body with KineMOUNT

Dimensions are shown in mm.
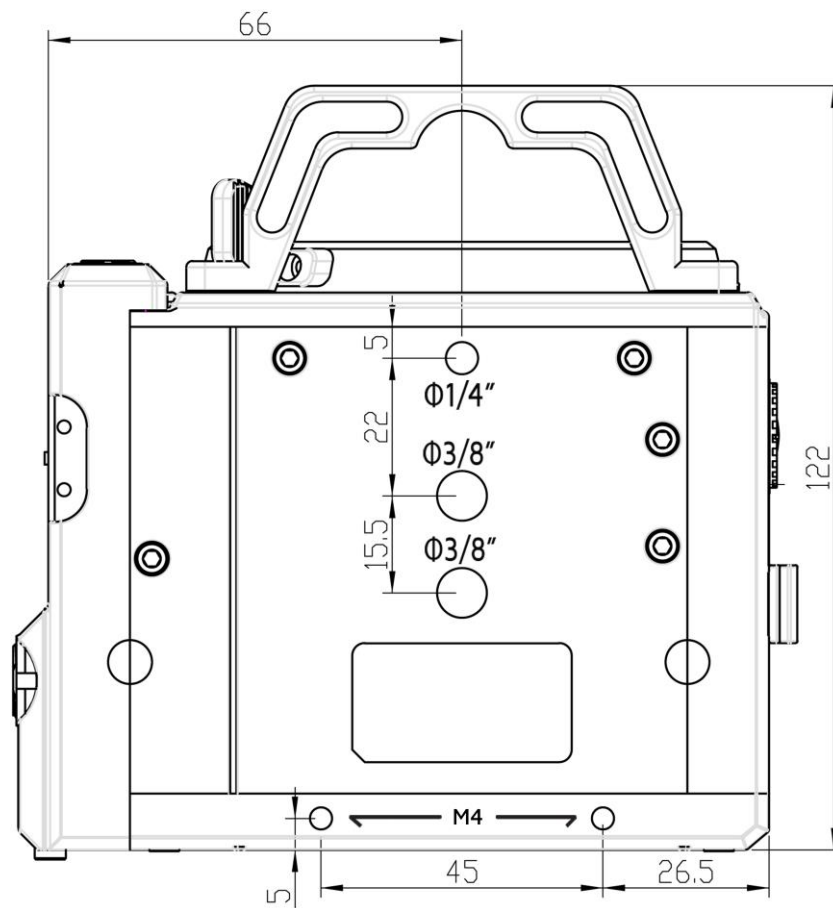
5.3.2 Body with KineMOUNT and EF Mounting Adapter (with KineBACK-W)

Front View of Body with KineMOUNT and EF Mounting Adapter (with KineBACK-W)
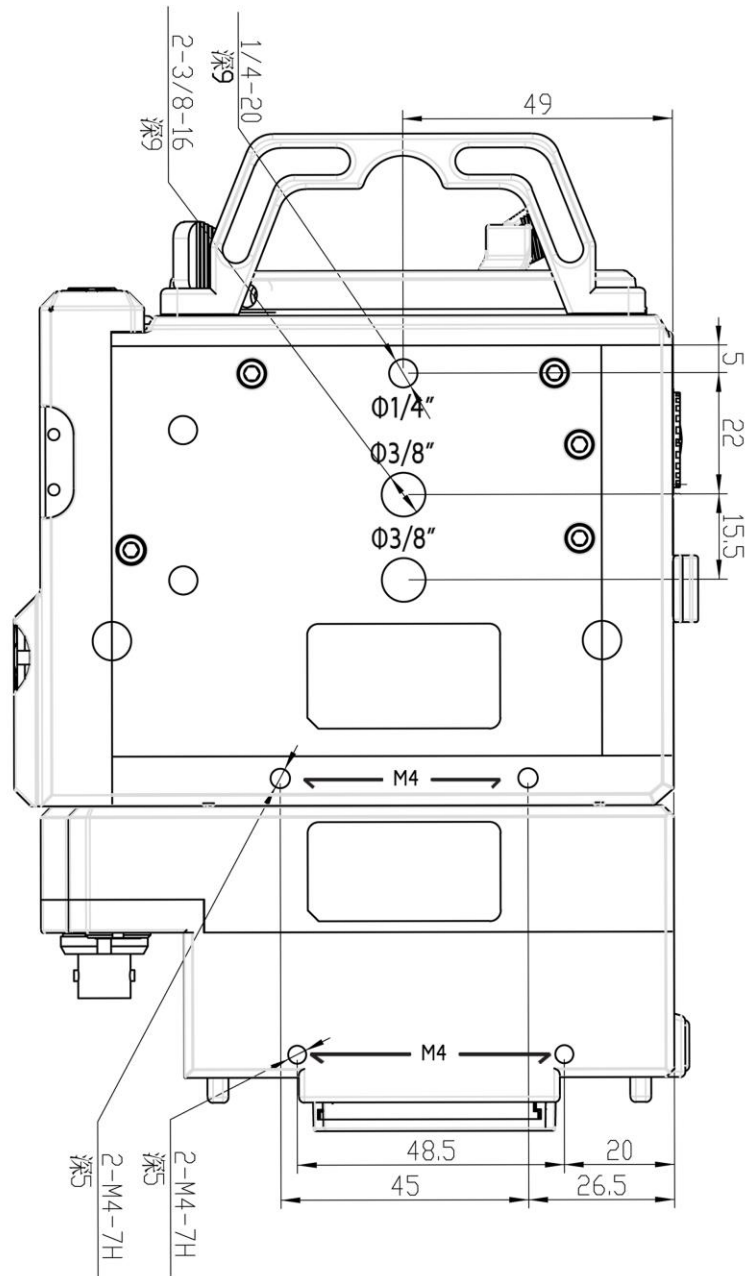
Dimensions are shown in mm.
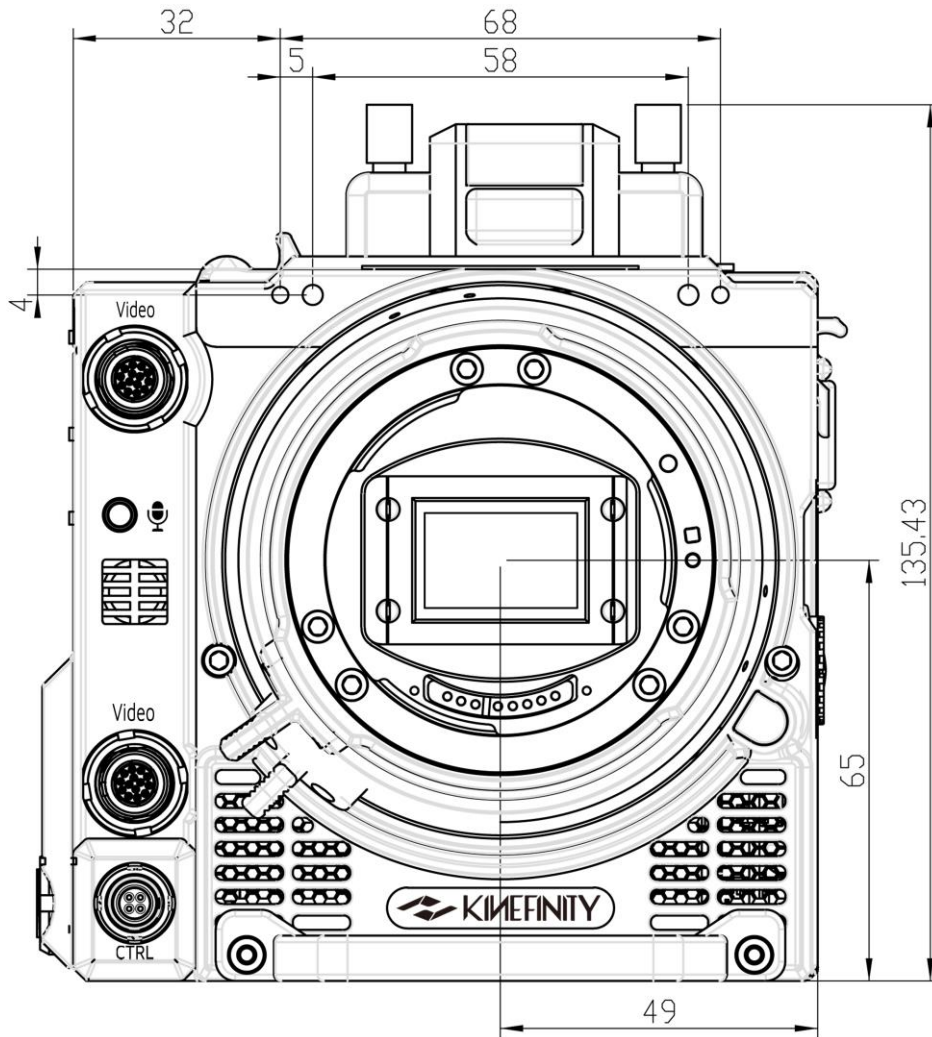
Top View of Body with KineMOUNT and EF Mounting Adapter (with KineBACK-W)

Dimensions are shown in mm.
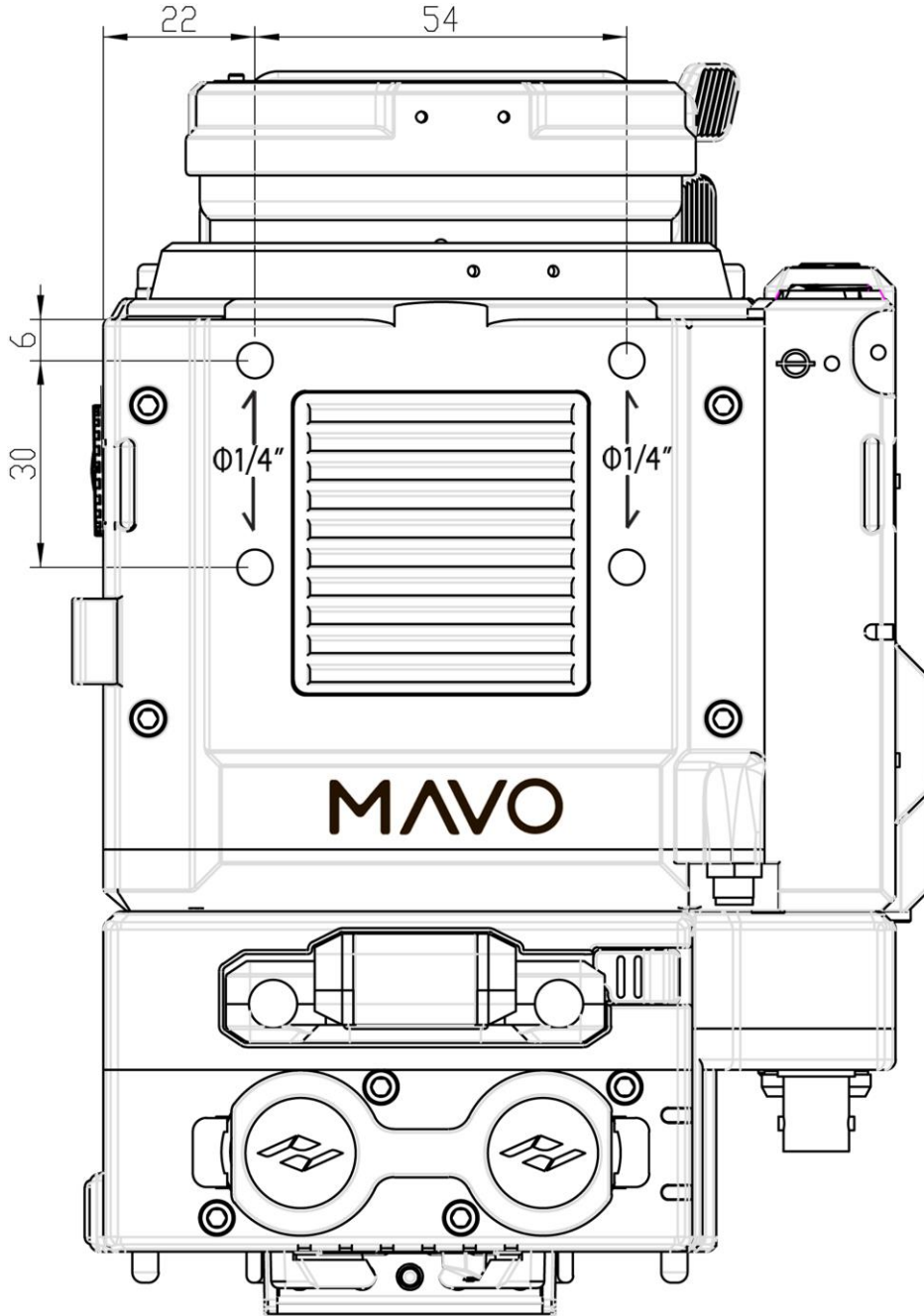
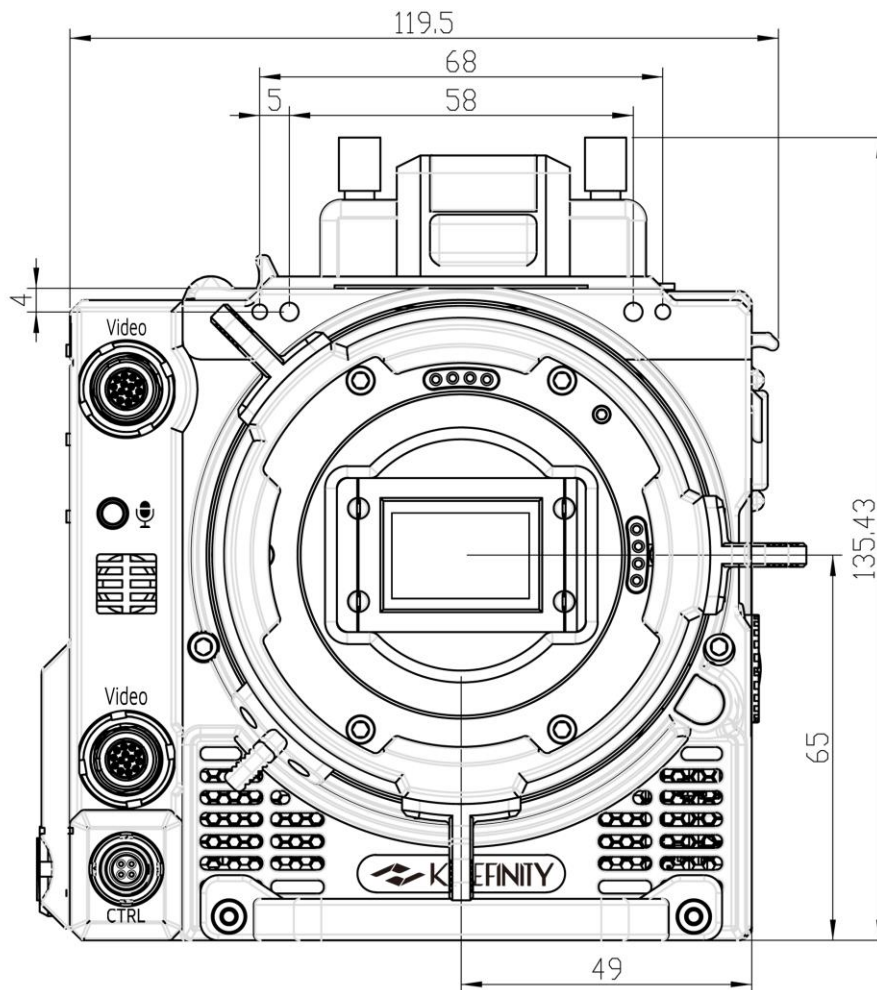**Bottom View of Body with KineMOUNT and EF Mounting Adapter (with KineBACK-W)**

Dimensions are shown in mm.
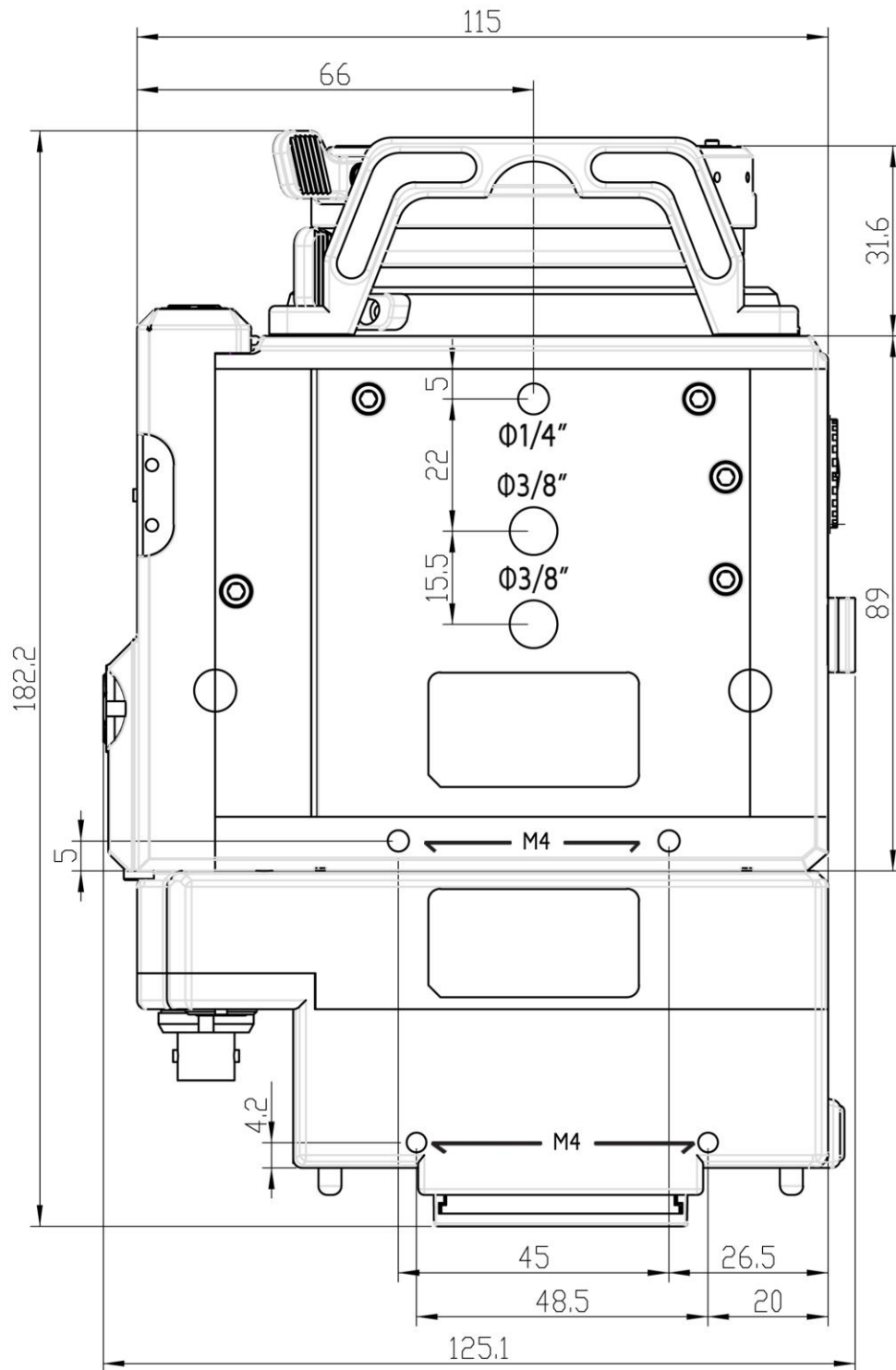
5.3.3 Body with KineMOUNT and E Mounting Adapter (with KineBACK-W)
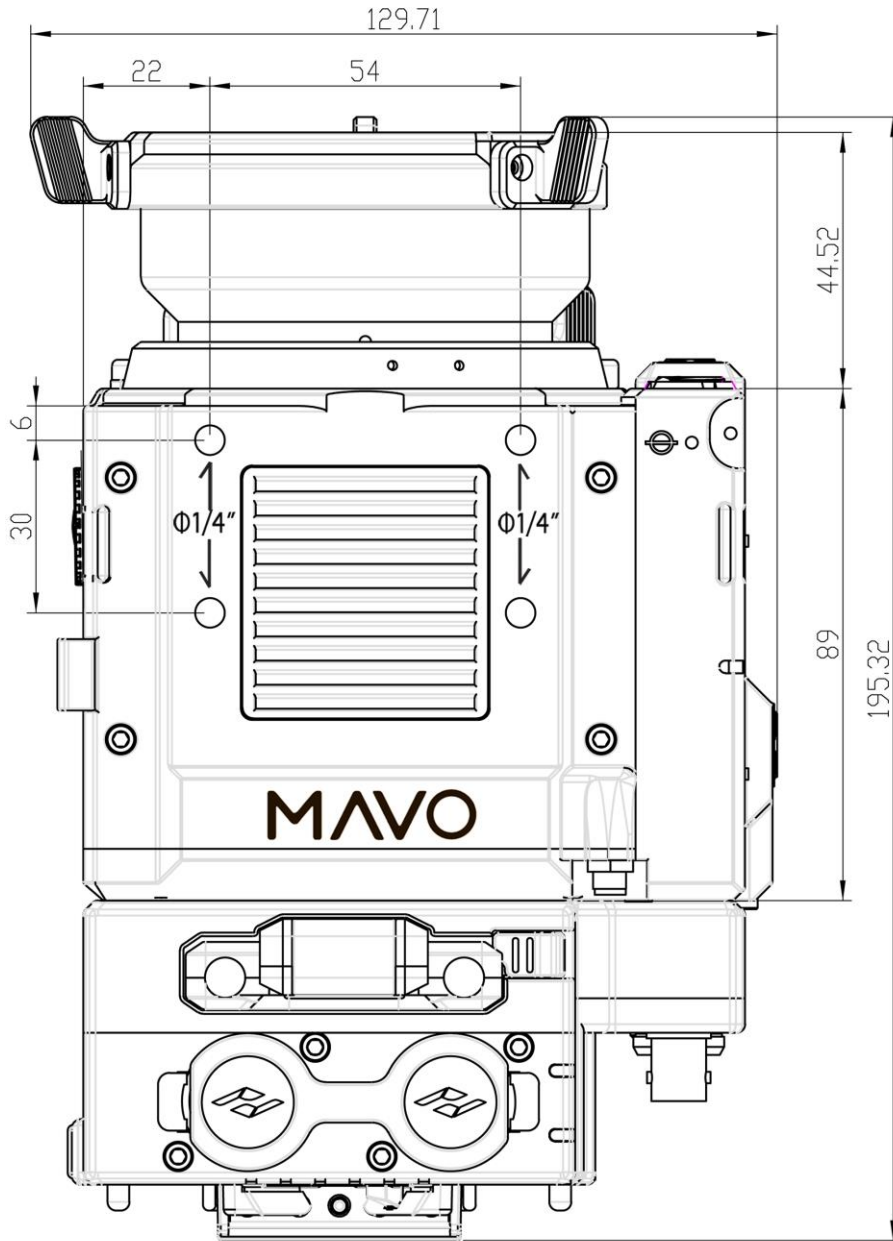
Front View of Body with KineMOUNT and E Mounting Adapter (with KineBACK-W)
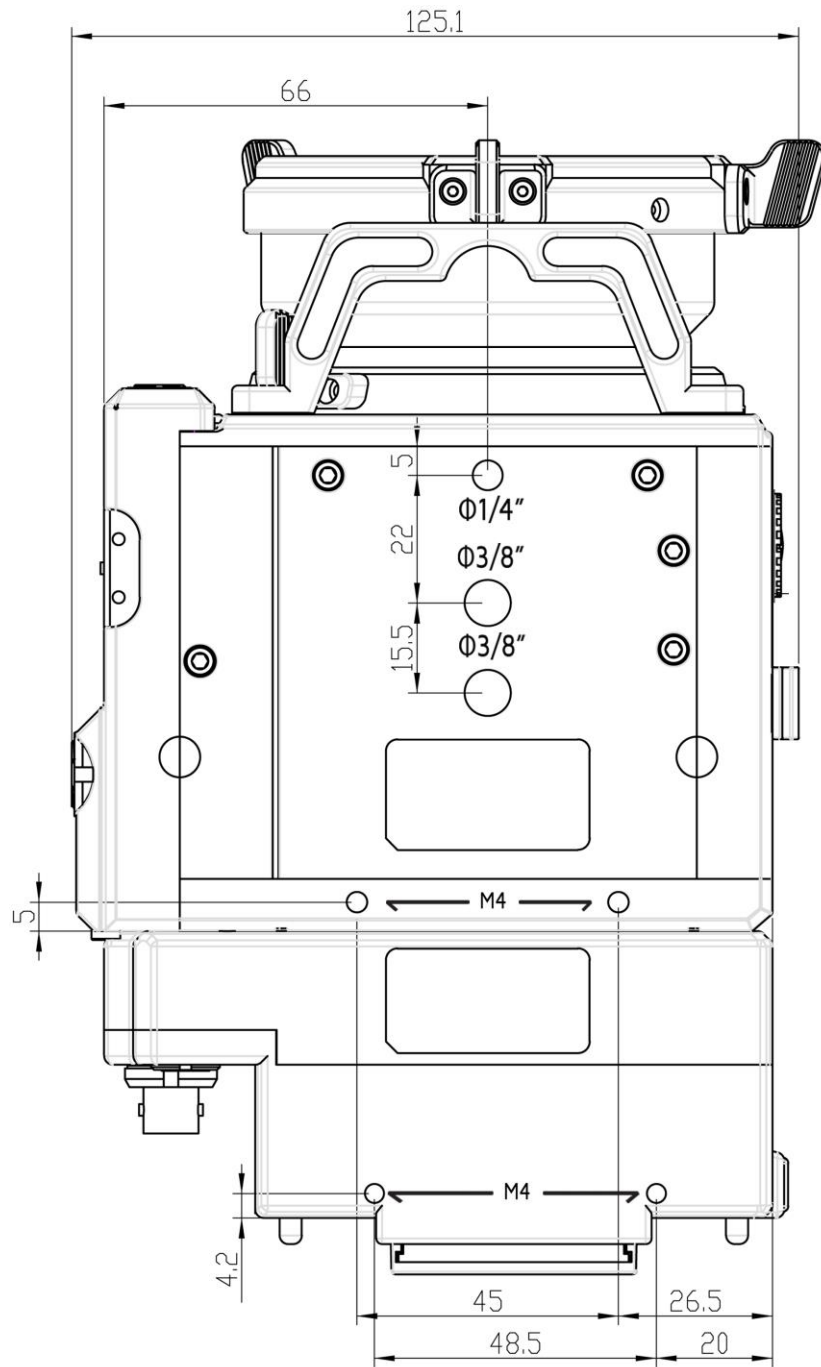
Dimensions are shown in mm.
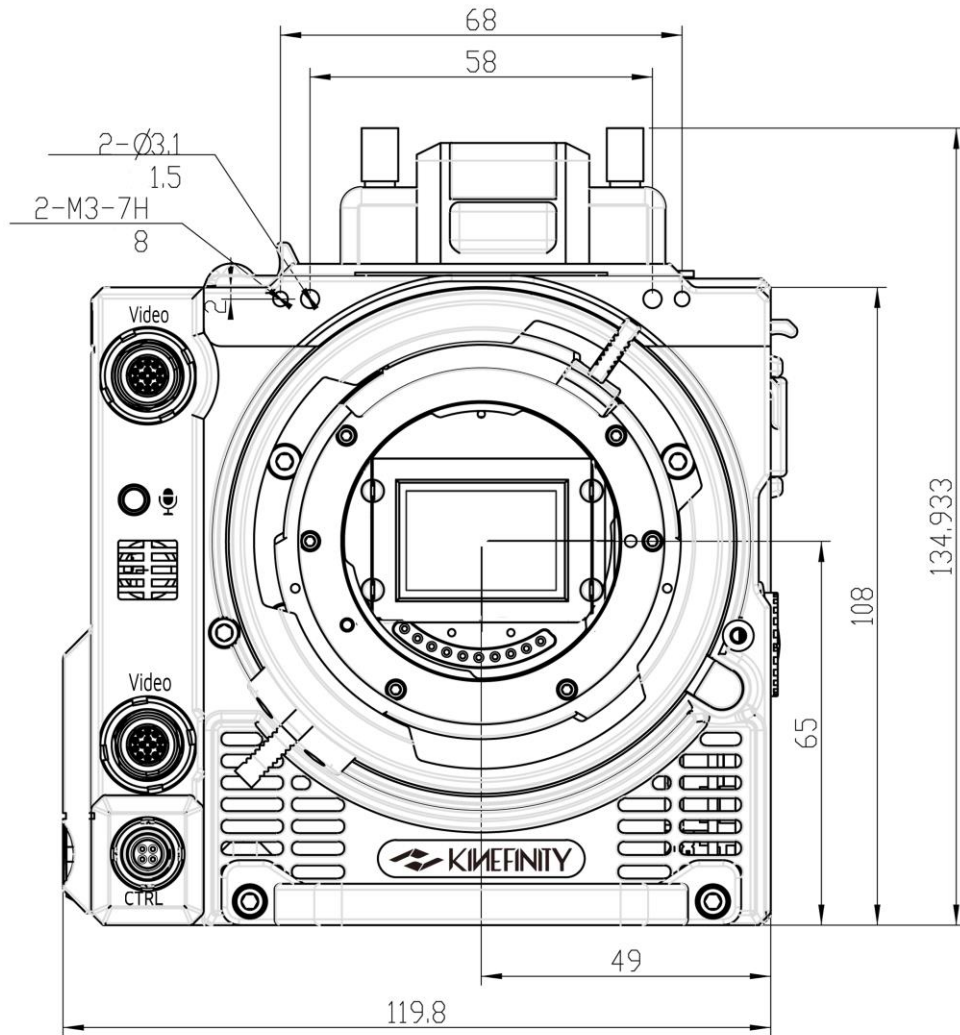
Top View of Body with KineMOUNT and E Mounting Adapter (with KineBACK-W)

Dimensions are shown in mm.
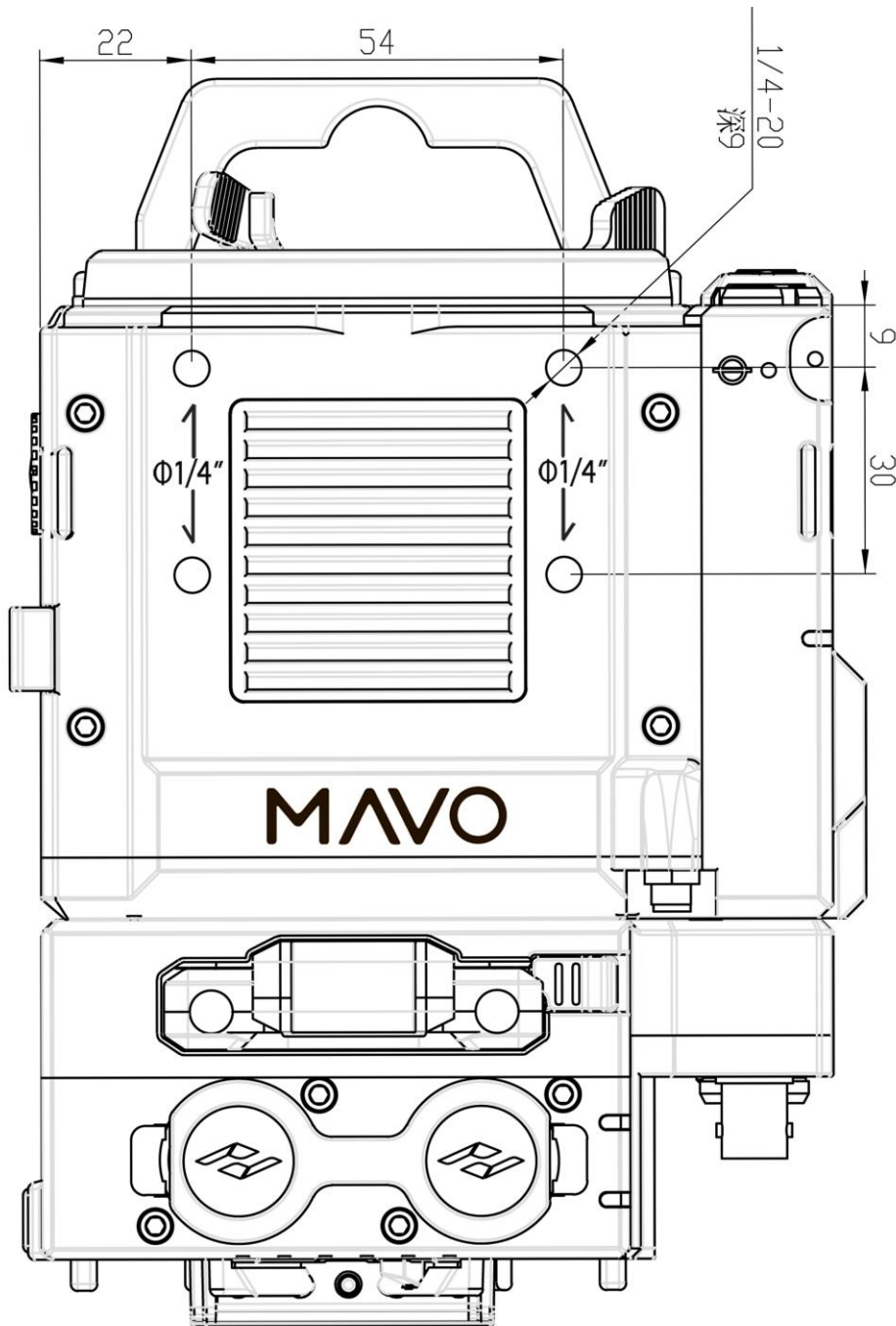
Bottom View of Body with KineMOUNT and E Mounting Adapter (with KineBACK-W)

Dimensions are shown in mm.

5.3.4 Body with KineMOUNT and PL Mounting Adapter (with KineBACK-W)

Front View of Body with KineMOUNT and PL Mounting Adapter (with KineBACK-W)

Dimensions are shown in mm.

Top View of Body with KineMOUNT and PL Mounting Adapter (with KineBACK-W)
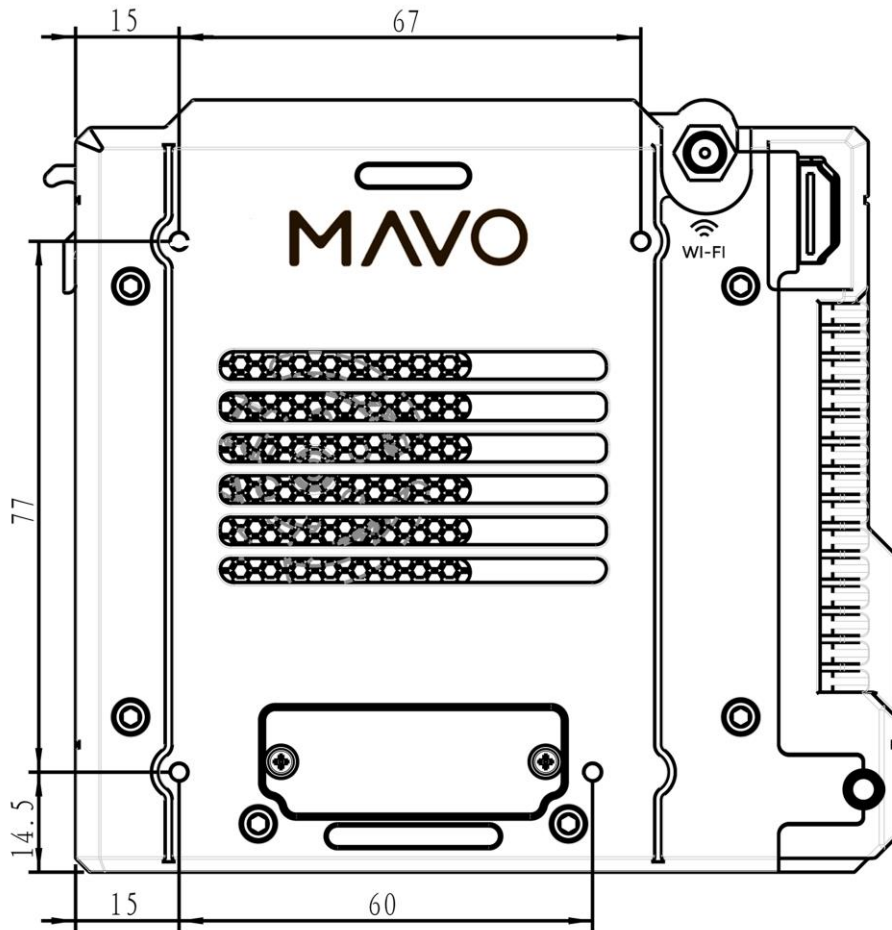
Dimensions are shown in mm.

Bottom View of Body with KineMOUNT and PL Mounting Adapter (with KineBACK-W)

Dimensions are shown in mm.

Back View

Dimensions are shown in mm.

Kinefinity Inc.

www.kinefinity.com

Address: Bldg #1, Enji West Park, No.1, Fuwailiangjiadian, Haidian
District Beijing, 100142, China

Phone: 0086-10-51243411

Email: support@kinefinity.com, sales@kinefinity.com