

# RovoCam

## UltraHD HDBaseT Camers System

# Installation & Operation Guide

Version 1.0r2

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*Telephone:* +1.530.271.3190

*FAX:* +1.530.271.3140

*Web:* <http://www.aja.com>

*Support Email:* [support@aja.com](mailto:support@aja.com)

*Sales Email:* [sales@aja.com](mailto:sales@aja.com)

# Chapter 1: RovoCam System Introduction

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## System Overview

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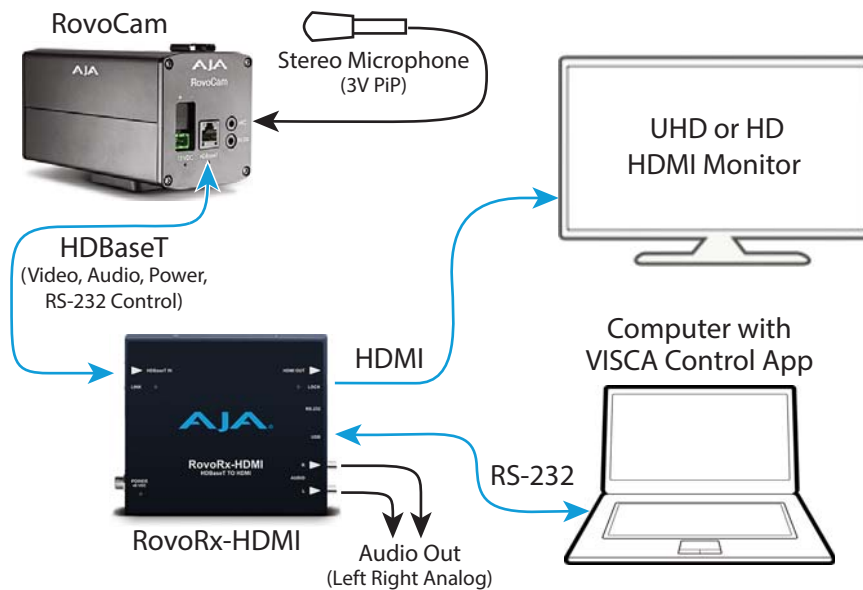
RovoCam is AJA's first compact block camera for industrial, corporate, security, ProAV and broadcast applications. Gorgeous UltraHD and HD imagery is obtained with superior Sony® optics with built-in 12x optical zoom and 20x digital zoom (with Sony's Super Resolution Zoom), auto and manual focus. Housed in a rugged machined aluminum case with multiple mounting options, RovoCam delivers the flexibility, power and feature set to accommodate a variety of applications.

A single Cat5e/6 cable carries all uncompressed video, two-channel audio, VISCA camera control, and power for the simplest installation ever due to RovoCam's integrated HDBaseT interface. Delivering this much functionality and power with single cable connectivity dramatically simplifies the installation, camera setup and footprint requirements.

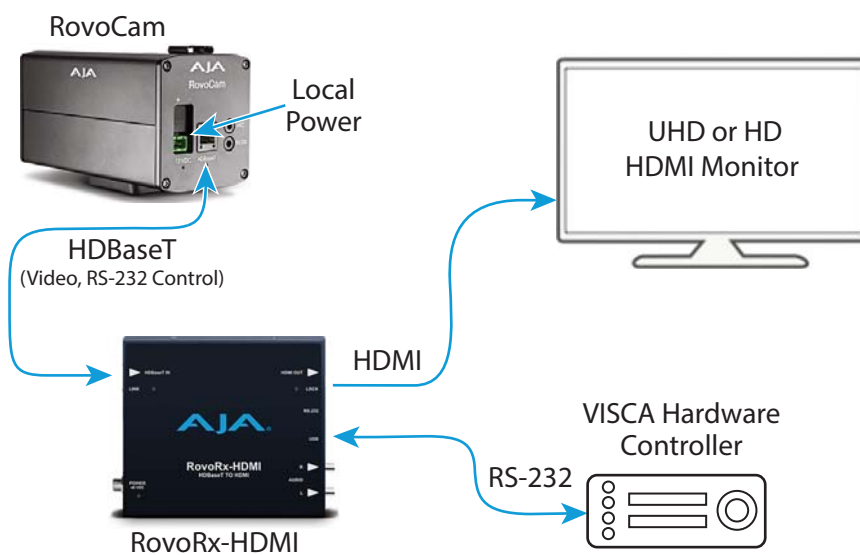
RovoRx-HDMI, the companion receiver unit, offers the simplest reception option for RovoCam with an HDMI output to drive displays, and all video/audio signals, power, and control offered over HDBaseT. RovoRx-HDMI is an UltraHD/HD HDBaseT Receiver with integrated HDMI video and audio outputs specifically designed to receive RovoCam's output. This allows one to receive the RovoCam's output up to 100m (328') away from the camera itself and display the gorgeous output on a display wherever needed. The HDBaseT connector on RovoRx-HDMI further allows for camera interaction, power, and control, all over a single Cat5e/6 cable, greatly simplifying workflows and systems integration.

**NOTE:** *The HDBaseT format uses RJ45 connectors but does not support Ethernet. HDBaseT is point-to-point signal transport.*

**Figure 1. RovoCam System Diagram, with Audio and Computer**



**Figure 2. RovoCam System Diagram, with Hardware Controller**



## Features

### Hardware

- RovoCam**
  - UltraHD and HD video output (see ["RovoCam Specifications" on page 29](#))
  - Sensor
    - Progressive scan CMOS, 1/2.3 type Exmor R™, 3840x2160
    - 8.93 Mega Pixels
  - Zoom Lens

- Focal length: 3.9mm to 46.8mm
- F1.8 to 2.0
- Horizontal Angle of View
- 12x optical zoom
- 12x digital zoom
- 1 x HDBaseT connector (RJ45)
- 1 x Stereo mini audio input (3V PIP)
- 1 x 3.5mm TRS connector RS-232
- 48v DC power in

- RovoRx-HDMI**
- 1 x HDMI 1.4b output (see [“RovoRx-HDMI Specifications” on page 31](#))
  - 2 x RCA analog audio outputs
  - 1 x USB for firmware upgrades
  - 1 x RS-232 for RovoCam control via SONY VISCA
  - 1 x HDBaseT connector (RJ45)
  - 48VDC power supply (included)

## Software

- AJA RovoControl software available for download from the AJA website
- RovoCam accepts VISCA camera control
- A variety of third-party software controllers are also available. See [“Chapter 5: Third Party Control Solutions on page 28”](#) for more information.

## Warranty

- Three year AJA warranty on RovoCam
- Five year AJA warranty on RovoRX-HDMI

## What’s In The Boxes?

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When you unpack your product you’ll find the following components:

- RovoCam Box**
- AJA RovoCam camera
  - Phoenix/Euroblock style plug-in power adapter (optional use with local power)
- RovoRX-HDMI Box**
- AJA RovoRX-HDMI Mini-Converter
  - 48VDC power supply with AC cable
  - USB to RS-232 adapter cable

In addition the following item is available from AJA as part of the HB-CABLE-KIT:

- 3.5mm TRS to DB9 adapter cable

*NOTE: This cable is also widely available for purchase from other sources.*

Please save all packaging for future shipping.

## In This Manual

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- Chapter 1** Introduces the RovoCam system, briefly describing the components, features, box contents, and system requirements.



- Chapter 2** Describes the RovoCam hardware and connections.
- Chapter 3** Describes the RovoRx-HDMI hardware, connections, and system installation.
- Chapter 4** Describes the AJA's RovoControl camera control software.
- Chapter 5** Describes RovoCam system third-party control software.
- Appendix A** Provides specifications for various aspects of the system.
- Appendix B** Contains important caution, warning, and compliance statements.

# Chapter 2: RovoCam

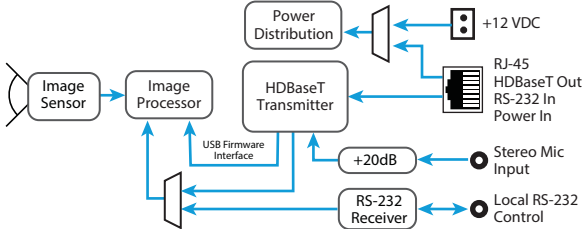


## Overview

When using the product, you'll make media cable connections to a variety of equipment based on how the system is being used.

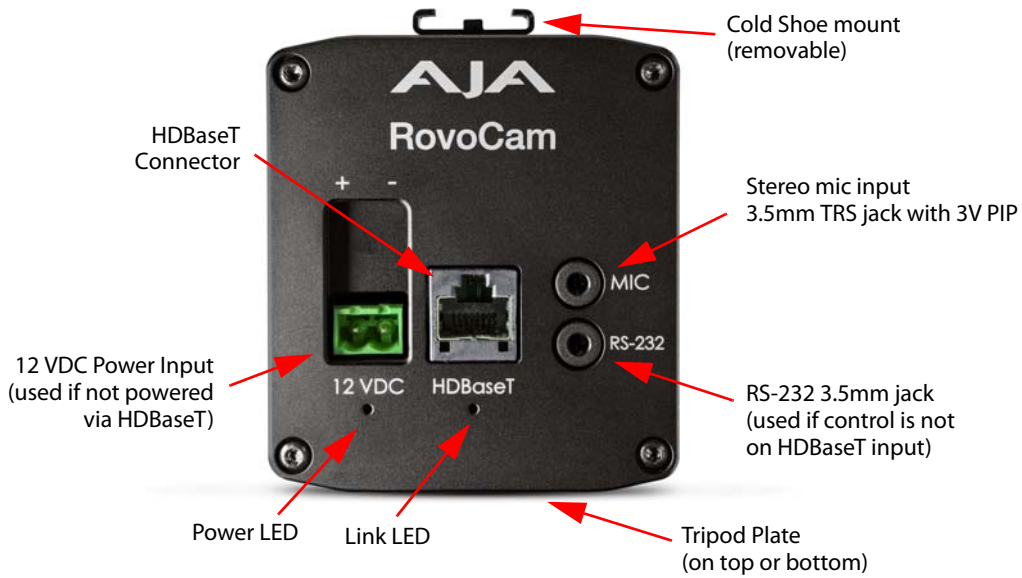
## Block Diagram

Figure 3. RovoCam Simplified Block Diagrams



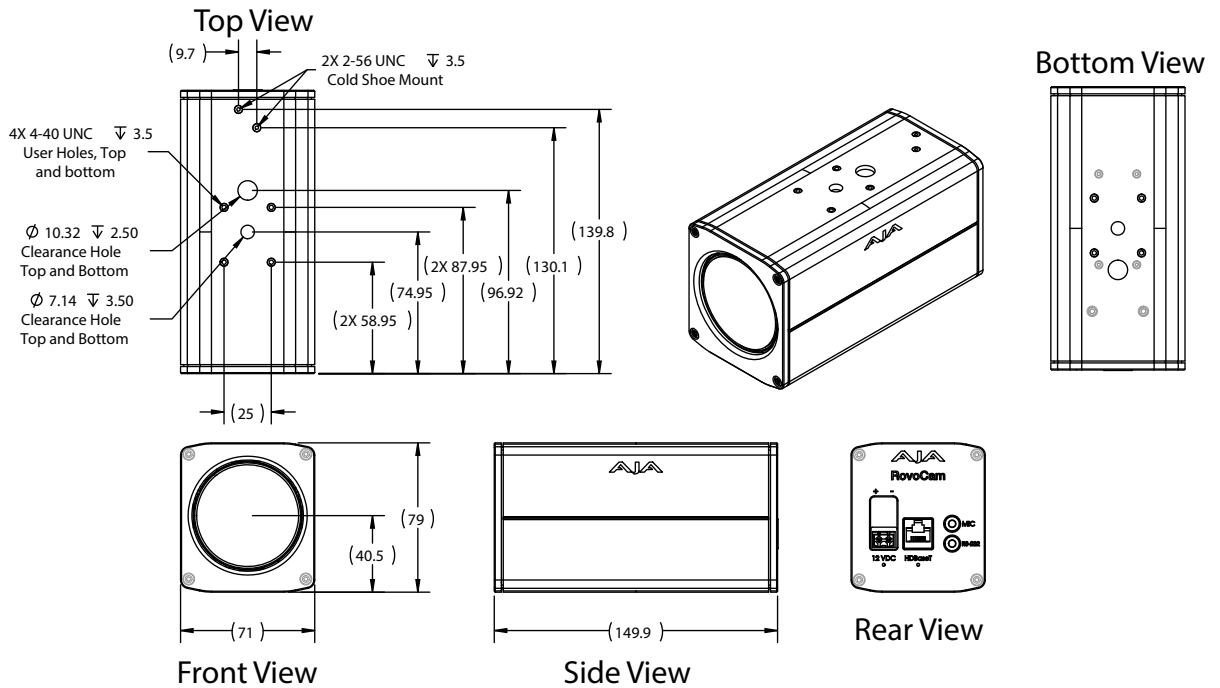
# Connectors

**Figure 4. RovoCam Rear View**



# Dimensions

**Figure 5. RovoCam Dimensions**

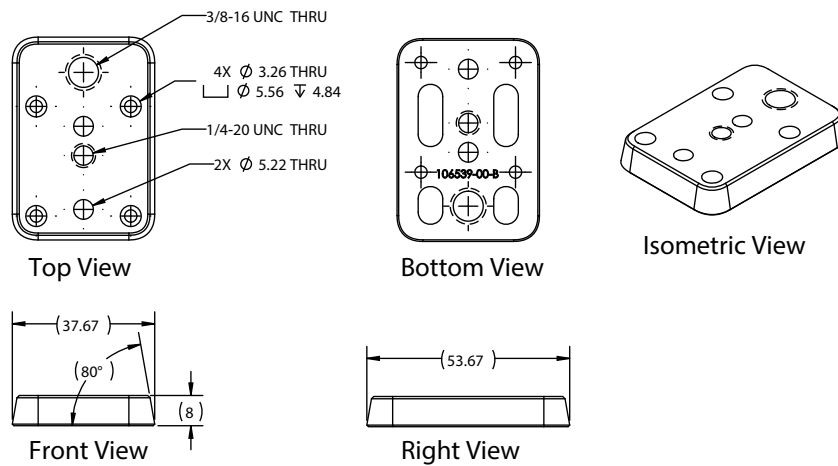


# Camera Installation

## Tripod Plate

The removable tripod plate can be mounted on the top or bottom of the camera (use the software controlled image flip feature for upside down mounting). The tripod plate has 1/4-20 and 3/8-16 threaded holes and guide pin holes, and is attached to the camera via four 4-40 cap screws, 5/64 hex heads.

**Figure 6. Tripod Plate Dimensions**



## Cold Shoe

The removable cold shoe plate can be mounted on the top of the camera, and can hold a microphone or light. It is held in place with two 2 Phillips head screws.

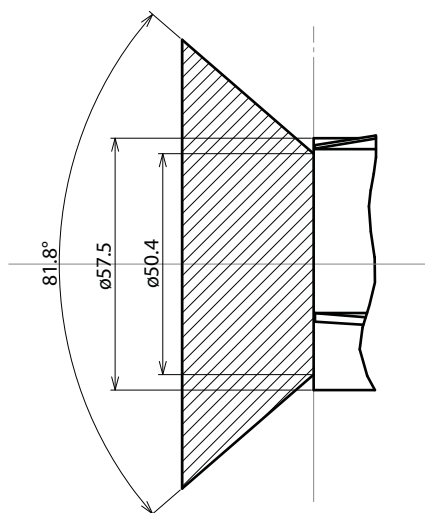
## Enclosure

The small block camera outside dimensions are suitable for installation into a variety of environmental enclosures. Examples of compatible enclosures include:

- SONY SNCUNI (indoor use)
- SONY SNCUNIHB/1 (outdoor use)

**Eclipse** When selecting the housing, refer to the dimensional allowance as shown in [Figure 7](#).

**Figure 7. Eclipse Diagram**



## System Installation

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See [“Installation with RovoCam” on page 16](#) for instructions on installing the RovoCam with an RovoRx-HDMI receiver.

## General Precautions

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The following general precautions apply to RovoCam operation.

### Operation

Start the camera control software on your computer after you turn on the camera and the image is displayed.

### Operation and Storage Locations

Do not shoot images that are extremely bright (e.g., light sources, the sun, etc.) for long periods of time. Do not use or store the camera in the following extreme conditions:

- Extremely hot or cold places (operating temperature (0° C to +55° C (32° F to 131° F)
- Close to generators of powerful electromagnetic radiation such as radio or TV transmitters
- Where it is subject to fluorescent light reflections
- Where it is subject to unstable (flickering, etc.) lighting conditions
- Where it is subject to strong vibration
- Where it is subject to radiation from laser beams

### Care of the Unit

Remove dust or dirt on the surface of the lens with a blower (commercially available).

## Other

- Design and specifications are subject to change without notice.
- Do not apply excessive voltage. (Use only the specified voltage.) Otherwise, you may get an electric shock or a fire may occur.
- The CMOS image sensor and IC included in this camera may break if exposed to static electricity. When directly handling this camera, wear an antistatic strap, spread a conductive sheet or similar item under your workbench, and take measures to eliminate static electricity.
- In case of abnormal operation, contact AJA support or the store where you purchased the product.

## Phenomena Specific to CMOS Image Sensors

The following phenomena that may appear in images are specific to CMOS image sensors. They do not indicate malfunctions.

### Rolling Shutter

As CMOS image sensors use shutters that capture images line-by-line, there is a slight time difference between the top and bottom of an image. As a result, images may appear skewed if the camera is moved.

### White Flecks

Although the CMOS image sensors are produced with high-precision technologies, fine white flecks may be generated on the screen in rare cases, caused by cosmic rays, etc.

This is related to the principle of CMOS image sensors and is not a malfunction.

The white flecks especially tend to be seen in the following cases:

- When operating at a high environmental temperature
- When you have raised the master gain (sensitivity)
- When operating in Slow-Shutter mode

### Aliasing

When fine patterns, stripes, or lines are shot, they may appear jagged or flicker.

## Phenomena Specific to Lenses

### Ghosting

If a strong light source (e.g., the sun) exists near the incidence angle of the lens, bright spots may appear in the image due to diffuse reflection within the lens.

# Chapter 3: RovoRx-HDMI

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## Overview

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RovoRX-HDMI converts uncompressed HDMI Video/Audio signals up to 4K/UHD for reception via HDBaseT over CAT type twisted pair cable. It can also send and receive RS-232 control signals over the same cable. Video and audio can be received by this device over distances up to 328 feet/ 100 meters on Cat 6a cable. See ["Specifications" on page 29](#) for a complete list of supported formats, frame rates, and CAT cable requirements.

The simple and economical RovoRx-HDMI is designed to pair with the AJA RovoCam camera, to provide video, audio, control and power transmission using a single CAT cable.

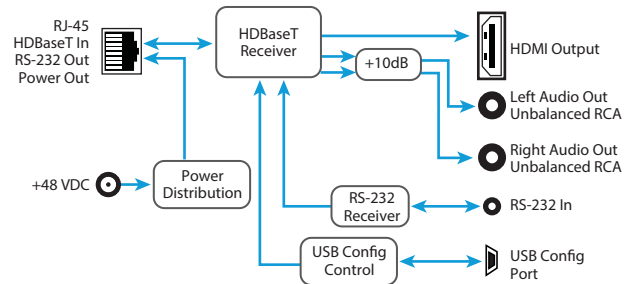
RovoRx-HDMI can also be used with any compatible HDBaseT transmitter, including AJA's HB-T-HDMI and HB-T-SDI Mini-Converters.

## Features

- HDBaseT Certified 4K/UHD Signal Extender
- Extend uncompressed 4K, UltraHD or HD HDMI signal up to 100m over Ethernet cable
- RS-232 control on the same RJ45 cable
- 48VDC power supply (included)
- Optional RS232 Cable Kit (HB-CABLE-KIT)
- Two channel unbalanced analog audio outputs, when used with RovoCam and optional stereo microphone
- Up to eight channels of embedded audio when used with a compatible HDBaseT transmitter
- 5-year warranty

## Block Diagram

**Figure 8. RovoRx-HDMI Simplified Block Diagrams**



## I/O Connections

**Figure 9. RovoRx-HDMI Converters**



**NOTE:** The LINK LED, when green, indicates an active HDBaseT connection.

**NOTE:** The LOCK LED, when blinking green, indicates a lock to a valid video source. If the LOCK LED is not blinking, the source video is encrypted (RovoCam does not encrypt video).

## System Installation

### Installation with RovoCam

Typically, installation consists of the following steps:

1. Ensure the RovoRx-HDMI converter is disconnected from power.



2. Connect the RovoCam HDBaseT RJ-45 output to the HDBaseT RJ-45 input connector with an approved CAT cable type and length.
3. Connect the RovoRx-HDMI output to the HDMI input of a destination device (in this example, an HDMI monitor) with an HDMI cable.
4. Connect the threaded 48 VDC power connector to the RovoRx-HDMI, and then connect the provided DC power supply to an AC power source with the supplied cable.

*NOTE: The RovoCam camera ships configured for UltraHD 29.97 video format.*

5. Power up the HDMI monitor. If the monitor supports the UltraHD 29.97 format, without additional configuration you should see the camera image on the monitor. This confirms the camera and links are working.
6. Connect a control source to the RS-232 input connector, using a 3.5mm TRS cable.
7. Install and configure your third-party control application for operation with the RovoCam system.

**Audio Level** The RovoCam microphone input is a single ended stereo audio input with a fixed 20dB of gain. The RovoRx has a fixed audio gain of 10dB, giving a system gain of 30dB which will bring a typical microphone output up to line level.

**System Ground and Audio** When the RovoCam is used with RovoRx, the power provided by RovoRx has 1500V isolation from ground, meaning that the RovoCam is electrically isolated from ground. When RovoCam is used with an external microphone, the microphone is also isolated from ground, and there will be no noise issues. If you use the RovoCam microphone input from source equipment which is grounded it can cause ground loops in the system and unintended noise will be heard on the microphone input. To correct this, the user can ground the RovoCam camera by connecting a ground wire to the negative input of the 12V DC power connection. This will effectively tie the camera to earth ground and eliminate the unwanted noise.

## **Pairing RovoRx-HDMI with HB-T Transmitters**

RovoRx-HDMI can also receive HDBaseT signals up to UltraHD from other HDBaseT transmitters. Examples include AJA's HB-T-SDI and HB-T-SDI model Mini-Converters (but HB-T-SDI does not support UHD).

Up to 8 embedded audio channels (4 stereo pairs) at 24-bit/48 KHz can be carried from input to output on either HDMI/HDMI and SDI/HDMI pairs.

# Chapter 4: Operation with RovoControl

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## Introduction

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This chapter describes how to install and operate the RovoControl software available from AJA.

A wide variety of third-party control solutions are also available. See "[Chapter 5: Third Party Control Solutions on page 28](#)".

## RovoControl Overview

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RovoControl is a free application from AJA intended to allow easy configuration and Control for RovoCam.

RovoControl uniquely offers electronic PTZ for moving an HD 1080p box around the UltraHD frame, allowing Pan and Tilt for HD output.

## RovoControl Features

RovoControl v1.0 software features include:

- Zoom, focus and iris control.
- Electronic PTZ to move a 1080p box around an UltraHD frame for Region of Interest (ROI) Pan and Tilt extraction for HD workflows.
- Change resolution dynamically between UltraHD and HD options.
- Windows and Mac OS X cross platform support.

## RovoControl Installation

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1. Download from the AJA website the free RovoControl version of software for your computer operating system (.msi for Windows, .dmg for Mac).
2. Install the RovoControl software onto your computer, using the standard procedure for your operating system.
3. Connect the RovoRX-HDMI converter to RovoCam with an RJ-45 cable.
4. Connect the RovoCam HDMI Out port to an HDMI monitor using an HDMI cable.
5. Connect one of your computer's USB ports to the RovoRX-HDMI RS-232 port, using the provided 1/8 in. TRS adapter cable.

*NOTE: If you use a 3rd party RS-232 adapter, be sure to install the manufacturer's drivers for the operating system you are using.*

6. Connect the RovoRX-HDMI to a power source. This provides power to both the RovoRX-HDMI and RovoCam.
7. Under most circumstances, on power up the native Windows or Mac drivers will recognize the RovoRX-HDMI RS-232 connection.
8. Launch the RovoControl application.

*NOTE: The RovoControl application needs to detect a valid RovoCam is attached before it can complete its launch (Waiting for RovoCam connection... message)*

9. When connected to RovoCam, a Camera Select button at the bottom of the screen will be colored blue (see [Figure 10 on page 19](#))
10. The RovoControl application now gives you control of the RovoCam.

## RovoControl General Operation

### User Interface

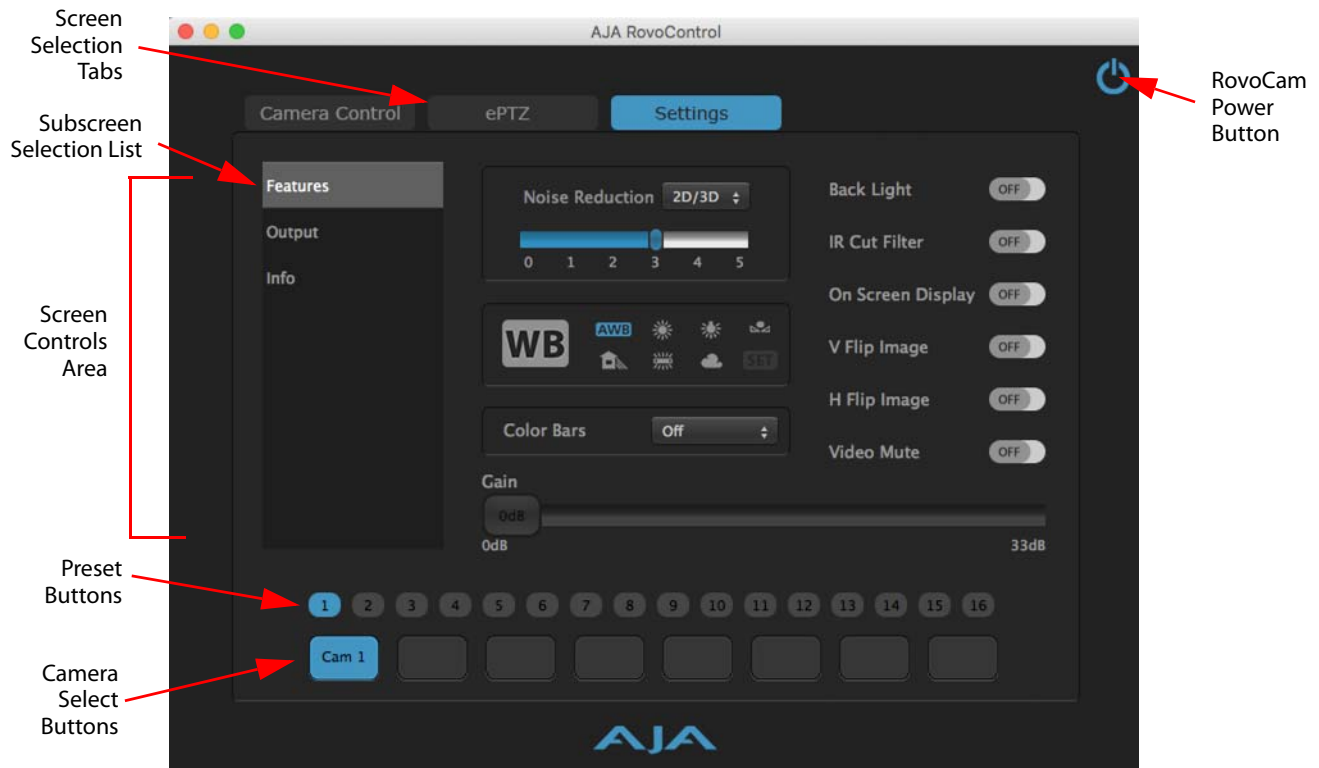
The RovoControl user interface has tabs at the top to select different control screens.

Various user controls are located in the center of each screen. On the Settings screen subscreens can be selected from the list on the left.

On the upper right is a Camera power button, which toggles power to the selected RovoCam on and off.

At the bottom of all the control screens are labeled Camera Select buttons and numbered Preset buttons.

**Figure 10. RovoControl Example User Interface Screen**



### Screen Control Summary

Click on one of the upper tabs to go to that control screen. Click on a listed subscreen name to go to that subscreen.

**Tooltips** Holding the cursor over a control icon brings up a tooltip explaining that feature.

- Control Colors**
- Controls that are colored blue are selected and active.
  - Controls colored light gray are active but not selected.
  - Controls colored dark gray are inactive. Another control setting is usually required to make a dark gray control operational.

**Mouse and Keyboard Control** Various slider and on/off widgets are available for mouse control.  
Some controls have drop-down lists for mouse selection, and some have numeric or text entry boxes for use with a keyboard or keypad.

**Control Menus** Right clicking some controls can open a menu of selections for that control.  
Right clicking on the background of a RovoControl screen brings up a menu of general functions.

- Refresh - Refreshes the UI screen display.
- Lens Initialize - Initializes the zoom and focus of the lens.
- Default controls (see below)

**Camera Select Buttons** When more than one RovoCam is connected, clicking on a different lit Camera Select button chooses that camera for RovoControl operation.

**Presets** The 16 smaller buttons near the bottom of all the RovoControl screens can be used to set and recall Presets (see below).

## About RovoCam Defaults and Presets

A RovoCam Default consists of the settings that the camera will use when it is power cycled, when its output format is changed, or when Recall Default is selected. The user can configure the camera for baseline operation and then use Set Default to save those settings for reuse. .

**Table 1. Default Settings**

Camera Control	Settings Features
Aperture	Back Light
Shutter speed	IR Filter
Priority	V-Flip
Focus	H-Flip
Zoom	Noise Reduction
	White Balance
	Gain
	On Screen Display (not in Presets)
	Back Light
	IR Filter
	V-Flip
	H-Flip
	Noise Reduction

**Table 2. Settings Not Included in Defaults**

<b>Camera Control</b>	<b>Settings Features</b>
Zoom Speed	Video Mute
	Color Bars

**User and Factory Defaults** After right clicking on the background, default controls are available:

- Set Default - Saves the current settings as a Default.
- Recall Default - Recalls the last saved Default setting above.
- Set Factory Default - Recalls Factory Default settings.

**RovoCam Presets** Sixteen different Presets can be saved, which recall the same settings as Default except the On Screen Display is not included.

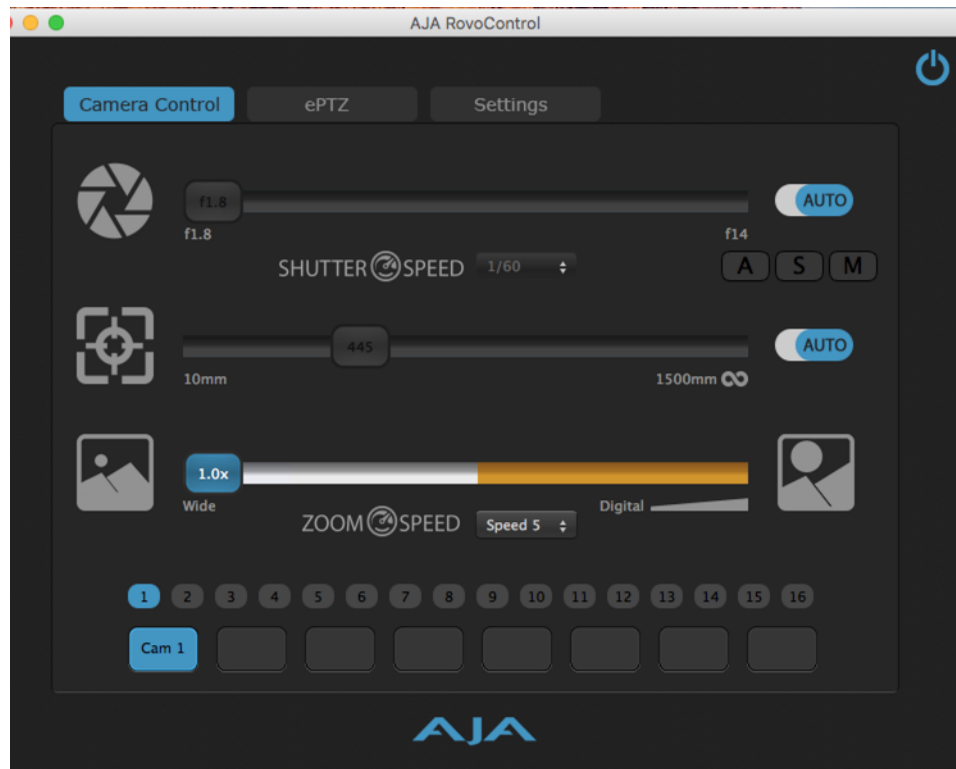
**Set Preset** Adjust all the settings you will want to recall later. Then right click on one of the numbered Preset buttons and choose the Set option. Those settings are saved to that preset.

**Recall Preset** Left clicking on a Preset button that has been set recalls those settings. Left clicking on a preset and selecting Recall also recalls that preset.

**Restore Default To A Preset** To restore Default to a Preset, left click on the screen background, select Recall Default, then right click on the desired Preset and choose Set.

Default can be useful for initially setting up Presets. You can recall and save the Default to all the Presets, and then you can change those baseline settings as needed for each individual Preset.

# Camera Control Screen



## Aperture Control Group

The top set of controls adjust RovoCam lens aperture and shutter speed.

**AUTO Aperture Button** When On (right and colored blue) aperture and shutter speed is controlled automatically. When Off (left and colored gray) other controls become active.

- A** Aperture Priority - Selecting **A** allows you to select the aperture using the slider (f1.8 to f14 or closed). Shutter speed is set automatically.
- S** Shutter Priority - Selecting **S** allows you to select the shutter speed from the drop-down list. Aperture is set automatically.
- M** Full Manual - Selecting **M** gives you full control of both aperture and shutter speed.

## Focus Control Group

The center set of controls adjust focus.

**AUTO Focus Button** When On (right and colored blue) focus is controlled automatically. When Off (left and colored gray) the manual focus slider becomes active.

**Manual Focus Slider** Click and slide the control to change the focus.

Click anywhere on the slider to immediately go to that focus setting. Range is 10mm to 1500mm focal length.

## Zoom Control Group

The lower controls adjust zoom. These controls are always active on this screen.

**Zoom Icons** Clicking on the left icon (Wide) moves the zoom from its current setting in the wide angle direction at the Zoom Speed selected below.

Clicking on the right icon (Tele) moves the zoom from its current setting in the telephoto direction as the Zoom Speed selected below.

**Zoom Slider** Click anywhere on the slider to quickly go to that zoom setting. Range is 1x to 144x, depending on type of zoom.

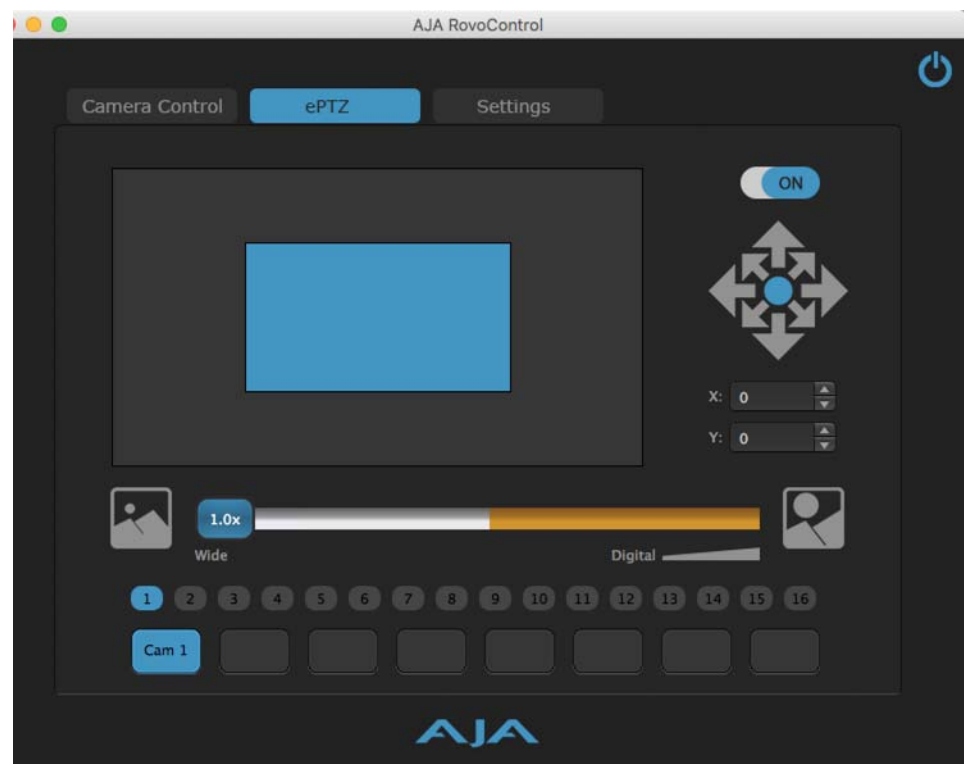
**Zoom Speed** A list of zoom speeds (from slowest 0 to fastest 7) is available by clicking on this control.

**Type of Zoom** Right clicking on a Zoom control brings up a list of types to zoom.

- Zoom Optical (12x) - Only optical zoom is used.
- ZoomSuper (20x) - Uses Sony Super Resolution Zoom.
- Zoom Optical + Digital (144x) - Permits full zoom capabilities of the camera.

**Image Stabilizer** Also included in this list is an Image Stabilizer control (On or Off).

## ePTZ Control Screen



**NOTE:** The ePTZ screen is only operational when an UltraHD (3840) format has been selected in the Settings/Output screen.

**ON Button** With an UltraHD output selected, clicking the **On** button at the upper right activates and deactivates the ePTZ feature. When On, a HD resolution portion (Region of Interest) of the UltraHD signal is selected for display. A UltraHD monitor is not required to view this signal.

**Region of Interest Screen** The blue box represents the region of the UltraHD screen currently being displayed. You can click and drag the box to virtually pan and tilt the image.

**Pan Tilt Controls** The diamond shaped controls on the right allow you to click an arrow to move the region a few pixels in that direction. Clicking on the center circle moves the region to the exact center of the UltraHD image.

**X Y Controls** You can also move the region by entering X and Y values in their numeric fields, and by clicking their up and down arrow buttons.

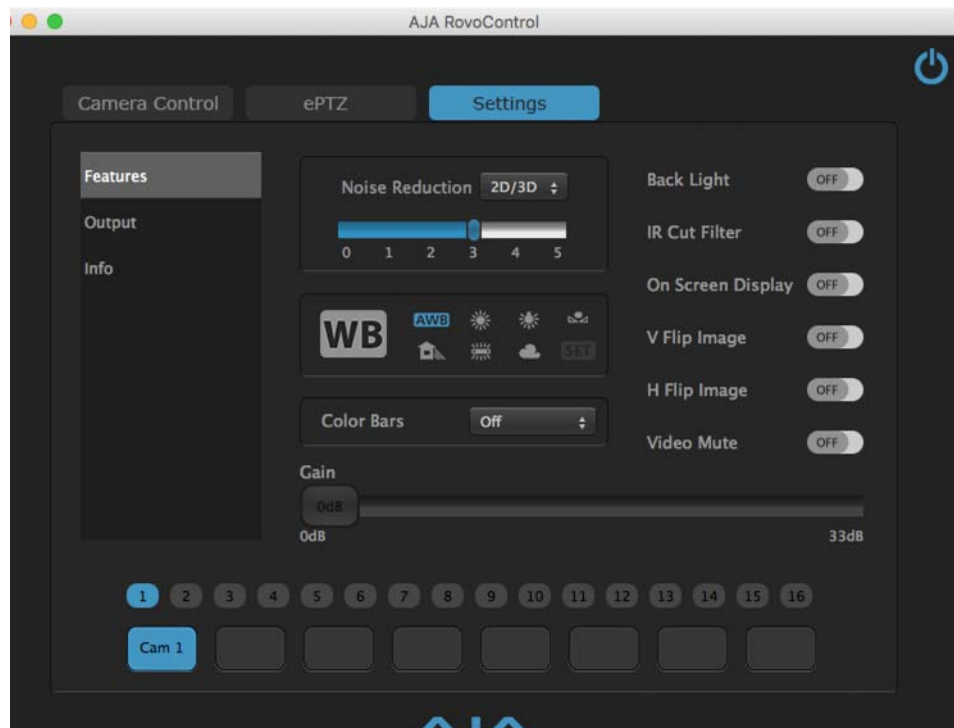
**ePTZ Zoom Slider** The Zoom slider on this screen works the same as those on the Camera Control screen (see *"Zoom Control Group" on page 23*), except there is no speed control. The speed control setting on the Camera Control screen is also used by the ePTZ Zoom slider.

## Settings Control Screens

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Three different control screens are available under Settings.

### Features Screen



**Noise Reduction** The Noise Reduction (NR) function removes noise (both random and non-random) to provide clearer images. This function has six steps: levels 1 to 5, plus 0 (off), controlled with a slider. The NR effect is applied in levels based on the gain, and this slider value determines the limit of the effect. In bright conditions, changing the NR level will not have an effect.



- Type**
- Std - Performs standard noise reduction at the selected level.
  - 2D/3D - Performs 2D/3D noise reductions at the selected level, which can improve the clarity of moving images.

**White Balance** The following White Balance setting buttons are available, arranged in this order.

<b>Auto</b>	<b>Daylight</b>	<b>Indoor</b>
<b>Auto Trace</b>	<b>Sodium</b>	<b>Outdoor</b>

- Color Bars** Three different test signals are available:
- Off, no test signal, normal camera image output,
  - 8 Bar 100% (color)
  - 7 Bar 100% (color)
  - Gray Scale (monochrome)

**Gain** The Manual Gain Control slider affects the overall gain of the image. The current setting is displayed on the slider. Range is 0 to 33dB.

*NOTE: The Gain control is only active when the Aperture Control Auto setting is Off and Manual is selected on the Camera Control Screen*

**Other Features** On off buttons on the right activate and deactivate the following features:

**Backlight** Backlight Compensation On or Off - When the background of the subject is too bright, or when the subject is too dark due to shooting in AE mode, back light compensation will make the subject appear clearer.

**IR Cut Filter** ICR (IR Cut-Removable) Mode On or Off - An infrared (IR) cut filter can be disengaged (On) from the image path for increased sensitivity in low light environments. When set to On the image becomes black and white.

*NOTE: In Auto Exposure mode, the IR filter will automatically move into and out of the image path depending on the ambient light, allowing the camera to be effective in day/night environments.*

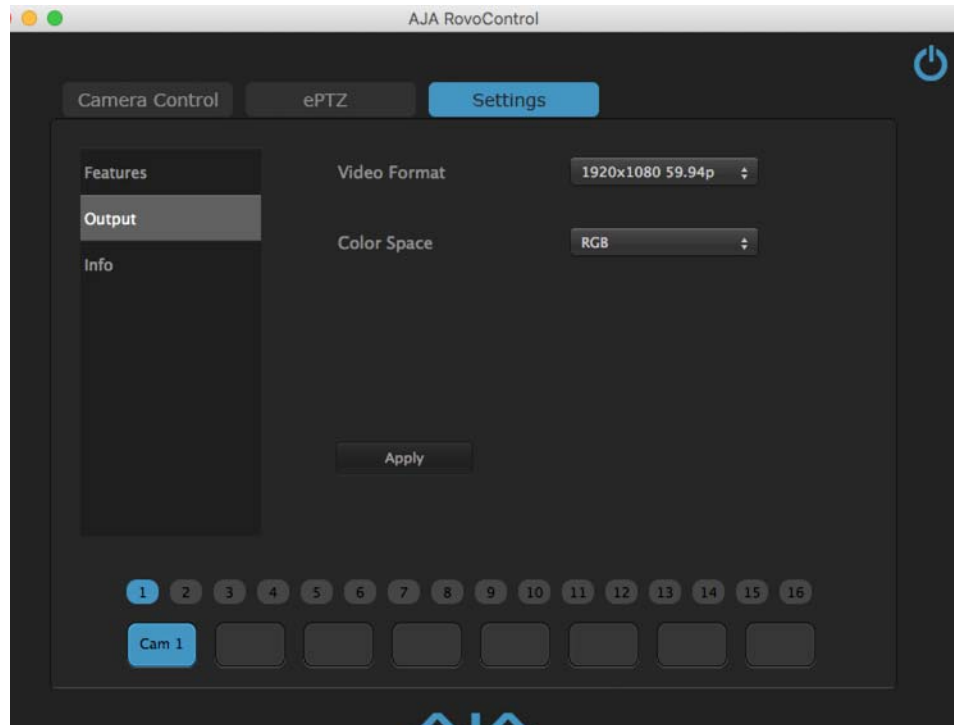
**On Screen Display** Text display, showing the current video format, region of interest, and various settings.

**V Flip Image** Flips the image vertically.

**H Flip Image** Flips the image horizontally.

**Video Mute** Blanks the Screen (blue) and sends out a synchronizing signal.

## Output Screen

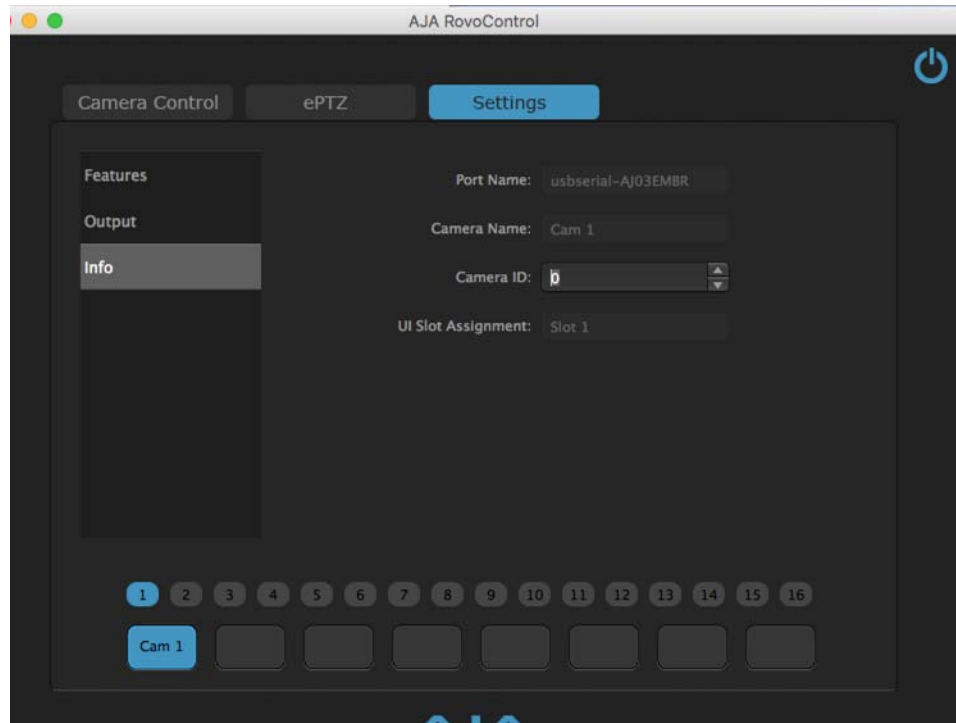


**Apply Button** Some settings selected on this screen are not applied until the **Apply** button is used and may require resetting RovoCam.

**Video Format** Select the desired RovoCam format. Choosing a 3840 UltraHD format permits use of the ePTZ feature.

**Color Space** Select RGB or YUV.

## Info Screen



This screen displays information about the connected RovoCam. Only the Camera ID control is active.

**Camera ID** When multiple RovoCams are in use, you can assign a different number to each camera for reference UI slot assignment. This allows you to change which slot in the RovoControl User interface that camera uses.

# Chapter 5: Third Party Control Solutions

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## Overview

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Because the RovoCam system uses the industry standard SONY VISCA camera control protocol, a wide variety of third- party control solutions are available. Refer to the software providers for specific computer system requirements.

Listed below are some providers, products, and links:

*NOTE: Some controllers will require a serial null modem to operate with RovoCam.*

### RocoSoft

- RocoSoft PTZ tester software, free utility download:  
<http://www.rocosoft.com/download/software/RocosoftPTZCameraTester.EXE>
- PTZJoy - PTZ Camera Controller
- PTZJoy Pro- PTZ Camera Controller
- PTZJoy STUDIO- PTZ Camera Controller

**Contact** <http://www.rocosoft.com/ptz-control-products/broadcasting-ptz-camera-controller-software>

### Serial Port Tool

- PTZ Controller (version 3.2)

**Contact** <http://www.serialporttool.com/PTZ.htm>

# Appendix A: Specifications

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## RovoCam Specifications

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**Camera Module** • Sony FCB-ER8300

### Video Formats

**UltraHD** • 3840 x 2160p 25, 29.97

**HD** • 1080p 50, 59.94

• 1080i 25, 29.97

• 720p 50, 59.94

**Other** • 720 x 480p 59.94

• 720 x 576p 50

### Pixel Format

• YUV 4:2:2

• RGB 4:4:4

### Sensor

• Progressive scan CMOS, 1/2.3 3840 x 2160 8.93 Mega Pixels

### Image Processor

• Noise reduction (2D/3D)

• Visibility Enhancer ICR (Day and Night) Slow AE

• High Sensitivity

• Gamma

• Character Generator

• Defog

• Color Enhancement Picture Effect

• Spherical Privacy Zone Masking

• E-Flip

### Lens

**Focal length** 3.9mm to 46.8mm

**Focus** • Auto, Manual, One push trigger mode

**Lens Control** Zoom, Focus, Iris, IRCS

**F value** 1.8 to 2.0

**Horizontal Angle of View** 70.7 deg (wide), 6.2 deg (tele)

**Magnification** • 12x optical zoom

• 20x or 24x with Super Resolution Zoom

**Digital Zoom** • 12x

**Super Resolution Zoom** • UltraHD: 1.67x (max 20x combined with 12x optical zoom)  
• HD: 2.0x (max 24x combined with 12x optical zoom)

## White Balance

• Auto, ATW, Indoor, Outdoor, One push, Manual, Sodium Lamp

## Video Output Digital

• HDBaseT (RJ-45, Requires Receiver Unit such as RovoRx-HDMI)  
• Cat 5e 70m (230 ft) or Cat 6a 100m (328 ft)?

**Table 3. Video Resolutions and Performance**

W x H	Frame Rate	Color Sampling	Max. Cable Length		Max. Bit Depth
			Cat 5e/6	Cat 6a/7	
3840x2160	< 30 fps	4:2:2	70 meters	100 meters	8-bit
1920x1080	< 30 fps	4:2:2	100 meters	100 meters	8-bit
	>30 fps	4:2:2	100 meters	100 meters	8-bit
		4:2:2	100 meters	100 meters	8-bit
1280x720	>30 fps	4:2:2	100 meters	100 meters	8-bit
720x480	>30 fps	4:2:2	100 meters	100 meters	8-bit

## Audio Input Analog

• 1 x 3.5mm TRS Input with 3V PiP (Plug in Power)

## Control

• 1 x 3.5mm TRS Input for RS-232/VISCA camera control  
• RS-232 over HDBaseT from the RovoRx-HDMI unit

## User Interface

• VISCA Compatible Control Software and Hardware  
• AJA Control Software  
• 1 x USB to 3.5mm TRS cable for RS-232 control

## Size

**Width** 2.8" (71mm)

**Length** 5.9" (149.9mm)

**Height** • Camera only: 3.1" (79mm)  
• Including tripod mount and cold shoe: 3.6" (91.4mm)

## Weight

• 2.2 lbs (1kg)

## Power

• Over HDBaseT Conforming to IEEE802.3af-2003 mode A, 6W typical, 8W max, -OR-  
• 10-12Vdc 2 pin pluggable terminal block, 0.6A max, 6W typical, 8W max

## Environment

Safe Operating Temperature Range: 0°C to +55°C (32°F to 131°F)

# RovoRx-HDMI Specifications

## Video Input

- HDBaseT (RJ-45)

## Video Formats

- 4K**
  - 4096 x 2160P 50, 59.94, 60 (8-bit 4:2:0)
  - 4096 x 2160P 23.98, 24, 25, 29.97, 30
- UltraHD**
  - 3840 x 2160P 50, 59.94, 60 (8-bit 4:2:0)
  - 3840 x 2160P 23.98, 24, 25, 29.97, 30
- 2K**
  - 2048 x 1080p 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
- HD**
  - 1080p 23.98, 24, 25, 29.97, 50, 59.94, 60
  - 1080i 25, 29.97
  - 720p 25, 29.97, 50, 59.94, 60
- SD**
  - 525i
  - 625i
- VESA** Wide range of VESA formats supported for pass through see associated chart on VESA formats.

**Table 4. VESA Display Resolutions and Performance**

WxH	Frame Rate	Color Sampling	Max. Cable Length		Bits Per Pixel
			Cat 5e/6	Cat 6a/7	
640x480	to 85 fps	4:4:4	100 meters	100 meters	24-bits
800x600	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1024x768	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1152x768	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1280x768	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1280x800	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1280x1024	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1360x768	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1366x768	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1400x1050	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1440x900	to 120 fps	4:4:4	100 meters	100 meters	24-bits
1600x1200	to 75 fps	4:4:4	100 meters	100 meters	24-bits
	85 to 120 fps	4:4:4	70 meters	100 meters	24-bits
1680x1050	to 85 fps	4:4:4	100 meters	100 meters	24-bits
	120 fps	4:4:4	70 meters	100 meters	24-bits
1920x1200	to 120 fps	4:4:4	70 meters	100 meters	24-bits
1920x1440	to 60 fps	4:4:4	70 meters	100 meters	24-bits
2560x1600	to 60 fps (reduced blanking time)	4:4:4	70 meters	100 meters	24-bits

## Video Output

- HDMI 1.4b

## Audio Output Digital

- 8-Channels (4 pairs) of HDMI embedded audio supported
- Rates supported: 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, and 96 kHz

## Audio Output Analog

- 2 x RCA connectors, 2-channel unbalanced \*
- \*This feature only works when used in conjunction with RovoCam

## RS-232

- 1- 3.5mm TRS Input for RS-232/VISCA Bi directional signals

## RS-232 Cable Option

The RS-232 pinout diagram provided below pertains to the AJA cable bundle provided as an optional purchase.

**DB9 Pinout** This chart depicts the complete RS-232 pinout specification. As noted, only three connections are commonly used today and are supported in the AJA cable option.

### DTE to DCE Connections:

DTE Device (Computer)			DB9	DCE Device (Modem)			DB9
Pin #	DB9	RS-232 Signal Names	Signal Direction	Pin #	DB9	RS-232 Signal Names	
#1	Carrier Detector (DCD)		←	#1	Carrier Detector (DCD)		CD
#2	Receive Data (Rx)	*	←	#2	Receive Data (Rx)	*	RD
#3	Transmit Data (Tx)	*	→	#3	Transmit Data (Tx)	*	TD
#4	Data Terminal Ready		→	#4	Data Terminal Ready		DTR
#5	Signal Ground/Common (SG)	*	—	#5	Signal Ground/Common (SG)	*	GND
#6	Data Set Ready		←	#6	Data Set Ready		DSR
#7	Request to Send		→	#7	Request to Send		RTS
#8	Clear to Send		←	#8	Clear to Send		CTS
#9	Ring Indicator		←	#9	Ring Indicator		RI
Soldered to DB9 Metal - Shield			—	Soldered to DB9 Metal - Shield			F GND

\* As is common current practice, only these pins and functions are supported.

## User Interface

- AJA Control Software

## USB

- 1 x USB for firmware and additional control

## Size

**Width** 4.03" (102.4mm)

**Length** 5.2" (132mm)

**Height** 0.94" (23.9mm)

## Weight

0.5 lbs (0.2kg)



## Power

- RovoRx-HDMI only: 48V @ 125mA = 6W typical, 48V @ 156mA = 7.5W max
- RovoRx-HDMI Powering RovoCam: 48V @ 271mA = 13W typical, 48V @ 312mA = 15W max

## Environment

<b>Safe Operating Temperature Range</b>	0°C to 40°C (32 °F to 104°F)
<b>Operating Relative Humidity</b>	10-90% non-condensing
<b>Operating Altitude</b>	<3,000 meters (<10,000 feet)
<b>Safe Storage Temperature (Power OFF)</b>	-40°C to 60°C (-40°F to 140°F)

## Cat Cable Recommendations

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The cable types in the table below are recommended for maximum performance reach and full -capacity by the HDBaseT Alliance.

**Table 5. Recommended Cables for Ultra-HD video transmission**

Type	Manufacturer	URL
CAT7 S/FTP	Teldor	<a href="http://www.teldor.com/">http://www.teldor.com/</a>
CAT6A H/STP	Teldor	<a href="http://www.teldor.com/">http://www.teldor.com/</a>
CAT.7	Earthline	<a href="http://products.lappgroup.com/online-catalogue/data-communication-systems-for-ethernet-technology/">http://products.lappgroup.com/online-catalogue/data-communication-systems-for-ethernet-technology/</a>

# Appendix B: Safety and Compliance

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## Federal Communications Commission (FCC) Compliance Notices

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### Class B Interference Statement

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

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

### FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Canadian ICES Statement

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Canadian Department of Communications Radio Interference Regulations

This digital apparatus does not exceed the Class B limits for radio-noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class B digital apparatus complies with Canadian ICES-003.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique respecte les limites de bruits radioélectriques visant les appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada. Cet appareil numérique de la Classe B est conforme à la norme NMB-003 du Canada.

# European Union and European Free Trade Association (EFTA) Regulatory Compliance

This equipment may be operated in the countries that comprise the member countries of the European Union and the European Free Trade Association. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:

AUSTRIA, BELGIUM, BULGARIA, CYPRUS, CZECH REPUBLIC, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, IRELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM, ICELAND, LICHTENSTEIN, NORWAY, SWITZERLAND

## Declaration of Conformity

Marking by this symbol indicates compliance with the Essential Requirements of the EMC Directive of the European Union 2004/108/EC.



This equipment meets the following conformance standards:

*Safety:* EN 60065: 2002 + A1: 2006 + A11: 2008 + A2: 2010 + A12: 2011 (GS License)

IEC 60065: 2001 + A1: 2005 + A2: 2010 (CB Scheme Report/Certificate)

Additional licenses issued for specific countries available on request.

*Emissions:* EN 55032: 2012, CISPR 22: 2008, EN 61000-3-2:2006 +A1:2009 +A2:2009, EN 61000-3-3:2008

*Immunity:* EN 55103-2: 2009, EN 61000-4-2:2009, EN 61000-4-3:2006+A1:2008+A2:2010, EN 61000-4-4:2004+A1:2010, EN 61000-4-5:2005, EN 61000-4-6:2009, EN 61000-4-11:2004

Environments: E2, E3 and E4

The product is also licensed for additional country specific standards as required for the International Marketplace.




### Warning!

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

Achtung! Dieses ist ein Gerät der Funkstörgrenzwertklasse B. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention! Ceci est un produit de Classe B. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

## Recycling Notice

	<p>This symbol on the product or its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.</p>
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## Korean KCC Compliance Statement

<p>A급 기기 (업무용 방송통신기자재)</p> <p>Class A (Broadcasting Communication Equipment for Office Use)</p>	<p>이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.</p> <p>As an electromagnetic wave equipment for office use (Class A), this equipment is intended to use in other than home area. Sellers or users need to take note of this.</p>
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## Taiwan Compliance Statement

警告使用者：  
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

This is a Class B product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class B. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## Japanese Compliance Statement

### 2. Class B ITE

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCI-B

This is a Class B product based on the standard of the VCCI Council (VCCI V-3/2015.04). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

## Translated Warning and Caution Messages

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The following caution statements, warning conventions, and warning messages apply to this product and manual.




Warning Symbol




Caution Symbol

## Before Operation Please Read These Instructions

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	<p><b>Warning!</b> Read and follow all warning notices and instructions marked on the product or included in the documentation.</p> <p><b>Avertissement !</b> Lisez et conformez-vous à tous les avis et instructions d'avertissement indiqués sur le produit ou dans la documentation.</p> <p><b>Warnung!</b> Lesen und befolgen Sie die Warnhinweise und Anweisungen, die auf dem Produkt angebracht oder in der Dokumentation enthalten sind.</p> <p><b>¡Advertencia!</b> Lea y siga todas las instrucciones y advertencias marcadas en el producto o incluidas en la documentación.</p> <p><b>Aviso!</b> Leia e siga todos os avisos e instruções assinalados no produto ou incluídos na documentação.</p> <p><b>Avviso!</b> Leggere e seguire tutti gli avvisi e le istruzioni presenti sul prodotto o inclusi nella documentazione.</p>
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	<p><b>Warning!</b> Do not use this device near water and clean only with a dry cloth.</p> <p><b>Avertissement!</b> N'utilisez pas cet appareil près de l'eau et nettoyez-le seulement avec un tissu sec..</p> <p><b>Warnung!</b> Das Gerät nicht in der Nähe von Wasser verwenden und nur mit einem trockenen Tuch säubern.</p> <p><b>¡Advertencia!</b> No utilice este dispositivo cerca del agua y límpielo solamente con un paño seco.</p> <p><b>Aviso!</b> Não utilize este dispositivo perto da água e limpe-o somente com um pano seco.</p> <p><b>Avviso!</b> Non utilizzare questo dispositivo vicino all'acqua e pulirlo soltanto con un panno asciutto.</p>
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**Warning!**

Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

**Avertissement !** Ne bloquez aucune ouverture de ventilation. Suivez les instructions du fabricant lors de l'installation.

**Warnung!** Die Lüftungsöffnungen dürfen nicht blockiert werden. Nur gemäß den Anweisungen des Herstellers installieren.

**¡Advertencia!** No bloquee ninguna de las aberturas de la ventilación. Instale de acuerdo con las instrucciones del fabricante.

**Aviso!** Não obstrua nenhuma das aberturas de ventilação. Instale de acordo com as instruções do fabricante.

**Avviso!** Non ostruire le aperture di ventilazione. Installare in conformità con le istruzioni del fornitore.

**Warning!**

Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

**Avertissement !** N'installez pas l'appareil près d'une source de chaleur telle que des radiateurs, des bouches d'air de chauffage, des fourneaux ou d'autres appareils (amplificateurs compris) qui produisent de la chaleur.

**Warnung!** Nicht in der Nähe von Wärmequellen wie Heizkörpern, Heizregistern, Öfen oder anderen Wärme erzeugenden Geräten (einschließlich Verstärkern) aufstellen.

**¡Advertencia!** No instale cerca de fuentes de calor tales como radiadores, registros de calor, estufas u otros aparatos (incluidos amplificadores) que generan calor.

**Aviso!** Não instale perto de nenhuma fonte de calor tal como radiadores, saídas de calor, fogões ou outros aparelhos (incluindo amplificadores) que produzam calor.

**Avviso!** Non installare vicino a fonti di calore come termosifoni, diffusori di aria calda, stufe o altri apparecchi (amplificatori compresi) che emettono calore.

**Warning!**

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the device.

**Avertissement!** Protégez le cordon d'alimentation pour que l'on ne marche pas dessus ou qu'on le pince, en particulier au niveau des prises mâles, des réceptacles de convenance, et à l'endroit où il sort de l'appareil.

**Warnung!** Vermeiden Sie, dass auf das Netzkabel getreten oder das Kabel geknickt wird, insbesondere an den Steckern, den Steckdosen und am Kabelausgang am Gerät.

**¡Advertencia!** Proteja el cable de energía para que no se le pise ni apriete, en especial cerca del enchufe, los receptáculos de conveniencia y el punto del que salen del equipo.

**Aviso!** Proteja o cabo de alimentação de ser pisado ou de ser comprimido particularmente nas fichas, em tomadas de parede de conveniência e no ponto de onde sai do dispositivo.

**Avviso!** Proteggere il cavo di alimentazione in modo che nessuno ci cammini sopra e che non venga schiacciato soprattutto in corrispondenza delle spine e del punto in cui esce dal dispositivo.

**Warning!**

Unplug this device during lightning storms or when unused for long periods of time.

**Avertissement!** Débranchez cet appareil pendant les orages avec éclairs ou s'il est inutilisé pendant de longues périodes.

**Warnung!** Das Gerät ist bei Gewitterstürmen oder wenn es über lange Zeiträume ungenutzt bleibt vom Netz zu trennen.

**¡Advertencia!** Desenchufe este dispositivo durante tormentas eléctricas o cuando no se lo utilice por largos periodos del tiempo.

**Aviso!** Desconecte este dispositivo da tomada durante trovoadas ou quando não é utilizado durante longos períodos de tempo.

**Avviso!** Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore, quali il treppiedi e l'esoscheletro.

**Warning!**

Do not open the chassis. There are no user-serviceable parts inside. Opening the chassis will void the warranty unless performed by an AJA service center or licensed facility.

**Avertissement!** Ne pas ouvrir le châssis. Aucun élément à l'intérieur du châssis ne peut être réparé par l'utilisateur. La garantie sera annulée si le châssis est ouvert par toute autre personne qu'un technicien d'un centre de service ou d'un établissement agréé AJA.

**Warnung!** Öffnen Sie das Gehäuse nicht. Keine der Geräteteile können vom Benutzer gewartet werden. Durch das Öffnen des Gehäuses wird die Garantie hinfällig, es sei denn, solche Wartungsarbeiten werden in einem AJA-Service-Center oder einem lizenzierten Betrieb vorgenommen.

**¡Advertencia!** No abra el chasis. El interior no contiene piezas reparables por el usuario. El abrir el chasis anulará la garantía a menos que se lo haga en un centro de servicio AJA o en un local autorizado.

**Advertência!** Não abra o chassi. Não há internamente nenhuma peça que permita manutenção pelo usuário. Abrir o chassi anula a garantia, a menos que a abertura seja realizada por uma central de serviços da AJA ou por um local autorizado.

**Avvertenza!** Non aprire lo chassis. All'interno non ci sono parti riparabili dall'utente. L'apertura dello chassis invaliderà la garanzia se non viene effettuata da un centro ufficiale o autorizzato AJA.



**Warning!**

Refer all servicing to qualified service personnel. Servicing is required when the device has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the device, the device has been exposed to rain or moisture, does not operate normally, or has been dropped.

**Avertissement !** Référez-vous au personnel de service qualifié pour tout entretien. L'entretien est exigé quand l'appareil a été endommagé de quelque manière que ce soit, par exemple lorsque le cordon d'alimentation ou la prise sont endommagés, que du liquide a été versé ou des objets sont tombés dans l'appareil, que l'appareil a été exposé à la pluie ou à l'humidité, ne fonctionne pas normalement ou est tombé.

**Warnung!** Das Gerät sollte nur von qualifizierten Fachkräften gewartet werden. Eine Wartung ist fällig, wenn das Gerät in irgendeiner Weise beschädigt wurde, wie bei beschädigtem Netzkabel oder Netzstecker, falls Flüssigkeiten oder Objekte in das Gerät gelangen, das Gerät Regen oder Feuchtigkeit ausgesetzt wurde, nicht ordnungsgemäß funktioniert oder fallen gelassen wurde.

**¡Advertencia!** Consulte al personal calificado por cuestiones de reparación. El servicio de reparación se requiere cuando el dispositivo ha recibido cualquier tipo de daño, por ejemplo cable o espigas dañadas, se ha derramado líquido o se han caído objetos dentro del dispositivo, el dispositivo ha sido expuesto a la lluvia o humedad, o no funciona de modo normal, o se ha caído.

**Aviso!** Remeta todos os serviços de manutenção para o pessoal de assistência qualificado. A prestação de serviços de manutenção é exigida quando o dispositivo foi danificado mediante qualquer forma, como um cabo de alimentação ou ficha que se encontra danificado/a, quando foi derramado líquido ou caíram objectos sobre o dispositivo, quando o dispositivo foi exposto à chuva ou à humidade, quando não funciona normalmente ou quando foi deixado cair.

**Avviso!** Fare riferimento al personale qualificato per tutti gli interventi di assistenza. L'assistenza è necessaria quando il dispositivo è stato danneggiato in qualche modo, ad esempio se il cavo di alimentazione o la spina sono danneggiati, è stato rovesciato del liquido è stato rovesciato o qualche oggetto è caduto nel dispositivo, il dispositivo è stato esposto a pioggia o umidità, non funziona correttamente o è caduto.

**Warning!**

Only use attachments and accessories specified and/or sold by the manufacturer.

**Avertissement!** Utilisez seulement les attaches et accessoires spécifiés et/ou vendus par le fabricant.

**Warnung!** Verwenden Sie nur Zusatzgeräte und Zubehör angegeben und / oder verkauft wurde durch den Hersteller.

**¡Advertencia!** Utilice solamente los accesorios y conexiones especificados y/o vendidos por el fabricante.

**Aviso!** Utilize apenas equipamentos/acessórios especificados e/ou vendidos pelo fabricante.

**Avviso!** Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore.

# Warranty and Liability Information

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## Limited 5-Year Warranty (RovoRx-HDMI)

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AJA Video Systems, Inc. (AJA Video) warrants that this product will be free from defects in materials and workmanship for a period of five years from the date of purchase. If a product proves to be defective during this warranty period, AJA Video, at its option, will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, you the Customer, must notify AJA Video of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Customer shall be responsible for packaging and shipping the defective product to a designated service center nominated by AJA Video, with shipping charges prepaid. AJA Video shall pay for the return of the product to the Customer if the shipment is to a location within the country in which the AJA Video service center is located. Customer shall be responsible for paying all shipping charges, insurance, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. AJA Video shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than AJA Video representatives to install, repair or service the product, b) to repair damage resulting from improper use or connection to incompatible equipment, c) to repair any damage or malfunction caused by the use of non-AJA Video parts or supplies, or d) to service a product that has been modified or integrated with other products when the effect of such a modification or integration increases the time or difficulty of servicing the product.

THIS WARRANTY IS GIVEN BY AJA VIDEO IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. AJA VIDEO AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. AJA VIDEO'S RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE WHOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER AJA VIDEO OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

## Limited 3-Year Warranty (RovoCam)

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AJA Video Systems, Inc. (AJA Video) warrants that the product, not including hard-disk based Storage Modules (HDD), will be free from defects in materials and workmanship for a period of three years from the date of purchase. AJA Video warrants that the hard-disk based Storage Modules (HDD), will be free from defects in materials and workmanship for a period of one year from the date of purchase. If a product proves to be defective during this warranty period, AJA Video, at its option, will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

To obtain service under this warranty, the Customer must notify AJA Video of the defect before expiration of the warranty period and make suitable arrangements for the performance of service by contacting AJA Video support through the channels set forth

on the support contacts web page at <http://www.aja.com/support/index.php>. Except as stated, the Customer shall bear all shipping, packing, insurance and other costs, excluding parts and labor, to effectuate repair. Customer shall pack and ship the defective product to a service center designated by AJA Video, with shipping charges prepaid. AJA Video shall pay to return the product to Customer but only if to a location within the country in which the AJA Video service center is located.

This warranty shall not apply to any defect, failure or damage caused by negligent, inadequate or improper use, handling or maintenance. Without limiting the foregoing, AJA Video shall not be obligated to furnish service under this warranty or repair any damage or malfunction a) resulting from attempts by personnel other than AJA Video representatives to install, repair or service the product, b) resulting from improper use or connection to incompatible equipment, c) caused by the use of non-AJA Video parts or supplies, d) if the product has been modified or integrated with other products when the effect of such a modification or integration increases the time or difficulty of servicing the product, or (e) resulting from being dropped or otherwise subjected to undue force, exposure to moisture or other corrosive or conductive substances, exposure to strong magnetic fields, use with improperly regulated power supplies, exposure to electric shock, use in temperatures outside the specified operating range, or otherwise failing to treat the product in accordance with the standard of care appropriate to sensitive and delicate electronic equipment.

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## **Limitation of Liability**

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