

Makito X HEVC Rugged Encoder Installation Guide

Makito X HEVC Rugged Encoder 2.3

This Installation Guide provides the steps required to install and configure the Makito X HEVC Rugged Video Encoder (#S-292E-HEVC-R) to stream to your compatible decoding device. Please refer to the [Makito X Encoder User's Guide](#) for detailed configuration and operation information.

We recommend that you familiarize yourself with this Installation Guide before installing your encoder.

Use the following guidelines when unsafe conditions exist or when potentially hazardous voltages are present:

- Always use caution and common sense.
- To reduce the risk of electrical shock, do not operate equipment with the cover removed.
- Repairs must be performed by qualified service personnel only.

Improper handling and/or installation practices of sensitive equipment may VOID the warranty.

Caution

When handling components, or when setting switch options, always use an antistatic wrist strap connected to a grounded equipment frame or chassis. *If a wrist strap is not available, periodically touch an unpainted metal surface on the equipment.* Never use a conductive tool, such as a screwdriver or a paper clip, to set switches.

Waste Electrical and Electronic Equipment (WEEE) Disposal



In accordance with the European Union (EU) WEEE Directive, Haivision products that fall within the scope of the WEEE, are labeled with the above symbol, and customers are encouraged to responsibly recycle their equipment at the time of disposal. Haivision also offers its customers the option of returning Haivision equipment to facilitate its environmentally sound disposal.

For more information, please visit our website at: <https://www.haivision.com/environment>.

Makito X HEVC Rugged Overview

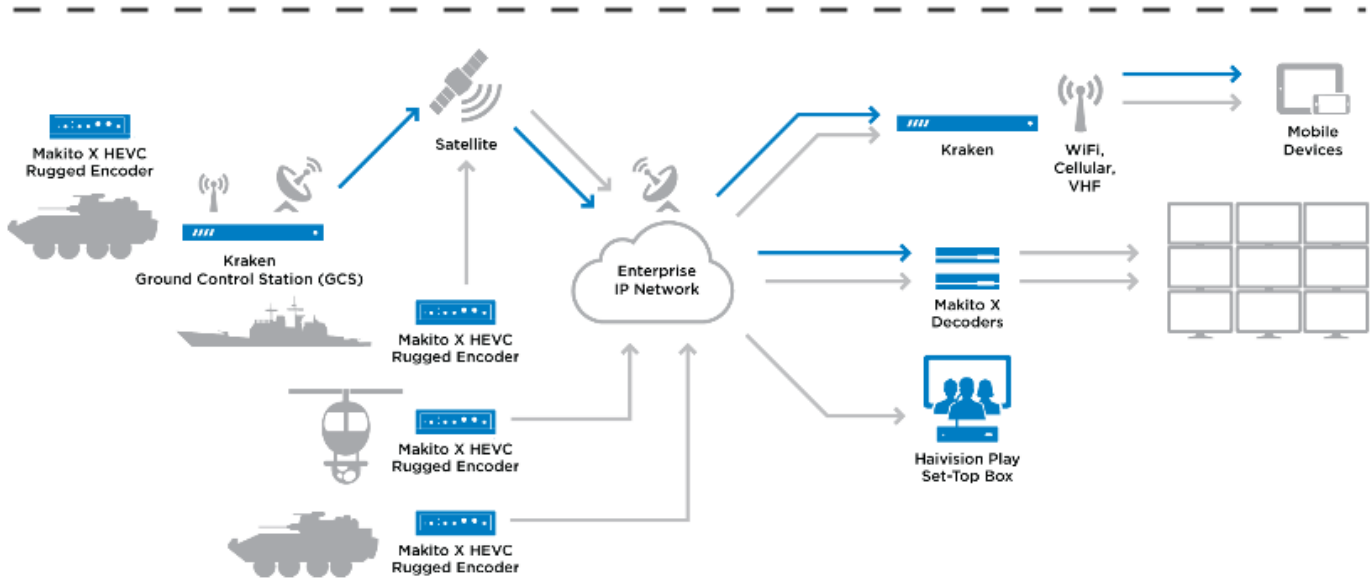
The Makito X HEVC Rugged is a ruggedized military-grade appliance designed for deployment in Intelligence, Surveillance, and Reconnaissance (ISR) environments. The Makito X HEVC Rugged combines the low latency and performance of Haivision's Makito X encoder in a ruggedized form-factor with full KLV/CoT metadata support. It supports two video input channels, with each channel supporting up to 1080p60 H.264 or 1080p30 in HEVC Mode.

The Makito X HEVC Rugged can simultaneously output H.264 and HEVC streams, each at different bit rates per video input. Scaling and frame rate settings can be adjusted on-the-fly.



Applications

Designed for integration on both manned and unmanned platforms, including aerial, naval, and ground vehicles, the Makito X HEVC Rugged encoder is a single Line Replaceable Unit (LRU) that will not require major system upgrades to existing platform designs. It has been tested against international standards for ruggedization, including MIL-STD 810G, MIL-STD-704F, MIL-STD 1275E and MIL-STD 461F.



Before You Begin

1. Unpack the box and visually inspect the package contents for any evidence of shipping damage. See the *Important Notice* document in the box for a list of contents.
2. In addition to the contents of the box, you may need to have the following items available:
 - Four #8-32 or M4 screws for mounting (not included)
 - Haivision cabling kits (see [Product Numbers](#)) or your own custom cables (see [HEVC Rugged Encoder Pinouts](#))
 - A laptop with Web browser, Telnet client, and video player (e.g., VLC)
3. To view the output from the encoder, make sure you have a decoding device or video player that supports the UDP Transport Stream format.

⚠ Note

If the device is to be installed in a remote location (e.g., on a utility pole, or on a mobile platform), we recommend that you follow the instructions in this Installation Guide to perform an initial setup in a "staging" environment, such as a lab or control center. Once the device has been set up and is demonstrated to be operating normally, you can then move it to the remote location.

⚠ Caution

Before installing the device, please refer to [Safety Guidelines](#) (in the *Makito X Encoder User's Guide*). Only connect the unit to a compatible power source. If an electrical fault occurs, disconnect the unit and contact Haivision Technical Support. Never try to force the connections when setting up the system as this may damage the unit.

⚠ Caution

Hot surface. Avoid contact. The chassis can achieve a surface temperature 95°C in poorly ventilated environments, and may cause personal injury if touched.

ATTENTION Surface chaude. Eviter le contact. Le châssis peut atteindre une température de surface de 95°C dans des environnements mal ventilés et peut causer des blessures en cas de contact.

⚠ Warning

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

AVERTISSEMENT Ce produit est destiné à être installé dans une zone d'accès restreint. Les zones d'accès restreint sont protégées par un mécanisme spécifique, par une serrure et une clé, ou par tout autre dispositif de sécurité.

⚠ Note

The device is equipped with a supercapacitor (with a 30-minute charge time) that will keep time for approximately 3 weeks. However, it has no real-time clock (RTC) battery, and in the event of a power loss, the system date and time settings may be lost. For any application with a requirement for standalone synchronized system timing (or derived time codes), an NTP server should be used to provide time and date synchronization. For details, refer to [Configuring Date and Time](#) (in the *Makito X Encoder User's Guide*).

Installing the Encoder

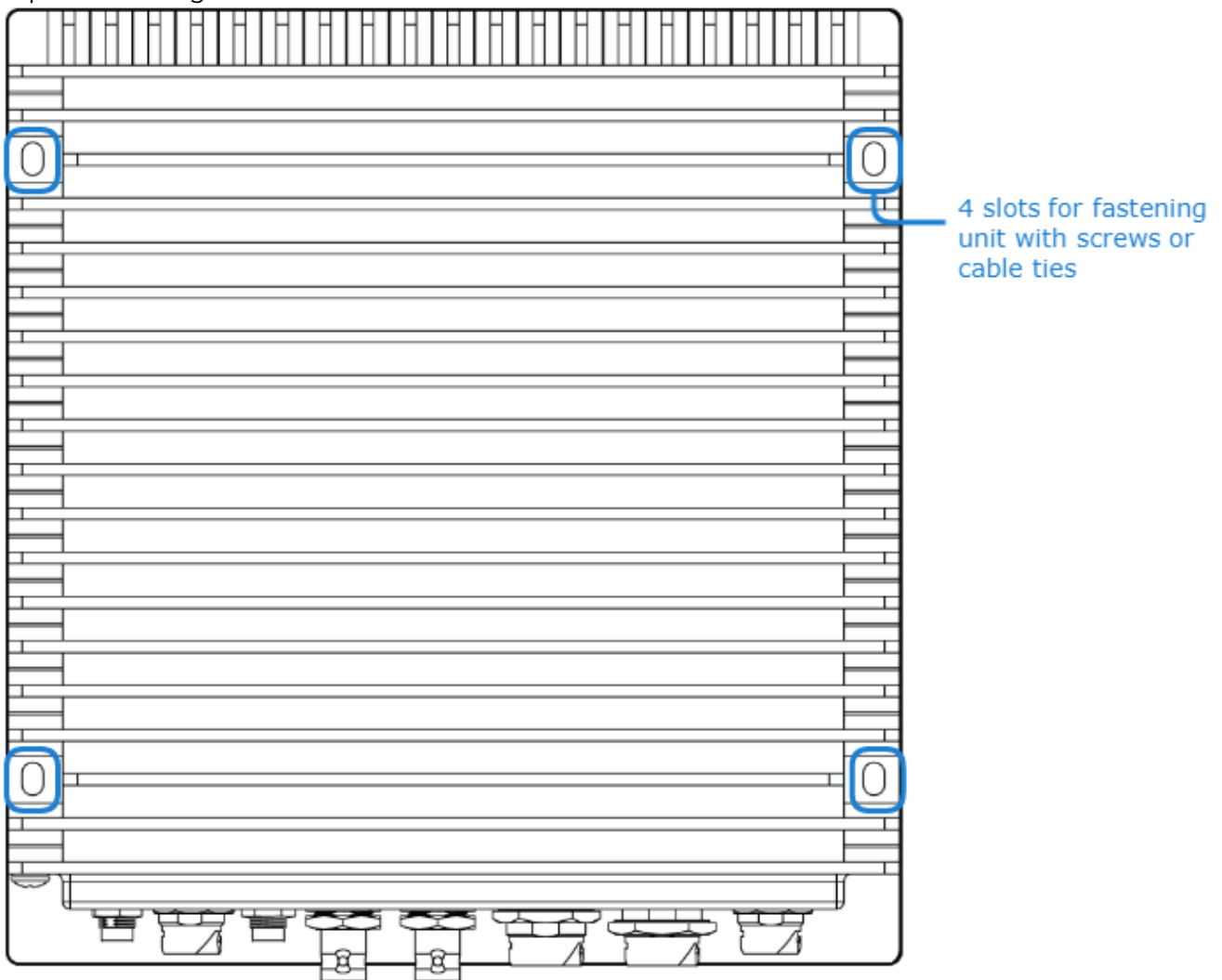
To install the appliance:

1.

⚠ Caution

The surface temperature of the chassis can reach 95°C in poorly ventilated environments. We recommend that you fasten the appliance to a metal (cold) plate to increase heat dissipation.

2. Fasten the appliance to its support base with four screws (size 8-32, or M4, not included). Or you can use two stainless steel, harsh-environment cable ties (up to 250 mils wide), which can be passed through slots in the chassis.



3. Fasten a grounding wire (10 AWG minimum) to the grounding lug using the screw and lock washer provided.



⚠ Caution

The chassis must be properly grounded in order to provide protection against lightning strikes and other power surges.

Connecting to the Network and Audio/Video Sources

The Makito X HEVC Rugged enclosure provides rugged connectors for connecting the encoder's Video, Audio, Serial, and Power inputs, as well as the Network interface.

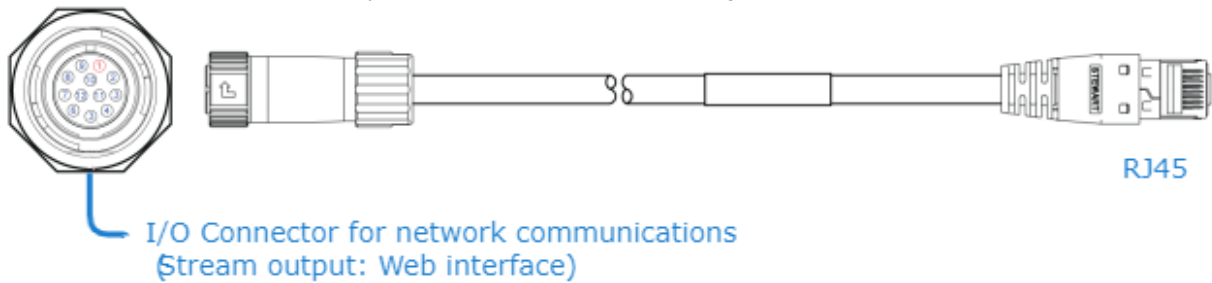


Note

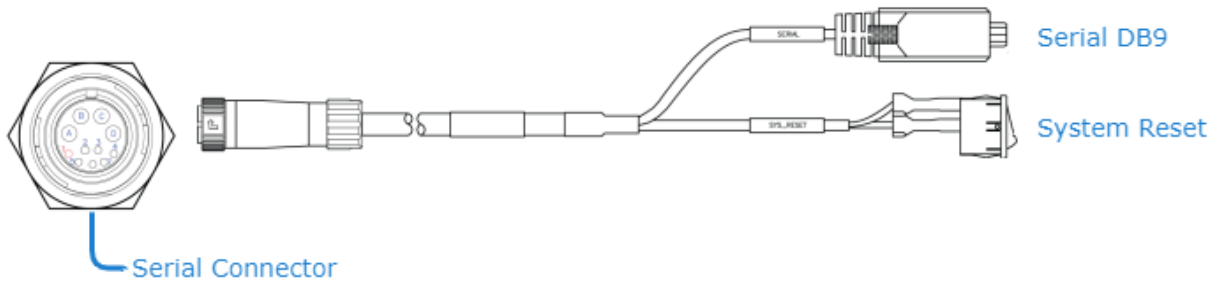
The Makito X HEVC Rugged encoder supports two video inputs at up to 1080p50/59.94/60.

To connect the encoder to the network and A/V sources:

1. Remove the protective caps from the encoder's connectors.
2. Connect the encoder's **Network** port to the IP network using the **Ethernet cable** (shown following):



3. Connect one or more of the encoder's **Video** ports to your video source(s), referring to the above image. The BNC connector(s) are used for Composite (CVBS), SD-SDI (Serial Digital Interface) and HD-SDI video input signals. It is also a 3G-SDI capable interface supporting 1080p 50/60 fps video @ 3Gbps.
4. (Optional) Connect the encoder's **Serial** port to a metadata source or to the serial port of a computer using the serial breakout cable.

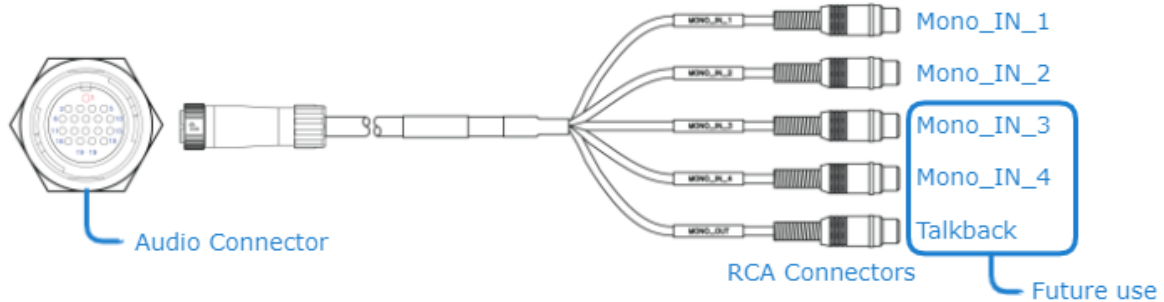


Note

The Reset button provides two options:

- If you press and hold the button for less than 4 seconds, the system resets and loads the last saved "startup" configuration. If no configuration was previously saved as the startup preset, the default settings prevail.
- If you press and hold the button for more than 4 seconds, the module performs a complete factory reset. It clears all of the previously configured settings, including IP, streams and encoder configurations.

5. Connect the encoder's **Audio** connector to your audio source(s) using the audio breakout cable.



Note

The Makito X with software version 2.2.1 or later supports two (2) input channels of analog audio.

Related Topics

- For pinout information, see [HEVC Rugged Encoder Pinouts](#). Connector drawings, kitting and terminated cabling drawings are available upon request. Contact Haivision Technical Support.
- To order connectors or cables, see [HEVC Rugged Technical Specifications](#) for accessory product numbers.

Powering Up the Encoder



There is no power switch on the encoder. The power is automatically on when the unit is plugged in.

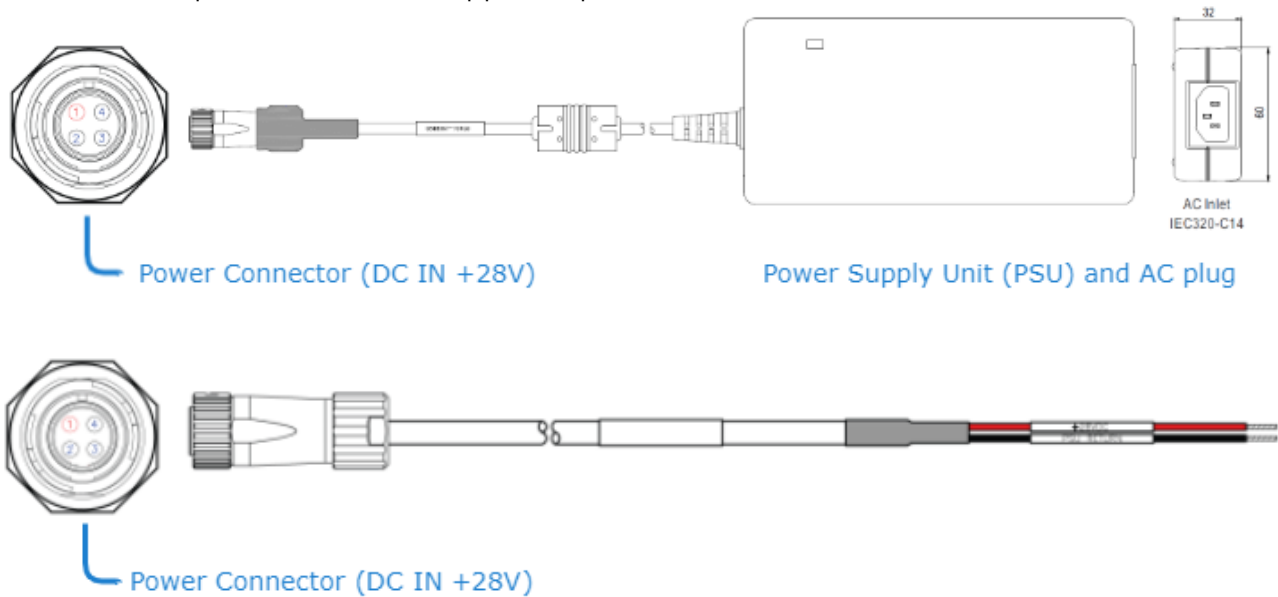
⚠ Warning

When using the AC/DC power adapter, the power cord is the main disconnect device. Ensure that the socket-outlet is located/installed near the equipment and is easily accessible.

ATTENTION Quand on utilise l'adaptateur AC à DC, le cordon d'alimentation est utilisé comme interrupteur général. La prise de courant doit être située ou installée à proximité de l'équipement et être facile d'accès.

To power up the encoder:

1. Insert the 4-pin connector of the **power cable** into the power input jack (**DC IN**) at the rear of the encoder. Both power cables are shipped as part of the Evaluation Kit.



Make sure the connector is properly inserted and locked to avoid intermittent power problems.

2. Connect the power cable to a 28V power source. (The P-292E-XCR-PS-AC PSU can be used to convert from 120V AC to +24V DC.)
The Status LED next to the video inputs will start blinking green, indicating that the encoder is booting up.
3. Wait until the Status LED stays solid green, indicating that the encoder is ready for operation.

Note

The encoder performs Built-in Self Tests (BIST) and Power-On Self Tests (POST) to ensure that the hardware and firmware are operating reliably and correctly. BIST provides a minimal suite of tests that test the various hardware and firmware sub-systems to ensure correct operation. The POST suite of tests (a subset of the BIST suite) are performed every time there is a power-cycle. All BIST/POST configuration, status and test results are available via CLI (serial, Telnet or SSH). For more information, please refer to `bist` (in the *Makito X Encoder User's Guide*, CLI Command Reference).

Related Topics

- For pinout information, see [Power Entry Connector](#).
- To order the PSU, see [HEVC Rugged Technical Specifications](#).

Accessing the Web Interface

1. Open a Web browser of your choice, such as Chrome, Firefox, Safari, or Internet Explorer.
2. Type the IP address for the encoder into the browser's address bar and press Enter.

The Makito X comes pre-configured with the following default settings:

IP Address	Subnet Mask	Gateway
10.5.1.2	255.255.0.0	10.5.0.1

Note

To access the Web interface, your computer must be in the same IP Address range (subnet). You may have to temporarily change your computer's IP Address to be in the same subnet as the encoder. Only then will you be able to access the encoder and change its IP address, and then afterwards change your computer's IP address back. For details, see [Configuring Network Settings](#) in the User's Guide.

3.

Note

The Makito X identity certificate and trusted root certificates may be managed from the Web interface (Certificates page) or using the CLI `certificate` command. See [Managing Certificates](#) in the User's Guide.

4. Sign in to the Makito X Web interface, using the default administrative username and password. Please refer to the *Important Notice* (postcard included in the box or available from the [Download Center](#) on the Haivision Support Portal) for the default sign-in credentials.

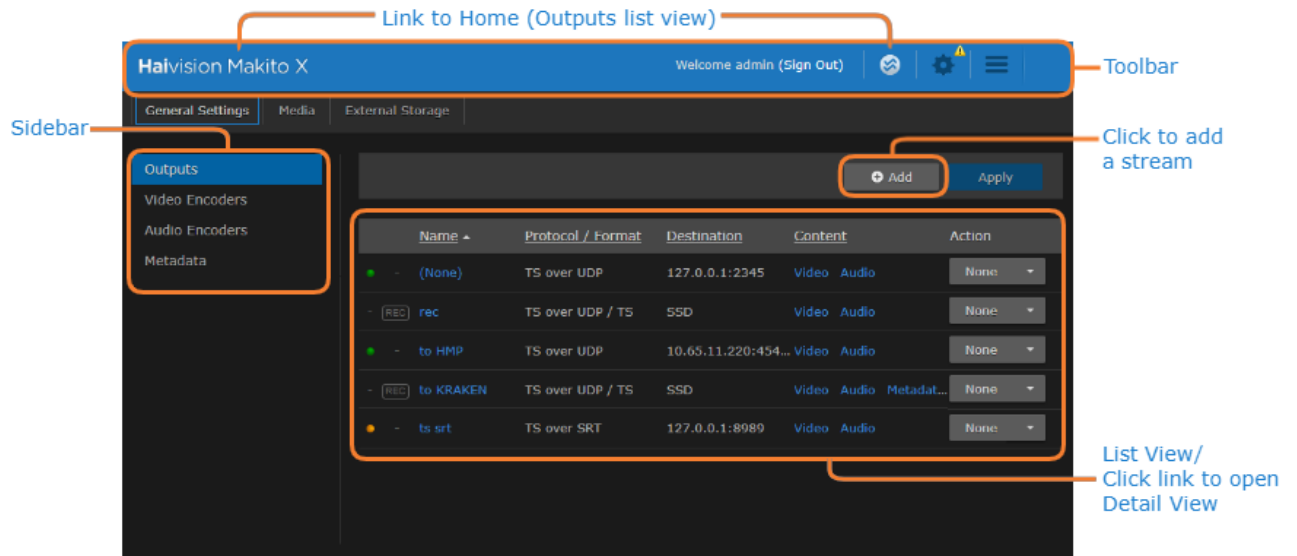
Important

Makito X Series devices ship from the factory with only the `admin` account enabled. For security reasons, the two default user accounts (`user` and `operator`) are locked at the factory as well as after a factory reset. An administrator must unlock them and change the passwords to use them for the first time.

Tip

For security purposes, be sure to change the default passwords! See [Changing Your Password](#) in the User's Guide.

The Web interface opens to the Outputs List View.

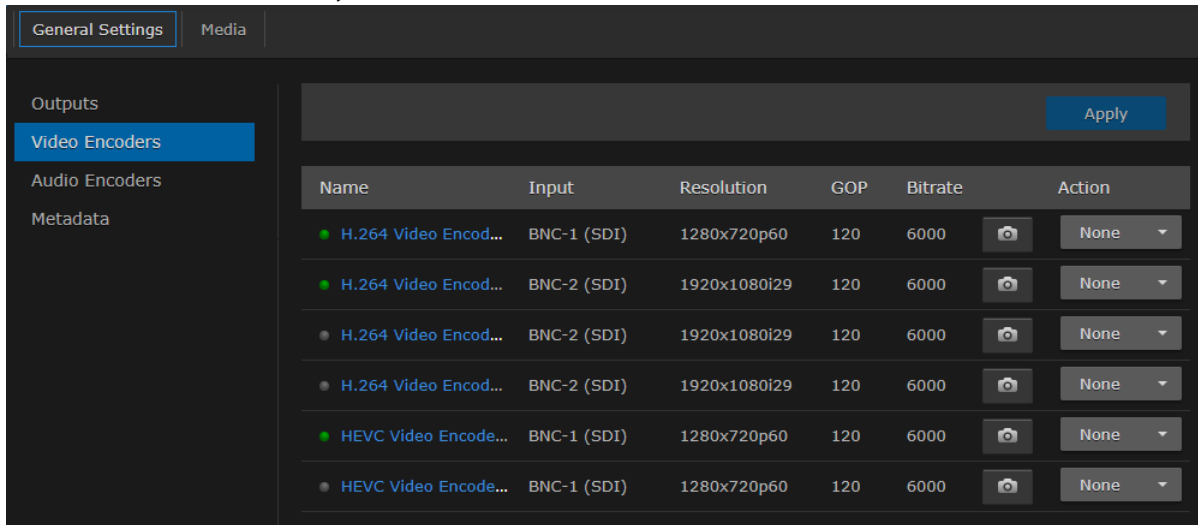


Setting Up a Test Stream

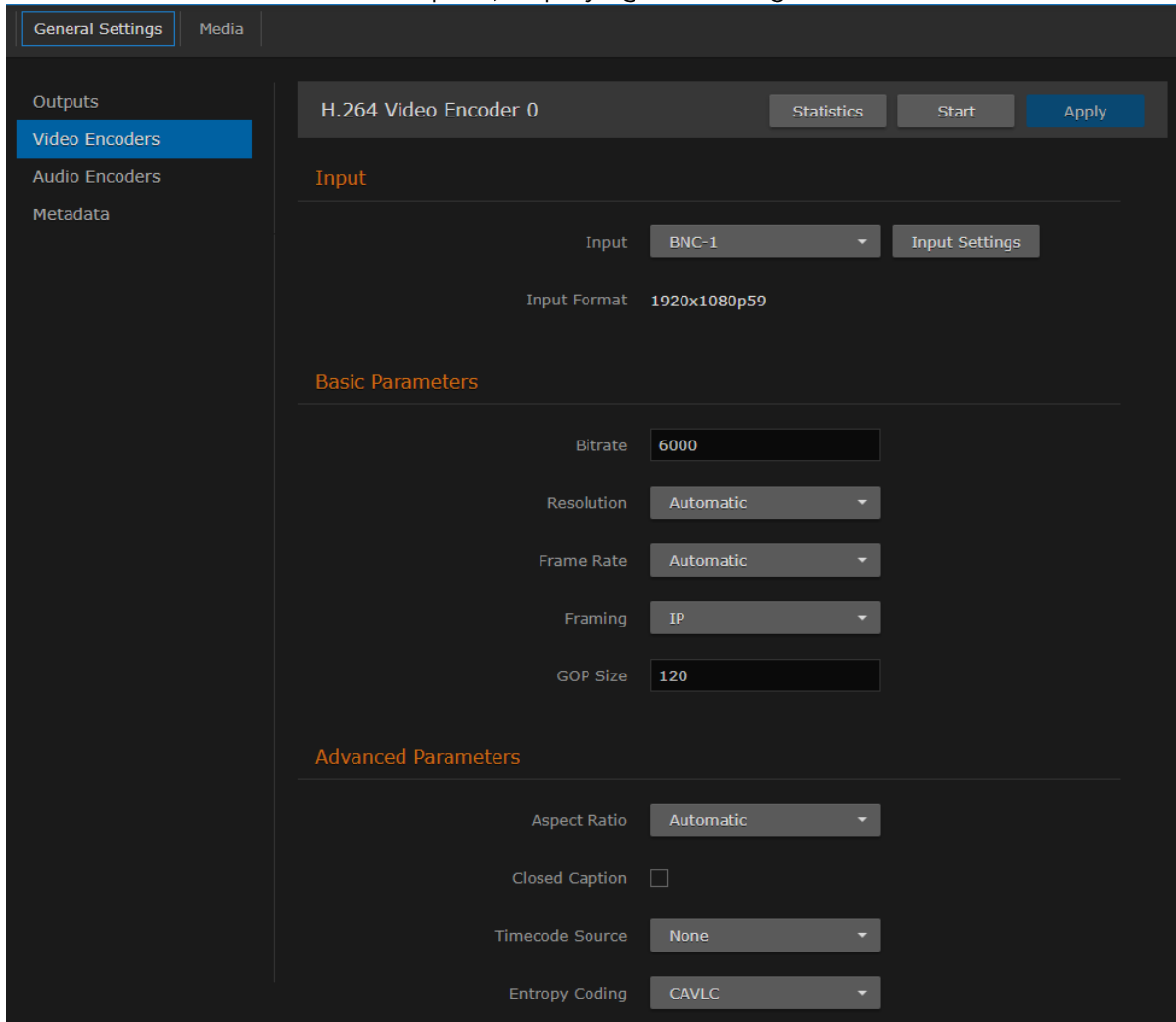
Setting up a test stream requires that you have an active video source connected to the Makito X Encoder. You will need to configure an encoding instance based on your video source, and then configure an output stream for that encoder. For detailed information, refer to [Configuring Video Encoders](#) and [Configuring Streaming Outputs](#) (in the *Makito X Encoder User's Guide*).

To configure an encoding instance:

1. Click **Video Encoders** on the sidebar (under **General Settings**).
The Video Encoders List View opens. (Note that on the Makito X HEVC, the List View includes two HEVC encoder instances.)



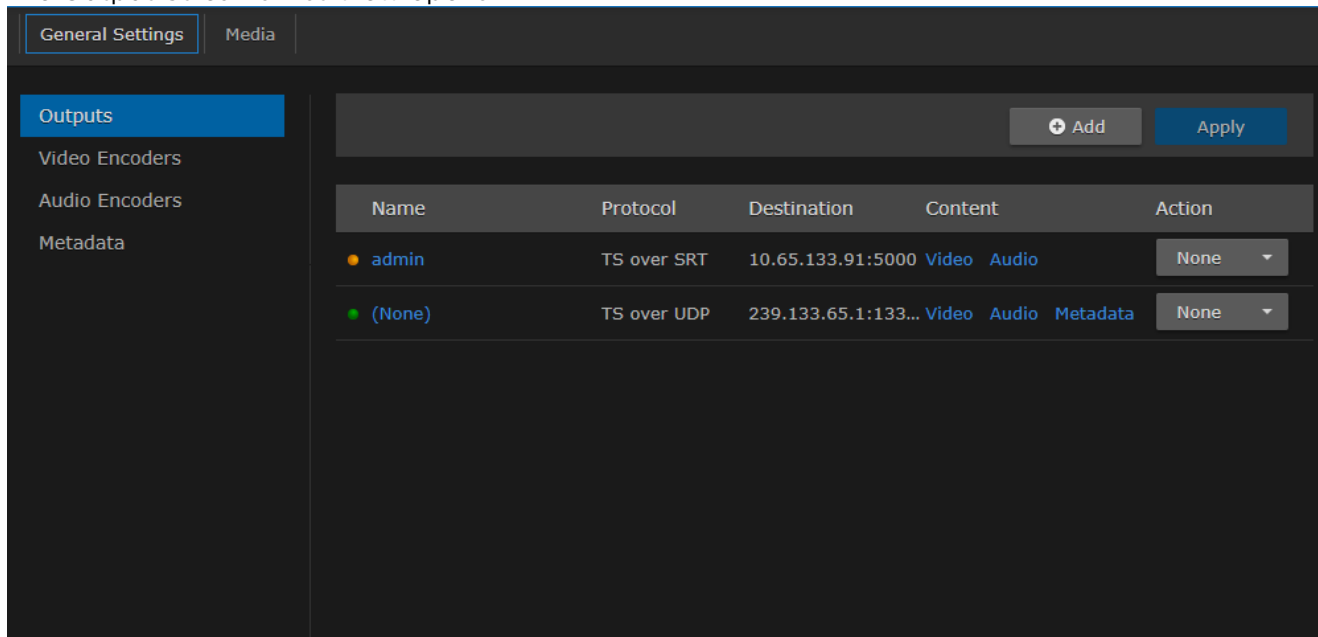
- Click a link in the table to select the encoder.
The Video Encoder Detail View opens, displaying the settings for the selected video encoder.



- To configure the encoder, select or enter the new value(s) in the appropriate fields (see [Configuring Video Encoders](#) in the User's Guide).
- Click **Start**, and then click **Apply**.

To configure an output stream:

1. Click **Outputs** on the sidebar.
The Output Streams List View opens.



2. To add an output stream, click the **+** **Add** button.
The New Stream page opens.

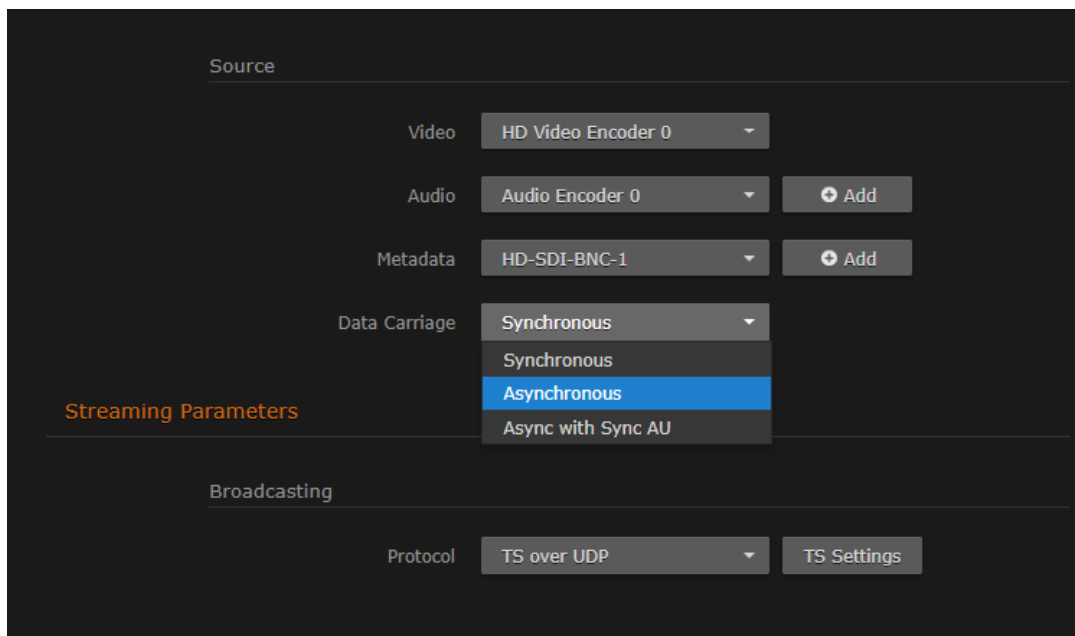
The screenshot shows the 'New Stream' configuration page in the HAIVISION interface. The page is divided into two main sections: 'Content' and 'Streaming Parameters'. The 'Content' section includes a 'Name' field, a 'Source' section with dropdowns for 'Video' (H.264 Video Encoder 0), 'Audio' (Audio Encoder 0), and 'Metadata' (None), and an 'Apply' button. The 'Streaming Parameters' section includes a 'Broadcasting' section with a 'Protocol' dropdown (TS over UDP) and a 'TS Settings' button, and a 'Destination' section with 'Address' and 'Port' fields.

- Under Content, type a Name for the stream, and under Source, select the encoder you started in **step 4** (above).
- Under Broadcasting, select **TS over UDP** for the Protocol.
- Under Destination, type in a valid multicast Address (e.g., `239.192.2.3`) and Port number (e.g., `2000`).

Note

The Multicast address range is from `224.0.0.0` to `239.255.255.255`. Multicast addresses from `224.0.0.0` to `224.0.0.255` are reserved for multicast maintenance protocols and should not be used by streaming sessions. We recommend that you use a multicast address from the Organization-Local scope (`239.192.0.0/14`).

- To add metadata to the stream, select the Metadata source, and (optionally) select the encapsulation type (Data Carriage).



7. To apply your changes and start streaming, click **Apply**.

Note

The changes will take effect immediately but will be lost after a reboot. For information on saving configuration settings, refer to [Saving and Loading Presets](#) in the *Makito X User's Guide*.

Viewing the Test Stream

1. Make sure your decoding device (or software) supports MPEG Transport Stream format.
2. Turn the device on and connect it to a display (if applicable), or open your video player software (e.g., VLC).
3. Make sure you are on the same network segment as the encoder.
4. Tune your decoding device or software to the multicast address of the test stream coming from the encoder.

HEVC Rugged Encoder Pinouts

This section contains the pinout descriptions for the Makito X HEVC Rugged Video Encoder. This information is intended to be used in conjunction with Haivision drawing no. TIID-053 (Makito X HEVC Rugged Appliance).

Enclosure Front Panel

The Makito X HEVC Rugged enclosure provides rugged connectors for connecting the encoder's Video, Audio, Serial, and Power inputs, as well as the Network interface. All connectors are located on the front panel, as well as three LEDs that indicate power and video encoding status.



The following table lists the encoder connectors and LEDs:

Connectors LED Status Indicators

Connectors

Connector	Description	Number of Contacts
Power Entry Connector	DC IN +28V Power Connector Hirose P/N LF10WBRB - 4P	4
Video Input Connectors	2X Coax BNC Jack Amphenol P/N 112235-12	1 per coax
Analog Audio Input Connector	Hirose P/N LF13WBRB - 20S	20
Serial Connector	Hirose P/N LF13WBRB - 11S	11
Ethernet Connector	Hirose P/N LF10WBRB - 12S	12

Note

Hirose Cable Assemblies: Cabling must be done using the Hirose LF Series Connector Termination and Assembly Instructions.

Connectors [LED Status Indicators](#)

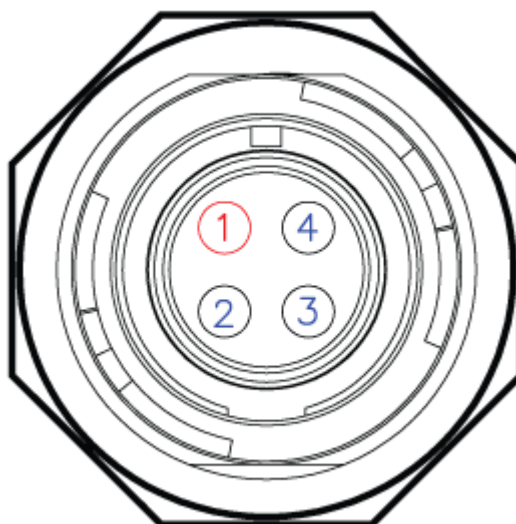
LED Status Indicators

LED	Description	Indication
POWER	Power Status	Green when power is ON
TX1	Video Encoder Status	Bi-color (Green or Amber) Green when video detected; amber when no video detected (Channel 1)
TX2	Video Encoder Status	Bi-color (Green or Amber) Green when video detected; amber when no video detected (Channel 2)

Power Entry Connector

Power Entry Connector		
	On Unit	Mating Connector
Manufacturer	Hirose	Hirose
Connector Type	DC IN +28V Power Connector	DC IN +28V Power Connector
Part Number	LF10WBRB-4P	LF10WBP-4S or LF10WBP-4S(31)

Power Entry Connector Pinout	
Contact #	Description
1	+28V DC IN
2	GND
3	N/C
4	N/C

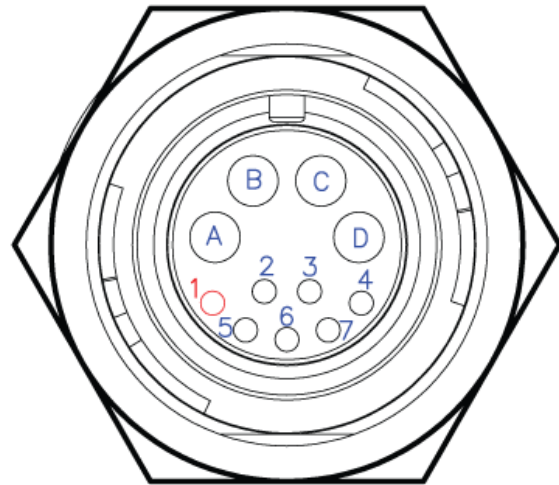


For the connector and cable, see [Powering Up the Encoder](#).

Serial Connector

Serial Connector		
	On Unit	Mating Connector
Manufacturer	Hirose	Hirose
Connector Type	Serial Connector	Serial Connector
Part Number	LF13WBRB-11S	LF13WBP-11P

Serial Connector Pinout		
Contact #	Description	
	RS-232	RS-422
1	N/C	COM 0 - RXD-
2	GND	GND
3	RXD	COM 0 - RXD+
4	N/C	COM 0 - TXD+
5	N/C	N/C
6	TXD	COM 0 - TXD-
7	N/C	N/C
A	GND	GND
B	SYS_RESET#	SYS_RESET#
C	GND	GND
D	N/C	N/C



Note

The System Reset button (RST# signal) provides two options:

- If you press and hold the button for less than 4 seconds, the system resets and loads the last saved configuration. If no configuration was previously saved, the default settings prevail.
- If you press and hold the button for more than 4 seconds, the module performs a complete factory reset. It clears all of the previously configured settings, including IP, streams and encoder configurations.

For the connector and cable, see **Step #4** in [Connecting to the Network and Audio/Video Sources](#).

Analog Audio Input Connector

The Makito X HEVC Rugged with software version 2.2.1 or later supports two (2) input channels of analog audio.

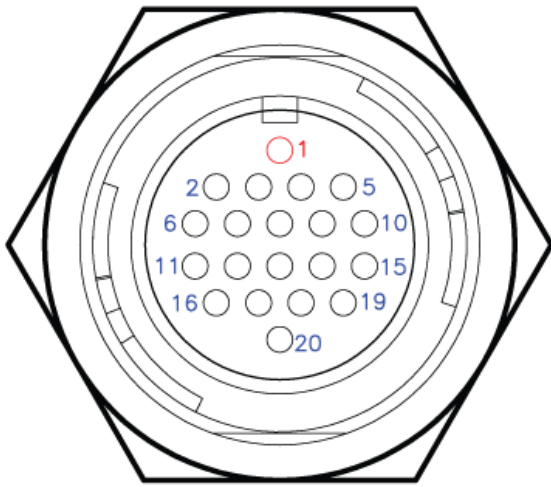
The analog audio interface consists of four (4) mono inputs and one mono output (for talkback). This interface complies with the Intel High Definition Audio (HDA) specification.

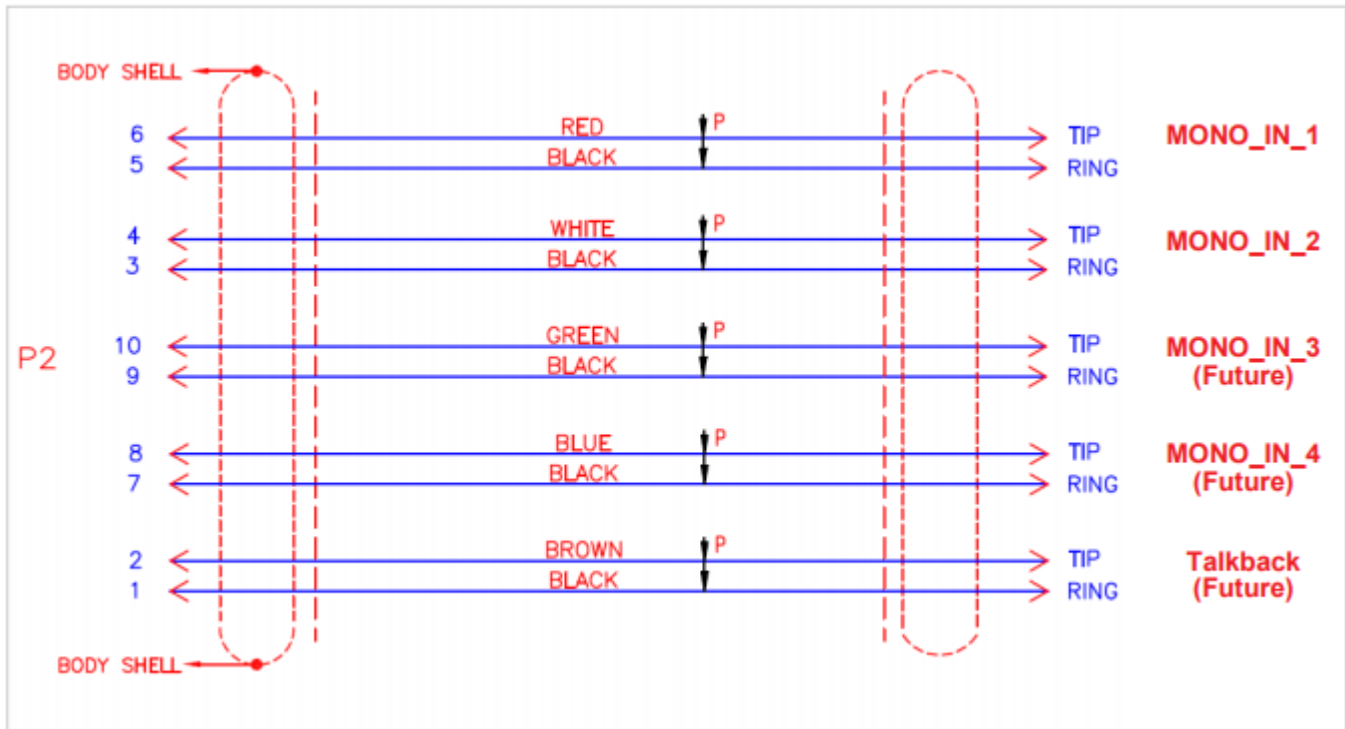
The audio input channels support 48-kHz sample rates with 16-bit PCM data.

The audio input channels support up to 4.15Vpp (single ended) inputs. The input signal level is configurable from 2 to 8 dBu, with a default value of 6 dBu. The maximum input level of 8 dBu translates to a maximum value of 5.50Vpp.

Analog Audio Connector		
	On Unit	Mating Connector
Manufacturer	Hirose	Hirose
Connector Type	Audio Connector	Audio Connector
Part Number	LF13WBRB-20S	LF13WBP-20P

Analog Audio Connector Pinout	
Contact #	Description
1	GND
2	AUDIO OUT (for talkback, future use)
3	GND
4	AUDIO IN CHANNEL 2
5	GND
6	AUDIO IN CHANNEL 1
7	GND
8	AUDIO IN CHANNEL 4 (future use)
9	GND
10	AUDIO IN CHANNEL 3 (future use)
11-20	N/C





For the connector and cable, see **Step #5** in [Connecting to the Network and Audio/Video Sources](#).

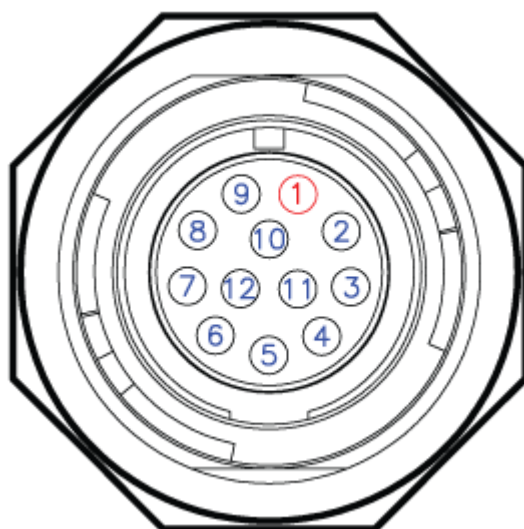
Ethernet Connector

The Makito X HEVC Rugged video encoder allows for connectivity with one 10/100/1000 Gigabit Ethernet port over CAT-5 unshielded twisted pair per IEEE 802.3ab. The naming convention is per IEEE STD 802.3. This port is designated as GBE0.

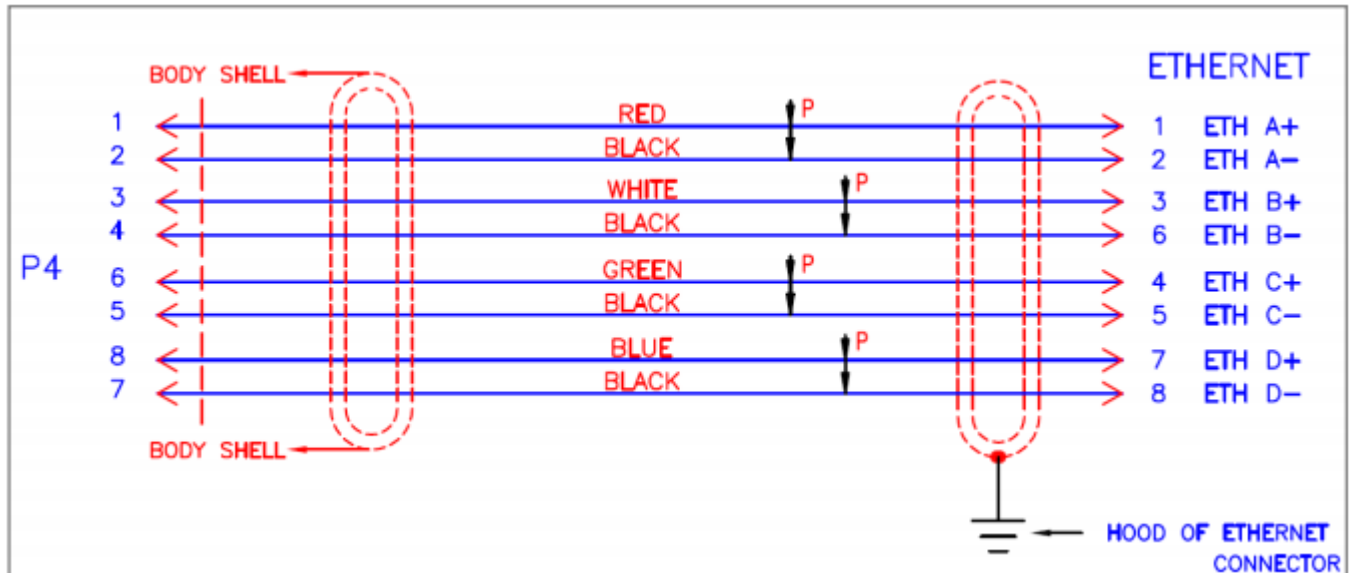
Network Connector		
	On Unit	Mating Connector
Manufacturer	Hirose	Hirose
Connector Type	Network Connector	Network Connector
Part Number	LF10WBRB-12S	LF10WBP-12P or LF10WBP-12P(31)

Ethernet

Network Connector Pinout	
Contact #	Description
1	ETH A+
2	ETH A-
3	ETH B+
4	ETH B-
5	ETH C-
6	ETH C+
7	ETH D-
8	ETH D+



Ethernet Wiring Diagram



For the connector and cable, see **Step #2** in [Connecting to the Network and Audio/Video Sources](#).

Video Input Connectors

The Makito X HEVC Rugged video encoder supports two (2) SDI / Composite video inputs, both signals sharing the contact pin.

- SDI is governed by SMPTE 259M (SD-SDI), 292M (HD-SDI) and 424M (3G-SDI) standards. Each coaxial pin is 75ohm impedance (3-GHz bandwidth).
- Composite video allows for NTSC and PAL input signals among others.



The requirements for external cable assemblies are as follows (assuming the customer wants to avoid water immersion on them):

BNC Coaxial Cable Assemblies

The cable assemblies must be waterproof. We recommend using waterproof compression type BNC connectors for better reliability and mechanical properties. We suggest use of a connector such as the Belden p/n FSNS6BNCU with a cable retention force of 40 lbs. per SCTE IPS SP401.

The input impedance must be 75 Ohms.

Note

We recommend that you keep the protective cap on any unused video connectors.

HEVC Rugged Technical Specifications

Abbreviations and Definitions

Abbreviation	Definition
EMC	Electromagnetic Compatibility
ESD	Electro Static Discharge
GBE	Gigabit Ethernet per IEEE 802.3ab (same as 1000BASE-T)
GPIO	General Purpose Input/Output
HDA	High Definition Audio (Intel standard)
I2C	Two-wire Serial Interface
NC	No Connect
PCB	Printed Circuit Board
p/n	Part Number
SCD	Source Controlled Drawing / Source Controlled Document
SDI	Serial Data Interface (governed by SMPTE standards)
SKU	Stock Keeping Unit
TBD	To be determined
USB	Universal Serial Bus

References

For additional information, please refer to the following documents:

- Makito X HEVC Rugged External Cable Connections (TIID-053)
- Makito X HEVC Rugged Data Sheet
- [Makito X Encoder User's Guide](#)
- SMPTE 259M (SD-SDI), 292M (HD-SDI) and 424M (3G-SDI)
- IEEE 802.3-2012 (Ethernet)
- High Definition Audio (HDA) codec specification (Rev.1.0a), Intel

Physical Characteristics

The table below describes some basic characteristics of the Makito X HEVC Rugged. For complete specifications, please refer to the data sheet available from the Haivision Web site.

Makito X HEVC Rugged Video Encoder (#S-292E-HEVC-R)	
Dimensions	54mm H x 192mm W x 205mm D (2.125" H x 7.56" W x 8.1" D)
Material	Aluminum 6061 T651 per SAE AMS-QQ-A-250/11
Weight	5.35 lbs. / 2.43 kg
Finish	External: Black anodized, as per MIL-A-8625F, Type 2, Class 2
Power	28 VDC Nominal, 25W
Temperature	Operating: -40° to 71°C (-40° to 160°F) Non-operating: -45° to 85°C (-49° to 185°F)
Relative Humidity	0-100% condensing
IP Rating	IP67, dust tight with water immersion up to 1 meter depth for 30 minutes.

Caution

If you have questions regarding the suitability of the Makito X HEVC Rugged in your operating environment, please contact Haivision Technical Support.

Power Supply Unit Characteristics

PSU (#P-292E-XCR-PS-AC)			
Input Voltage	20 VDC to 33 VDC 25 W (max)	Storage Temperature	-51°C to 85°C
Input Protection	Reverse polarity protection	Working Temperature	-40°C to 71°C

Product Numbers

S-292E-X-HEVC-R	Dual channel HD-SDI Makito X HEVC Ruggedized Encoder with black anodized finish (no metadata)
S-292E-X-HEVC-R-KLV	Dual channel HD-SDI Makito X HEVC Ruggedized Encoder with black anodized finish and metadata support
S-292E-X-HEVC-R-DK	Dual channel HD-SDI Makito X HEVC Ruggedized Encoder with metadata support, cabling set and power supply for bench testing

Accessory Product Numbers

CA-292E-XCR-CONN	Rugged connector set (power, Ethernet, serial, audio)
CA-292E-XCR-TERM	Commercial break-out connectors terminated cable set (Ethernet = RJ45, serial = DB9, 4-input audio, power) with rugged connectors
P-292E-XCR-PS-AC	Power supply for the Makito XCR or HEVC Rugged unit - 120/240 AC to +24V DC with locking connector
CA-292E-XCR-DK	Terminated cabling and PSU kit for Makito XCR or HEVC Rugged Encoder

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