Makito™ XR Encoder Installation Guide

This Installation Guide summarizes the basic steps required to install and configure the Makito XR SD/HD/3G SDI H.264 Video Encoder (single chassis, as shown below) to stream to your compatible decoding device. Please refer to the Makito X User's Guide or the online help (available from the Web Interface) for detailed information.

> **NOTE** We recommend that you familiarize yourself with this Installation Guide before installing your Makito XR.

The Makito XR is a rugged COTS encoder designed for the most demanding Intelligence, Surveillance, and Reconnaissance (ISR) applications and built to match the physical and mission-critical requirements of Full Motion Video (FMV). The Makito XR High Profile encoder supports up to four 720p60 HD (in the X4R model) or two 1080p60 HD/3G inputs (in the X2R model), and can simultaneously output two H.264 streams, each at different bit rates. 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 XR is a single Line Replaceable Unit (LRU) that will not require major system upgrades to existing platform designs. Tested against the highest international standards for ruggedization, including MIL-STD 810G, MIL-STD 1275E and MIL-STD 461F, it can survive shock and vibration from any mobile application, including law enforcement, military, and underwater vehicles deployed by oil and gas companies.
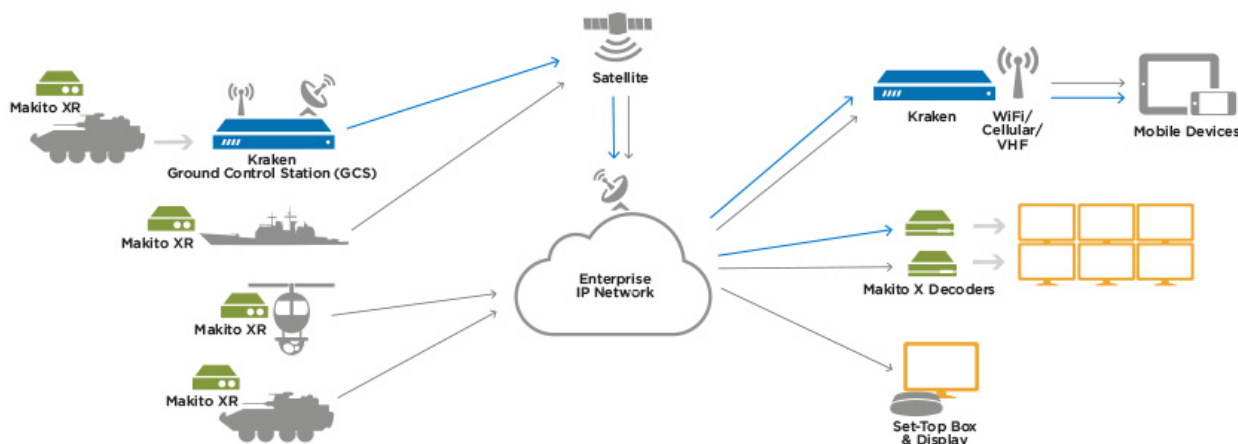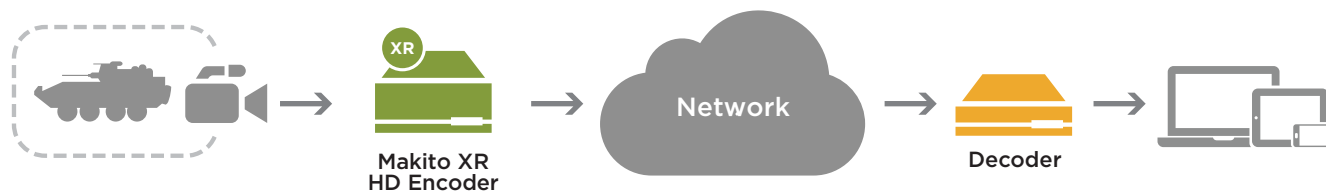
Makito XR Physical Characteristics

Dimensions	8.5" W x 3.9" H x 6.7" D
Material	Aluminum 6061 T651 per SAE AMS-QQ-A-250/11
Weight	6.8 lbs. (3.08 kg)
Finish	External: (Option 1) Black anodized, as per MIL-A-8625F, Type 2, Class 2; (Option 2) CARC white Internal: Machined T651

Makito XR Power Supply Unit Characteristics

Input Voltage	28V DC / 30W (max.)	**Storage Temperature**	-51 to 85 deg C from PDD
Input Protection	Reverse polarity protection	**Working Temperature**	-40 to 71 deg C

Makito XR Product Numbers

S-292E-X2R	Dual channel 3G-SDI Makito X Ruggedized with black anodized finish
S-292E-X4R	Quad channel HD-SDI Makito X Ruggedized with black anodized finish
S-292E-X2R-W	Dual channel 3G-SDI Makito X Ruggedized with white CARC finish
S-292E-X4R-W	Quad channel HD-SDI Makito X Ruggedized with white CARC finish

⚠️ CAUTION We strongly recommend that you install the Makito XR in an enclosure for protection against weather and other environmental stresses. The ambient temperature inside the enclosure should be between -40°C and +71°C, and the relative humidity between 0 and 100%. If you have specific questions regarding the suitability of the Makito XR in your operating environment, please contact Haivision Technical Support.

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 Makito XR box, you may need to have the following items available:

   • Four #10-32 or M5 screws for mounting

   • Haivision cabling kits (see "Accessory Product Numbers" on page 5), or your own custom cables (see "Makito XR Pinouts" on page 5)

   • A laptop with web browser, Telnet client, and video player (e.g. VLC)

   NOTE Connector drawings, kitting and terminated cabling drawings are available upon request.

3. In order to be able to view the output from the Makito XR, make sure you have a decoding device or video player that is able to support the UDP Transport Stream format.

   NOTE If the Makito XR 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 set-up in a "staging" environment, such as a lab or control center. Once the encoder has been set up and is demonstrated to be operating normally, you can then move it to the remote location.

   CAUTION Before installing the Makito XR, please refer to the section on "Safety Guidelines" in the Makito X 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 limité sont protégées par un mécanisme spécifique, une serrure et une clé ou tout autre dispositif de sécurité.*

   NOTE While the Makito XR has a real-time clock (RTC), it has no RTC battery. In the event of a power loss, the system date and time settings are 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. Refer to the Makito X User's Guide for details.

Haivision

Installing the Makito XR

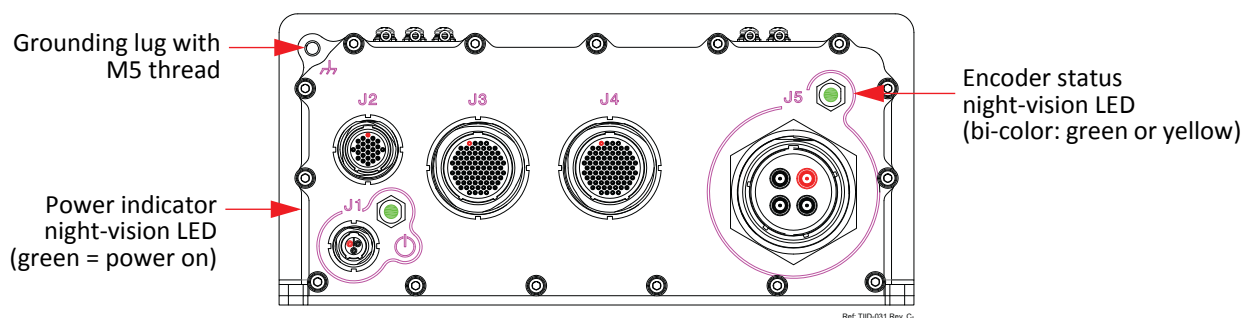1. Position the appliance against a solid base.

⚠️ **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 10-32, or M5).

Mounting hole   Mounting hole

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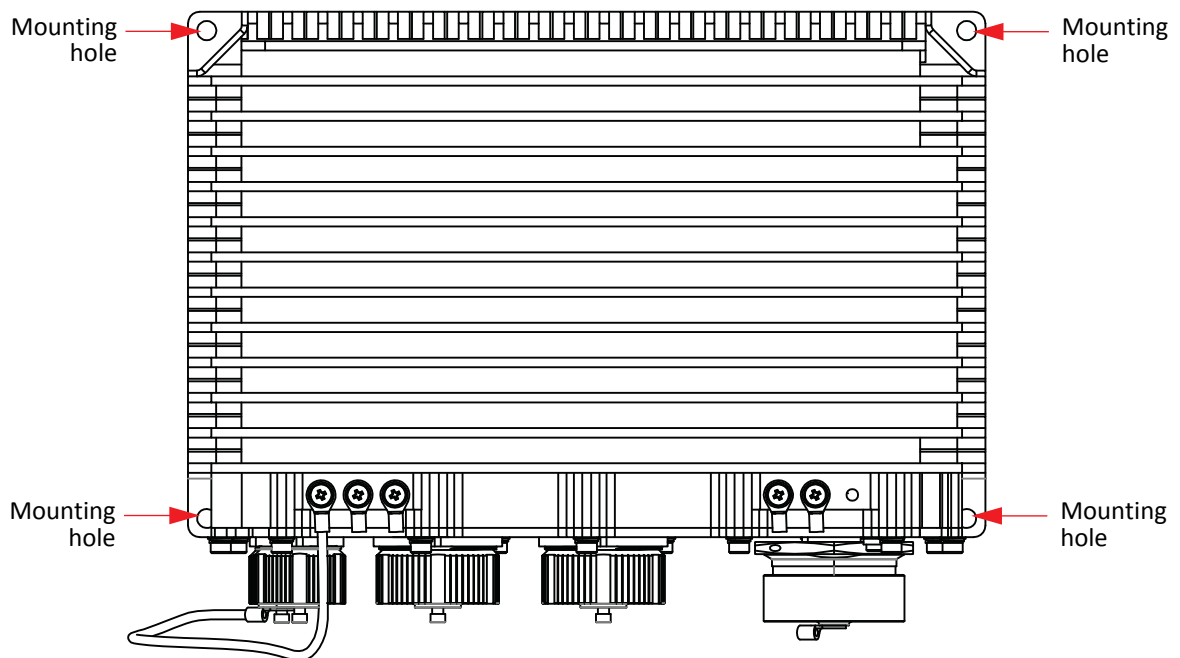
3. Fasten a grounding wire (10 AWG minimum) to the grounding lug using the nut and lock washer provided.

Grounding lug with M5 thread

J2   J3   J4   J5

Encoder status night-vision LED (bi-color: green or yellow)

Power indicator night-vision LED (green = power on)

J1

Ref: TIID-031 Rev. C-

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

Accessory Product Numbers

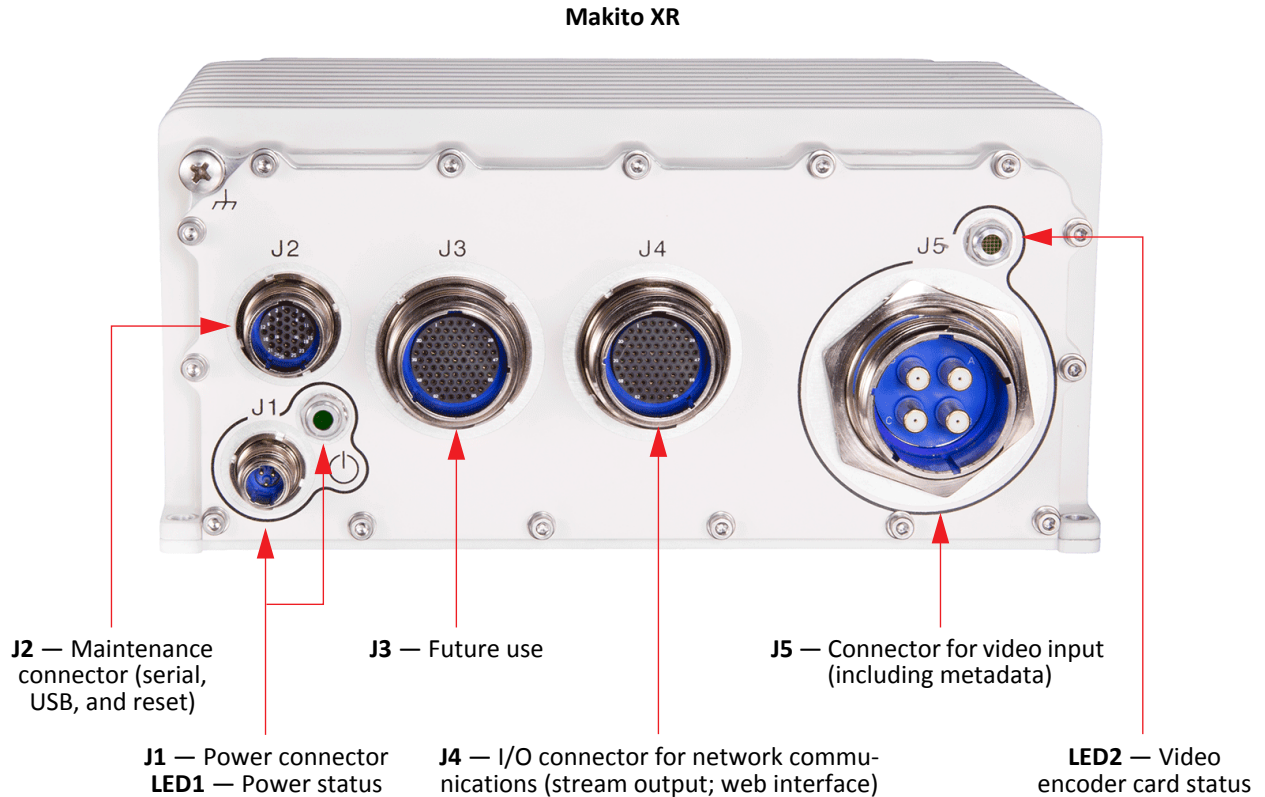| CA-292E-XR-CONNSET	MIL-STD connector set (power, video, Ethernet/serial) — J1 to J5
CA-292E-XR-TERMSET	Commercial break-out connectors terminated cable set (Ethernet = RJ45, serial=DB9, 4-input audio, video BNC, power) with MIL-STD connectors
P-292E-XR-PS	Power supply for the XR unit — 120/240 AC to +28V DC (40 Watts) with locking connector

Makito XR Pinouts

The J1 to J4 connectors on the Makito XR are GLENAIR 38999 series shells. J5 is a MIL-DTL-38999 matched impedance connector. The coaxial pins are GLENAIR 852-056-02. For detailed pinout information see "Appendix A: Makito XR Encoder Pinouts".
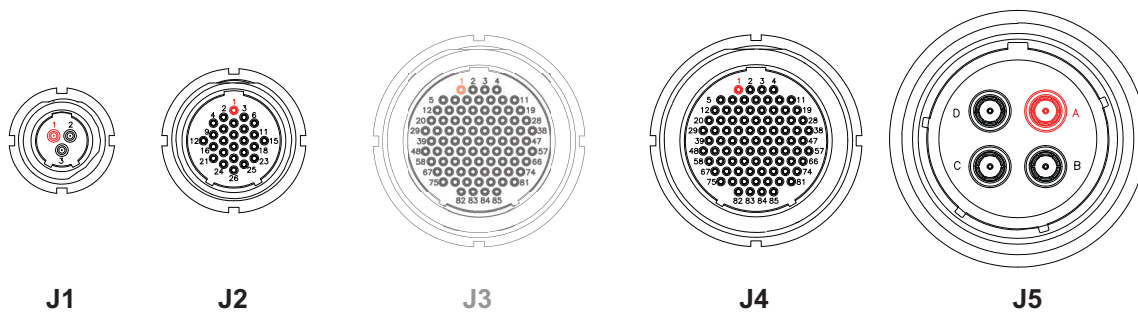
J1   J2   J3   J4   J5

NOTE Connector drawings, kitting and terminated cabling drawings are available upon request. Contact Haivision Technical Support

## Connecting the Makito XR to the Network and Video Sources

1. Connect video, serial and network cables, referring to the images below:

Makito XR

J2 — Maintenance connector (serial, USB, and reset)

J3 — Future use

J5 — Connector for video input (including metadata)

J1 — Power connector
LED1 — Power status

J4 — I/O connector for network communications (stream output; web interface)

LED2 — Video encoder card status

2. Remove the protective caps from the Makito XR's connectors

3. Connect the Makito XR's **J4** port to the IP network using the **Ethernet cable**:


RJ-45
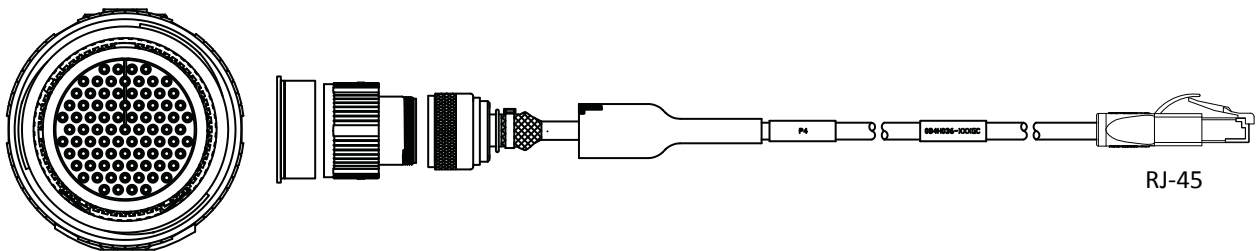
4. (Optional) Connect the Makito XR's **J2** port to a metadata source or to the serial port of a computer using the **maintenance breakout cable** (shown following).

DB-9
RS-232/422

USB 2.0
(Future use)

System
Reset

J2
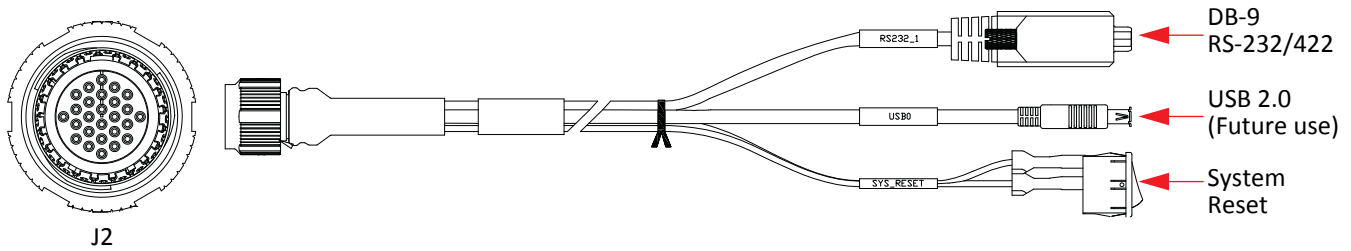
NOTE The reset button provides two options:

- If you press and hold the button for less than 4 seconds the system resets and load 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.

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5. Connect the Makito XR's **J5** port to your video source(s) using the **video breakout cable**.

J5

Mini-BNC
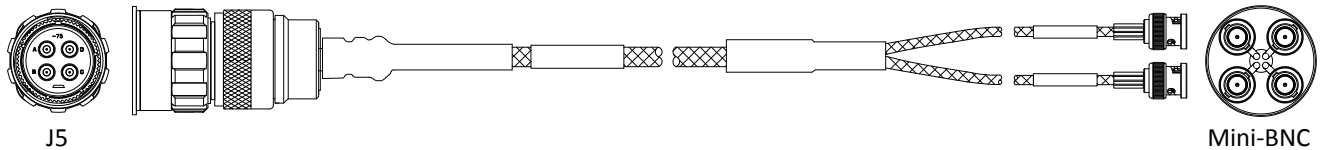
NOTE The Makito XR supports up to 2 video inputs @ 1080p50/59.94/60 (in the X2R model), or up to 4 video inputs @ 1080p25/29.97/30 (in the X4R model).

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6. Power up the unit. Note that there is no power switch on the Makito XR appliance. The power is automatically on when the unit is plugged in.

CAUTION The power cord is used as the main disconnect device. Ensure that the socket-outlet is located/installed near the equipment and is easily accessible.
ATTENTION *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.*

- Insert the 3-pin connector of the **power cable** into the power input jack (**J1**) at the rear of the encoder.

J1
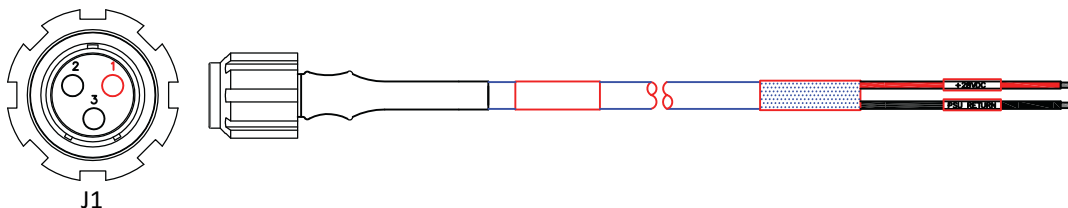
Make sure the connector is properly inserted and locked to avoid intermittent power problems.

- Connect the power cable to a 28V power source (the P-292E-VR-B PSU can be used to convert from +120V AC to +28V DC).

- The Status LED next to J5 will start blinking green, indicating that the encoder is booting up.

- Wait until the Status LED stays solid green, indicating that the encoder is ready for operation.

NOTE The Makito XR 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 the Makito X User's Guide.

Modifying the Makito XR's IP Address

If you haven't changed the factory presets, and if not specified elsewhere in the shipment, the encoder's IP address is set by default to: `10.5.1.2`. To be able to log in to the Makito XR Web interface, your computer has to 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.

> 💡 TIP After you change the Makito XR encoder's IP address, we recommend that you document it some-where, and label the chassis.

1. If you have not already done so, power up the Makito XR.

2. The Makito XR comes pre-configured with the following settings:

IP Address*	Subnet Mask	Gateway
10.5.1.2	255.255.0.0	10.5.0.1

   * The IP address of your computer must be in the same subnet.

3. Open a Web browser, type the IP Address for the Makito XR into the URL address bar, and press Enter.

4. Log in to the Makito XR Web Interface, using the following default administrative username and password:

Admin Username	Password*
admin	manager

   * Be sure to change the default password.
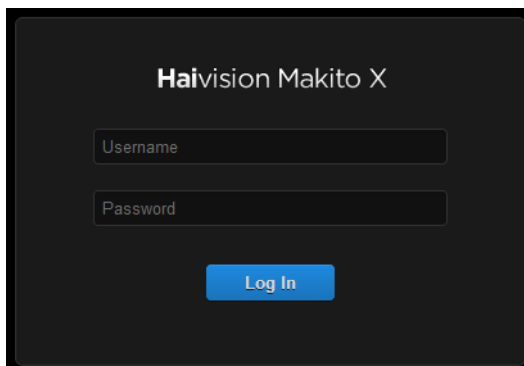
> ℹ️ NOTE While the Web interface is most commonly used to control the Makito XR, a Command Line Inter-face (CLI) is accessible via Telnet or SSH. For more information, please refer to the Makito X User's Guide.

5.   Select the ⚙ ADMINISTRATION icon from the toolbar, and then select NETWORK (under SETTINGS).
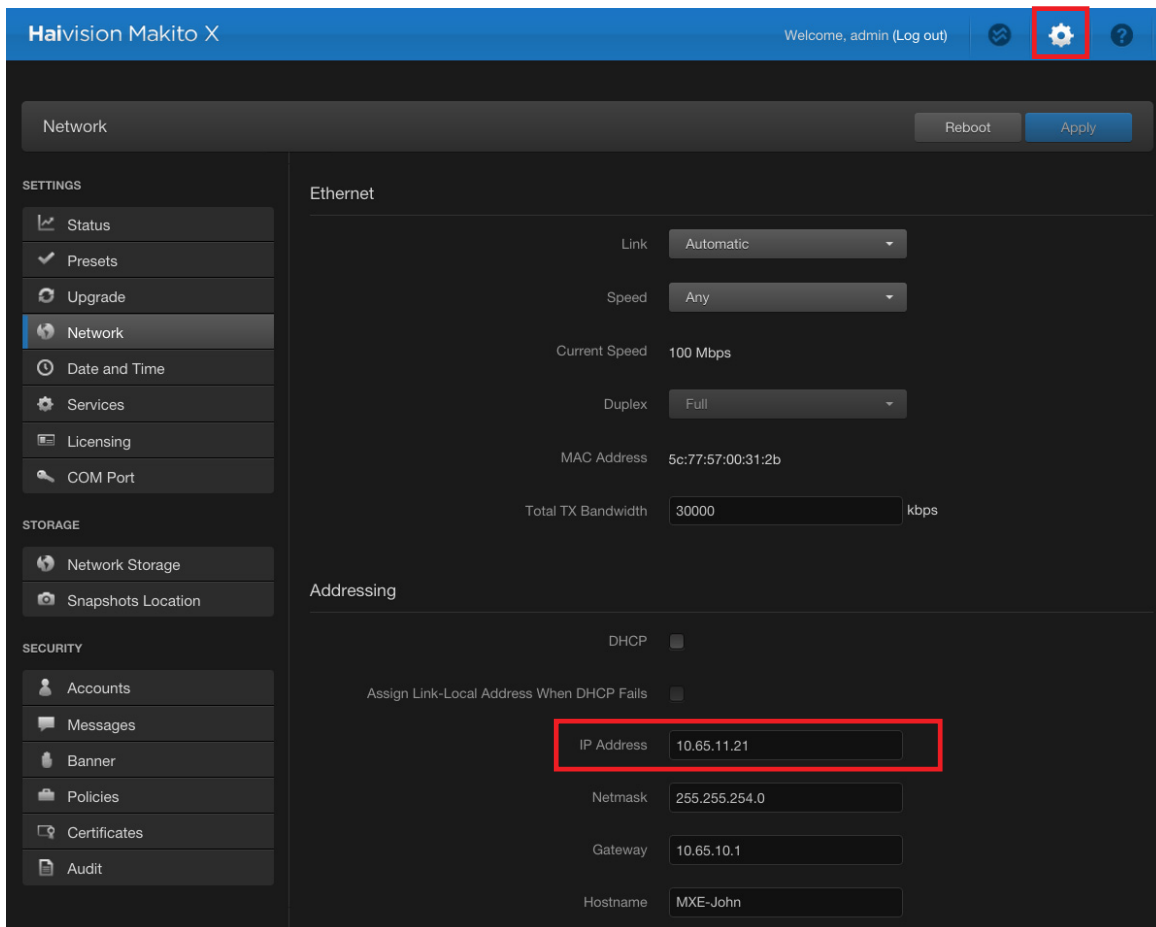
6.   Type in the new IP address. If required, select or enter other new value(s) in the appropriate field(s).

7.   To apply your changes, click Apply, and then click Reboot. (You must reboot the system for the changes to take effect.)

ℹ   NOTE   Remember to change your computer network settings to be on the same network segment as the Makito XR.

Setting up a Test Stream

Setting up a test stream requires that you have an active video source connected to the Makito XR. 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, please refer to Chapter 4 of the Makito X User's Guide.

1. If you have not already done so, power up the Makito XR.

2. Open a Web browser, type the IP Address* for the Makito XR into the URL address bar, and press Enter.

   * The IP address of your computer must be in the same subnet (see "Modifying the Makito XR's IP Address" on page 9).

3. Click the ⊗ STREAMING icon on the toolbar, and then click VIDEO ENCODERS from the sidebar menu.
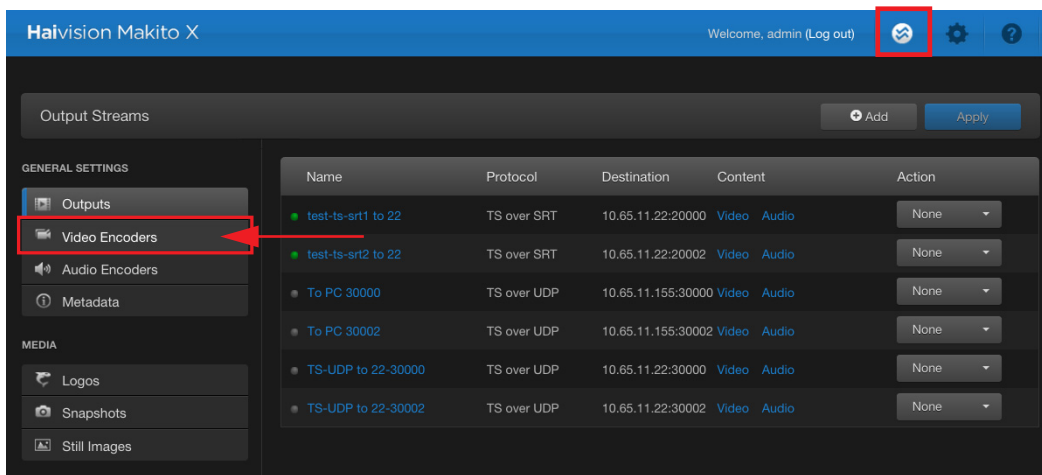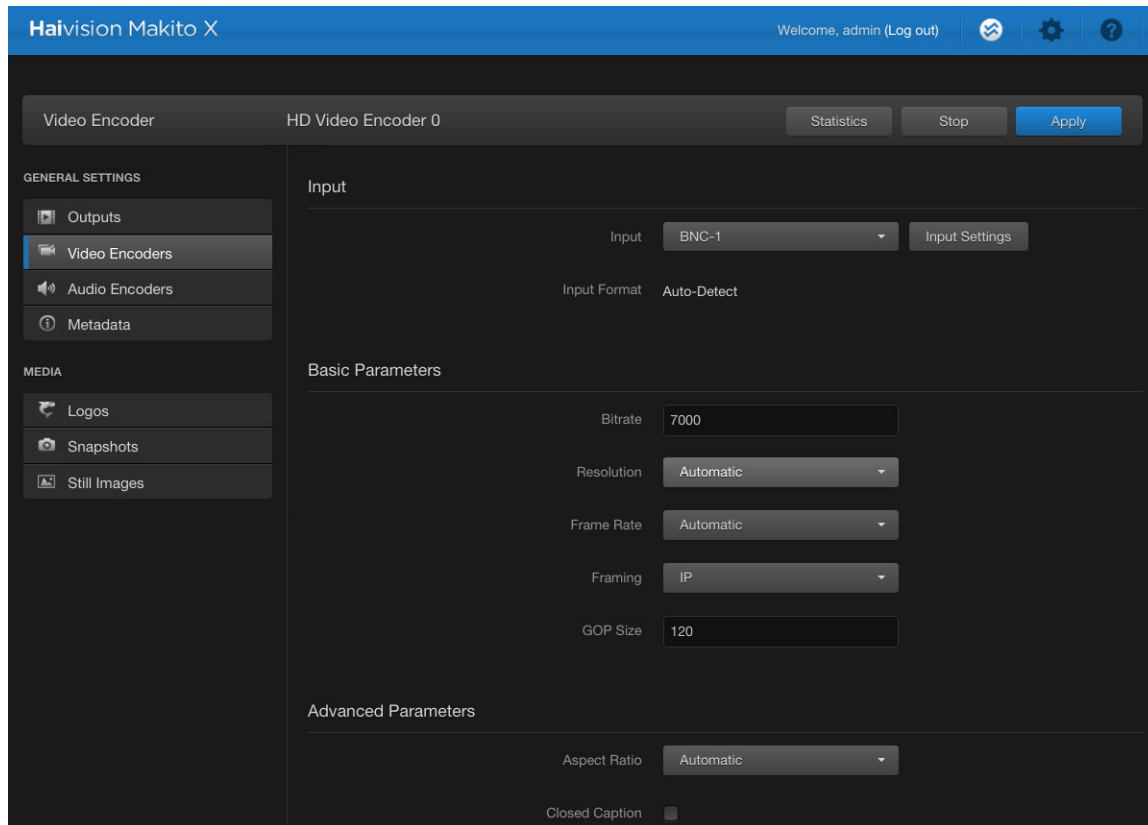

The Video Encoders List View opens, as shown in the following example.
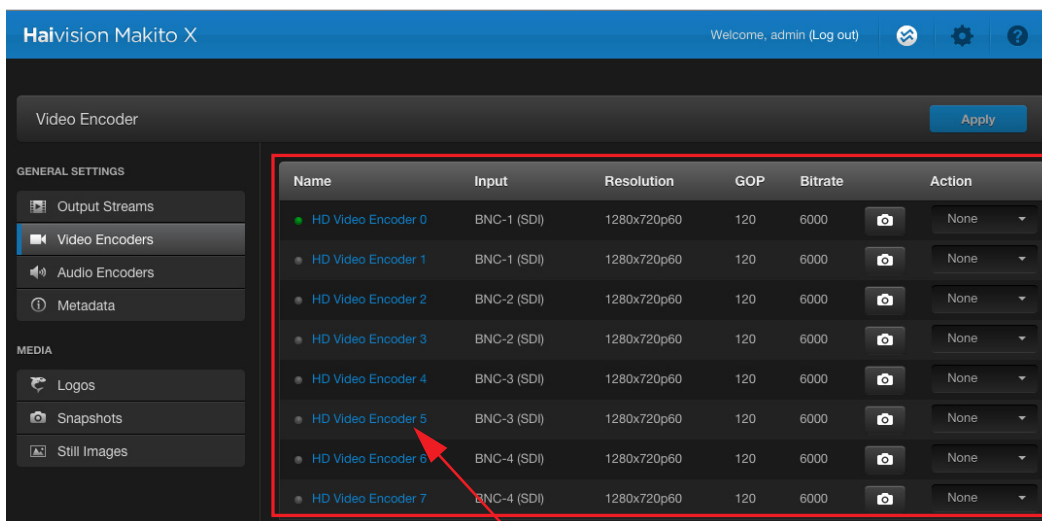

Click link to open Detail View

4. From the Video Encoders List View, click a link in the table to select the encoder.

The Video Encoder Detail View opens, displaying the settings for the selected video encoder (see following example).

5. Select or enter the new value(s) in the appropriate field(s).

6. Click Start, and then click Apply.

7. Click the ⬙ STREAMING icon on the toolbar, and then click OUTPUTS from the sidebar menu.

The Output Streams List View opens, as shown in the following example.
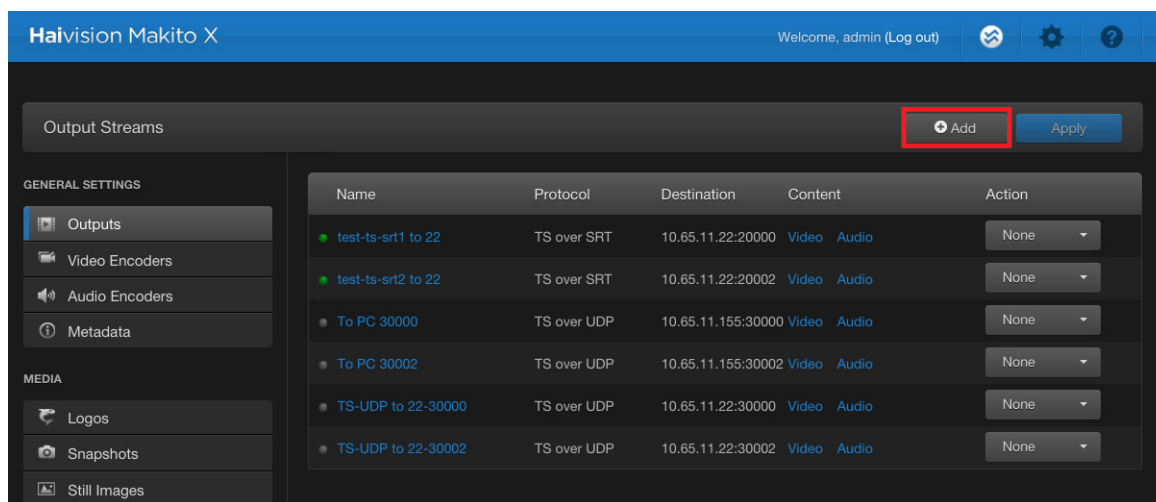
8. To add an output stream, click Add.

    The Output Streams Detail View opens (as shown in the following example for a new stream).

9. Type a Name for the stream and select **TS over UDP** for the Protocol.

10. In the Source section, select the encoder you started in step 6. from the **Video** menu.

11. In the Destination section, 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`).

12. To add metadata to the stream, select the Metadata source, and (optionally) select the encapsulation type (Data Carriage).
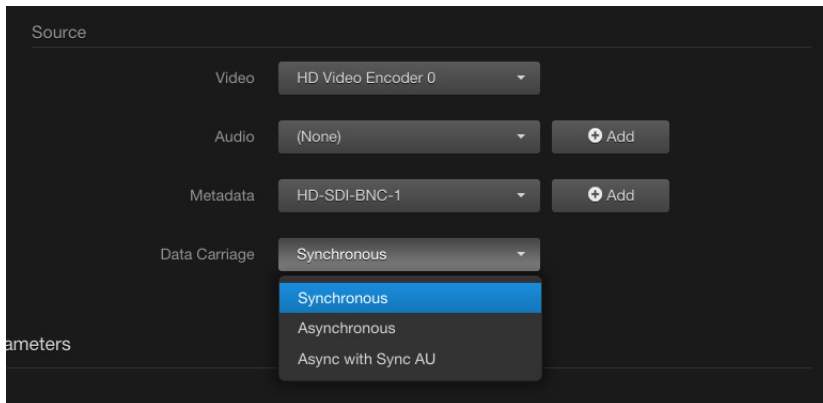
13. To apply your changes and start streaming, click Apply.

The changes will take effect immediately *but will be lost after a reboot.* For information on saving configuration settings, please refer to the "Saving and Loading Presets" section of the Makito X User's Guide.
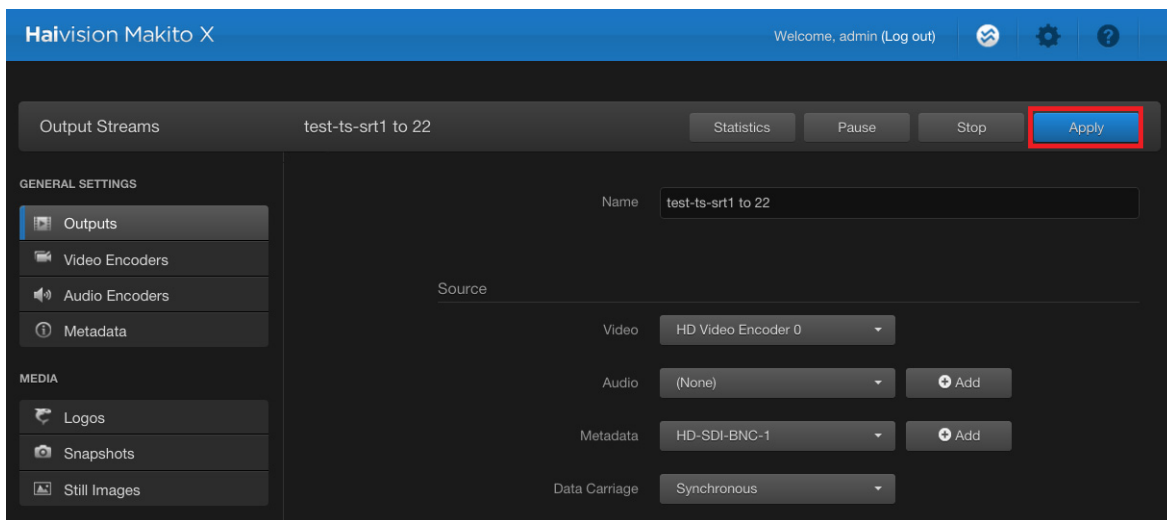
Viewing the Test Stream

1. Make sure your decoding device (or software) is compatible with the UDP 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 Makito XR, and

4. Tune your decoding device or software to the multicast address of the test stream coming from the Makito XR.

Appendix A: Makito XR Encoder Pinouts

This appendix contains the pinout descriptions for the Makito XR SD/HD/3G SDI H.264 Video Encoder. This information must be used in conjunction with Haivision drawing no. TIID-031 (Makito XR Enclosure External Cable Connections).

Abbreviations & Definitions

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 XR External Cable Connections (TIID-034)
- Makito XR Data Sheet
- Makito X User's Guide
- SMPTE 259M (SD-SDI), 292M (HD-SDI) and 424M (3G-SDI)
- IEEE 802.3-2012 (Ethernet)
- USB standard, USB Implementers Forum (USB.org)
- High Definition Audio (HDA) codec specification (Rev.1.0a), Intel

Enclosure Front Panel

The Makito XR video encoder enclosure offers total of 5 MIL-STD connectors for external cables attachment.

Makito XR Video Encoder Enclosure Front View

List of Connectors		
ID	Description	Number of Contacts
J1	Power Connector	3
J2	Maintenance Connector	26
J3	Future use	85
J4	Ethernet	85
J5	Video Input Connector	4 pins (coaxial, 75-ohm)
List of LED Indicators		
ID	Description	Location
LED1	Power Status	Near J1
LED2	Video Encoder Card Status	Near J5

Connector Part Numbers

J1 to J4 are GLENAIR 38999 series shells.

J5 is a MIL-DTL-38999 matched impedance connector that accommodates 4 pin contacts, size 8, with 75-ohm impedance. The coaxial pins are GLENAIR 852-056-02

Refer to Haivision drawings TIID-031 and TIID-034 for detailed list of part numbers.

Power Entry Connector (J1)

Refer to the Makito XR video encoder data sheet for power requirements details.

Power Connector J1	
Manufacturer	GLENAIR
Connector Type	MIL-DTL-38999
Part Number	805-004-07ZNU8-23PA

Front Connector Power Location		
Connector	Pin	Description
J1	1	28 Volt Input – 1.0A max
J1	2	28 Volt Return
J1	3	Chassis Ground
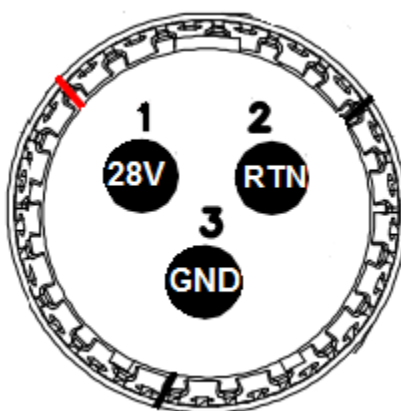
J1 Power Connector Pin Locations

Maintenance Connector (J2)

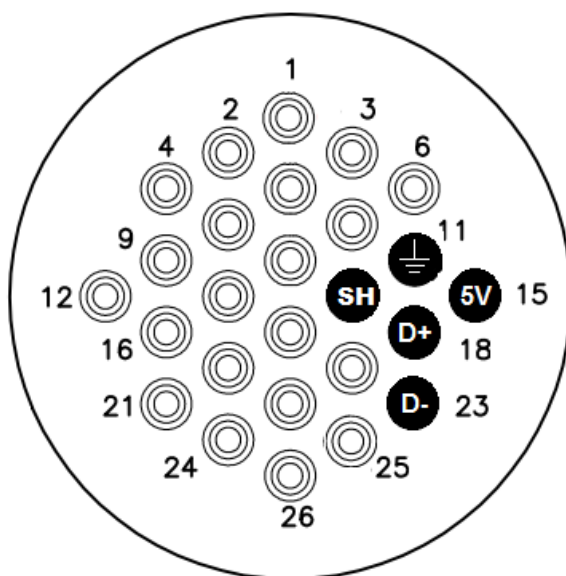| I/O Connector: J2	
Manufacturer	GLENAIR
Connector Type	MIL-DTL-38999
Part Number	805-005-07 ZNU 12-26SA

Feature	Reference
USB 2.0 interface	Refer to "USB 2.0 Interface"
RS-232 serial interface	Refer to "RS-232 Serial Interface"
Reset Button	Refer to "Reset Button"

USB 2.0 Interface

The Makito XR video encoder has a USB 2.0 Host Interface which is provisioned for future use applications. It is currently disabled.

Do not attach a USB device requiring more than **500 mA**.

| Front Connector View I/O Location			
Connector	Pin	Description	
J2	11	USB7_GND signal	
	14	USB7 Drain Wire – Cable shield	SH - Shield
	15	USB7 5V - Always enabled	500 mA Max
	18	USB7_D+ Data signal	ESD Protected ± 8 kV
	23	USB7_D- Data signal	ESD Protected ± 8 kV
	All Others	Not Connected (NC)	

J2 Maintenance Connector USB Pin Locations

RS-232 Serial Interface

Makito XR video encoder can be managed through a RS-232 serial interface, one commonly used for configuration making use of the Command Line Interface (CLI). This port is designated as COM1.

| Front Connector View I/O Location			
Connector	Pin	Description	
J2	1	COM1 – Drain Wire / Cable Shield	SH
	3	COM1 – RX RS-232 Receive Data signal	RX1 ESD Protected ± 18 kV
	6	COM1 – TX RS-232 Transmit Data signal	TX1 ESD Protected ± 18 kV
	8	COM1 – RS-232 Ground signal	
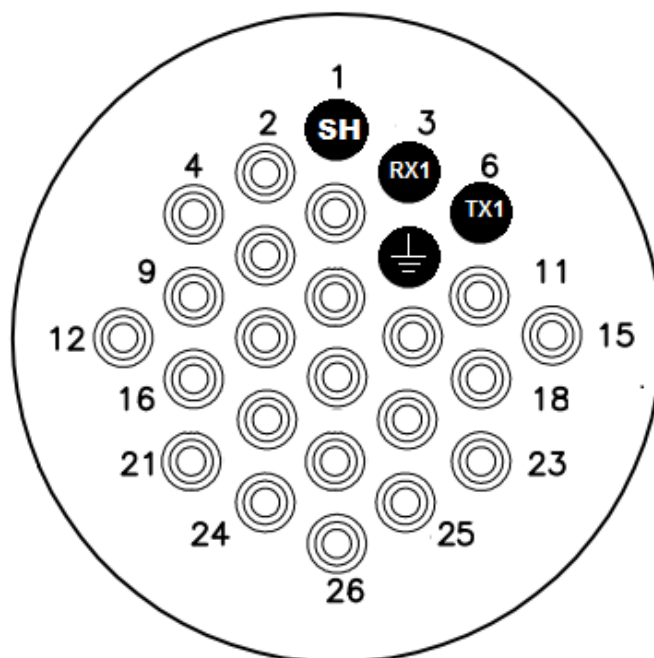
J2 Maintenance Connector COM1 – Module RS-232 Pin Locations

Reset Button

A reset button (RST# signal) can be asserted to ground to provide the user with 2 options.

• If RST is asserted for 0s < t < 4s duration, the system resets and loads the last saved configuration. If no configuration was previously saved, the default settings prevail.

• For assertion of t > 4s, the module performs a complete factory reset. It clears all of the previously configured settings, including IP, streams and encoder configuration.

Front Connector I/O Location				
Connector	Pin	Description		
J2	19	System Reset Ground		
	24	System Reset Signal – asserted LOW	RST#	3.3V Input ESD Protected ± 18 kV
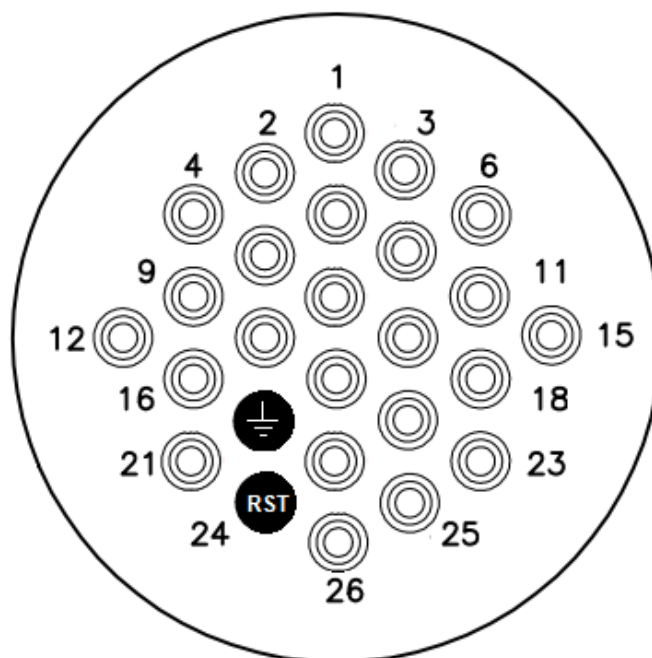
J2 Maintenance Connector MISC Signal Pin Locations

Connector (J3)

This connector is reserved for future use.

Ethernet (J4)

I/O Connector: J4	
Manufacturer	GLENAIR
Connector Type	MIL-DTL-38999
Part Number	0805-005-07M19-85SD

Feature	Reference
GBE0 — Ethernet	Refer to "GBE0 — Ethernet"

GBE0 — Ethernet

The Makito XR 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.

Front Connector View I/O Location					
Connector	Pin	Description			
J4	4	Ethernet Data Signal	GBE0_BI_DB+	1+	ESD Protected ± 8 kV
	9	Ethernet Data Signal	GBE0_BI_DB-	1-	
	18	Ethernet Data Signal	GBE0_BI_DD-	3-	
	19	Ethernet Data Signal	GBE0_BI_DD+	3+	
	25	Ethernet Data Signal	GBE0_BI_DA-	0-	
	26	Drain Wire – Ethernet Shield		SH	
	35	Ethernet Data Signal	GBE0_BI_DA+	0+	
	37	Ethernet Data Signal	GBE0_BI_DC-	2-	
	38	Ethernet Data Signal	GBE0_BI_DC+	2+	
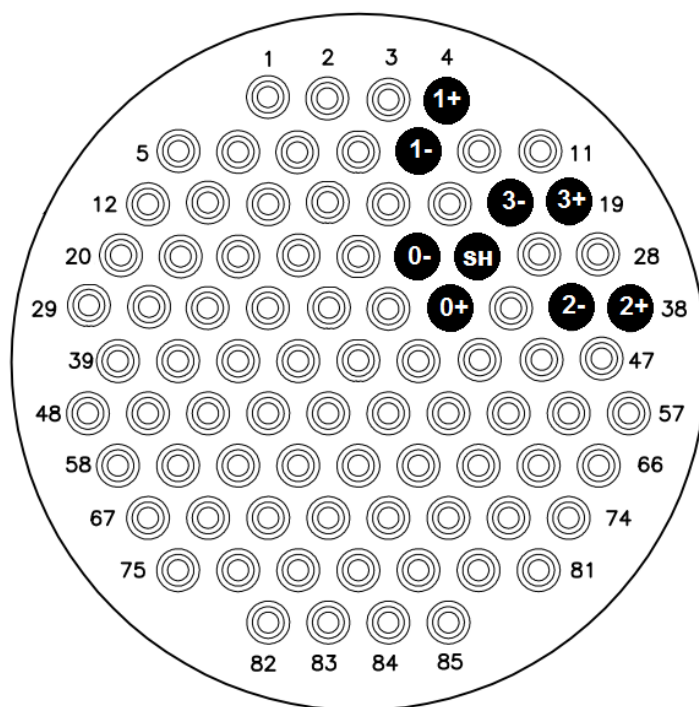
J4 Ethernet GBE0 Pin Locations

Video Connector (J5)

The Makito XR video encoder allows up to four 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 75-ohm impedance (3-GHz bandwidth).
- Composite video allows for NTSC and PAL input signals among others.

Refer to the product specification for complete details.

I/O Connector: J5	
Manufacturer	GLENAIR
Connector Type	Video Quad Coax Plugs
Part Number	SHELL : 257-606ZR07-21Q-75AN PINS : 852-056-02

Front Connector I/O Location			
Connector	Pin	Description	
J5	A	Video Input BNC 1	ESD Protected ± 8 kV
	B	Video Input BNC 2	
	C	Video Input BNC 3	
	D	Video Input BNC 4	
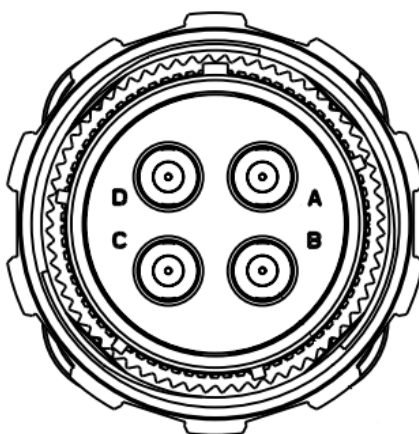
J5 Video Input Pin Locations

For More Information

Contact Haivision Technical Support via our Support Portal on our website at: http://www.haivision.com/support-portal-home

Or you may use the phone numbers or email addresses listed below:

North America:	Toll Free: 1.877.224.5445 (option 4)
International:	Tel: 1-514-334-5445 (option 4) Fax: 1-514-334-0088
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