

Makito X1 Rugged Encoder Installation Guide

Makito X1 Rugged Encoder

This Installation Guide provides the steps required to install and configure the Makito X1 Rugged Video Encoder to stream to your compatible decoding device. This guide covers the Makito X1 appliance (#S-MX1E-R-SDI1-ISR) and the Evaluation Kit (#S-MX1E-R-SDI1-DK, available upon request at sales@haivision.com)

Please refer to the [Makito X1 Rugged Encoder User's Guide](#) for detailed configuration and operation information, as well as technical specifications.

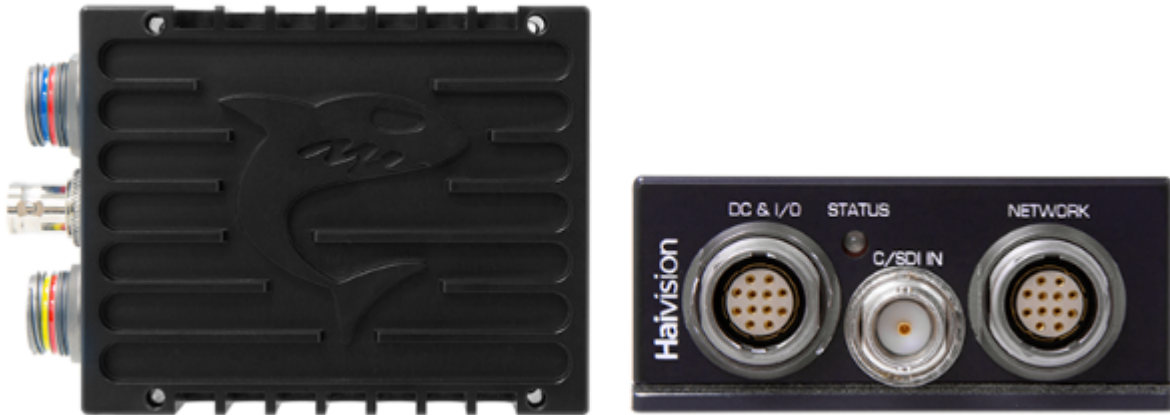
We recommend that you familiarize yourself with this guide before installing your encoder.

Guide Contents

- [Makito X1 Rugged Encoder Overview](#)
- [Getting Started](#)
 - [Safety Guidelines](#)
- [Install the Makito X1 Rugged Encoder](#)
 - [Connect to the Network and Audio/Video Sources](#)
 - [Power up the Makito X1 Encoder](#)
- [Access the Web Interface](#)
- [Set Up a Test Stream](#)
- [View the Test Stream](#)
- [Reset the Encoder](#)
- [Makito X1 Rugged Encoder Pinouts](#)
 - [Enclosure Front Panel](#)
 - [DC IN and I/O Connector](#)
 - [Network Connector](#)
 - [Video Input Connector](#)
- [Terms of Service Agreement](#)

Makito X1 Rugged Encoder Overview

MX1 Rugged v2 (#S-MX1E-R-V2-SDI1)



MX1 Rugged (#S-MX1E-R-SDI1)



The Makito X1 Rugged is an ultra-compact H.265/HEVC and H.264/AVC low latency encoder for real-time streaming of MISB/JITC-compliant full motion video in demanding Intelligence, Surveillance and Reconnaissance (ISR) environments.

Makito X1 Rugged features include the following:

- **HEVC Encoding** – With dual encoding cores, the Makito X1 Rugged can encode HD 1080p60 or SD with H.265/HEVC and H.264/AVC compression simultaneously. On the first encoder (only), it offers independent control of scaling, cropping, and encoding parameters. It also supports Network Adaptive Encoding to provide quality streams even when network bandwidth is variable or unpredictable, for example, over constrained IP networks, line-of-sight (LOS) and satellite links.

- **Small Form Factor, Powerful Encoding** – The Makito X1 Rugged is a portable, SWaP- (Size, Weight, and Power)-optimized video encoder available as a hardened appliance or OEM board for advanced integrations.
 - The appliance is designed for deployment in portable man-wearable equipment or small platforms in harsh environments.
 - The OEM board is suited for deep integration within ISR sensor, datalink, or mission systems.
- **Ultra Low Latency for ISR and Situational Awareness** – The Makito X1 Rugged streams high-quality full-motion video at low encoding latencies suitable for the most demanding ISR applications. It ensures excellent picture quality at low bit rates to address the real-time requirements for air, ground, manned or unmanned platforms.
- **Compliant Encoding with KLV Metadata from Haivision** – The Makito X1 Rugged complies with MISB/STANAG specifications for encoding and KLV metadata. It supports selective filtering of KLV metadata parameters to ensure downstream interoperability with exploitation systems and cross-domain applications. It provides the flexibility to combine H.265/HEVC and H.264/AVC encoded video with synchronous or asynchronous KLV metadata and optimizes streaming bandwidth.

Note

For information on the OEM board, please refer to the *Makito X1 Integrator's Board Installation Guide* (available upon request at sales@haivision.com).

Getting Started

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.

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 (p/n CA-MX1E-R-TERM) or your own custom cables (see [Makito X1 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](#). 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. Ensure adequate thermal management (cooling).

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.

Safety Guidelines

- Antistatic Precautions
- EMC Warnings
 - Notice with respect to Class A (FCC)
 - Avis relatif aux appareils de classe A (FCC)
 - Notification for Class A (Canada)
 - Notification pour les appareils de classe A (Canada)
 - Safety instructions for Class A for CISPR32
 - Consigne de sécurité relative à la Classe A pour CISPR32
- Waste Electrical and Electronic Equipment (WEEE) Disposal

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.

Warning

The installation of the equipment must comply with local and national electrical regulations.

ATTENTION L'installation de l'équipement doit être conforme aux réglementations électriques locales et nationales en vigueur.

Antistatic Precautions

Electrostatic discharge (ESD) results from the buildup of static electricity and can cause computer components to fail. Electrostatic discharge occurs when a person whose body contains a static buildup touches a computer component.

The equipment contains static-sensitive devices that may be easily damaged, and proper handling and grounding is essential. Use ESD precautionary measures when installing systems or cards, and keep the parts and cards in antistatic packaging when not in use. If possible, use antistatic floor pads and workbench pads.

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

Caution

When handling components, 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.

EMC Warnings

Notice with respect to Class A (FCC)

Changes to equipment without the permission of Haivision may result in its failure to comply with the FCC requirements for Class A digital devices. If applicable, your rights to use the equipment may be limited by the FCC rules and you may be able to remedy, at your own expense, any interference with radio or television equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference that may occur when the equipment is used in a commercial environment. This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Use of this equipment in residential areas may cause harmful interference. If necessary, users will have to resolve these issues at their own expense.

Avis relatif aux appareils de classe A (FCC)

Toute modification de l'équipement sans l'autorisation de Haivision peut entraîner sa nonconformité aux exigences de la FCC concernant les appareils numériques de classe A. Le cas échéant, vos droits d'utilisation de l'équipement seront susceptibles d'être limités par les règlements de la FCC et vous pourrez être amené à remédier, à vos frais, aux éventuelles interférences avec des dispositifs radiophoniques ou télévisuels. Cet équipement a été testé et jugé conforme aux limites d'un périphérique numérique de classe A en vertu de la partie 15 des règlements de la FCC. Ces limites ont pour but de fournir une protection raisonnable contre les interférences nuisibles susceptibles de se produire, lorsque l'équipement est utilisé dans un environnement commercial. Cet équipement génère, utilise et peut émettre de l'énergie radioélectrique. S'il n'est pas installé ni utilisé conformément au manuel d'instructions, il peut provoquer des interférences nuisibles aux communications radio. L'utilisation de cet équipement dans les zones résidentielles est susceptible de causer des interférences nuisibles. Le cas échéant, les utilisateurs devront résoudre ces problèmes à leurs frais.

Notification for Class A (Canada)

This Class A digital apparatus complies with Canadian ICES-003.

Notification pour les appareils de classe A (Canada)

Cet appareil numérique de Classe A est conforme à la norme NMB-003 du Canada.

Safety instructions for Class A for CISPR32

WARNING: This product is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may need to take appropriate measures.

Consigne de sécurité relative à la Classe A pour CISPR32

ATTENTION: Il s'agit d'un produit de Classe A. Dans un environnement domestique, ce produit peut entraîner des perturbations radioélectriques, auquel cas l'utilisateur devra éventuellement prendre des mesures adéquates.

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.

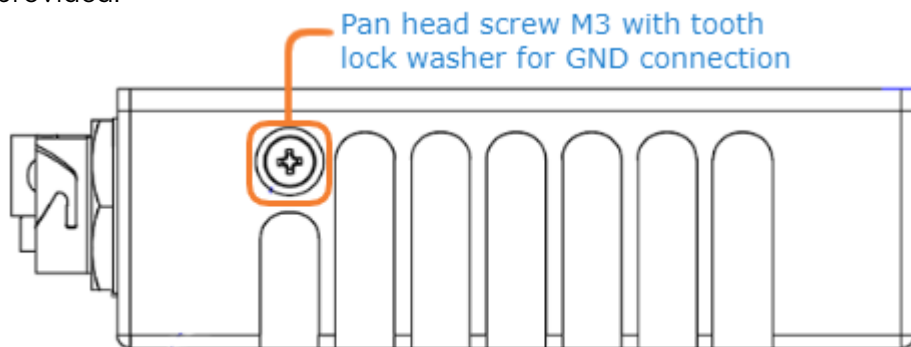
For more information, please visit our website at: <https://www.haivision.com/environment>.

Install the Makito X1 Rugged Encoder

Always read the instructions carefully and keep this guide for future reference.

To install the appliance:

- ⚠ 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. In add cases, adequate temperature management is required to dissipate 6 Watts of power continuously.
- Fasten the appliance to its support base with four screws (size M2.5 or 4-40, 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.
- 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.

Topics Discussed

- [Connect to the Network and Audio/Video Sources](#)
- [Power up the Makito X1 Encoder](#)

Connect to the Network and Audio/Video Sources

MX1 Rugged v2 (#S-MX1E-R-V2-SDI1)



MX1 Rugged (#S-MX1E-R-SDI1)



The Makito X1 Rugged enclosure provides the following rugged connectors:

- **Power & I/O** connector combining these inputs:
 - **Power** (+5VDC, < 6 W)
 - **Analog Audio** Two (2) channels of analog audio – 15 Kohms input impedance
 - **Serial Port** (RS-232/422 – can be used for Management, Pass-thru or KLV or CoT metadata ingest)
- **CVBS/SDI** connector – 75 Ω BNC (used for either SD-SDI (Serial Digital Interface), HD-SDI video, or Composite (CVBS) input signals, with format auto-detected)
- **Network** connector – 10/100/1000 Base-T Gigabit Ethernet; connector also includes a Reset line

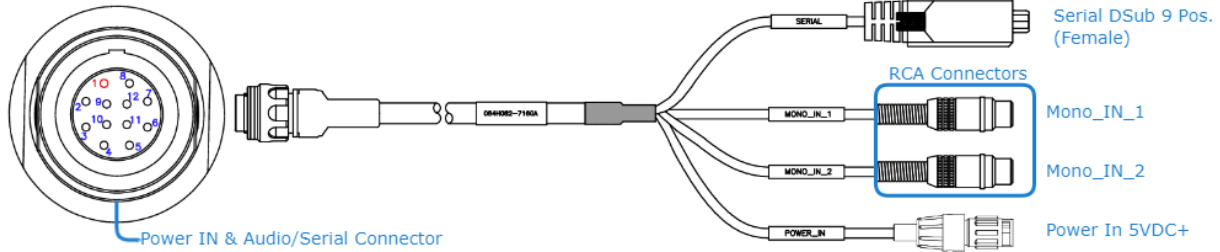
The BNC connector is also a 3G-SDI capable interface supporting 1080p 50/60 fps video @ 3Gbps. In addition, it supports auto-detection of the HD resolution and embedded digital audio.

The Ethernet/Factory Reset and Power/Audio/Serial breakout cables (shown in the following steps) are shipped as part of the Evaluation Kit (#S-MX1E-R-SDI1-DK).

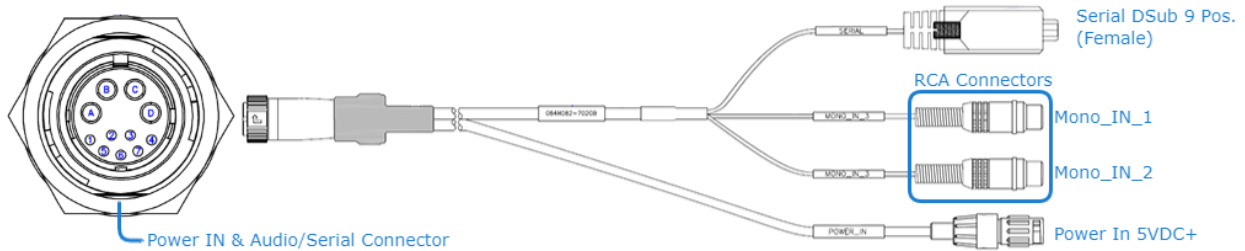
To connect the encoder to the network and A/V sources:

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

Power IN & Audio/Serial Cable Assembly v2

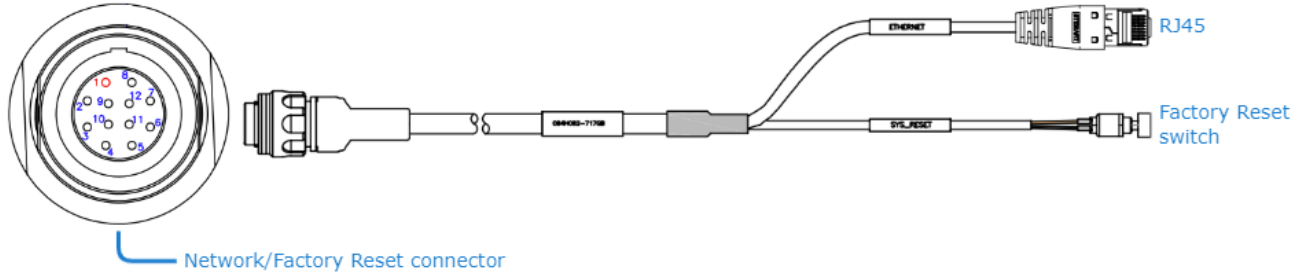


Power IN & Audio/Serial Cable Assembly

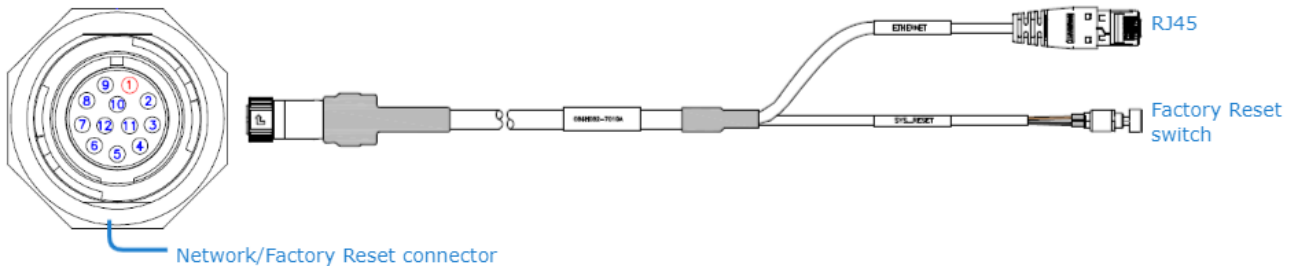


3. Connect the encoder's **CVBS/SDI** video input to your video source, referring to the above image.
4. (Optional) Connect the encoder's **DC In & I/O** port to your audio source(s) using the **Power/Audio/Serial** breakout cable (shown following).

Network Cable Assembly v2



Network Cable Assembly



5. (Optional) If you have a KLV or CoT source that uses RS-232 or RS-422, connect the encoder's **DC In & I/O** port to the metadata source or to the serial port of a computer using the power/audio/serial breakout cable. The **DC In & I/O** port may be used to ingest KLV/CoT, as a management port or as pass-thru for camera control.

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.

6. (Optional) To capture analog audio, connect the encoder's **Audio/Serial** connector to your audio source(s) using the the audio/serial breakout cable, shown in the previous step.

Note

As of Release 1.1.1, the Makito X1 Rugged supports two (2) input channels of analog audio. To configure analog audio, see [Set Up a Test Stream](#).

Power up the Makito X1 Encoder

MX1 Rugged v2 (#S-MX1E-R-V2-SDI1)



MX1 Rugged (#S-MX1E-R-SDI1)



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

Warning

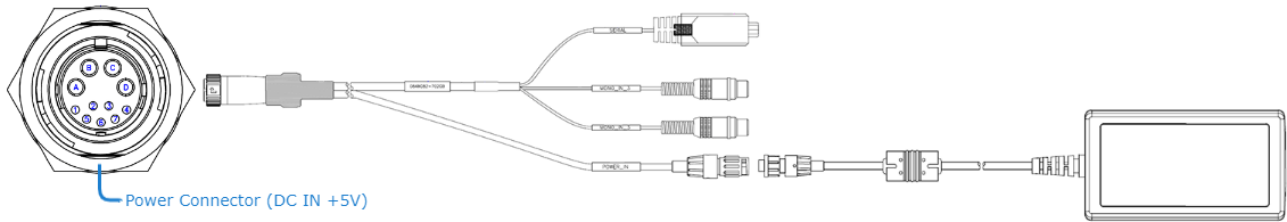
When using the AC/DC power adapter, the power cord is the main disconnect device. Ensure that the socket-outlet is located/installed near the equipment and is easily accessible.

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.

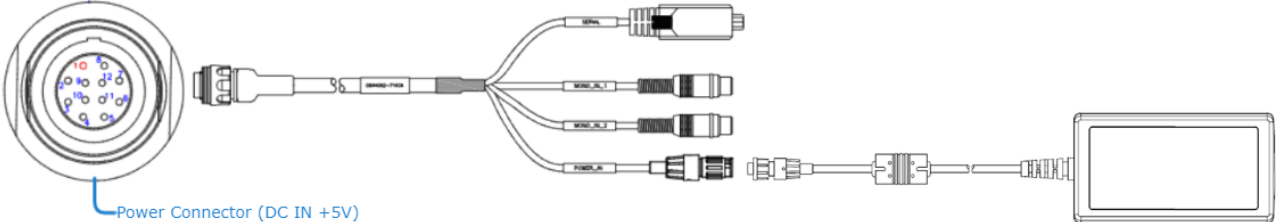
To power up the encoder:

1. (As shown under [Connect to the Network and Audio/Video Sources](#)) Insert the **Power/Audio/Serial** breakout cable connector into the encoder's the encoder's power input port (**DC In & I/O**). Both AC and DC power cables (shown following) are shipped as part of the Evaluation Kit (#S-MX1E-R-SDI1-DK).

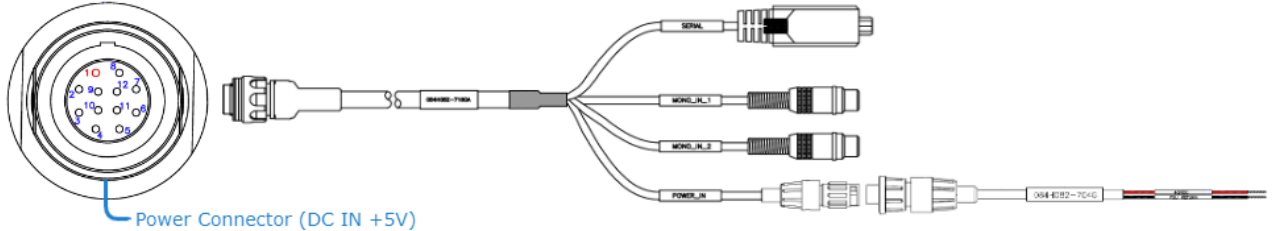
AC Power Cable Assembly



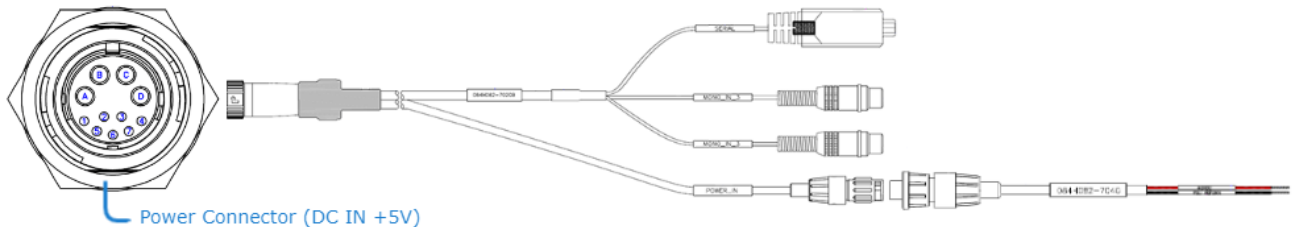
AC Power Cable Assembly v2



DC Power Cable Assembly v2



DC Power Cable Assembly



2. Make sure the connector is properly inserted and locked to avoid intermittent power problems.
3. Connect the power cable to a +5V power source. (The AC PSU can be used to convert from 120V AC to 5VDC \pm .25V.)
The Status LED next to the video input will start blinking green, indicating that the encoder is booting up.
4. Wait until the Status LED stays solid green, indicating that the encoder is ready for operation.

Related Topics

- For pinout information, see [DC IN and I/O Connector](#).
- To order the PSU, contact Haivision Sales at sales@haivision.com.

Access 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 X1 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

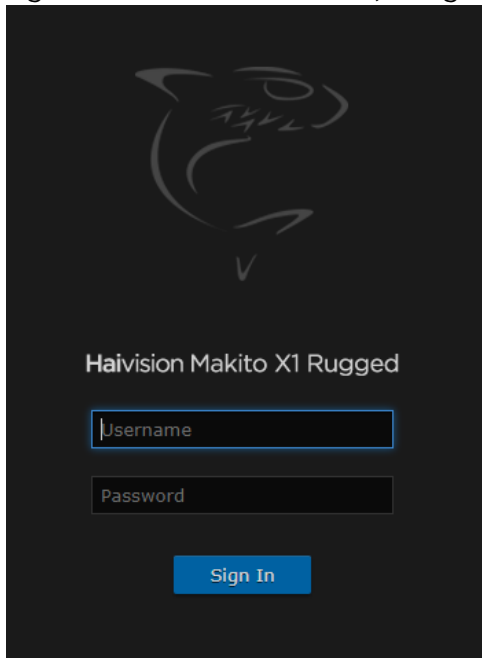
To access the Web interface, your computer must be in the same IP Address range (subnet). You may have to temporarily change your computer’s IP Address to be in the same subnet as the encoder. Only then will you be able to access the encoder and change its IP address, and then afterwards change your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

3. The first time you try to access the Web interface from a new browser, the browser may not recognize the encoder’s https connection, and you may get a Security Certificate Warning (such as “This Connection is Untrusted.” or “The site’s security certificate is not trusted.”). You must accept the encoder’s self-signed certificate in order to access the Web interface.

Note

The Makito X1 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 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.

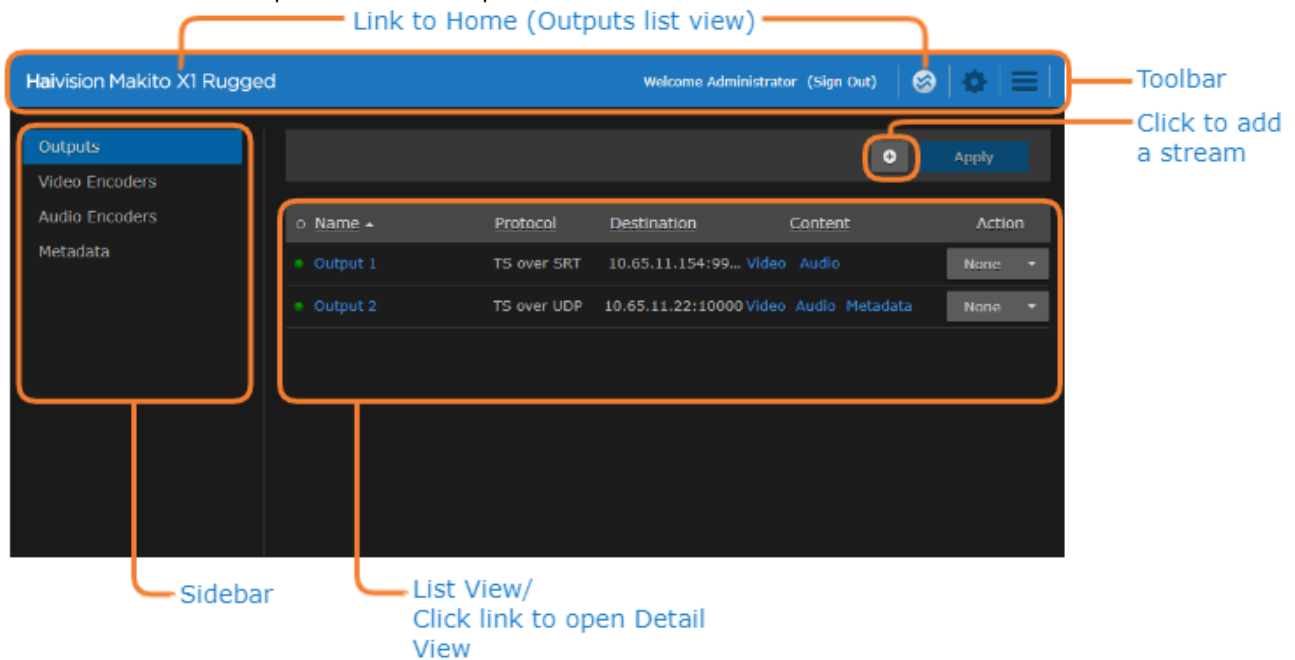
Important

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.

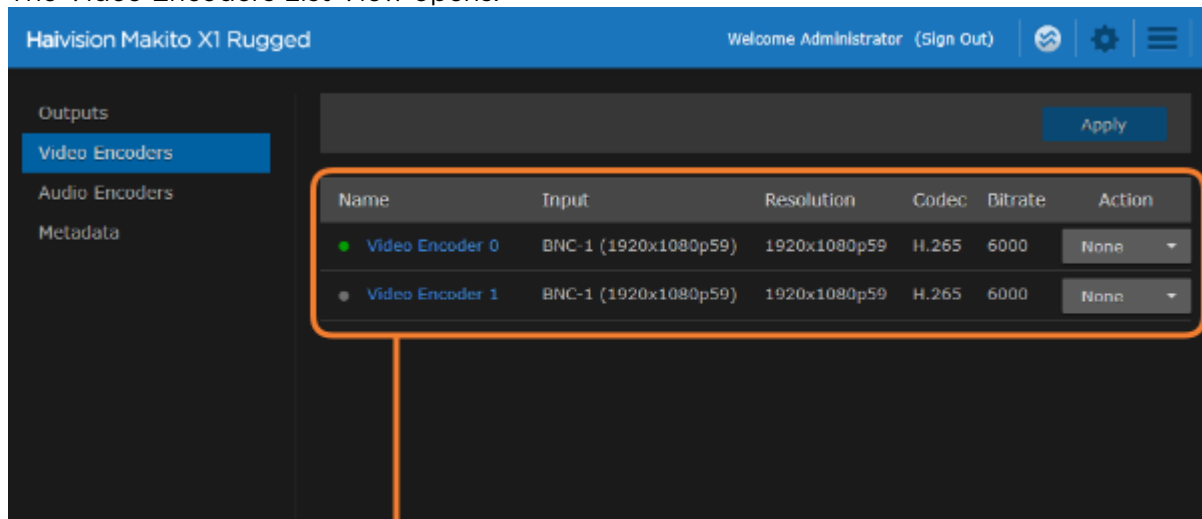


Set Up a Test Stream

Setting up a test stream requires that you have an active video source connected to the Makito X1 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 User's Guide).

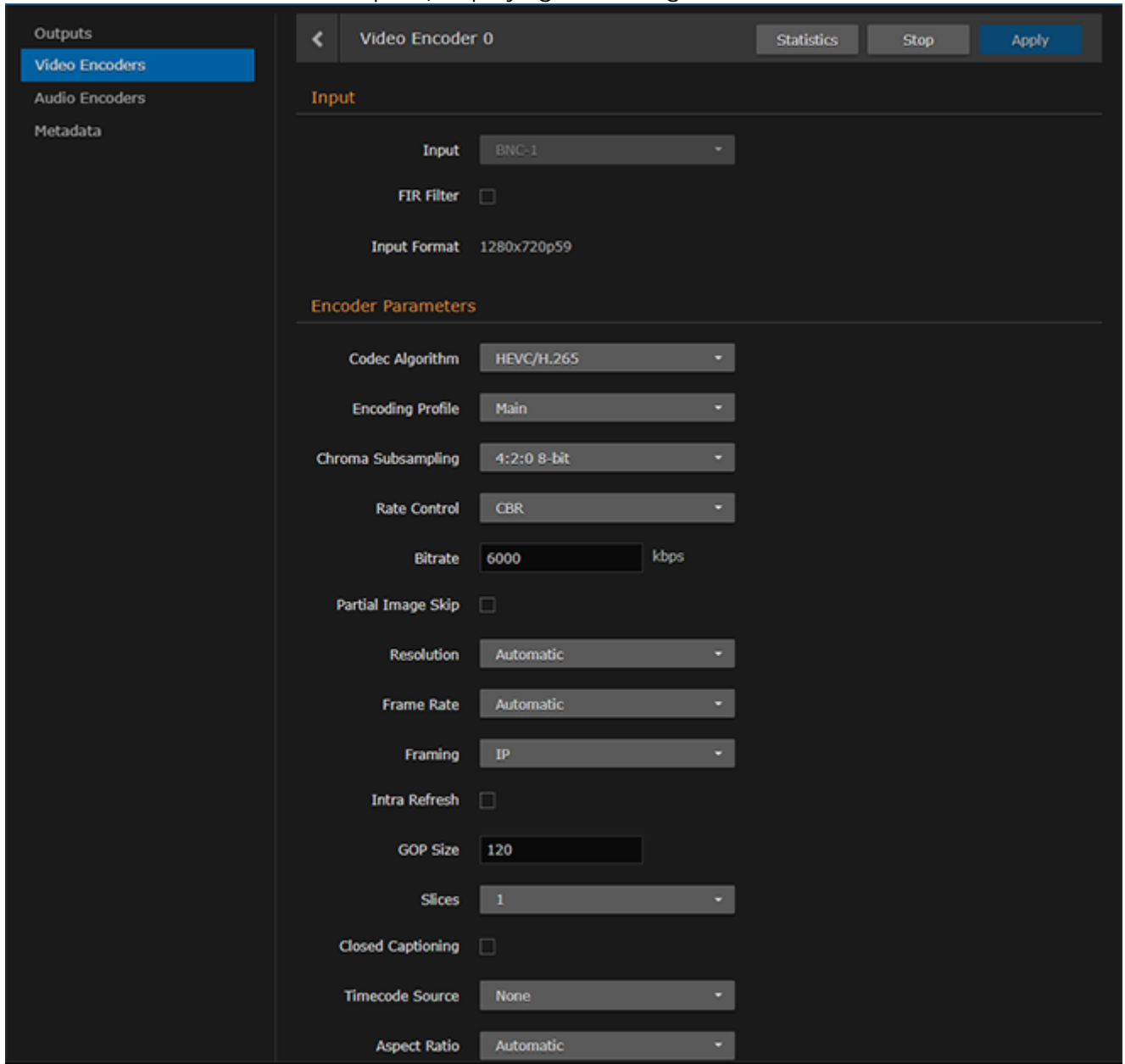
To configure an encoding instance:

1. Click **Video Encoders** on the sidebar. The Video Encoders List View opens.



Video Encoders List View/
Click link to open Detail View

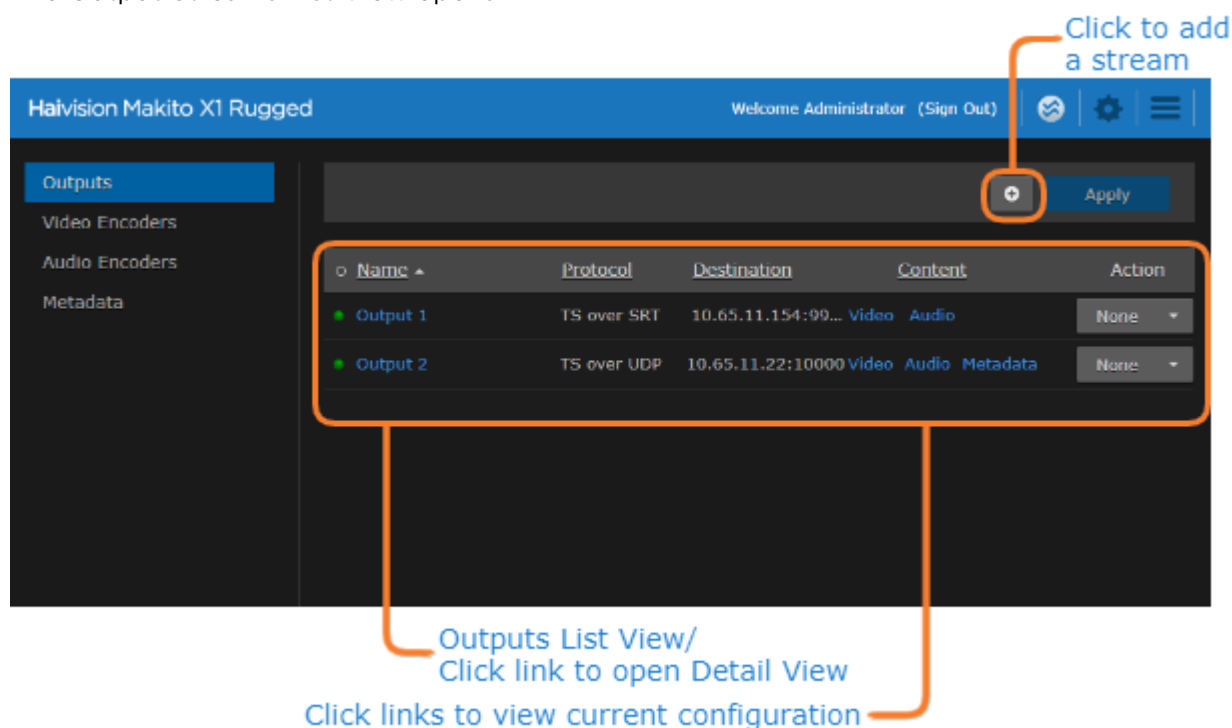
- Click a link in the table to select the encoder.
The Video Encoder Detail View opens, displaying the settings for the selected video encoder.



- 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.



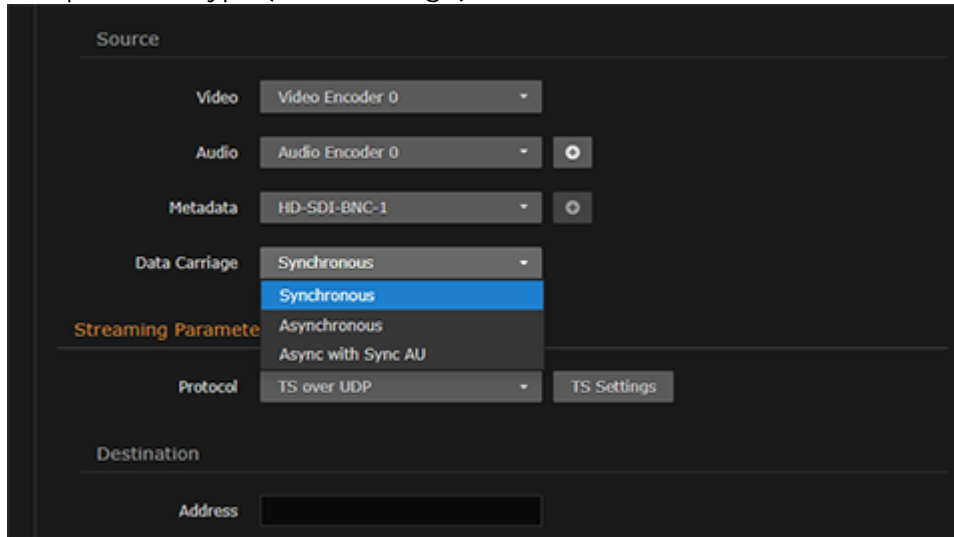
- To add an output stream, click the **+** **Add** button. The New Stream page opens.

- 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).



- 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 User's Guide.

View the Test Stream

- [General Guidelines](#)
- [Streaming to VLC Player](#)

General Guidelines

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.

Streaming to VLC Player

The following steps show how to validate a video streaming setup using VLC as a video decoder. VLC can be operated on a Windows or Linux machine. The following example uses a Windows machine but all the steps can easily be executed on a Linux machine.

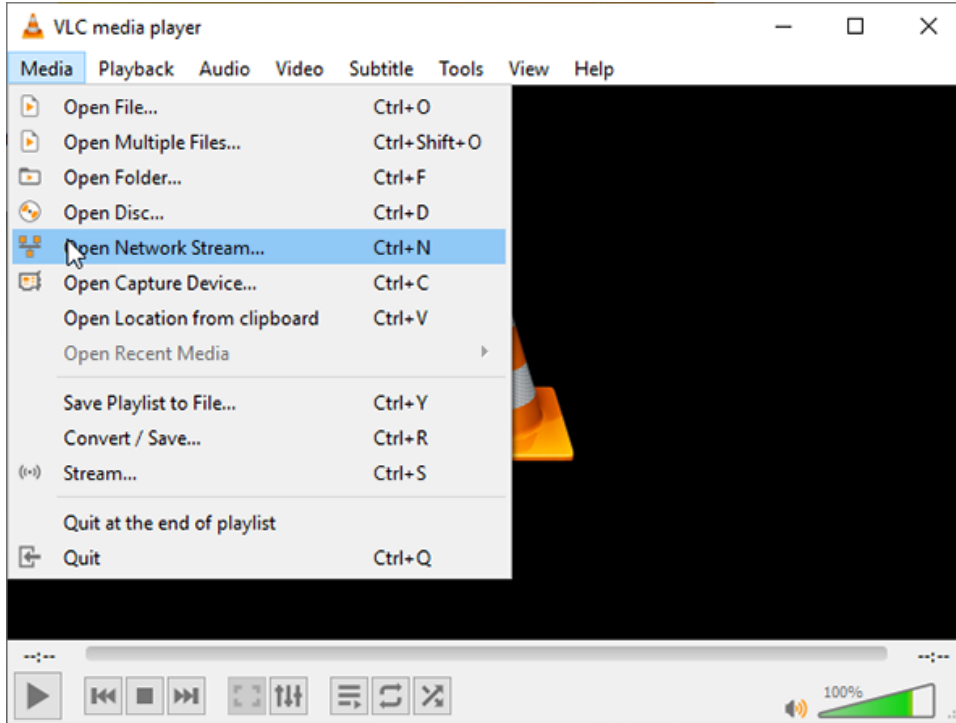
Note

Unless otherwise specified, references to the "Makito X Series" or "Makito X" can be taken to include the Makito X, Makito X4, and Makito X1 family of encoders and decoders.

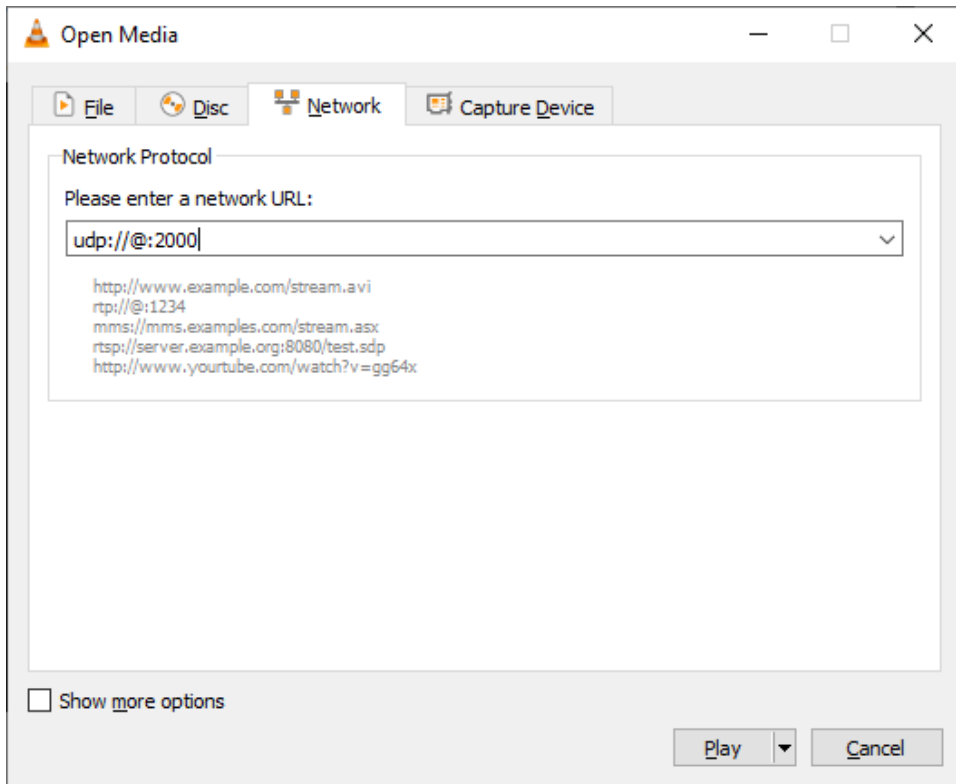
First, configure the encoder (see [Set Up a Test Stream](#)).

Then set up VLC to decode the stream (as shown in the following procedure). This will validate your setup.

1. Connect the PC with VLC on the same network as the Makito X Series Encoder. Note the IP address of the PC.
2. On the Serial connector or through an SSH connection, create a stream from the Makito X encoder to the PC.
For example: `stream create addr={IP of the pc with VLC} port=2000 videosrc=0`
3. Once the stream is created, you can validate that the encoder has started encoding by executing either of the following commands:
`"stream all get table" or "videnc all get table"`
4. On the PC, open VLC and under the "Media" tab, select "Open Network Stream...".



- Under "Please enter a network URL:", enter "udp://@:2000" and click **Play**.
The stream should start within seconds. In case of failure, replace the "@" by the actual IP address of the PC.



- Repeat Steps #2 and #3 to create a stream from HD Video Encoder 2. The only difference is on the Serial or SSH connection.

Enter the following command: `#stream create addr={IP of the pc with VLC} port=2200
videosrc=2`

 **Note**

When changing the video input resolution on the encoder, you may need to re-initialize VLC to show the stream.

Reset the Encoder

- [Default Network Settings](#)

This section describes the steps to perform a hardware reset on the Makito X1. The Reset button (located on the Ethernet/Factory Reset cable) is used either to reset the system or to restore the factory default settings.

- **System Reset:** In some cases, if your encoder is experiencing a problem, resetting the system can return the encoder to normal operation.
- **Factory Reset:** If the problem remains after performing a reset, it may help to restore the encoder to its factory default settings. A factory reset returns the encoder to the same settings it originally had when shipped from Haivision, including the factory default IP address, subnet, and gateway.

Note

After a factory reset, only the firmware revision, serial number, MAC address, and licenses are preserved. All other data is deleted (including saved presets, added user accounts, modified passwords, and encoding or decoding settings). All settings are returned to their factory preset conditions (including the IP address).
Preset Auto-Save is enabled by default after a factory reset.

Important

Do *not* perform a factory reset during bootup. This may cause the unit to enter error mode (LED flashing orange) and fail to boot.

Use one of the following methods to either reset or restore the encoder settings:

1. With the encoder on, press the button labeled **Reset** on the Ethernet/Factory Reset cable.
2. **System Reset:** Press the switch (you will feel the button depress) for at least one second and release. Be sure to release the button in less than five (5) seconds.
-or-
Factory Reset: Press and hold the switch for five (5) seconds.
3. Wait for the encoder to reboot. As soon as the lights stop blinking and the Status LED is solid green, the encoder is ready.

Default Network Settings

After a factory reset, the Network settings should be:

IP Address	Subnet Mask	Gateway
10.5.1.2	255.255.0.0	10.5.0.1

Related Topics

- [Enclosure Front Panel](#) ("LED Status Indicator")

Makito X1 Rugged Encoder Pinouts

This section contains the pinout descriptions for the Makito X1 Rugged Video Encoder. This information is intended to be used in conjunction with Haivision drawing no. TIID-060 (Makito MX1 Ruggedized Appliance).

Topics Discussed

- [Enclosure Front Panel](#)
- [DC IN and I/O Connector](#)
- [Network Connector](#)
- [Video Input Connector](#)

Enclosure Front Panel

The Makito X4 Rugged enclosure provides rugged connectors for connecting the encoder's Power/ Audio/Serial inputs, Video input, and Network interface, located on the front panel. There is one LED that indicates the power status.



[Connectors](#) [LED Status Indicator](#)

Connectors

Connector	Description	Number of Contacts
DC IN and I/O Connector	Hirose P/N LF13WBRB - 11S	11
Video Input Connector	Coax BNC Jack Amphenol P/N 31-70551-12G	1
Network Connector	Hirose P/N LF10WBRB - 12S	12

[Connectors](#) [LED Status Indicator](#)

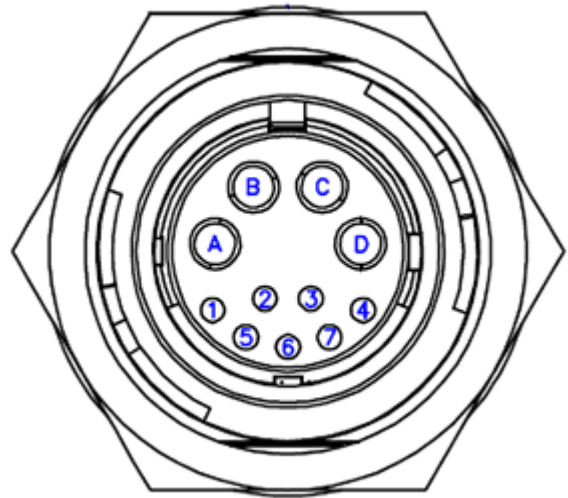
LED Status Indicator

Function	Description	Indication
STATUS	Off	No power
	Green fast blinking	Reset button is pressed for less than four seconds. If the Reset button is not pressed, there is a power fault.
	Green slow blinking	Booting/Initialization
	Green solid	Booting/Initialization sequence is complete (No fault/OK).
	Orange fast blinking	Reset button is pressed for more than five seconds (Factory Reset enabled). After Orange fast blinking, the LED turns off, stays off for a while, and then starts Green slow blinking towards the end of the booting up.

DC IN and I/O Connector

DC IN & I/O (Power, Audio & Serial) Connector		
	On Unit	Mating Connector
Manufacturer	Hirose	Hirose
Connector Type	DC IN & I/O	DC IN & I/O
Part Number	LF13WBRB-11S	LF13WBP-11P

For the connector and cable, see [Power up the Makito X1 Encoder](#).



DC IN & I/O Connector Pinout		
	Description	
Hirose P1 Contact #	RS-232 Connections	RS-485/422 Connections
1	RXD	RXD-
2	N/C	RXD+
3	TXD	TXD-
4	N/C	TXD+
5	COM 0_GND	
Audio / Power		
6	AUDIO IN CHANNEL 1+	
7	AUDIO IN CHANNEL 1 GND	
A	AUDIO IN CHANNEL 2+	
B	AUDIO IN CHANNEL 2 GND	
C	PSU RETURN	
D	+5VDC IN	

COM1 Management Pinout (on DB9 connector)

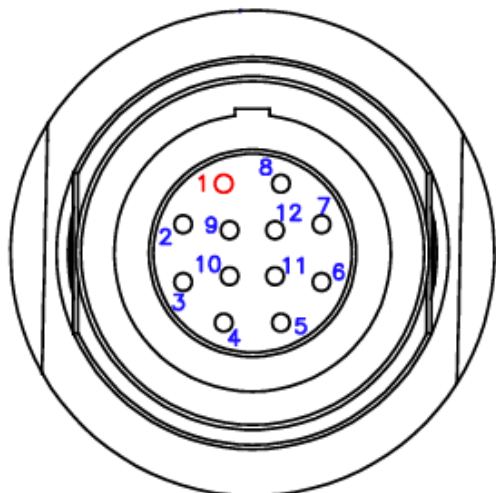
Contact #	Signal RS-232	Signal RS-422
8		RXD+
7		TXD+
6		
5	Ground	Ground
3	TXD	TXD-
4		
1		
2	RXD	RXD-

Note

The COM1 pins are DTE (Data Terminal Equipment) which defines the direction of the signals (IN/OUT). The COM1 pins are configured by default for Metadata mode but may be switched to Management mode (to connect to a computer for management of the encoder) using the `metadata` CLI command. The `metadata` command may also be used to select the transceiver mode for the metadata capture (i.e., RS-232 or RS-422). For details, see `metadata` in the [Makito X1 Rugged Encoder User's Guide](#).

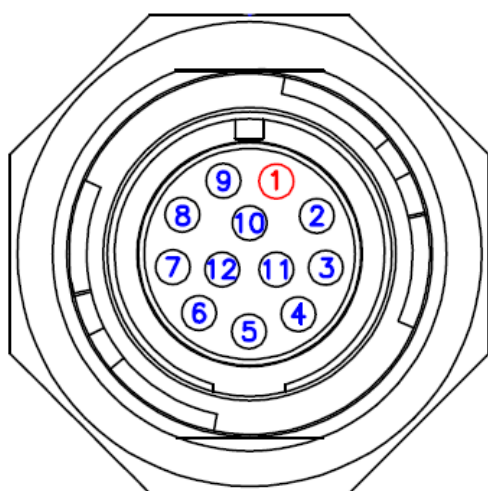
Network Connector

Network Connector v2



Network Connector v2		
	On Unit	Mating Connector
Manufacturer	LEMO	LEMO
Connector Type	Network Connector	Network Connector
Part Number	HEP.2M.312.XLNP	FGP.2M.312.XLCT

Network Connector



Network Connector		
	On Unit	Mating Connector
Manufacturer	Hirose	Hirose
Connector Type	Network Connector	Network Connector

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

Ethernet

Network Connector Pinout v2

Contact #	Description
1	ETH B+
2	ETH B-
3	ETH C+
4	ETH C-
5	ETH D+
6	ETH D-
7	ETH A+
8	ETH A-
9	GND
10	SYS_RST#
11	N/C
12	N/C

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+
9	N/C
10	N/C
11	SYS_RST#
12	GND

Video Input Connector

The Makito X1 Rugged video encoder supports a single video input. The port marked **CVBS/SDI** can support up to 3G-SDI or analog video (NTSC/PAL).

- 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.

MX1 Rugged v2 (#S-MX1E-R-V2-SDI1)



MX1 Rugged (#S-MX1E-R-SDI1)



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.

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