



Haivision

## Makito X Series

Professional Encoding and Streaming Solutions from Haivision

Haivision's award-winning Makito X series of encoders and decoders enables ultra low latency end-to-end transport of secure, high-quality HD video, even over unpredictable networks.

**Makito X products are available in a broad range of configurations including:**

- H.264 and/or HEVC encoding and decoding
- Single, dual, or quad-input channel operation
- Compact, ruggedized & fanless operation
- HD-SDI/Composite or DVI input options
- Storage options: fixed, removable or without storage
- Rackmounting in high density 1RU, 2RU or 4RU chassis



### High Quality

Delivers pristine quality at low bitrates making it ideal for internet or satellite transport of video.



### Ultra Low Latency

Ideal in mission critical applications where end-to-end latency below 200 ms is required.



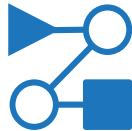
### Secure

AES 128/256 bit encryption ensures only intended viewers can watch streams.



### Next-gen Compression

HEVC (H.265) options reduce bandwidth by up to 50% compared to H.264, future proofing your workflow.



### End-to-end Streaming with Sync

Makito X series includes encoder/decoder pairs for any high-performance use case as well as synchronized multi-camera workflows.



### Secure Reliable Transport

Assures quality-of-service when faced with packet loss, jitter, latency, and fluctuating bandwidth from unpredictable networks.



### On-board Storage

Fixed and removable storage options safeguard your content, regardless of network conditions.



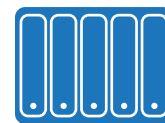
### Ruggedized

Fanless chassis option designed for high operating temperature environments.



### KLV Metadata

Supports full-motion video requiring STANAG and MISP compliant Key-Length-Value (KLV) metadata.



### High Density

Highly flexible deployment from ultra compact appliance to 21 blade (4RU) chassis.

## Powerful Features for Defense, Broadcast, and Enterprise

The Makito X series of encoders and decoders are designed to address the most rigorous video applications in enterprise, broadcast and defense. Multi-bitrate (MBR) encoding to unicast, multicast, and RTMP enables administrators to direct many unique streams groomed to specific desktop and mobile viewers, set-top boxes, recorders, and internet destinations. With Network Adaptive Encoding and SRT, the Makito X dynamically adapts to changing network conditions so you never lose your video streams.

Integrated features such as snapshots, logo insertion, Selective Mute™, talkback, and powerful control interfaces enable advanced video network management in enterprise applications. The excellent picture quality at low bandwidth and the lowest end-to-end latency of the industry makes the Makito X platform ideal for a broad range of applications.

**The Makito X series is ideal for live, interactive and headend applications and is used in:**

DEFENSE



- Mission Command & Control
- Situational Awareness
- Cross Domain Sharing

BROADCAST



- Live News Contribution
- Remote Production
- Point-to-Point Distribution

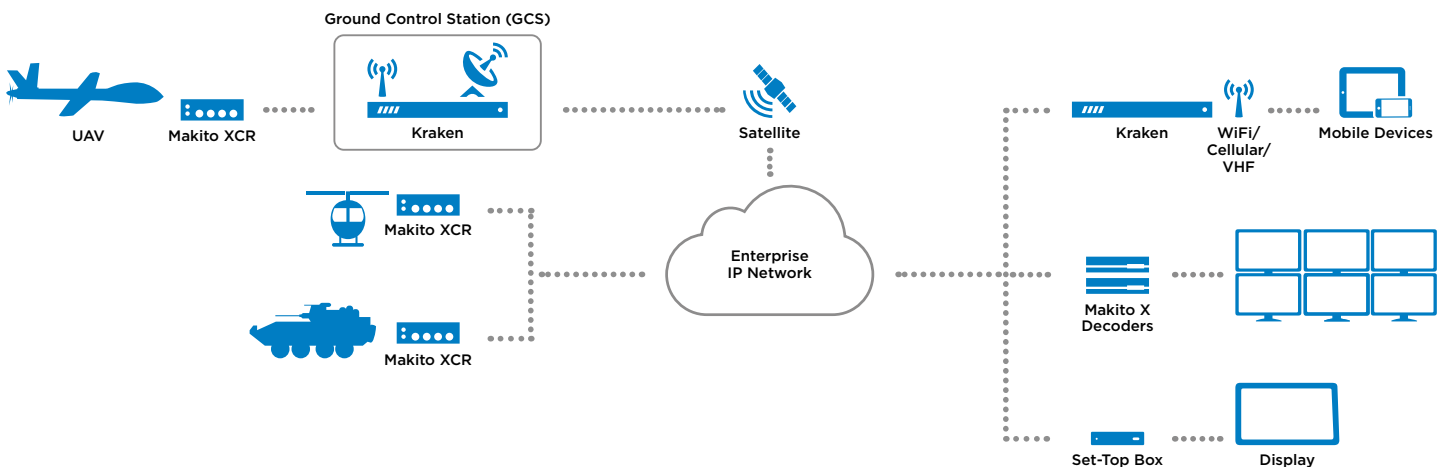
ENTERPRISE



- Backhaul for All Hands
- Remote Contribution
- Secure IPTV Contribution

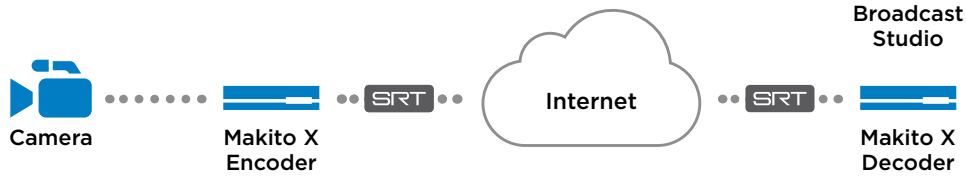
### Defense | Mission Critical Video Solutions

Haivision video streaming solutions support mission-critical video applications. With high quality, low latency, and best-in-class security, Haivision solutions power applications for Intelligence, Surveillance, Reconnaissance (ISR), Test & Training Ranges, and Command & Control (C2) operations centers. Makito X encoders are designed for ISR applications where uplink network bandwidth is limited and costly. Combining KLV and CoT metadata support makes the Makito X ideal for Full Motion Video (FMV) applications in government and military.



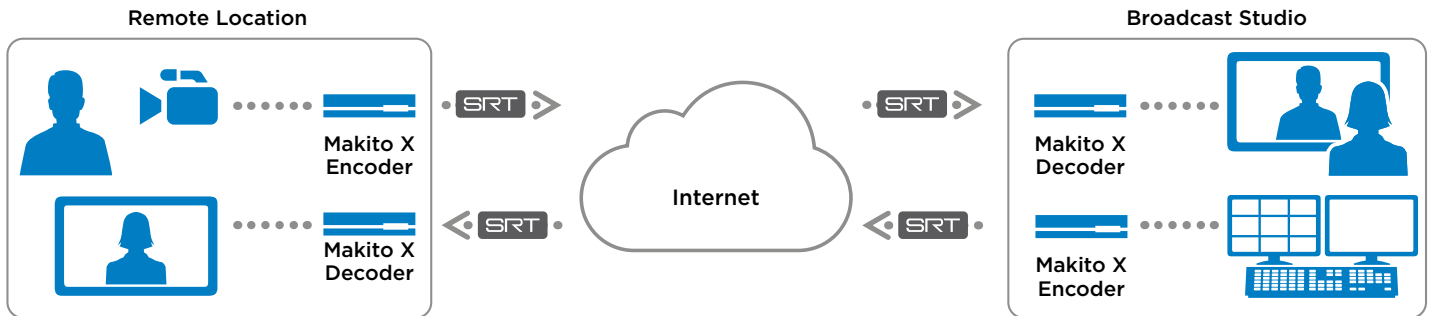
**Broadcast | Field Contribution for Live On-air Productions**

Meet your audience’s demand for more content with Makito X encoders and decoders. When news is breaking, internationally or regionally, timely access to relevant video is critical. By using Haivision’s Makito X encoding technology for low latency video, broadcasters are getting field content from anywhere, cost-effectively, over any network.



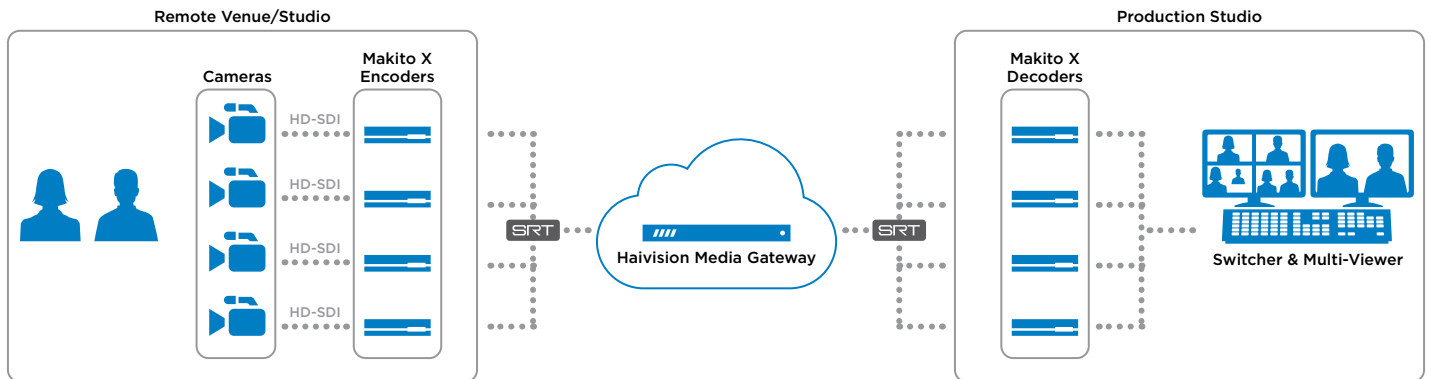
**Broadcast | Remote Interviews & Interactive Contribution**

With the Makito X encoder and decoder, broadcasters have the power to provide audiences with more content from remote locations, allowing for real-time commentary on breaking news or current events. With low latency and SRT, broadcasters can take advantage of low cost internet connections to deliver high quality video without the need for dedicated networks or satellites.



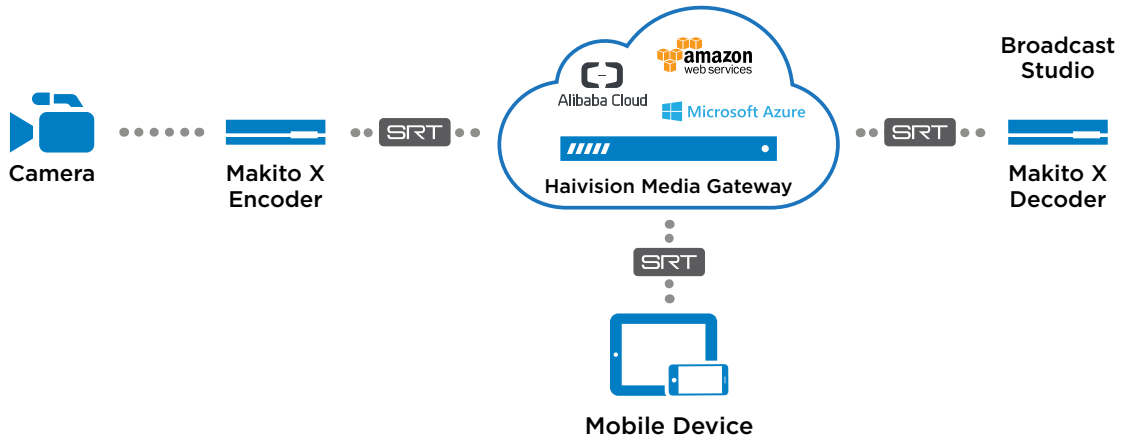
**Broadcast | Remote Monitoring of Low-latency Video Streams**

Haivision Remote Production workflows allow you to cover a wide range of live events including sports, musical performances or news, without the costly overhead of deploying production teams and OB trucks to each site. By streaming synchronized, low latency multi-camera feeds from venue to the broadcast studio over cost-effective IP networks, you can boost your productivity and satisfy the need for more content without the costs of onsite deployment or the logistical challenges.



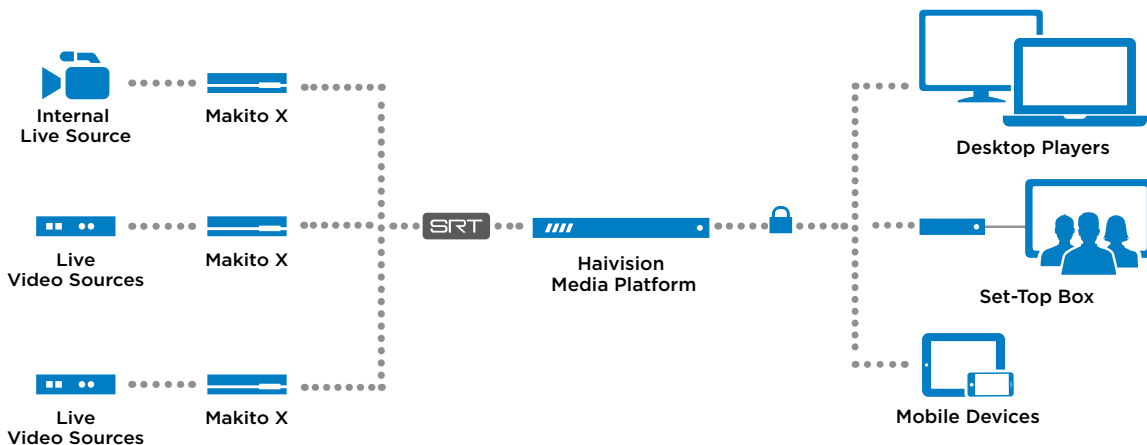
**Broadcast | Remote Monitoring of Low-latency Video Streams**

Makito X encoders are suitable for many broadcast contribution workflows. With the addition of Haivision Media Gateway, producers can make quick decisions through confidence monitoring of broadcast production feeds live on their mobile devices from anywhere, even when on-the-go.



**Enterprise | Enterprise Media Communications**

Communication is critical to efficient enterprise operations and an effective communication strategy relies on selecting the right delivery channels. Haivision’s portfolio of video streaming solutions including the Makito X series help enterprises connect with their employees, customers or partners with live or on-demand video distributed within a private network or over the internet.



**Related Products**



Haivision Media Platform



Haivision Media Gateway



KB Encoder/Transcoder



Kraken CR Transcoder



## High Quality, Low Latency H.264/HEVC Encoders & Decoders

Haivision's award-winning Makito X series of encoders and decoders transports secure, low latency, HD video over any network at extremely low bitrates. The Makito X is ideal for live, interactive and bandwidth constrained applications.

**High Profile Encoding** To maximize video quality over your network, the Makito X series supports High Profile H.264 encoding. Matched with Makito X Decoders to provide extremely low end-to-end latency, the Makito X series delivers pristine quality for HD video at sub-2 Mbps bitrates. And with Network Adaptive Encoding, Makito X will dynamically adjust bitrate to overcome adverse network conditions.

**Secure Reliable Transport** SRT is a unique transport technology that optimizes streaming performance across unpredictable networks like the internet. Included with Haivision streaming solutions like the Makito X series, SRT features packet loss recovery, real time end-to-end network statistics, options to easily manage firewall traversal and more, for the highest quality live video over the worst networks.

**KL / STANAG Metadata for ISR Applications** Makito X encoders are ideal for full-motion video (FMV) applications requiring STANAG and MISP compliant Key-Length-Value (KLV) metadata. Capable of aggregating metadata from many sensors and sources, the Makito X fuels downstream networks, exploitation systems, and viewers, with frame accurate synchronization.

**High-density, Flexible Form Factor** Available in blade format for high density applications, the Makito X series can be used in headends or remote installations for unparalleled performance and flexibility featuring up to 6 inputs within a 1RU or 42 inputs within a 4RU chassis. The Makito X series is also available as a compact and portable appliances, ideal for remote interviews or remote streaming workflows.

### Features

### Benefits

<b>Low end-to-end latency</b>	Supports mission-critical distribution and interactive communication challenge
<b>Multiple H.264 &amp; HEVC* encoding engines</b>	Flexible encoding & compression, adapting to different network environments & applications
<b>Multiple destinations per stream</b>	Target different systems, networks, users, and platforms individually
<b>Network Adaptive Encoding</b>	Automatic bitrate adjustment based on network conditions
<b>12 HD 1080p60 channels in 1RU</b>	Highest density available reducing cost, footprint, and energy consumption
<b>AES 256 bit encryption</b>	Secure unicast or multicast end-to-end video distribution
<b>Metadata support option</b>	Insert synchronized KLV into the MPEG stream from IP, embedded, or serial data sources
<b>Frame-accurate Synchronization</b>	Decoder synchronization using NTP timestamp for multi-cam remote production
<b>SRT and FEC</b>	Maintain video quality over unqualified networks and low cost public internet connections

\* Makito X HEVC only



## Makito X H.264 Encoders & Decoders

Haivision's award-winning Makito X H.264 encoder and decoder transports secure, low latency, HD video over any network at extremely low bitrates. And with Network Adaptive Encoding, Makito X ensures your stream plays even when network performance chokes. The Makito X is ideal for live, interactive and bandwidth constrained applications and is available with single channel SDI, DVI and Dual channel SDI configurations.

**Synchronized Streams** Multiple Makito X encoders & decoders can be used with synchronized cameras to enable cost-effective and efficient remote production capabilities with multi-channel simultaneous decoding & playback.

**Security & Stream Tuning** By implementing the Advanced Encryption Standard (AES) protocol within Haivision's SRT, Makito X decoders delivers video content securely and ensures high quality even on congested or unreliable networks. The Makito X HEVC decoder provides recovery from packet loss with either forward error correction (FEC) or using SRT with an adjustable receive buffer to tune its performance for various network conditions.



## Makito X HEVC Encoder & Decoder

**HEVC + H.264** With the Makito X HEVC, you can reduce bandwidth requirements by 50%, while maintaining video quality when compared to H.264. The Makito X HEVC differs from competing HEVC encoders by combining a four engine Makito X H.264 architecture with a dedicated HEVC encoding engine. Makito X HEVC supports existing H.264 workflows, and offers the best-in-class HEVC performance, future proofing your video streaming solutions.



## Makito X Encoder with Storage

**Record High, Stream low** The Makito X with Storage is the perfect encoder for situations where bandwidth availability is limited and keeping a high quality master for further review, archiving or post production workflows is necessary. The Makito X with Storage is built with multiple encoding cores, allowing you to stream live video at low bitrates while recording up to two high quality streams directly onto the encoder. Both .ts and .mp4 files are supported.

**Fixed and Removable Storage** With 250GB (expandable up to 1TB) of either fixed or removable storage, the Makito X with Storage can record up to 5 days at 5Mb/s or 30 hours at 20Mb/s. Removable storage is powered by industry standard 2.5" SATA SSD drives, giving you the option to quickly remove a drive once full, and allowing for content backups regardless of how close you are to your main storage/server facility.

**Remote Management** The Makito X with Storage can be programmed and controlled remotely through command line, web UI, and SNMP APIs. You can set a time or size limit on the recording segments allowing for easier management of your video files. Simply upload your video from the Makito X with Storage to a USB, SD Card, Haivision Video Cloud, Haivision Media Platform, FTP, or NFS.



### Makito X Harsh Encoder & Decoder

**Extreme Encoding & Decoding** The Makito Harsh Environment encoder and decoder are industrial-grade fanless appliances designed for high operating temperature environments within static deployment applications.



The Makito X series of H.264 encoders and decoders for harsh environments delivers a complete field proven video solution offering confidence, security, and reliability with a mature feature set.



### Makito XCR Compact, Ruggedized Encoder

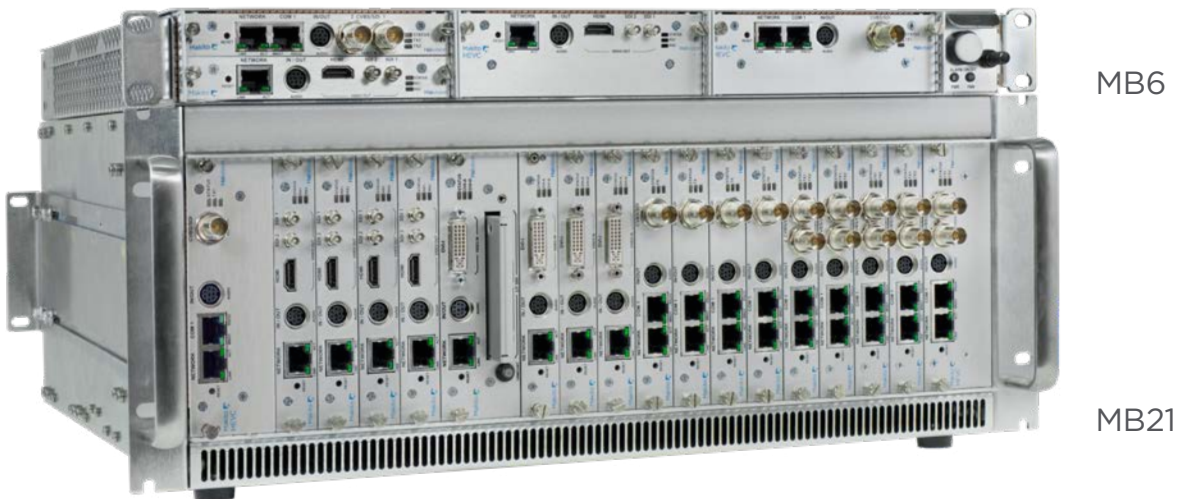
The Makito XCR encoder is a compact and ruggedized military-grade appliance designed for deployment in the most demanding ISR environments. Makito XCR combines the unrivaled low latency and performance of Haivision’s commercial Makito X encoder in a completely ruggedized MIL-STD-810G/DO-160G compliant form-factor with full KLV/CoT metadata support.

## Rackmounting Appliances

1RU or 2RU mounting brackets available for mounting one or two Makito or Makito X appliances (single or double height) in machine rooms racks.







## High Density, Flexible, and Scalable Chassis

Designed for high density deployment in server rooms across broadcast, enterprise, universities, and hospitals, the MB series of chassis provide flexible and scalable solutions where rackmount installations are required.

**High Density Multichannel Chassis** Haivision's encoders, decoders, and gateways are available as single product appliances or as independent mini-blades. For installations where rack mounting is desired, Haivision offers rackmount kits for single and dual-height appliance enclosures, as well as the MB6 and MB21 enclosures, which can contain up to 6 or 21 encoder/decoder blades, respectively, within the single highest density platform available. MB6 & MB 21 series enclosures feature redundant power supplies, allow for in-service blade replacement and incorporate fan management circuitry to minimize fan noise. MB series enclosures can be populated with various combinations of Haivision's Makito high performance, HEVC or H.264 encoder, the HEVC or H.264 Makito decoder, as well as Haivision's Torpedo DVB to IP gateways.

**MB1 & MB2 Enclosures** Makito X blades can be mounted in lightweight and portable single-height (MB1) or dual-height (MB2) enclosures. The MB2 can contain two single-height encoder or decoder blades, one dual-height encoder or decoder, or both an encoder and a decoder, providing a flexible options for building a portable unit.

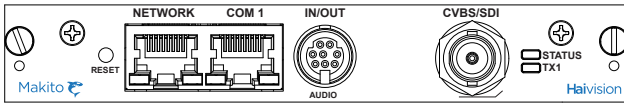
**MB6 AC, DC and Medical High Density Six-Slot Chassis** The MB6 is designed to support fast deployments of Haivision's market-leading encoding/decoding systems in the most space constrained installations. The six-slot chassis can hold up to 6 Makito and Makito X encoders/decoders or Torpedo DVB to IP gateways, in just a single rack unit (1RU), making it the highest density system available. The MB6 is available with either redundant AC, single DC, or medical grade AC power supplies.

**MB21 High Density Twenty-One Slot Chassis** Designed for high density IP video headends, the MB21 holds any combination of up to 21 Makito, or Torpedo products in a 7-inch rack (4 RU) and also features fully redundant power supplies. This high density, cost effective solution has been deployed in headends and server rooms in universities, hospitals, and enterprises worldwide.

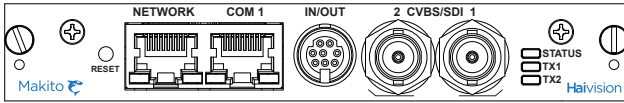
**MB21X** The Makito X blade only variant of the MB21 (F-MB21X-R) features replaceable fans and fully redundant power supplies. In addition, the MB21X provides a station alarm interface so as to notify operators when a power supply or fan failure has occurred.

**Redundancy** Redundant AC inputs and a field serviceable power supply allows the MB21 to continue operating even if an AC input is lost or a Power Supply Unit (PSU) fails. With the MB21B quad PSU variation, the unit can lose up to two power supplies and remain operational, while the MB21X dual PSU variant can remain fully operational if a single power supply has failed. With the MB6X-RAC, a single AC input or PSU can fail without affecting the operation of the unit.

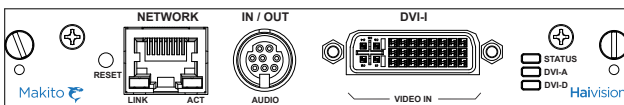
Encoders



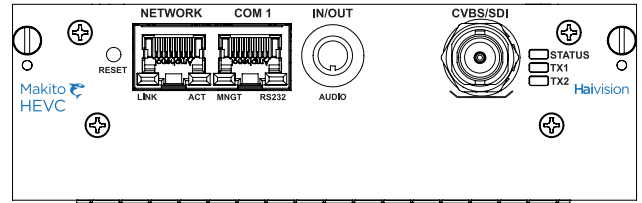
Makito X (Single SDI)



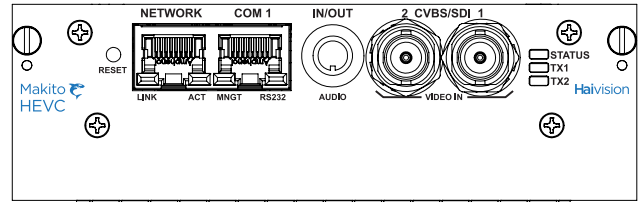
Makito X (Dual SDI)



Makito X (DVI)

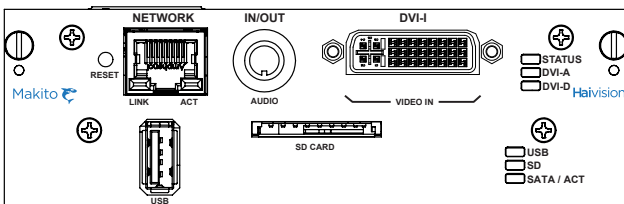


Makito X HEVC (Single SDI)

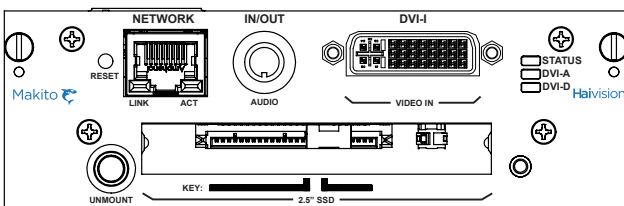


Makito X HEVC (Dual SDI)

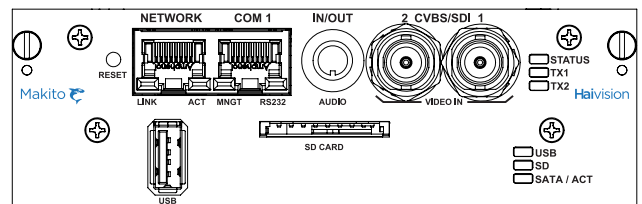
Encoders with Storage



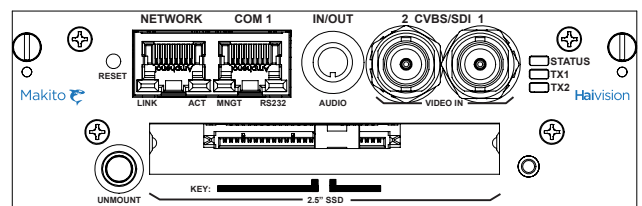
Makito X DVI with Fixed Storage



Makito X DVI with Removable Storage

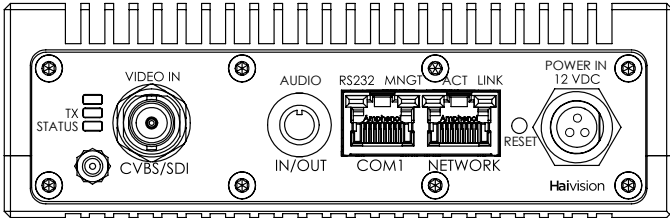


Makito X Dual SDI with Fixed Storage

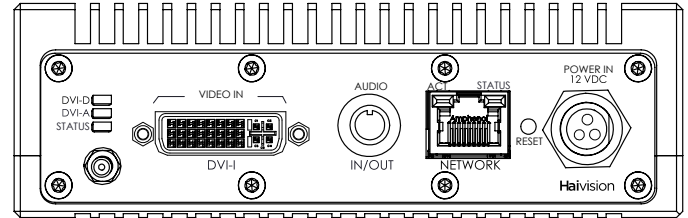


Makito X Dual SDI with Removable Storage

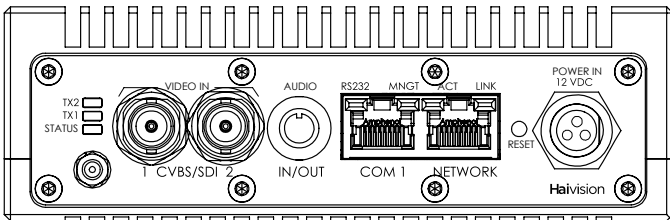
Harsh Environment Encoders



Makito X (Harsh Environment Single Channel SDI)

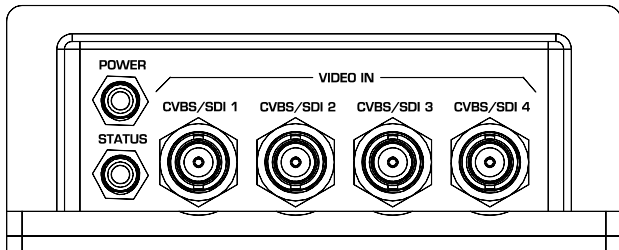


Makito X (Harsh Environment Single Channel DVI)

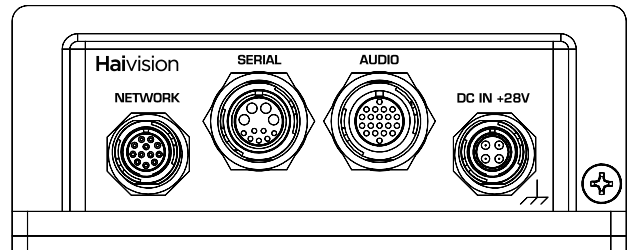


Makito X (Harsh Environment Dual Channel SDI)

Ruggedized Encoder

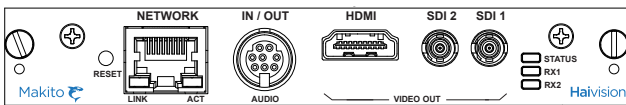


Makito XCR (Front)

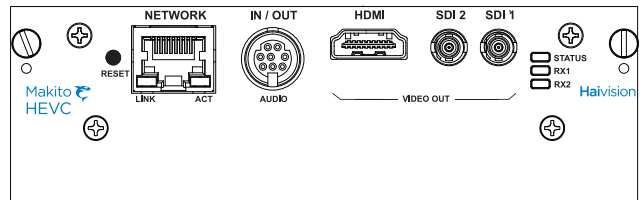


Makito XCR (Back)

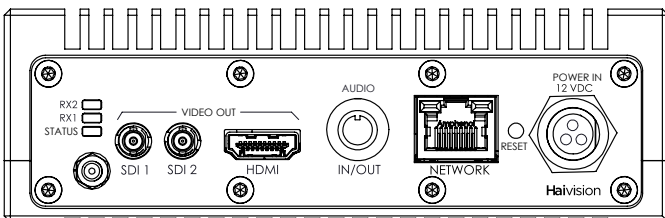
Decoders



Makito X Decoder

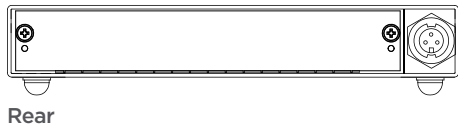


Makito X HEVC Decoder (Dual SDI)

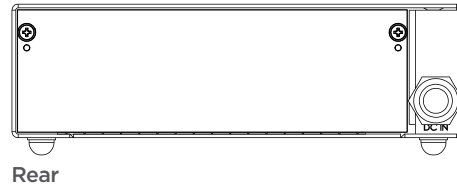


Makito X Decoder (Harsh Environment Dual Channel)

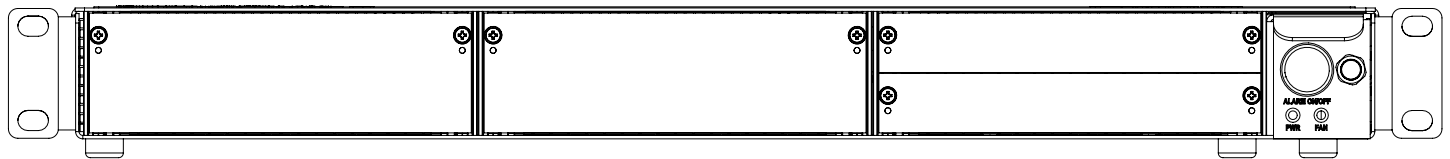
**MB1**



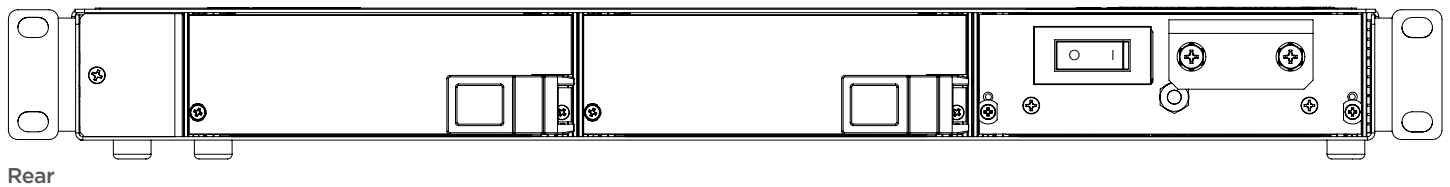
**MB2**



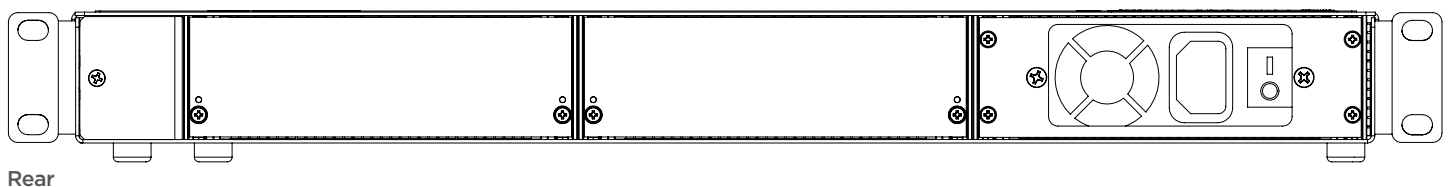
**MB6X with DC Power Supply (MB6X-DC)**



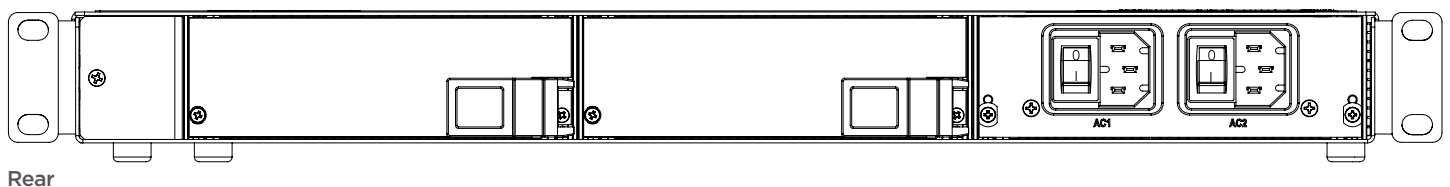
Front (This is the same schematic as for MB6X-DC, MB6X-MED and MB6X-RAC)



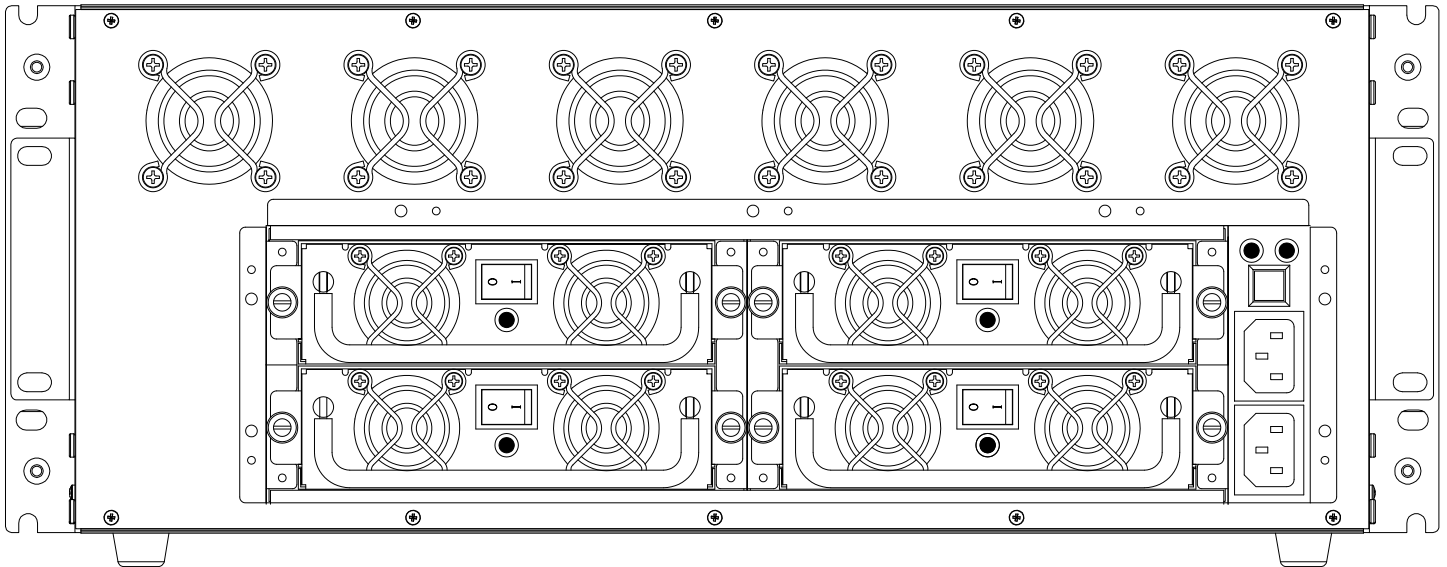
**MB6X with Medical Power Supply (MB6X-MED)**



**MB6X with Redundant AC Power (MB6X-RAC)**

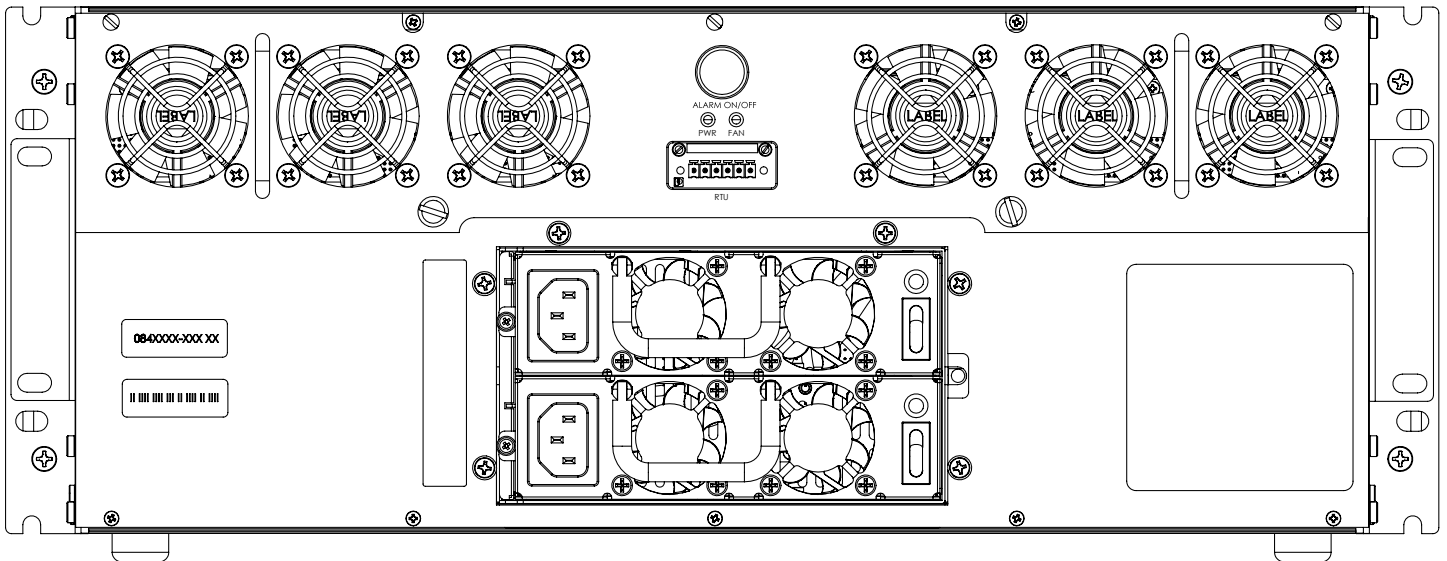


MB21B



Rear - With quad power supplies

MB21X



Rear - With dual power supplies, removable fans, and station alarm interface

# TechSpecs - Channels, Video Inputs, Outputs & Resolutions

Makito X Series

	Makito X Encoders					XCR	Makito X Decoders		
	H.264 SDI	H.264 DVI	HEVC SDI	H.264 Harsh SDI	H.264 Harsh DVI		H.264	HEVC	H.264 Harsh
<b>CHANNELS</b>									
Single	•	•	•	•	•	•	•	•	•
Dual	•		•	•		•	•	*	•
Quad						•			
<b>VIDEO INPUTS</b>									
<b>ANALOG</b>									
Composite NTSC/PAL/PAL-M	•		•	•		•			
Y, Pb, Pr / RGBHV component analog		•			•				
Y, Cb, Cr / DVI single link component digital		•			•				
<b>SD-SDI</b>									
SMPTE 259M-C	•		•	•		•			
<b>HD-SDI</b>									
SMPTE 292M	•		•	•		•			
SMPTE 274M	•		•	•		•			
SMPTE 296M	•		•	•		•			
<b>3G-SDI</b>									
SMPTE 424M (Level A Only)	•		•	•		•			
SMPTE 425M	•		•	•		•			
<b>DVI-I</b>									
HDMI 1.4		•			•				
<b>VIDEO OUTPUTS</b>									
<b>SD-SDI</b>									
SMPTE 259M-C							•	•	•
<b>HD-SDI</b>									
SMPTE 292M							•	•	•
SMPTE 274M							•	•	•
SMPTE 296M							•	•	•
<b>3G-SDI</b>									
SMPTE 424M (Level A Only)							•	•	•
SMPTE 425M							•	•	•
<b>HDMI</b>									
HDMI 1.4							•	•	•
<b>VIDEO RESOLUTIONS</b>									
<b>HD 1080</b>									
1920x1080p 60/59.94/50/30/29.97/25 Hz	•	•	•	•	•	•	•	•	•
1920x1080p 24/23.98 Hz	•	•	•	•	•	•			
1920x1080i 60/59.94/50 Hz	•	•	•	•	•	•	•	•	•
<b>HD 720</b>									
1280x720p 60/59.94/50 Hz	•	•	•	•	•	•	•	•	•
1280x720p 30/29.97/25 Hz	•	•	•	•	•	•			
<b>SD</b>									
720x480/576i 60/59.94/50 Hz	•	•	•	•	•	•	•	•	•
720x480/576p 60/59.54/50 Hz		•			•		•		•
(HDMI/DVI only) interlaced shown in fields per second									
<b>COMPUTER RESOLUTIONS HDMI/DVI only</b>									
1920x1200 60 Hz	1440x900 75/60 Hz	1152x864 75 Hz							
1680x1050 60 Hz	1360x768 60 Hz	1024x768 85/75/60 Hz							
1600x1200 60 Hz	1280x1024 75/60 Hz	800x600 85/75/60 Hz	•				•		•
1600x900 60 Hz	1280x800 85/75/60 Hz	640x480 85/75/60 Hz							
1400x1050 75/60 Hz	1280x768 85/75/60 Hz								

\* Dual-channel HEVC decode up to 1080p30.

	Makito X Encoders						Makito X Decoders		
	H.264 SDI	H.264 DVI	HEVC SDI	H.264 Harsh SDI	H.264 Harsh DVI	XCR	H.264	HEVC	H.264 Harsh
<b>AUDIO I/O</b>									
<b>Available through a locking mini-DIN-8 connector:</b>									
Balanced stereo analog audio	•	•	•	•	•	•	•	•	•
Unbalanced stereo analog audio	•	•	•	•	•	•	•	•	•
Talkback	•	•	•	•	•	•	•	•	•
<b>Embedded Audio</b>									
SD-SDI SMPTE 272M	•		•	•		•	•	•	•
HD/3G-SDI SMPTE 299M	•		•	•		•	•	•	•
Embedded DVI (encoder only)		•			•				
HDMI 1.4 (decoder only)							•	•	•
<b>VIDEO ENCODING</b>									
<b>Video Compression</b>									
H.265/HEVC (ISO/IEC 23008-2)			•					•	
H.264 (MPEG-4 AVC part 10 / ISO/IEC 14496-10)	•	•	•	•	•	•	•	•	•
High Profiles	•	•	•	•	•	•	•	*	•
Baseline & Main Profiles	•	•	•	•	•	•	•	•	•
Up to Level 4.2 and lower intermediate levels	•	•	*	•	•	•	•	*	•
Up to Level 4 (1080p60) (HEVC)			*				-	*	-
I, IP framing	•	•	•	•	•	•	•	•	•
IBP, IBBP framing	•	•		•	•	•	•	*	•
Configurable Group of Picture (GOP) size	•	•	•	•	•	•			
Configurable frame rate	•	•	•	•	•	•	•	•	•
Region of Interest Coding	•	•	*	•	•	•			
Bit Rates (SD/HD) H.264	32 kbps - 25 Mbps	32 kbps - 25 Mbps	32 kbps - 25 Mbps	32 kbps - 25 Mbps	32 kbps - 25 Mbps	32 kbps - 25 Mbps			
Bit Rates (SD/HD) HEVC			Up to 15 Mbps						
Rate Control	CBR/VBR	CBR/VBR	CBR/VBR	CBR/VBR	CBR/VBR	CBR/VBR			
Encoder Latency	<55ms	<55ms	<55ms H.264 <45ms HEVC	<55ms	<55ms	<55ms			
<b>AUDIO ENCODING/DECODING</b>									
<b>Compression Standard:</b>									
MPEG-2 AAC-LC ISO/IEC 13818-7	•	•	•	•	•	•	•	•	•
MPEG-4 AAC-LC ISO/IEC 14496-3	•	•	•	•	•	•	•	•	•
<b>Audio Channels:</b>									
2 analog audio per blade	•	•	•	•	•	•	•	•	•
16 embedded audio per blade (SDI)	•	•	•	•	•	•	•	•	•
2 embedded audio per blade (DVI)		•			•				
2 embedded audio per blade (HDMI)							•	•	•
<b>Bit Rates:</b>									
From 56 to 320 kbps per audio pair	•	•	•	•	•	•	•	•	•
<b>Frequency Response:</b>									
From 20 Hz to 22 kHz	•	•	•	•	•	•	•	•	•
High precision timecode insertion as per MISB 0604.2	•	•	•	•	•	•			

\* for H.264 only

	Makito X Encoders						Makito X Decoders		
	H.264 SDI	H.264 DVI	HEVC SDI	H.264 Harsh SDI	H.264 Harsh DVI	XCR	H.264	HEVC	H.264 Harsh
<b>METADATA (Optional)</b>									
<b>Input Metadata</b>									
KLV over SD-SDI/HD-SDI/3G-SDI	•		•	•		•	•	•	•
KLV or CoT over serial RS-232/422	•	•	•	•	•	•			
KLV or CoT over UDP/IP	•	•	•	•	•	•			
<b>Metadata Processing</b>									
CoT to KLV conversion	•	•	•	•	•	•			
CoT Relay	•	•	•	•	•	•			
Insertion and KLV edits	•	•	•	•	•	•			
CC 608/708 pass-through	•		•	•		•	•	•	•
SMPTE 336M compliant	•	•	•	•	•	•	•	•	•
MISB 0601.10 compliant	•	•	•	•	•	•	•	•	•
MISB 0604.2 compliant	•	•	•	•	•	•	•	•	•
Asynchronous & synchronous modes as per MISB 0604.2	•	•	•	•	•	•	•	•	•
High precision timecode insertion as per MISB 0604.2	•	•	•	•	•	•			
<b>STORAGE OPTIONS</b>									
250GB mSATA SSD Fixed	optional	optional							
250GB SATA SSD Removable	optional	optional							
<b>RECORDING OPTIONS</b>									
<b>File Formats</b>									
TS	optional	optional							
MP4	optional	optional							
Record KLV source metadata in TS format	optional	optional							
<b>File Segments</b>									
File Size	optional	optional							
Time Limit	optional	optional							
<b>Auto-Export</b>									
FTP Server	optional	optional							
Calypso	optional	optional							
Haivision Video Cloud	optional	optional							
<b>Asset Management</b>									
Copy/Move assets from SSD to NAS, SD or USB devices (SD and USB is specific to the fixed storage option)	optional	optional							
Download assets to your PC	optional	optional							
Browse assets within Makito X with Storage Web UI	optional	optional							
Playback MP4 assets within Makito X with Storage Web UI	optional	optional							
All assets are stored within an EXT4 file system on the SSD	optional	optional							
When connecting the SSD to a Windows/MAC, Paragon software must be used.	optional	optional							

\* for H.264 only



	Makito X Encoders						Makito X Decoders		
	H.264 SDI	H.264 DVI	HEVC SDI	H.264 Harsh SDI	H.264 Harsh DVI	XCR	H.264	HEVC	H.264 Harsh
<b>IP NETWORK INTERFACES</b>									
<b>Standard</b>									
Ethernet 10/100/1000 Base-T, auto-detect, Half/Full-duplex	•	•	•	•	•	•	•	•	•
Static IP/DHCP	•	•	•	•	•	•	•	•	•
Unicast streaming	•	•	•	•	•	•	•	•	•
Multicast streaming (IGMP v3)	•	•	•	•	•	•	•	•	•
Multiple unicast streaming	•	•	•	•	•	•			
<b>Streaming Protocols</b>									
MPEG Transport Streamover UDP / RTP	•	•	•	•	•	•	•	•	•
RTMP	•	•	•	•	•	•			
SAP (RFC 2974)	•	•	•	•	•	•	•	•	•
Secure Reliable Transport (SRT)	•	•	•	•	•	•	•	•	•
Direct-RTP - H.264 over RTP (RFC 3984)	•	•	*	•	•	•			
Connector RJ45	•	•	•	•	•	•	•	•	•
<b>MANAGEMENT INTERFACES</b>									
<b>Standard</b>									
RJ45 to RS-232 (DB-9 Management Cable Req'd.)	•		•	•		•			
Ethernet	•	•	•	•	•	•	•	•	•
<b>Management</b>									
HTTPS (web browser)	•	•	•	•	•	•	•	•	•
Command line over SSH/Telnet/RS-232	•	•	•	•	•	•	•	•	•
SFTP/TFTP/SCP	•	•	•	•	•	•	•	•	•
SNMP v3	•	•	•	•	•	•	•	•	•

\* for H.264 only

	Makito X Encoders						Makito X Decoders		
	H.264 SDI	H.264 DVI	HEVC SDI	H.264 Harsh SDI	H.264 Harsh DVI	XCR	H.264	HEVC	H.264 Harsh
Network Adaptive Encoding	•	•	•	•	•	•			
Multi-bitrate (MBR) streaming	•	•	•	•	•	•			
HD/SD de-interlacing	•	•	•	•	•	•	•	•	•
Built-in downscaling	•	•	•	•	•	•	•	*	•
EIA-608-B/NTSC Line 21 closed captioning	•		•	•		•	•	*	•
EIA-708-B/SDI closed captioning	•		•	•		•	•	*	•
Forward Error Correction (FEC)	•	•	•	•	•	•	•	•	•
AES encryption 128-bit or 256-bit with Furnace & SRT	•	•	•	•	•	•	•	•	•
Aspect ratio configuration	•	•	•	•	•	•			
Active Format Description (AFD)	•		•	•		•	•	*	•
Wide Screen Signaling (WSS)	•		•	•		•	•	*	•
Timecode (ATC_VITC)	•	•	•	•	•	•	•	•	•
Selective Mute	•	•	•	•	•	•			
Talkback	•	•	•	•	•	•	•	•	•
Color Space Conversion (DVI only)		•			•				
Image cropping	•	•	•	•	•	•			
Bi-directional serial passthrough	•		•	•		•			
Advanced Buffering Control							•	•	•
Still Image Insertion	•	•	•	•	•	•	•	•	•
Logo Overlay	•	•	•	•	•	•			
Synchronized playback between decoders							•	•	•

\* for H.264 only

## Software Version

- Makito X Encoder: 2.2.2
- Makito X Decoder: 2.2

## Encoders &amp; Decoders

	Makito X Encoders						Makito X Decoders		
	H.264 SDI	H.264 DVI	HEVC SDI	H.264 Harsh SDI	H.264 Harsh DVI	XCR	H.264	HEVC	H.264 Harsh
<b>Dimensions(H x W x D)</b>									
Millimeters	21 x 129 x 196	21 x 129 x 184	42 x 129 x 196	44 x 137 x 202	44 x 137 x 202	51 x 127 x 185	21 x 129 x 187	42 x 129 x 187	44 x 137 x 202
Inches	0.83 x 5.1 x 7.7	0.83 x 5.1 x 7.2	1.7 x 5.1 x 7.7	1.73 x 5.4 x 8.0	1.73 x 5.4 x 8.0	2.0 x 5.0 x 7.3	0.83 x 5.1 x 7.4	1.7 x 5.1 x 7.4	1.73 x 5.4 x 8.0
<b>Weight</b>									
kg	1.14 1.36 w/ Storage	1.14 1.36 w/ Storage	1.36	1.8	1.8	1.25	1.14	1.36	1.8
lbs	2.5 3 w/ Storage	2.5 3 w/ Storage	3	4	4	2.65	2.5	3	4
<b>Power</b>									
Blade/Appliance	12VDC 20W	12VDC 20W	12VDC 25W	12VDC 20W	12VDC 20W	28VDC 30W*	12VDC 20W	12VDC 25W	12VDC 20W
PSU External locking power supply	100-240 VAC 30W	100-240 VAC 30W	100-240 VAC 60W	100-240 VAC 30W	100-240 VAC 30W	90-240 VAC 40W	100-240 VAC 30W	100-240 VAC 60W	100-240 VAC 30W
<b>Appliance Temperature</b>									
Operating (°C)	0 to 40	0 to 40	0 to 40	0 to 70	0 to 70	-40 to 71	0 to 40	0 to 40	0 to 70
Non-operating (°C)	-30 to 70	-30 to 70	-30 to 70	-40 to 85	-40 to 85	-45 to 85	-30 to 70	-30 to 70	-40 to 85
Operating (°F)	32 to 104	32 to 104	32 to 104	32 to 158	32 to 158	-40 to 160	32 to 104	32 to 158	32 to 158
Non-operating (°F)	-22 to 158	-22 to 158	-40 to 122	-40 to 185	-40 to 185	-49 to 185	-22 to 158	-40 to 122	-40 to 185
<b>Humidity</b>									
%	up to 95% non-condensing						up to 95% non-condensing		

\* Power Standard as per MIL-STD-1275E

## Rackmount Chassis

	6 Blade			21 Blade	
	F-MB6X-RAC	F-MB6X-DC	F-MB6X-MED	F-MB21B-R	F-MB21X-R
<b>Dimensions(H x W x D)</b>					
Rackmount Units	19" 1RU	19" 1RU	19" 1RU	19" 4RU	19" 4RU
Millimeters	43.7 x 435.0 x 420.4	43.7 x 435.0 x 420.4	43.7 x 435.0 x 420.4	177.29 x 441.35 x 462.5	177.29 x 441.35 x 461.92
Inches	1.72 x 17.125 x 16.55	1.72 x 17.125 x 16.55	1.72 x 17.125 x 16.55	6.980 x 17.376 x 18.211	6.980 x 17.376 x 18.186
<b>Weight - empty chassis</b>					
kg	7.94	7.94	7.94	17.24	14.52
lbs	17.5	17.5	17.5	38	32
<b>Power</b>					
Internal Power Supply	90-264 VAC 47Hz-63Hz 300 Watt max	20-36 VDC 300 Watt max	90-264 VAC 47Hz-63Hz 300 Watt max	90-132 V and 180-240 VAC 47Hz-63Hz 600 Watt max	100-240 VAC 47Hz-63Hz 600 Watt max
<b>Appliance Temperature</b>					
Operating (°C)	0°C to 50°C	0°C to 50°C	0°C to 50°C	0°C to 50°C	0°C to 50°C
Non-operating (°C)	-40°C to 70°C	-40°C to 70°C	-40°C to 70°C	-40°C to 70°C	-40°C to 70°C
Operating (°F)	32°F to 122°F	32°F to 122°F	32°F to 122°F	32°F to 122°F	32°F to 122°F
Non-operating (°F)	-40°F to 158°F	-40°F to 158°F	-40°F to 158°F	-40°F to 158°F	-40°F to 158°F
<b>Humidity</b>					
%	up to 95% non-condensing			up to 95% non-condensing	

Makito X Product Name	SKU	Description
<b>Encoders</b>		
Makito X H.264 Single SDI	<b>S/B-292E-HSDSI1</b>	Makito X Encoder Appliance (S) or Blade (B) HD H.264 IP video encoder supporting a single 3G/HD/SD-SDI and Composite
Makito X H.264 Dual SDI	<b>S/B-292E-HSDSI2</b>	Makito X Encoder Appliance (S) or Blade (B) HD H.264 IP video encoder supporting dual 3G/HD/SD-SDI and Composite
Makito X H.264 DVI	<b>S/B-292E-DVI</b>	Makito X Encoder Appliance (S) or Blade (B) HD H.264 IP video encoder supporting a single DVI-I and Component
Makito X HEVC Single SDI	<b>S/B-292E-SDI1-HEVC</b>	Makito X HEVC Appliance (S) or Blade (B) HD HEVC/H.264 IP video encoder supporting a single 3G/HD/SD-SDI or Composite
Makito X HEVC Dual SDI	<b>S/B-292E-SDI2-HEVC</b>	Makito X HEVC Appliance (S) or Blade (B) HD HEVC/H.264 IP video encoder supporting dual channel 3G/HD/SD-SDI or Composite
Makito X Harsh Single SDI	<b>S-292E-X1H</b>	Makito X Single SDI Encoder Appliance for Harsh Environments
Makito X Harsh Dual SDI	<b>S-292E-X2H</b>	Makito X Dual SDI Encoder Appliance for Harsh Environments
Makito X Harsh Single DVI	<b>S-292E-DVI-H</b>	Makito X Single DVI Encoder Appliance for Harsh Environments
Makito XCR Quad Input	<b>S-292E-XCR</b>	Makito XCR Rugged Appliance with quad input (HD/SD-SDI and Composite) ; up to 1080p30; H.264 encoder
Makito XCR Quad Input with KLV	<b>S-292E-XCR-KLV</b>	Makito XCR Rugged Appliance with quad input (HD/SD-SDI and Composite) ; up to 1080p30; H.264 encoder with KLV
<b>Decoders</b>		
Makito X H.264 Single Decoder	<b>S/B-292D-HD1</b>	Makito X Decoder Appliance (S) or Blade (B) HD H.264 IP Video decoder supporting single channel 3G/HD/SD-SDI and HDMI
Makito X H.264 Dual Decoder	<b>S/B-292D-HD2</b>	Makito X Decoder Appliance (S) or Blade (B) HD H.264 IP Video decoder supporting dual channel 3G/HD/SD-SDI and HDMI
Makito X HEVC Single Decoder	<b>S/B-292D-HD1-HEVC</b>	Makito X HEVC single channel decoder appliance (S) or blade (B)
Makito X HEVC Dual Decoder	<b>S/B-292D-HD2-HEVC</b>	Makito X HEVC dual channel decoder appliance (S) or blade (B)
Makito X Harsh Single Decoder	<b>S-292D-X1H</b>	Makito X Single Channel Decoder Appliance for Harsh Environments
Makito X Harsh Dual Decoder	<b>S-292D-X2H</b>	Makito X Dual Channel Decoder Appliance for Harsh Environments
<b>Rackmount Kits</b>		
21 Slot Chassis Redundant AC	<b>F-MB21B-R</b>	Rackmount 4RU Chassis - Up to 21 Makito/Makito X/Torpedo2 mini-blades, Redundant Quad AC power supply, 90-132V and 180-240VAC 47Hz-63Hz, 400 Watt max.
21 Slot Chassis with Dual Redundant AC for Makito X Blades	<b>F-MB21X-R</b>	Rackmount 4RU Chassis - Up to 21 Makito X mini-blades, Redundant Dual AC power supply, 100-240VAC 47Hz-63Hz, 600 Watt max.
6 Slot Chassis Redundant AC	<b>F-MB6X-RAC</b>	1RU Rackmount Chassis - Up to 6 Makito/Makito X/Torpedo2 mini-blades, Redundant AC power supply, 90-264VAC, 47Hz-63Hz, 300 Watt max.
6 Slot Chassis DC	<b>F-MB6X-DC</b>	Rackmount 1RU Chassis - Up to 6 Makito/Makito X/Torpedo2 mini-blades, DC power supply, 2-36 VDC, 300 watt max.
6 Slot Chassis Medical Grade AC	<b>F-MB6X-MED</b>	Rackmount 1RU Chassis - Up to 6 Makito/Makito X/Torpedo2 mini-blades, Medical grade AC power supply, 90-264VAC, 47Hz-63Hz, 300 Watt max.
1RU appliance mounting bracket	<b>RU-MB1-1</b> <b>RU-MB1-2</b>	1RU mounting bracket for one or two single-height appliance chassis
2RU appliance mounting bracket	<b>RU-MB2-1</b> <b>RU-MB2-2</b>	2RU mounting bracket for one or two double-height appliance chassis

\* For complete pricing and ordering, contact us at sales@haivision.com or your certified Haivision reseller.

- N O T E S -

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