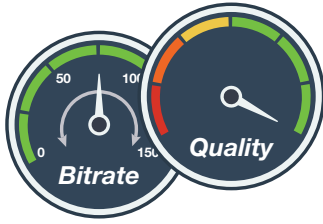


# High-Density Contribution Encoder



## Matrox® Monarch™ EDGE High-Density Contribution Encoder

The contribution or mezzanine-level encoding capabilities of Monarch EDGE provide broadcasters with a means to easily add additional or complimentary backhaul feeds, or redundant contribution channels of their primary feeds. This small-footprint appliance with a tiny power envelope delivers quad-channel broadcast quality with 4:2:2 10-bit HD streams. It has enough encoding horsepower to simultaneously generate low-bitrate 4:2:0 proxy streams for each input, which can be monitored by any device on the network.

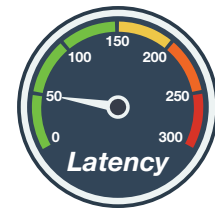


## Built for High Quality 10-bit H.264 Encoding

The optimized H.264 engine powering Monarch EDGE keeps data rates exceptionally low without sacrificing quality. I-frame-only streams reaching 120 Mbps can be delivered if quality is a high priority. Each input can be streamed at resolutions up to 1080p60 using the High 4:2:2 H.264 encoding profile. Multiple processes can be performed on each input by the scaling and de-interlacing engines. This enables each input to be streamed in multiple resolutions and bitrates simultaneously.

## Exceptionally Low Encode Latency

In live productions, long encode and transmission latencies can have adverse effects on the production. With a 50ms latency between input of uncompressed video and output of compressed stream, Monarch EDGE achieves some of the lowest compression latencies on the market.



## Flexible Streaming Options

There are a variety of streaming protocols available to Monarch EDGE users. On closed networks, MPEG-2 TS or RTSP streams can be selected for delivery. For cloud-based destinations, or when the network is congested, SRT may be more appropriate. SRT is a new open-source format that provides the reliability of RTMP, while reducing latency, for use on open networks. SRT streams can also be encrypted if security is a concern.

## Connectivity for Today and Tomorrow

Monarch EDGE offers flexible, future-proof connectivity with 3G, 12G SDI, and ST 2110 over 25 GbE network connections. Inputs are auto-detectable and allow for a wide range of connectivity to devices such as cameras, switchers, vision mixers or routers. Monarch EDGE is also capable of accessing 16 channels of embedded audio per input. Up to four stereo pairs per input can be encoded. Alternatively, the professional analog stereo audio can be selected from the balanced XLR connectors.



## Convenient, Centralized Control

Monarch EDGE Control Hub is a powerful application that provides remote-control management and configuration over all network-connected encoders from a central location. This powerful software provides authorized users with high-level views of all devices on the network, and enables full access and control from a single, easy-to-use interface.

## Preview Inputs First

Allowing up to four simultaneous input previews on a single desktop monitor, Monarch EDGE ensures that videos are ready to be webcasted. Monarch EDGE Control Hub allows users to effortlessly configure how they would like to preview audio sources of input. Users can choose to monitor one input at a time, or mute the DisplayPort audio output.



## Robust and Practical Design

Monarch EDGE was built with reliability in mind. An LCD screen on the front of the appliance allows the user to quickly access its status and configuration settings. A locking power connector safeguards against connection loss during production. Redundant Ethernet (1 GbE) ports allow users to control the device from one port while sending video from a second port. Users can opt to send the same streams from each port while taking completely separate network paths. Finally, Monarch EDGE's compact design ensures it can be installed in a fly-pack, OB van, or with a second Monarch EDGE unit in a 1RU-rack space.



## Matrox Monarch EDGE connections



- |                                         |                        |                           |
|-----------------------------------------|------------------------|---------------------------|
| 1. USB 1                                | 7. Analog Audio Output | 14. *SFP28 Ports          |
| 2. USB 2                                | 8. Analog Audio Input  | 15. Display Port          |
| 3. Power LED                            | 9. Genlock             | 16. USB 3                 |
| 4. Reset Button                         | 10. Balance Audio      | 17. Gigabit Ethernet Port |
| 5. LCD Panel                            | 11. Tally Signals      | 18. Power Connection      |
| 6. Navigation and Configuration Buttons | 12. 3G SDI             | 19. Power Switch          |
|                                         | 13. 12G SDI            |                           |

*\*SFP module supplied by third party*

# Technical Specifications

## Connectivity

### Input connections

- 1x 12G SDI input per ST 2082
- 3x 3G SDI inputs per ST 425 (Level A mapping only)
- UHD support using 4 SDI inputs per SMPTE ST 425-5
  - Square division
  - 2x sample interleave input<sup>1</sup>
- 2x SFP 28 network ports (up to 25 Gbps)<sup>1</sup>
- Capture up to four independent 3 Gbps video streams or one 12 Gbps (4Kp60) stream encapsulated per SMPTE ST 2110-10, -20, and -21. Seamless protection (redundancy) according to SMPTE ST 2022-7.

### Resolutions

- 2160p at 50, 59.94, 60 fps
- 1080p at 25<sup>1</sup>, 29.97<sup>1</sup>, 30<sup>1</sup>, 50, 59.94, 60 fps
- 1080i at 25, 29.97, 30<sup>1</sup> fps
- 720p at 50, 59.94, 60 fps

### Configurable genlock

- Bi-level genlock output
- Bi-level or tri-level genlock input

### Digital audio

- 8x channels of embedded audio support per SDI input. Two channels per input supported with first release.<sup>1</sup>

### Analog audio<sup>2</sup>

- 2x channels of balanced analog audio input via XLR connector
- 2x channels of balanced analog audio output via XLR connector<sup>1</sup>
- 1 channel of unbalanced stereo audio output via 1/8" TRS connector
- All sampled at 48 kHz

### Audio processing

- Embedded or analog audio channels can be compressed as a stereo pair or processed as PCM<sup>1</sup> (uncompressed audio)
- Multi-channel audio support as separate audio pairs<sup>1</sup>

## Control and management

### Access

- Monarch EDGE Control Hub dedicated Windows® application
- RESTful HTTP API<sup>3</sup>

### Physical

- On-device buttons and screen for basic set up and monitoring operations

### Monitoring output

- 1x DisplayPort (HD output only)

<sup>1</sup>. Enabled with future firmware update.

<sup>2</sup>. Available via optional Audio cable.

<sup>3</sup>. Contact Matrox Representative for Availability.

## Compression

### Codecs

- Video: H.264/MPEG-4 part 10 (AVC)
- Audio: AAC-HE and AAC-LC

### Bitrate per stream

- Video: Up to 120 Mbps
- Audio: From 32 to 256 Kbps

### Chroma sub-sampling

- 4:2:2 (8-bit and 10-bit),
- 4:2:0 (8-bit and 10-bit) – MDG4/E10/I
- 4:2:0 (8-bit only) – MDG4/E8/I

### Encoding controls

- Up to 5.2 level support
- GOP size and structure
- Variable and constant bit rate support
- Average max/min data rate controls
- Encoding frame rates offered independent of input frame rates

### Profile

- Up to High 4:2:2 profile (Hi422P)

### Latency

- Encode latency as low as 50ms (network transfers and decode operation not included in value)

### Encode density/workflow examples

- One (1) 3840 x 2160p @60 fps (encoded as 4:2:0 or 4:2:2) plus one 1080p (4:2:0 8 bit) proxy stream OR
  - Four (4) 1920 x 1080 @60 fps (encoded as 4:2:0 or 4:2:2) plus four 720p30 (4:2:0) proxy stream
- There are a number of additional encoding profiles that can be generated per input.*

## VANC ancillary data processing (SDI and IP)<sup>1</sup>

- Closed captioning (CC) embedded in VANC processing as CEA-608/708
- Vertical interval timecode (RP-188)
- HDR and colorimetry metadata

## Tally light output<sup>1</sup>

- 8x tally signals (sent to cameras)
- Tally ports available via a 15-pin D-SUB connector

## Streaming protocols

- MPEG-2 TS over UDP
- RTP/RTSP
- Native RTP<sup>1</sup> (unicast or multicast)
- SRT
- RTMP

## Network

- 2x RJ45, 100/1000BASE-T Ethernet
- 2x MSA-compatible SFP28 cage supporting 10 GbE and 25 GbE modules<sup>1</sup>

## Physical and power

### Product dimensions

#### (length x width x height)

- 8.53x7.45x1.68 in (21.7x18.9x4.3 cm)
- Rack-mountable; two Monarch EDGE appliances can fit in 1 RU space

### Product weight

- 3.65 lbs (1,660 g)

### Operating conditions

- 32 to 104 deg. F (0 to 40 deg. C), 20 to 80% relative humidity (non-condensing)

### Power

- Line voltage: 12 volts
- Total power consumption: 45 watts [avg.]
- Connector: DIN 4

### Power supply

- Line voltage: 100-240 VAC
- Frequency: 50-60 Hz
- Input: external AC/DC adapter - IEC320-C14
- DIN4 locking power connector

### Regulatory

- EMI: FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
- Power-supply safety: UL/CUL(UL60950-1), TUV-GS(EN60950-1), T-LICENSE(BS EN60950-1), CCC(GB4943.1-2011), PSE(J60950), SAA(AS/NZS60950-1), KC-MARK(K60950), S-MARK(IEC60950-1)
- RoHS directive 2002/95/EC

### Warranty

- Two-year limited warranty with free online or telephone support

## Ordering information

### MDG4/E10/I

- Monarch EDGE appliance with 4:2:0 8-bit and 4:2:2 10-bit encoding

### MDG4/E8/I

- Monarch EDGE appliance with 4:2:0 8-bit encoding

### MRCH/RACK/KIT

- Monarch Rack Mount Kit. Can fit up to two Monarch EDGE units in a 1RU space.

### PWR/SUP/MDG

- Monarch EDGE power supply unit. Does not include IEC-C14 power cord. These cables must be sourced locally.

### MDG/AUD/CBL

- Monarch EDGE break out audio cable. Provides two input channels and two output channels. DB15 to XLR I/O.

## Contact Matrox

### North America Corporate Headquarters

Tel: (514) 822-6364, (800) 361-4903 (North America) • Fax: (514) 685-2853  
E-mail: video.info@matrox.com

Matrox is a market leader in the 4K and HD digital video hardware and software fields, offering accelerated H.264 encoding, streaming, AV signal conversion, capture/playout servers, and CGs. Matrox's Emmy award-winning technology powers a range of multi-screen content creation and delivery platforms used by broadcasters, telcos, cable operators, post-production facilities, live event producers, videographers, and AV professionals worldwide. Founded in 1976, Matrox is a privately held company headquartered in Montreal, Canada. For more information, visit [www.matrox.com/video](http://www.matrox.com/video).

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### Europe, Middle East & Africa

Tel: +44 (0) 1895 827220 • Fax: +44 (0) 1895 827239  
E-mail: video.info.emea@matrox.com

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