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MATROX MXO2 FAMILY FOR PC PRODUCT GUIDE

matrox MXO™2 Family

35th
matrox®
Digital Video Solutions

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More Than Just I/O
Lightning Fast H.264 Encoding Too!

As a video professional you need an editing platform you can rely on to connect to anything, anywhere; work with your favorite apps; and deliver high-quality video to all the devices your viewers and clients use – the web, mobile devices, Apple TV, Blu-ray discs, even tape. The award-winning Matrox MXO2 devices have you covered. You get highly-reliable, broadcast-quality video and audio input/output and HDMI video monitoring with the unique Matrox HDMI Calibration Utility as well as 10-bit realtime hardware up/down/cross conversion on capture and output. The devices can easily be moved among the desktop systems in your facility, installed in an OB van, or taken on the road with laptops. Units equipped with the MAX option provide lightning fast H.264 file encoding.

Support for your favorite editing apps
The Matrox MXO2 devices are the only complete platforms for Adobe Creative Suite 5.5 Production Premium, providing a wealth of productivity tools. Matrox MXO2 Mini is a cost-effective HD monitoring solution for Avid editing systems, ideal for file-based workflows. The Matrox MXO2 devices can also be used with Mac Pros and MacBook Pros, giving you even more apps to work with.

avid.com Adobe

With four models to choose from you are sure to find the connectivity you need.

Matrox MXO2 Mini – Affordable HDMI/analog video and audio I/O
Matrox MXO2 LE – Professional HD/SD video and audio I/O
Matrox MXO2 – Complete HD/SD video and audio I/O
Matrox MXO2 Rack – Most comprehensive HD/SD video and audio I/O

Key features of the Matrox MXO2 family for PC

- Convenient form factors for use in studio, on set, in the field, and in OB vans
- Works with Windows 7 (64-bit) laptops and desktops
- Complete connectivity – PCI Express and ExpressCard/34
- Broadcast quality HD/SD video and audio input/output
- Flexible support for leading codecs, file formats, cameras, and workflows
- Captures to HD and SD codecs – 8- and 10-bit uncompressed and highly efficient Matrox MPEG-2 I-frame
- Extensive application support including Adobe Premiere Pro, Encore, Photoshop, and After Effects, Eyeon Fusion and NewTek LightWave 3D
- Matrox RT technology that enhances the Adobe Mercury Playback Engine to provide full-resolution, full-frame-rate, multi-layer, realtime video editing and advanced realtime Matrox Flex CPU effects
- Cost-effective HD monitoring for Avid Media Composer and Avid NewsCutter with Matrox MXO2 Mini
- 10-bit HDMI input, output and monitoring with the unique Matrox HDMI Calibration Utility
- 10-bit realtime hardware up/down/cross conversion on capture and output
- Matrox A/V Tools application for fast capture/playback of audio, video, and still frames
- Three-year hardware warranty and complimentary telephone support

Additional features with Matrox MAX
- Lightning fast H.264 encoding with Adobe Media Encoder, Adobe Premiere Pro and Adobe Encore
- Matrox MAX H.264 Capture application for direct capture to H.264 files for the web, mobile devices, Apple TV, and Blu-ray discs

Matrox MXO2 Mini

Matrox MXO2 LE

Matrox MXO2

Matrox MXO2 Rack

Convenient form factors

Complete connectivity
The Matrox MXO2 products connect to your computer via a PCI Express adapter card or an ExpressCard/34 adapter. When purchasing an MXO2 product, you choose the version that includes the adapter you need for your particular system. Additional adapters may be purchased separately.

Portable
MXO2 Mini, MXO2 LE and MXO2 are lightweight, portable devices that easily fit into your laptop bag.

Can run off standard field batteries
MXO2 and MXO2 LE can run off standard field batteries or their included AC power adapter. MXO2 LE attaches directly to a battery via a standard 4-pin XLR connector. MXO2 connects to a battery via an optional cable that can be purchased separately.

Rackmountable
MXO2 Rack occupies 2RU in a standard 19" inch rack. It comes with two adjustable mounting "ears" so that the unit can be mounted in the rack with the connectors facing the front or back of the rack. The design of the ears allows you to adjust the depth of the unit in the rack.

Dimensions and weight

	Dimensions	Weight
Matrox MXO2 Mini	*6 1/2" x 4 5/16" x 1 1/2" (166mm x 110mm x 40mm)*	*0.6 lbs (280g)*
Matrox MXO2 LE	*9 1/4" x 9 1/2" x 2" (235mm x 241mm x 51mm)*	*2 3/4 lbs (1245g)*
Matrox MXO2	*13" x 9½" x 2" (330mm x 241mm x 51mm)*	*3 1/2 lbs (1600g)*
Matrox MXO2 Rack	*21" x 18" x 8.25" (533mm x 457mm x 210mm)*	*15 lbs (7000g)*

Broadcast-quality HD/SD video and audio input/output

Video I/O

The Matrox MXO2 products provide a full range of professional video inputs and outputs.

MXO2 LE, MXO2 and MXO2 Rack provide RS-422 machine control for frame-accurate capture and print-to tape with Adobe Premiere Pro.

Matrox MXO2 LE, MXO2 and MXO2 Rack provide SD analog black burst (bi-level) or HD tri-level sync genlock. They can genlock to any type of video input or to house sync. Timing offset controls can be used to align your video output relative to your external genlock source to compensate for cable delays within your facility. On MXO2 Rack, loop through is supported.

Matrox MXO2 LE, MXO2 and MXO2 Rack support up to five user-selectable simultaneous video outputs – HD and/or SD on HDMI, SDI, and analog.

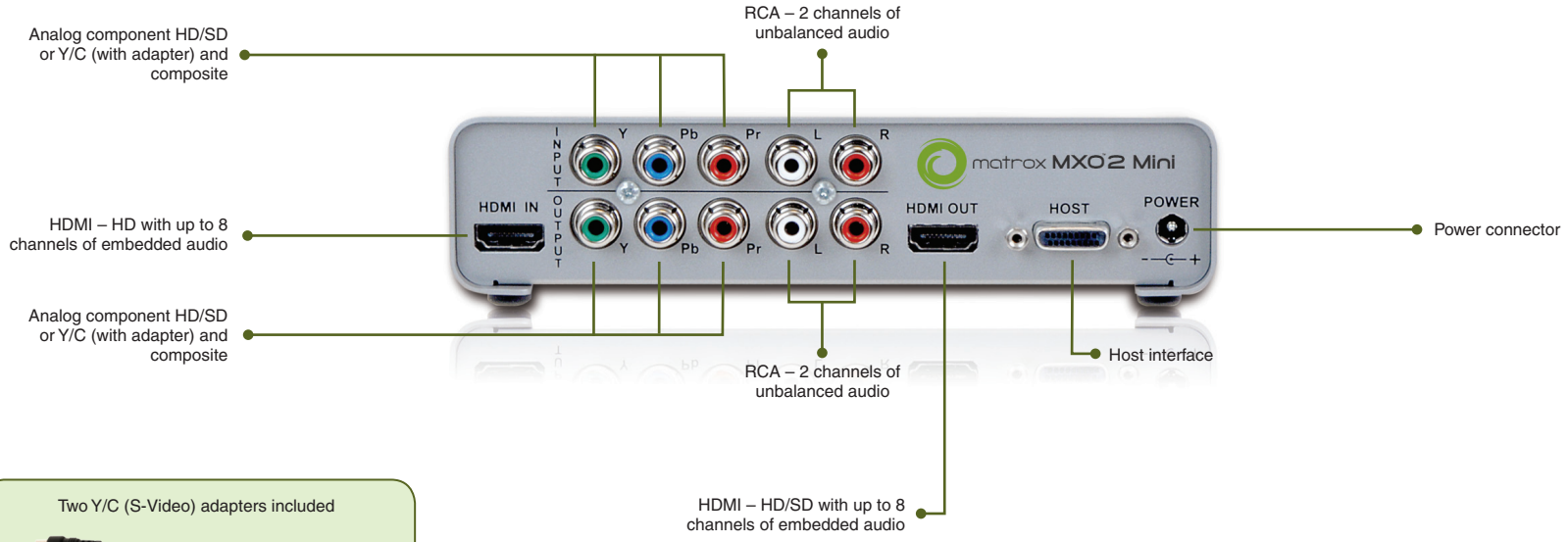
	MXO2 Mini	MXO2 LE	MXO2	MXO2 Rack
Video Inputs				
Component HD/SD (YUV or RGB)	*Yes*	*Yes*	*Yes*	*Yes*
SDI HD/SD	*No*	*Yes*	*Yes*	*Yes*
Y/C	*Yes*	*Yes*	*Yes*	*Yes*
Composite	*Yes*	*Yes*	*Yes*	*Yes*
HDMI (YUV or RGB)	*Yes*	*Yes*	*Yes*	*Yes*
Video Outputs				
Component HD/SD (YUV or RGB)	*Yes*	*Yes*	*Yes*	*Yes*
SDI HD/SD	*No*	*Yes*	*Yes*	*Yes*
Y/C	*Yes*	*Yes*	*Yes*	*Yes*
Composite	*Yes*	*Yes*	*Yes*	*Yes*
HDMI (YUV or RGB)	*Yes*	*Yes*	*Yes*	*Yes*

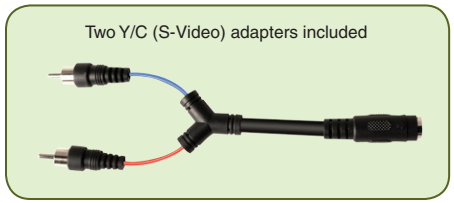
Audio I/O

The Matrox MXO2 products provide a full range of audio inputs and outputs with the flexibility to map any audio track in Adobe Premiere Pro to any audio output.

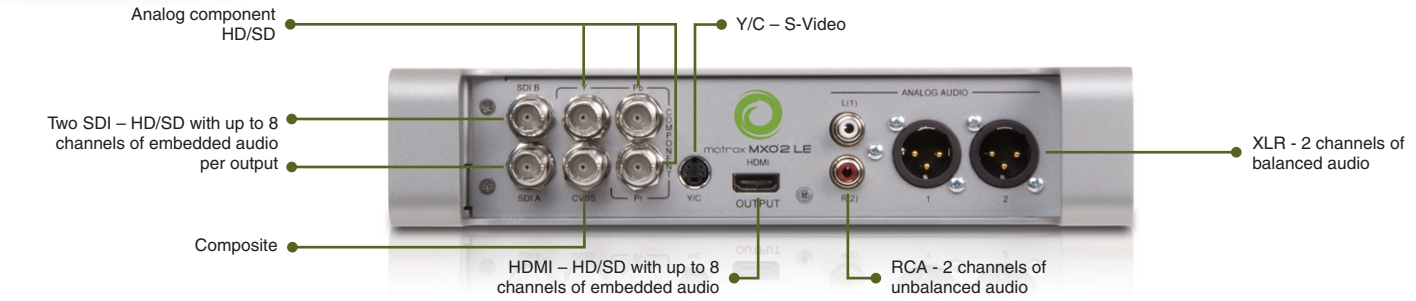
Audio Inputs	MXO2 Mini	MXO2 LE	MXO2	MXO2 Rack
RCA Audio (unbalanced)	*2 channels*	*2 channels*	*2 channels*	*No*
XLR Audio (balanced)	*No*	*2 channels*	*2 channels*	*4 channels*
AES/EBU (unbalanced)	*No*	*No*	*2 channels*	*4 channels*
SDI embedded audio (8 channels)	*No*	*Yes*	*Yes*	*Yes*
HDMI embedded audio (8 channels)	*Yes*	*Yes*	*Yes*	*Yes*
Audio Outputs				
RCA Audio (unbalanced)	*2 channels*	*2 channels*	*6 channels*	*No*
XLR Audio (balanced)	*No*	*2 channels*	*4 channels*	*8 channels*
AES/EBU (unbalanced)	*No*	*No*	*2 channels*	*4 channels*
SDI embedded audio (8 channels)	*No*	*Yes*	*Yes*	*Yes*
HDMI embedded audio (8 channels)	*Yes*	*Yes*	*Yes*	*Yes*
Direct surround sound monitoring	*No*	*No*	*5.1*	*5.1 and 7.1*

Matrox MXO2 Mini Connections

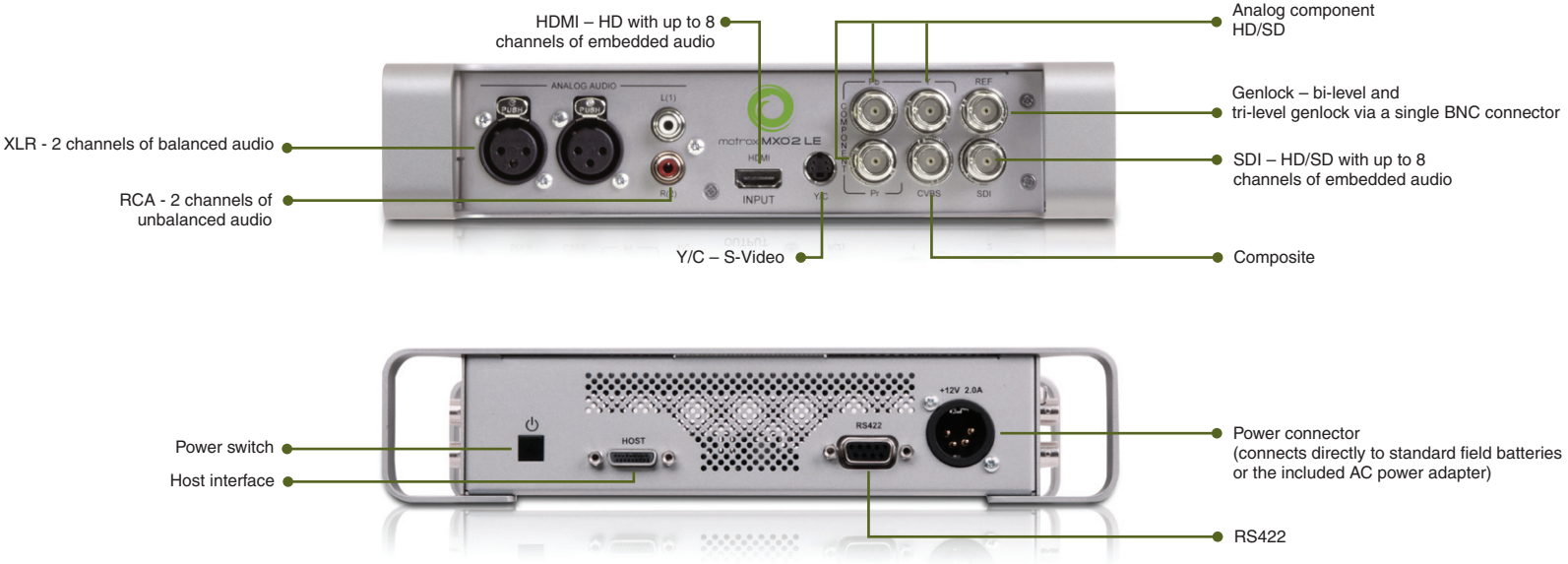




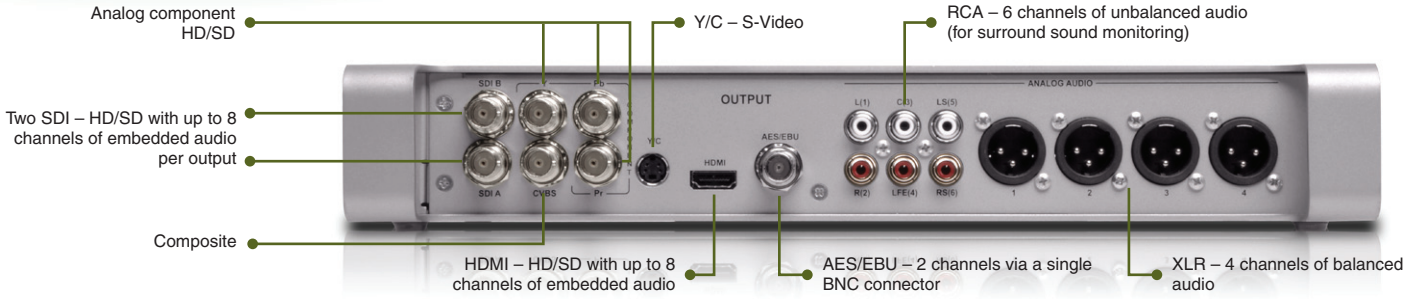
Matrox MXO2 LE Connections - Outputs



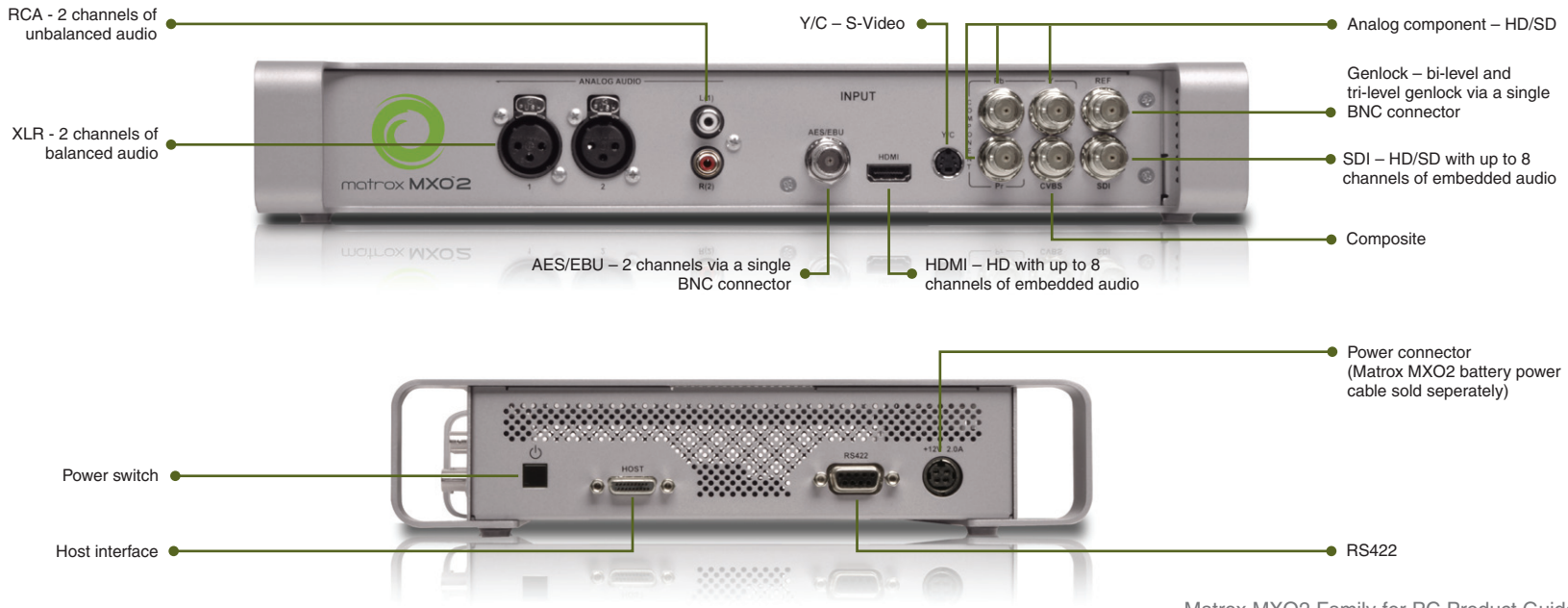
Matrox MXO2 LE Connections - Inputs



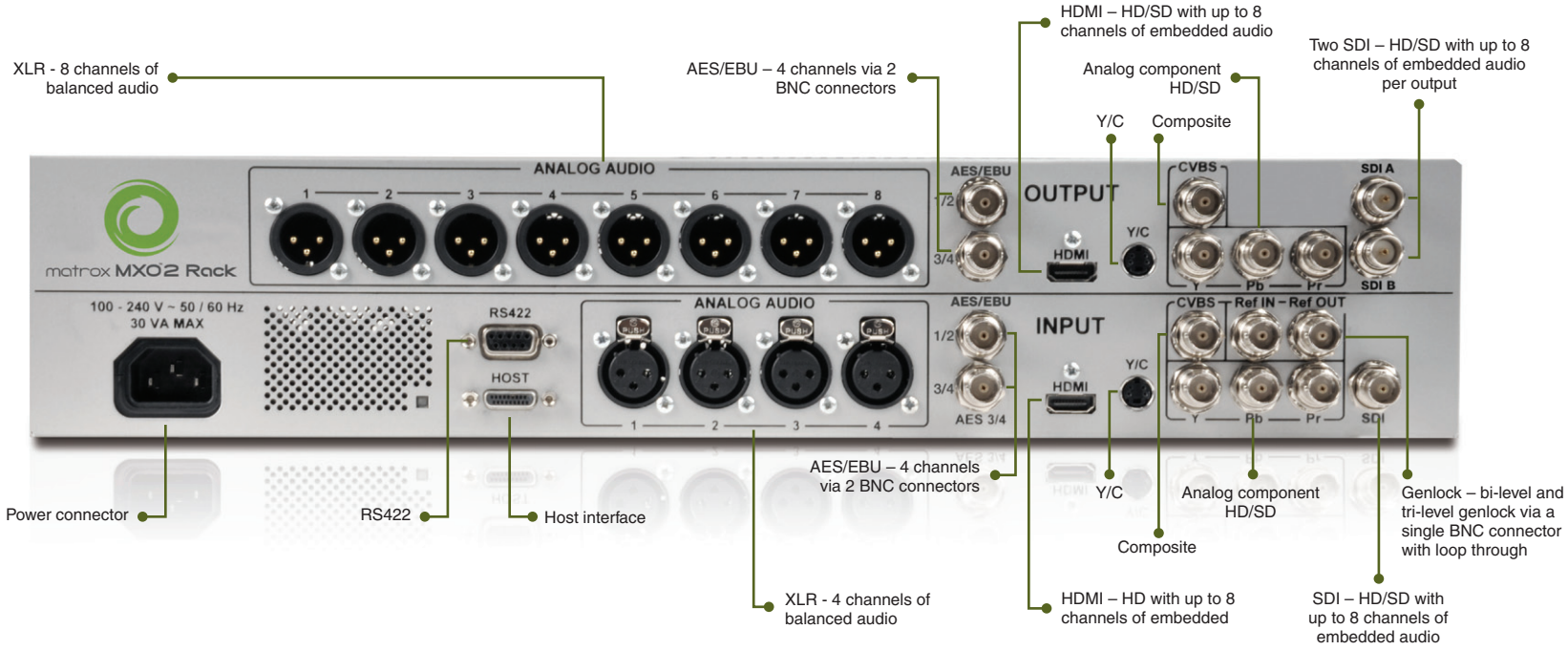
Matrox MXO2 Connections - Outputs



Matrox MXO2 Connections - Inputs



Matrox MXO2 Rack Connections



Flexible support for leading codecs, file formats, cameras, and workflows

The MXO2 product family lets you work with virtually any codec, file format, camera, and workflow out there.

Works with a variety of codecs
The Matrox MXO2 devices let you work with all the codecs supported by Adobe Premiere Pro including AVCHD, HDV, DVCPRO HD, DVCPRO50, DVCPRO, and DV. You can also capture video from within the Adobe Premiere Pro capture interface to 8- and 10-bit uncompressed and Matrox MPEG-2 I-frame codecs in HD and SD.

Use your favorite file-based formats
The Matrox MXO2 devices give you full-screen monitoring as you work with file-based formats such as XDCAM, XDCAM HD, XDCAM EX, P2, and P2HD in Adobe Premiere Pro.

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P2HD

XDCAM HD
Professional Disc System

RED workflow support (does not apply to Matrox MXO2 Mini)

RED users can benefit from Matrox MXO2 LE, MXO2 or MXO2 Rack to capture, monitor, and playback on set. Back in the post suite, you can use your Matrox MXO2 device to work with R3D files and output to SD, 720, or 1080.

Closed Captioning Support with Adobe Premiere Pro

Adobe Premiere Pro CS5.5 lets you attach a closed caption data file to a sequence and display the closed captions in the Program Monitor and through Firewire DV output. Compatible file types are described as .mcc and .scc files for use in DTV (CEA-708) and SD (CEA-608) transmissions respectively.

All Matrox MXO2 devices can add appropriately formatted closed captioning data to line 21 of analog SD outputs for monitoring and print-to-tape. They can also let you use standard (non-closed captioning enabled) monitors to preview HD timelines with closed captioning data by overlaying decoded closed captioning text over the previewed video. This is the ideal cost-effective way to see your closed captions, even when you're using an inexpensive HDMI display as your program monitor.

Matrox MXO2 LE, MXO2, and MXO2 Rack can also embed closed captioning data in SDI streams in accordance with the above specifications and let you simultaneously deliver HD-SDI and analog SD masters containing closed captions.

Extensive application support

The Matrox MXO2 products amplify your productivity with editing, content creation, H.264 encoding/authoring, and streaming applications on the PC.

Editing applications
You benefit from the full range of Matrox MXO2 features with Adobe Premiere Pro CS5.5. Matrox MXO2 Mini provides a cost-effective HD monitoring solution for Avid editing systems.

Content creation applications
The Matrox MXO2 devices provide WYSIWYG support for applications suchas Adobe Encore, Photoshop, and After Effects as well as Eyeon Fusion and NewTek LightWave 3D.

H.264 encoding/authoring applications that take advantage of Matrox MAX technology

The Matrox MXO2 devices equipped with Matrox MAX technology tap in to Adobe Media Encoder to let you quickly and easily create H.264 files for Blu-ray, the web and mobile devices. You can create Blu-ray H.264 level 4.0 files, directly from Adobe Media Encoder that can be authored in Adobe Encore and burned without re-encoding on either Blu-ray or DVD media. These Blu-ray H.264 level 4.0 files can also be used for mass replication of Blu-ray discs.

Streaming applications

The Matrox MXO2 devices let you stream from any camera, anywhere there is an internet connection using Adobe Flash Media Live Encoder. News, sports, concerts, educational seminars, religious services, and corporate meetings are just a few of the many types of live events where an MXO2 device will come in handy for creating your internet broadcasts. You can also stream material that was previously recorded.

DirectShow Filter

The Matrox MXO2 DirectShow source filter lets developers create DirectShow-based applications to access the high quality digital and analog audio and video inputs of the MXO2 devices as well as the onboard scaler.

Adobe Premiere Pro

The Matrox MXO2 platforms go far beyond the capabilities of systems that combine Adobe Premiere Pro CS5.5 and a simple I/O card. The additional benefits you get include:

- Matrox RT technology that enhances the Adobe Mercury Playback Engine to provide full-resolution, full-frame-rate, multi-layer, realtime video editing and advanced realtime Matrox Flex CPU effects
- Convenient form factors for use with laptops and desktops in studio, on set, in the field, and in OB vans
- 10-bit HDMI input, output and monitoring with the unique Matrox HDMI Calibration Utility
- 10-bit realtime hardware up/down/cross conversion on capture and output
- Capture to HD and SD video to 8- and 10-bit uncompressed AVI files
- Capture to HD and SD video to the highly-efficient Matrox MPEG-2 I-frame intermediate codec at bit rates from 50 to 300 mbps
- Playback of 32-bit MPEG-2 I-frame AVI files with alpha
- Matrox A/V Tools application for fast capture/playback of audio, video, and still frames

When you include the Matrox MAX option in your MXO2 device you also get:

- Matrox MAX technology for lightning fast H.264 encoding with Adobe Media Encoder, Adobe Premiere Pro and Adobe Encore

Matrox RT technology for Adobe Premiere Pro

The Matrox MXO2 platforms feature Matrox RT technology that enhances the Adobe Mercury Playback Engine to provide full-resolution, full-frame-rate, multi-layer, realtime video editing.

Matrox RT technology is designed for use with or without the presence of GPU acceleration. It provides many of the benefits of GPU acceleration but works with any system, even laptops. It optimizes your system to output to professional monitors at full-resolution and full-frame-rate.

In addition, Matrox RT provides advanced realtime Matrox Flex CPU effects such as primary and secondary color correction, smooth speed changes, and many more; along with a high-quality, highly-efficient MPEG-2 I-frame intermediate codec that streamlines working with CPU-taxing footage such as AVCHD and XDCAM.

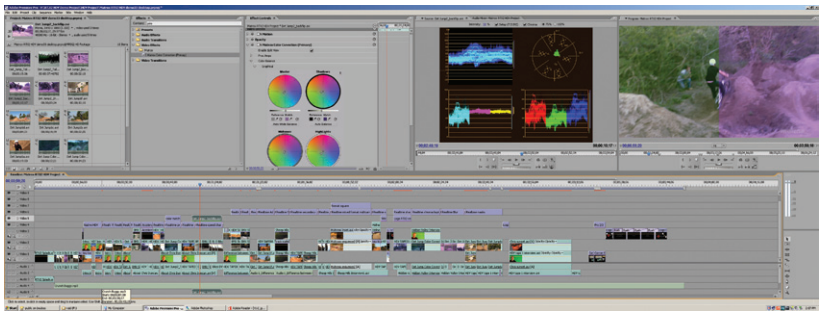
Realtime Matrox Flex CPU effects with Adobe Premiere Pro

The Matrox MXO2 platforms work in conjunction with the power of your CPU to perform a variety of advanced realtime effects including:

Realtime primary color correction
Realtime secondary color correction
Realtime chroma and luma keying
Realtime speed changes
Realtime transitions
Native Adobe Premiere Pro effects and transitions
Realtime timecode

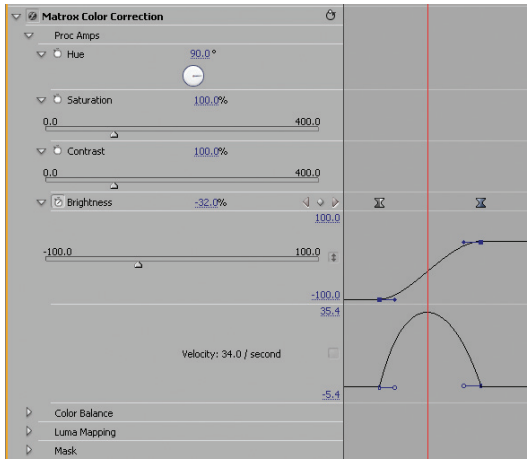
Realtime primary color correction

Primary color correction is a critically important effect for all productions, whether to achieve continuity when cutting between shots, ensure broadcast safe levels, or establish and emphasize a “look”. The primary color corrector provides basic proc amp control; three-way color correction complete with master, shadows, midtones and highlights control; input/output level control; and RGB curves control.



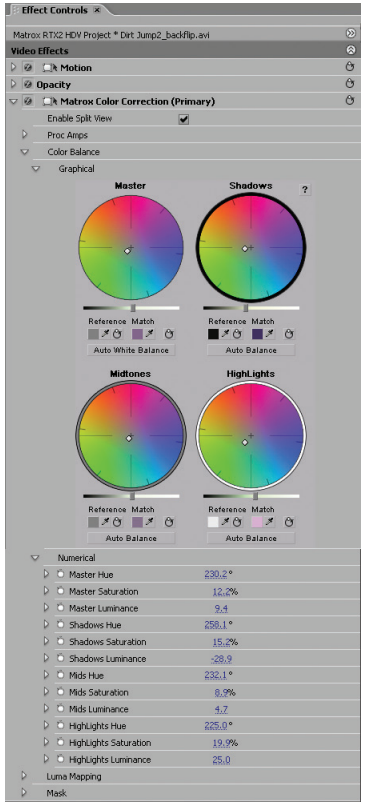
Realtime proc amp controls

The Matrox MXO2 devices let you easily adjust four proc amp controls - hue, saturation, brightness, and contrast. Hue adjusts the tint of the colors in the image, saturation adjusts the vividness, contrast adjusts the difference in luminance between the lightest and darkest areas of the image, and brightness adjusts the level of black. You can also use these controls to create special effects, such as black and white, in real time.



Realtime color match and color balance

Colors can be corrected using nine parameters related to the black (shadow), midtone, and white (highlight) levels of your clips. You can easily match colors or balance blacks, whites, and grays against a reference shot in one simple step.



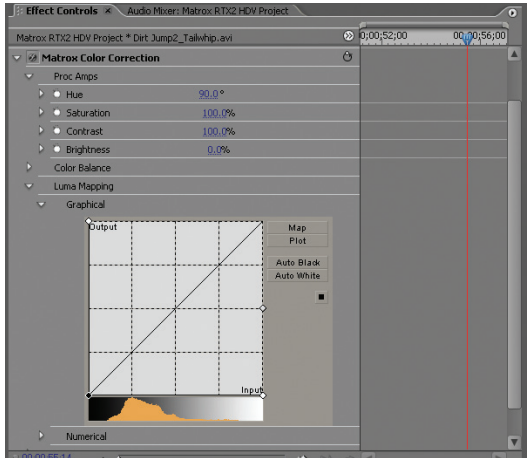
Reference

Match

Corrected

Realtime input/output level control

Using the histogram display and level controls, luminance levels can be remapped to maximize the dynamic range of a clip. For example, bright areas can be made brighter and dark areas can be made darker. Five parameters are available - black, white, and gamma levels on the input; and black and white levels on the output. Auto white and auto black controls are also provided.



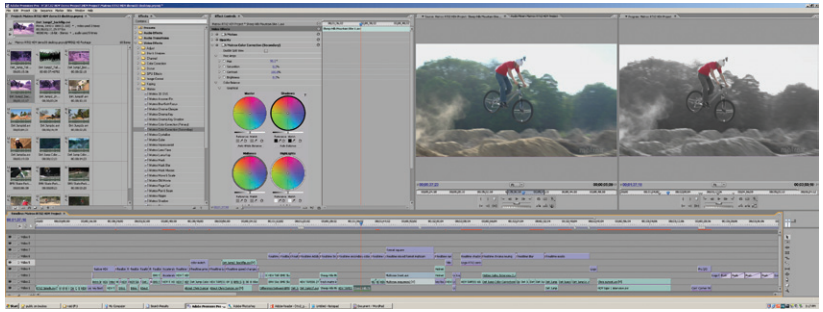
Realtime RGB curves control

RGB curves control offers a fast, natural way to fine-tune the colors in your video. If, for example, you want to remove a blue tint from your video, you simply drag the blue curve down. With RGB curves you can also achieve wild color effects and other looks that are otherwise impossible.

Realtime secondary color correction

The secondary color corrector is an advanced tool used for fine-tuning or dramatic effects creation. It offers all the controls found in the primary color correction filter with the added capability of limiting the effect to a specific range of pixels. Pixel selection can be done using color and/or brightness. Using the simple garbage matte tool, you can also limit the effect to a specific region. The pixel selection can also be inverted.

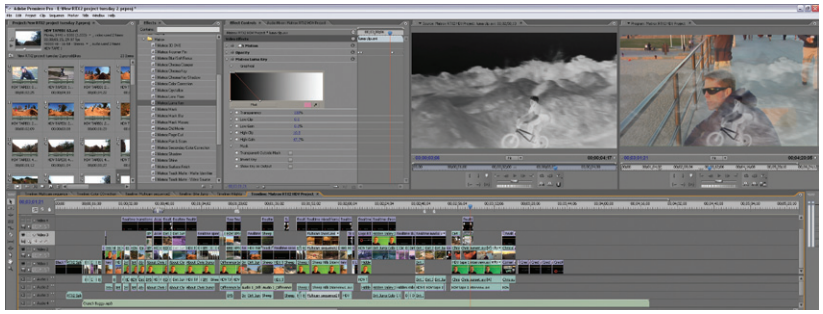
The secondary color corrector lets you achieve effects such as color pass and color replace. It can be used, for example, to change the color of a dress, deepen the background sky color, or to achieve an effect similar to the film Schindler's List where only one object or person remains in color while the rest of the image becomes black and white.



Realtime chroma and luma keying

The Matrox MXO2 devices provide one of the finest realtime chroma keyers in the industry. Clean blue- and green-screen keys are easy to achieve, even with HDV and AVCHD material shot in less than optimal lighting conditions. Your video is upsampled to 4:4:4:4 resolution and advanced noise reduction algorithms are used to ensure superior results. The auto key button intelligently adjusts the key with soft edges, spill removal, and shadow preservation. If needed, you can further refine the key with manual controls. You can key on any color, not just blue and green. You can also invert the selection and display the matte being generated to fine tune the key.

The realtime luma keyer gives you low clip, low gain, high clip, high gain, and transparency controls.



Realtime speed changes

You can use speed changes to emphasize special moments, extend the duration of shots to match voiceover timing, or enhance the feeling of dramatic shots. You can apply smooth slow and fast motion with field or frame blending.

Realtime transitions

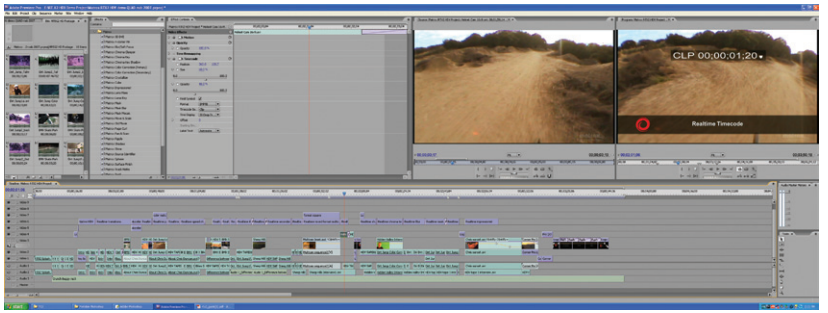
The Matrox MXO2 devices support standard dissolves, SMPTE wipes, and organic wipes with soft edges and color borders.

Native Adobe Premiere Pro effects and transitions

Some of Adobe Premiere Pro's most popular native effects and transitions such as Opacity, Crop, Dip to Black, Black and White, Dissolve, and Additive Dissolve can be used in real time in SD. The Matrox MXO2 devices accelerate these effects and transitions in HD.

Realtime timecode

The MXO2 devices overwrite the Adobe Premiere Pro timecode filter so that it becomes realtime. The realtime time code effect lets you generate and overlay a time code counter on a video production. You can use it to make a dub of source tapes with time code "burn-in" then use these tapes to log scenes, create edit decision lists, or get client feedback on your finished production.



Matrox MPEG-2 I-frame intermediate codec with Adobe Premiere Pro

The Matrox MPEG-2 I-frame intermediate codec is a high-quality, highly-efficient 8-bit 4:2:2 video codec used mainly as a less processor-intensive way of working with long-GOP footage such as HDV, AVCHD, and XDCAM HD. The bit rate of the codec can be set between 50 and 300 Mbps, giving you the flexibly on each clip to make your own tradeoffs between video quality and storage considerations.

It can be used with Adobe Premiere Pro in four ways:

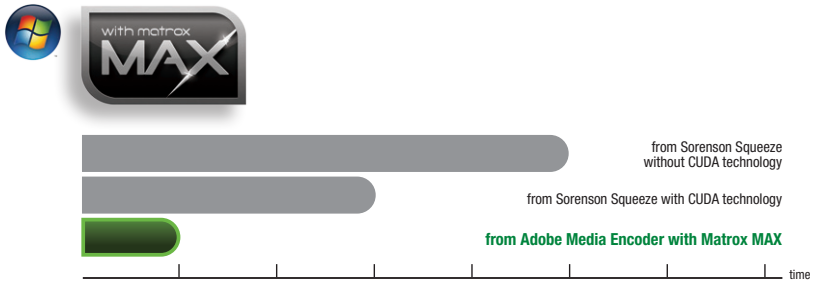
1. as a full-raster capture codec when capturing from SDI or analog;
2. as an intermediate editing format when working with CPU-taxing formats such as AVCHD to maximize quality as well as editability;
3. as a rendering codec to ensure that “flattened” files maintain high quality when exporting or printing to tape; and
4. as an effective archiving codec for material that may be used in future projects.

Avid Editing Systems

Avid's support of Matrox MXO2 Mini gives Media Composer users a very inexpensive HD monitoring solution. But that's not the only benefit Matrox products offer Avid users. Matrox MXO2 Mini with the built-in MAX H.264 encoding accelerator option lets you deliver H.264 files for the web, mobile devices, and Blu-ray at speeds up to five times faster than software alone, without sacrificing quality.

On the PC, you can speed up deliveries of H.264 files for the web, mobile devices, and Blu-ray using Adobe Media Encoder, which you already own if you are using Adobe After Effects for your motion graphic creation. Using Matrox MAX with Adobe Media Encoder lets you deliver H.264 files up to five times faster than if you export from Sorenson Squeeze software.

Exporting to an H.264 file on the PC



Not only do you get superior speed and quality, you can also tweak the power of Matrox MAX to meet your specific needs. The vast array of fine-tuneable controls lets you optimize encoding speed and video quality. Web video publishers, in particular, will appreciate the ability of Matrox MAX technology to deliver superb quality video at low bit rates.

Benefits of Matrox MXO2 Mini for Avid users include:

- Turning your HDMI screen into a professional grade video monitor with the unique Matrox HDMI Calibration Utility
- Ideal support for file-based workflows
- Matrox MAX option for H.264 files deliveries up to five time faster than software alone
- Small, lightweight, external box for use in studio, on set, in the field, and in OB vans
- Cross-platform support - Mac and PC; laptops, desktops, and workstations
- HDMI, analog component, S-Video, and composite output
- Stereo RCA and up to 8 channels of HDMI audio output
- Compatibility with Avid Media Composer and Avid NewsCutter

HD and SD video monitoring

The Matrox MXO2 devices provide full quality previews on all digital and analog outputs for popular applications such as Adobe Premiere Pro, Encore, Photoshop, and After Effects so you don't need to rely on just a small preview window on your desktop. In addition, MXO2's realtime downscaling feature lets you view your HD projects on an SD monitor.

Matrox MXO2 Mini provides a cost-effective HD monitoring solution for Avid editing systems.

HDMI™
HIGH-DEFINITION MULTIMEDIA INTERFACE

Matrox HDMI Calibration

Matrox HDMI Calibration Utility – HDMI monitoring with 10-bit 4:2:2 color precision

The Matrox MXO2 products include the unique Matrox HDMI Calibration Utility that lets an HDMI monitor perform like a broadcast HD/SD monitor. Broadcast monitors are typically adjusted to meet ITU-R Recommendation BT.709 (also known as Rec 709), the broadcast industry standard for color representation. HDMI displays are typically not adjusted to meet this specification and they are likely to introduce additional signal processing errors that the viewer might not be aware of. The Matrox HDMI Calibration Utility provides a wizard that walks you through a set of patterns that lets you effectively identify and compensate for five improper adjustments that may be present in your HDMI monitor. The goal is to meet the Rec 709 specification as closely as possible, given the characteristics of your particular monitor.

True 1:1 pixel representation – To accurately judge your video content, it is best to view it at its native resolution. However, some HDMI monitors scale the input signal by default. The Matrox HDMI Calibration Utility lets you easily identify if this is the case. Two of the five verifications that you can do with the Matrox HDMI Calibration Utility (gamma response and hue and chroma) require 1:1 pixel mapping.

White and black levels – The white level is the intensity at which the monitor will display the whitest pixel. The black level is the intensity at which a monitor will display a black pixel. The Matrox HDMI Calibration Utility lets you use the monitor's controls and the MXO2 device's hardware controls to get the grey ramp to show the blackest patch (black) and the whitest patch (white) while still being able to see the different patches. Performing these adjustments ensures that the widest possible color gamut is available to the MXO2.

White point – The white point is the color of the white reference for a particular display. Rec 709 specifies 6500K as that reference which is equivalent to the color of a white sheet of paper when seen outdoors at noon when the sky is overcast. Using an iterative process, the Matrox HDMI Calibration Utility lets you establish your monitor's 6500K white point under your particular viewing conditions.

Gamma response – The input to output response of a broadcast video monitor is a non-linear power function called the gamma response. The Rec 709 specification defines the gamma response expected of broadcast monitors. The Matrox HDMI Calibration Utility characterizes how your particular HDMI monitor's gamma response deviates from that defined by Rec 709 and creates a set of gamma correction curves (compensation equations). These corrections are then applied to the HDMI signal so that the colors displayed on the monitor will match the Rec 709 specification. Your HDMI monitor must support 1:1 pixel mapping to use this feature of the Matrox HDMI Calibration Utility.

Hue and chroma – The Matrox HDMI Calibration Utility includes patterns that let you ensure that the intensity of the primary and secondary colors are accurate. External references such as a blue-only button or a blue gel filter are not required, provided your HDMI monitor supports 1:1 pixel mapping.

HDMI Monitor Calibration – Frequently Asked Questions (see Appendix)

Realtime hardware up/down/cross conversion on capture and output

The Matrox MXO2 products let you deliver in any format your clients demand. The 10-bit hardware scaling provides high-quality mastering.

HD to SD downscaling

The Matrox MXO2 products provide realtime HD to SD downscaling with proper conversion of the HD color space to the SD color space and proper aspect ratio conversion to anamorphic and letterbox. You can monitor or record an SD master of your HD project in real time.

SD to HD upscaling

The Matrox MXO2 products provide realtime SD to HD upscaling with proper conversion of the SD color space to the HD color space. MXO2 will “pillarbox” 4:3 footage and scale 16:9 SD footage to full screen.

Cross conversion

The Matrox MXO2 products offer realtime cross conversions from 720 to 1080 and 1080 to 720. Realtime frame rate conversion is also supported with 2:3:2:3 and 2:3:3:2 cadences. This feature is useful if, for example, your source material is recorded at a different frame rate or resolution than the delivery format your client requires. It also facilitates monitoring when, for example, you need to work with 23.98 fps footage but your monitor does not support that frame rate. You can use the MXO2 family’s realtime frame rate conversion to view your project at 29.97 fps. Conversion from 23.98 fps to 25 fps is handled by Adobe Premiere Pro and the host.

Matrox MAX Option and Matrox A/V Tools

Matrox A/V Tools application for fast capture/playback of audio, video, and still frames

Matrox A/V Tools is a stand-alone application for fast capture and playback of your audio/video assets. It's very useful with Adobe applications such as Encore, Media Encoder, and After Effects, as well as other Video for Windows compatible applications because video sources can be digitized without the need to capture through Adobe Premiere Pro.

Matrox A/V Tools lets you capture HD and SD analog, SDI, or HDMI video from your camera or VTR into AVI files on your computer. You can choose to capture to the uncompressed 8- or 10-bit codecs for the highest quality or to the highly efficient Matrox MPEG-2 I-frame codec at up to 300 Mb/s. When your acquisition format is XDCAM or AVCHD, using the Matrox MPEG-2 I-frame codec as an intermediate format for editing greatly improves productivity.

Matrox A/V Tools provides on-screen transport controls to let you navigate quickly and easily through clips on disk. You can create playlists and change the order of clips by simply dragging and dropping them. You can also grab single-frame images and save them as TGA files to create photo montages.

Matrox MAX option for lightning fast H.264 encoding

The Matrox MXO2 devices are available in versions that include Matrox MAX H.264 encoding acceleration hardware.

Matrox MAX is a unique technology that speeds up H.264 encoding for resolutions ranging from iPod to HD. It uses a dedicated hardware processor to accelerate the creation of H.264 files for Blu-ray, the web, and mobile devices. By using specialized hardware acceleration, jobs are finished with amazing speed and system resources are liberated for other tasks. Quality and flexibility are ensured through direct integration with professional applications such as Adobe Media Encoder and Adobe Premiere Pro on the PC.

Matrox MAX H.264 Capture

Matrox MAX H.264 Capture is a stand-alone application that lets you capture directly to H.264 files for the web, mobile devices, and Blu-ray using any Matrox MXO2 product equipped with Matrox MAX technology. You can capture material from any of your MXO2 device's video and audio inputs, and monitor the source material that you're capturing using the MXO2 video and audio outputs. Matrox MAX H.264 Capture is quick and easy-to-use with default presets for many popular delivery formats. It also gives you the ability to create your own custom presets. You can capture to the .mp4 file wrapper for web, iPad, and other popular H.264 deliverables or you can capture to .264 elementary stream files for immediate Blu-ray authoring without transcoding.

Matrox MAX H.264 Capture is ideal for delivering dailies in a fraction of the usual time or archiving from tape and legacy equipment.

Matrox MAX H.264 Capture can also be used with any Matrox MXO2 product along with a CompressHD card.

Matrox MAX H.264 Capture - User Interface.

Quick delivery of dailies
While recording to your camera's media format, you can also be capturing to H.264 files. As soon as the capture is finished, you can upload your dailies to the target device of your choice – the web, iPad, YouTube, etc.

Archiving
Matrox MAX H.264 Capture is the perfect tool for archiving all your old master tapes to Blu-ray discs. Simply use any of your MXO2 device's video and audio inputs and encode directly to H.264 Blu-ray files that can be authored in Adobe Encore without transcoding.

Complete controls for the highest quality, lowest bit rate deliveries
Matrox MAX H.264 Capture provides default presets for many popular delivery formats such as those for the web, iPod, iPad, YouTube, and Blu-ray. It also lets you create the perfect custom presets for your jobs based on the following parameters:

- Resolutions: even frame sizes from 64x64 to 1920x1088
- Bit rates: from 100 Kb/s to 50 Mb/s
- Baseline or main profile, CABAC or CAVLC entropy encoding
- GOP structure controls
- 2.0, 3.0, 3.1, 4.0, 4.1 and 4.2 level support
- Frame rates: 12.5, 14.98, 23.98, 24, 25, 29.97, 30, 50 and 59.94
- Constant bit rate to ensure that the bit rate remains stable. Quality varies depending on the complexity of each frame.
- Variable bit rate to squeeze out the highest quality possible at the target bit rate. Matrox MAX analyzes each video frame and determines which frames require more or less compression data to deliver the highest possible quality at the targeted bit rate. You set the minimum and maximum bit rate per job.
- Noise filtering to save bits by reducing high-frequencies in your video
- Hardware de-interlacing

Kit contents

The Matrox MXO2 products are packaged with the most popular accessories. Optional components including additional Matrox MXO2 host adapters can be purchased separately.

Matrox MXO2 Mini
Matrox MXO2 Mini input/output device
Matrox MXO2 PCIe cable (1 meter)
Matrox MXO2 Mini external power supply
Two S-Video adapters
One of the following:
- Matrox MXO2 PCIe x 1 host adapter (for use with desktops and workstations)
- Matrox MXO2 PCIe host ExpressCard/34 adapter (for use with laptops)

Matrox MXO2 LE
Matrox MXO2 LE input/output device
Matrox MXO2 PCIe cable (1 meter)
Matrox MXO2 LE external power supply and IEC-C13 power cord
One of the following:
- Matrox MXO2 PCIe host adapter (for use with desktops and workstations)
- Matrox MXO2 PCIe ExpressCard/34 adapter (for use with laptops)

(A third-party RS422 cable is required for machine control.)

Matrox MXO2
Matrox MXO2 input/output device
Matrox MXO2 PCIe cable (1 meter)
Matrox MXO2 external power supply and IEC-C13 power cord
Matrox MXO2 PCIe host adapter (for use with desktops and workstations)
Matrox MXO2 PCIe host ExpressCard/34 adapter
(for use with laptops)
(The Matrox MXO2 battery power cable may be purchased separately.
A third-party RS422 cable is required for machine control.)

Matrox MXO2 Rack
Matrox MXO2 Rack input/output device with two mounting “ears”
Matrox MXO2 PCIe cable (3 meter)
IEC-C13 power cord
BNC 75-ohm terminator (for REF OUT connector)
Matrox MXO2 PCIe host adapter (for use with desktops and workstations)
(A third-party RS422 cable is required for machine control.)

Matrox MXO2 Mini

Matrox MXO2 LE

Matrox MXO2

Matrox MXO2 Rack

HDMI Monitor Calibration – Frequently Asked Questions

Q - Why do I need to calibrate my monitor?
A - The color of light in a room affects your perception. Think of a white sheet of paper. If the light in the room is blue, the sheet of paper will look blue. But if the light is red, the paper will look red. In the same way, the colors you see on your monitor will depend on the color of the lighting in the room. The level of lighting in the room also plays a role.

Manufacturers of televisions, broadcast monitors, and computer monitors make assumptions about the lighting in your room when adjusting their factory default settings. Computer monitors are factory adjusted to be used in brightly lit rooms such as offices. Broadcast monitors are designed for the lighting typically found in living rooms. Manufacturers of broadcast monitors take extra care to make sure their red, green, and blue are as close as possible to those specified by ITU-R Recommendation BT.709 (also known as Rec 709). Television manufacturers, on the other hand, are more interested in having their televisions stand out from the crowd in the showroom than in having exact colors or shades of grey. More often than not, when comparing the colors on a broadcast monitor to the default setting on a digital television, you'll find that the television is too bright and the colors are too saturated.

In addition, variations in manufacturing processes result in variations of the actual shades of red, green, and blue from monitor to monitor.

Q - Why do HDMI monitors and televisions require more adjustments than broadcast monitors?
A - Broadcast HD-SDI monitors are manufactured to match the Rec 709 specification. The only adjustments that need to be done on them are those required to adapt their picture to the environment in which that are used. For example, in a bright room your eyes will have a harder time perceiving the 2% black pluge bar than in a very dark room. You can adjust the monitor by increasing the black level (brightness) until you can see the 2% black pluge bar. Similarly, other controls on the broadcast monitor are there to adapt the picture on the monitor to its environment, not to compensate for errors in the manufacturing of the monitor.

In the case of analog component signals, some compensation for transmission errors might be required even on a broadcast monitor. But for the discussion here, transmission errors are not an issue because HDMI monitors and televisions are digital.

Because computer monitor default settings are not designed to display video in a living room, more parameters need to be adjusted to match the Rec 709 specification. One would think that television default settings would closely match those of a broadcast monitor. However, because television manufacturers set up their television to stand out from the crowd in the showroom, they also require more adjustments to match the Rec 709 specification.

Q - Why is it so important that my monitor follows the Rec 709 spec?
A - In order to ensure that the picture a video camera is filming is going to match the picture the viewer is ultimately going to see, the camera and monitor need to digitize and display colors in exactly the same way. Otherwise for example, the viewer might see a dark green apple when in reality the apple was light green. That is why there is a specification, ITU-R Recommendation BT.709 (also known as Rec 709), that defines how a HD monitor should display color. It specifies, among other things, a gamma response of 2.22, the white point, and the exact primaries to be used.

Q - What is the white point?
A - There are several parameters in the Rec 709 spec that define how a monitor should display colors. One of them is the actual color the monitor should display when displaying white. It sounds odd, but white can actually take on slightly different hues. If we take a white piece of paper and look at it in sunlight at noon and in sunlight at sunset, our eyes perceive a slightly different hue of white. The one at sunset will be more orange, but our brain will still see both as white. Rec 709 specifies the exact hue white should have. It's roughly what the white sheet of paper looks like under sunlight on an overcast day at midday. This white is neutral, neither blue nor yellow.

Appendix

HDMI Monitor Calibration – Frequently Asked Questions

Q - What is the gamma of a monitor and why is it important?
A - On a Rec 709 video display, the intensity of the light generated by the display is not linearly proportional to the input signal. For example, given an 8-bit RGB image, white is R,G, and B at 255 (100%) and 50% grey is R,G, and B at 128. This 50% grey pixel will generate a light intensity on the screen that is NOT half as bright as the white pixel. The function that describes the response of the monitor to the input signal is called a gamma function. This is an important characteristic. If a display does not have the proper gamma response, shadows and highlights will not be rendered properly.

Q - What are primaries?
A - Monitors display colors by using a combination of Red, Green, and Blue. Since it's possible to have different shades of Red, Green, and Blue; Rec 709 specifies the exact color of Red, Green, and Blue to use. These are the primaries of the monitor.

Q - My HDMI TV has a blue-only mode, is that useful to adjust my white point?
A - No. It's true that most TVs have a tendency to display whites with too much blue because buyers think whites look brighter with a bit of blue added, however, blue-only mode is not useful to detect this kind of problem. Blue-only mode detects only whether there are equal amounts of blue in the white, blue, magenta, and cyan. There could be 120% of blue in all of them and the blue-only mode would be perfectly happy.

Q - My HDMI TV has a blue-only mode, is that useful to adjust my colors?
A - Yes, the blue-only mode is useful if the white point of the monitor is neutral grey. Blue-only mode helps verify that the white, magenta, cyan, and blue have the same amount of blue in them. Since, in general, such monitors will generate the same intensity of blue, green, and red when generating white, magenta, and cyan; making sure there is an equal amount of blue in the white, magenta, and cyan guarantees that these colors are right.

Q - What if my monitor or TV does not have a blue-only mode?
A - Blue-only mode can be useful but it is not required. Matrox has developed a technique for checking and adjusting the colors on your monitor or TV without the need for a blue-only mode. The Matrox HDMI Calibration Utility generates a pattern that is very sensitive to error in both hue and intensity for all primary and secondary colors. The Matrox HDMI Calibration Utility wizard lets you adjust the actual color of the primary and secondary colors to make sure they have the right amount and hue of red, green, and blue.