

Matrox M.Key/100

User Guide

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You shall be responsible for the cost of consolidated freight (one way only) for warranty units from your location to the location designated by Matrox. Once repaired, Matrox will incur the cost of consolidated freight for warranty units to your location.

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Your notes

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What is Matrox M.Key/100?

Matrox M.Key/100 is a USB dongle with associated software that allows you to use all the Matrox Video for Windows (VFW) software codecs on a system that doesn't have Matrox video hardware. With Matrox M.Key/100 connected to your computer's USB port, all the Matrox VFW codecs are available on your system and behave as though you have Matrox video hardware, such as Matrox Axio or Matrox DSX, installed in your computer.

This means that you can render and play back Matrox *.avi* files with your VFW programs using any Matrox VFW codec, including those codecs that are available only to users that have Matrox video hardware. The following Matrox VFW codecs are available with Matrox M.Key/100:

- Matrox DV/DVCAM.
- Matrox DVCPRO.
- Matrox DVCPRO50.
- Matrox DVCPRO HD¹.
- Matrox MPEG-2 I-frame in SD or HD resolution¹.
- Matrox MPEG-2 I-frame + Alpha in SD or HD resolution¹.
- Matrox Uncompressed in SD or HD resolution.
- Matrox Uncompressed + Alpha in SD or HD resolution.
- Matrox Offline HD.
- Matrox M-JPEG (for legacy DigiSuite files).
- Matrox HDV (for playback only of Matrox HDV files)¹.

Because the Matrox VFW codecs will behave as though you have Matrox video hardware, Matrox offline HD files will be upscaled to full-screen size for playback with your VFW program, and you'll have full support of the Matrox MPEG-2 I-frame HD codec to create *.avi* files with or without alpha in all supported HD formats, including 720p, HDV 1080i (1440×1080), and full-size 1080i (1920×1080). For details on using the Matrox VFW codecs, see "Using Matrox M.Key/100 with VFW programs" on page 5.



Important If M.Key/100 is not connected to your computer's USB port when you render or play back Matrox clips, any clips that use a video compression format that requires the Matrox video hardware, such as MPEG-2 I-frame HD + Alpha, will display as invalid video.

¹ The Matrox DVCPRO HD, MPEG-2 I-frame + Alpha, and HDV VFW codecs require Matrox video hardware and are available with M.Key/100. Unless you have Matrox video hardware or M.Key/100, the Matrox MPEG-2 I-frame HD codec supports HDV 1080i (1440×1080) files only.

Hardware supplied for Matrox M.Key/100

- M.Key/100 dongle.
- USB extension cable.

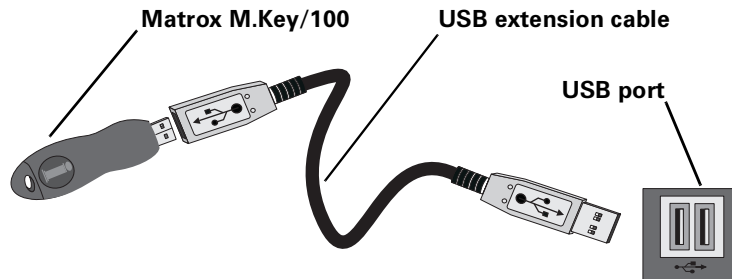
Matrox M.Key/100 system requirements


Matrox M.Key/100 requires a computer with the following minimum system configuration:

- A computer that supports SIMD Extensions 2 (SSE2), such as an Intel Pentium 4 or AMD Athlon 64 or later.
- Windows XP Professional operating system with Service Pack 2.
- Free USB port.
- A CD-ROM or DVD-ROM drive to install the M.Key/100 software.

Connecting Matrox M.Key/100 to your computer

You can plug Matrox M.Key/100 directly into your computer's USB port, or use the provided USB extension cable. With the wide variety of USB port designs on desktop and notebook computers, you may find that the extension cable provides greater convenience and flexibility for connecting M.Key/100 to your USB port.




Note USB port designs may vary, but you can always identify your computer's USB port by the following symbol: 

Hardware detection

The first time you connect Matrox M.Key/100 to your computer's USB port (and your computer is on), the Windows "Found New Hardware Wizard" will detect your M.Key/100 hardware. Because the Matrox M.Key/100 Setup program will automatically install the appropriate drivers for your M.Key/100, you must press **ESC** or click **Cancel** to close the "Found New Hardware Wizard" and then install the Matrox M.Key/100 software as explained in the next section.

Hardware supplied for Matrox M.Key/100

Installing the Matrox M.Key/100 software

 **Important** You cannot install the M.Key/100 software on a computer that already has Matrox video hardware and drivers, such as a Matrox Axio system with Axio.utils. If you don't have Matrox video hardware but you've installed the Matrox Video for Windows software codecs on your computer, you must remove these codecs using **Add or Remove Programs** in Windows Control Panel before installing the M.Key/100 software.



To install the Matrox M.Key/100 software:

- 1 Plug the M.Key/100 dongle into your computer's USB port as explained in "Connecting Matrox M.Key/100 to your computer" on page 2. Windows will detect M.Key/100 and the "Found New Hardware Wizard" will appear.
- 2 Press **ESC** or click **Cancel** to close the "Found New Hardware Wizard." To ensure a smooth software installation, it is essential that you do not let the wizard try to install any drivers.
- 3 Insert the Matrox M.Key/100 installation CD into your computer's CD-ROM or DVD-ROM drive. The Matrox M.Key/100 Setup program will start (the Setup program refers to Matrox M.Key/100 as Matrox M.Key).
- 4 Follow the on-screen instructions to install the software.

The "Found New Hardware Wizard" may appear during installation. If this happens, ignore it and continue with the Matrox M.Key/100 Setup program. The wizard will close automatically when installation is complete. If you have Adobe Premiere Pro installed on your computer, Matrox Desktop project presets will be installed for use with Matrox M.Key/100. For details on using these presets, see the next section.



Note If you later want to install Matrox video hardware on a computer that already has M.Key/100 installed, you must first uninstall the M.Key/100 software. To uninstall the M.Key/100 software, choose **Start > Programs > Matrox M.Key > Uninstall Matrox M.Key**.

If you plug M.Key/100 into a different USB port

After you have installed the M.Key/100 software, it is recommended that you always use M.Key/100 in the same USB port that you used when you installed the software. If you plug M.Key/100 into a different USB port, the "Found New Hardware Wizard" will appear again. You won't need to re-install the M.Key/100 software, but you'll need to use the "Found New Hardware Wizard" to install the required drivers. For each driver, select **Install the software automatically (Recommended)**, then click **Next**. Repeat this step until the "Found New Hardware Wizard" has finished installing all the required drivers.

Using Matrox M.Key/100 with Adobe Premiere Pro

Matrox M.Key/100 includes project presets for Adobe Premiere Pro that you can load to immediately apply appropriate settings to create a project using the Desktop editing mode for working with Matrox .avi files in any supported video compression format. For example, you can select a preset to create a 1080i @ 29.97 fps project for working with Matrox MPEG-2 I-frame HD files.

⇒ To load a Matrox Desktop project preset:

- 1 Start Adobe Premiere Pro. The **New Project** dialog box appears.
- 2 From the appropriate **Matrox Desktop** folder (**Matrox Desktop - SD** to create an SD project, or **Matrox Desktop - HD** to create an HD project), select the preset that matches the type of project you want to create. For example, if you want to create an NTSC project for playing back DV/DVCAM clips in a standard 4:3 editing environment, expand the **NTSC** and **Standard** folders under **Matrox Desktop - SD**, then select the **DV** preset.
- 3 Under **Location**, specify where you want to save the project on your hard drive.
- 4 Under **Name**, specify a name for your project.
- 5 Click **OK** to apply the settings.



Note When a project uses the Desktop editing mode, Adobe Premiere Pro works like a VFW program as explained in “Using Matrox M.Key/100 with VFW programs” on page 5.

Important: If you unplug M.Key/100 when using Adobe Premiere Pro

Make sure that M.Key/100 is connected to your USB port when working with your Matrox Desktop project. If M.Key/100 is accidentally unplugged from your USB port while you are working in Adobe Premiere Pro, you must do the following:

- 1 Save your project.
- 2 Quit Adobe Premiere Pro and all other programs.
- 3 Reconnect M.Key/100 into the same USB port you were using.
- 4 Restart Adobe Premiere Pro and re-open your project.

Always reconnect M.Key/100 **before** starting Adobe Premiere Pro. If you reconnect M.Key/100 after starting Adobe Premiere Pro, your Matrox clips may appear as “offline” when you re-open your project. If this happens, unplug M.Key/100 and follow the above steps.

Using Matrox M.Key/100 with VFW programs

When using VFW programs to render material to an *.avi* file, such as in the case of a completed video production or an animation, you can use a Matrox codec to create a Matrox *.avi* file. For example, you may want to render an animation to Matrox DV/DVCAM format so that you can record it onto DV tape. You could also use your VFW program to render video to a Matrox *.avi* file so that you can import the file as a realtime clip into your Adobe Premiere Pro projects on Matrox Axio.

When rendering compositions or animations that have an alpha channel, you can select a “+ Alpha” Matrox VFW codec to render to a Matrox uncompressed or MPEG-2 *.avi* file that includes the alpha-key information. This *.avi* file will play back in real time on your Axio system, and will be automatically keyed when you place the clip in your Adobe Premiere Pro sequence.



Note Although Matrox has tested many VFW programs, there may be certain operational limitations when using Matrox M.Key/100 with some of these programs (as well as with untested programs).

Before you start rendering

Before you start rendering material to a Matrox *.avi* file, make the following settings in your Video for Windows program:

- Set the appropriate frame rate for the video format to which you are rendering. For example, if you are rendering to PAL format, set the frame rate to 25 fps.
- Set the frame size of your rendered material to full-screen:
 - 720 × 480 if you are rendering to NTSC or 486p @ 23.98 fps format using the DV/DVCAM, DVCPRO, DVCPRO50, or MPEG-2 I-frame codec (with or without alpha).
 - 720 × 576 if you are rendering to PAL format using the DV/DVCAM, DVCPRO, DVCPRO50, or MPEG-2 I-frame codec (with or without alpha).
 - 720 × 486 or 720 × 576 if you are rendering to Matrox uncompressed SD or Matrox M-JPEG format.
 - 1920 × 1080 or 1280 × 720 if you are rendering to uncompressed HD or DVCPRO HD format.
 - 1440 × 1080, 1920 × 1080, or 1280 × 720 if you are rendering to MPEG-2 I-frame HD format.
 - 480 × 270 or 320 × 180 if you are rendering to offline HD format. If you’re rendering clips for use in an Adobe Premiere Pro project on Matrox Axio, set the frame size to 480 × 270 for an HDV 1080i, 1080i, or 1080p project, or 320 × 180 for a 720p project. For more information, see “Using the

Matrox Offline HD Codec” in your *Matrox Axio Installation and User Guide*.

- To render video using the same compression format, frame size, and frame rate as your source video but using a different video quality (data rate), scanning mode (interlaced or progressive), or bit depth (8-bit or 10-bit), such as to export uncompressed 1080i @ 29.97 fps clips to uncompressed 1080p @ 29.97 fps format, you must select the **Recompress Always** option so that your video will be recompressed during the export.
- If you’ll be rendering audio, set the audio sample rate to 48 kHz and the sample size to 16-bit (mono or stereo).
- For best results, make sure you clear your program’s **Data rate limit** option for rendered material. This ensures that your *.avi* files will be rendered at the particular video quality you select.
- If you’re using Adobe Premiere Pro, set the **Fields** for rendering to **Lower Field First** for NTSC video, **Upper Field First** for PAL and interlaced HD video, or **No Fields (Progressive Scan)** for progressive video.



Note Before rendering a lot of material, check that your rendered animations and transitions such as wipes and slides play back smoothly. If they appear jumpy, try adjusting the field dominance or field order for your rendered material. For example, if your transitions appear jumpy with the field dominance set to **Odd field** or **Field 1**, try switching the setting to **Even field** or **Field 2**.

Selecting color space conversion options

When you render material to an *.avi* file using a Matrox VFW codec, you can determine how you want the luminance levels and chroma information to be processed during the color space conversion that’s performed during the render.



Note The default settings for color space conversion provide good results for most applications. We recommend that you change these settings only when needed for special purposes.



To select the color space conversion options you want:

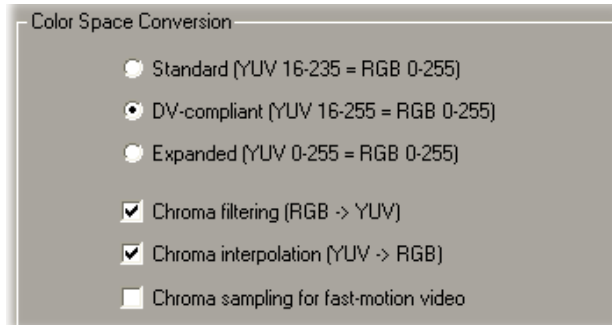
- 1 Right-click **My Computer**, then choose **Manage**, and double-click **Device Manager**.
- 2 Under **Sound, video and game controllers**, double-click **Video Codecs**.
- 3 Click **Properties**, then select one of the Matrox VFW codecs.



Note All the available Matrox VFW codecs will be listed. You can select **Matrox VFW Software Codecs** to configure all the Matrox DV, M-JPEG, MPEG-2 I-frame SD, and offline HD codecs.

- 4 Click **Properties**, and then **Settings**.

- 5 In the provided dialog box under **Color Space Conversion**, select the options you want:



Note If an option isn't supported by the particular codec(s) you are configuring, that option will not be available. Most options, however, are common to all the Matrox Video for Windows codecs. When these options are set for a particular codec, they are also set for the other codecs that support those options.

- **Standard** Renders video using standard broadcast luminance levels. Super black and super white luminance levels are clipped.
- **DV-compliant** Renders video using luminance levels appropriate for DV material. This ensures that the super white luminance levels of your video are retained.
- **Expanded** Renders video using the full range of luminance levels. Super black and super white luminance levels are retained. You may want to use this setting, for example, to render material on which you'll be applying luminance key effects.



Important When rendering RGB graphics, selecting **Expanded** or **DV-compliant** will create super black and/or white in your rendered images. For example, if you select **Expanded**, all black in your RGB graphics will become super black, and white will become super white. To render your RGB graphics with standard black and white levels, set your luminance range to **Standard**.

- **Chroma filtering** and **Chroma interpolation** Select these options to adjust the chroma bandwidth of RGB graphics. This improves images that have abrupt changes between different colors, such as a blue box on a black or white background. You should select these options for most animation and compositing work (computer-generated material). For most video editing programs, however, it's best that you **not** select these options. If you find that your rendered images appear to be blurred, try clearing one or both of these options.

- **Chroma sampling for fast-motion video** Select this option to help eliminate artifacts such as jagged edges and unwanted lines at the edges of fast-motion video (for PAL video only).



Important When rendering graphics and titles, make sure that **Chroma sampling for fast-motion video** is **not** selected, as this option can cause jagged edges to appear in your rendered images.

- 6 Click **OK** to save your settings. Any change you make to your selected luminance range setting (such as switching from **Standard** to **Expanded**) will only take effect the next time you start your VFW program.

Rendering material to a Matrox VFW .avi file

When you render material to an *.avi* file, such as when you render a finished video production or an animation, you must select the compressor (codec) you want to create the file. The compressor determines the quality of your rendered video. Refer to your program's documentation for instructions on how to select a compressor for your *.avi* file.



Note When specifying your Export Movie settings in Adobe Premiere Pro, you must set the **File Type** to **Microsoft AVI** on the **General** page, then select the compressor you want on the **Video** page.



To create a Matrox Video for Windows *.avi* file:

- 1 Select one of the following codecs from your program's list of available compressors:
 - **Matrox DV/DVCAM** Renders video to DV or DVCAM format.
 - **Matrox DVCPRO** Renders video to DVCPRO format.
 - **Matrox DVCPRO50** Renders video to DVCPRO50 or D-9 format.
 - **Matrox DVCPRO HD** Renders video to DVCPRO HD format (for 1080i and 720p video only).
 - **Matrox MPEG-2 I-frame** Renders video to MPEG-2 intra-frame format using the 4:2:2 Profile @ Main Level at a selected data rate (SD resolution only).
 - **Matrox MPEG-2 I-frame + Alpha** Renders video to MPEG-2 intra-frame format with alpha using the 4:2:2 Profile @ Main Level at a selected data rate (SD resolution only).
 - **Matrox MPEG-2 I-frame HD** Renders video to MPEG-2 intra-frame format using the 4:2:2 Profile @ High Level at a selected data rate.
 - **Matrox MPEG-2 I-frame HD + Alpha** Renders video to MPEG-2 intra-frame format with alpha using the 4:2:2 Profile @ High Level at a selected data rate.
 - **Matrox Uncompressed SD** Renders video to 8-bit or 10-bit uncompressed SD format.

Using Matrox M.Key/100 with VFW programs

- **Matrox Uncompressed SD + Alpha** Renders video to 8-bit or 10-bit uncompressed SD format with alpha.
- **Matrox Uncompressed HD** Renders video to 8-bit or 10-bit uncompressed HD format.
- **Matrox Uncompressed HD + Alpha** Renders video to 8-bit or 10-bit uncompressed HD format with alpha.
- **Matrox Offline HD** Renders video to a proxy HD video format for offline editing purposes.

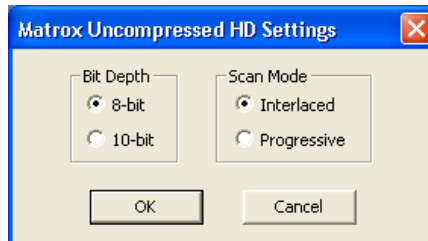


Note The Matrox M-JPEG codec will also be available to create clips for use on Matrox DigiSuite or DigiSuite LE. For information about configuring the Matrox M-JPEG codec, see your Matrox DigiSuite documentation.

- 2 If you've selected a Matrox codec that requires configuration, such as to select a data rate (video quality), click the **Configure** button. For details, see the following sections.

Configuring the Matrox Uncompressed codecs

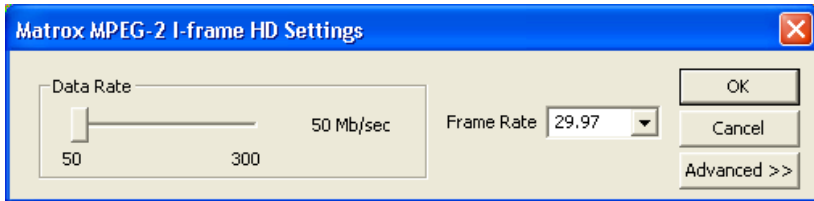
When you click your program's **Configure** button to configure a Matrox Uncompressed (SD or HD resolution, with or without alpha), a dialog box similar to the following appears:



- 1 Under **Bit Depth**, select the bit depth you want for your video.
- 2 Under **Scan Mode**, select the scan mode of your video.
- 3 Click **OK** to save your selection. The settings you selected will be used each time you render material with your program, until you change the settings again.

Configuring the Matrox MPEG-2 I-frame codecs

When you click your program's **Configure** button to configure a Matrox MPEG-2 I-frame codec (SD or HD resolution, with or without alpha), a dialog box similar to the following appears:



- 1 Drag the **Data Rate** slider until your desired data rate is displayed. The higher the data rate you select, the better the video quality will be. Depending on the capabilities of your system, however, you may not be able to smoothly play back video at a high quality using your Video for Windows program.
- 2 Beside **Frame Rate**, select a frame rate from the list. Make sure the frame rate you select is appropriate for the format to which you are rendering.

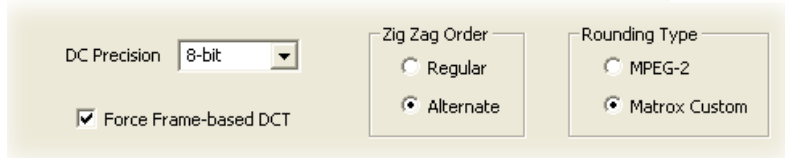


Note The **Frame Rate** setting is not available if you're rendering to MPEG-2 I-frame SD format without alpha.

- 3 To apply advanced settings to your MPEG-2 I-frame file, click the **Advanced** button.



Note The **Advanced** button is not available if you're rendering to MPEG-2 I-frame SD format without alpha. The default advanced settings should provide good results for most applications. We recommend that you change these settings only when needed for special purposes.



- 4 Beside **DC Precision**, select the bit-depth precision of the DC intra block. The higher the DC precision value that's used to render your video, the more likely that the DC content will be increased at the expense of the AC content in the encoded stream. This may result in lowering the overall quality of the compressed stream at a specified data rate.
- 5 Under **Zig Zag Order**, select one of the following:
 - **Regular** Sets the regular (default) zig zag scanning pattern of the AC coefficient of the DCT block as defined in the ISO/IEC 13818-2 (figure 7-2) specification documentation.

Using Matrox M.Key/100 with VFW programs

- **Alternate** Sets an alternate zig zag scanning pattern of the AC coefficient of the DCT block as defined in the ISO/IEC 13818-2 (figure 7-3) specification documentation. Use this setting when capturing or rendering video at a high data rate (for example, at a data rate of 100 Mb/sec or higher).
- 6 Under **Rounding Type**, select one of the following:
 - **MPEG-2** Rounds the AC coefficients up to the nearest whole number when calculating the quantization coefficient.
 - **Matrox Custom** Truncates the AC coefficients to the lowest whole number when calculating the quantization coefficient. In some cases, this setting may yield less artifacts in graphics.
 - 7 Select the **Force Frame-based DCT** setting to render macroblocks as frames rather than as fields. In some cases, graphics will yield less artifacts if this option is selected.
 - 8 Click **OK** to save your settings. The settings you selected will be used each time you render material with your program, until you change the settings again.

Matrox M.Key/100 specifications

General

USB interface	As defined in Chapter 7 of the USB specification
Regulatory compliance	FCC Class B, CE Mark Class B, RoHS Directive 2002/95/EC, WEEE Directive 2002/96/EC
Dimensions	68.48mm (L) × 24.94mm (H)
Total power consumption	58mA in USB active mode, and 0.5 mA in suspend mode

Environmental specifications

- Minimum/maximum ambient operating temperatures: 0 to 70° C
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Minimum/maximum storage temperature: -10 to 85° C
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Compliance Statements

USA



FCC Compliance Statement

Remark for the Matrox hardware products supported by this guide These devices have been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: • Reorient or relocate the receiving antenna • Increase the separation between the equipment and receiver • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected • Consult the dealer or an experienced radio/TV technician for help.

WARNING Changes or modifications to this unit not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment. The use of shielded cables for connection of the equipment is required to meet FCC requirements.

Declaration of conformity of a Class B digital device according to the FCC rules

We, the Responsible Party Matrox, 625 State Route 3, Unit B, Plattsburgh, NY 12901-6530 • Telephone: (514) 822-6000 (ext. 2026) • Attention: Conformity Group

Declaration The Matrox hardware products supported by this guide comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation. Any question regarding this declaration should be forwarded to the above coordinates.

Canada

(English) Industry Canada Compliance Statement

Remark for the Matrox hardware products supported by this guide These digital devices do not exceed the Class B limits for radio noise emission from digital apparatus devices set out in the Radio Interference Regulation of Industry Canada.

(Français) Conformité avec les exigences du ministère de l'Industrie Canada

Remarque sur les produits matériels Matrox couverts par ce guide Ces appareils numériques n'émettent aucun bruit radioélectrique dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

Europe



(English) European user's information – Declaration of Conformity

Remark for the Matrox hardware products supported by this guide These devices comply with EC Directive 89/336/EEC for a Class B digital device. They have been tested and found to comply with EN55022/CISPR22 and EN55024/CISPR24. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures. To meet EC requirements, shielded cables must be used to connect the equipment.

(Français) Informations aux utilisateurs Européens – Déclaration de conformité

Remarque sur les produits matériels Matrox couverts par ce guide Ces unités sont conformes à la directive communautaire 89/336/EEC pour les unités numériques de classe B. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55022/CISPR22 et EN55024/CISPR24. Le fonctionnement de ces produits dans un environnement résidentiel peut causer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre les mesures appropriées. Pour respecter les impératifs communautaires, les câbles de connexion entre l'équipement doivent être blindés.

(Deutsch) Information für europäische Anwender – Konformitätserklärung

Anmerkung für die Matrox Hardware-Produktunterstützung durch dieses Handbuch Diese Geräte entsprechen EC Direktive 89/336/EEC für ein digitales Gerät Klasse B. Sie wurden getestet und entsprechen demnach EN55022/CISPR22 und EN55024/CISPR24. In einer Wohnumgebung können diese Produkte Funkinterferenzen erzeugen, und der Benutzer kann genötigt sein, entsprechende Maßnahmen zu ergreifen. Um EG-Anforderungen zu entsprechen, müssen zum Anschließen des ausrüstung abgeschirmte Kabel verwendet werden.

(Italiano) Informazioni per gli utenti europei – Dichiarazione di conformità

Nota per i prodotti hardware Matrox supportati da questa guida Questi dispositivi sono conformi alla direttiva CEE 89/336/EEC relativamente ai dispositivi digitali di Classe B. Sono stati provati e sono risultati conformi alle norme EN55022/CISPR22 e EN55024/CISPR24. In un ambiente domestico, questi prodotti possono causare radiointerferenze, nel qual caso all'utente potrebbe venire richiesto di prendere le misure adeguate. Per soddisfare i requisiti CEE, l'apparecchiatura vanno collegati alla scheda grafica con cavi schermati.

(Español) Información para usuarios europeos – Declaración de conformidad

Observación referente a los productos de hardware de Matrox apoyados por este manual Estos dispositivos cumplen con la directiva de la CE 89/336/EEC para dispositivos digitales de Clase B. Dichos dispositivos han sido sometidos a prueba y se ha comprobado que cumplen con las normas EN55022/CISPR22 y EN55024/CISPR24. En entornos residenciales, estos productos pueden causar interferencias en las comunicaciones por radio; en tal caso el usuario deberá adoptar las medidas adecuadas. Para satisfacer las disposiciones de la CE, deberán utilizarse cables apantallados para conectar el equipo.



www.matrox.com/video

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