

# Matrox Concord

Installation and Hardware Reference

Manual no. Y11088-101-0101

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**Chapter**

# 1

## **Introduction**

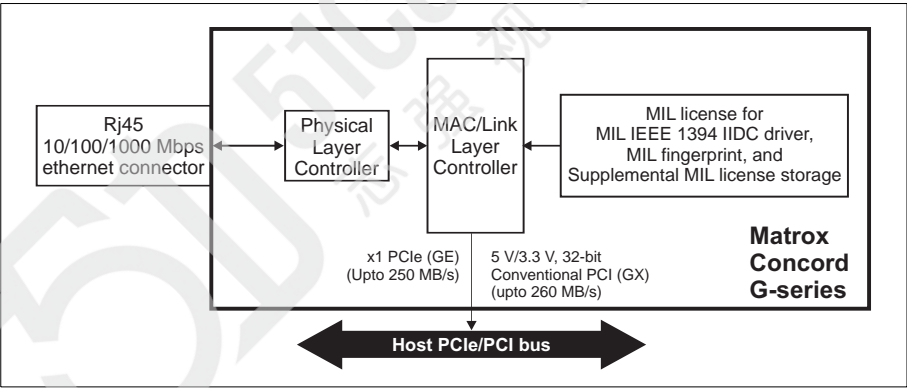
This chapter outlines the key features of the Matrox Concord boards.

# Matrox Concord

The Matrox Concord family is comprised of two types of network interface boards: the G-series boards, which are Gigabit ethernet network interface boards (NICs), and the F-series boards, which IEEE 1394b network adapters boards. For image acquisition from supported network cameras, these boards are pre-licensed for use with the Matrox Imaging Library (MIL) GigE Vision and IEEE 1394 IIDC drivers, respectively.

## Matrox Concord G-series

The Matrox Concord G-series boards are basically 10/100/1000BaseT (Gigabit or GigE) NICs that provide optimum support for the GigE Vision camera interface standard. There are two versions of the G-series boards: a conventional 32-bit PCI version called Matrox Concord GX, and a x1 PCIe version called Matrox Concord GE.



Using the MIL GigE Vision driver, Matrox Concord can capture video from multiple<sup>1</sup> cameras compliant with the GigE Vision specification.

Unlike generic NICs, Matrox Concord G-series with MIL does not require manually adjusting advanced driver properties. Through MIL, the Matrox Concord G-series boards are optimally configured to minimize GigE Vision

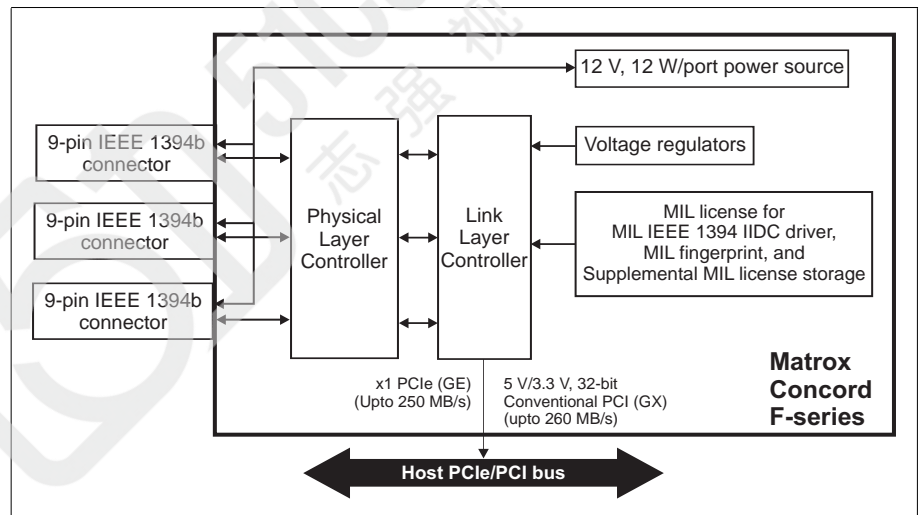
1. Refer to MIL documentation for the number of cameras from which Matrox Concord can simultaneously capture video.

protocol loading on the Host. By default, MIL automatically enables jumbo packets and selects optimal settings for the interrupt throttling rate and number of receive buffers.

The Matrox Concord G-series boards come equipped with auto medium-dependent interface crossover ports (MDIX) that can operate at all link speeds (10, 100, and 1000 Mbps). MDIX ports simplify setup by automatically detecting and using the appropriate connection type, eliminating the need for cross-over cables.

### Matrox Concord F-series

The Matrox Concord F-series boards are 1394 network adapter boards that, through MIL, permit image acquisition from leading IEEE 1394 industrial cameras that use the standard IIDC protocol. There are two versions of the F-series boards: a conventional 32-bit PCI version called Matrox Concord FX, and a x1 PCIe version called Matrox Concord FE.



The Matrox Concord F-series boards have three IEEE 1394b input/output ports. IEEE 1394a and 1394b cameras can be attached to any one or all three IEEE 1394b input ports, as long as the configuration of cameras comply with the IEEE 1394 tree topology. Matrox Concord FE can connect to and acquire from a maximum of 8 cameras; Matrox Concord FX can connect to and acquire from a maximum of 4 cameras. Note that the maximum number of cameras is also subject to bandwidth limitations and maximum total power consumption.

Through MIL, the Matrox Concord F-series boards support up to the S400 and S800 modes of the IEEE 1394a and 1394b standards respectively, ensuring maximum camera performance and minimal transfer latency. The boards are limited to a maximum data transfer rate of 800 Mbits/s. The three ports (combined) can supply up to 12W per port<sup>1</sup> for IEEE 1394a/b cameras.

In addition, the use of bilingual copper connectivity provides for cost-effective cabling. General features

In addition to being pre-licensed for use with the MIL drivers for GigE Vision and IEEE 1394 IIDC, the Matrox Concord boards can act as a fingerprint for licensing supplemental MIL functionality. The boards can also store a supplemental MIL license, which facilitates the process of moving to a new computer.

## Software

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To capture images using Matrox Concord, you can use MIL or one of its derivatives: MIL-Lite, ActiveMIL, ActiveMIL-Lite, Matrox Inspector, and Matrox Intellicam.

### MIL

MIL is a high-level programming library with an extensive set of optimized functions for image capture, processing, analysis, transfer, compression, display, and archiving. Image processing operations include point-to-point, statistical, spatial filtering, morphological, geometric transformation, and FFT operations. Analysis operations support calibration, are performed with sub-pixel accuracy, and include pattern recognition (normalized grayscale correlation and Geometric Model Finder), blob analysis, edge extraction and analysis, measurement, metrology, character recognition (template-based and feature-based), and code recognition (1D, 2D and composite code types).

MIL applications are easily ported to new Matrox hardware platforms and can be designed to take advantage of multi-processing and multi-threading environments.

- 
1. If the internal power connector of the board is connected to the power supply of the computer, the board can supply 12 W per port; otherwise the board can only supply 6 W total.



<b>MIL-Lite</b>	MIL-Lite is a subset of MIL. It includes all the MIL functions for image acquisition, transfer, display control, and archiving. It also allows you to perform processing operations that are typically useful to pre-process grabbed images.
<b>ActiveMIL</b>	ActiveMIL is a set of ActiveX controls that are based on MIL. ActiveMIL was designed for rapid application development (RAD) tools, such as Microsoft's Visual Basic.Net. ActiveMIL is included with MIL (ActiveMIL-Lite is included with MIL-Lite).
<b>Matrox Inspector</b>	Matrox Inspector is an interactive Windows application for image capture, processing, analysis, and archiving. Matrox Inspector is included <sup>1</sup> with MIL. MIL application developers can use Matrox Inspector as a prototyping tool to quickly build proof-of-concept demonstrations. End users can use Matrox Inspector to perform and automate image enhancement and measurement tasks.
<b>Matrox Intellicam</b>	Matrox Intellicam is an interactive Windows program that allows for fast video source interfacing and provides interactive access to all the acquisition features of your Matrox board. Matrox Intellicam is included with all Matrox Imaging software products.

## Essentials to get started

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To use Matrox Concord, you must have a computer with at least the following:

- For Matrox Concord GX and FX, an available 3.3 V or 5 V, half-length PCI/PCI-X slot. For Matrox Concord GE and FE, an available PCIe slot.
- Processor with an Intel 32-bit architecture (IA32) or equivalent.
- A computer with a relatively up-to-date PCI chipset. An up-to-date chipset is recommended because it generally offers better performance in terms of data transfer rates.
- Matrox Imaging Library (MIL), or one of its derivatives. This should be installed after you install your board.

Consult your software package for other computer requirements like the operating system and memory requirements.

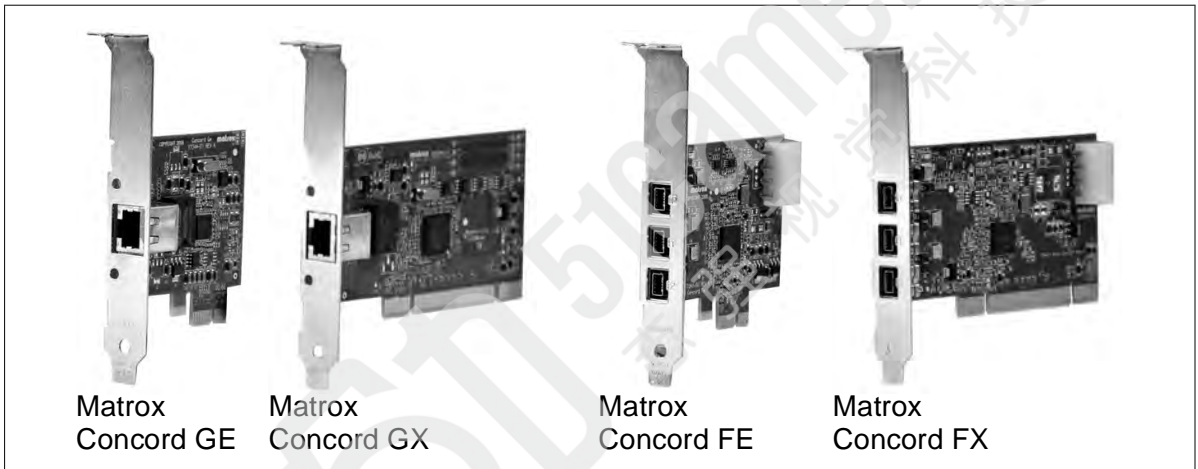
## Inspecting the Matrox Concord package

When you unpack your Matrox Concord package, you should check its contents. Note that optional parts might or might not be included, depending on what you ordered. If something is missing or damaged, contact your Matrox representative.

### Standard package

You should receive the following item:

- The Matrox Concord board that your ordered.



### Optional item

You might have also ordered one or more of the following:

- CONGACCnnPAK, an accessory pack for Matrox Concord G-series that includes low-profile (half-height) PCI brackets. The *nn* represents the number of brackets included in the pack.
- CONFACCnnPAK, an accessory pack for Matrox Concord F-series that includes low-profile (half-height) PCI brackets. The *nn* represents the number of brackets included in the pack.

## Handling components

The electronic circuits in your computer and the circuits on the Matrox Concord board are sensitive to static electricity and surges. Improper handling can seriously damage the circuits. Be sure to follow these precautions:

- Drain static electricity from your body by touching a metal fixture (or ground) before you touch any electronic component.
- Avoid letting your clothing come in contact with the circuit boards or components.

## Caution

Before you add or remove devices from your computer, always turn off the power to your computer and all peripherals.

## Installation

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The installation procedure consists of the following steps:

1. Complete the hardware installation as described in *Chapter 2: Hardware installation*.
2. Complete the software installation procedure described in the documentation accompanying your software package.

## More information

For a summary of hardware information, as well as environmental and electrical specifications, and connector pinout descriptions, see *Appendix B: Technical information*.

## Need help?

If you experience problems during installation or while using this product, refer to the support page on the Matrox Imaging web site: [www.matrox.com/imaging/support](http://www.matrox.com/imaging/support). This page provides answers to frequently asked questions, as well as offers registered customers additional ways of obtaining support.

If your question is not addressed and you are currently registered with the MIL maintenance program, you can contact technical support. To do so, you should first complete and submit the online Technical Support Request Form, accessible from the above-mentioned page. Once the information is submitted, a Matrox support agent will contact you shortly thereafter by email or phone, depending on the problem.



**Chapter**

# 2

## **Hardware installation**

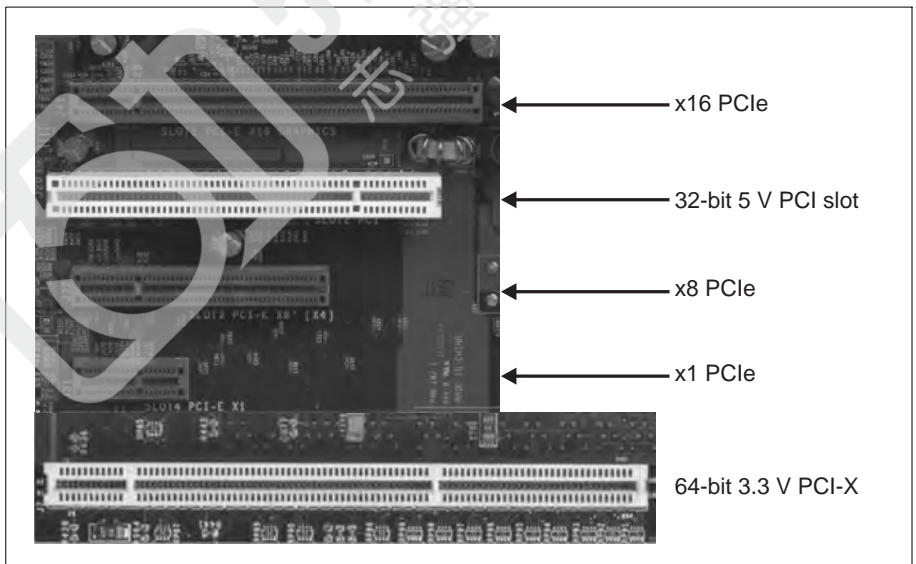
This chapter explains how to install the Matrox Concord hardware.

## Installing Matrox Concord

Before you install your Matrox Concord board, some precautionary measures must be taken. Turn off the power to your computer and its peripherals, and drain static electricity from your body (by touching a metal part of the computer chassis).

Use the following steps to install your Matrox Concord board. Note that your board should be installed before you install your software.

3. Remove the cover from your computer using the instructions from your computer manual.
4. Check that you have an empty slot that can accommodate your Matrox Concord board. Matrox Concord FE and GE need at a x1 PCIe slot or better; Matrox Concord FX and GX need a conventional 32-bit PCI slot or better (for example, a 64-bit PCI or PCI-X slot). Illustrated below are some of the more common PCIe, PCI-X, and PCI slots.



If necessary, remove a board from your computer to make room for your Matrox Concord board.

5. If present, remove the blank metal plate located at the back of the selected slot. Keep the removed screw; you will need it to fasten the Matrox Concord board.
6. For Matrox Concord F-series, if your cameras will draw more than .5 A total (4W) over the three 1394b connectors of the board combined, you should attach a power cable to the board, as described in the *Using the power connector* section.
7. Carefully position the Matrox Concord board in the selected empty PCI/PCI-X/PCIe slot. Once perfectly aligned with the slot's connector, press the board firmly but carefully into the connector.

### **Important**

8. Anchor the board by replacing the screw that you removed.
9. Attach your cameras as described in the *Connecting devices to Matrox Concord* section.
10. Turn on your computer.
  - ❖ When you boot your computer, Windows' Plug-and-Play system will detect a new Multimedia Video Device and you will be asked to assign it a driver. At this point, you should click on **Cancel** because the driver will be installed during the installation of Matrox Concord software.

## Using the power connector

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A Matrox Concord F-series board can receive power, through its internal power connector, directly from the power supply of your computer. This is essential if the attached cameras together draw more than .5 A total (6W) over the three 1394b connectors combined.

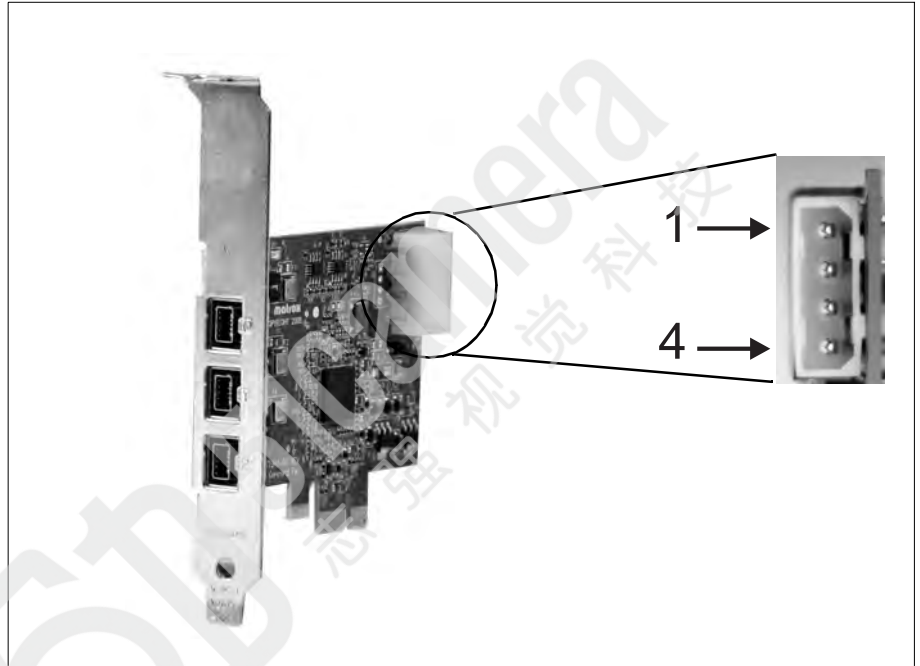
To properly connect the power supply to the internal power connector of Matrox Concord F-series, do the following:

1. If the cable attached to the power supply of your computer has LP4 connectors, find an available connector to which you can connect the Matrox Concord F-series board.

If the cable attached to the power supply of your computer has SATA connectors, attach an SATA-female-to-LP4-female power adapter cable to an available SATA connector.



2. Attach the LP4 connector of your power supply cable or your SATA-female-to-LP4-female power adapter cable to Matrox Concord F-series's internal power supply connector. The LP4 connectors on the cable and on Matrox Concord F-series are polarised so that they cannot be connected incorrectly; they lock into position using a latch.

**Caution**

When attaching the LP4 connector to the board's internal power connector, do so carefully and slowly to avoid lifting the connector and loosening its attachment to the board.

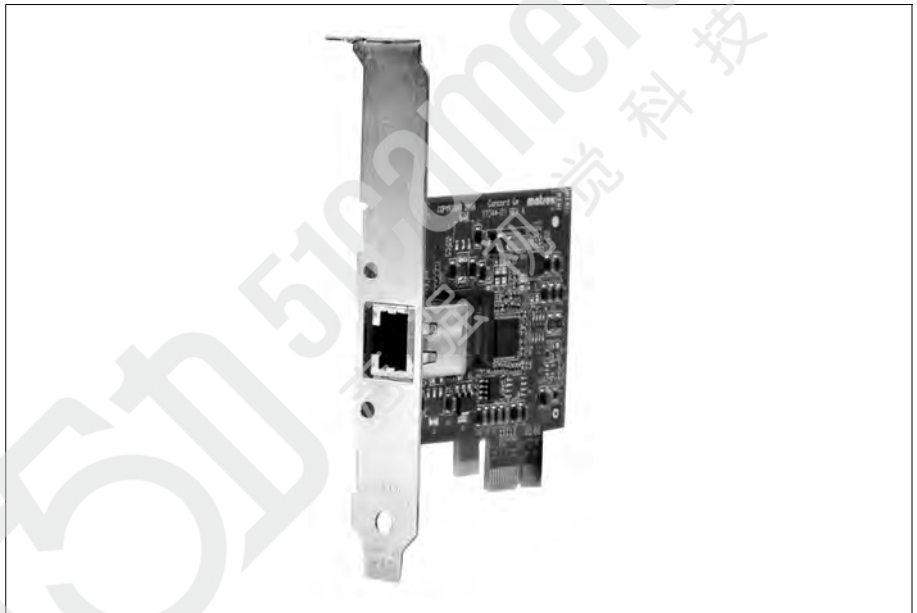
## Connecting devices to Matrox Concord

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### Connecting to Matrox Concord G-series boards

The Matrox Concord G-series boards have the following external connector:

- **One Ethernet connector.** Used to receive video input from GigE Vision-compliant cameras and transmit/receive communication signals between the camera and the frame grabber. Can also be used to receive data from and transmit data to other types of Ethernet devices.



Matrox Concord G-series boards support acquisition from multiple GigE Vision-compliant cameras<sup>1</sup>. You can connect the Ethernet connector on Matrox Concord G-series boards to any Ethernet network that contains at least one GigE Vision-compliant camera.

To interface with the Ethernet connector, use Category 5e or Category 6 twisted pair cables. Alternatively, Category 5 twisted-pair (Cat 5 UTP) cables can be used.

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1. Refer to MIL documentation for the number of cameras from which Matrox Concord can simultaneously capture video.

- ❖ For optimal performance, connect your GigE Vision camera directly to your Matrox Concord G-series board.

Matrox Concord G-series boards are designed for use with 1-Gigabit Ethernet (1000BASE-T) networks, however they will also function correctly with 100 Mbps Fast Ethernet (100BASE-T) and 10 Mbps Ethernet (10BASE-T) networks. It is recommended that you use Matrox Concord G-series boards with Gigabit Ethernet networks to ensure maximum performance.

### Connecting to Matrox Concord F-series boards

The Matrox Concord F-series boards have the following external connectors:

- **Three 1394b connectors (on the faceplate).** Used with 1394a and 1394b cameras. These connectors cannot be AC-coupled.



#### Cable

Standard FireWire cables can be used to connect to the three 1394b ports. For a possible FireWire cable supplier, see *1394b connectors* subsection of the *Matrox Concord F-series connectors* section, in *Appendix B: Technical information*.



# **Appendix A:**

## **Glossary**

This appendix defines some of the specialized terms used in this Matrox Concord document.

## **Glossary**

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- **Bandwidth**

A term describing the capacity to transfer data. Greater bandwidth is needed to sustain a higher transfer rate. Greater bandwidth can be achieved, for example, by using a wider bus.

- **Bus**

A pathway along which signals are sent, generally in two directions, for communication of data.

- **DCF**

*Digitizer Configuration Format.* A DCF defines the input data format and among other things, how to accept or generate video timing signals such as horizontal sync, vertical sync, and pixel clock.

- **Grab**

To acquire or capture an image from a camera.

- **Host**

In general, Host refers to the principal CPUs in one's computer.

- **PCI**

*Peripheral Component Interconnect.* An expansion bus for attaching peripheral devices to a computer's motherboard.

# **Appendix B: Technical information**

This appendix contains information that might be useful when installing the Matrox Concord board.

## Technical information

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This appendix contains information that might be useful when installing your Matrox Concord.

### Global information

- Operating system: See your software manual for supported operating systems.
- Computer requirements: An Intel Pentium processor (or equivalent) or better. In addition, Matrox Concord FE and GE need at a x1 PCIe slot or better; Matrox Concord FX and GX need a conventional 32-bit PCI slot or better (for example, a 64-bit PCI or PCI-X slot).

We recommend a relatively up-to-date PCIe chipset. An up-to-date chipset is recommended because it generally offers better performance in terms of data transfer rates.

### Matrox Concord G-series

- x1 PCIe (GE) or 32-bit, 33 MHz conventional PCI (GX) universal (3.3 V/5 V) Host bus interface.
- Intel Gigabit Ethernet PHY/MAC/Link controller.
- Single port.
- Handles 10/100/1000 Mbps connections.
- Supports Jumbo frames/packets up to 9014 bytes.
- Selectable interrupt moderation rate.
- Resizeable receive buffers/descriptors.
- Supports auto MDIX (signal crossover).
- PCI low-profile, sub-half-length.
- Standard RJ-45 Ethernet modular jack.



- Can connect to and simultaneously capture from multiple independent cameras. Refer to MIL documentation for the number of cameras from which Matrox Concord can simultaneously capture video.
- Can generate interrupts for the start and end of frame and sequence capture.

### **Matrox Concord F-series**

- x1 PCIe (FE) or 32-bit, 33 MHz conventional PCI (FX) universal (3.3 V/5 V) Host bus interface.
- Texas Instruments physical/link layer controller.
- OHCI compliant.
- Three bilingual IEEE 1394a/b ports. Three 1394b connectors (on the faceplate). Used with 1394a and 1394b cameras. These connectors cannot be AC-coupled.
- PCI low-profile, sub-half-length.
- 9-pin connector for copper cabling.
- Provides power (up to 12 W<sup>1</sup> per port).
- Serial data bus rates of 100, 200, 400, or 800 Mbits/s are shared across the three 1394b ports.
- Can connect to and simultaneously capture from multiple independent cameras. Matrox Concord FE can connect to and acquire from a maximum of 8 cameras; Matrox Concord FX can connect to and acquire from a maximum of 4 cameras. Note that the maximum number of cameras is also subject to bandwidth limitations and maximum total power consumption.
- Can generate interrupts for the end of frame and sequence capture.

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1. If the internal power connector of the board is connected to the power supply of the computer, the board can supply 12 W per port; otherwise the board can only supply 6 W total.

## Electrical specifications

The following tables list the electrical specifications of the Matrox Concord board.

**Important**

When determining the power requirements for your computer, do not forget to include the power requirements for other peripheral devices.

Typical operating voltage and current for Matrox Concord GE board (Starting from version 000).		
Voltage	Current (A)	Power (W)
3.3 V ± 10%	0.44 A	1.45 W typical
12 V ± 10%	0 A	0 W
Total		1.45 W typical

Typical operating voltage and current for Matrox Concord GX board (Starting from version 000).		
Voltage	Current	Power
3.3 V ± 10%	0 A	0 W
5 V ± 10%	0.29 A	1.45 W typical
12 V ± 10%	0 A	0 W
Total		1.45 W typical

Typical operating voltage and current for Matrox Concord FE board (Starting from version 000).		
Voltage	Current	Power
3.3 V ± 10%	0.33 A	1.1 W typical
12 V ± 10%	0 A	0 W
Total		1.1 W typical

Typical operating voltage and current for Matrox Concord FX board (Starting from version 000).		
Voltage	Current	Power
3.3 V ± 10%	0 A	0 W
5 V ± 10%	0.2 A	1 W typical
12 V ± 10%	0 A	0 W
Total		1 W typical

**Matrox Concord F-series power over 1394b bus**

Minimum voltage level: 10.5 V.

Typical voltage level: 12 V.

Minimum current limit: 0.5 A total if external power not connected.

Typical current limit: 1.5 A/port if external power connected.

Maximum power: 12 W /port<sup>1</sup>.

1.If the internal power connector of the board is connected to the power supply of the computer, the board can supply 12 W per port; otherwise the board can only supply 6 W total.

## **Dimensions and environmental specifications**

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- Dimensions (from bottom edge of goldfinger to top edge of board and without bracket):
  - GE: 7.4 L x 6.9 H x 1.6 W cm (2.9" x 2.7" x 0.62).
  - GX: 11.9 L x 6.4 H x 1.6 W cm (4.7" x 2.5" x 0.62).
  - FE: 8.6 L x 6.9 H x 1.6 W cm (3.4" x 2.7" x 0.62).
  - FX: 11.9 L x 6.4 H x 1.6 W cm (4.7" x 2.5" x 0.62).
- Minimum/maximum ambient operating temperature: 0°C to 55°C (32°F to 131°F).
- Operating relative humidity: 10% - 95% (non-condensing).
- FCC part 15 class A.
- CE Class A.
- RoHS-compliant.

## Matrox Concord G-series connectors

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The Matrox Concord G-series boards have one Ethernet connector, located on their bracket. The Ethernet connector is a standard RJ-45 Ethernet modular jack. It is used to receive video input signals between the camera and the frame grabber, as per GigE Vision protocol, found in the IEEE 802.3-2002 standard.



To interface with the Ethernet connector, use Category 5e or Category 6 twisted pair cables. Alternatively, Category 5 twisted-pair (Cat 5 UTP) cables can be used.

## **Matrox Concord F-series connectors**

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The Matrox Concord F-series boards have three 1394b bilingual connectors (compatible with 1394a and 1394b cameras) on their bracket, and an internal power connector.



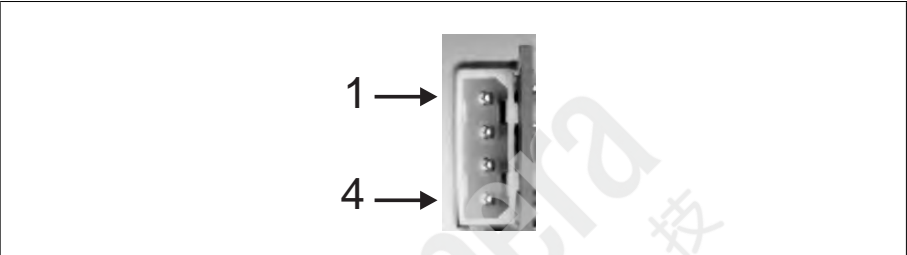
### **1394b connectors**

The three 1394b connectors are identical, rectangular, 9-pin sockets. They are standard 9-pin 1394b bilingual connectors. Since they are bilingual, they are compatible with 1394a and 1394b cameras. Their pinout is described in the IEEE 1394b-2002 standard.

Standard FireWire cables should be used to connect to the three 1394b ports. You can purchase appropriate cables from Components Express, Inc.

**Internal power connector**

The internal power connector, located at the back of the Matrox Concord board, is a standard LP4 (4-pin) male power connector. The connector's pin assignment is as follows:



Pin	Description
1	+5 V.
2	Ground.
3	Ground.
4	+12 V.

You can interface this connector with the cable attached to the power supply of your motherboard if the cable has LP4 connectors. Otherwise, you need a SATA-female-to-LP4-female power adapter cable to interface this connector with the power supply cable; you can purchase an appropriate adapter cable (part number LP4SATAFM2L) from StarTech.





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# Regulatory Compliance

## FCC Compliance Statement

### Warning

Changes or modifications to these units 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 connections of these devices to other peripherals is required to meet the regulatory requirements.

### Note

These devices comply with Part 15 of 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.

This equipment has been tested and found to comply with the limits for Class A digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of these devices in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

## Industry Canada Compliance Statement

These digital apparatuses do not exceed the Class A limits for radio noise emission from digital apparatuses set out in the Radio Interference Regulations of Industry Canada.

Ces appareils numériques n'émettent pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

## EU Notice (European Union)

**WARNING:** These are class A products. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures.

**AVERTISSEMENT:** Ces appareils sont des produits informatiques de Classe A. Lorsque ces appareils sont utilisés dans un environnement résidentiel, ces produits peuvent entraîner des interférences radioélectriques. Dans ce cas, l'utilisateur peut être prié de prendre des mesures correctives appropriées.

This device complies with EC Directive 89/336/EEC for Class A digital devices. They have been tested and found to comply with EN55022/CISPR22 and EN55024/CISPR24 when installed in a typical class A compliant host system. It is assumed that these devices will also achieve compliance in any Class A compliant system.

Ces unités sont conformes à la Directive communautaire 89/336/EEC pour les unités numériques de Classe A. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55022/CISPR22 et EN55024/CISPR24 lorsqu'elles sont installées dans un système hôte typique de la Classe A. On suppose qu'elles présenteront la même compatibilité dans tout système compatible de la Classe A.

## **Directive on Waste Electrical and Electronic Equipment (WEEE)**

### **Europe**

#### **(English) European user's information – Directive on Waste Electrical and Electronic Equipment (WEEE)**

Please refer to the Matrox Web site ([www.matrox.com/environment/weee](http://www.matrox.com/environment/weee)) for recycling information.

#### **(Français) Informations aux utilisateurs Européens – Règlementation des déchets d'équipements électriques et électroniques (DEEE)**

Se référer au site Web de Matrox ([www.matrox.com/environment/weee](http://www.matrox.com/environment/weee)) pour l'information concernant le recyclage.

#### **(Deutsch) Information für europäische Anwender – Europäische Regelungen zu Elektro- und Elektronikgeräten (WEEE)**

Bitte wenden Sie sich an dem Matrox-Website ([www.matrox.com/environment/weee](http://www.matrox.com/environment/weee)) für Recycling Informationen.

#### **(Italiano) Informazioni per gli utenti europei – Direttiva sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE)**

Si prega di riferirsi al sito Web Matrox ([www.matrox.com/environment/weee](http://www.matrox.com/environment/weee)) per le informazioni di riciclaggio.



# Limited Warranty

Refer to the warranty statement that came with your product.



