Matrox Iris GTR

Installation and Technical Reference

Manual no. Y11377-201-0200
July 12, 2018

Contents

Appendix C: Selecting a lens 75

Appendix D: Matrox Imaging operating system
utilities and recovery. 79

Appendix E: Microsoft Windows
operating system partition backup and recovery 87

Appendix F: The Matrox Iris GTR breakout board. 99

Chapter

1

Before you begin

This chapter describes the features of your Matrox Iris GTR, lists the various smart camera models available, describes the software required to develop your imaging applications, outlines documentation conventions, provides an overview of this manual, and specifies where to find further support.

Introduction

Matrox Iris GTR combines the integration of a conventional smart camera with the flexibility of a traditional PC-based machine vision system. Matrox Iris GTR is a fully programmable device, allowing extensive customization. Matrox Iris GTR can come pre-installed with Matrox Design Assistant or with MIL-only; contact your sales representative for more information. Note that the information found in this manual applies to both Matrox Iris GTR with Design Assistant and Matrox Iris GTR with MIL-only, unless otherwise specified.

Matrox Design Assistant is an intuitive, flowchart-based, integrated development environment (IDE). System integrators and professional end-users can easily and quickly develop and deploy machine vision applications on a highly integrated platform without the need for traditional programming skills. The integrated development environment provides access to a comprehensive set of highly-efficient and field-proven image analysis and measurement tools.

Matrox Iris GTR features an Intel-architecture processor, and uses a global shutter CMOS image sensor from a range of monochrome and color options. The CMOS image sensor allows the exposure phase of a triggered grab to occur while the previous image is being transferred. The Intel-architecture processor is an Celeron N2807 processor. The 32-Gbyte eMMC (flash disk) provides in-camera (on-board) storage for both the operating system and additional data. The 2 Gbytes of DDR3L SDRAM provides in-camera (on-board) volatile storage.

Matrox Iris GTR is fully integrated in an IP67 enclosure, eliminating the need to separately source a sealed camera housing, while still providing easy access to the lens.

Matrox Iris GTR can connect to a display device through the VGA/USB connector and it can communicate with other devices through the Gigabit Ethernet network interface (100/1000 BaseT) and digital auxiliary I/O signals. An advanced I/O engine is included to allow you to communicate and coordinate events using the auxiliary I/O signals (for example, to trigger and set the duration of the exposure).

The network interface can be used for general purpose, Gigabit network communication, or for communication with external devices using the PROFINET, EtherNet/IP, or Modbus industrial protocols. For PROFINET communication on the network interface, Matrox Iris GTR provides a PROFINET engine with a hardware-assisted PROFINET interface. The hardware-assisted interface supports a minimum I/O cycle time of 1 msec.

Models available

There are eight models available in the Matrox Iris GTR family of products.

Matrox Iris GTR feature	GTR300	GTR300C	GTR1300	GTR1300C	GTR2000	GTR2000C	GTR5000	GTR5000C
Sensor chip type	1/4"-type		1/2"-type		2/3"-type		1"-type	
Effective resolution	640x480		1280x1024		1920x1200		2592x2048	
Color / Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color	Monochrome	Color
Frame rate	Up to 293 fps	Up to 147 fps	Up to 85 fps	Up to 35 fps[a]	Up to 45 fps	Up to 20 fps[a]	Up to 21 fps	Up to 8.5 fps[a]

a. Note that these numbers come from tests that store the grabbed images in BGR packed format. When using YUV, planar or Mono10 packed formats, the frame rate can be significantly different.

Color versions of this smart camera utilize a sensor with a Bayer color filter but store the images in BGR32 packed format, by default.

Inspecting your Matrox Iris GTR package

You should check the contents of your Matrox Iris GTR package when you first open it. If something is missing or damaged, contact your Matrox representative.

Matrox Iris GTR with Design Assistant base package

If you purchased the Matrox Iris GTR with Design Assistant base package, it includes the following:

- Matrox Iris GTR smart camera. This includes the Matrox Design Assistant runtime environment, the MIOS operating system, and some preloaded utilities (for example, Putty, FileZilla, and Virtual Network Computing). It also includes a run-time license for some common Matrox Design Assistant steps; for a detailed list of steps that are included, please visit our website **http://www.matrox.com/imaging/en.**

- IP lens case.

- VGA/USB connector cap.

- Liquid lens connector cap.

- Matrox Design Assistant DVD.

❖ Note that your Matrox Iris GTR base package does not include any cables, a power supply, or a manual iris lens. To purchase these items, contact a Matrox sales representative.

Matrox Iris GTR with MIL-only base package

If you purchased the Matrox Iris GTR with MIL-only package, it includes the following:

- Matrox Iris GTR smart camera, pre-installed with the Windows 10 IoT enterprise operating system, and a run-time license for MIL. The run-time license includes the industrial and robot communication module. This might change over time; contact your Matrox representative for more information. This license also allows for Distributed MIL configurations.

- IP lens case.

- VGA/USB connector cap.

- Liquid lens connector cap.

- Matrox Iris GTR Rescue Utility DVD (which includes a sticker with your Windows 10 IoT enterprise license).

- System and Drivers Utilities DVD.

❖ Note that your Matrox Iris GTR base package does not include any cables, a power supply, or a manual iris lens. To purchase these items, contact a Matrox sales representative.

Matrox Iris GTR starter kits

There are two versions of the Matrox Iris GTR starter kit. The GTR-STARTER-KIT is meant for use with all Matrox Iris GTR smart cameras with sensors less than 5 Mpixels; these kits include a standard sized lens. The GTR5000-STR-KIT is meant for use only with the Matrox Iris GTR 5000 series of smart cameras (which have a 5 Mpixel sensor); this kit includes a slightly larger lens. Both Matrox Iris GTR starter kits include the following:

- External power supply.

- GTR-CBL-ETH/5, a 100/1000 BaseT Ethernet cable with an M12 8-pin (male) X-coded connector on one end and an RJ-45 registered jack on the other. This cable connects your Matrox Iris GTR to another computer or a network.

- GTR-CBL-PWR/3, a Digital I/O and power cable with an M12 12-pin (male) connector on one end and open ended wires on the other. This cable connects your Matrox Iris GTR to power and third-party digital I/O devices.

- GTR-CBL-VGAUSB, a VGA/USB cable with an M12 12-pin (female) connector on one end and a HD-15 (female) connector and a USB connector on the other end. This cable connects your Matrox Iris GTR to a display device and a USB device (such as, a keyboard or mouse).

- Matrox Iris GTR breakout board. This open circuit-board contains several wire terminal blocks, switches, and push buttons. It is designed to provide a means to connect third-party devices to your Matrox Iris GTR in a development environment. Note that the Matrox Iris GTR breakout board is strictly intended for development purposes only. It is not to be used for deployment with the Matrox Iris GTR smart camera.

- One C-mount 12 mm lens.[1]

Handling precautions

The lens of Matrox Iris GTR is a sensitive device. It should never be touched directly. Always cover the lens if the smart camera is not in use to reduce dust buildup.

If dust accumulates on the lens, use either a can of compressed air or a lens cloth to remove the dust.

Available separately
The following items are available separately.

- Matrox Iris GTR breakout board. This open circuit-board contains several wire terminal blocks, switches, and push buttons. It is designed to provide a means to connect third-party devices to your Matrox Iris GTR in a development environment. Note that the Matrox Iris GTR breakout board is strictly intended for development purposes only. It is not to be used for deployment with the Matrox Iris GTR smart camera.

- GTR-CBL-PWR/3, an open-wire digital I/O and power cable. On one end is an M12 12-pin (male) connector. The other end consists of 12 separately-colored wires. This cable is meant to connect your Matrox Iris GTR to your Matrox Iris GTR breakout board, or to obtain power and to connect with third-party digital I/O devices. For more details about this cable, refer to the *Digital I/O and power connector* subsection of the *Matrox Iris GTR connectors* section, in *Appendix B: Technical reference*.

- GTR-CBL-ETH/5, a 100/1000 BaseT Ethernet cable with an M12 8-pin (male) X-coded connector on one end and an RJ-45 registered jack on the other. For more details about this cable, refer to the *100/1000 BaseT Ethernet connector*

---

1. In the GTR5000-STR-KIT, this is a larger lens to accommodate the 5 Mpixel sensor of the Matrox Iris GTR 5000 series of smart cameras.

subsection of the *Matrox Iris GTR connectors* section, in *Appendix B: Technical reference*. This cable is meant to connect your Matrox Iris GTR to another computer or network device.

- GTR-CBL-VGAUSB, a VGA and USB cable with an M12 12-pin (female) connector on one end and a HD-15 (female) connector and a USB connector on the other end. For more details about this cable, refer to *VGA/USB connector* subsection of the *Matrox Iris GTR connectors* section, in *Appendix B: Technical reference*. This cable is meant to connect your Matrox Iris GTR to a display device and a USB device (such as, a keyboard or mouse).

Third-party supported devices

The following items are available from third-party suppliers. Your Matrox Iris GTR was designed to work with them, but they are optional.

- Light controllers (such as, the Advanced Illumination inline control system or the Smart Vision Lights brick light). These can be used to control your strobe (or light). Your Matrox Iris GTR provides a signal to control the connected light's intensity. For information, refer to *Digital I/O and power connector* subsection of the *Matrox Iris GTR connectors* section, in *Appendix B: Technical reference* or, if using the Matrox Iris GTR breakout board, refer to the *ICS3 connector* subsection of the *Open-wire connectors reference* section and *Routing Matrox Iris GTR auxiliary output signals* section, in *Appendix F: The Matrox Iris GTR breakout board*.

- Varioptic Caspian C-39N0-160-I2C or C-39N0-250-I2C lens (liquid lens). This lens is available from Varioptic and fits inside your Matrox Iris GTR's IP lens case for IP67 compatibility. For more details about how to connect this lens, refer to *Optionally connecting a liquid lens* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR.*

Software overview

The Matrox Iris GTR with Design Assistant is distributed with Matrox Design Assistant, a flowchart-based, integrated development environment (IDE). It allows you to create an imaging application without writing a single line of code. Application development is a step-by-step approach, where each step is taken from an existing toolbox and is configured through a series of dialog windows. Matrox Design Assistant runs on your development computer and uses the resources of

your Matrox Iris GTR smart camera (for example, to grab an image and communicate with connected devices) to build projects. Once the project is built, it runs on your Matrox Iris GTR without relying on the resources of your development computer.

With Matrox Design Assistant, you can:

- Create your project as a series of steps using a flowchart.

- Test your project from your computer without any additional code editors or compilers and without deploying (copying and running) your project on your Matrox Iris GTR.

- Design and layout a web page (operator view) to receive operator input and to display your project's output.

- Run, terminate, and re-run the project on your Matrox Iris GTR from within Matrox Design Assistant.

Imaging projects can:

- Grab images from your Matrox Iris GTR or use images from disk.

- Analyze images using several industry-proven image analysis and measurement tools (for example, code reader and Geometric Model Finder tools).

- Send and receive user-defined signals from the Digital I/O and power connector of your Matrox Iris GTR.

- Send and receive information and save images across the network using TCP/IP, Modbus, EtherNet/IP, and PROFINET protocols.

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, image

registration, metrology, character recognition (template-based, and for both normal and dot-matrix text, feature-based using String Reader and SureDotOCR respectively), code recognition and verification (1D, 2D, and composite code types), bead inspection (continuous strip of material), 3D reconstruction and analysis, and color analysis.

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

MIL-Lite   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.

Documentation conventions

Your Matrox Iris GTR is a network-aware device. The terminology used throughout this document mirrors that of local area networks (LANs).

In this document, any computer that can communicate with your Matrox Iris GTR is referred to as "your computer". If you use your computer to develop your applications for your Matrox Iris GTR, it is referred to as your development computer.

The procedure to select a menu item from a submenu uses a simplified format. For example, the following procedure:

> Select the **Edit** menu item from the main menu, and then select the **Copy** menu command from the presented submenu.

will be replaced by:

> Select the **Edit Copy** menu item.

Throughout this manual, every mention of MIL/MIL-Lite refers to version 10.0 or higher.

Matrox Iris GTR safety warnings and key to symbols

Before connecting to and using your Matrox Iris GTR, you should be aware of the meaning of the symbols on the smart camera and the important safety precautions. The following is a list of precautionary symbols on Matrox Iris GTR and their meaning.

Symbol[a]	Description
⚠	The case of your Matrox Iris GTR can become quite hot and should not be touched while operating. Always allow hot surfaces to cool down before touching your Matrox Iris GTR.
⚠	• Caution: Consult this manual[b] before connecting to and using Matrox Iris GTR. For hardware connection instructions, refer to *Chapter 2: Powering and connecting to your Matrox Iris GTR*; for environmental and electrical specifications and connector pinout descriptions, refer to *Appendix B: Technical reference*. This product must be used as specified; otherwise, the protection provided by its components might be compromised. • Refer to the Electrical specifications section, in *Appendix B: Technical reference* of this manual, for voltages and current ratings. • There are no serviceable parts inside this product. In case of defect, contact your Matrox representative. • To maintain IP67 conformity, all unused connectors on your Matrox Iris GTR must be capped and the IP case must be screwed firmly into place. • This product meets the requirements of a Category 1 installation as per industry standards[c]. • This product is designed for use in a pollution degree 2 environment as per industry standards[c]. • This product is designed for indoor use only. • This product is designed to operate at temperatures ranging from 0°C to 50°C. • This product is not intended for use at altitudes exceeding 2000 m.
▬ ▬ ▬	DC current only. Your Matrox Iris GTR can only be powered using a 24 V DC power source.

a. Note that these symbols might not necessarily be the same color as depicted.
b. Manual available on the Matrox Imaging website at http://www.matrox.com/imaging
c. As per CAN/CSA-C22.2 No 61010-1-12, UL std. No 61010-1 (3rd edition), and EN Std. No. 61010-1 (3rd Edition)

Manual overview

This manual provides all the information required to power, connect, and configure your Matrox Iris GTR to develop and deploy imaging applications. Most of this information is pertinent to both the Matrox Iris GTR with Design Assistant and the Matrox Iris GTR with MIL-only.

For information on powering your Matrox Iris GTR, reading the LEDs, connecting your smart camera to your network, and connecting to it remotely, and connecting it to third-party devices, refer to *Chapter 2: Powering and connecting to your Matrox Iris GTR*.

For a summary of the key features of Matrox Iris GTR, and pinout descriptions for external connectors of your Matrox Iris GTR, refer to *Appendix B: Technical reference*.

To select a lens, refer to *Appendix C: Selecting a lens*.

If you have a Matrox Iris GTR with Design Assistant, to use the various utilities and to recover the Matrox Imaging operating system (MIOS) on a Matrox Iris GTR, refer to *Appendix D: Matrox Imaging operating system utilities and recovery*.

If you have a Matrox Iris GTR with MIL-only, to backup and restore the smart camera's operating system partition, refer to *Appendix E: Microsoft Windows operating system partition backup and recovery*.

For information on how to use your Matrox Iris GTR breakout board, refer to *Appendix F: The Matrox Iris GTR breakout board*.

Need help?

Additional help can be found on the support page of the Matrox Imaging website: **http://www.matrox.com/imaging/en/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 registered, you can contact technical support. To do so, you should first complete and submit the online Technical Support Request Form using the gathered information, 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

Powering and connecting to your Matrox Iris GTR

This chapter guides you through powering your Matrox Iris GTR, connecting it to another device, and reading the LEDs.

Powering and connecting to your Matrox Iris GTR

The Matrox Iris GTR has the following interfaces (from left to right):

- **Digital I/O and power connector.** Used to receive power from an external power source. The connector can also receive trigger input and send/receive digital auxiliary I/O signals to/from third-party I/O devices. In addition, the connector has a specialized analog intensity (dimming) control signal intended to be used with a lighting device (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device).

- **VGA/USB connector.** Provides connectivity between your Matrox Iris GTR and a display device and/or a USB device (such as a keyboard or a mouse).

- **100/1000 BaseT Ethernet connector.** Provides connectivity between your Matrox Iris GTR and your computer or your network. Matrox Iris GTR can gain access to a LAN via Gbit Ethernet (GigE, 1G BaseT, or 1000BaseT), fast Ethernet (100BaseT), or twisted pair Ethernet (10BaseT). This interface can also be used for communication with external devices using the PROFINET, EtherNet I/P, or Modbus protocol. For PROFINET, the interface operates as a hardware-assisted PROFINET interface. The LAN connection associated with the hardware-assisted PROFINET interface can be shared with other traffic.

- **Liquid lens connector** (not depicted). Used to provide automatic focusing of your Varioptic Caspian C-39N0-160-I2C or C-39N0-250-I2C lens. Automatic focusing can be configured using a MIL application.

To use your Matrox Iris GTR, perform the following:

1. Connect an external power supply and your third-party I/O devices to the Digital I/O and power connector of your Matrox Iris GTR using the provided cable.

   If you have purchased the Matrox Iris GTR starter kits, use the open-ended digital I/O and power cable and the Matrox Iris GTR breakout board, included in the kit, to make the connections. For details regarding the Matrox Iris GTR breakout board camera connector, refer to the *Powering and connecting* section, in *Appendix F: The Matrox Iris GTR breakout board*.

❖ Note that the Matrox Iris GTR breakout board is for development purposes and not industrially protected.

   If you have purchased the Matrox Iris GTR breakout board separately, you can make your own cable. Alternatively, you can use the GTR-CBL-PWR/3 open-wire digital I/O and power cable from Matrox; however, you must use a custom cable to connect it to a power supply. For more information regarding the pin-out of your Matrox Iris GTR power and I/O connector, refer to the *Digital I/O and power connector* subsection of the *Matrox Iris GTR connectors* section, in *Appendix B: Technical reference*.

2. Connect your display device and USB device to the VGA/USB connector of your Matrox Iris GTR using the VGA/USB cable (either the cable from the starter kit or GTR-CBL-VGAUSB).

   Alternatively, you can build your own. For more information regarding the pin-out of your Matrox Iris GTR VGA/USB connector, refer to the *VGA/USB connector* subsection of the *Matrox Iris GTR connectors* section, in *Appendix B: Technical reference*.

   There are multiple ways to connect devices to the VGA/USB cable. If connecting to a display device that has a VGA connector available, we recommend using it. To connect your Matrox Iris GTR to a display device and one or more input devices (such as a keyboard and mouse), connect a USB hub to the USB connector

of your VGA/USB cable. Once the hub is connected, connect your keyboard and mouse to the hub. Note that, in some cases, your display device can also act as a USB hub.
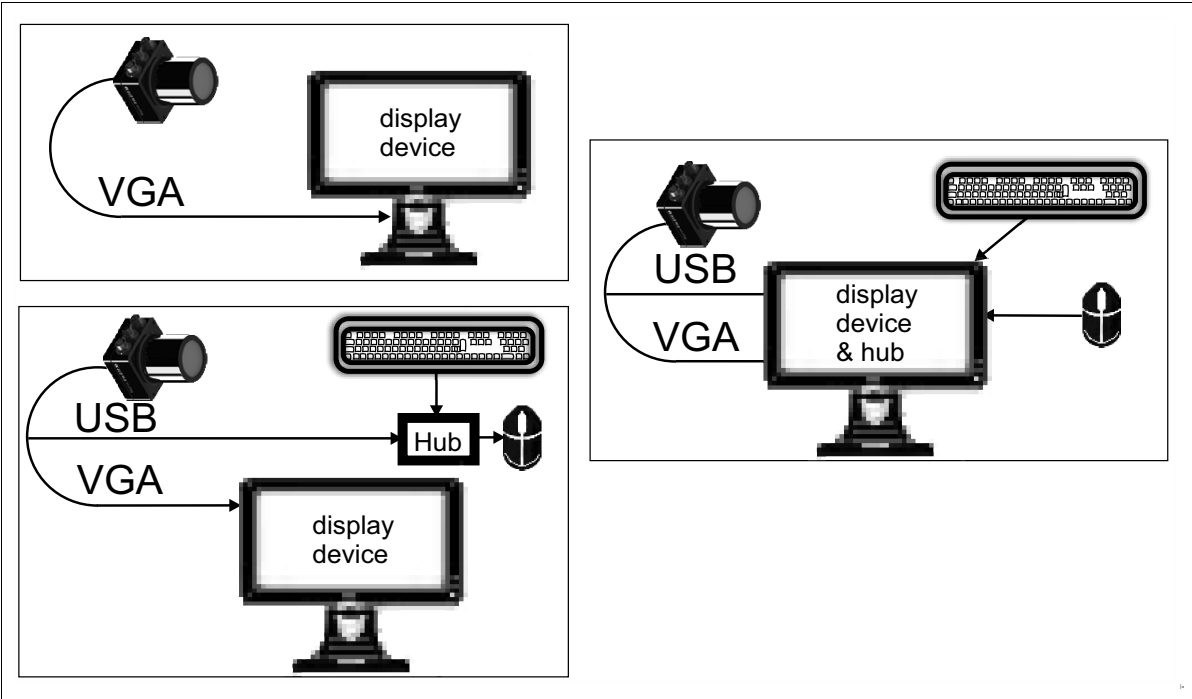
❖ Note that if you are using a Matrox VGA/USB cable, the cable has a type A USB connector.

If you are not using this connector, the VGA/USB cap must remain in place for IP67 conformity.

If connecting the Matrox VGA/USB cable to a device requiring a type B connector, use a type A to type B USB cable to connect the VGA/USB cable to your device.
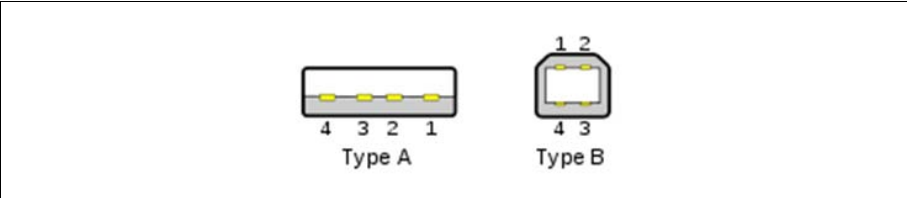
3. Connect your network or your computer (peer-to-peer) to the Matrox Iris GTR 100/1000 BaseT Ethernet connector using a network cable with an M12 8-pin X-coded connector on one end (either the cable from the starter kit or GTR-CBL-ETH/5).

   Connect the RJ45 connector of the cable to the network connector of your network/computer.

   After making the network connection, you might need to configure your Matrox Iris GTR so that it can communicate with your network or computer. To do so, refer to *Adding Matrox Iris GTR to your network* section, later in this chapter.

   If not using the network connection, the connector must be capped to maintain IP67 conformity.

4. Connect your lens to the Matrox Iris GTR housing, screwing it in firmly. Note that if you are using a Varioptic Caspian C-39N0-160-I2C or C-39N0-250-I2C lens, refer to *Optionally connecting a liquid lens* section, later in this chapter.

   Important   Screw on the IP lens case until it is firmly in place over the lens and on the Matrox Iris GTR housing. Note that the IP lens case must be in place for IP67 conformity.

5. If using your Matrox Iris GTR in a deployment environment, you must fasten your smart camera to a support using its provided mounting holes. For the dimensions of the mounting holes, refer to the *Dimensions* section, in *Appendix B: Technical reference.*

Optionally connecting a liquid lens

If using a Varioptic Caspian C-39N0-160-I2C or C-39N0-250-I2C lens, it must be connected to your Matrox Iris GTR's liquid lens connector.

To do so, perform the following steps:

1. Disconnect the power from your Matrox Iris GTR.

2. If in place, unscrew the IP lens case from your Matrox Iris GTR.

3. Remove the plug covering the liquid lens connector inside the camera lens housing, using non-conductive tweezers.

4. Screw the lens onto the lens enclosure, until it is firmly in place.

5. The Varioptic Caspian lens has two cables. Wrap the longer cable (with the 6-pin connector) tightly around the Varioptic Caspian lens housing.

6. Plug the 6-pin connector of your Varioptic Caspian lens into the liquid lens connector on your Matrox Iris GTR. To do so, use non-conductive tweezers. Once the connector is in place, use the tweezers to press firmly on either side of the connector to ensure a good connection.

7. Tuck the 3-pin connector (and its branched wire) into the folds of the longer cable. The 3-pin connector is not used..

8. Slide the IP lens case over the lens, and screw it into the Matrox Iris GTR housing, until it is firmly in place.

   ❖ Note that the IP lens case must be in place for IP67 conformity.

9. Reconnect the power to your Matrox Iris GTR.

Reading the state of your Matrox Iris GTR

From the moment you power up your Matrox Iris GTR to the moment you power it down, at least one of the four light-emitting diodes (LEDs) at the back of Matrox Iris GTR should be lit.

| Power | Status | User | 100/1G |

Digital I/O and power connector

VGA/USB connector

100/1000 BaseT Ethernet connector
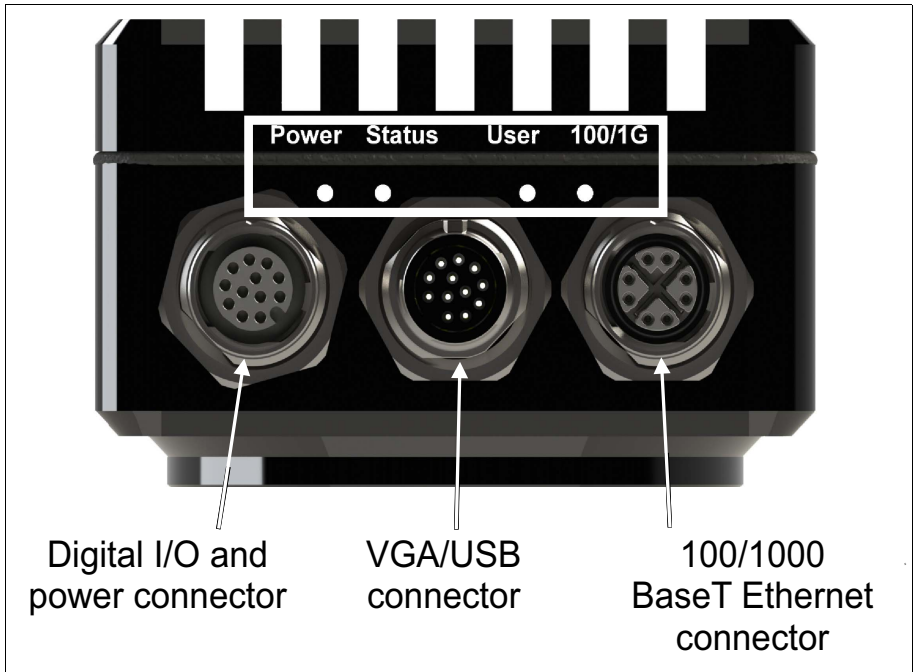
The LEDs on your Matrox Iris GTR are:

- **Power LED and User LED**. The colors of these two LEDs change as your Matrox Iris GTR boots.

- **Status LED**. This LED shows the general activity of your Matrox Iris GTR.

- **100/1G LED**. This LED shows the connection status of your Matrox Iris GTR.

The Power and User LEDs typically display one of the following sets of colors:

LED Color		Description
Power	**User**	
Off	Off	Matrox Iris GTR has no power.
Red	Red[a]	Power is available, but your Matrox Iris GTR is not responding.
Red	Orange[a]	Memory initialization error detected.
Orange	Orange/Red blink[a]	Thermal trip detected.
Orange	Orange	BIOS execution in progress.
Orange	Green[a]	BIOS execution completing.
Green	Off[a]	Matrox Design Assistant is now in control.
Green	Orange[a]	Operating system startup in progress.
Green	Green[a]	Camera ready.
Green	Orange/Off blink[a]	Overheat detected. Temperature is above the throttle temperature limit.

a. This LED is not pre-configured on the Matrox Iris GTR with MIL-only smart cameras, but can be configured using MsysControl with M_LED_USER.

The Status LED typically displays one of the following sets of colors:

LED Color	Description
Off	There is no power.
Red	Matrox Iris GTR is booting.
Red/Orange	Sensor has not been attached or initialized yet.
Orange	The Matrox Iris GTR acquisition section is initializing. A MIL or Matrox Design Assistant application could also be waiting for a trigger or using image files from disk.
Green	The Matrox Iris GTR acquisition section is grabbing an image.

100/1G LED typically shows the connection status of your Matrox Iris GTR:

LED Color	Description
Off	There is either no activity or a low speed (10 Mbits) connection between your Matrox Iris GTR and the network.
Solid yellow	There is a link on the 100 Mbits/sec connection.
Blinking yellow	The 100 Mbits/sec connection has activity.
Solid green	There is a link on the 1 Gbit/sec connection.
Blinking green	The 1 Gbit/sec connection has activity.

Adding Matrox Iris GTR to your network

Corporate-wide networks typically use DHCP servers to assign each connected device an IP address. If your Matrox Iris GTR is still in its factory-configured state, and your network uses a DHCP server, no configuration is required to use your Matrox Iris GTR on your network.

Much of the information found in this section is directed to users with a Matrox Iris GTR camera with Matrox Design Assistant, because in this case, the camera uses the Matrox Imaging Operating System (MIOS). There are some differences if you are using Matrox Iris GTR with MIL-only because it uses a Windows 10 IoT operating system. Some differences include:

• Access to the Matrox Design Assistant **configuration** portal is not available. Some settings, such as TCP/IP, can be changed through the **Settings** menu in Windows 10 IoT, instead of the Matrox Iris GTR **configuration** portal.

• The Matrox Iris GTR Discovery utility is not available.

• Configuration settings must be changed the same way as any other Windows 10 IoT operating system; refer to the relevant Windows documentation for this information.

Device name (AUTO NETNAME)

By default, Matrox Iris GTR comes factory configured with a device name (AUTO NETNAME), which can be found on a sticker attached to your Matrox Iris GTR smart camera and is unique for each camera. If you are connecting to a static network, use the IP address of the camera; otherwise, if you are connected to a DHCP network, this name is used:

```
GTR32XXXX
```

The XXXX corresponds to the last four hexadecimal digits of your Matrox Iris GTR's MAC address. This can be changed to a more meaningful name through the Matrox Design Assistant configuration portal.

The Matrox Design Assistant configuration portal on your Matrox Iris GTR is located at *http:\\GTR32XXXX*, where *GTR32XXXX* is your smart camera's device name. This portal allows you to manage many aspects of your smart camera (for example, configure settings, manage projects, and set up communication). You can change network settings in the **TCP/IP** tab of the **Administration** page (gear icon), where you can also change the device name (AUTO NETNAME) of your camera.

Using a static IP address with networks that do not use DHCP

If your network does not use DHCP, you must access and configure your Matrox Iris GTR to use a static IP address. To access Matrox Iris GTR when you don't know its current IP address, you can physically connect to it or use the Matrox Iris GTR Discovery utility on your development computer.

Connecting directly to your Matrox Iris GTR

If you do not know your Matrox Iris GTR's IP address, you can physically connect to it and change its IP address; to do so for a Matrox Iris GTR, perform the following:

1. Connect your Matrox Iris GTR to a monitor, mouse, and USB keyboard. Then, turn on the connected monitor, mouse, and USB keyboard before plugging in your Matrox Iris GTR to a power source.

2. On your Matrox Iris GTR, launch your web browser, and go to the following address:

```
http:\\localhost
```

3. When the Matrox Design Assistant configuration portal loads, go to the **Administration** page by clicking on the **gear** button.

4. Click on the **TCP/IP** tab.

5. Enter the IP address, subnet mask, and gateway address in the spaces provided. When done, click on the **Save settings** button.

   Your IP address is now changed.

   ### Using the Matrox Iris GTR Discovery utility for Matrox Iris GTR
   If you do not know your Matrox Iris GTR's IP address, you can use the Matrox Iris GTR Discovery utility to access it and change its IP address; to do so, perform the following:

1. On your development computer (where Matrox Design Assistant is installed), launch the MIL Control Center utility.

2. In the MIL Control Center utility, select Design Assistant Tools for the version of Matrox Design Assistant.

3. In the Design Assistant Tools directory, select and run the Matrox Iris GTR Discovery utility (IrisGTRDiscovery).

   The Matrox Iris GTR will find all the Matrox Iris GTRs on the same subnet, and allow you to modify their communication settings.

Connecting to your Matrox Iris GTR desktop

From your smart camera's desktop, you can launch the MILConfig utility (to configure updates, assist in troubleshooting your runtime application with Matrox technical support, and set default values), as well as access files stored on your smart camera.

The following instructions are for Matrox Iris GTR with Matrox Design Assistant. If you have Matrox Iris GTR with MIL-only, it has Windows 10 IoT, so you can set up remote access to your camera using the Windows Remote Desktop Connection utility.

Accessing your Matrox Iris GTR desktop remotely

If you do not want to keep a keyboard, mouse, and monitor connected to your Matrox Iris GTR, once your smart camera is on your network, you can connect to your Matrox Iris GTR remotely by using a virtual network computing (VNC) program. Several VNC programs are available on the Internet. A few choice examples are available to download directly from your smart camera. To download and install one of these programs, perform the following:

1. For Matrox Iris GTR with Design Assistant users, go to the following web address:

```
http:\\GTR32XXXX:8080
```

Replace XXXX with the last four digits of your smart camera's MAC address, or if you have changed the camera's device name, replace GTR32XXXX with its new name. You can also replace GTRXXXX with the smart camera's IP address.

2. Select the installer that best matches your needs.

Follow all on-screen instructions. Refer to the provided documentation for assistance.

Logging in   When using VNC for the first time, you must log into your Matrox Iris GTR using the default user account:

User name:	MtxUser
Password:	Matrox

❖ Matrox Design Assistant expects to work with the MtxUser account; in this case, it should not be renamed or deleted.

Accessing your Matrox Iris GTR from your PC

Once your Matrox Iris GTR is added to your network, you can remotely access the hard disk of your Matrox Iris GTR using Microsoft Windows Explorer. Typically, Matrox Iris GTR will be listed as a computer under the **Network** folder. When you try to access the files on your Matrox Iris GTR, you are prompted for a user name and password. Note that these fields are case-sensitive.

If you are accessing your camera from a computer on a separate domain, remember to prefix your user name with the camera's device name:

```
\\gtr32XXXX\mtxuser
```

On Matrox Iris GTR with Matrox Design Assistant, several folders are shared by default, including the MtxUser user's folder.

In Matrox Design Assistant, you can use the PATH function with predefined settings to access a few of the more commonly used paths.

Type of files	File path	Path command in Matrox Design Assistant	Examples

Matrox Design Assistant Documents	*\\GR32XXXX\mtxuser\Documents*	`PATH("DA Documents")`	`{PATH("DA Documents")}\\SavedImages`
			`{PATH("DA Documents")}\\SavedTextFiles`
			`{PATH("DA Documents")}\\Images`

Matrox Design Assistant Project files	*\\GTR32XXXX\mtxuser\da\Projects*	`PATH("DA Project")`	`{PATH("DA Project")}\\Images`

Connecting to the auxiliary I/O interface

Matrox Iris GTR has an auxiliary I/O interface with 7 optically isolated auxiliary signals. Four are inputs that support sinking and sourcing configurations and can receive 24 V. Three are outputs that support sinking configurations and operate at up to 24 V nominal; you could connect one of the outputs in a sourcing configuration, but the other two outputs would no longer be available. Matrox Iris GTR also has an analog intensity (dimming) control signal, which is discussed in the *Connecting a light controller and the analog intensity control signal* section later in this chapter.

Note that sinking and sourcing concepts refer to the *conventional current flow*, which means current flows from the positive potential towards the negative potential. A sinking device provides a path to *sink* current towards ground or to the *return path;* a sinking device does not provide power. A sourcing device provides a path that sources current; it provides a path from the power source. In the following diagram, the device on the right is the sourcing device, and the device on the left is the sinking device.
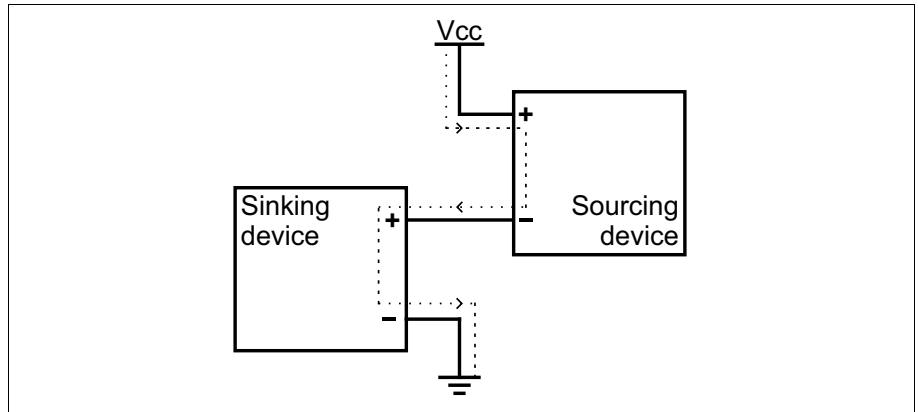
Equivalent circuit only

When setting up auxiliary I/O, be aware that you need to configure these pins on the software side as well. If you are using Matrox Design Assistant, refer to the *Connecting to your Matrox Iris GTR as your runtime platform* section of the *Matrox Iris GTR appendix* in the *Matrox Design Assistant help file* for this information. If you are using MIL, refer to *Matrox Iris GTR connectors and signal names* section of the *Matrox Iris GTR appendix* in the *MIL help file*

Connecting devices to the auxiliary output signals

Matrox Iris GTR auxiliary output signals can be interfaced with input modules (with sourcing or sinking input signals) found on most programmable logic controllers (PLCs) and other devices. The auxiliary output signals can also be interfaced with inductive load devices (such as a relay or a small motor).

The Matrox Iris GTR auxiliary output signals are sinking output signals, based on an NPN-type transistor. They need to be connected to an external power source because on their own, they are not capable of providing voltage to drive a device. They are typically connected in a sinking configuration because they only have one dedicated pin (AUX_OUT0, AUX_OUT1, AUX_OUT2, respectively) and share their other pin (AUX_OUT_COMMON). So, typically, a sourcing device is connected to their dedicated pin and the return path is connected to the common pin. The exact connection between the output signal, the connected device, and the power source depends on the type of device to which you connect.

Connecting three sourcing devices to sinking auxiliary output signals
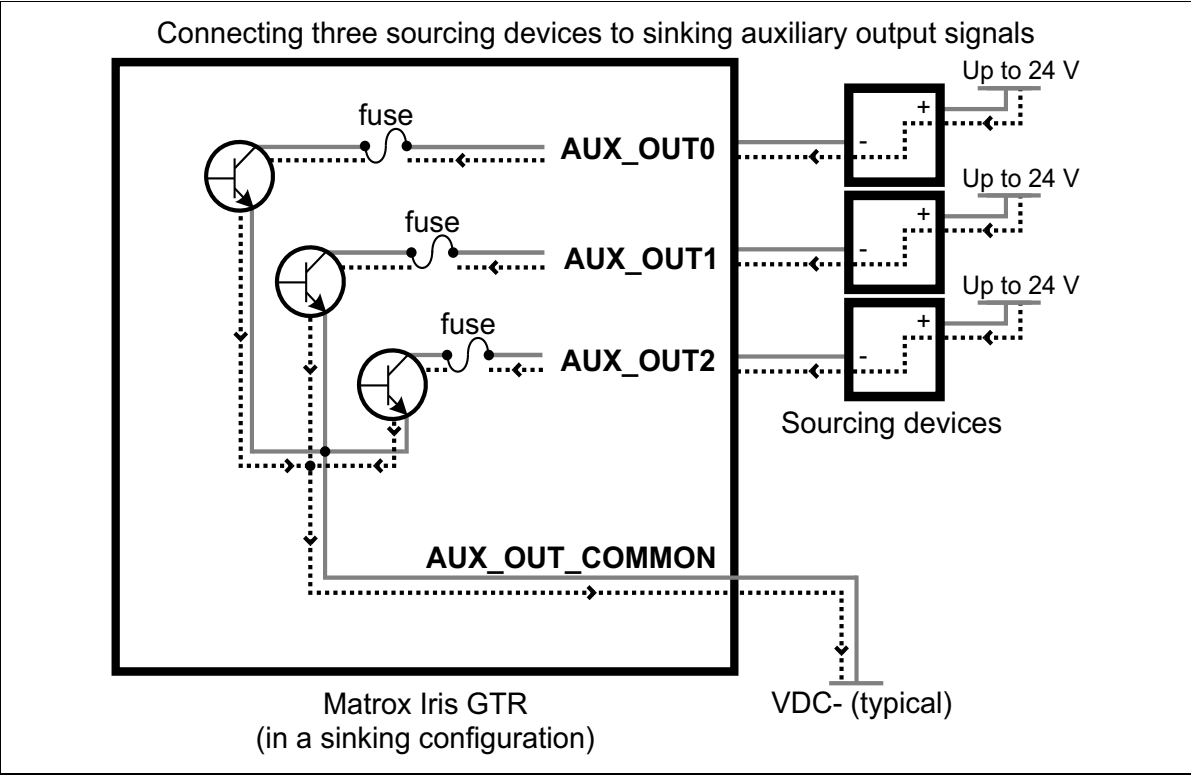
Equivalent circuit only

You can also connect a single auxiliary output signal in a sourcing configuration, such that the common pin is connected to a sinking device and the dedicated pin is connected to the power supply. However, in this configuration, the other two auxiliary output signals are not available. The exact connection between the output signal, the connected device, and the power source depends entirely on the type of device to which you connect.

Connecting one sourcing auxiliary output signal to a sinking device.
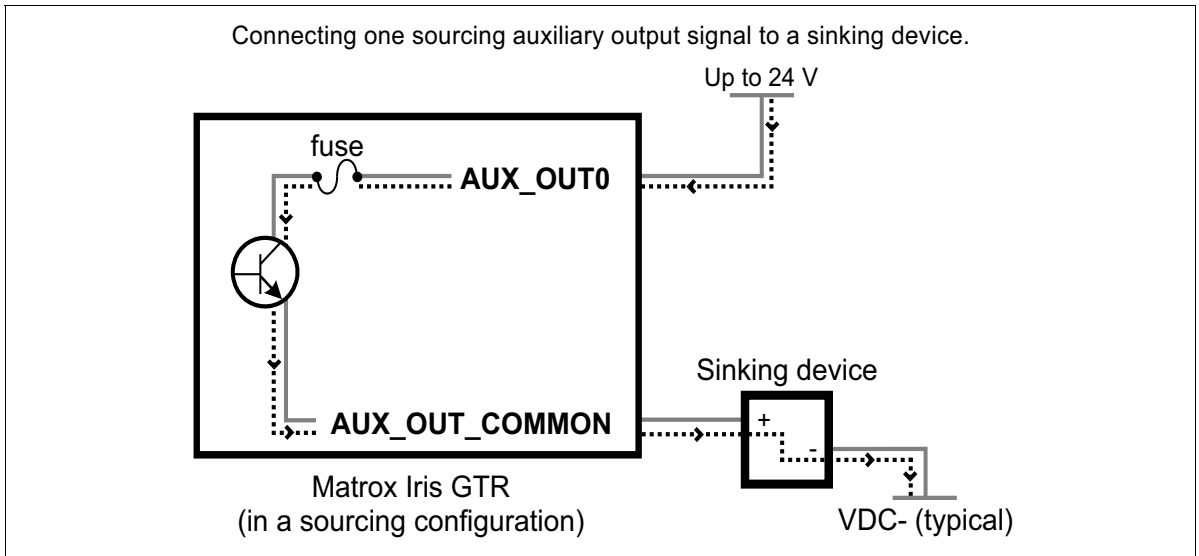
Equivalent circuit only

When an auxiliary output signal is **on**, the circuit between its AUX_OUT pin and AUX_OUT_COMMON pin is closed, allowing current to flow from the AUX_OUT pin to the AUX_OUT_COMMON pin, if the AUX_OUT pin is attached to a power source or a sourcing device. When an auxiliary output signal is **off**, the circuit between the AUX_OUT and AUX_OUT_COMMON pins of the signal is open and no current flows through.

Important   Note that the power source must be provided externally.

When the auxiliary output signal is attached to a device, the following can be observed:

Connection	Observed at	Observed voltage	
		Signal on (closed so current can flow from AUX_OUT to AUX_OUT_COMMON pin)	Signal off (open so current cannot flow from AUX_OUT pin to AUX_OUT_COMMON pin)
Sourcing device attached to AUX_OUT pin and return path attached to AUX_OUT_COMMON pin	AUX_OUT pin	Low	Floating (voltage level is imposed by the sourcing device)
	AUX_OUT_COMMON pin	Low	Low
Power supply attached to AUX_OUT pin and sinking device attached to AUX_OUT_COMMON pin	AUX_OUT pin	High	High
	AUX_OUT_COMMON pin	High	Floating (voltage level is imposed by the sinking device)

Connecting to a digital device that requires two predictable voltage levels to operate

The auxiliary output signals can, therefore, only present one predictable voltage level for a given configuration: a low voltage level in a sinking configuration or a high voltage level in a sourcing configuration. Their other output state is, by default, floating. So, if you need to connect to a digital device that requires two predicable voltage levels to operate, pullup or pull-down circuitry must be added.

Connection required if using external pullup circuitry

+

Up to 24V

-

AUX_OUT

AUX_OUT_COMMON

------ Optional.
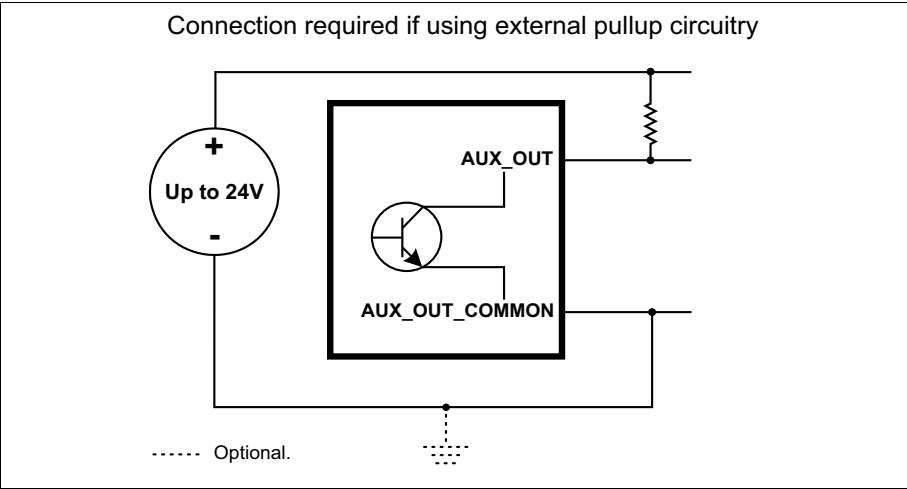
Equivalent circuit only

To add pullup or pull-down circuitry, attach an external pullup or pull-down resistor, respectively. A resistance value of 3 KOhms is suggested to protect your Matrox Iris GTR. Since your Matrox Iris GTR auxiliary output signals can sink up to 50 mA, use the documentation of your input to calculate the required resistance for your external pullup/pull-down resistor (if necessary).

In the connections above, the pullup circuitry causes an inversion if the input of the device is connected to the AUX_OUT pin. When the auxiliary output signal is **on**, the circuit between its AUX_OUT and AUX_OUT_COMMON pins is closed, and current flows from the power source to the AUX_OUT_COMMON pin. So the observed voltage at the AUX_OUT pin will be low. Whereas, when the auxiliary output signal is **off**, the circuit between its AUX_OUT and AUX_OUT_COMMON pins is open, and current flows from the power source to the input of the device. In this state, the current is limited by the pullup's resistor value.

Warning   The Matrox Iris GTR auxiliary output signals are compatible with voltages up to 24 V. However, by default, the auxiliary output signals offer low resistance. When they are **on** (their circuit is closed), current flows directly through them. Ensure that the circuit created between the power source, the output signal, the connected device, and return path does not cause more than 50 mA to flow through the signal.

As a precaution, the auxiliary output signals are individually fuse-protected up to 50 mA. Matrox Iris GTR uses resettable fuses. The fuses protect Matrox Iris GTR if you accidentally connect their corresponding auxiliary output signal to a device that sources/sinks more current than Matrox Iris GTR can safely transmit. If more than 50 mA of current goes through your Matrox Iris GTR, the fuse will eventually trip. After disconnecting your Matrox Iris GTR, the fuse will reset only after it has sufficiently cooled,

The diagram below depicts Matrox Iris GTR's on-board fuse.
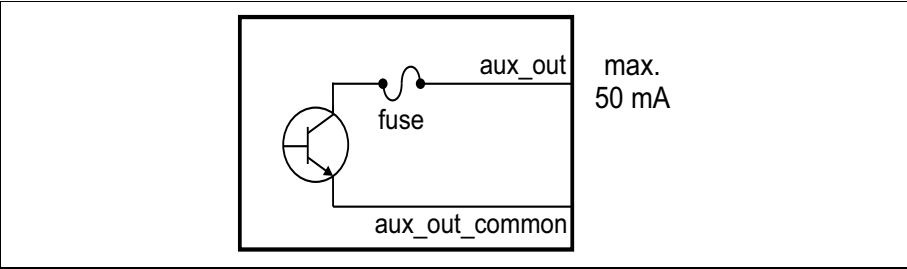
Equivalent circuit only

Optically-isolated output signals

The Matrox Iris GTR auxiliary output signals are optically isolated from the power and analog intensity (dimming) control signal as well as from the Matrox Iris GTR auxiliary input signals. They are not, however, optically isolated from each other as they share a common pin (AUX_OUT_COMMON).

About the connections in the following subsections

The following subsections detail how to connect the most common third-party devices to the Matrox Iris GTR auxiliary output signals. Ground is only shown in the following subsections for reference, in case you need to reference your return path to ground. To connect to a light controller (such as, an Advanced Illumination or Smart Vision Lights lighting controller), see *Connecting a light controller and the analog intensity control signal* section later in this chapter.

Power, as depicted in the following diagrams, represents a nominal voltage of up to 24 V (+/- 10%). For minimum and maximum voltage requirements, refer to the electrical specification of the opto-isolated output signals, in *Appendix B: Technical reference*.

The signal names in this section are shortened to fit within the diagrams: from M_AUX_OPTOIND_OUTn to AUX_OUT and from M_AUX_OPTOIND_OUT_COMMON to AUX_OUT_COMMON.

Connecting an auxiliary output signal to a sourcing input

Connect a Matrox Iris GTR auxiliary output signal to a sourcing input, as shown below.
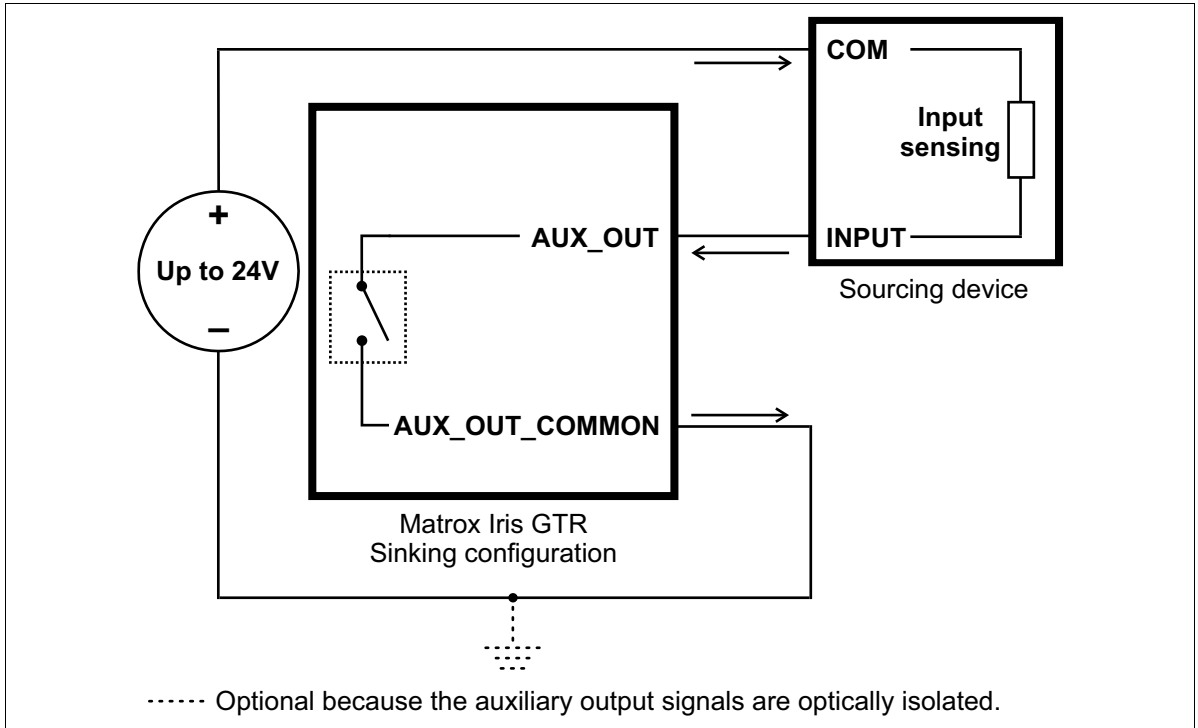
Equivalent circuit only

❖ Note that, when connecting a resistive load sourcing device instead of an input sensing sourcing device, the same connection would be used as displayed above.

Connecting an auxiliary output signal to a sinking input

Connect a Matrox Iris GTR auxiliary output signal to a sinking input, as shown below. In this case, the pullup circuitry is used to source the current to the sinking input.

····· Optional because the auxiliary output signals are optically isolated.
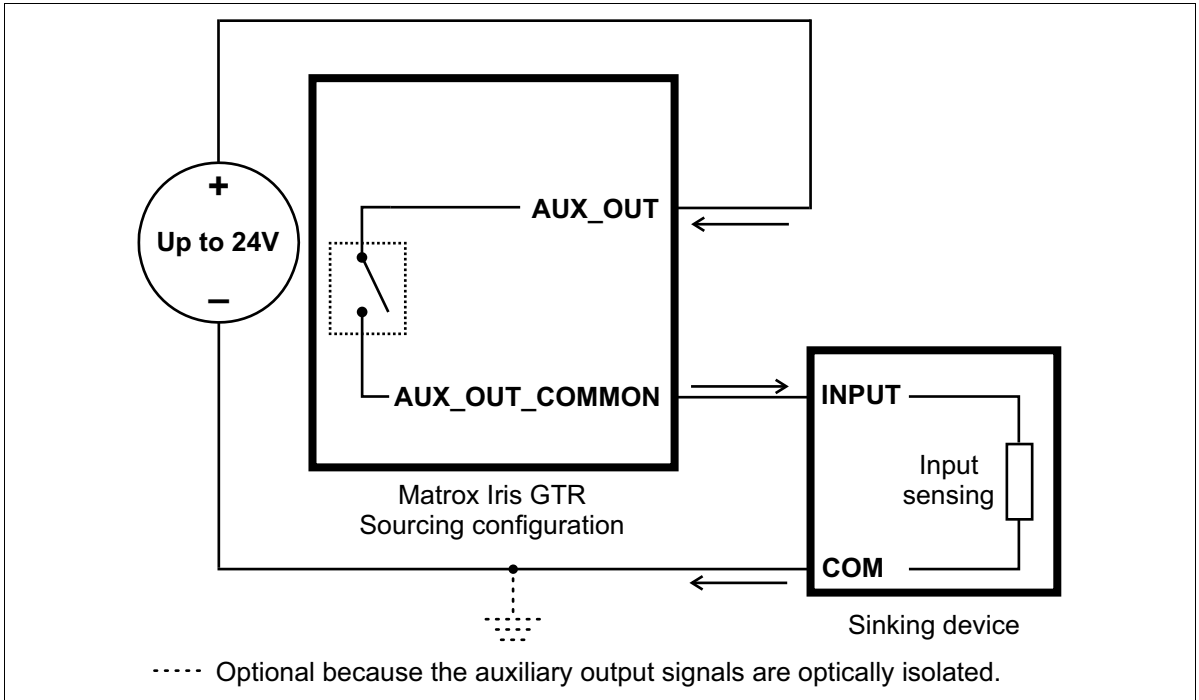
Equivalent circuit only

Important   In this configuration, the other two auxiliary output signals are not available.

❖ Note that, when connecting a resistive load sinking device instead of an input sensing sinking device, the same connection would be used as displayed above.

Connecting an auxiliary output signal to a sinking input using an external pullup resistor

To not lose two of the available three auxiliary output signals, you can connect an auxiliary output signal to a sinking input as follows. Note that, in this configuration, you will need to connect an external pullup resistor. Since your Matrox Iris GTR auxiliary output signals can sink up to 50 mA, use the documentation of your sinking device to calculate the required resistance for your external pullup resistor (if necessary).
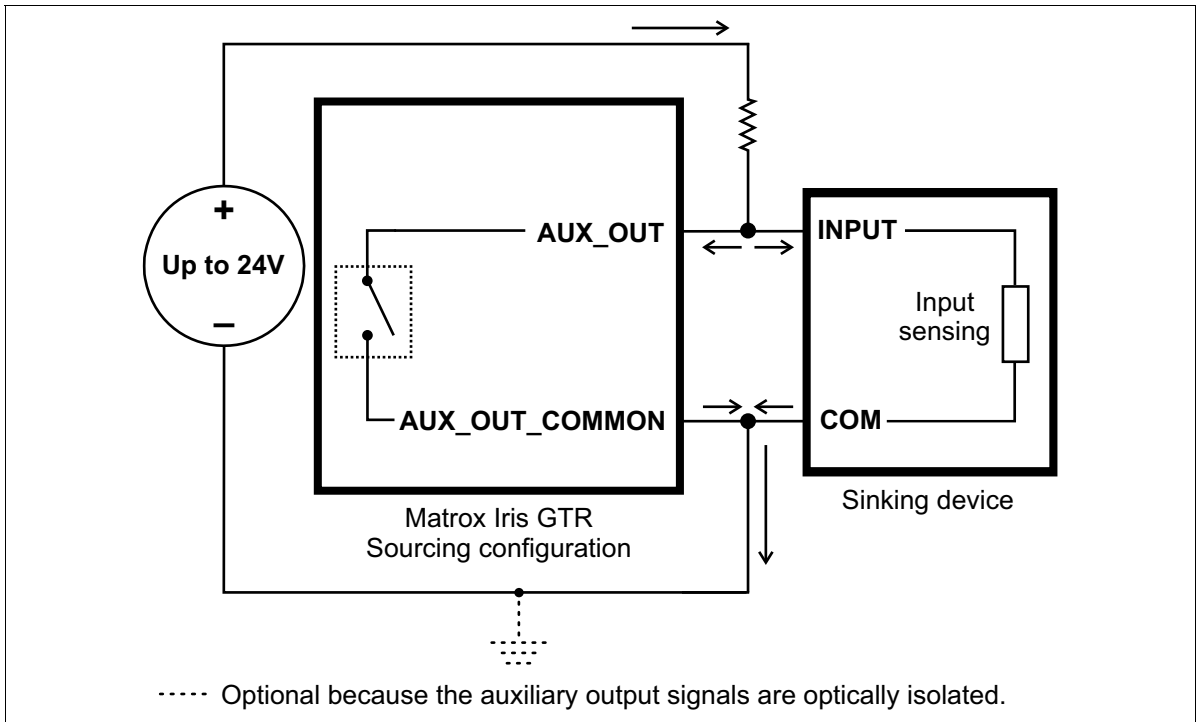
Equivalent circuit only

Connecting an auxiliary output signal to an inductive load input

Connect a Matrox Iris GTR auxiliary output signal to an inductive load input, as shown below.

An inductive load device, such as a traditional relay, requires that you use a flyback diode to protect Matrox Iris GTR from over and under-voltage, as shown below. This diode should be connected as close as possible to the input and voltage source of your inductive load device.
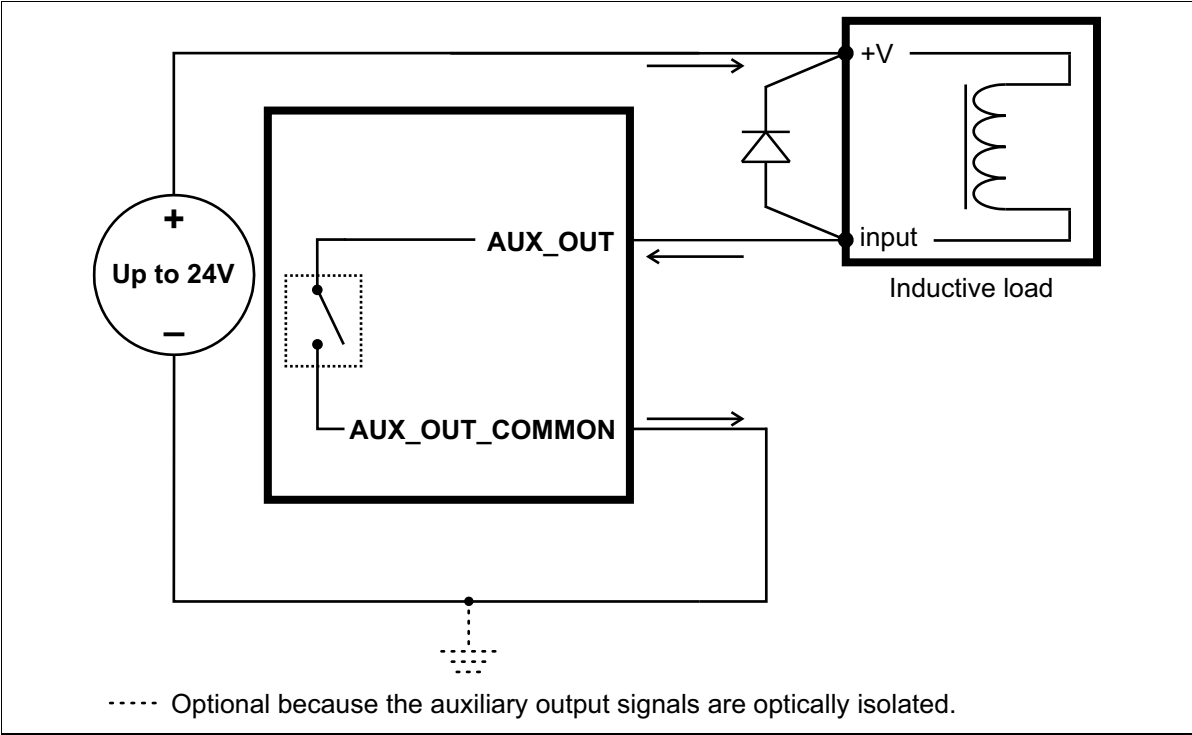
Equivalent circuit only

Connecting devices to the auxiliary input signals

Matrox Iris GTR auxiliary input signals can be interfaced with a wide variety of devices (such as proximity detectors). The Matrox Iris GTR auxiliary input signals only detect when current flows between their AUX_IN pin and AUX_IN_COMMON pin. As such, an auxiliary input signal must be connected to a device that controls the flow of current. When current is detected, the signal is reported as **on**; otherwise, it is reported as **off**. In software, you can enable an interrupt to be generated the moment current is detected. For information on the electrical specifications of the **on** and **off** voltage levels, see the *Electrical specifications* section, in *Appendix B: Technical reference*.

Each of the four available auxiliary input signals has one dedicated pin (AUX_IN3, AUX_IN4, AUX_IN5, and AUX_IN6, respectively) and shares its other pin (AUX_IN_COMMON) with the other auxiliary input signals.

You can connect the auxiliary input signals in a sinking or sourcing configuration. Since the auxiliary input signals share a common pin, they have to be all in a sinking configuration or all in a sourcing configuration. The exact connection between the input signal, the connected device, and the power source depends entirely on the type of device to which you connect. You should essentially connect your device respecting the following:

Equivalent circuit only
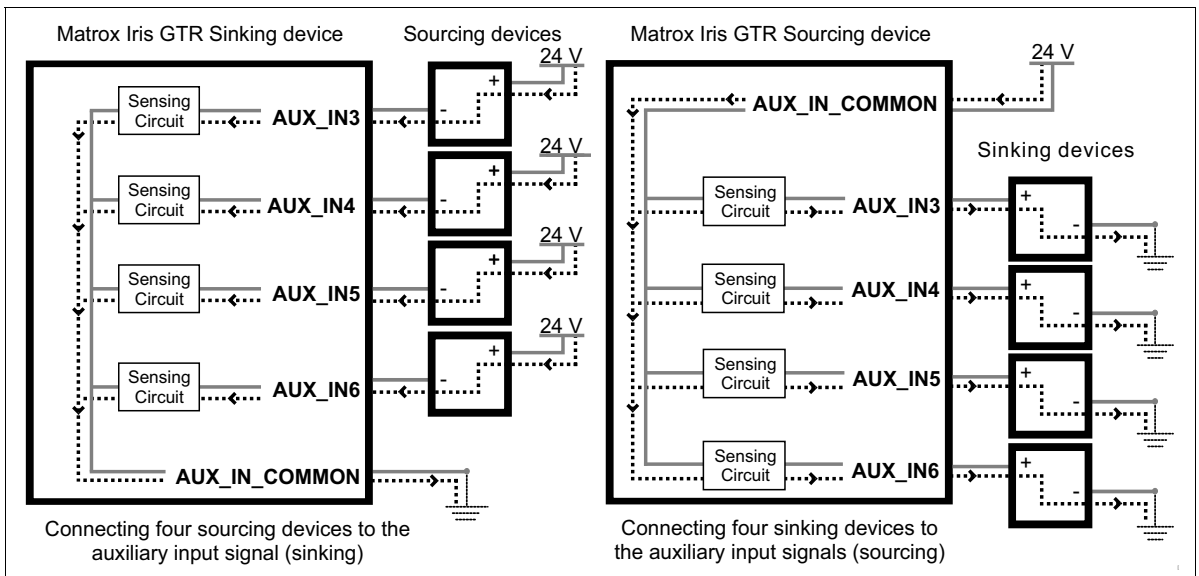
Pullup circuitry

In some cases, you must add pullup circuitry to connect an output device to an auxiliary input signal; specifically, you must attach an external pullup resistor between the voltage source and the AUX_IN pin.

This is required when you connect the AUX_IN_COMMON pin to the electrical return path and the third-party output device is in a sinking configuration. In this case, select a resistor value that will not overcurrent the output device and instead provide just enough current and voltage to your Matrox Iris GTR auxiliary input signals, according to the *Electrical specifications* subsection in *Appendix B: Technical reference*. Note that you should use a resistor with an appropriate power rating for your circuit.

Connection required if using external pullup circuitry

AUX_IN

24V

Sensing Circuit

AUX_IN_COMMON

····· Optional because the auxiliary input signals are optically isolated.
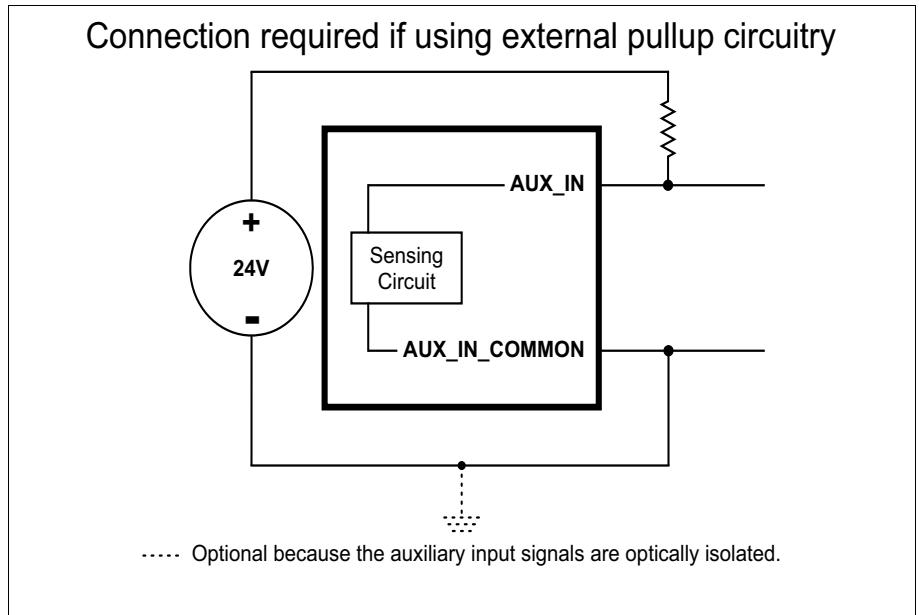
Equivalent circuit only

Bleeding resistor   By default, if properly configured, the current should flow from the AUX_IN pin to the AUX_IN_COMMON pin (when connected to a sourcing device), or from the AUX_IN_COMMON pin to the AUX_IN pin (when connected to a sinking device). In some cases, the amount of current going through the sensing circuit is insufficient for the connected output device to match its minimum current requirement when the device is in an on or off-state, depending on the configuration of the circuit. To boost the flowing current, connect a 2.2 kOhm external bleeder resistor between the AUX_IN and AUX_IN_COMMON pins. For example:
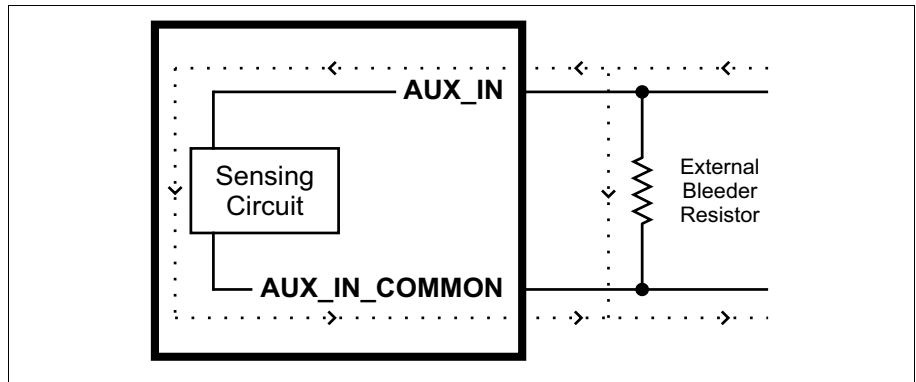
Equivalent circuit only

About the connections in the following subsections   The following subsections detail how to connect the most common third-party devices to the Matrox Iris GTR auxiliary input signals.

Note that Matrox Iris GTR auxiliary input signals are optically isolated. Ground is only shown in the following subsections for reference, in case you need to reference your return path to ground.

Power, as depicted in the following diagrams, represents a nominal voltage of 24 V (+/- 10%). For minimum and maximum voltage requirements, refer to the electrical specification of the opto-isolated auxiliary input signals, in the *Electrical specifications* subsection in *Appendix B: Technical reference*.

The signal names in this section are shortened to fit within the diagrams: from M_AUX_OPTOIND_INn to AUX_IN; and from M_AUX_OPTOIND_IN_COMMON to AUX_IN_COMMON.

Connecting a sourcing output device to an auxiliary input signal

Connect a sourcing output device to Matrox Iris GTR auxiliary input signal, as shown below.
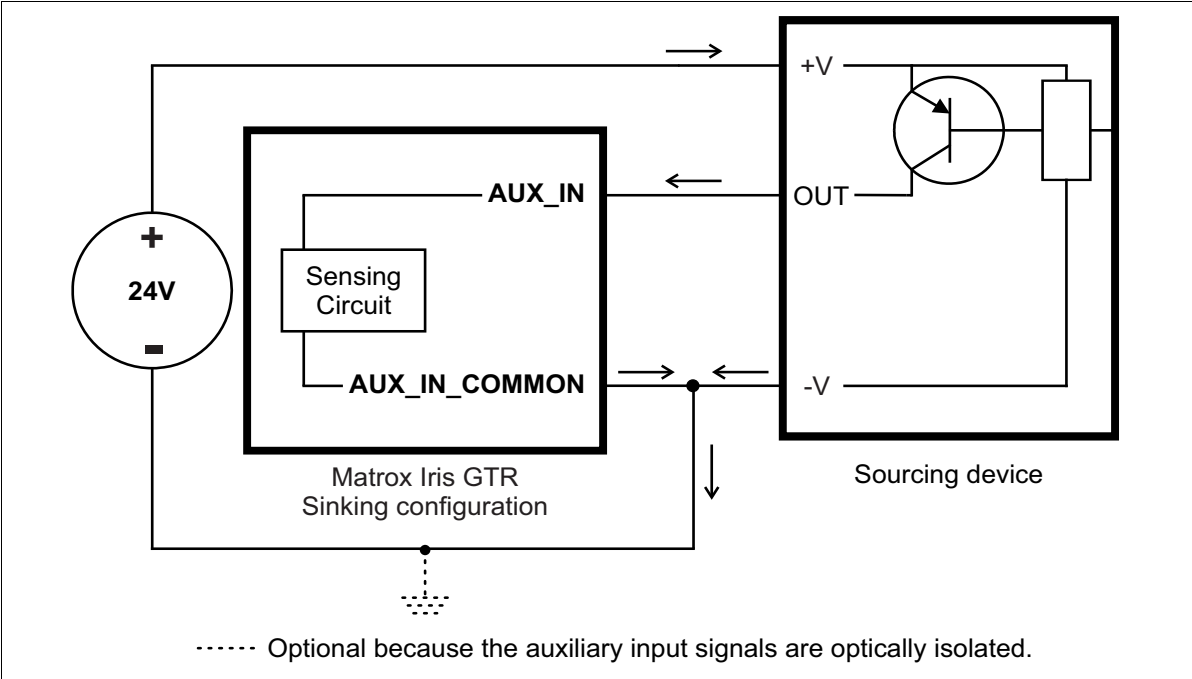
Optional because the auxiliary input signals are optically isolated.

Equivalent circuit only

Connecting a sinking output device to an auxiliary input signal

Connect a sinking output device to a Matrox Iris GTR auxiliary input signal, as shown below.
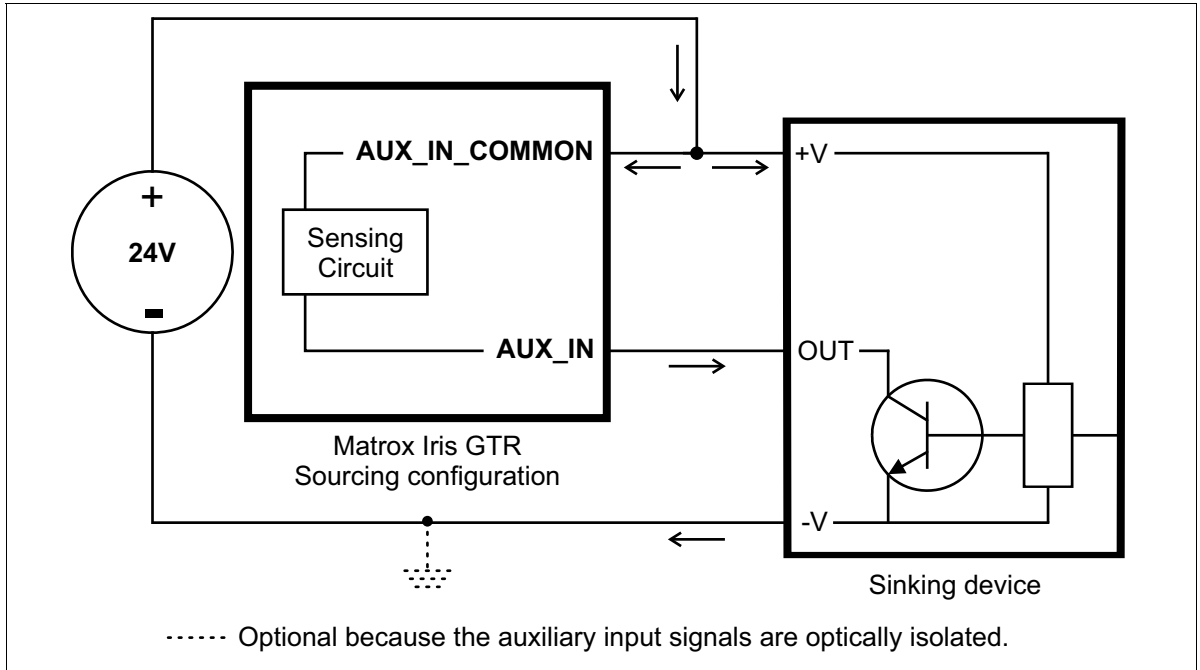
Equivalent circuit only

Connecting a 3-wire PNP proximity sensor to an auxiliary input signal

Connect a 3-wire PNP proximity sensor to a Matrox Iris GTR auxiliary input signal, as shown below.

Brown wire

Black wire

AUX_IN

Blue wire

+

24V

−

Sensing
Circuit

3-wire PNP
proximity sensor

AUX_IN_COMMON

Matrox Iris GTR
Sinking configuration

- - - - - - Optional because the auxiliary input signals are optically isolated.
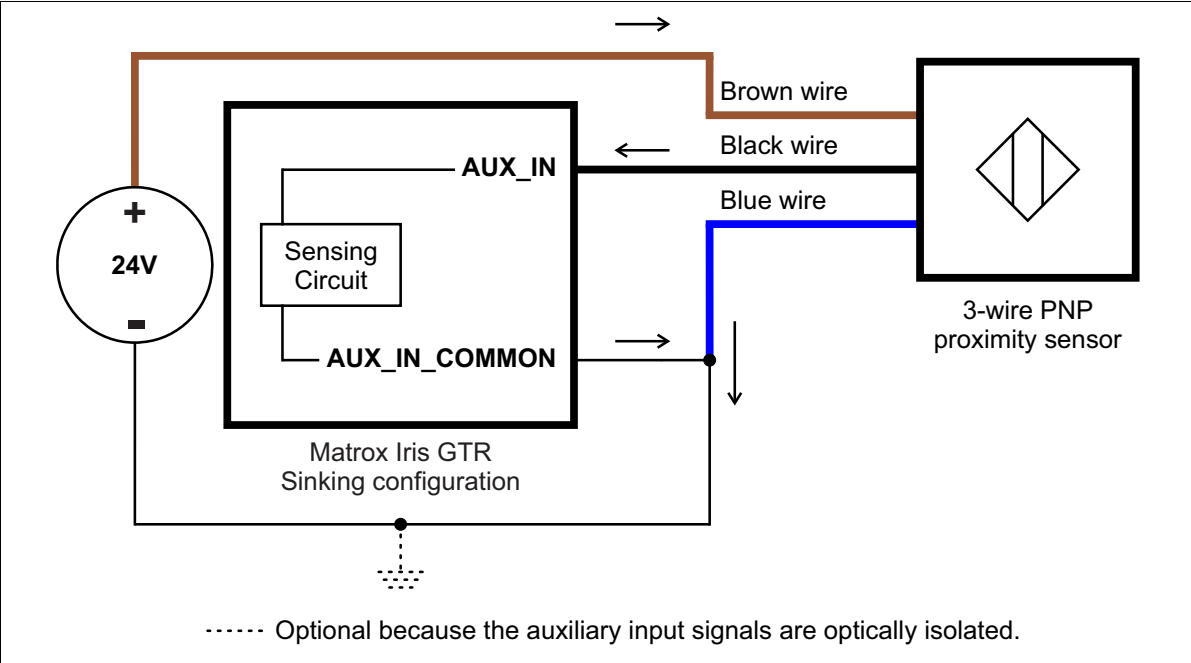
Equivalent circuit only

Connecting a 3-wire NPN proximity sensor to an auxiliary input signal

Connect a 3-wire NPN proximity sensor to a Matrox Iris GTR auxiliary input signal, as shown below.
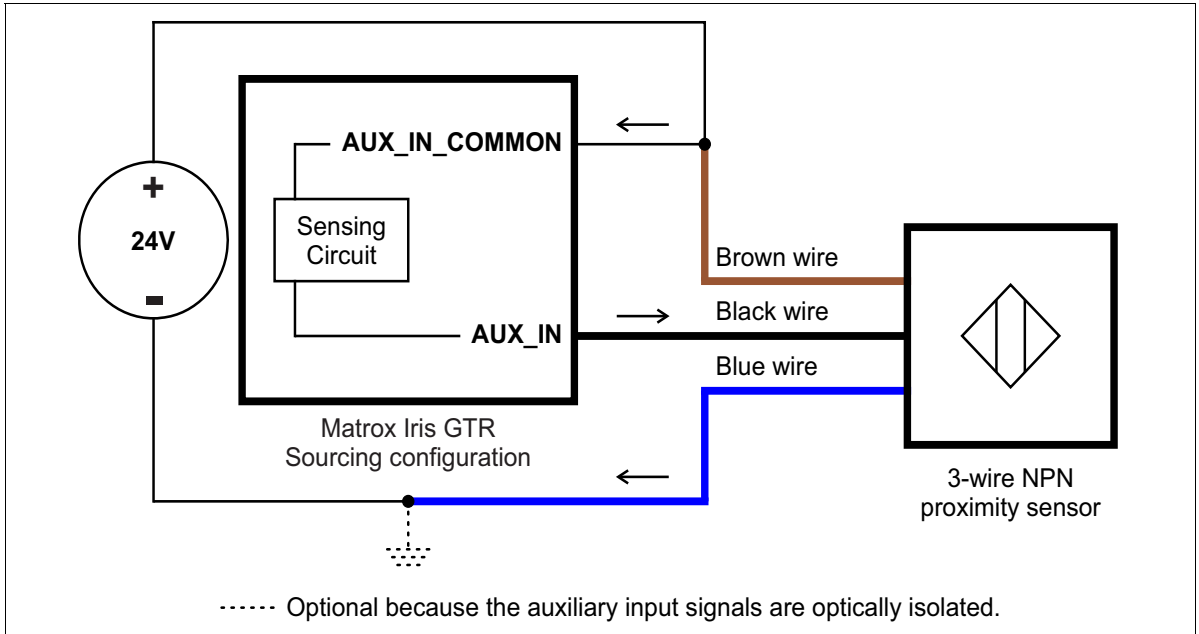
Equivalent circuit only

Connecting a 2-wire proximity sensor to an auxiliary input signal

You can connect a 2-wire proximity sensor to a Matrox Iris GTR auxiliary input signal in either a sourcing or sinking configuration (that is, on a positive or negative power wire). Note that in both cases, you will need to install an external bleeder resistor, to ensure that a minimum amount of current flows into the proximity sensor in its on-state and in its off-state.

- For the auxiliary input signal to source the current (that is, to connect an auxiliary input signal on a positive power wire), connect the 2-wire device to the auxiliary input signal as shown below. You must also install an external bleeder resistor between the AUX_IN_COMMON pin and brown wire of the proximity sensor.

Matrox Iris GTR
Sourcing configuration

AUX_IN_COMMON

24V

Sensing
Circuit

AUX_IN

Brown wire

Blue wire

2-wire NPN
proximity sensor

- - - - - Optional because the auxiliary input signals are optically isolated.
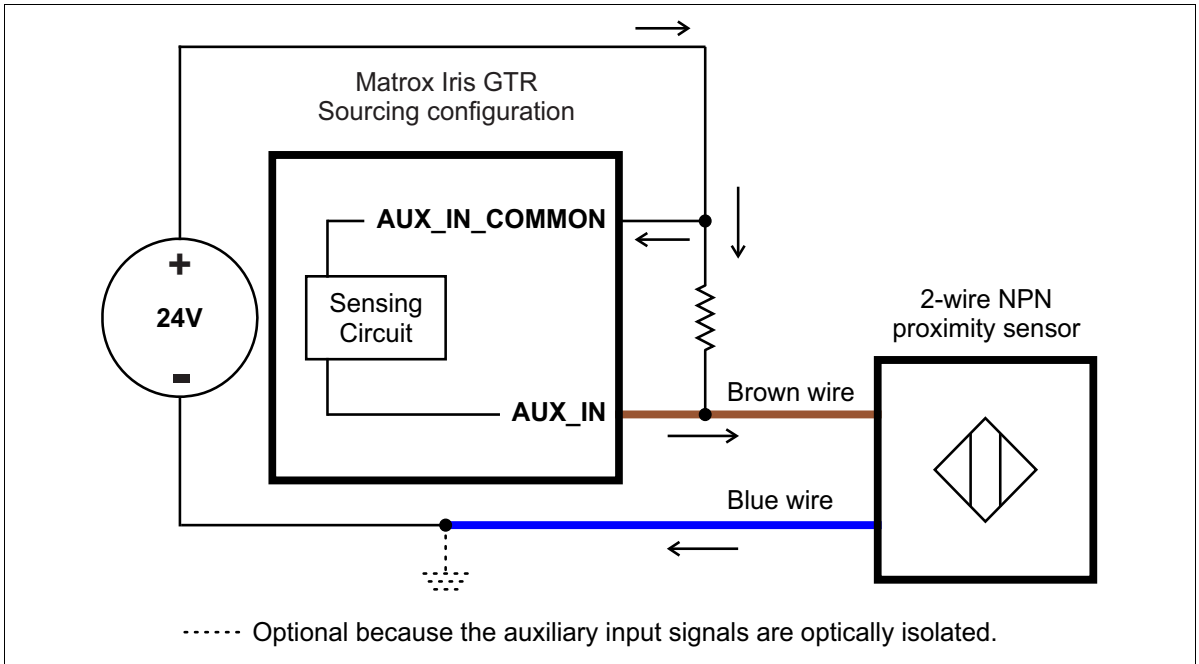
Equivalent circuit only

The bleeder resistor's value should guarantee that the minimal required current is provided to the connected sensor (the third-party device). For details regarding the sensor's minimum current requirements, refer to its documentation. Note that you should use a bleeder resistor with an appropriate power rating for your circuit.

• For the auxiliary input signal to sink the current, connect the 2-wire device to auxiliary input signal as shown below. Install the external bleeder resistor between the blue wire of the proximity sensor and the AUX_IN_COMMON pin.
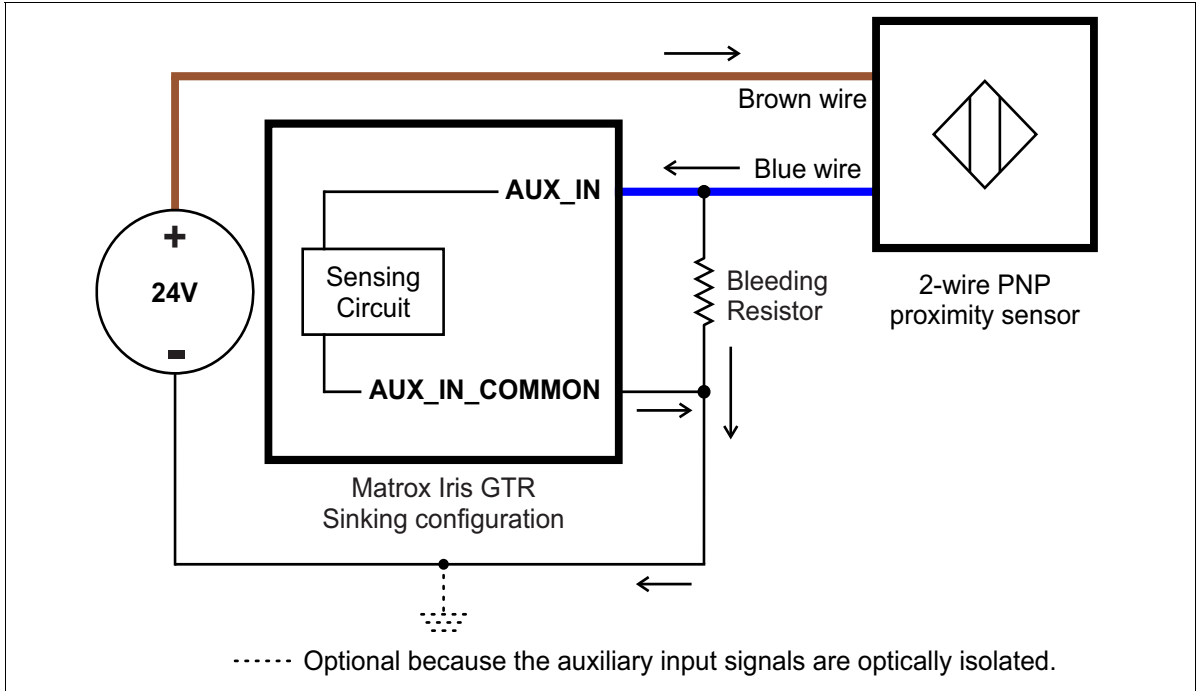
Equivalent circuit only

Connecting a light controller and the analog intensity control signal

Matrox Iris GTR includes an auxiliary I/O engine, with an analog intensity control signal (AUX_AREF_OUT7), which provides a slow changing analog intensity (dimming) control signal from 0-10 VDC. This control signal can be used to set the intensity for a light controller (for example, with an Advanced Illumination inline control system or Smart Vision Lights brick light); however, it should not be used to draw any current or drive power.

To set the intensity of the light controller using Matrox Design Assistant, chose **Physical Camera** under the **Cameras** item of the Platform configuration dialog, and enter a value for **Intensity**. See the *Grab and auxiliary I/O overview* section of the *Matrox Iris GTR appendix* in the *Matrox Design Assistant help file* for more information.

To set the intensity of the light controller using MIL, use **MdigControl**() with M_LIGHTING_BRIGHT_FIELD. For more information, see the *Matrox Iris GTR connectors and signal names* section of the *Matrox Iris GTR appendix* in the *MIL help file.*

Connect the lighting controller's intensity pin directly to the analog intensity control pin (AUX_AREF_OUT7). The following examples show how to connect Matrox Iris GTR to the trigger and intensity pins of your lighting controller.

Connecting a sourcing light controller (NPN pin)

If your lighting controller has an NPN pin (sourcing input signal), it expects to be connected in an NPN topology, whereby the connected, controlling auxiliary output signal sinks the current and the input pin sources the current. To do so, connect the sourcing light controller to an auxiliary output signal and the analog intensity control signal (AUX_AREF_OUT7) of Matrox Iris GTR as shown below[1].

Connection to Matrox Iris GTR
Digital IO and power connector

Connector of the camera
M12 12 pin (female)

Signal Name	Pin#
AUX_OPTOIND_OUT_COMMON	1
AUX_AREF_OUT7	2
AUX_OPTOIND_OUT2	3
+VDC	4
AUX_OPTOIND_IN3	5
AUX_OPTOIND_IN_COMMON	6
AUX_OPTOIND_IN5	7
AUX_OPTOIND_IN6	8
AUX_OPTOIND_IN4	9
AUX_OPTOIND_OUT0	10
-VDC	11
AUX_OPTOIND_OUT1	12

The above drawing shows the connector on the camera

Generic light controller

Blue wire +24 VDC
Black wire Trigger (NPN/Active Low)
Brown wire GND
Green wire Intensity (optional)

Connection to power (Standard 24 V)

+24 V
0 V

---
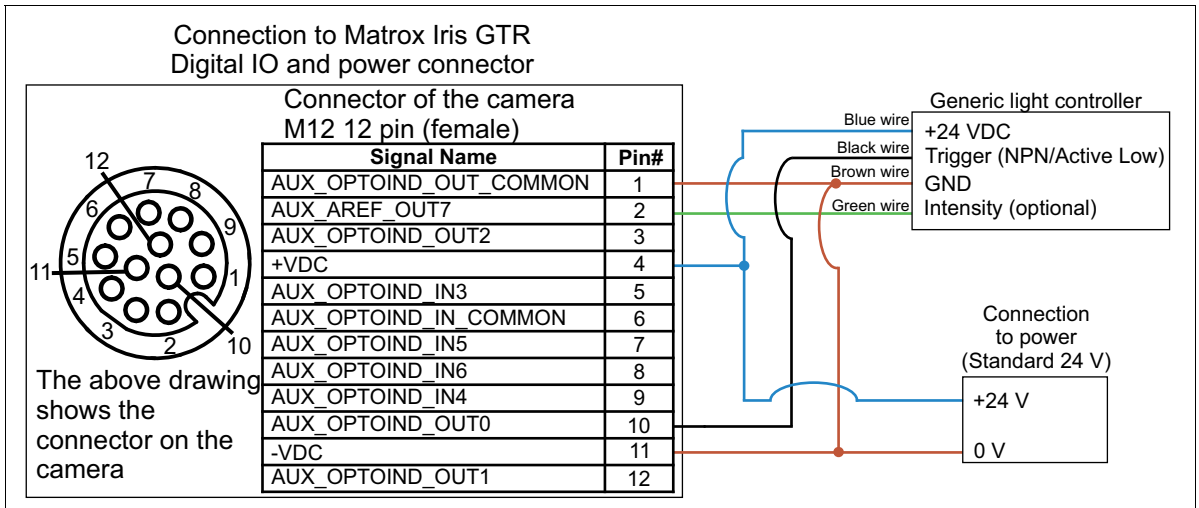
1. When the auxiliary output signal is on, the circuit between AUX_OPTOIND_OUT0 and AUX_OPTOIND_OUT_COMMON is closed. This allows current to flow from AUX_OPTOIND_OUT0 to AUX_OPTOIND_OUT_COMMON, before sinking to ground. When the auxiliary output signal is off, the circuit is open and no current flows.

Connecting a sinking light controller (PNP Pin)

If your lighting controller has a PNP pin (sinking input signal), it expects to be connected in a PNP topology, whereby the connected, controlling auxiliary output signal sources the current and the input pin sinks current. To do so, connect the sinking light controller to an auxiliary output signal and the analog intensity control signal (AUX_AREF_OUT7) of Matrox Iris GTR as shown below.[1]

Note that in this configuration, the other two auxiliary output signals (AUX_OPTOIND_OUTn) from Matrox Iris GTR are not available.
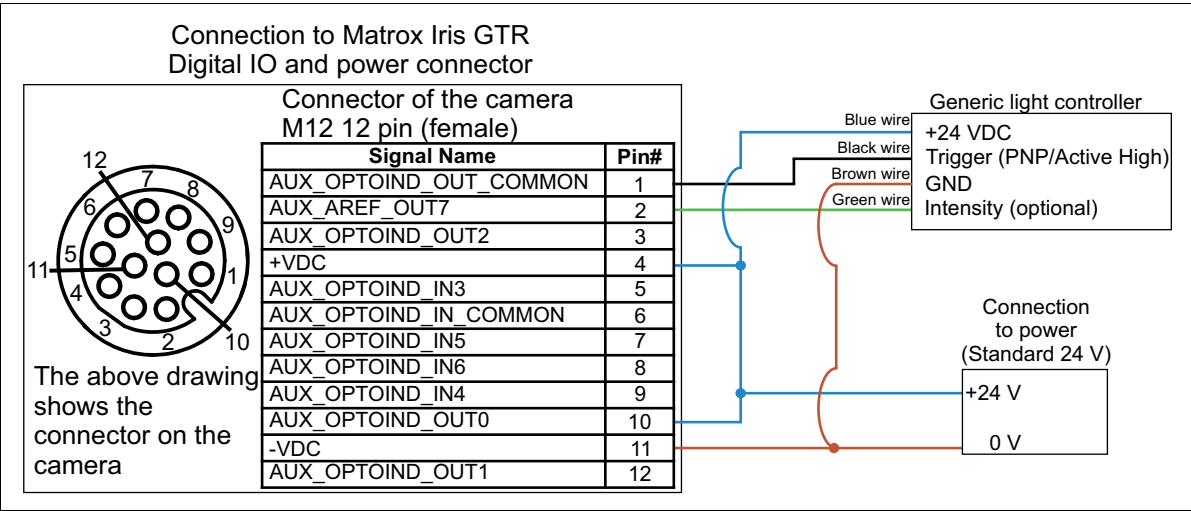
Connection to Matrox Iris GTR
Digital IO and power connector

Connector of the camera
M12 12 pin (female)

Signal Name	Pin#
AUX_OPTOIND_OUT_COMMON	1
AUX_AREF_OUT7	2
AUX_OPTOIND_OUT2	3
+VDC	4
AUX_OPTOIND_IN3	5
AUX_OPTOIND_IN_COMMON	6
AUX_OPTOIND_IN5	7
AUX_OPTOIND_IN6	8
AUX_OPTOIND_IN4	9
AUX_OPTOIND_OUT0	10
-VDC	11
AUX_OPTOIND_OUT1	12

The above drawing shows the connector on the camera

Generic light controller
Blue wire — +24 VDC
Black wire — Trigger (PNP/Active High)
Brown wire — GND
Green wire — Intensity (optional)

Connection to power (Standard 24 V)
+24 V
0 V

---

1. When the auxiliary output signal is on, the circuit between AUX_OPTOIND_OUT0 and AUX_OPTOIND_OUT_COMMON is closed. This allows current to flow from AUX_OPTOIND_OUT0 to AUX_OPTOIND_OUT_COMMON, and to the trigger input of the lighting controller. When the auxiliary output signal is off, the circuit is open and no current flows through.

Appendix A: Glossary

This appendix defines some of the specialized terms used in this manual.

Glossary

- **Auxiliary signal.**

  An auxiliary signal is a user-defined I/O signal that can have one or more additional functions. For example, a signal that can be both a trigger signal and a user-defined input signal, is an auxiliary signal.

- **IP67 enclosure.**

  An IP67 enclosure is a specific type of industrial enclosure that is dust and water-tight. The name is derived using the incarnation protection rating (or ingress protection code), and defined in the international standard IEC 60529.

- **Sinking.**

  A DC circuit that provides the common reference (low) for the circuit. In the case of your Matrox Iris GTR, determining whether the connection is sinking or sourcing determines how to connect the auxiliary input common signal and auxiliary output common signal, respectively.

- **Sourcing.**

  A DC circuit that provides the voltage needed for the circuit. In the case of your Matrox Iris GTR, determining whether the connection is sinking or sourcing determines how to connect the auxiliary input common signal and auxiliary output common signal, respectively.

- **Wire-terminal**.

  A wire-terminal is designed to receive a stripped wire; the stripped wire can carry a signal. Typically, multiple wire-terminals are grouped together into an open-wire connector.

Appendix B:
Technical reference

This appendix summarizes the hardware elements of Matrox Iris GTR. In addition, this appendix provides pinout descriptions for the external connectors of your Matrox Iris GTR.

Matrox Iris GTR smart camera summary

Sensor board

Specifications		GTR300	GTR300C	GTR1300	GTR1300C
CMOS sensor	Geometry	1/4"-type		1/2"-type	
	Format	Monochrome	Color	Monochrome	Color
	Make and model	ON Semiconductor - Python family (NOIP1SN or NOIP1SE)			
Effective resolution (H x V)		640 x 480		1280 x 1024	
Frame rate[a]		Up to 293 fps	Up to 147 fps	Up to 85 fps	Up to 35 fps[b]
Pixel size (H x V)		4.8 μm x 4.8 μm			
Gain range		0 to 19.4dB			
Exposure speeds		50 μsec to 4 sec.			
External trigger latency (Typical value measured from OFF to ON)		7.1 μsec		7.2 μsec	
External trigger to output strobe delay (Typical value measured from OFF to ON)		9.1 μsec		9.2 μsec	

a. Frame rate is established solely upon rates of acquisition. Your results will differ when including processing time.

b. Note that these numbers come from tests that store the grabbed images in BGR packed format. When using YUV, planar, or Mono10 packed formats, the frame rate can be significantly different.

Specifications		GTR2000	GTR2000C	GTR5000	GTR5000C
CMOS sensor	Geometry	2/3"-type		1"-type	
	Format	Monochrome	Color	Monochrome	Color
	Make and model	ON Semiconductor - Python family (NOIP1SN or NOIP1SE)			
Effective resolution (H x V)		1920 x 1200		2592 x 2048	
Frame rate[a]		Up to 45 fps	Up to 20 fps[b]	Up to 21 fps	Up to 8.5 fps[b]
Pixel size (H x V)		4.8 μm x 4.8 μm			
Gain range		0 to 19.4dB			
Exposure speeds		50 μsec to 4 sec.			
External trigger latency (Typical value measured from OFF to ON)		8.0 μsec		8.0 μsec	
External trigger to output strobe delay (Typical value measured from OFF to ON)		10 μsec		10 μsec	

a. Frame rate is established solely upon rates of acquisition. Your results will differ when including processing time.

b. Note that these numbers come from tests that store the grabbed images in BGR packed format. When using YUV, planar, or Mono10 packed formats, the frame rate can be significantly different.

CPU board

The CPU board of Matrox Iris GTR has the following features:

- **SOC/CPU**: Intel Celeron Processor N2807.

- **Volatile memory**: 2048 Mbytes of DDR3L SDRAM.

- **Non-volatile memory**: 32 Gbytes of flash disk (eMMC) memory.

- **Networking**: One 100/1000 Mbits (or 100 Mbit/1 Gbit) Ethernet networking interface. This interface can be used for communicating with external devices using the PROFINET, EtherNetI/P, or Modbus protocol. For PROFINET, Matrox Iris GTR provides a hardware-assisted PROFINET interface that support a minimum I/O cycle time of 1 msec. When using the hardware-assisted PROFINET interface, it will create a second Ethernet communication device with its own independent MAC address and IP settings. The LAN connection associated with the hardware-assisted PROFINET interface can be shared with other traffic.

- An advanced I/O engine that includes the following:

  - **Digital I/Os**: 4 inputs and 3 outputs.

    › 4 opto-isolated, digital auxiliary input signals (24V).

    › Input signals have interrupt generation capabilities.

    › Input signals can sink or source. To source voltage, you must connect an auxiliary voltage source to the common input signal (AUX_OPTOIND_IN_COMMON). For voltage expectations, see *Electrical specifications* subsection of the *Matrox Iris GTR specifications* section, later in this appendix. Whether all the input signals are sinking or sourcing is dependent upon the connection of the common input signal.

    › Input signals are debounced (that is, configured to wait a given amount of time between accepting a signal change). The debouncing time can be configured using Matrox Design Assistant. For more information, refer to the *Matrox Design Assistant help file*. If you have a Matrox Iris GTR with MIL-only, refer to the *MIL help file* for more information.

› 3 opto-isolated auxiliary output signals (up to 24 V). Note that these auxiliary output signals are sinking signals that share a common signal. If one of these signals is used as a sourcing signal, the other two are no longer available.

- **One analog output**. A 0-10 V signal designed to connect to the 0-10 V analog intensity control pin of a light controller (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device). This signal does not provide power; instead, it provides analog intensity (dimming) control (0-10 V translates to 0-100% illumination).

- **Timers**. 1 exposure, 1 strobe, 8 general purpose.

    › 1 exposure timer. A 28-bit timer used to control the exposure of your Matrox Iris GTR, and allows a range of exposure time from 50 usec to 4 sec. The timer output will always set camera exposure, but can be simultaneously redirected to any auxiliary output signal.

    › 1 strobe timer. A 28-bit timer whose output can be routed to any auxiliary output signal. The resulting output signal can then be used to control a strobe device. This timer is limited by the maximum possible value for the exposure timer, and when the exposure timer ends, so will the strobe timer.

    › 8 general timers. Each of the timers (Timer 1 through 8) is a 32-bit timer and can count up to 4,294,967,295 clock ticks before resetting. Each timer can use a specified clock source for its active period and a different specified clock source for its delay period.

- **One I/O command list**. Used to schedule I/O commands, in any order.

- **One rotary decoder**. Supports input from rotary encoders with quadrature output.

- **Display.** Your Matrox Iris GTR can use a video screen connected to the VGA/USB connector to display the Matrox Iris GTR interface. The following information relates to the device that can be connected to the VGA/USB connector.

  - **Output**: RGB analog output.

  - **Maximum supported resolution**: 1920 x 1200.

  - **Maximum pixel depth**: 32-bits.

  - **Maximum vertical refresh frequency**: 60 Hz - 85 Hz, depending on resolution.

- **USB connection.** A standard USB keyboard and mouse are supported natively. To connect any other device (such as a specialized keyboard or touch screen) to your Matrox Iris GTR, it must have a specialized device driver. If the device has a third-party provided driver, inquire whether a specialized device driver is available for your Matrox Iris GTR by contacting your local Matrox Imaging representative.

Lenses

Each Matrox Iris GTR starter kit ships with a C-mount lens. Contact your Matrox sales representative for details.
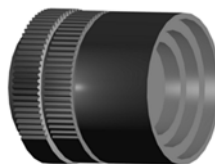
Keep the lens free of fingerprints and dust. Do not clean with an alcohol-based cleaning solution and do not spray water or cleaning fluids directly onto the lens. Instead, use a can of compressed air or a lens cleaning cloth to remove dust.

The Matrox Iris GTR works with the Varioptic Caspian C-39N0-160-I2C or C-39N0-250-I2C lens (liquid lens). This electronically focus-controllable C-mount lens, fits within the IP lens case, provided with your Matrox Iris GTR. The Varioptic lens connects to the liquid lens connector inside the lens case housing of your Matrox Iris GTR.

General care and cleaning

To clean the unit housing, use a small amount of mild detergent cleaner on a cleaning cloth. Do not pour the cleaner directly onto the unit housing.

To remove dust from the lens cap, use either a can of compressed air or a lens cloth. The air must be free of oil, moisture, and other contaminants that could remain on the lens cap.

To clean the glass window of the lens cap, use a small amount of isopropyl alcohol on a cleaning cloth. Do not pour the alcohol directly on the glass window.

Matrox Iris GTR specifications

The following specifications detail your Matrox Iris GTR.

Electrical specifications

GTR300, GTR300C, GTR1300, GTR1300C, GTR2000, GTR2000C, GTR5000, GTR5000C	
Operating voltage for the Matrox Iris GTR under testing conditions	24 V.
Rated current	600 mA
Operating voltage tolerance	± 10%

GTR300, GTR300C, GTR1300, GTR1300C, GTR2000, GTR2000C, GTR5000, GTR5000C		
I/O specifications		
Opto-isolated output signals	Operating voltage	24 V (26 V abs. max)
	Sink current	50 mA max
	Maximum leakage current	1 μA@ 24 V 1 mA@ 26 V
	ON voltage	0.4 V @ 2 mA 1.1 V @ 25 mA 1.5V @ 50 mA
	PTC[a] fuse max. time-to-trip	1 sec @ 0.5 A
	OFF to ON response	2 μsec to reach 4 V[b]
	ON to OFF response	50 μsec to reach 11 V[b]
Opto-isolated input signals	Operating voltage	24 V (26 V abs. max)
	Input current (sink or source)[c]	3.5 mA max[d], 1 mA min[e]
	ON voltage level	> 11 V[f]
	OFF voltage level	< 4 V
	OFF to ON response	6 μsec
	ON to OFF response	80 μsec
0-10 V analog control output signal	Non-isolated. Supports lighting devices (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device). Note that the 0-10 V is intended for reference voltage only (that is < 1 mA).	

a. The PTC is an automatically resetting fuse.
b. This occurred under the following condition: output pulled to 24 V using 1 kΩ.
c. Regardless whether the signal is sinking or sourcing, this measurement is the same.
d. Maximum input current at maximum ON voltage. Note that the connected device must not limit the current to a value lower than this.
e. Minimum input current at minimum ON voltage. This can be used to calculate bleeding resistor needed for 2-wire proximity sensor.
f. Recommended > 12 V when using Matrox Iris GTR breakout board.

GTR300, GTR300C, GTR1300, GTR1300C, GTR2000, GTR2000C, GTR5000, GTR5000C		
Varioptic Caspian C-39N0-160-I2C or C-39N0-250-I2C lens (liquid lens)		
Typical	Supplied voltage	5 V
	Rated current	50 mA

Environmental specifications

- For indoor use only.

- Maximum altitude: 2000 meters.

- Operating temperature: 0 to 50 C (32 °F to 122 °F)[1].

- Ventilation requirements: Natural convection.

- Pollution degree: 2 environment.

- Over-voltage category: I

- Ingress protection rating: IP67.

Mechanical specifications

GTR300, GTR300C, GTR1300, GTR1300C, GTR2000, GTR2000C, GTR5000, GTR5000C	
Connectors	M12 8-pin (female) X-coded connector for 100/1000 BaseT Ethernet.
	M12 12-pin (male) connector for VGA/USB.
	M12 12-pin (female) connector for digital I/O and power.
Certification	IP67

Dimensions

Dimensions	GTR300, GTR300C, GTR1300, GTR1300C, GTR2000, GTR2000C, GTR5000, GTR500C
Weight	460.39 g (16.24 oz)
Smart camera length (without the connectors)	75 mm (2.95") ± 2 mm (0.079")
Smart camera height (without the lens)	54 mm (2.13") ± 2 mm (0.079")
Smart camera width	75 mm (2.95") ± 2 mm (0.079")
IP cap length (interior from the mounting flange to inside the clear top)	59.5 mm (2.34") ± 2 mm (0.079")
IP cap max lens internal clearance	

	Length	59 mm (2.32") ± 2 mm (0.079")
	Diameter	18 mm (0.71") ± 2 mm (0.079")

---

1. Under current testing conditions.

Camera heatsink
Camera housing
O-ring
M12 connectors
O-ring
IP lens case

[1.811]
46.00

[2.834]
72.00
REF.

[1.614]
41.00

[1.043]
26.50

[4.646]
118.00
REF.

Cable center

[.945]
24.00

[.236]
2X 6.00

[.673]
17.10

Power   Status   User   Userb

[2.126]
54.00

Flange

M4X0.7 - 6H ⤓ 4.00[0.157]

[.276]
7.00

[2.402]
61.00

[3.447]
87.55

[1.831]
46.50

[3.583]
91.00

[.276]
7.00

[.827]
21.00

[1.654]
42.00

[.650]
16.50

[1.476]
37.50

M4X0.7 - 6H ⤓ 3.50[0.138]

Optical axis

[2.953]
75.00

[2.402]
61.00

[1.476]
37.50

[.276]
7.00

[2.402]
61.00

[.276]
7.00

[2.953]
75.00

Matrox Iris GTR connectors

Your Matrox Iris GTR has several interface connectors. These are the Digital I/O and power connector, the VGA/USB connector, the100/1000 BaseT Ethernet connector, and the Liquid lens connector.

Digital I/O and power connector   VGA/USB connector   100/1000 BaseT Ethernet connector

Lens enclosure   Liquid lens connector
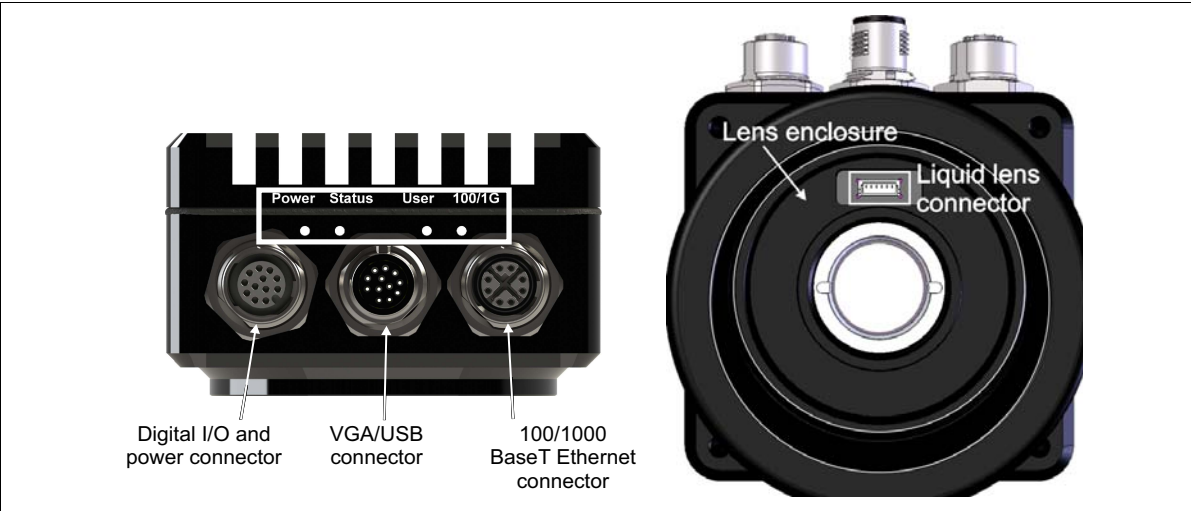
Digital I/O and power connector

The digital I/O and power connector is an M12 12-pin (female) connector that transmits and receives digital I/O signals, provides an analog intensity (dimming) control signal for an inline control system lighting controller, and provides power to your Matrox Iris GTR.
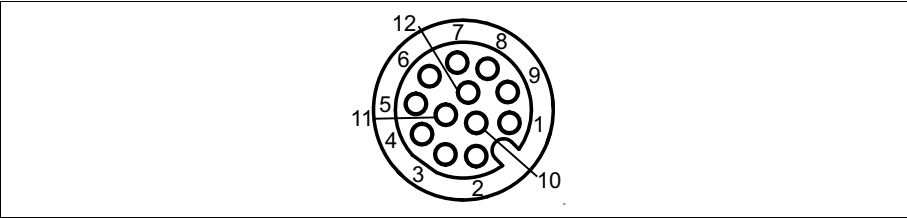
The pinout for the digital I/O and power connector is as follows:

Pin	Hardware signal name	MIL constant for auxiliary signal	Description
1	AUX_OPTOIND_OUT_COMMON	N/A	Opto-isolated industrial auxiliary signal (output) common.
2	AUX_AREF_OUT7	N/A	0-10 VDC Analog intensity control signal (output). Note that this signal uses the - VDC for reference.
			Supported function: a 0-10 VDC analog intensity (dimming) control signal that can be received by typical lighting controllers (such as, an Advanced Illumination inline control system (ICS3), Smart Vision Lights Brick light, or other similar devices). This pin used to be referred to as the Analog reference voltage signal.
3	AUX_OPTOIND_OUT2	M_AUX_IO2	Opto-isolated industrial auxiliary signal 2 (output).
			Supported function: user-bit 2 (output 3 of 3).
4	+ VDC	N/A	Positive pin of the power provided to your Matrox Iris GTR. This pin must be connected to a + 24 V +/- 10% power supply.
5	AUX(TRIG)_OPTOIND_IN3	M_AUX_IO3	Opto-isolated industrial auxiliary signal 3 (input).
6	AUX_OPTOIND_IN_COMMON	N/A	Opto-isolated industrial auxiliary signal (input) common.
			Supported function: Whether you should connect this pin to an electrical return path or a voltage source depends on whether the third party device is sourcing or sinking the current, respectively.
7	AUX_OPTOIND_IN5	M_AUX_IO5	Opto-isolated industrial auxiliary signal 5 (input).
8	AUX_OPTOIND_IN6	M_AUX_IO6	Opto-isolated industrial auxiliary signal 6 (input).
9	AUX_OPTOIND_IN4	M_AUX_IO4	Opto-isolated industrial auxiliary signal 4 (input).
10	AUX_OPTOIND_OUT0	M_AUX_IO0	Opto-isolated industrial auxiliary signal 0 (output).
			Supported function: user-bit 0 (output 1 of 3).
11	- VDC	N/A	Negative pin of the power provided to your Matrox Iris GTR. This pin must be connected to the electrical return path of the + 24 V +/- 10% power supply connected to the +VDC pin.
12	AUX_OPTOIND_OUT1	M_AUX_IO1	Opto-isolated industrial auxiliary signal 1 (output).
			Supported function: user-bit 1 (output 2 of 3).

To interface with this connector, you can use either the cable that comes with the starter kit, GTR-CBL-PWR/3, or you can build your own. To build your own digital I/O and power cable, parts can be purchased from:

	Cable information
Manufacture	Phoenix Contact GmbH & Co. KG
Part number:	SAC-12P- MS/3,0-PVC SCO Order No:1554788
Description:	Sensor/actuator cable, 12-pos., black PVC, straight M12 SPEEDCON plug on free conductor end, length: 3.0 m

100/1000 BaseT Ethernet connector

The 100/1000 BaseT Ethernet connector is an M12 (female) 8-pin X-coded connector that provides communication capabilities at 10 Mbit/sec, 100 Mbit/sec, or 1 Gbit/sec (1000 Mbit/sec). For PROFINET communication, this interface provides a hardware-assisted PROFINET interface, which supports a minimum cycle time of 1 msec.
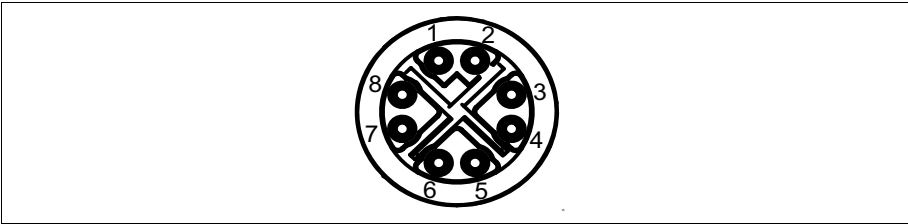
The pinout for the Ethernet connector is as follows:

Pin number	Signal name	Description
1	MDI_1+	Bidirectional data A+
2	MDI_1-	Bidirectional data A-
3	MDI_2+	Bidirectional data B+
4	MDI_2-	Bidirectional data B-
5	MDI_4+	Bidirectional data D+
6	MDI_4-	Bidirectional data D-
7	MDI_3-	Bidirectional data C-
8	MDI_3+	Bidirectional data C+

To interface with this connector, you can use either the cable that comes with the starter kit, GTR-CBL-ETH/5, or your can purchase a similar cable from an alternate source. For an alternate source of 100/1000 BaseT Ethernet cables, contact:

	Cable information
Manufacture	Phoenix Contact GmbH & Co. KG
Part number:	NBC-MSX/5.0-94F/R4AC SCO Order No.: 1407473
Description:	Assembled Ethernet cable, CAT6A, 8-position, PUR, RAL 5021 (water blue), Plug straight M12 SPEEDCON / IP67, Coding: X, on plug straight RJ45 / IP20, length 5 m.

VGA/USB connector

The VGA/USB connector is an M12 12-pin (male) connector that transmits output video and can both transmit and receive USB signals. The output video signal is a standard RGB analog video output used to send the operating system's desktop to the connected display device.
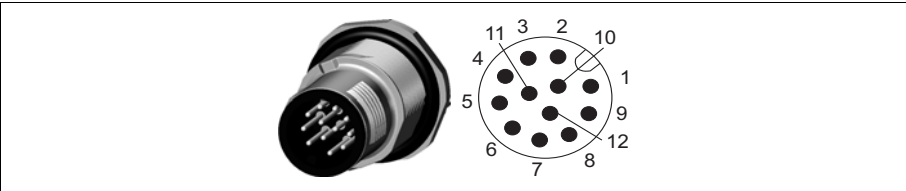
The table below summarizes the supported standard display resolutions:

Standard display resolution	Analog video	Maximum refresh rate
1920 × 1200	RGB	60 Hz
1920 × 1080	RGB	60 Hz
1600 × 1200	RGB	60 Hz
1280 × 1024	RGB	85 Hz
1024 × 768	RGB	85 Hz
800 × 600	RGB	85 Hz
640 × 480	RGB	85 Hz

The pinout for the VGA/USB connector is as follows:

Pin number	Signal name	Description
1	USB PWR	5 V supplied from your Matrox Iris GTR to the USB peripherals.
2	USB_DATA_P	USB data +.
3	USB_DATA_N	USB data -.
10	USB_REF	USB reference.
5	RED_VID_OUT	R component of the RGB video output signal.
6	BLUE_VID_OUT	B component of the RGB video output signal.
7	VSYNC	Vertical sync of the RGB video output signal.
8	HSYNC	Horizontal sync of the RGB video output signal.
9	GREEN_VID_OUT	G component of the RGB video output signal.
4, 11, 12	VGA _REF	VGA reference.

The following is a wire-diagram of the Matrox GTR-CBL-VGAUSB cable, showing the connection between the Matrox Iris GTR VGA/USB connector on one end and the HD-15 and USB connectors on the other.
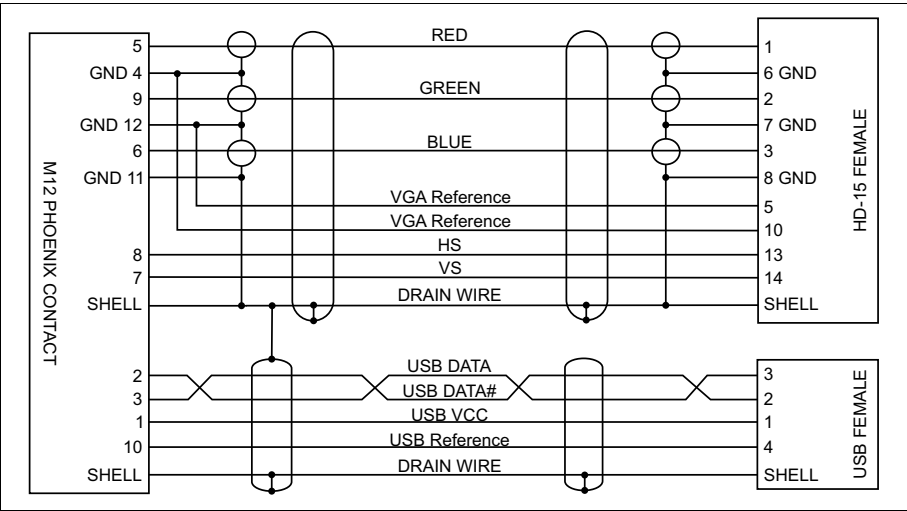
This cable can be purchased as part of the starter kit, or separately from Matrox (GTR-CBL-VGAUSB).

Liquid lens connector

The liquid lens connector is a six-pin shrouded male connector designed to connect to the 6-pin connector from a Varioptic Caspian C-39N0-160-I2C or C-39N0-250-I2C lens. The secondary, 3-pin male connector, from the Varioptic lens is not used.

This connector is located inside the lens cap housing of your Matrox Iris GTR.

The pinout for the liquid lens connector is as follows:

Pin number	Signal name	Description
1	PWR	Power supply (+5 V).
2	GND	Ground.
3	SDA	Serial data line signal.
4	SCL	Serial data clock signal.
5	Unused	Unused.
6	Unused	Unused.

Appendix C: Selecting a lens

This appendix provides information on how to select the lens best suited to your needs.

Introduction

This appendix includes information on lens selection, an important consideration when building your application.

The primary consideration during lens selection is that the focal length of the selected lens meets your application's requirements.

The focal length is the distance between the principal plane and the point where parallel light rays, bent at the principal plane, intersect the optical axis.
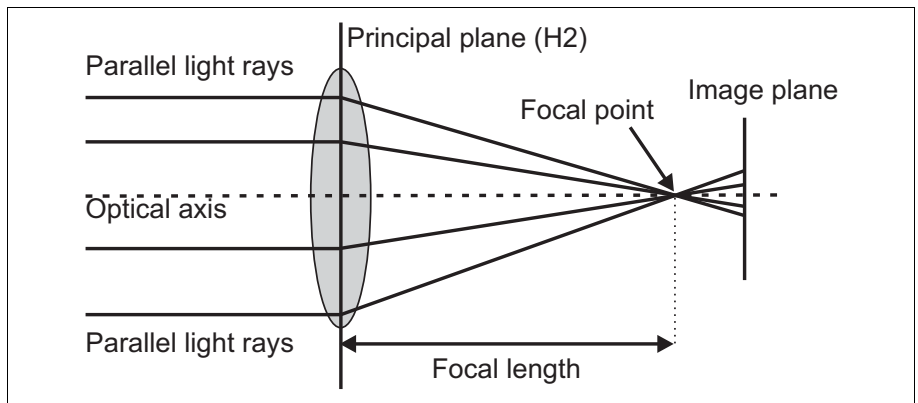
❖ Note that each lens is designed for a specific focal length; a zoom lens is designed for variable focal lengths.

Calculating the required focal length

To calculate the required focal length, measure the distance from the smart camera to the object, as well as the height (vertical size) and width (horizontal size) of the object.
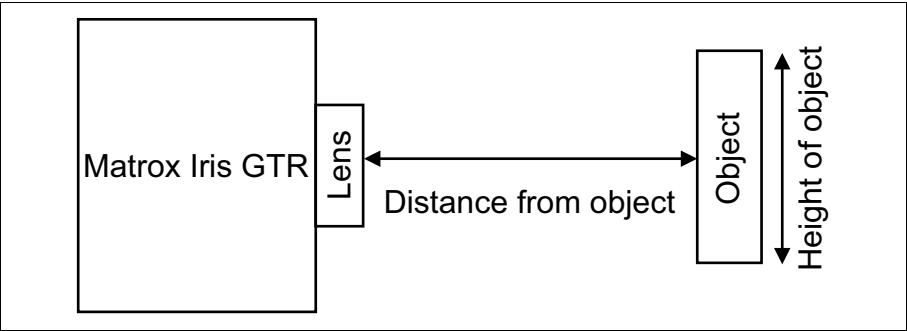
Use the following calculations to determine the required focal length for your situation.

$$\frac{\text{Vertical constant} \times \text{Distance from object}}{\text{Vertical size of object} + \text{Vertical constant}} \quad \text{and} \quad \frac{\text{Horizontal constant} \times \text{Distance from object}}{\text{Horizontal size of object} + \text{Horizontal constant}}$$

By selecting the smallest focal length from the vertical and the horizontal focal length calculations, you ensure that both the vertical and horizontal dimensions of your object fit within the view of your lens.

The model of your smart camera determines the horizontal and vertical constants required in the above-mentioned calculations.

Model	Horizontal constant	Vertical constant
GTR300, GTR300C	3.0 mm	2.3 mm
GTR1300, GTR1300C	6.1 mm	4.9 mm
GTR2000, GTR2000C	9.2 mm	5.8 mm
GRT5000, GTR5000C	12.4 mm	9.8 mm

For example, your Matrox Iris GTR300 has a 3.0 mm horizontal constant and a 2.3 mm vertical constant. If there is a 52 mm distance between the object and the front of the lens (distance to the object) and the object is 14 mm wide (horizontal size) and 15 mm tall (vertical size), then the following calculations are used to determine the required focal length:

$$\frac{3.0 \text{ mm} \times 52 \text{ mm}}{14 \text{ mm} + 3.0 \text{ mm}} = 9.18 \text{ mm (rounded)} \quad \text{and} \quad \frac{2.3 \text{ mm} \times 52 \text{ mm}}{15 \text{ mm} + 2.3 \text{ mm}} = 7.34 \text{ mm (rounded)}$$

In this example, a lens with a focal length of 7.34 mm (horizontal) is required.

If the lens shipped with your Matrox Iris GTR starter kits has a focal length equal to the focal length of your calculation, you have the correct lens for your situation. If the lens does not match the focal length of your calculation, you can still use it. However, if your lens has a focal length smaller than your calculation, there will be empty space around your object in the image. If your lens has a focal length greater than your calculation, part of your object might not fully fit within the image.

Appendix D: Matrox Imaging operating system utilities and recovery

This appendix describes the utilities found on your Matrox Iris GTR and provides instructions on how to recover the Matrox Imaging operating system (MIOS) that comes with Matrox Iris GTR with Design Assistant.

If you purchased Matrox Iris GTR with MIL-only, see *Appendix E: Microsoft Windows operating system partition backup and recovery* instead.

Matrox Imaging operating system utilities

Matrox Iris GTR includes several useful utilities. They are available from the following web address:

```
http:\\GTR32XXXX:8080
```

In the above example, replace XXXX with the last four digits of your smart camera's MAC address. If you have changed the camera's device name, replace GTR32XXXX with the name of your smart camera, or use its IP address; for more information, see *Appendix 2: Connecting to your Matrox Iris GTR desktop*.

❖ Note that these utilities are stored on your Matrox Iris GTR, but should be installed on your development computer, in case the operating system partition becomes corrupt and you need to use these programs. They can be downloaded from the web address above.

The utilities offered are as follows:

- **Virtual network computing (VNC)**. These utilities allow you to remotely connect to your Matrox Iris GTR.

- **Matrox Iris GTR Discovery utility.** This 32-bit windows utility allows you to discover Matrox Iris GTR cameras on your network. In addition, it can change network settings, restart or shut down individual smart cameras, or open the portal page of a specific camera. On computers with Matrox Design Assistant installed, this utility is included in the *Tools* folder, accessible from the MIL Control Center.

- **Bonjour browser**. This is a link to the Internet that leads to the Bonjour browser website. Bonjour browser is a program that lists all the services on your subnet. This provides a way to find the IP address of any Matrox Iris GTR on the subnet.

- **FileZilla**. A client utility for transferring files from one computer to another using FTP, FTPS, or SFTP.

- **Putty.** A client console utility for running remote sessions on a computer over a network using the SSH (Secure Shell), Telnet, or Rlogin network protocols.

- **Rufus**. A utility that formats and creates bootable USB keys.

Upgrading the Matrox Imaging operating system

If you have upgraded Matrox Design Assistant, you might be required to update the version of the Matrox Imaging operating system (MIOS) on Matrox Iris GTR. You can configure the MILConfig utility on your development computer to receive updates, if you have purchased a maintenance plan. You can then use this update to upgrade the camera. For more information on purchasing the maintenance plan, contact your Matrox representative.

Warning

An upgrade will erase all information on the Matrox Iris GTR storage drive. If you have made changes to a deployed project from its operator view, it is recommended that in Matrox Design Assistant, you synchronize recipes between the runtime and the design time project. Also, import all recipes that you created at runtime, copy all image folders that are stored on Matrox Iris GTR, and back up any validation sets that you need to continue using after the upgrade.

To upgrade the Matrox Imaging operating system (MIOS) on your Matrox Iris GTR, perform the following:

1. Connect remotely to your Matrox Iris GTR from Matrox Design Assistant. Matrox Design Assistant will detect a version mismatch and prompt you to upgrade. When you accept this prompt, an **Update** dialog will appear.

2. In the **Update** dialog, browse to the location on your development computer where MILConfig stored the new MIOS ISO file (.iso). This is generally in the same location as where your Matrox Design Assistant upgrade package is stored.

3. Once the MIOS ISO file has been selected, click on the **Update** button in the **Update** dialog and your update will begin.

   The ISO file will be copied to Matrox Iris GTR; then, the camera will power cycle. Some early production cameras do not have the ability to automatically power cycle; instead, they will display a timeout message once the bar is fully green, and you will have to power cycle the camera manually. Upon power cycling, the camera is upgraded.

To apply an MIOS upgrade on several smart cameras, it might be more efficient to upgrade from a USB key, connected to the smart camera's VGA/USB connector, through a GTR-CBL-VGAUSB cable. Burn the MIOS ISO onto one or more USB keys; see the *Acquiring and restoring MIOS from a USB key* subsection of the *Restoring the Matrox Imaging operating system* section, later in this appendix.

Restoring the Matrox Imaging operating system

If required, you can restore the Matrox Imaging operating system either to factory defaults, available on your Matrox Iris GTR, or boot from a USB key with an upgraded MIOS ISO.

Restoring the MIOS to factory defaults

The factory default version of the MIOS ISO is stored on Matrox Iris GTR. To recover the factory default version, perform the following:

1. Connect a monitor, mouse, and keyboard to your Matrox Iris GTR, as described in *Chapter 2: Powering and connecting to your Matrox Iris GTR*

2. Reboot your Matrox Iris GTR.

3. Near the end of the BIOS boot process, after the BIOS logo appears, a monochrome screen presents two restore options: the current OS and the MIOS recovery ISO. Use your keyboard to select the latter.

Warning!   This will replace the contents of your Matrox Iris GTR's storage drive.

4. Follow all on-screen instructions.

Acquiring and restoring MIOS from a USB key

To acquire an ISO of the MIOS, contact your Matrox representative, or refer to the Matrox Imaging bulletin that you received when you purchased or registered your product.

Burning an ISO to a USB key

To safely copy your ISO and use it to install a new operating system on multiple Matrox Iris GTRs, you should burn the ISO of the MIOS to a blank USB key with a capacity of 2 Gbytes, or more. To do so:

1. Get the latest MIOS ISO and store it locally on your Microsoft Windows development computer.

2. Connect a blank USB key to your Microsoft Windows development computer.

3. Launch Rufus (the Reliable USB formatting utility). To acquire a copy of the Rufus utility, refer to the *Matrox Imaging operating system utilities* section, earlier in this appendix.

   ❖ When using Rufus, make sure to specify a FAT32 partition on your USB key, and to select the appropriate ISO image.

4. Follow all on-screen instructions.

Upgrading the MIOS using a USB key

Once your USB key has a burned image of the MIOS, you can use it to install the MIOS onto multiple Matrox Iris GTRs. To do this, you should have the ability to connect your bootable USB key, a monitor, mouse, and keyboard to your Matrox Iris GTR, as described in *Chapter 2: Powering and connecting to your Matrox Iris GTR*.

1. Connect your USB to your Matrox Iris GTR and reboot your Matrox Iris GTR.

2. When the BIOS logo appears, press the ESC key to open the **BIOS utility** menu.

3. When the **BIOS utility** menu opens, click on the **Boot Manager utility** icon to load the **BIOS boot device** menu.

4. From the **BIOS boot device** menu, select the **Legacy USB entries** option. Matrox Iris GTR will then boot from the USB key.

5. After the **Welcome to Matrox Imaging operating system** dialog appears, select the **Install to Hard Drive** option.

Warning   This will replace the contents of your Matrox Iris GTR storage drive.

6. Follow all on-screen instructions.

Updating the Matrox Iris GTR BIOS

After upgrading the operating system, you should verify that you have the most up-to-date BIOS version before beginning.

Important   If you do not have the correct BIOS version, it will cause a problem with your Matrox Iris GTR. The BIOS version is displayed on the **Essential Information** page of the Matrox Design Assistant configuration portal, and here you can also see if there are new BIOS versions available.

Updating the BIOS is a delicate operation that requires user-intervention to ensure it is executed without interruption. Note that if a power failure occurs during the BIOS update process, your Matrox Iris GTR will have to be sent to Matrox for repair.

To update the BIOS, perform the following:

1. Access the Matrox Iris GTR desktop. To do so, you can either:

   • Connect directly using a local display and mouse-keyboard connection. To connect a local display, mouse, and keyboard, see the *Powering and connecting to your Matrox Iris GTR* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR*.

   • Connect remotely via either a VNC client (such as Rufus or Putty), or through Microsoft Windows telnet. To find Rufus or Putty, follow the instructions in the *Matrox Imaging operating system utilities* section, earlier in this appendix.

2. Once the Matrox Iris GTR desktop is displayed, open a terminal window by clicking on the **Activities** menu command and then the **Terminal** icon.

3. Inside the terminal window, go to the */opt/BIOS* folder using the following commands:

```
cd /opt
cd BIOS
```

❖ Note that MIOS is case-sensitive.

4. Start the BIOS update application using the following command:

```
sudo  ./IR<BIOSVERSION>.bin
```

where you should replace <*BIOSVERSION*> with the new BIOS version (for example, *IR110018.bin*). The BIOS update starts after a 10-second delay. Once the BIOS update begins, information will appear on your local display.

5. When the BIOS update completes, you will be prompted to reboot Matrox Iris GTR. Changes made will not take effect until you reboot.

Appendix E: Microsoft Windows operating system partition backup and recovery

This appendix provides instructions on how to restore or backup your Matrox Iris GTR if it was purchased with MIL-only.

If you purchased the Matrox Iris GTR with Design Assistant see *Appendix D: Matrox Imaging operating system utilities and recovery* instead.

Matrox Iris GTR Windows 10 IoT Enterprise configuration utility

If purchased with MIL-only, Matrox Iris GTR comes with the Windows 10 IoT Enterprise operating system pre-installed. To backup and restore Matrox Iris GTR, the Matrox Iris GTR Rescue utility and the Matrox Iris GTR Windows IoT Enterprise configuration utility (OSConfig) also come pre-installed; these utilities allow you to:

- Capture an image of your Matrox Iris GTR's operating system partition so that you can deploy the camera's operating system, applications, and particular settings, to multiple Matrox Iris GTR smart cameras. The capture process creates a rescue USB key with a captured backup *.wim* file; user settings and the camera's unique ID will be reconfigured when the image is restored on other smart cameras.

- Backup the image of your Matrox Iris GTR's operating system partition to a USB key or specified drive. This process makes a similar backup (*.wim* file) as a captured backup, except it retains the current user settings and ID. This backup is mostly useful to restore the smart camera from which the backup was made, because it will also restore the user settings and ID; multiple cameras (or other devices) with the same ID will cause problems on your network. When creating this type of backup, you have the option to simply save the backup file, or to create a rescue USB key (that is, to also configure the key with other files necessary for installing the backup image).

- Restore a Matrox Iris GTR to its factory default settings or to a backup or captured backup image of all its files.

❖ Note that the default mass storage device shipped with your Matrox Iris GTR (an eMMC) has 2 partitions labeled as follows:

- RECOVERY. This partition is not assigned a drive letter.

- MTXGTR. This partition is assigned to the C: drive.

The RECOVERY partition houses the Matrox Iris GTR Rescue utility and does not get reformatted if you restore a backup *.wim* file from the Matrox Rescue utility console. However, if you use a rescue USB key with a captured backup *.wim* file (*W10EGTR.wim*), or restore to a factory default settings file (*W10Ex64GTR.wim*), then both the RECOVERY and MTXGTR partitions are reformatted.

❖ Note that when operating in system recovery mode (that is, using the Matrox Iris GTR Rescue utility), the RECOVERY partition is assigned to the C: drive, and the MTXGTR partition is assigned to the D: drive.

To perform any of the backup, capture, or restore tasks, you must access your Matrox Iris GTR directly; you cannot perform these tasks remotely. To access the camera directly, connect a display device, keyboard, and mouse to your Matrox Iris GTR. For information, refer to *Powering and connecting to your Matrox Iris GTR* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR*.

For the latest information on backup, capture, and restore features, refer to the **ResQReadme.txt** file, found on the C: drive of your Matrox Iris GTR, or the **WinReadme.txt**. found on the System and Drivers utilities DVD.

Microsoft Windows Out-Of-Box-Experience (OOBE)

When you start your Matrox Iris GTR for the first time, Microsoft Windows performs its Out-Of-Box-Experience (OOBE) customization steps. The OOBE automatically performs initial customizations (such as setting the date and time), and creates a default user, MtxUser, and password, Matrox. The OOBE also generates a unique ID for your Matrox Iris GTR. At the end of your OOBE, you will be asked to leave User Account Control (UAC) on; select OK. For more information on the OOBE default settings, refer to the *ResQReadme.txt* file on your Matrox Iris GTR's C: drive.

If you backup your Matrox Iris GTR with the backup option, the unique ID (and initial OOBE customizations) is saved with the backup (*.wim* file); if you restore this backup, the unique ID is also restored. Be aware that if two cameras (or other devices) on the same network have the same ID, you will have issues. However, if you use the capture option to backup your Matrox Iris GTR, the ID (and initial OOBE customization) is not saved; so when you restore the captured backup on a Matrox Iris GTR smart camera, Windows will perform its OOBE and generate a new unique ID (and initial OOBE customizations) for the camera.

Capturing the Matrox Iris GTR operating system partition for deployment

You can capture an image of your Matrox Iris GTR's operating system partition (the operating system, application, and some settings) and then restore it on multiple Matrox Iris GTR smart cameras. The capture process will save the image to a captured backup *.wim* file, while also creating a rescue USB key so that you can deploy the capture to other Matrox Iris GTR smart cameras. The captured backup *.wim* file does not contain the user settings and unique ID of the original camera. When you deploy the capture to the target cameras and reboot them, Microsoft Windows OOBE will assign them their own unique ID and allow you to configure their user settings.

Note   The capture process should be done once your Matrox Iris GTR is configured to your specifications and you do not need to make any more changes.

To perform a capture, you must access your Matrox Iris GTR directly; you cannot perform this task remotely. To access the camera directly, connect a display devices, keyboard, and mouse to your Matrox Iris GTR. For information, refer to *Powering and connecting to your Matrox Iris GTR* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR* for more information.

To make a captured backup of your Matrox Iris GTR, perform the following steps directly on your Matrox Iris GTR:

1. Launch the OSConfig utility from the Windows **Start** menu.

2. When the **OSConfig** dialog opens, select the **Capture OS** tab, and click on the **Reboot to Audit Mode** button. Your Matrox Iris GTR will reboot in audit mode (administrative mode).

3. When the reboot process completes, the **System preparation tool** dialog opens. Click on the **Cancel** button to close this dialog.

   ❖ Note that, when you boot in audit mode, the **System preparation tool** dialog opens every time. You can close or ignore this dialog.

4. From the Windows **Start** menu, launch the OSConfig utility. Disable the Unified Write Filter (UWF) (if it is on), so that you can write to the drive. This option is found on the **Write Filter** tab of the **OSConfig** dialog.

5. Click on the **Capture OS** tab, and click on the **Reboot and launch capture tool** button. A dialog appears that says the "MtxUser" account will be deleted to reseal the image; click on **OK** and your Matrox Iris GTR will restart.

6. When the reboot process completes, a list of possible options is displayed. Click on the **Troubleshoot** option, and then on the **Matrox Rescue Utility** option.

7. When the **Matrox Rescue Utility** dialog opens, you must read the license agreement. When done, click on the **I agree** button to accept the license agreement.

8. The next page is presented, with an option already selected: **Capture the OS for deployment**; leave this option as is. Below this, you can specify the location of your USB key. If you do not already have your USB key connected, you can do so now. Once you have selected the location of the USB key, you can press OK and the process will begin.

WARNING!   This will reformat your USB key and all data will be erased.

The Matrox Iris GTR Rescue utility configures the USB key to be a rescue USB key with all the necessary settings to restore your captured backup *.wim* file onto other Matrox Iris GTRs.

9. When the process completes, a message dialog opens, explaining what was done. Click on the **OK** button to perform a shut down and reboot of Windows 10 IoT Enterprise.

10. After the reboot, if UWF was enabled before you started the capture process, launch the OSConfig utility from the Windows **Start** menu, and re-enable UWF.

To use the configured USB key to restore the operating system partition of your Matrox Iris GTR, or to configure another Matrox Iris GTR, refer to the *Restore Windows 10 IoT Enterprise* section, later in this appendix.

Backup Matrox Iris GTR Windows 10 IoT Enterprise

You can create a backup *.wim* file of your Matrox Iris GTR's operating system partition and save the file to a specified location. It is useful to do this procedure as soon as you have completed the OOBE on your Matrox Iris GTR. Note that, the backup process will copy the unique ID of the camera; this ID will be applied to any Matrox Iris GTR that is restored with this backup *.wim* file. If two cameras with the same unique ID are running on the same network, there will be network conflicts. Be aware of this limitation when performing a backup on a network camera.

To perform a backup, you must access your Matrox Iris GTR directly; you cannot perform this task remotely. To access the camera directly, connect a display devices, keyboard, and mouse to your Matrox Iris GTR. For information, refer to *Powering and connecting to your Matrox Iris GTR* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR* for more information.

To backup your operating system partition, perform the following directly form your Matrox Iris GTR:

1. Save all your work and close all running applications.

2. From the Windows **Start** menu, launch the OSConfig utility.

3. Go to the **Write Filter** tab. If the Unified Write Filter (UWF) option is enabled, disable it.

4. Click on the **Capture OS** tab.

5. On the **Capture OS** tab, click on the **Reboot and launch backup tool** button. Your Matrox Iris GTR will reboot.

6. When the reboot process completes, a list of possible options is displayed. Click on the **Troubleshoot** option, and then on the **Matrox Rescue Utility** option.

7. When the **Matrox Rescue Utility** dialog opens, you must read the license agreement. When done, click on the **I agree** button to accept the license agreement.

8. The next page is presented with an option already selected: **Backup the OS for this unit**; leave this option as is. Below this, you can specify the location of your USB key. If you do not already have your USB key connected, you can do so now. It is not recommended to save the backup in the current operating system partition, or to a virtual drive. It is also recommended to save to a USB key with at least 16 Gbytes free. Once you have selected the location of the USB key, click on OK and the Matrox Rescue utility will copy the information to the destination specified.

9. When the process completes, a message dialog will open, explaining what was done. Click on the **OK** button.

10. After the reboot, if UWF was enabled before you started the backup process, launch the OSConfig utility from the Windows **Start** menu, and re-enable UWF.

❖ Note that to restore this backup without a working copy of the operating system on your Matrox Iris GTR, additional files are required. This backup *.wim* file can either be used with the Matrox Iris GTR Rescue utility (OSConfig), if the RECOVERY partition is not corrupt, or with a rescue USB key, if the RECOVERY partition is corrupt. To restore your Matrox Iris GTR with the Matrox Iris GTR Rescue utility, refer to the *Restore Windows 10 IoT Enterprise* section. To created a rescue USB key, refer to the section *Making a rescue USB key for Windows10 IoT Enterprise* section.

Making a rescue USB key for Windows10 IoT Enterprise

In the case that your Matrox Iris GTR operating system partition becomes corrupt, the easiest way to restore your smart camera is to use a rescue USB key containing the Matrox Rescue utility (OSConfig) and a backup of your operating system partition. This procedure requires a USB key with at least 16 Gbytes free.

To create a rescue USB key, you must access your Matrox Iris GTR directly; you cannot perform this task remotely. To access the camera directly, connect a display devices, keyboard, and mouse to your Matrox Iris GTR. For information, refer to *Powering and connecting to your Matrox Iris GTR* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR* for more information.

When creating a rescue USB key, you must already have a backup file that you want to use for the recovery. This could either be the Matrox default factory settings backup .wim file (W10Ex64GTR.wim) that comes with your installation DVD, or a backup file that you have created (W10EGTR.wim) using the procedure in the *Backup Matrox Iris GTR Windows 10 IoT Enterprise* section earlier in this chapter.

To create a rescue USB key of your operating system partition, perform the following:

WARNING!   Note that this will reformat your USB key and all its data will be erased.

1. Reboot your Matrox Iris GTR.

2. During the reboot, after the power-on self-test (POST), press the **F8** key. Select **Repair your computer** in the presented **Advanced Boot Options** screen.

3. When the reboot process completes, it will display a screen asking you to choose an option. Click on the **Troubleshoot** option, and then on the **Matrox Rescue Utility** option.

4. When the **Matrox Rescue Utility** dialog opens, you must read the license agreement. When done, click on the **I agree** button to accept the license agreement.

5. In the following dialog, select the **Copy Matrox Rescue Tool to USB storage device** menu option.

6. Browse to the file location. You can either chose to insert the installation DVD with the Matrox default factory settings backup *.wim* file (*W10Ex64GTR.wim*) or use a USB key with the files that you have created, such as the backup *.wim* file or captured backup *.wim* file (*W10EGTR.wim*). You can navigate to the following locations to find the *.wim* file of your customized operating system partition:

   - DVD drive: *<DVD>:\Ximage*

   - USB key: *<USB>:*

7. When this operation completes successfully, your rescue USB key can be used to restore the operating system on other Matrox Iris GTR smart cameras.

Restore Windows 10 IoT Enterprise

You can restore the Windows 10 IoT Enterprise operating system partition of your Matrox Iris GTR smart camera, using the Matrox Iris GTR Rescue utility with a backup *.wim* file or a captured backup *.wim* file.

Warning!

The restore operation will reformat and erase all data currently on the Matrox Iris GTR storage drive (eMMC). If you have two (or more) partitions on your Matrox Iris GTR storage drive, or have external drives connected, select the correct drive or disconnect from all external hard drives to prevent data being erased by accident.

❖ The RECOVERY partition houses the Matrox Iris GTR Rescue utility and does not get reformatted if you restore a backup *.wim* file from the Matrox Rescue utility console. However, if you use a rescue USB key with a captured backup *.wim* file (*W10EGTR.wim*), or restore to factory default settings file (*W10Ex64GTR.wim*), then both the RECOVERY and MTXGTR partitions are reformatted.

To restore your Matrox Iris GTR's operating system partition, you must access your Matrox Iris GTR directly; you cannot perform this task remotely. To access the camera directly, connect a display devices, keyboard, and mouse to your Matrox Iris GTR. For information, refer to *Powering and connecting to your Matrox Iris GTR* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR* for more information.

To restore your Matrox Iris GTR's operating system partition, perform the following:

1. Reboot your Matrox Iris GTR.

2. During the reboot, after the power-on self-test (POST), press the **F8** key, a list of possible options will be displayed. Click on the **Troubleshoot** option, and then on the **Matrox Rescue Utility** option**.**

3. When in the **Matrox Rescue utility** dialog, select the **Matrox Iris GTR - Restore OS** menu option.

4. Select which *.wim* file (*W10Ex64GTR.wim* or *W10EGTR*.wim) to restore.

❖ Note that these files are created with the backup or captured options, described earlier in this chapter.

5. Follow all on-screen instructions.

Appendix F:
The Matrox Iris GTR breakout board

This appendix describes how to use the Matrox Iris GTR breakout board to connect your Matrox Iris GTR to power and/or to third-party devices.

Note that the Matrox Iris GTR breakout board is strictly intended for development purposes only. It is not to be used for deployment with the Matrox Iris GTR smart camera.

Introducing the Matrox Iris GTR breakout board

The Matrox Iris GTR breakout board allows you to test the inputs and outputs of your Matrox Iris GTR, as well as initially power your smart camera. The Matrox breakout board provides a convenient way to connect the digital I/O and power cable, re-route signals, connect third-party devices, and generate triggers.

❖ Note that the status LEDs on your Matrox Iris GTR breakout board break the electrical isolation provided by the opto-isolated auxiliary signals from your Matrox Iris GTR.
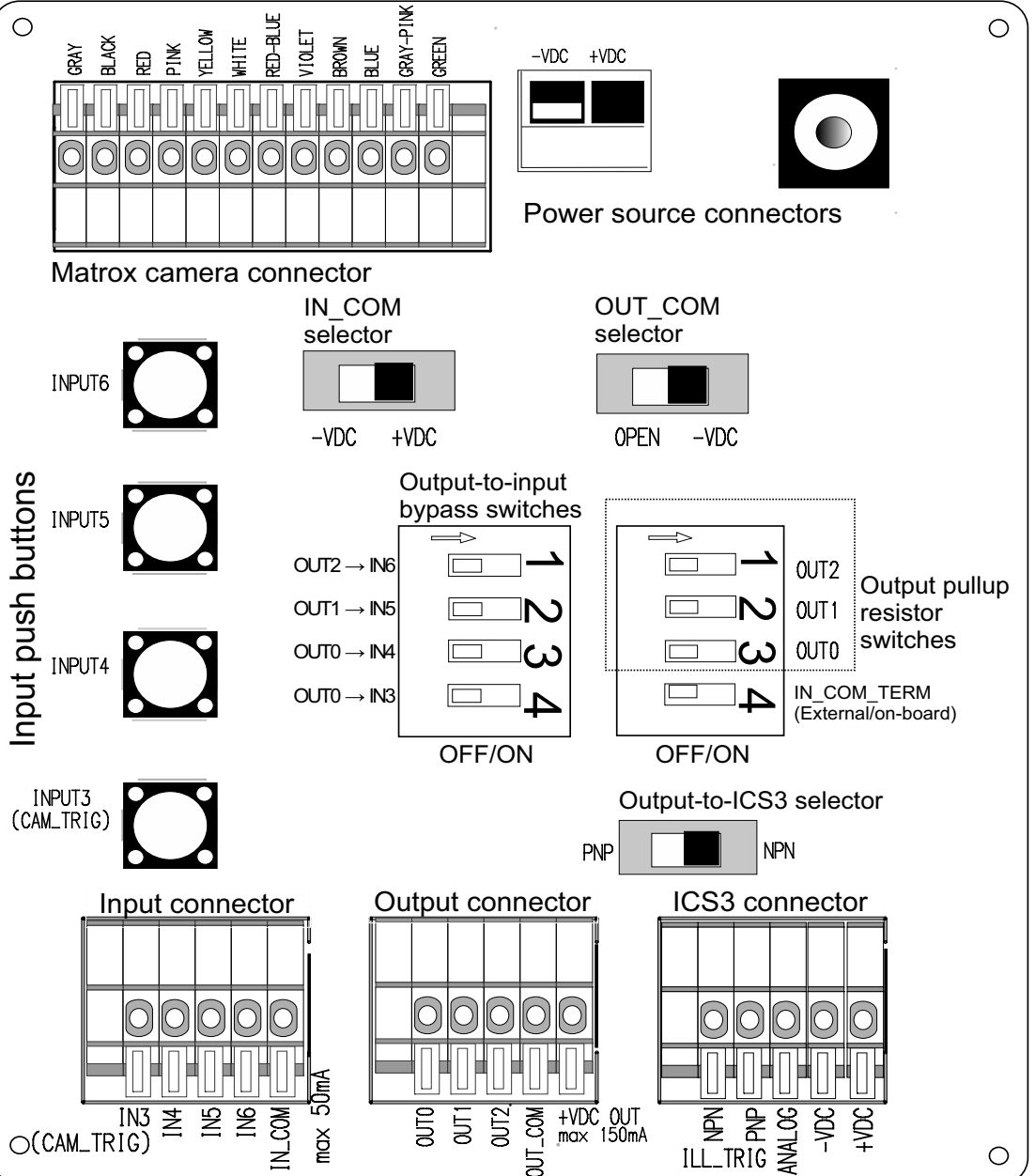
❖ Note that the Matrox Iris GTR breakout board is strictly intended for development purposes only. It is not to be used for deployment with the Matrox Iris GTR smart camera.
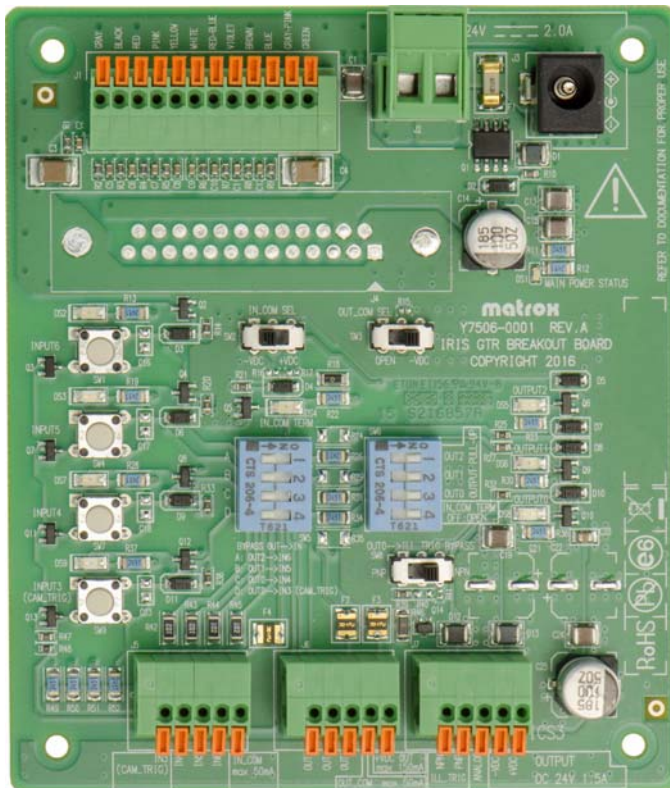
Matrox breakout board

Not to scale

Your Matrox Iris GTR breakout board has the following connectors, most of which are terminal block connectors:

- **Matrox camera connector**. Connects your Matrox breakout board to your Matrox Iris GTR, using the Matrox Iris GTR digital I/O and power cable.

- **Power source connectors**. Connects your Matrox Iris GTR breakout board to a source of power. The power source connectors includes both a terminal block connector and a DC power socket. Note that only one power source connector should be used.

- **Input connector**. Receives trigger signals and other auxiliary input signals from connected third-party input-generating devices.

- **Output connector**. Sends auxiliary output signals to connected third party devices.

- **ICS3 connector**. Sends an auxiliary output signal to a connected lighting controller (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device).

Flow diagram of the auxiliary input and output signals

The following is a flow diagram of the auxiliary input and auxiliary output signals of the Matrox Iris GTR breakout board:

Matrox Iris GTR

Matrox camera connector

Push buttons (input-generating)

Output router[1]

Input connector

Output connector

ICS3 connector

Third-party device   Third-party device   Third-party device (lighting controller)

1 A breakout board switch setting controls the routing of an output to an input.
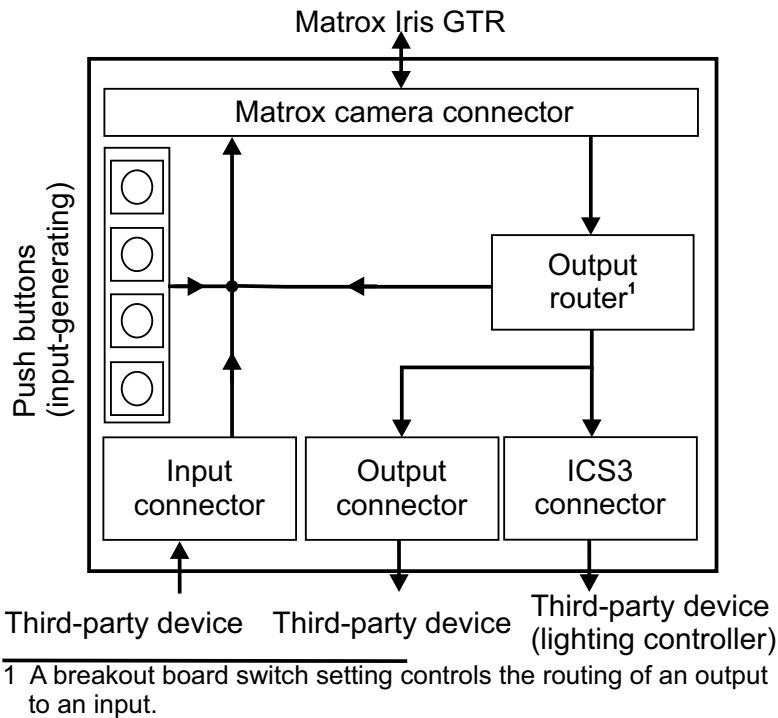
Equivalent circuit only

Connecting an open-wire to a spring wire-terminal

Most connectors on your Matrox Iris GTR breakout board are spring terminal block connectors; they have wire-terminals instead of pins. To connect an open-wire to a wire-terminal, perform the following:

1. Press down on the orange flange (the spring) with a small tool or pen.
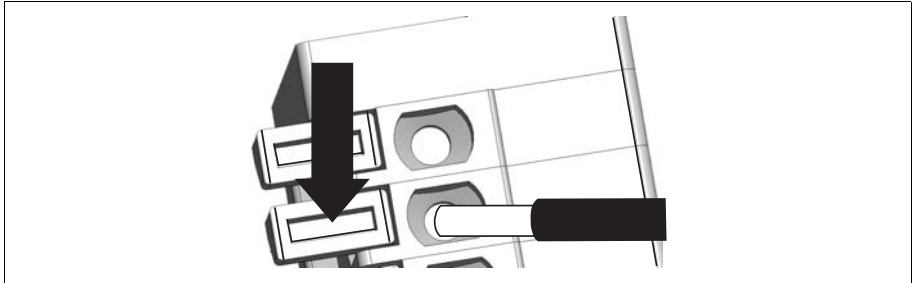
2. Insert the un-insulated and tinned wire tip into the hole before releasing the orange flange.

   The wire is now attached to the terminal block connector on the Matrox Iris GTR breakout board.

Powering and connecting

To power your Matrox Iris GTR and connect its I/O signals to your Matrox Iris GTR breakout board, perform the following:

1. Connect the gray-pink and green wires of the Matrox Iris GTR digital I/O and power cable to the gray-pink and green wire-terminals of the Matrox camera connector on the Matrox Iris GTR breakout board, respectively. For information on how to connect a wire to the wire-terminal, refer to the *Connecting an open-wire to a spring wire-terminal* section, earlier in this appendix.

2. If only powering your Matrox Iris GTR, wrap insulating tape around each of the unused wires of the digital I/O and power cable. Otherwise, connect them to the appropriate wire-terminals of the Matrox camera connector. For information, see the *Matrox camera connector* subsection of the *Open-wire connectors reference* section, later in this appendix.

3. Connect the digital I/O and power cable to your Matrox Iris GTR.

4. If connecting third party devices, connect each device to the respective Matrox Iris GTR breakout board connector.

   - Optionally, connect up to four third-party devices that require input to the Matrox Iris GTR breakout board input connector. For more information, refer to *Input connector* subsection of the *Open-wire connectors reference* section, later in this appendix.

   ❖ Note that, if an auxiliary input signals is in sinking mode, then all auxiliary input signals must be in sinking mode. Similarly, if one is in sourcing mode, then they must all be in sourcing mode.

- Optionally, connect up to three third-party devices that require input to the Matrox Iris GTR breakout board output connector. For more information, refer to *Output connector* subsection of the *Open-wire connectors reference* section, later in this appendix.

❖ Note that, if an auxiliary output signal is in sinking mode, then all auxiliary output signals must be in sinking mode. If one is in sourcing mode, then the other auxiliary output signals are no longer available.

- If using a lighting controller (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device), connect it to the ICS3 connector. For more information, refer to *ICS3 connector* subsection of the *Open-wire connectors reference* section, later in this appendix.

5. To power your Matrox Iris GTR breakout board, you can use one of two connectors: the DC power socket (J3) or the power screw wire-terminals (J2).

   To connect to the DC power socket (J3):

   a. Connect the external power supply, included in your Matrox Iris GTR starter kit, to the DC power socket (J3) of the power source connectors on your Matrox Iris GTR breakout board.

   b. Then, connect the external power supply to your AC power source.

   Alternatively, if your cable does not have a DC power plug, connect the power and return path wires from your power source to the screw wire-terminals (J2), respectively. Then, connect the external power supply to your AC power source.

❖ Note that a screw wire-terminal differs slightly from a spring wire-terminal, in that it uses screws to keep the wires tight. To open a screw wire-terminal to accept a wire, loosen the screw at the front of the wire-terminal. Once the tinned wire is in place, tighten the screw until the wire is firmly held. Repeat for the second wire.

Routing input signals to Matrox Iris GTR

There are three ways to route a signal to an auxiliary input signal of your Matrox Iris GTR:

• Route an output signal from a third-party device to an auxiliary input signal of your Matrox Iris GTR.

• Route an auxiliary output signal to an auxiliary input signal on your Matrox Iris GTR.

• Generate a Matrox Iris GTR auxiliary input signal with a push button.
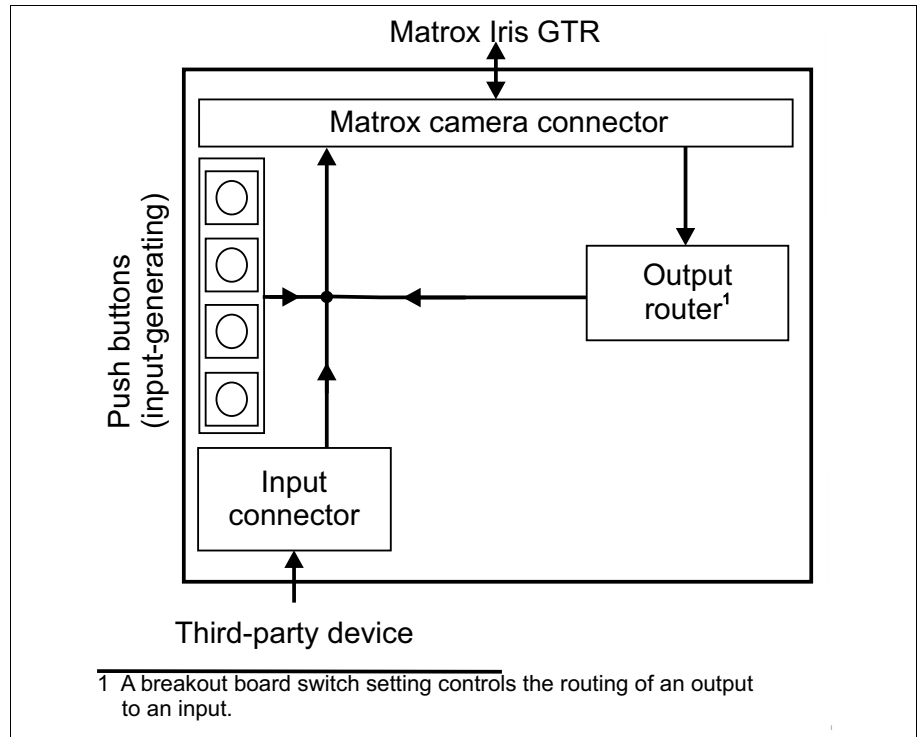
Equivalent circuit only

Routing an output signal from a third-party device to an auxiliary input signal of your Matrox Iris GTR

To route an output signal from a third-party device to a Matrox Iris GTR auxiliary input signal, connect the device to the input connector of the Matrox Iris GTR breakout board. The Matrox Iris GTR breakout board can generate either a common return path or voltage source for the auxiliary input signals.
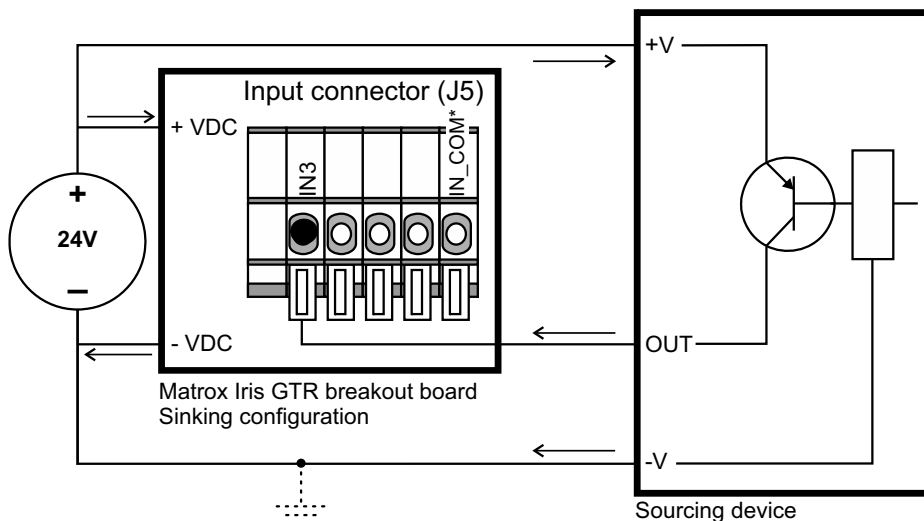
To route a sinking or sourcing output signal from a third-party device to a Matrox Iris GTR auxiliary input signal through your Matrox Iris GTR breakout board, perform the following:

1. Connect the power and the digital I/O signals of your Matrox Iris GTR to your Matrox Iris GTR breakout board by following the steps in the *Powering and connecting* section, earlier in this appendix.

   ❖ Note that your Matrox Iris GTR breakout board expects the output signal from any third-party device to have a nominal voltage of 24 V. For more specific requirements, refer to *Electrical specifications* subsection in *Appendix B: Technical reference*.

2. Perform the instructions in one of the following subsections, depending on the type of connection to be made:

- Connecting a sourcing output device to a Matrox Iris GTR auxiliary input signal.

- Connecting a sinking output device to a Matrox Iris GTR auxiliary input signal.

   If, however, you are connecting to a device in a way not mentioned in these subsections, refer to the *Connecting devices to the auxiliary input signals* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR*.

Connecting a sourcing output device to a Matrox Iris GTR auxiliary input signal

If connecting to a sourcing output of a third-party device, the input common should provide the common return path for the circuit. To provide the common return path through the Matrox Iris GTR breakout board (internally), set the IN_COM_TERM switch (SW6[4]) to ON and the IN_COM selector switch (SW2) to -VDC. Then, connect the input connector (J5) to your third-party device as follows:

··· The ground depicted is optional because the auxiliary input signals are optically isolated.
* In this example, IN_COM_TERM switch is set to ON and the IN_COM selector switch (SW2) is set to -VDC; so the IN_COM wire-terminal is not externally connected.

Equivalent circuit only

Connecting a sinking output device to a Matrox Iris GTR auxiliary input signal

If connecting to a sinking output of a third-party device, the input common should be connected to a voltage source so that the auxiliary input signal acts as a sourcing input. To have the Matrox Iris GTR breakout board (internally) provide the voltage source for the input common, set the IN_COM_TERM switch (SW6[4]) to ON and the IN_COM selector switch (SW2) to +VDC. Then, connect the input connector (J5) to your third-party device as follows:
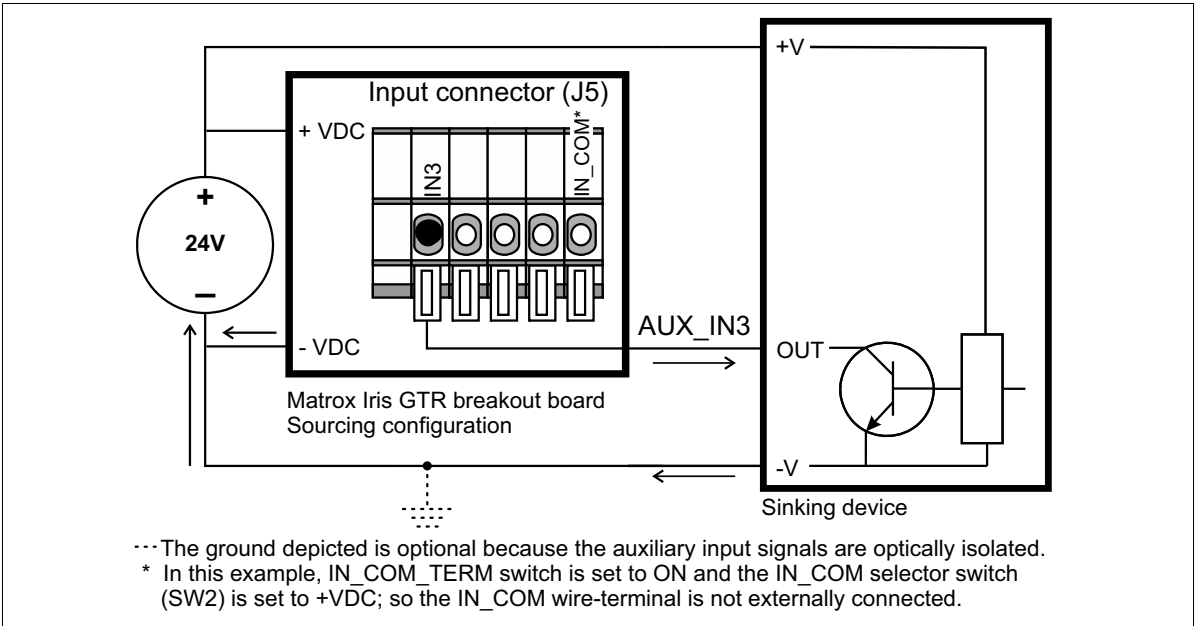

Matrox Iris GTR breakout board
Sourcing configuration

Sinking device

··· The ground depicted is optional because the auxiliary input signals are optically isolated.
 * In this example, IN_COM_TERM switch is set to ON and the IN_COM selector switch (SW2) is set to +VDC; so the IN_COM wire-terminal is not externally connected.

Equivalent circuit only

Routing a Matrox Iris GTR auxiliary output signal to an auxiliary input signal

You can route Matrox Iris GTR auxiliary output signal 0 to 2 to Matrox Iris GTR auxiliary input signal 3 to 6, respectively (auxiliary input signal 0 can be routed to auxiliary input signal 3 or 4). This is primarily used for testing, allowing you to receive what was sent on the Matrox Iris GTR auxiliary output signals. To route a Matrox Iris GTR auxiliary output signal to a Matrox Iris GTR auxiliary input signal, perform the following:

1. Connect the power and the digital I/O signals of your Matrox Iris GTR to the Matrox Iris GTR breakout board by following the steps in the *Powering and connecting* section, earlier in this appendix.

2. For each auxiliary output signal to route to an auxiliary input signal, switch on an output-to-input bypass switch.

   The output-to-input bypass switch box (SW5) has 4 switches, each one representing one of the four auxiliary input signals of your Matrox Iris GTR. For example, to route Matrox Iris GTR auxiliary output signal 2 (AUX_OPTOIND_OUT2) to auxiliary input signal 6 (AUX_OPTOIND_IN6), turn on output-to-input bypass switch 1 (SW5[1]).

   Repeat for each auxiliary output signal to be re-routed to an auxiliary input signal. For more information on the output-to-input bypass switch box (SW5), see the *Output-to-input bypass switches* subsection of the *Switches reference* section, later in this appendix.

   Each auxiliary input signal should have only one input source. For example, when an auxiliary output signal is re-routed to an auxiliary input signal, it should always be the only source of input for that signal, and not have to compete with the signal from a third-party device or a push button.

3. If the IN_COM_TERM selector (SW6[4]) is set to ON and the IN_COM selector switch (SW2) is set to +VDC (that is, the auxiliary input signal is sourcing and the auxiliary output signal is sinking), no pullup is required.

   If, however, the IN_COM_TERM selector (SW6[4]) is set to ON and the IN_COM selector switch (SW2) is set to -VDC (that is, the auxiliary input signal is sinking and the auxiliary output signal is sourcing), then for each auxiliary output signal routed to an auxiliary input signal, you must enable a pullup resistor.

To provide a pullup resistor, turn on the output pullup resistor switch (SW6[1] to SW6[3]) associated with the auxiliary output signal of your Matrox Iris GTR. For example, if routing Matrox Iris GTR auxiliary output signal 2 (AUX_OPTOIND_OUT2) to auxiliary input signal 6 (AUX_OPTOIND_IN6), turn on output pullup resistor switch 1 (SW6[1]), which enables the pullup for auxiliary output signal 2. For more information on the output pullup resistor switches (SW6), see the *Output pullup resistor switches* subsection of the *Switches reference* section, later in this appendix.

Generating a Matrox Iris GTR auxiliary input signal using a push button

You can generate a Matrox Iris GTR auxiliary input signal (for example, a trigger signal) using the push buttons on the Matrox Iris GTR breakout board. To do so, perform the following:

1. Connect the power and the digital I/O signals of your Matrox Iris GTR to the Matrox Iris GTR breakout board by following the steps in the *Powering and connecting* section, earlier in this appendix.

2. Press a push button to generate an auxiliary input signal. Your Matrox Iris GTR breakout board has 4 push buttons (labeled INPUT3 through INPUT6), one for each of the four auxiliary input signals of your Matrox Iris GTR. See the *Push buttons* section, later in this appendix, for the correspondence between the push buttons and the Matrox Iris GTR auxiliary input signals. For example, to generate a signal that will be received by Matrox Iris GTR auxiliary input signal 3 (AUX_OPTOIND_IN3), press the INPUT3 push button.

   Each auxiliary input signal should have only one input source. For example, when using a push button, it should always be the only source of input for that signal, and not have to compete with the signal from a third-party device or the re-routing of an auxiliary output signal.

3. Repeat for each Matrox Iris GTR auxiliary input signal that you want to generate.

Routing Matrox Iris GTR auxiliary output signals

There are three ways to route a Matrox Iris GTR auxiliary output signal:

- Route a Matrox Iris GTR auxiliary output signal to an auxiliary input signal; to do so, see *Routing a Matrox Iris GTR auxiliary output signal to an auxiliary input signal* subsection of the *Routing input signals to Matrox Iris GTR* section, earlier in this appendix.

- Route a Matrox Iris GTR auxiliary output signal to a third-party device.

- Route Matrox Iris GTR auxiliary intensity control signal and output signal 0 (trigger) to a lighting controller (for example, the Advanced Illumination inline control system).
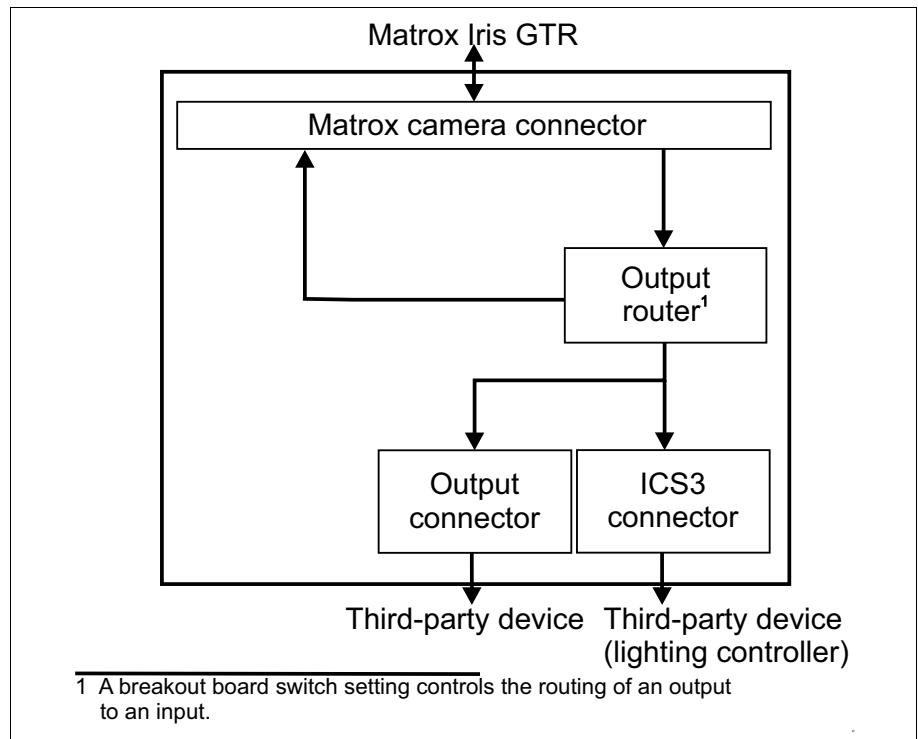
1 A breakout board switch setting controls the routing of an output to an input.

Equivalent circuit only

Routing a Matrox Iris GTR auxiliary output signal to a third-party device

To route a Matrox Iris GTR auxiliary output signal to an input signal of a third-party device, connect the device to the output connector of the Matrox Iris GTR breakout board. The Matrox Iris GTR breakout board can generate a common return path for the auxiliary output signals when they should be sinking. In addition, the Matrox Iris GTR breakout board has a +VDC_OUT wire-terminal on the output connector (J6[+VDC_OUT]) that can provide a voltage source to third-party devices (for a total maximum of 150 mA); you can externally connect one auxiliary output signal if it should be a sourcing output (discussed later).

❖ Note, if using a lighting controller (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device), refer to *Routing Matrox Iris GTR auxiliary output signal 0 and the analog intensity control signal to a lighting controller* subsection.

To route a Matrox Iris GTR auxiliary output signal to a third-party input signal through your Matrox Iris GTR breakout board, perform the following:

1. Connect the power and the digital I/O signals of your Matrox Iris GTR to the Matrox Iris GTR breakout board by following the steps in the *Powering and connecting* section, earlier in this appendix.

2. Perform the instructions in one of the following subsections, depending on the type of connection to be made:

- Connecting a sinking Matrox Iris GTR auxiliary output signal to a sourcing input of a device.

- Connecting a sinking Matrox Iris GTR auxiliary output signal to a sourcing input with a different voltage source.

- Connecting a sourcing Matrox Iris GTR auxiliary output signal to a sinking input of a device.

  If, however, you are connecting to a device in a way not mentioned in these subsections, refer to the *Connecting devices to the auxiliary output signals* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR.*

❖ Note that, each auxiliary output signal should have only one destination. For example, when the auxiliary output signal is connected to a third-party device through the output connector, it should not also be re-routed to an auxiliary input signal or to the ICS3 connector. This helps prevent signal interference, which could cause issues with connected devices.

Connecting a sinking Matrox Iris GTR auxiliary output signal to a sourcing input of a device

If connecting to a sourcing input of a third-party device, the output common should provide a common return path for the circuit. If the device doesn't need to be electrically isolated, you can use the common return path through the Matrox Iris GTR breakout board (internally); to do so, set the OUT_COM selector switch (SW3) to -VDC. Then, connect the output connector (J6) to your third-party device as follows:

Matrox Iris GTR breakout board
Sinking configuration
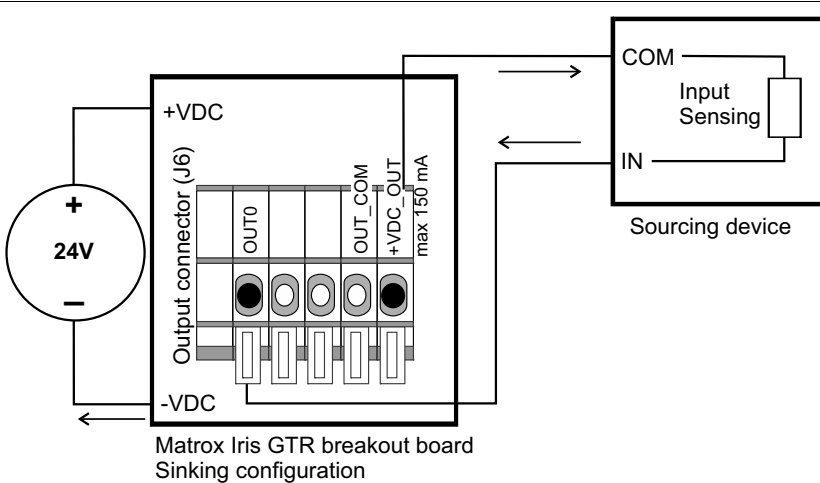
* In this example, the OUT_COM selector switch (SW3) is set to -VDC, so the OUT_COM wire-terminal is not externally connected.
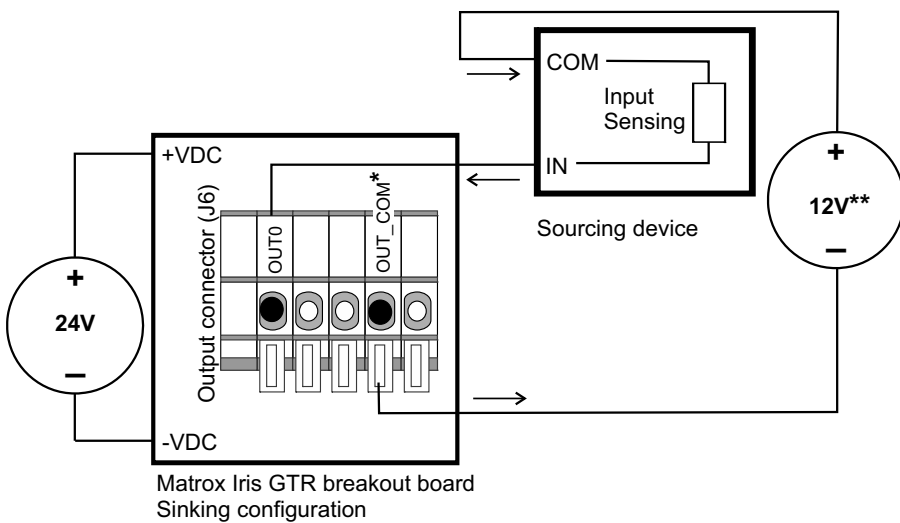
Equivalent circuit only

❖ Note however, if connecting to a device that needs to remain electrically isolated, see *Connecting a sinking Matrox Iris GTR auxiliary output signal to a sourcing input with a different voltage source* subsection, instead.

Above, the common terminal of the third-party device is connected to the +VDC_OUT wire-terminal as a voltage source; however, the third party-device could have used any other voltage source. Each of the auxiliary output signals can only sink up to 50 mA of current.

Connecting a sinking Matrox Iris GTR auxiliary output signal to a sourcing input with a different voltage source

If connecting to a sourcing input of a third-party device which requires less than 24 V, then your Matrox Iris GTR breakout board and your third-party device must each have their own voltage source. In addition, set the OUT_COM selector switch (SW3) to OPEN. Then, connect the output connector (J6) to your third-party device as follows:
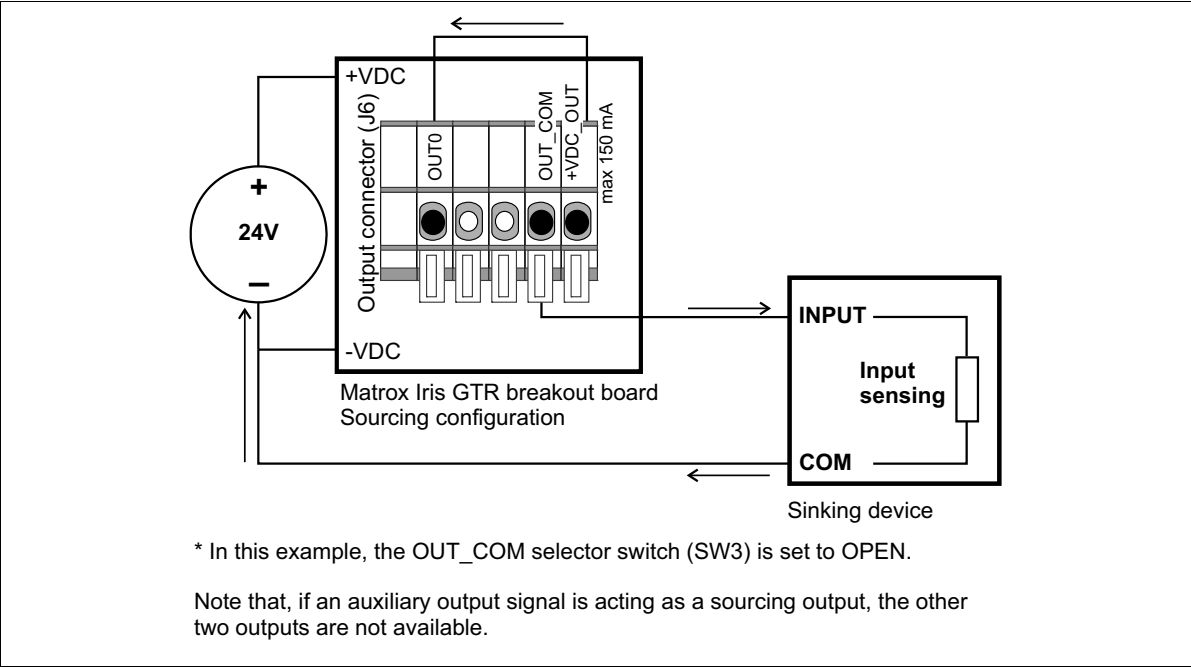

* In this example, the OUT_COM selector switch (SW3) is set to OPEN; therefore the OUT_COM wire-terminal is connected.

** The third-party device's power source could be up to 24 V.

Equivalent circuit only

Connecting a sourcing Matrox Iris GTR auxiliary output signal to a sinking input of a device

If connecting to a sinking input of a third-party device, an output wire-terminal (for example, OUT0) should be connected to a voltage source so that the auxiliary output signal provides a sourcing output through the OUT_COM wire-terminal. For this connection, set the OUT_COM selector switch (SW3) to OPEN. Externally connect the +VDC_OUT wire-terminal to the OUT0 wire-terminal on the output connector (J6) (as illustrated below). Then, connect the output connector (J6) to your third-party device as follows:

* In this example, the OUT_COM selector switch (SW3) is set to OPEN.

Note that, if an auxiliary output signal is acting as a sourcing output, the other two outputs are not available.

Equivalent circuit only

Using the Matrox Iris GTR breakout board's output pullup

If you need an output pullup, you can use the output pullup resistor switches (SW6) on the Matrox Iris GTR breakout board. To do so, turn on the output pullup resistor switch for the auxiliary output signal used. Each of the output pullup resistor switches (SW6[1-3]) is associated to one of the three auxiliary output signals of your Matrox Iris GTR.

❖ Note that the amount of resistance provided by the Matrox Iris GTR breakout board is 2.5 KΩ, which is suitable for a 24 V power supply. If another level of resistance is required, an external pullup resistor must be used.

For the correspondence between the auxiliary output signals and the output pullup resistor switches (SW6[1-3]), see the *Output pullup resistor switches* subsection of the *Switches reference* section, later in this appendix. For example, to use an output pull-up on the Matrox Iris GTR breakout board with auxiliary output signal 0 (AUX_OPTOIND_OUT0), turn on output pullup resistor switch 3 (SW6[3]).

Routing Matrox Iris GTR auxiliary output signal 0 and the analog intensity control signal to a lighting controller

The Matrox Iris GTR breakout board has a dedicated connector to route auxiliary output signal 0 and the analog intensity (dimming) control signal to a lighting controller (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device).

To route Matrox Iris GTR auxiliary output signal 0 and the analog intensity (dimming) control signal to a lighting controller, perform the following:

1. Connect the power and the digital I/O signals of your Matrox Iris GTR to the Matrox Iris GTR breakout board by following the steps in the *Powering and connecting* section, earlier in this appendix.

Important   If your lighting controller has both an NPN and PNP pin, follow the instructions below to connect only one of these two pins to your Matrox Iris GTR breakout board's ICS3 connector.

2. Perform the instructions in one of the following subsections, depending on the type of connection to be made:

• Connecting Matrox Iris GTR auxiliary output signal 0 to a sinking lighting controller (PNP pin).

• Connecting Matrox Iris GTR auxiliary output signal 0 to a sourcing lighting controller (NPN pin).

If, however, you are connecting to a device in a way not mentioned in these subsections, refer to the *Connecting devices to the auxiliary output signals* section, in *Chapter 2: Powering and connecting to your Matrox Iris GTR.* You can still connect the ANALOG wire-terminal to the intensity control (dimming control) of your lighting controller.

Connecting Matrox Iris GTR auxiliary output signal 0 to a sinking lighting controller (PNP pin)

If your lighting controller has a PNP pin (sinking input signal), it expects to be connected in a PNP topology, whereby the connected, controlling auxiliary output signal sources the current and the input pin sinks the current. To do so, route auxiliary output 0 to the PNP wire-terminal by setting the Output-to-ICS3 selector switch (SW8) to PNP, and activate the internal pullup for auxiliary output signal 0 by turning output pullup resistor switch 3 (SW6[3]) to ON. Then, connect the ICS3 connector (J7) to your third-party device as follows:
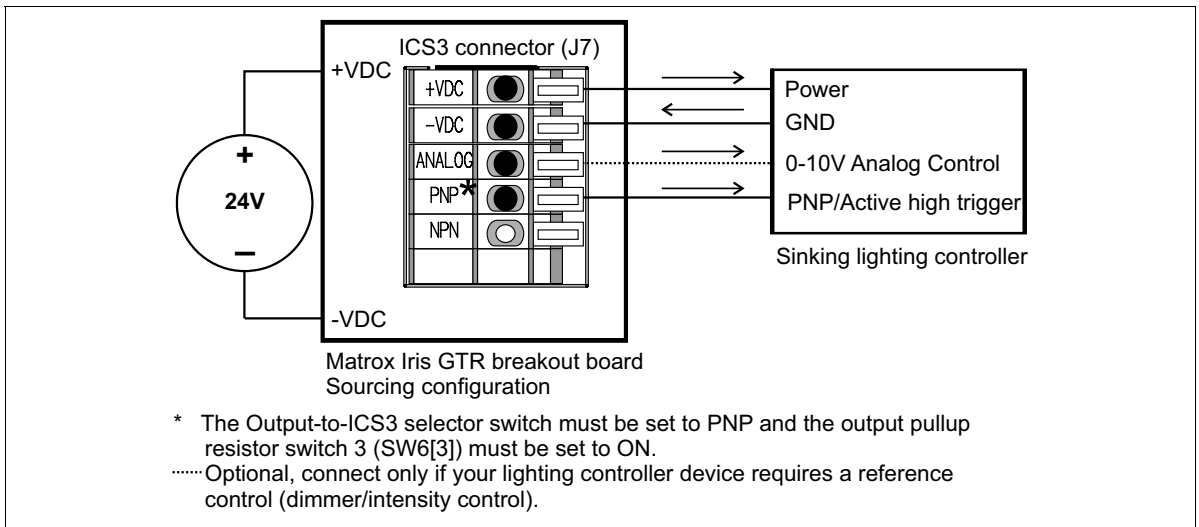
Equivalent circuit only

❖ Note that, when connecting to the PNP wire-terminal, the voltage observed on the pin is inverted when compared to the voltage observed on the auxiliary output signal pins (OUT0, OUT1, and OUT2). When the auxiliary output signal is set to On, the signal on the PNP wire-terminal is high; when it is set to Off, the signal on the PNP wire-terminal is low.
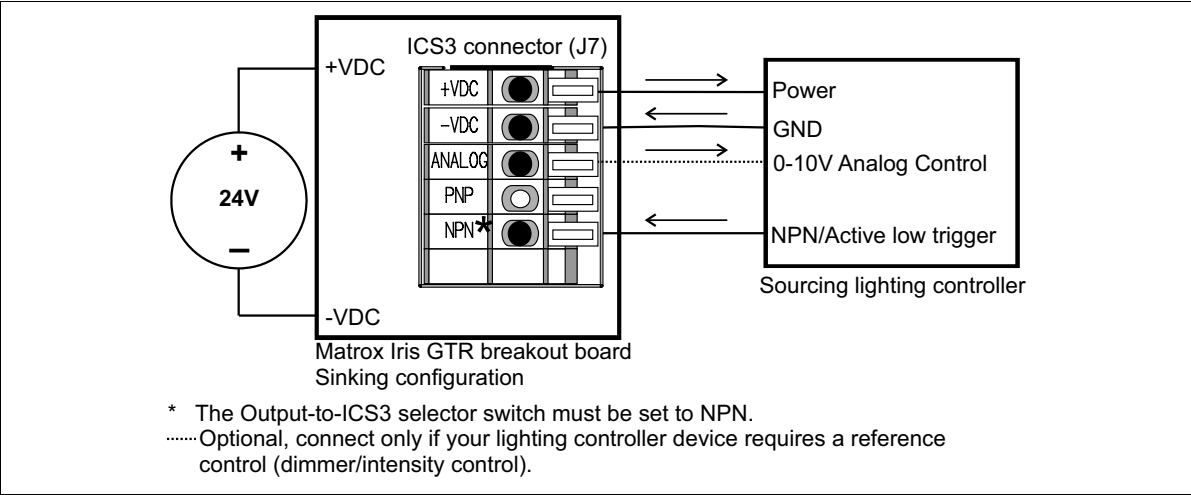
When the Matrox Iris GTR breakout board supplies the power to the lighting controller, verify that the total power required by the lighting controller and your smart camera does not exceed the rating of your power supply. If the lighting controller's power requirements exceed the 1.5 A provided by your Matrox Iris GTR breakout board, connect the lighting controller's 24 VDC directly to the power supply instead of using the +VDC wire-terminal (J7[+VDC]). For more information on current consumption of your Matrox Iris GTR breakout board,

refer to *Electrical specifications* subsection in *Appendix B: Technical reference*. For the current consumption of your lighting controller, refer to its associated documentation.

❖ Note that in this configuration, auxiliary output signal 1 and auxiliary output signal 2 are still available via the Matrox Iris GTR breakout board.

Connecting Matrox Iris GTR auxiliary output signal 0 to a sourcing lighting controller (NPN pin)

If your lighting controller has an NPN pin (sourcing input signal), it expects to be connected in a NPN topology, whereby the connected, controlling auxiliary output signal sinks the current and the input pin sources the current. To do so, route auxiliary output 0 to the NPN wire-terminal by setting the Output-to-ICS3 selector switch (SW8) to NPN. Then, connect the ICS3 connector (J7) to your third-party device as follows:

Equivalent circuit only

When the Matrox Iris GTR breakout board supplies the power to the lighting controller, verify that the total power required by the lighting controller and your smart camera does not exceed the rating of your power supply. If the lighting controller's power requirements exceed the 1.5 A provided by your Matrox Iris GTR breakout board, connect the lighting controller's 24 VDC directly to the power supply instead of using the +VDC wire-terminal (J7[+VDC]). For more information on current consumption of your Matrox Iris GTR breakout board, refer to *Electrical specifications* subsection in *Appendix B: Technical reference*. For the current consumption of your lighting controller, refer to its associated documentation.

Open-wire connectors reference

The Matrox Iris GTR breakout board has five separate terminal-block connectors designed for open-wire connections. Each connector is composed of multiple wire-terminals. Each of these wire-terminals requires a stripped cable with tinned wires to be inserted, wire by wire, into the available wire-terminal. Each wire-terminal is labeled (by color or signal name) on the board.

Matrox breakout board connector name	Wire-terminal	Connector type
Matrox camera connector	J1	Connects your Matrox Iris GTR to the Matrox Iris GTR breakout board via the digital I/O and power cable.
Power source connectors	J2-J3	Provides power to the Matrox Iris GTR breakout board and your Matrox Iris GTR.
Input connector	J5	Connects to third-party devices so that they can send auxiliary input and trigger signals to your Matrox Iris GTR.
Output connector	J6	Connects to third-party devices so that they can receive auxiliary output signals from your Matrox Iris GTR.
ICS3 connector	J7	Connects to a lighting controller (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device) so that your Matrox Iris GTR can control a light source.

Matrox camera connector

The Matrox camera connector (J1) is a series of 12 wire-terminals. Connect it to the digital I/O and power connector of your Matrox Iris GTR, using the Matrox open-wire digital I/O and power cable that comes with the Matrox Iris GTR starter kit. Each wire-terminal receives a wire with a color corresponding to the color listed on the Matrox Iris GTR breakout board. This connector provides power to your Matrox Iris GTR, receives Matrox Iris GTR auxiliary output signals, and transmits auxiliary input signals to your Matrox Iris GTR.
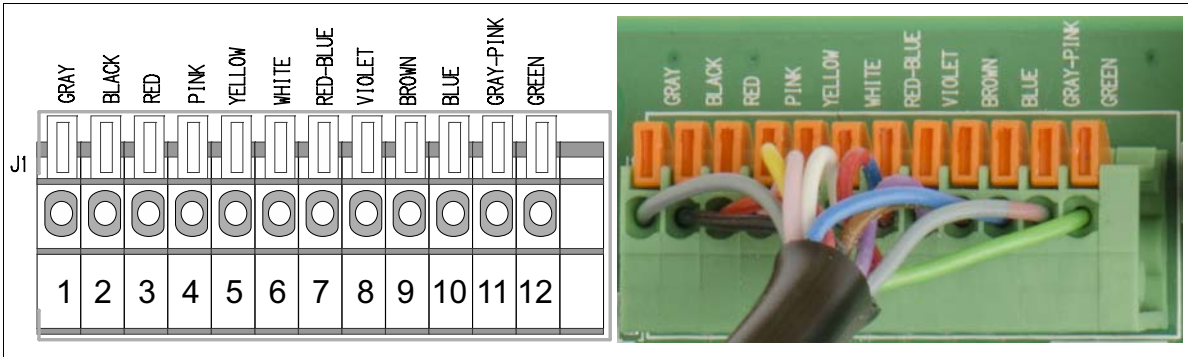
The pinout for the Matrox camera connector (J1) on the Matrox Iris GTR breakout board is as follows.

Matrox camera connector on the Matrox Iris GTR breakout board		Digital I/O and power connector on Matrox Iris GTR		
Wire color	**Wire -terminal**	**Matrox Iris GTR pin number**	**Signal name**	**Description**
Gray	J1[1]	8	AUX_OPTOIND_IN6	Auxiliary signal 6 (input)[a, b].
Black	J1[2]	7	AUX_OPTOIND_IN5	Auxiliary signal 5 (input)[a, b].
Red	J1[3]	9	AUX_OPTOIND_IN4	Auxiliary signal 4 (input)[a, b].
Pink	J1[4]	5	AUX(TRIG)_OPTOIND_IN3	Auxiliary signal 3 (input)[a, b]. This auxiliary input signal is typically used to trigger the grab, but the signal can be used for any other purpose.
Yellow	J1[5]	6	AUX_OPTOIND_IN_COMMON	Auxiliary signal (input) common[b].
White	J1[6]	3	AUX_OPTOIND_OUT2	Auxiliary signal 2 (output)[b].
Red-blue	J1[7]	12	AUX_OPTOIND_OUT1	Auxiliary signal 1 (output)[b].
Violet	J1[8]	10	AUX_OPTOIND_OUT0	Auxiliary signal 0 (output)[b].
Brown	J1[9]	1	AUX_OPTOIND_OUT_COMMON	Auxiliary signal (output) common[b].
Blue	J1[10]	2	AUX_AREF_OUT7	Analog intensity control signal (output). Supported function: a voltage-controlled signal designed to be received by a lighting controller (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device).
Gray-pink	J1[11]	11	-VDC	Negative pin of the power provided to your Matrox Iris GTR from the Matrox Iris GTR breakout board.
Green	J1[12]	4	+VDC	Positive pin of the power provided to your Matrox Iris GTR from the Matrox Iris GTR breakout board.

a. Can be either the positive or negative pin, depending on whether the auxiliary input signals are in sinking or sourcing mode, respectively.

b. Note that the status LEDs on your Matrox Iris GTR breakout board break the electrical isolation provided by the opto-isolated auxiliary signals from your Matrox Iris GTR.

Power source connectors

The power source connectors are a combination of two screw-wire-terminals (J2) and one DC power socket (J3). You can either connect power to the DC power socket or the two wire-terminals, but not both simultaneously. This connection powers both the Matrox Iris GTR breakout board and your connected Matrox Iris GTR smart camera. Note that a DC power supply (compatible with the DC power socket (J3) is provided in the Matrox Iris GTR starter kit.
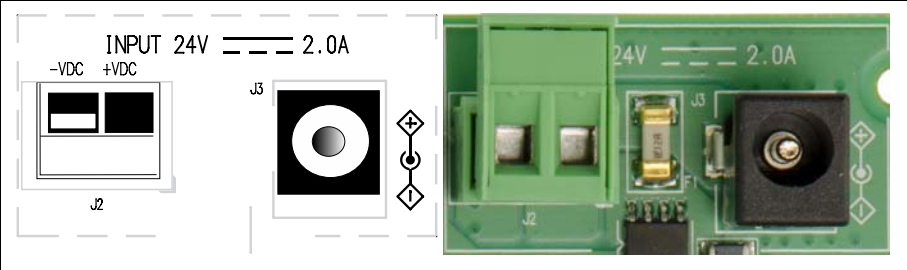
❖ Note that the screw-wire-terminals of the power source connector are designed to receive power from an external source and should not be connected to the open-ended digital I/O and power cable.
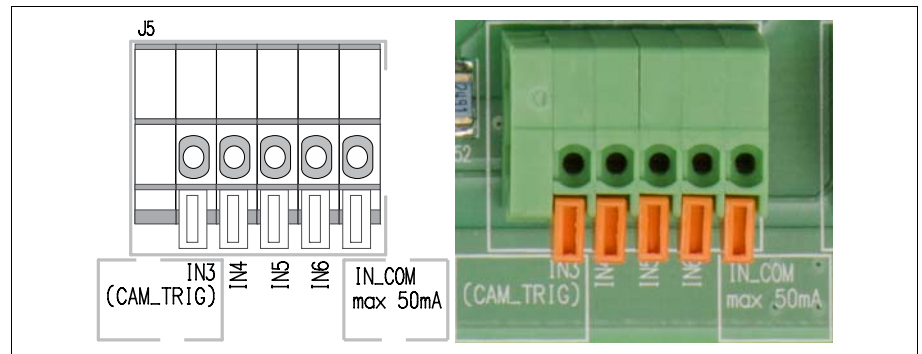
The pinout for the power source connector is as follows:

Board reference	Description
J3/DC Input	External DC input (+VDC). This connection is rated up to 24 V (2 A). Note that this power socket includes both +VDC (the pin) and -VDC (the shielding).
J2/+VDC	External DC input (+VDC) for use with an open-wire power cable, rated up to 24 V (2 A).
J2/-VDC	DC voltage reference (-VDC) for use with an open-wire power cable.

Input connector

The input connector (J5) is a series of 5 wire-terminals. Four of these wire-terminals (labeled IN3 (CAM TRIG) through IN6) connect to your third-party devices so that the devices can send signals to the auxiliary input signals of your Matrox Iris GTR (such as, trigger signals). The fifth-wire terminal can connect to an external voltage source/return path for the auxiliary input signals.

Each auxiliary input signal should have only one input source. For example, when an input signal comes from a connected third-party device, it should always be the only source of input for that signal, and not have to compete with the signal from a re-routed auxiliary output signal or a push button.

The pinout for the input connector (J5) is as follows:

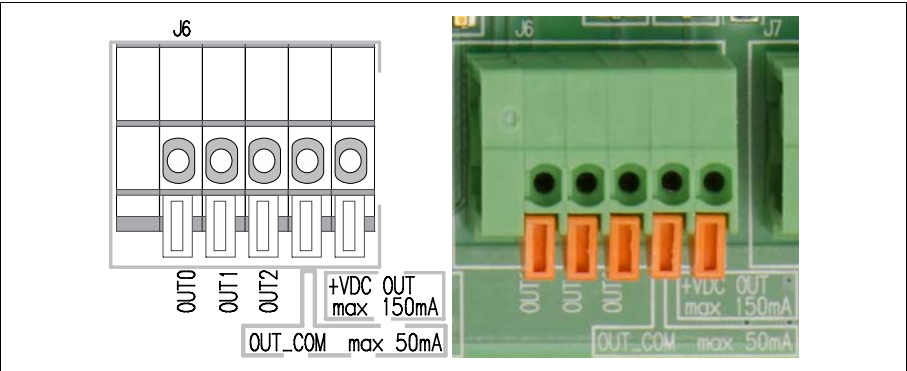| Wire-terminal	Description	Matrox Iris GTR signal received	Routed through the Matrox Iris GTR breakout board's camera connector
IN3 (CAM_TRIG)	Auxiliary signal 3 (input).	AUX(TRIG)_OPTOIND_IN3	Pink
IN4	Auxiliary signal 4 (input).	AUX_OPTOIND_IN4	Red
IN5	Auxiliary signal 5 (input).	AUX_OPTOIND_IN5	Black
IN6	Auxiliary signal 6 (input).	AUX_OPTOIND_IN6	Gray
IN_COM	Auxiliary signal (input) common.	AUX_OPTOIND_IN_COMMON	Yellow
	This wire-terminal can be connected either to a voltage return path or a voltage source, depending on whether the connected third-party device is sourcing or sinking the current, respectively. Note that, since this wire-terminal is shared among the four auxiliary input signals, if one of the third-party devices, connected to the input connector, is sinking the current, then they all should be.		
	If the IN_COM_TERM selector switch (SW6[4]) is set to ON, this wire-terminal should remain disconnected since your Matrox Iris GTR breakout board provides the common return path or voltage signal for the auxiliary input signals of your smart camera (depending on the setting of the IN_COM selector switch (SW2)).		
	To provide a voltage source less than 24 V for sourcing auxiliary input signals, connect this wire terminal to an external voltage source and set the IN_COM_TERM selector switch (SW6[4]) to OFF.		

Output connector

The output connector (J6) is a series of 5 wire-terminals. Four of these wire-terminals (labeled OUT0 through OUT2, and OUT_COM) connect to your third-party devices so that the devices can receive auxiliary output signals from your Matrox Iris GTR, via an open-wire cable. The fifth wire-terminal can output voltage to third-party devices.

If an auxiliary output signal is used as a sourcing output (that is, when the OUT_COM wire-terminal is connected to a sinking input of a third-party device while one of the OUT wire-terminals is connected to a voltage source), then only 1 auxiliary output signal is available.

Each auxiliary output signal should have only one destination. For example, when the auxiliary output signal is connected to a third-party device through the output connector, it should not also be re-routed to an auxiliary input signal or to the ICS3 connector. This helps prevent signal interference, which could cause issues with connected devices.


The pinout for the output connector (J6) is as follows:

Wire-terminal	Description	Matrox Iris GTR signal sent	Routed through the Matrox Iris GTR breakout board's camera connector
OUT0	Auxiliary signal 0 (output).	AUX_OPTOIND_OUT0	Violet
OUT1	Auxiliary signal 1 (output).	AUX_OPTOIND_OUT1	Red/Blue
OUT2	Auxiliary signal 2 (output).	AUX_OPTOIND_OUT2	White
OUT_COM	Auxiliary signal (output) common.	AUX_OPTOIND_OUT_COMMON	Brown
	Note that, this wire-terminal is shared among the three auxiliary output signals.		
	This wire-terminal is used to connect to a return path for the auxiliary output signals when connected to a sourcing input of a third-party device. Alternatively, this wire-terminal can connect to a sinking input, while one of the OUT wire-terminals connects to a voltage source, to provide a sourcing output (up to a maximum of 50 mA); in this case, only one auxiliary output signal is available.		
	In addition, if the OUT_COM selector switch (SW3) is set to -VDC, this wire-terminal should remain disconnected. Instead, your Matrox Iris GTR breakout board will provide the output common signal.		
+VDC_OUT	+VDC supply up to a maximum of 150 mA.		
	This wire-terminal can provide a voltage source to third party devices; you can also externally connect this wire-terminal to one of the auxiliary output signals if it should be a sourcing output (discussed previously). Note that, If you connect this wire-terminal, you cannot create an isolated circuit.		

ICS3 connector

The ICS3 connector (J7) is a series of 5 wire-terminals that has been designed to connect to a lighting controller (such as, an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device). This connector has several potential uses: to power the lighting controller, to provide an analog intensity (dimming) control signal, and/or to trigger your lighting controller.
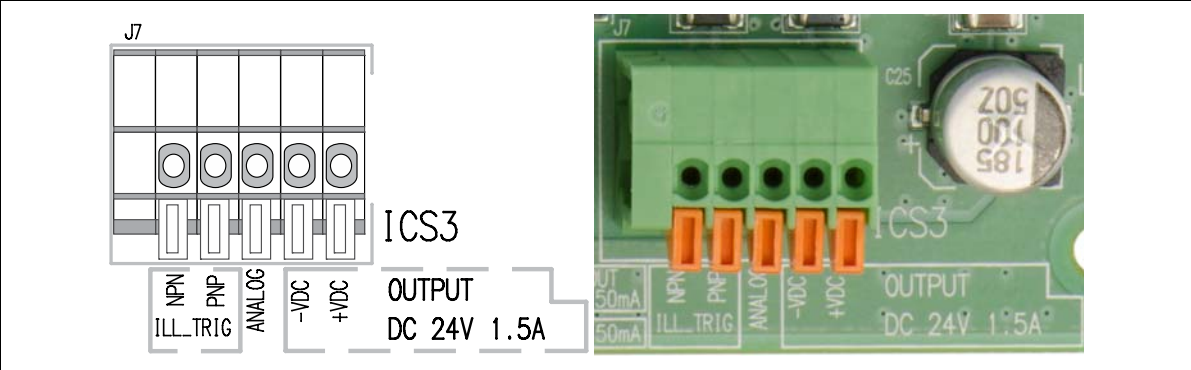
❖ Note that, this connector was designed to make an easier connection to a lighting controller, like an Advanced Illumination inline control system (ICS3), a Smart Vision Lights Brick light, or a similar device. When connecting to another type of third-party device, we recommend using the output connector (J6) instead.
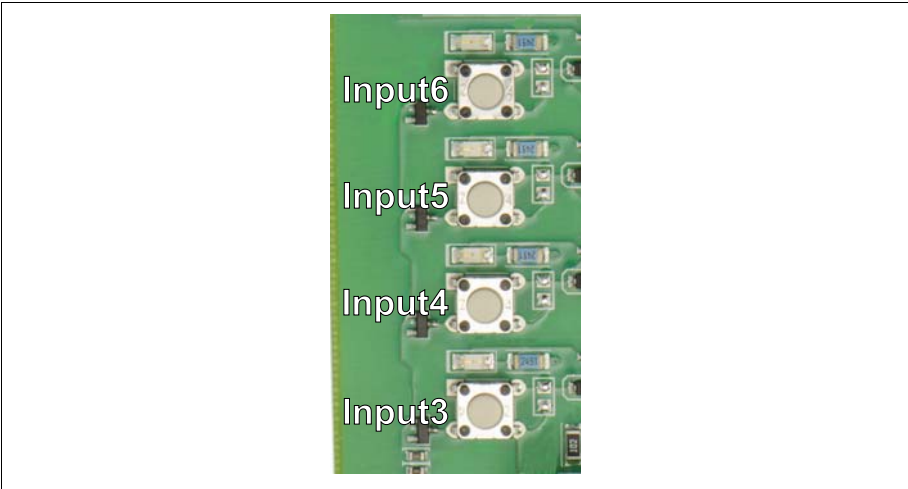
The pinout for the ICS3 connector is as follows:

Wire-terminal	Description	Matrox Iris GTR signal sent	Routed through the Matrox Iris GTR breakout board's camera connector	Connection to be made with your ICS3 device
NPN	Auxiliary signal 0 (output). Note that this wire-terminal is active only if the Output-to-ICS3 selector switch (SW8) is set to NPN. If used, the PNP wire-terminal should remain disconnected.	AUX_OPTOIND_OUT0	Violet	Pin 4 (black)
PNP	Auxiliary signal 0 (output). Note that this wire-terminal is active only if the Output-to-ICS3 selector switch (SW8) is set to PNP. When the PNP wire-terminal is connected, the voltage observed on the pin is inverted when compared to the voltage observed on the auxiliary output signal pins (OUT0, OUT1, and OUT2). That is, when the auxiliary output signal is set to On, the signal on the PNP wire-terminal is high; when it is set to Off, the signal on the PNP wire-terminal is low. Note that this connection requires that you enable the on-board pullup for OUT0 by turning output pullup resistor switch 3 (SW6[3)] to ON. If used, the NPN wire-terminal should remain disconnected.	AUX_OPTOIND_OUT0	Violet	Pin 4 (black)
Analog	Analog intensity (dimming) control signal. Note that this wire-terminal can be connected, even if the NPN, PNP, and +VDC wire-terminals are disconnected. Note that, if using the output connector (J6) instead of this connector for the controlling auxiliary output signal, the Analog pin is still available for use with your third-party lighting controller.	AUX_AREF_OUT7	Blue	Pin 5 (Grey)
-VDC	Negative pin of the power provided to the third-party lighting controller. Note that this wire-terminal (-VDC) must always be connected.		Gray-pink	Pin 3 (Blue)
+VDC	Positive pin of the power provided to the third-party lighting controller. The +VDC pin must be used in conjunction with the -VDC pin, and only if you want your third-party lighting controller to be powered by the Matrox Iris GTR breakout board.		Green	Pin 1 (brown)

Push buttons

Each push button (SW1, SW4, SW7, and SW9) generates an auxiliary input signal that is sent to your Matrox Iris GTR through the Matrox Iris GTR breakout board's camera connector (J1). When you press a push button to create an auxiliary input signal, signal bounce (also called chatter) might occur. To guarantee that the created auxiliary input signal is not interpreted as multiple input pulses, set the minimum period of time (debounce time) during which any shorter pulses are considered noise, and are suppressed. The debounce time can be set using Matrox Design Assistant or MIL.

Each auxiliary input signal should have only one input source. For example, when a push button is used to provide an auxiliary input signal, it should always be the only source of input for that signal, and not have to compete with the signal from a re-routed output signal or a signal from a connected third-party device.


The Matrox Iris GTR breakout board reference for the push buttons is as follows:

Push button	Description	Matrox Iris GTR signal received	Routed through the Matrox Iris GTR breakout board's camera connector
Input 6/SW1	Auxiliary signal 6 (input).	AUX_OPTOIND_IN6	Gray
Input 5/SW4	Auxiliary signal 5 (input).	AUX_OPTOIND_IN5	Black
Input 4/SW7	Auxiliary signal 4 (input).	AUX_OPTOIND_IN4	Red
Input 3/SW9	Auxiliary signal 3 (input).	AUX(TRIG)_OPTOIND_IN3	Pink

LEDs reference

Your Matrox Iris GTR breakout board has 9 LEDs designed to report activity on various auxiliary signals and power.
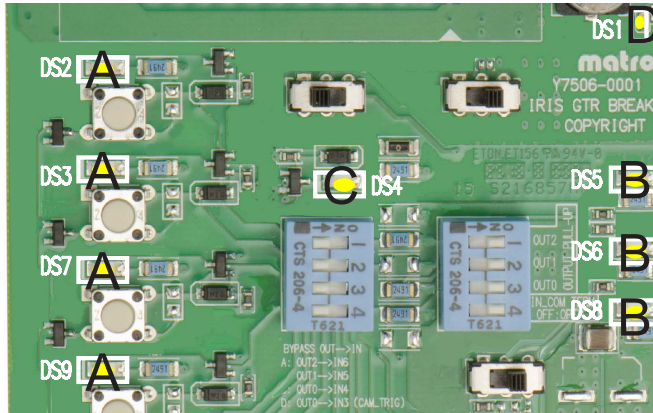
Each LED has two states: on and off, where on denotes activity on the monitored signal. Each LED is named and listed with its board label as follows.

Matrox breakout board LED name	Description			
	Board label	**Associated Matrox Iris GTR signal**	**Routed through the Matrox Iris GTR breakout board's camera connector**	**Description when the LED is On**
A. Input LEDs	Reports whether there is activity on each Matrox Iris GTR auxiliary input signal, regardless of whether it comes from a push button, rerouted auxiliary output signal, or connected third-party device.			
	DS9	AUX(TRIG)_OPTOIND_IN3	Pink	Activity on auxiliary signal 3 (input).
	DS7	AUX_OPTOIND_IN4	Red	Activity on auxiliary signal 4 (input).
	DS3	AUX_OPTOIND_IN5	Black	Activity on auxiliary signal 5 (input).
	DS2	AUX_OPTOIND_IN6	Gray	Activity on auxiliary signal 6 (input).
B. Output LEDs	Reports whether there is activity on each Matrox Iris GTR auxiliary output signal.			
	DS8	AUX_OPTOIND_OUT0	Violet	Activity on auxiliary signal 0 (output).
	DS6	AUX_OPTOIND_OUT1	Red-blue	Activity on auxiliary signal 1 (output).
	DS5	AUX_OPTOIND_OUT2	White	Activity on auxiliary signal 2 (output).
C. On-board input common LED	Reports whether the auxiliary input signals are sourcing the current (that is, the IN_COM wire-terminal is internally or externally connected to a voltage source).			
	DS4	ON	Specifies that the auxiliary input signals are sourcing the current.	
		OFF	Specifies that the auxiliary input signals are sinking the current.	
D. Main power status LED	Reports whether the Matrox Iris GTR breakout board has power from its power connectors (J2/J3).			
	DS1	ON	Specifies that Matrox Iris GTR breakout board has power.	
		OFF	Specifies that Matrox Iris GTR breakout board does not have power.	

Switches reference

Your Matrox Iris GTR breakout board has 6 switches designed to redirect the signals of your Matrox Iris GTR. Each switch has two states: on and off; each state is described below.
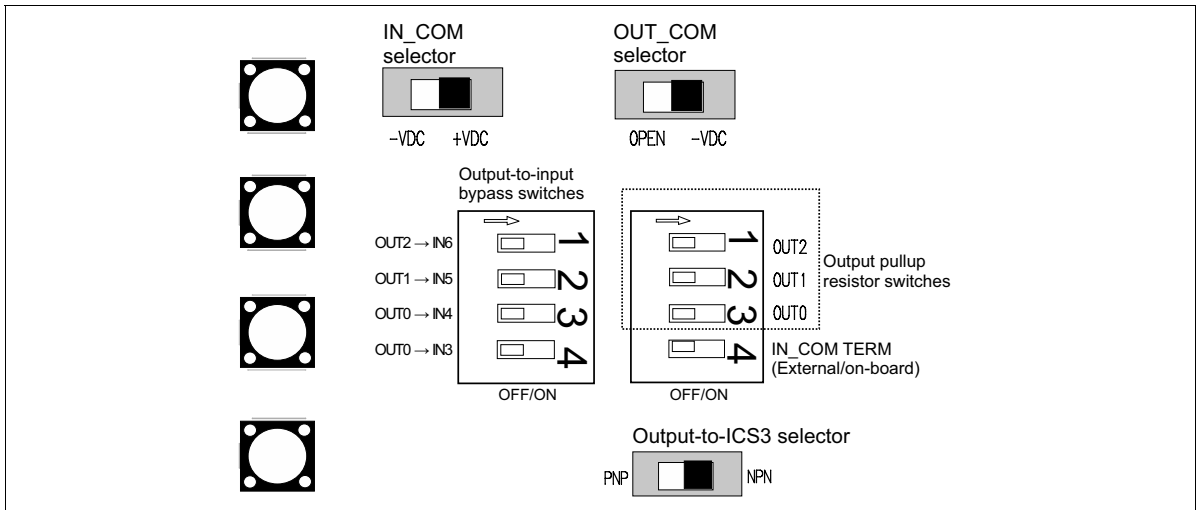

Each switch is named and listed with its board label.

Matrox breakout board switch name	Board label	Description
Output-to-input bypass switches	SW5[1] - SW5[4]	Redirects a specific auxiliary output signal from your Matrox Iris GTR to an auxiliary input signal of your Matrox Iris GTR.
Output pullup resistor switches	SW6[1] - SW6[3]	Applies a pullup of 2.5 KOhms to a specific auxiliary output signal.
IN_COM_TERM switch	SW6[4]	Specifies whether AUX_OPTOIND_IN_COMMON is connected to an on-board or an external voltage source/return path for all Matrox Iris GTR auxiliary input signals.
IN_COM selector switch	SW2	Specifies whether your Matrox Iris GTR breakout board will provide a return path or a voltage source for all Matrox Iris GTR auxiliary input signals (when the IN_COM_TERM switch is set to ON).
OUT_COM selector switch	SW3	Specifies whether the common return path for all Matrox Iris GTR auxiliary output signals are connected internally through the Matrox Iris GTR breakout board or externally through the output connector's OUT_COM wire-terminal (J6[OUT_COM]).
Output-to-ICS3 selector switch	SW8	Specifies whether the NPN or the PNP wire-terminal of the ICS3 connector will carry auxiliary output signal 0 to the connected third-party lighting controller.

Output-to-input bypass switches

The output-to-input bypass switches (SW5[1] to SW5[4]) allow you to reroute a Matrox Iris GTR auxiliary output signal to a Matrox Iris GTR auxiliary input signal.

❖ When creating an output-to-input bypass, enable the pullup for the auxiliary output signal using the corresponding output pullup resistor switch (SW6[1] - SW6[3], respectively), if required.
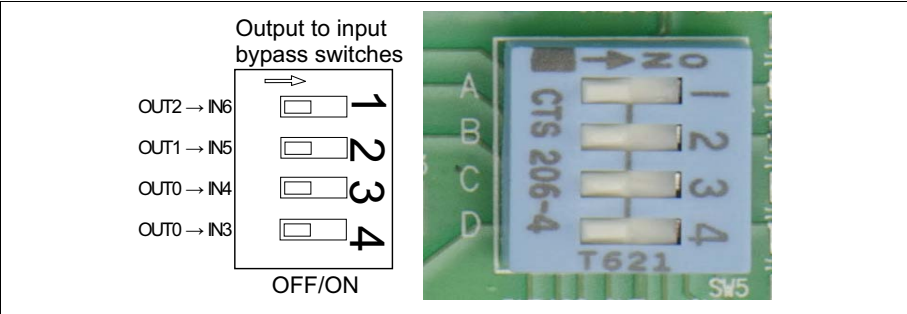

Each auxiliary input signal should have only one input source. For example, when an auxiliary output signal is re-routed to an input signal, it should always be the only source of input for that signal, and not have to compete with the signal from a third-party device or a Matrox Iris GTR breakout board push button.

Switch	Description (ON)
SW5[1]	Routes the Matrox Iris GTR AUX_OPTOIND_OUT2 signal to the AUX_OPTOIND_IN6 signal.
SW5[2]	Routes the Matrox Iris GTR AUX_OPTOIND_OUT1 signal to the AUX_OPTOIND_IN5 signal.
SW5[3]	Routes the Matrox Iris GTR AUX_OPTOIND_OUT0 signal to the AUX_OPTOIND_IN4 signal.
SW5[4]	Routes the Matrox Iris GTR AUX_OPTOIND_OUT0 signal to the AUX(TRIG)_OPTOIND_IN3 signal.

Output pullup resistor switches

The output pullup resistor switches (SW6[1] through SW6[3]) provide an on-board pullup for each auxiliary output signal. They are used when routing a Matrox Iris GTR auxiliary output signal to a Matrox Iris GTR auxiliary input signal using the output-to-input bypass switches (SW5). Alternatively, they can be used when routing an auxiliary output signal to a third-party device that requires a pullup between itself and the Matrox Iris GTR.
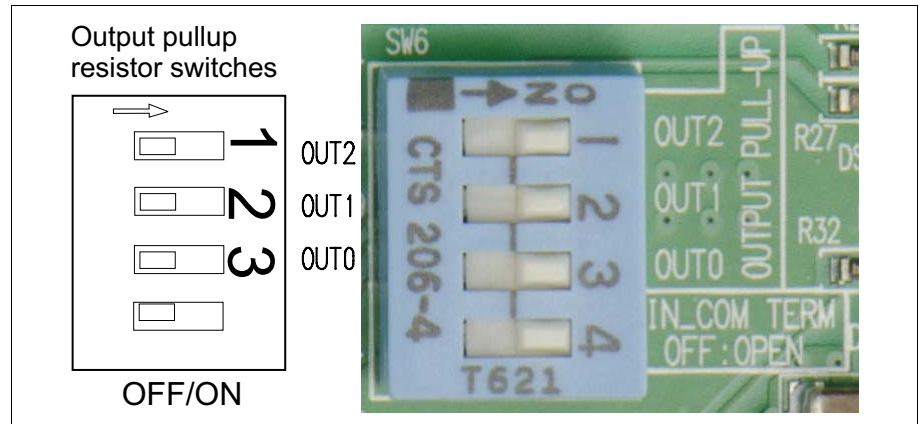
❖ Note that the amount of resistance provided by the Matrox Iris GTR breakout board is 2.5 KΩ, which is suitable for a 24 V power supply. If another level of resistance is required, an external pullup resistor must be used.

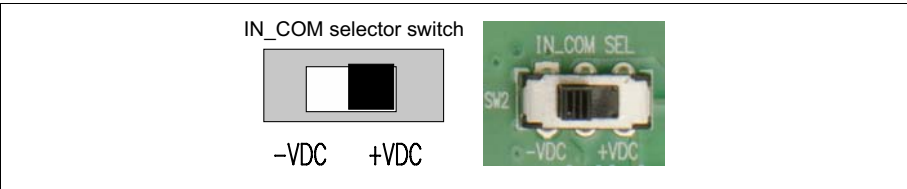| Switch	Description (ON)
SW6[1]	Adds an on-board pullup resistor to the AUX_OPTOIND_OUT2 signal.
SW6[2]	Adds an on-board pullup resistor to the AUX_OPTOIND_OUT1 signal.
SW6[3]	Adds an on-board pullup resistor to the AUX_OPTOIND_OUT0 signal.

IN_COM_TERM switch

The IN_COM_TERM switch (SW6[4]) determines whether AUX_OPTOIND_IN_COMMON is provided externally, through the input connector's IN_COM wire-terminal, or through the Matrox Iris GTR breakout board.

Switch	State	Description
SW6[4]	ON	Specifies that the smart camera's AUX_OPTOIND_IN_COMMON is provided internally and enables the IN_COM selector switch (SW2).The IN_COM selector switch (SW2) determines whether the auxiliary input signal is expected to be sourcing or sinking.
	OFF	Specifies that the smart camera's AUX_OPTOIND_IN_COMMON is provided externally and disables the IN_COM selector switch (SW2). Connect the input connector's (J5) IN_COM wire-terminal to either a voltage source or return path for your circuit, respectively, and connect the IN wire-terminal of an auxiliary input signal to the output signal of the third-party device. If creating an electrically isolated circuit with a third-party device, see *Connecting a sinking Matrox Iris GTR auxiliary output signal to a sourcing input with a different voltage source* subsection, previously in this appendix.

IN_COM selector switch

The IN_COM selector switch (SW2) allows you to change whether the auxiliary input signals of your Matrox Iris GTR are sinking or sourcing when the common return path or voltage source is provided by the Matrox Iris GTR breakout board (when the IN_COM_TERM switch (SW6[4]) is enabled).

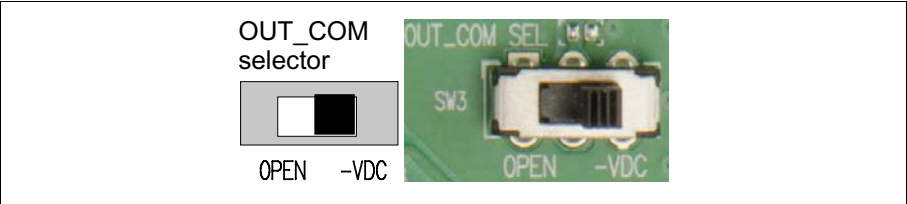❖ Note that the IN_COM selector switch (SW2) is only effective when the IN_COM_TERM switch (SW6[4]) is enabled (ON).

Switch	Description
-VDC	Specifies that your Matrox Iris GTR breakout board will connect the smart camera's AUX_OPTOIND_IN_COMMON to -VDC, providing the electrical return path for all auxiliary input signals.
+VDC	Specifies that your Matrox Iris GTR breakout board will connect the smart camera's AUX_OPTOIND_IN_COMMON to +VDC, providing the voltage source for all auxiliary input signals.

The IN_COM selector switch (SW2) has a direct effect on the on-board input common LED (DS4). The following table explains the relationship.

IN_COM selector switch state (SW2)	Matrox Iris GTR auxiliary input signal mode	Connected signal of the third party device	On-board input common LED (DS4)
+VDC	Sourcing	Sinking	On
-VDC	Sinking	Sourcing	Off

OUT_COM selector switch
The OUT_COM selector switch (SW3) allows you to provide the common return path internally when the auxiliary output signals of your Matrox Iris GTR are sinking.

Switch	State	Description
SW3	OPEN	Specifies that output common is provided externally. Connect the output connector's (J6) OUT_COM wire-terminal to the return path for your circuit for a sinking output. The output connector's (J6) OUT_COM wire-terminal can also be used in conjunction with an auxiliary output signal as a sourcing output; in this case, OUT_COM connects to the input pin of the third-party device and the voltage source connects to the one of the output connectors (J6) OUT wire-terminals.
	-VDC	Specifies that output common is provided internally. Your Matrox Iris GTR breakout board will provide the electrical return path for the auxiliary output signals. This setting can only be used when the auxiliary output signal is sinking.

Output-to-ICS3 selector switch

The Output-to-ICS3 selector switch (SW8) allows you to specify whether you are connecting auxiliary output 0 of your Matrox Iris GTR through the Matrox Iris GTR breakout board's ICS3 connector (J7) to a lighting controller that has either a PNP pin (sinking input signal) or an NPN pin (sourcing input signal).

Switch	Description
PNP	Specifies that auxiliary output signal 0 be connected in a PNP topology, whereby the connected, controlling auxiliary output signal 0 (via the PNP pin of the ICS3 connector (J7)) sources the current and the third-party input pin sinks the current.
NPN	Specifies that auxiliary output signal 0 be connected in a NPN topology, whereby the connected, controlling auxiliary output signal 0 (via the NPN pin of the ICS3 connector (J7)) sinks the current and the third-party input pin sources the current.

Appendix G: Listing of Matrox Iris GTR smart cameras

This appendix lists the key feature changes to the Matrox Iris GTR smart cameras.

Key feature changes

Part number	Version	Description
GTR300C, GTR1300C, GTR2000C, GTR5000C	000	First shipping of Matrox Iris GTR color models running Matrox Imaging operating system (64-bit) with Matrox Design Assistant IDE.
	015	Updated BIOS to version 1.10.018.
	016	Installed Matrox Design Assistant 5 on the smart camera.
	019	Updated BIOS to version 1.10.026.
	020	Updated MIOS operating system to 1.01 and Matrox Design Assistant to 5.1.
	021	Updated hardware to increases I/O reliability at power up.
GTR300CML, GTR1300CML, GTR2000CML, GTR5000CML	000	First shipping of Matrox Iris GTR color models running Matrox Imaging operating system (64-bit) with run-time software-only license.
	014	Updated BIOS to version 1.10.018.
	017	Updated BIOS to version 1.10.026.
	018	Updated hardware to increases I/O reliability at power up.
GTR300CMW,GTR1300CMW, GTR2000CMW, GTR5000CMW	000	First shipping of Matrox Iris GTR color models running Microsoft® Windows® Embedded Standard 7 with run-time software-only license.
	017	Updated BIOS to version 1.10.018.
	022	Updated BIOS to version 1.10.026.
	023	Updated firmware for Windows 10 SKU of the Matrox Iris GTR.
	024	Updated hardware to increases I/O reliability at power up.
GTR300, GTR1300, GTR2000, GTR5000	000	First shipping of Matrox Iris GTR monochrome models running Matrox Imaging operating system (64-bit) with Matrox Design Assistant IDE.
	014	Updated BIOS to version 1.10.018.
	015	Installed Matrox Design Assistant 5 on the smart camera.
	018	Updated BIOS to version 1.10.026.
	019	Updated MIOS operating system to 1.01 and Matrox Design Assistant to 5.1.
	020	Updated hardware to increases I/O reliability at power up.
GTR300ML, GTR1300ML, GTR2000ML, GTR5000ML	000	First shipping of Matrox Iris GTR monochrome models running Matrox Imaging operating system (64-bit) with run-time software-only license.
	013	Updated BIOS to version 1.10.018.
	016	Updated BIOS to version 1.10.026.
	017	Updated hardware to increases I/O reliability at power up.

Part number	Version	Description
GTR300MW, GTR1300MW, GTR2000MW, GTR5000MW	000	First shipping of Matrox Iris GTR monochrome models running Microsoft® Windows® Embedded Standard 7 with run-time software-only license.
	016	Updated BIOS to version 1.10.018.
	021	Updated BIOS to version 1.10.026.
	022	Updated firmware for Windows 10 SKU of the Matrox Iris GTR.
	023	Updated hardware to increases I/O reliability at power up.

Index

Trigger 123, 136

U
User name 33
Utilities 33

V
VGA/USB
    cable 15
    connector 13, 22–23, 25, 66, 68, 71
VNC 33–34
VNC **See** Connecting remotely

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.

Innovation, Science and Economic Development 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 Innovation, Science and Economic Development Canada (ISED).

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 Innovation, Sciences et Développement Économique Canada (ISDE).

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'usager peut être prié de prendre des mesures correctives appropriées.

This device complies with Directive 2014/30/EU for Class A digital devices. They have been tested and found to comply with EN55011/CISPR11 and EN61326-1/IEC61326-1.

Ces unités sont conformes à la Directive 2014/30/EU pour les unités numériques de Classe A. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55011/CISPR11 et EN61326-1/IEC61326-1.

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**) 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**) pour l'information concernant le recyclage.

(Deutsch) Information für europäische Anwender – Europäische Regelungen zu Elektro- und Elektronikaltgeräten (WEEE)

Bitte wenden Sie sich an dem Matrox-Website (**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**) per le informazioni di riciclaggio.

Limited Warranty

Refer to the warranty statement that came with your product.