



# **MX-E Series Hardware Guide**

## **for Processor and Cameras**

Publication Number 821004243 (Rev C)

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This product is covered by one or more of the following patents: Utility patents: US6,512,218 B1; US6,616,039 B1; US6,808,114 B1; US6,997,385 B2; US7,053,954 B1; US7,387,246 B2; US8,058,600 B2; EP996,284 B1; EP999,514 B1; EP1,014,292 B1; EP1,128,315 B1; EP1,396,811 B1; EP1,413,971 B1; JP4,435,343 B2; JP4,571,258 B2.

Additional patents pending.

### CE Compliance

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, 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 this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

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# Technical Support

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If you have technical questions about the operation of any Datalogic Automation, Inc. product, contact your distributor or Datalogic Automation, Inc. Please have the following information available before you call:

- The version number of Impact Software Suite you are running. To find it, click the About icon in the main toolbar.
- The model and serial numbers of the devices you are using.



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# When Your System Arrives

Thank you for purchasing an MX-E Series embedded machine vision system (MX-E Series Processor). *Please read the instructions in this document before starting your system setup.*

This manual explains the various parts of the MX-E Series system hardware, including the system inputs and outputs available to integrate your system into a production line. This manual covers the entire line of MX-E Series processors. Sections that apply to a specific model number are indicated.

When your system arrives, check the shipping cartons for wrinkled or damaged corners, holes through the cardboard, or other signs of rough handling or abuse. If you find any signs of damage, ask the delivery service to make a note on the delivery receipt describing the damage.

Carefully remove the system unit, cameras, cabling, and accessories from the shipping package. Place all equipment you unpack on a table and inspect each item. Report any damage to the carrier immediately. Save all packing materials so you can repack the shipment in case you need to move or ship it.

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**Temperature precautions:** If your system arrives in very cold or hot weather, allow all the equipment to reach room temperature before plugging it in. Exposing a cold device to a warm room causes condensation that could damage the system if power is applied too soon. If condensation forms, wait for it to dry completely.

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## System Factory Setup

Before we shipped your MX-E Series vision system, we ran the installation and setup program and specified a default software and hardware configuration. See page 1-5 for more information about setting up the hardware. Refer to the Impact Reference Guide for software configuration information.

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**IMPORTANT NOTE:**

A USB Hardware key is ordered and shipped separately from the processor. It must be present in the USB port labeled USB5 on the processor front before the processor is powered on. (See “Front Panel Connections” on page 1-8 and “USB Hardware Key” on page 2-7.)



### Processor Front View

A USB Hardware key is ordered and shipped separately from the processor. It must be present in the USB port labeled USB5 on the processor front before the processor is powered on.



# Hardware Components

The major hardware components of the system are the MX-E Series Processor, camera, and cables.

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NOTE: All descriptions and specifications apply to all models unless otherwise noted.

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- MX-E20-2-P-1, 2-camera capable, PNP outputs
- MX-E20-2-N-1, 2-camera capable, NPN outputs
- MX-E40-2-P-1, 2-camera capable, PNP outputs
- MX-E40-2-N-1, 2-camera capable, NPN outputs
- MX-E40-4-P-1, 4-camera capable, PNP outputs
- MX-E40-4-N-1, 4-camera capable, NPN outputs
- MX-E80-2-P-1, 2-camera capable, PNP outputs
- MX-E80-2-N-1, 2-camera capable, NPN outputs
- MX-E80-4-P-1, 4-camera capable, PNP outputs
- MX-E80-4-N-1, 4-camera capable, NPN outputs
- For details about MX-E Series cables, see “Processor Cables” on page 5-1.
- For details about MX-E Series cameras, see “Camera Specifications” on page 3-53.

## Safety Precautions



**Warning:** There are no user-serviceable parts inside the hardware. To avoid electrical shock, never open the case. Modifying or tampering with internal components will void the product warranty.

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**Attention:** Il n'y a aucune pièce réparable par l'utilisateur à l'intérieur du dispositif. Pour éviter un choc électrique, n'ouvrez jamais le cas. Modification ou manipulation des composants internes annulera la garantie du produit.

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1. Read all of the following instructions before setting up your system. **Save this document for later use.**
2. Follow all warnings and instructions in this manual and in other user guides shipped with your hardware components.
3. To avoid damage to the vision system and its components, *never* plug in or unplug a cable when the power is on. Always shut down the processor and turn off the power supply before you make cable changes (see “Turning Off the System” on page 1-3).

4. Never use the system if a power cable has been damaged. Do not allow anything to rest on a power cable and keep them away from traffic.
5. The air inlets and exhausts on the unit are for ventilation. Do not block or cover these openings or insert anything into these openings.
6. Do not expose the vision system to moisture, rain, or snow, and do not use it near water. If a component gets wet unplug it immediately.
7. To avoid injury, never open the case. Modifying or tampering with internal components will void the product warranty.



**Service Personnel Only - Caution:** Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to battery maker's instructions.

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## Turning Off the System

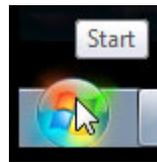


**Warning:** Turning off the processor power before stopping VPM and the Windows operating system can damage the processor and corrupt vision programs and other system files.

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### Processor Turn Off Procedure

1. If any cameras are online, turn them offline.
2. Close all open vision programs.
3. Disconnect VPM from any connected cameras.
4. Close VPM.
5. Click the Windows Start menu.
6. Click Shut down.



7. Wait approximately 30 seconds for the disk access and other processor functions to stop.
8. If the processor does not power off automatically, press and release the power button on the front of the processor (see "Front Panel Connections" on page 1-8).

## Processor Specifications

This section lists the general operating specifications for all MX-E Series Processors as well as individual processor model hardware. Only Datalogic GigE cameras will operate with MX-E Series Processors. USB cameras cannot be used. Each of the M-Series cameras has different operating specifications. See “M-Series and E-Series Cameras” on page 3-1 for details.

<b>Technical Data</b>	
Supply voltage (Vs)	24 VDC $\pm$ 10%
Nominal Current Draw	5.5 A at 24 VDC
Digital Inputs	16 opto-isolated
Input Current	ON: 2.0 mA or more Off: 0.16 mA or less
Digital Outputs	16 opto-isolated current sinking (NPN) or sourcing (PNP)
Output Voltage	35 VDC (max)
Output Current	100 mA max per output
Output saturation voltage	< 1V
Dimensions	5.12 w x 10.63 h x 10.03 d (in) 130 w x 270 h x 255 d (mm)
Temperature	Operating: 0° to +55° C (+32° to +131° F) Storage: -20° to +60° C (-4° to +140° F)
Relative Humidity (30 °C)	Operating: 10% to 90% (non-condensing) Storage: 5% to 95% (non-condensing)
Vibrations (EN60068-2-6)	2 to 8 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Shock resistance (EN60068-2-27)	11 MS (15 G)
Housing material	Galvanized plate, plastic
Mechanical protection (EN 60529)	IP20
Weight	4.52 lb. (2.05 kg)
Minimum Impact Software Version Required	11.5.0
CPU	MX-E20: Intel® Celeron 1047UE 1.4 Ghz – dual core MX-E40: Intel® Celeron 1020E 2.2 Ghz – dual core MX-E80: Intel® Core i7 3615QE 2.3 Ghz – quad core
System Memory	MX-E20 and MX-E40: 4 GB DDR3 RAM MX-E80: 8 GB DDR3 RAM

Technical Data	
Storage	MX-E20 and MX-E40: 60 GB SATA SSD (MLC) MX-E80: 128 GB SATA SSD (MLC)
Graphics	Intel® HD (1920x1200 resolution) - DVI
PCIe	1 x PCIe x8
Keyboard/Mouse USB Ports	MX-E20: 4 x USB 3.0 ports MX-E40 and MX-E80: 4 x USB 3.0 ports; 1 x USB 2.0 port
Serial Communication	1 x RS-232 Serial port
Communication Connectivity	Supports Ethernet/IP, Modbus, TCP, and OPC
Network interface	2 x LAN ports 10/100/1000 Mbps Base-T M-Series and E-Series Camera Connectors (CAM1-CAM4) Cable 606-0677-xx

## Setting Up the System

**WARNING:** To avoid damage to your unit, *never* plug in or unplug any cables when the unit power is on. Always shut down the processor and turn off the power supply first before making any cable changes (see “Turning Off the System” on page 1-3).

**NOTE:** When a new processor is powered on the first time, a monitor, keyboard, and mouse must be connected to the processor to approve the license agreement.

1. Familiarize yourself with the major system components as shown in this manual.
2. Unpack and check all the equipment.
3. Mount the MX-E Series Processor and power supply in their desired positions as indicated in the mounting instructions (see “Processor Installation” on page 2-3). Make sure all vents have at least 1.5 inches (38.1 mm) of clearance for sufficient ventilation.
4. Connect the I/O cable, optional monitor, and optional keyboard to the MX-E Series Processor. Connect the I/O cable to the terminal block. When a new processor is powered on the first time, a monitor, keyboard, and mouse must be connected to the processor to approve the license agreement.
5. Attach the appropriate lens for the application to the camera. Mount the MX-E Series camera, lighting, and optional power supply. See “Mounting the Camera” on page 3-7.  
NOTE: Do not leave the camera imager uncovered. When you remove the lens cap, you must replace it with a lens.
6. Connect the camera to a Processor GigE port using a Datalogic cable. See “Top Panel Connections” on page 1-7.
7. You are ready to wire the hardware. See “Processor I/O” on page 4-1 for details about input/output schematics for your MX-E Series system. Wiring specifications for all cables are described in “Cable Reference” on page 5-1.
8. Wire the MX-E Series camera’s strobe and trigger connections to the camera’s terminal blocks. See “Connecting the Camera” on page 3-10.
9. Wire the MX-E Series Processor power connector to the optional power supply. Wire AC power to the power supply. Connect the power supply plug to the processor connector. See “Power Supply Connection” on page 2-5.

10. Connect the cables from the MX-E Series terminal blocks to their cameras.
11. **IMPORTANT:** A USB Hardware key is ordered and shipped separately from the processor. It must be present in the USB port labeled USB5 on the processor front before the processor is powered on. (See “System Factory Setup” on page 1-1 and “USB Hardware Key” on page 2-7.)
12. Plug the power supplies into an appropriate *grounded* power source. To protect your system, we recommend using a surge protector.
13. Turn on the MX-E Series Processor power switch. Turn on the camera power supply.

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**NOTE:** Default network IP addresses were assigned to the MX-E Series Processor and Cameras at the factory. You will probably not need to change them unless there is a conflict with other devices on your network.

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14. Start the Impact Software program Vision Program Manager and click on the Settings tab. Check your camera and lighting setup, calibrate the camera, configure your inspection parameters, then put the camera online. For more information about using Impact software, refer to the Impact Reference Guide.

If your system does not work when you are finished with the setup, review the instructions and diagrams to make sure you made all connections properly.

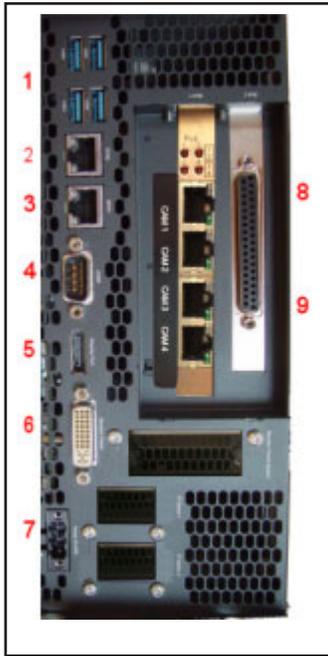
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Please note that Datalogic cannot guarantee the performance of MX-E Series systems which have additional software installed on them, including, but not limited to, anti-virus and firewall software. Datalogic recommends that MX-E Series systems remain disconnected from networks that access the Internet in order to minimize security risks. Datalogic will attempt to support systems with antivirus software installed, but we cannot guarantee system performance.

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# Top Panel Connections

This illustration shows the connections on the Processor’s top panel.



Symbol	Function
1	MX-E40 and MX-E80: USB 3.0 MX-E20: USB1 and 2
2	ETH2 - Ethernet 2 (See “Status Lights” on page 1-10)
3	ETH1 - Ethernet 1 (See “Status Lights” on page 1-10)
4	RS232 Serial Port (COM 1) - See “Serial Port” on page 5-2
5	Display Port connection
6	Monitor/Panel connection for smart monitor
7	Supply Voltage
8	37-pin D-Sub Digital I/O (See “Processor I/O Connection” on page 4-1)
9	E-Series Camera Connectors (CAM1-CAM4) Cable 606-0677-xx (See “Status Lights” on page 1-10)

# Front Panel Connections

This illustration shows the connections on the Processor's front panel.



Symbol	Function
A	Status Lights (see "Status Lights" on page 1-10)
B	Power Button: Press and release to turn the unit on or off. If the unit is on, press and release to shut down the OS and switch off the unit (see "Turning Off the System" on page 1-3). Press and hold to switch off without OS shut down. (Warning: Data could be lost.)
C	Reset Button: Resets the processor which triggers a hardware and PCI reset. The processor is restarted. (Warning: Data could be lost.)
D	USB 2.0 Port for USB Hardware key only. See "USB Hardware Key" on page 2-7.
E	CFAST Slot. A CFAST card can be used for extended storage. <b>Note:</b> Do NOT insert or remove the card while the unit is powered on. (See "CFAST Card" on page 2-8)
F	Battery Compartment (see "Battery" on page 2-9)



**Service Personnel Only - Caution:** Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to battery maker's instructions.

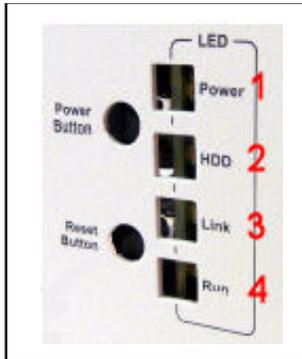
## Rear View

This illustration shows the Processor's rear panel.



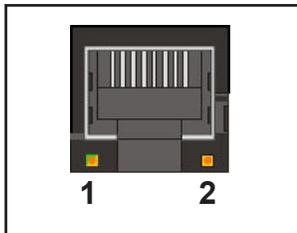
# Status Lights

This illustration shows the status lights on the front of the Processor.



Symbol	Name	When lit indicates:
1	Power	Power is On
2	HDD	Solid-state hard drive or Cfast access is active
3	Link	On: An active Smart Display Link connection is established Blinking: Connection is interrupted due to power loss to display unit
4	Run	An application is running

This illustration shows the status lights for the two Ethernet connections on the top of the Processor and the GigE camera connections.



Symbol	Name	When lit indicates:
1	Speed	Off: 10 Mbps Green: 100 Mbps Orange: 1000 Mbps (Gigabit)
2	Activity/Link	On: Link is established Blinking: Data is being transferred

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## Preventive Maintenance

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**Warning:** There are no user-serviceable parts inside the device. To avoid electrical shock, never open the case. Modifying or tampering with internal components will void the product warranty.

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**Attention:** Il n'y a aucune pièce réparable par l'utilisateur à l'intérieur du dispositif. Pour éviter un choc électrique, n'ouvrez jamais le cas. Modification ou manipulation des composants internes annulera la garantie du produit.

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This section contains tips to keep your system trouble-free and operating smoothly.

- Insure at least 1.5 inches (38.1 mm) of clearance on the sides and top of the MX-E Series Processor.
- Periodically check mounting bolts for tightness and wear. The MX-E Series Processor should be mounted securely in a vibration-free location.
- Keep the outside of the unit clean and free of oil and dust. You can clean the unit with a mild cleanser. *Do not* use an abrasive cleaner and *never* immerse the unit in water.
- Periodic cleaning of the air inlets, filters, and exhausts is highly recommended.
- Verify that all cable connections are correct and tight. Secure the cables to prevent accidents or damage to the device connectors.
- When you move the system, be careful that the movement does not loosen connections. After the system is moved, verify cable and power cord connections.
- Repair or replace frayed or damaged cables immediately.
- Do NOT attempt to clean the camera imager or imager cover. Do NOT spray the imager or imager cover with compressed air as this may leave spots.

## Before You Call

If you have a problem with your system, contact your distributor or call Datalogic Automation, Inc. Before calling, however, review the installation to ensure you are not overlooking an obvious reason for the problem.

When you call for support, be prepared to answer to the following questions:

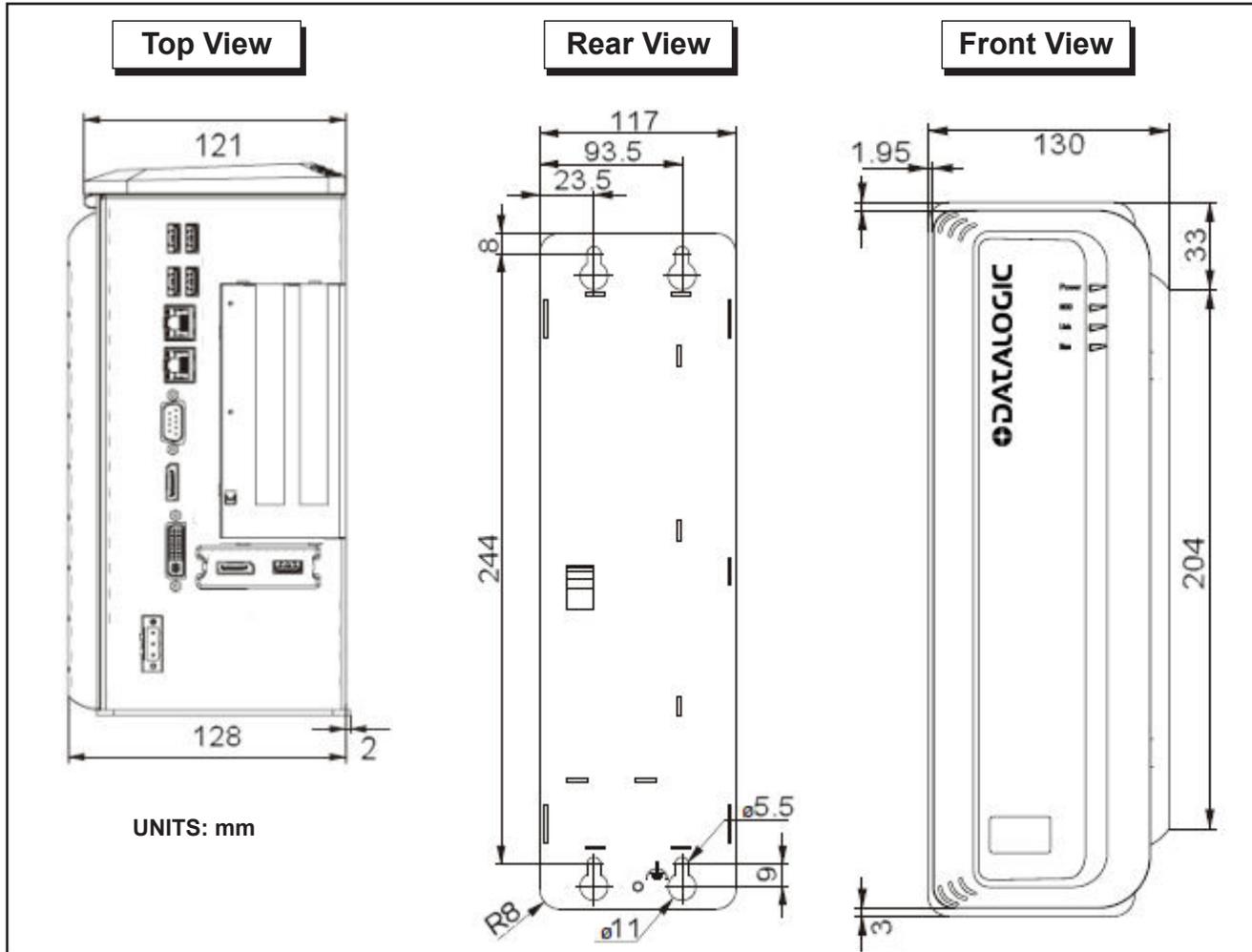
- What are the model and serial numbers of the device you are using? The model, serial, and part numbers are located on the rear panel of the processor.
- Have you added, replaced, or reconfigured your hardware recently? This includes any changes to the camera or other components.
  - What version of Impact Software you are running? Look on the title bar of one of the Impact Software components.
  - Have you updated or replaced any software on your client computer lately?

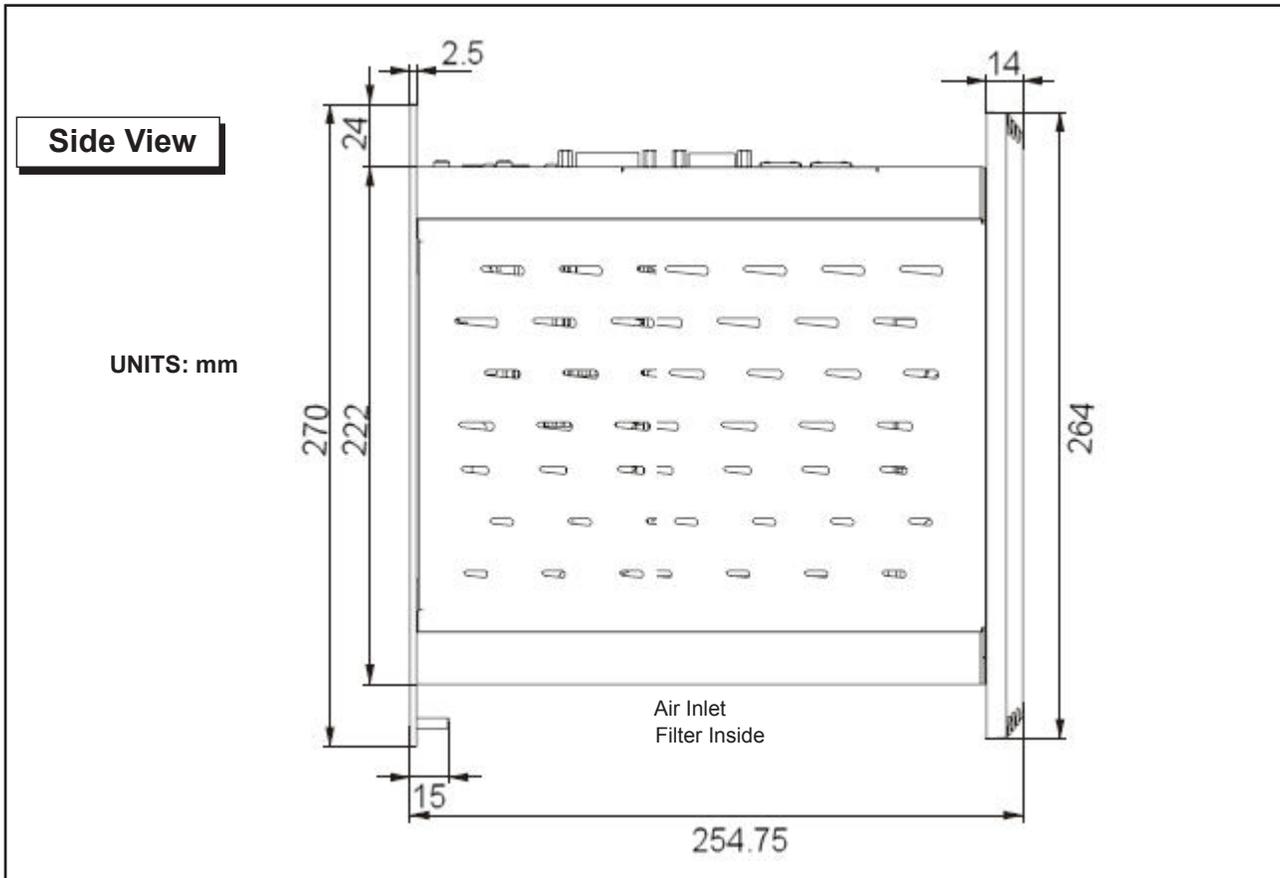


# Basic Hardware Components

## Processor Views and Dimensions

This section shows specifications for the Processor, including various views and dimensions.





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# Processor Installation

## Safety Instructions

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 **Warning:** There are no user-serviceable parts inside the device. To avoid electrical shock, never open the case. Modifying or tampering with internal components will void the product warranty.

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 **Attention:** Il n'ya pas de pièces réparables par l'utilisateur à l'intérieur du matériel. Pour éviter un choc électrique, n'ouvrez jamais le boîtier. L'ouverture du boîtier ou de retirer l'étiquette inviolable annulera la garantie du produit.

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- Make sure heavy equipment is loaded evenly in the rack to avoid a hazardous condition. The rack should safely support the combined weight of all the equipment it supports.
- Before the system is connected to the supply circuit, be sure to check equipment nameplate ratings to avoid overloading circuits. Overloading may damage over-current protection devices and supply wiring.
- Slots and openings in the cabinet are provided for ventilation. To ensure sufficient air circulation for reliable system operation, and to prevent overheating, maintain a minimum of 1.5 inches (38.1 mm) of clearance on the top and sides of the cabinet and between MX-E Series Processors.

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An optional power supply is available for MX-E Series Processors. If you provide your own, it must supply 24VDC at 5.5 A (nominal) with a safe operating ambient temperature range of 0° to +55° C (+32° to +131° F).

This equipment is to be powered by a Listed power supply for the U.S. and Canada, or a power supply that meets the requirements for use where either IEC 60950 or EN60950 is applicable.

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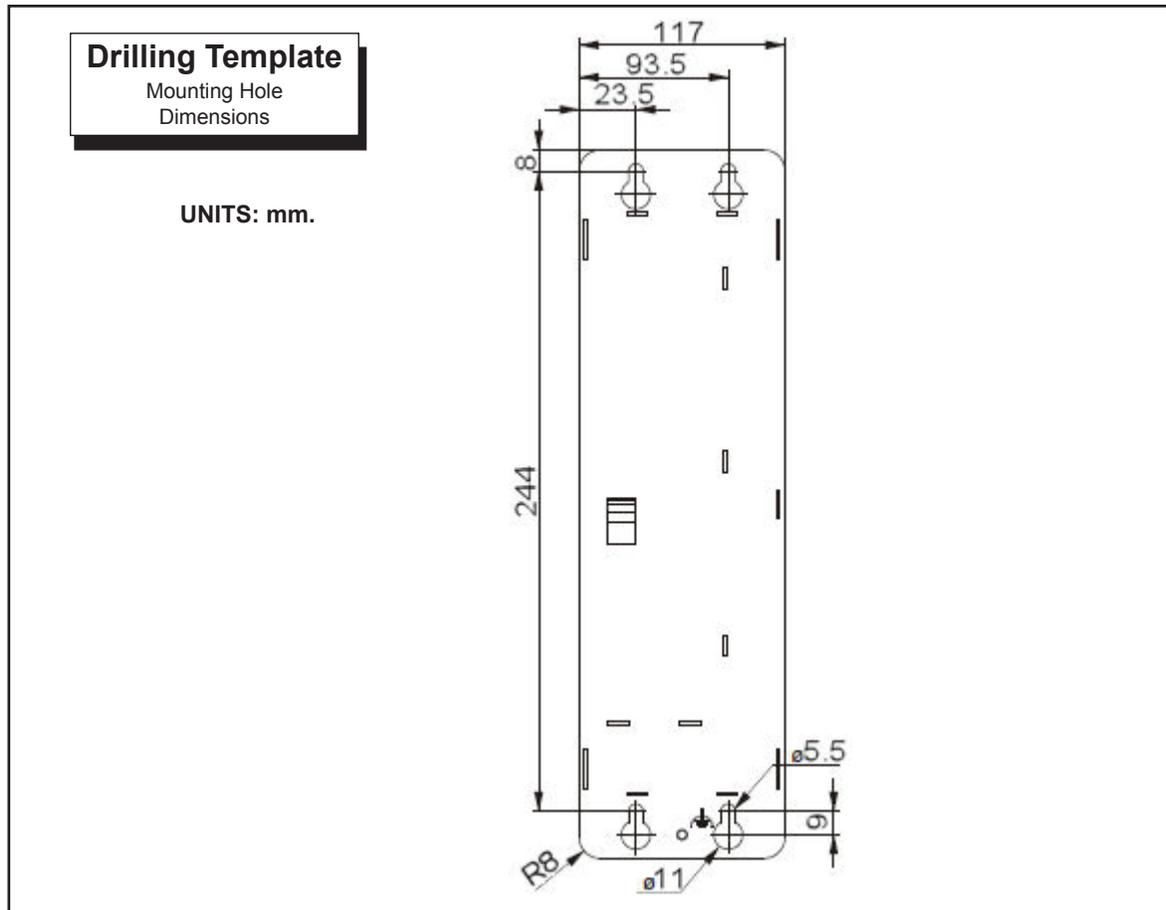
- To ensure safe operation, the system power must be properly grounded. If the unit is mounted within a rack, verify that it is reliably connected to electrical ground. The ground terminal on the power input must be connected to the grounded chassis/enclosure of the power supply. This insures electromagnetic compliance and proper operation. See “Grounding Concepts” on page 2-6.
- The Processor is to be connected only to networks that do not route outside the plant.

## Flat Surface Mounting

When mounting the MX-E Series Processor:

- Take environmental conditions into consideration.
- Mount the processor to a flat, stable, vibration-free surface.
- This processor is only certified for operation in closed rooms.
- Do not subject the processor to direct sunlight.
- Do not cover the ventilation holes.
- Mount the processor only in an upright position as shown in “Processor Views and Dimensions” on page 2-1.
- The wall or control cabinet must be able to withstand four times the total weight of the processor.

- Do not exceed the flex radius of any connected cables.



NOTE: If the Processor uses a Compact Flash card, mount with the Processor top facing upward so the CF card does not fall out due to vibration.

### To mount the Processor:

1. Mark the surface mounting holes in the desired location using the drilling template dimensions.
2. Drill four surface mounting holes in the mounting surface. Use suitable anchors if necessary.
3. Insert four M5 mounting screws in the mounting holes and tighten them until approximately 0.2 inches (5 mm) is left exposed. The mounting screws must be long enough to provide sufficient support.
4. Maneuver the Processor so mounting bracket slots align with the mounting screws.
5. Place the slots over the screws and slide the Processor down until the screws fit snugly into the mounting bracket slots.
6. If necessary, tighten the mounting screws until snug.

# Power Supply Connection

**Warning:** To avoid electrical shock, disconnect all power to the power supply before working on it.

**Avertissement:** Pour éviter le choc électrique, débranchez toute la puissance à l'alimentation d'énergie avant de travailler à lui.

This equipment is to be powered by a Listed power supply for the U.S. and Canada, or a power supply that meets the requirements for use where either IEC 60950 or EN60950 is applicable.

Wire the supplied power plug according to the chart shown below, then plug it into the power connector on the top of the processor. The ground terminal (pin 2) on the +24V power input must be connected to the power supply's grounded chassis/enclosure. This connection is needed to insure electromagnetic compliance and proper operation. See "Grounding Concepts" on page 2-6.

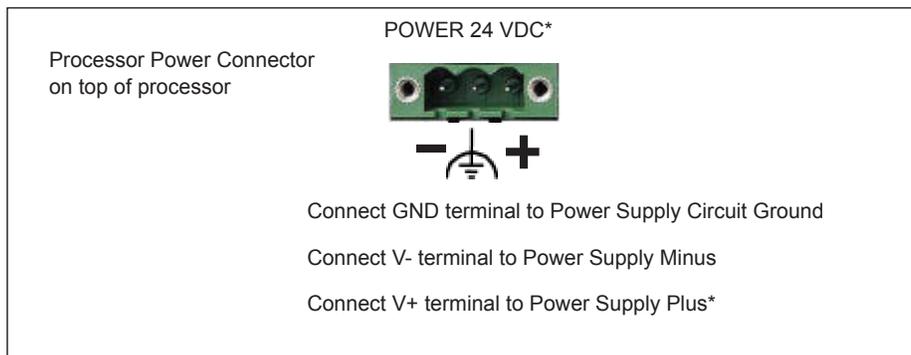
Slot Number	Signal Name
1	24 VDC Supply Minus
2	Chassis Ground
3	24 VDC Supply Plus

SUPPLIED POWER PLUG

Insert stripped wire into this hole →

To open, insert a small screwdriver into this slot and push down gently on the screwdriver handle →



\*Note: The processor requires approximately 5.5 A @ 24VDC. We recommend using a 24 VDC power supply capable of providing 5.5 A current. This voltage is commonly used in many manufacturing environments.

## Grounding Concepts

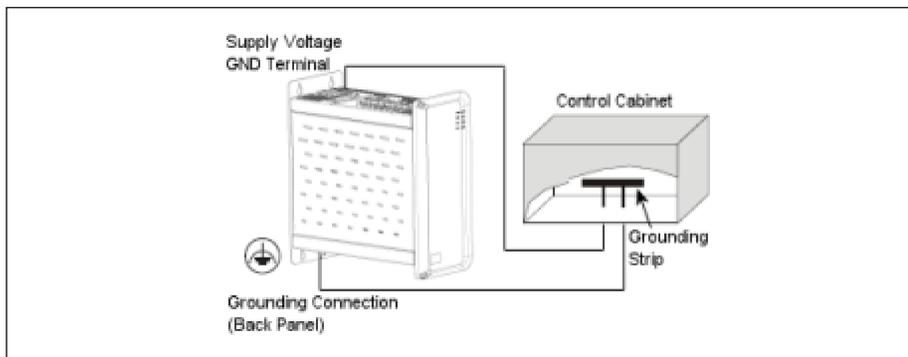
Functional ground is a low impedance current path between electrical circuits and ground. It is used, for example, to improve immunity to disturbances, but is not a protective measure. Grounding deflects disturbances, but does not necessarily provide protection against electric shock.

The functional ground on the processor has two connections:

- Supply voltage GND terminal
- Grounding connection on the processor back panel

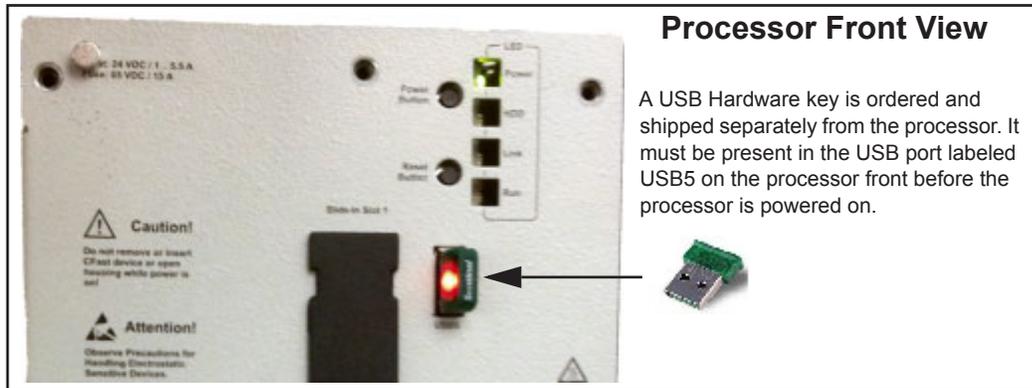
To guarantee a good functional ground:

- Connect the processor to the central grounding point in the control cabinet using the shortest route possible.
- Use a cable with a minimum cross section of 2.5 mm<sup>2</sup> per connection. If a cable with wire tip sleeves is connected to the supplied power plug, then a cable with maximum 1.5 mm<sup>2</sup> per connection is possible.
- Use shielded cable for all data connections.



## USB Hardware Key

A USB Hardware key, which contains license and processor configuration information, is ordered and shipped separately from the processor. It must be present in the USB port labeled USB5 on the processor front before the processor is powered on.



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## CFast Card

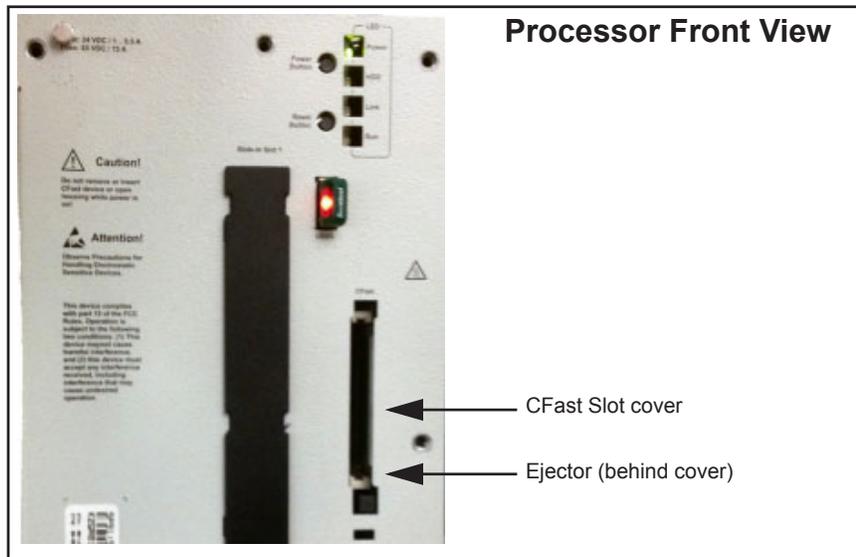
A CFast slot is located in the Processor front. A CFast card can be used as removable media for transferring data, performing upgrades, or for extended storage.

This CFast slot is connected to the chip set internally via SATA 1 with SATA III design (SATA 6 Gbit/s).

---

**WARNING:** Power must be disconnected before inserting or removing the CFast card.

---



### To exchange the CFast card

1. Press down on the slot cover's top clip to open the slot.
2. Press the ejector at the bottom of the slot with a pointed object, such as a pen.
3. Pull the card straight out.
4. Insert the new card straight into the slot.
5. Close the slot cover.

---

## Battery

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**⚠ WARNING:** Risk of explosion if battery is handled improperly or replaced by an incorrect type. Do not recharge, disassemble, or dispose of in fire. Lithium batteries are considered hazardous waste. Dispose of used batteries according to battery maker's instructions or in accordance with applicable local regulations.

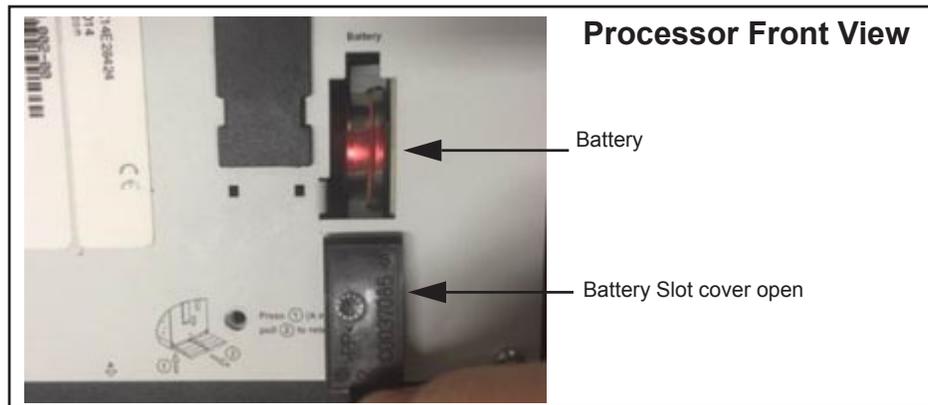
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The lithium battery (CR2477N, 3 V, 950 mAh) powers the internal real-time clock (RTC). It is located behind the processor's front cover. The battery has a limited service life and should be replaced at least every four years.

---

**⚠ WARNING:** Power must be disconnected before replacing the battery.

---



### To replace the battery

1. Disconnect the power supply to the processor.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Press down on the slot cover's top clip to open the battery slot.
4. Do not hold the battery by its edges. Using the removal strip, carefully pull the battery out of its slot.
5. Insulated tweezers may be used to insert the new battery in the slot. Be sure the removal strip is in place to make the next battery replacement easier.
6. Reconnect the power supply to the processor.
7. Reset the date and time in the BIOS.



# M-Series and E-Series Cameras

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## Introduction

This section describes digital cameras provided by Datalogic Automation, Inc. and other third-party manufacturers. Our E-Series cameras can be used only with our MX-E Series Processors. USB cameras will not operate on an MX-E Series Processor.

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**NOTE:** E-Series cameras work only on MX-E Series processors.

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Datalogic Automation, Inc. does not support the use of these cameras in any manner other than described herein.

E-Series cameras acquire an image when a signal is present on the trigger input of the camera trigger/power cable, then digitize images at the camera source and transmit them directly to the processor over the Ethernet cable. These cameras provide 8-bit resolution using internal 12-bit A/D converters and some have progressive scan shutter exposure (allowing individual pixel readings). Third-party cameras may have different specifications. All cameras are capable of Gigabit transmission rates.

E-Series cameras have a hard-coat finish case that helps eliminate ground loops. All camera settings (shutter, strobe, partial scan, etc.) are configured using Impact software and are maintained in the MX-E Series processors' memory so there are no physical switches on the cameras.

All camera settings must be configured using the Settings tab in the Vision Program Manager (VPM) or in the Settings program. For more detailed information, refer to the Impact Reference Guide (843-0093).

---

**IMPORTANT NOTE:** We recommend that the sum of the pixel resolution of all the cameras connected to an MX processor not exceed thirty-two Megapixels. This limit is not enforced by Impact software, but, if the limit is exceeded, the IMPACT user interface performance will degrade.

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**NOTE:** The MX-E20 processor can accommodate a maximum of two cameras. The maximum image size of each camera is two Megapixels. (The calculation is: maximum width in pixels \* maximum height in pixels < 2,500,000.)

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## Safety Precautions

Read all of the following instructions before setting up your camera. Save this document for later use.

- Follow all warnings and instructions in this manual and in other user guides shipped with your hardware components.
- Do not attempt to disassemble the camera. Do not remove screws or attachments. There are no user-serviceable parts inside. Refer servicing to Datalogic Automation, Inc.
- All E-Series and third-party cameras connect to the MX-E Series Processors using a Cat5E Ethernet cable (606-0677-xx). Cat6 cable is required for distances greater than 25 meters. Using any other cable may cause intermittent data

transmission. Cameras connect to power and triggering signals using a cable and terminal block. See “Connecting the Camera” on page 3-10 for more details.

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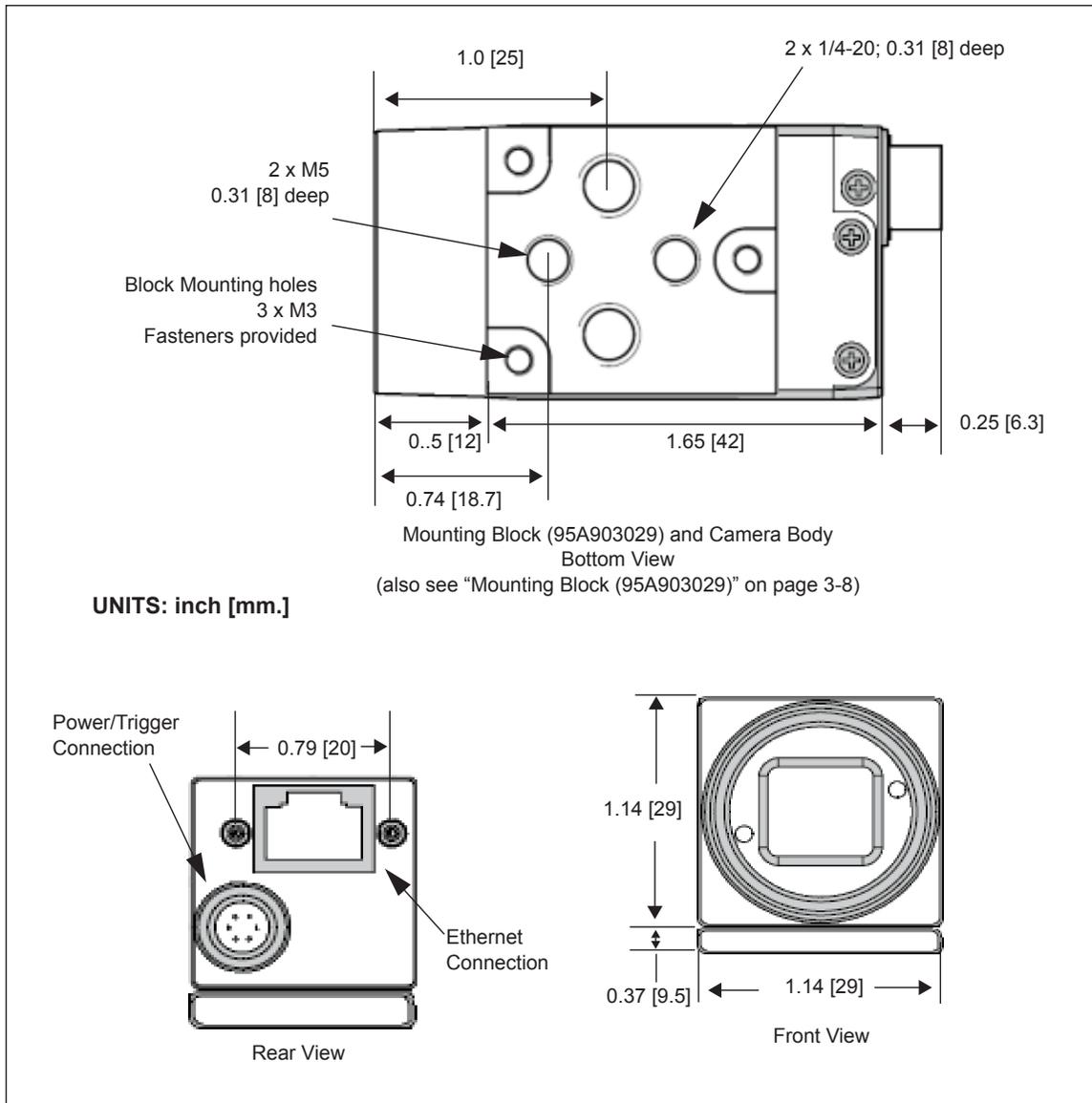
**NOTE:** We recommend that you do not use a switch or a router between the MX-E Series Processor and the camera.

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- This camera is designed for indoor use. Do not expose it to moisture, including rain or snow, and avoid operating it in wet areas. Should the camera become wet, turn off the power immediately. Moisture can damage the camera and create danger of electric shock. Avoid using the camera when the humidity is above 80%.
- Make sure your camera has enough airflow around it for proper ventilation. The safe case temperature during operation is from 0° to 50° C (32° to 122° F).
- Mount the camera body in a fixed position where it will not be subject to excessive vibration.
- To reduce stress on the camera connectors and cable, loop the cables and fasten them to the camera's mounting block. Do not crimp or tie the cables tightly with wire ties as this may damage them internally. The minimum cable bend radius is fifteen times the cable diameter. It is not intended for continuous flexing or movement. Be sure that cables are safely routed away from vehicle and pedestrian traffic.
- Check the intended installation area to be sure there is enough room for the camera and any lighting that may be needed.
- Avoid areas with excessive heat, vibration, and environmental contaminants.
- Mount the camera away from devices that emit large amounts of electromagnetic energy.
- Do NOT attempt to clean the camera imager or imager cover. Do NOT spray the imager or imager cover with compressed air as this may leave spots.
- Do not leave the camera imager uncovered. When you remove the lens cap, you must replace it with a lens.

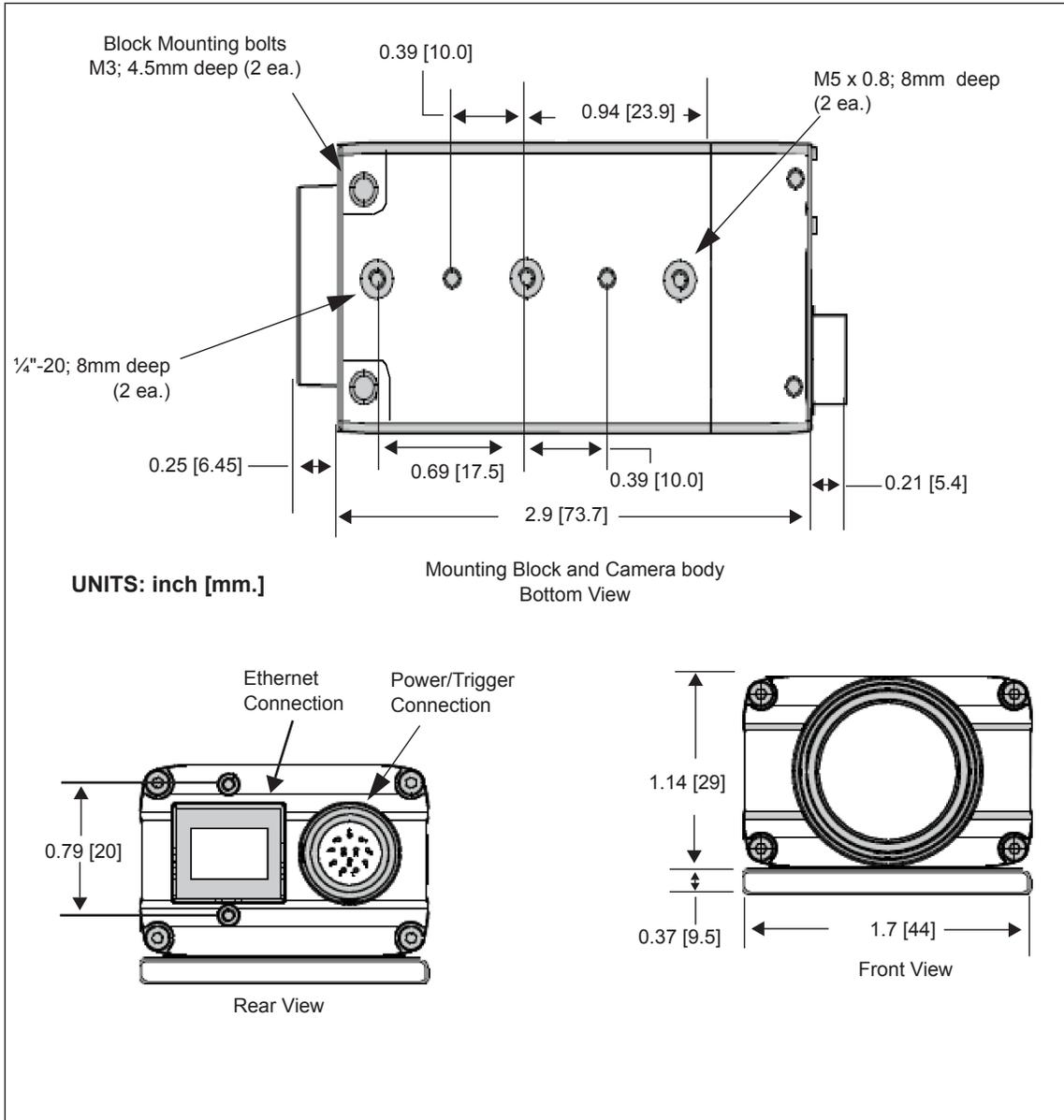
# M1xx and E1xx Camera Dimensions

These cameras weigh approximately 4 ounces (112 grams) with a mounting block, but without a lens.



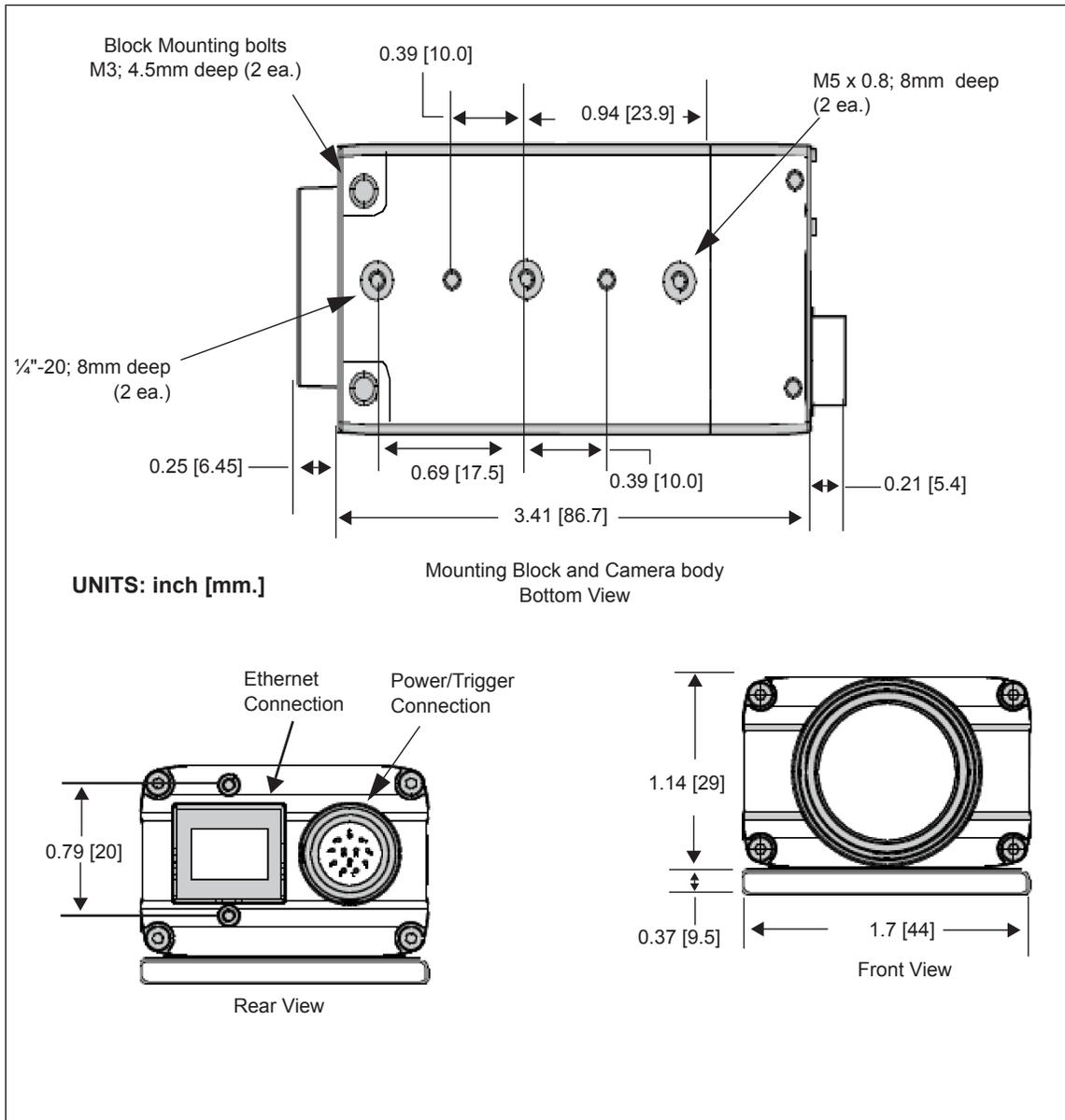
# M2xx Camera Dimensions

The M2xx series of cameras weighs approximately 6.2 ounces (177 grams) with a mounting block, but without a lens.



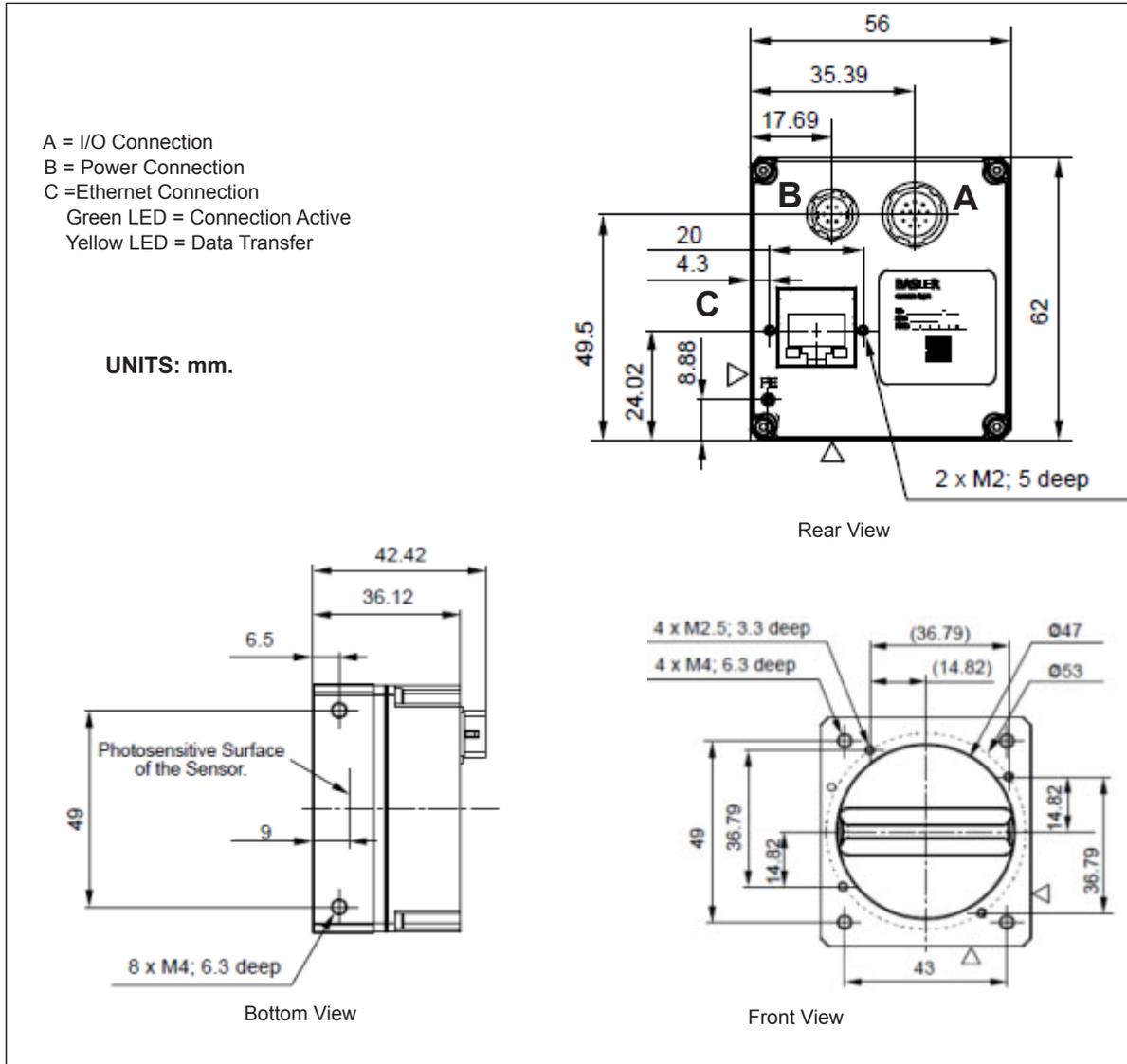
# M3xx Camera Dimensions

The M3xx series of cameras weighs approximately 8.5 ounces (242 grams) with a mounting block, but without a lens



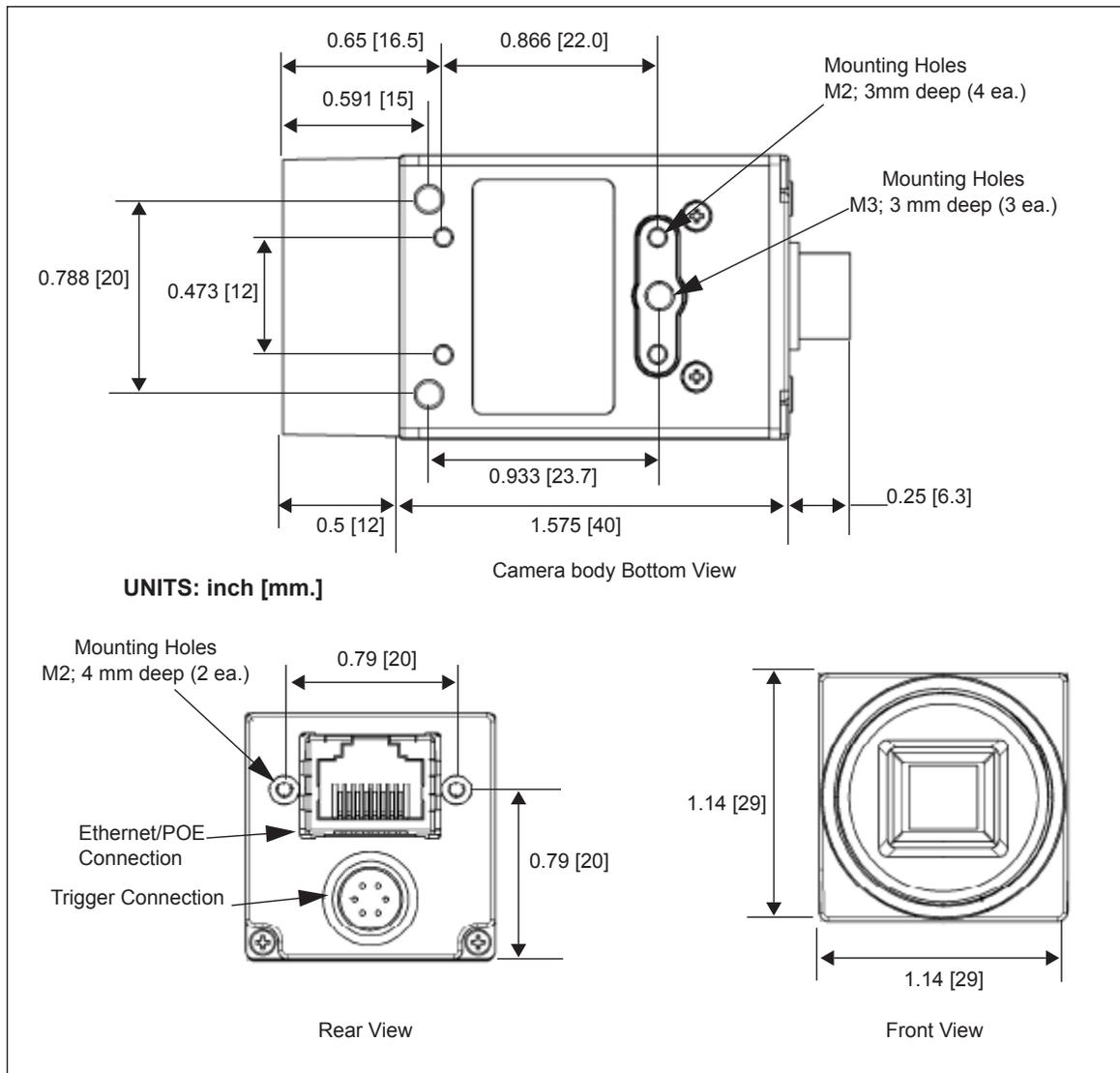
# M565/M570/M575/M580 Camera Dimensions

The camera weighs approximately 8 ounces (240 grams) without a lens. With an F-mount lens adapter the weight is approximately 11.6 ounces (330 grams).



# M6xx Camera Dimensions

The M6xx series of cameras weighs approximately 1.9 ounces (53 grams) without a lens.



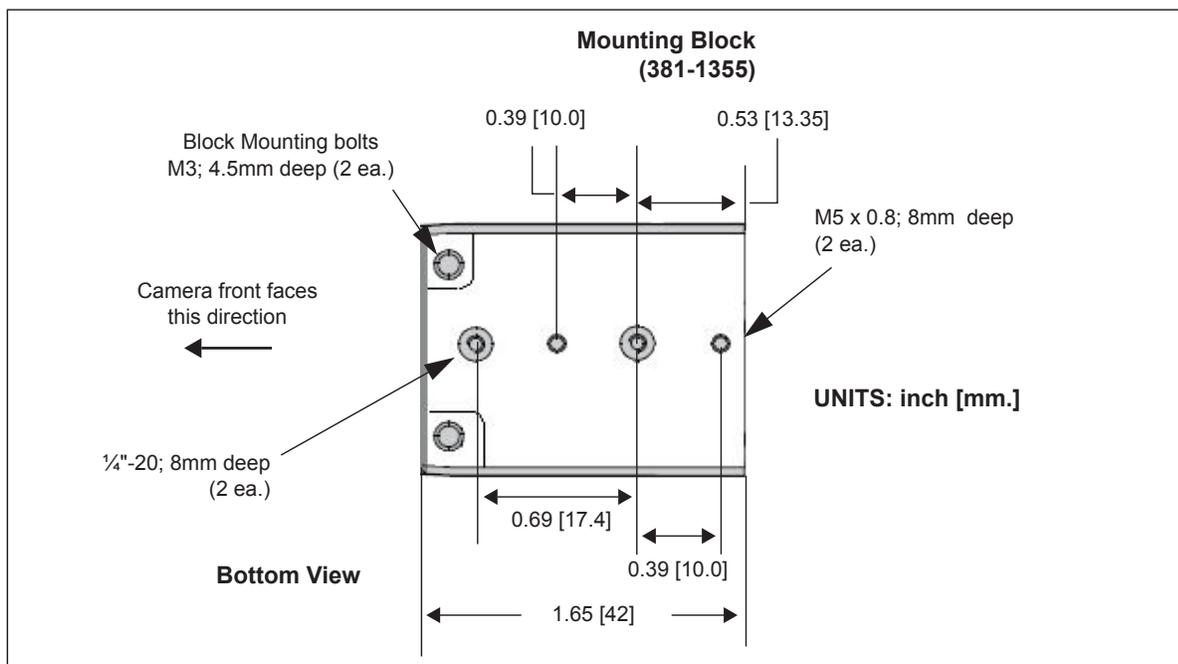
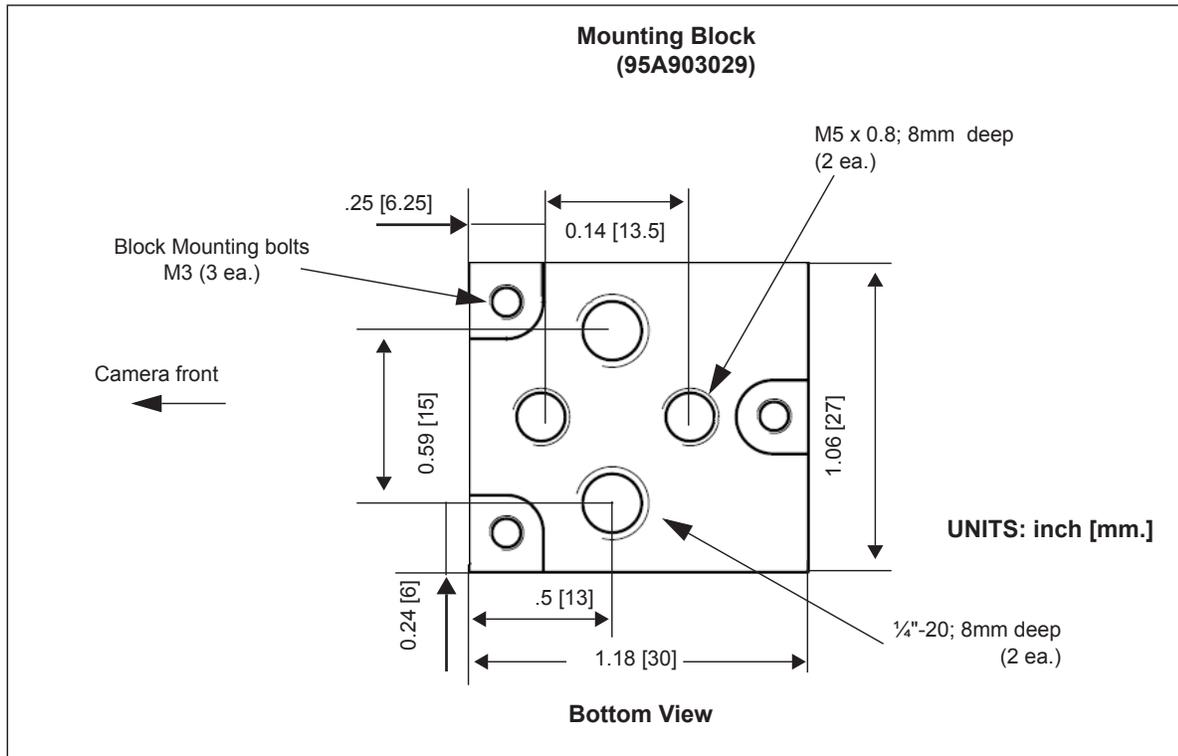
## Mounting the Camera

This section provides instructions for mounting Datalogic cameras. For information about third-party cameras, consult the manufacturer’s documentation for those cameras.

### To mount an M1xx or E1xx camera

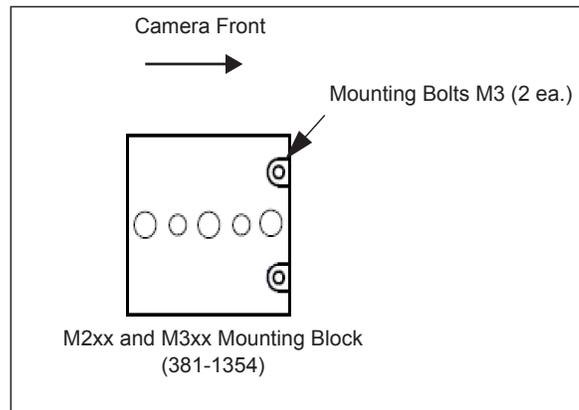
1. With the mounting block held tightly against the camera body, insert the mounting bolts through the mounting bolt holes (see diagram).
2. Turn the mounting bolt clockwise to tighten the block and secure it to the camera.

- Use appropriately sized fasteners in the pre-threaded holes in the bottom of the mounting bracket to secure the mounting block to a rigid surface for proper stability and heat transfer. (See “M1xx and E1xx Camera Dimensions” on page 3-3.)



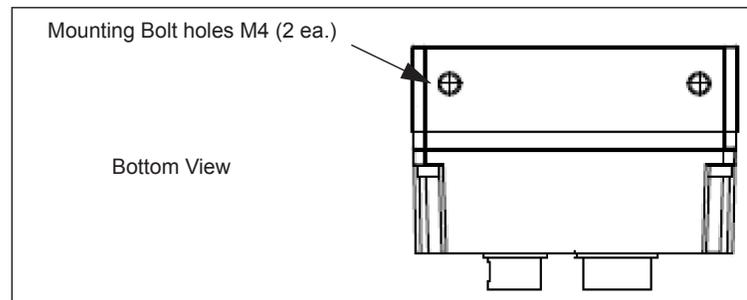
### To mount an M2xx or M3xx camera

1. With the mounting block held tightly against the camera body, insert two mounting bolts through the mounting bolt holes (see diagram).
2. Turn the mounting bolt clockwise to tighten the block and secure it to the camera.
3. Use appropriately sized fasteners in the pre-threaded holes in the bottom of the mounting bracket to secure the mounting block to a rigid surface for proper stability and heat transfer. (See “M2xx Camera Dimensions” on page 3-4 and “M3xx Camera Dimensions” on page 3-5.)



### To mount an M565/M570/M575/M580 camera

1. With the camera body held tightly against the desired mounting surface, insert two mounting bolts through the mounting surface and into the mounting bolt holes (see diagram).



### To mount an M6xx camera

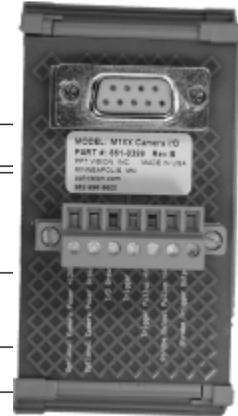
1. With the camera body held tightly against the desired mounting surface, insert appropriately sized mounting bolts through the mounting surface and into the mounting bolt holes on the bottom of the camera (see “M6xx Camera Dimensions” on page 3-7).

## Connecting the Camera

**WARNING:** Never wire M1xx or E1xx Camera Strobe Outputs in parallel with M1xx, E1xx, M2xx, or M3xx Camera Strobe Outputs. This will damage the cameras.

### M1xx and E1xx Camera Connection

To connect M1xx and E1xx camera trigger signals and strobe outputs, use cable 606-0674-xx (6 pin Hirose Male to DB9) with terminal block 661-0399.



Terminal Name	Signal	Notes
Optional Camera Power	DO NOT USE	Do NOT apply power to this terminal. Power is supplied by Power over Ethernet (PoE)
Optional Camera Power Ground	DO NOT USE	Not required. Ground is supplied by Power Over Ethernet (PoE)
I/O Ground	I/O Ground	
Trigger In**	Camera Trigger In	0 to +24 VDC recommended Maximum +30 VDC As sinking input Off: 0 to +1.4 VDC On: +2.2 to +24 VDC; 5 to 15 ma As sourcing input (see Trigger Pullup +VCC) Off: +2.2 to +24 VDC; 5 to 15 ma On: 0 to +1.4 VDC
Trigger Pullup +VCC**	Trigger In Pullup - use if Trigger In needs sourcing (see Note 1 below)	+24 VDC recommended Maximum +30 VDC (**Block contains 1.6k Ohm 1W resistor between Trigger In and Trigger Pullup +VCC)
Strobe Output Pullup +VCC*	Strobe Supply Voltage - use if Strobe Trigger Output needs sourcing (see Note 2 below)	Based on Strobe requirement (optional) Max: +30 VDC; 50 ma (*Block contains 1.6k Ohm 1W resistor between Strobe Trigger Output and Strobe Output Pullup +VCC)
Strobe Trigger Output*	Trigger Out to Strobe (see Note 3 below)	DO NOT APPLY ANY VOLTAGE DIRECTLY TO THIS OUTPUT. DO NOT WIRE OUTPUTS IN PARALLEL.

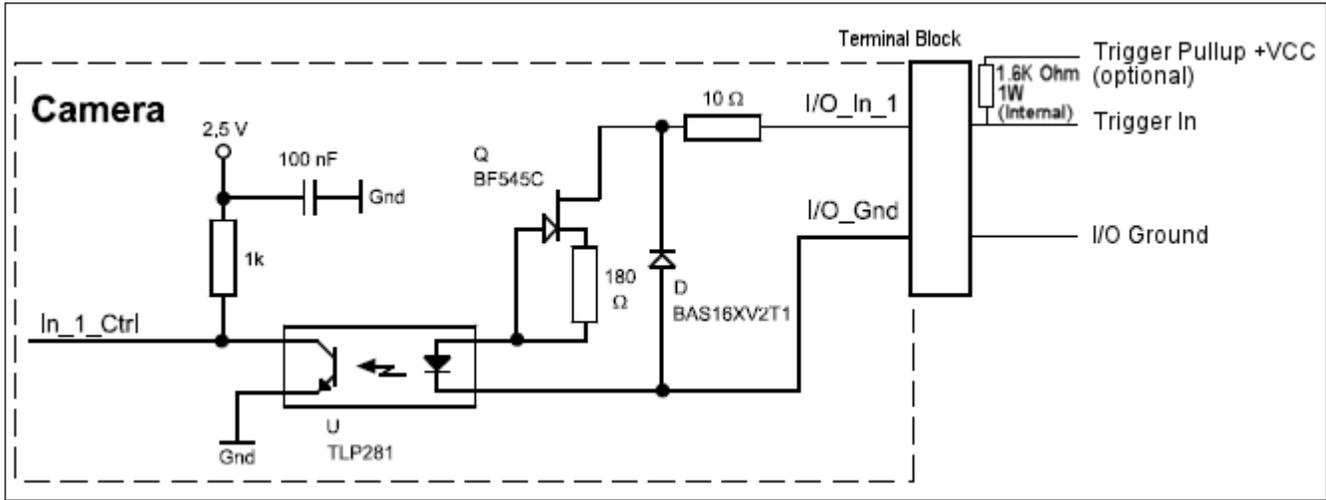
**NOTE 1:** If Camera Trigger In requires a sinking signal, set the Software Trigger Event to Rising Edge. If it requires a sourcing signal, set the Software Trigger Event to Falling Edge.

**NOTE 2:** If Strobe Trigger Output requires a sinking signal, set the Strobe Trigger Output to Falling Edge. If it requires a sourcing signal, set the Strobe Trigger Output to Rising Edge.

**NOTE 3:** Disconnecting the camera will turn on some strobe lights.

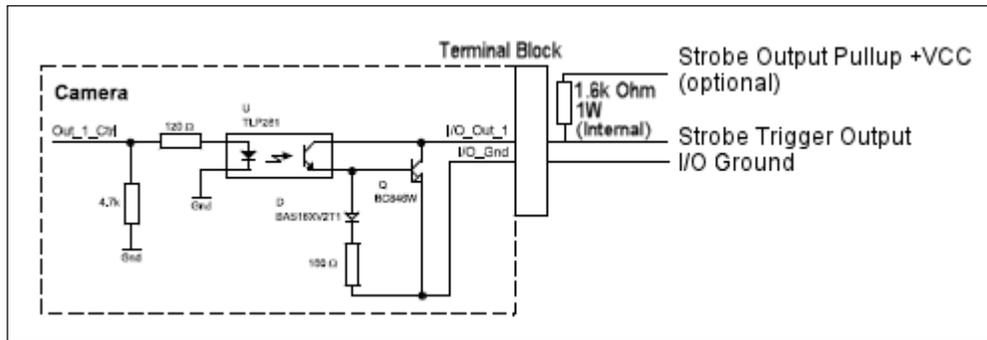
# M1xx and E1xx Circuit Diagrams

## M1xx Trigger In Circuit

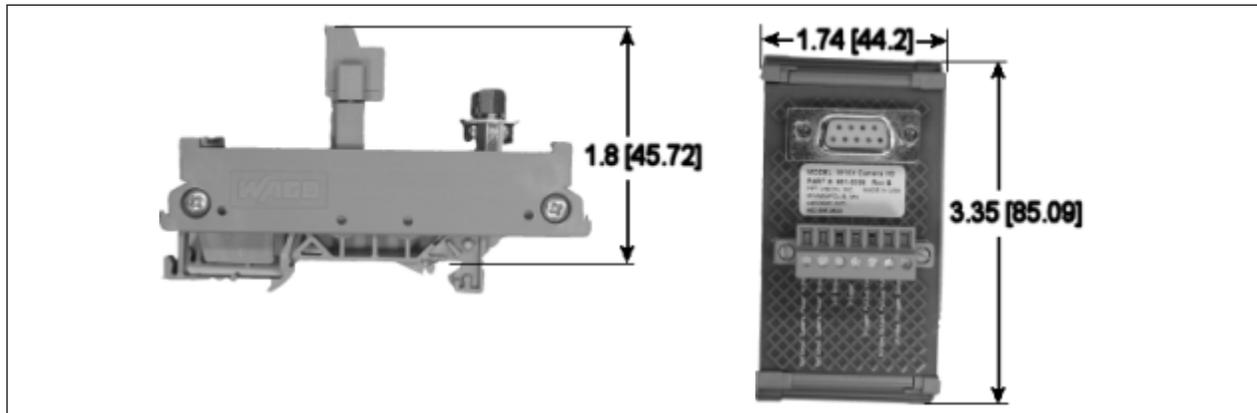


**WARNING:** Never wire M1xx or E1xx Camera Strobe Outputs in parallel with M1xx, E1xx, M2xx, or M3xx Camera Strobe Outputs. This will damage the cameras.

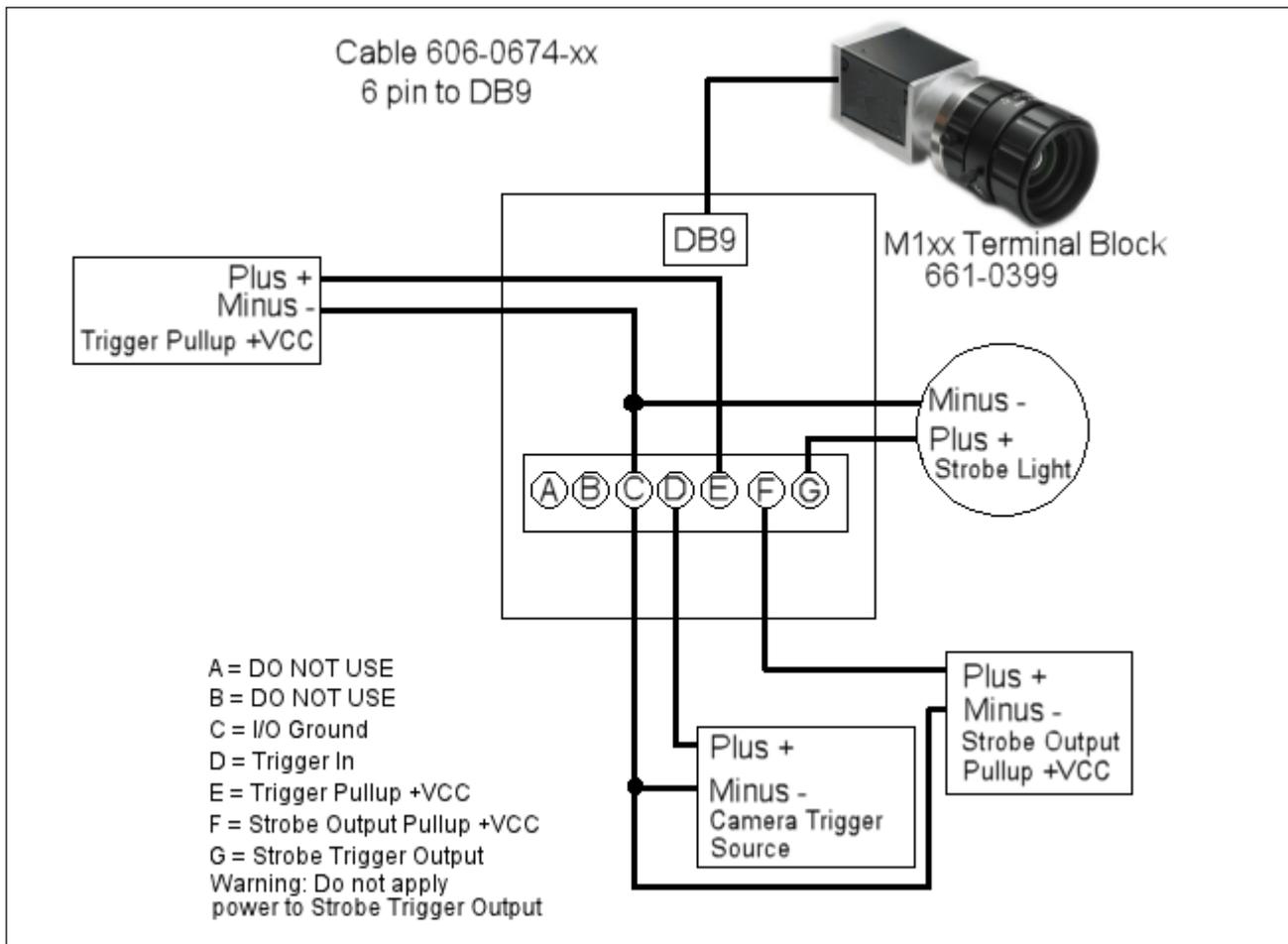
## M1xx Strobe Trigger Output Circuit



## 661-0399 Terminal Block Dimensions

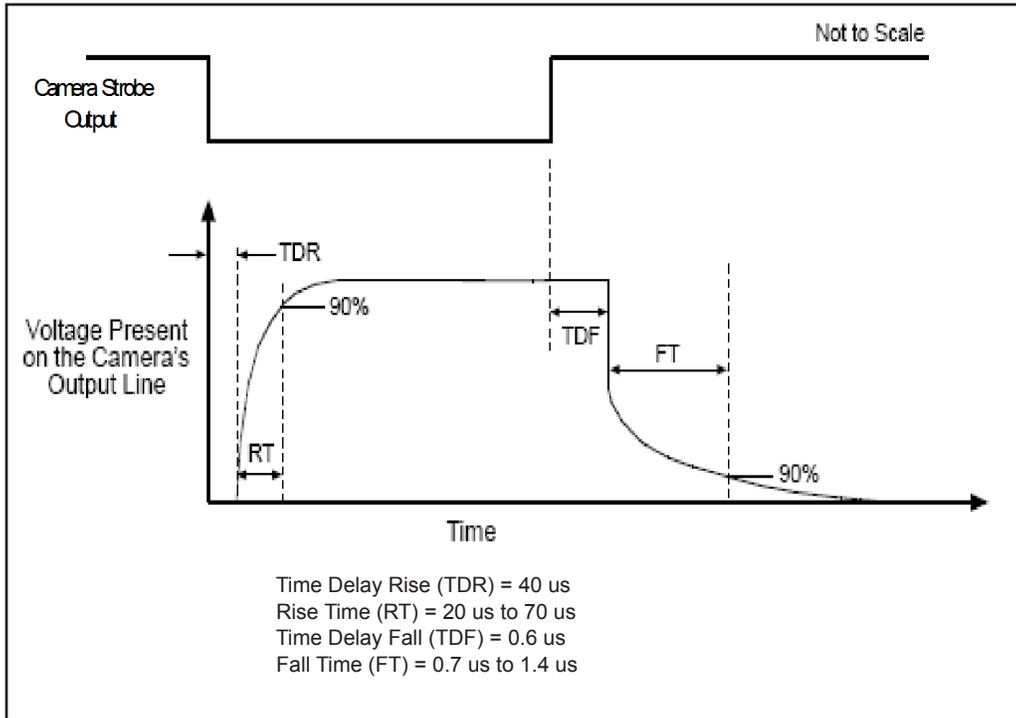


### M1xx and E1xx Terminal Connections



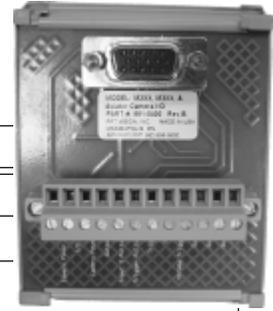
The response times for the strobe output on the M1xx and E1xx camera will typically fall into the ranges specified below. The exact response time for your application will depend on the external resistor and the applied voltage you use. The shutter begins opening simultaneously with the "Camera Strobe Output" in the diagram. Set the strobe time 60 to 110

microseconds longer than you would on a M2xx to account for the delays. The shutter time must then be set a little longer than the strobe time.



## M2xx and M3xx Camera Connection

To connect M2xx and M3xx camera power, trigger signals, and strobe outputs, use cable 606-0673-xx (12-pin Hirose Male to HD-15) with terminal block 661-0400.



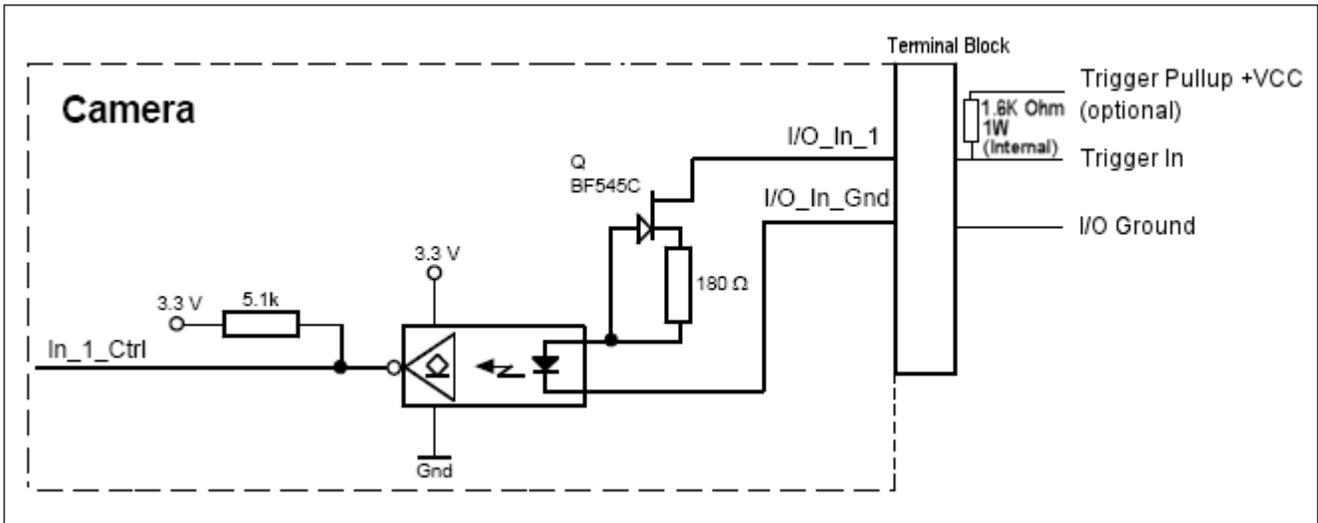
Terminal	Signal Name	Notes
Camera Power Ground	Camera Ground	
I/O Ground	I/O Ground	
Camera Power +VDC	Camera Power	+12 to +24 VDC recommended @ 500 mA Max Maximum: +30 VDC
Output +VCC	Power for Strobe Trigger Out	+3.3 to +24 VDC; 50 mA Max Maximum: +30 VDC
Input 2 Pullup +VCC	DO NOT USE	Not Currently Supported
Trigger Pullup +VCC	Trigger In Pullup - use if Trigger In needs sourcing input	Recommended: +24 VDC
Trigger In	Camera Trigger In (see Note 1 below)	0 to +24 VDC recommended Maximum +30 VDC As sinking input Off: 0 to +1.4 VDC On: +2.2 to +24 VDC; 5 to 15 ma As sourcing input (see Trigger Pullup +VCC) Off: +2.2 to +24 VDC; 5 to 15 ma On: 0 to +1.4 VDC
Input 2	DO NOT USE	Not Currently Supported
Strobe Trigger Out	Trigger Out to Strobe (see Note 2 below)	DO NOT APPLY GROUND DIRECTLY TO THIS OUT- PUT.
Output 2	DO NOT USE	Not Currently Supported
Output 3	DO NOT USE	Not Currently Supported
Output 4	DO NOT USE	Not Currently Supported

NOTE 1: If Camera Trigger In requires a sinking signal, set the Software Trigger Event to Rising Edge. If it requires a sourcing signal, set the Software Trigger Event to Falling Edge.

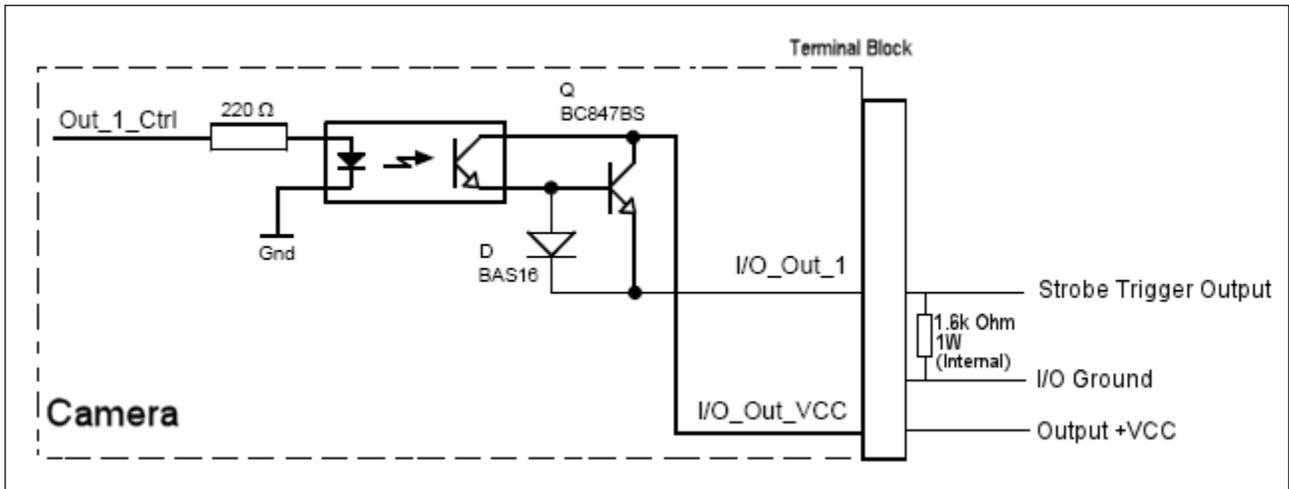
NOTE 2: If Strobe Trigger Output requires a sinking signal, set the Strobe Trigger Output to Falling Edge. If it requires a sourcing signal, set the Strobe Trigger Output to Rising Edge.

# M2xx and M3xx Circuit Diagrams

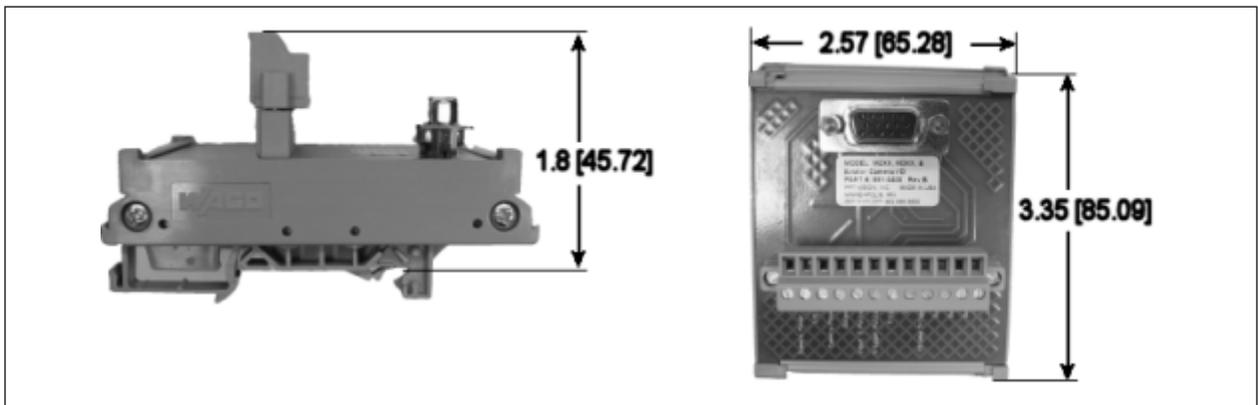
## M2xx and M3xx Trigger In Circuit



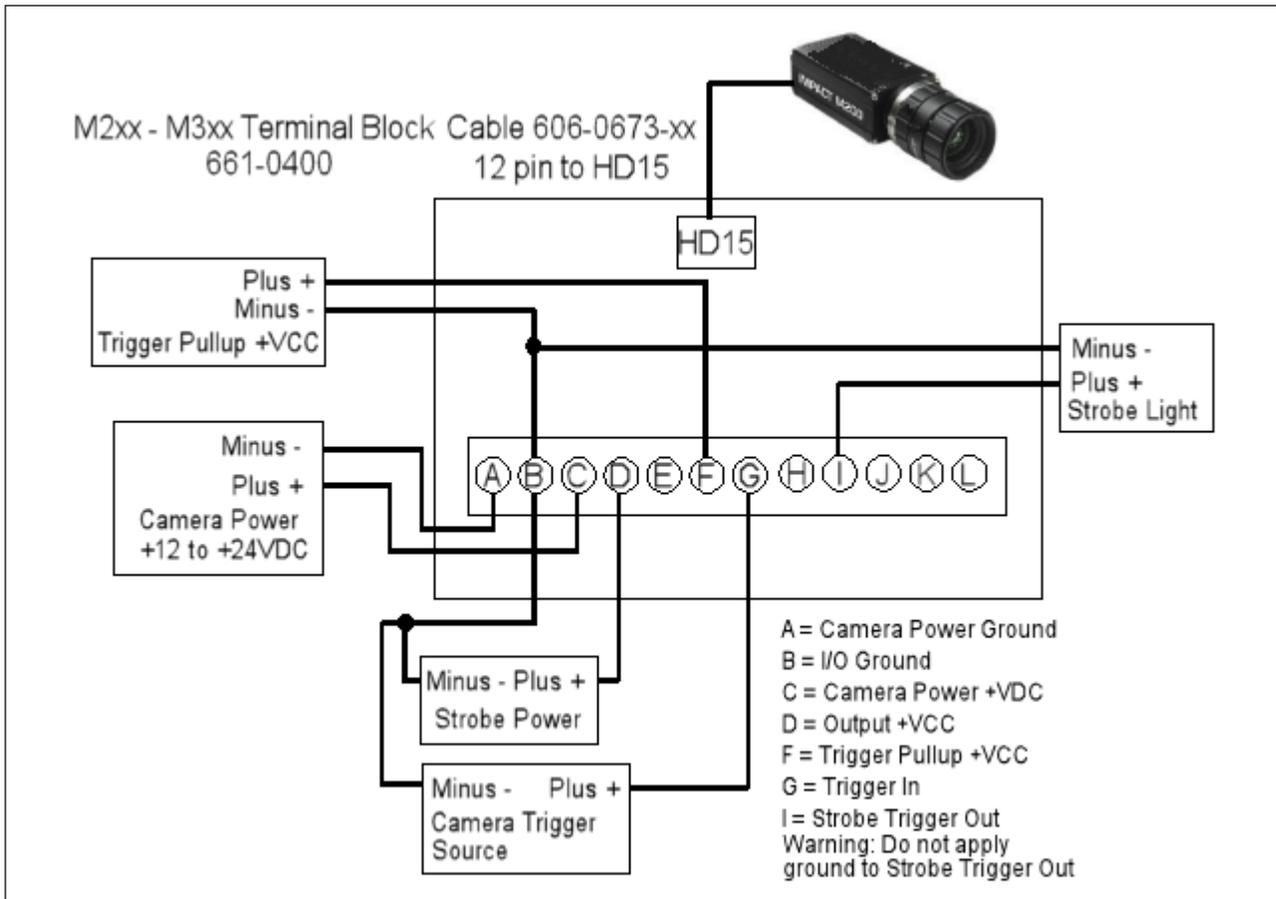
## M2xx and M3xx Strobe Trigger Out Circuit



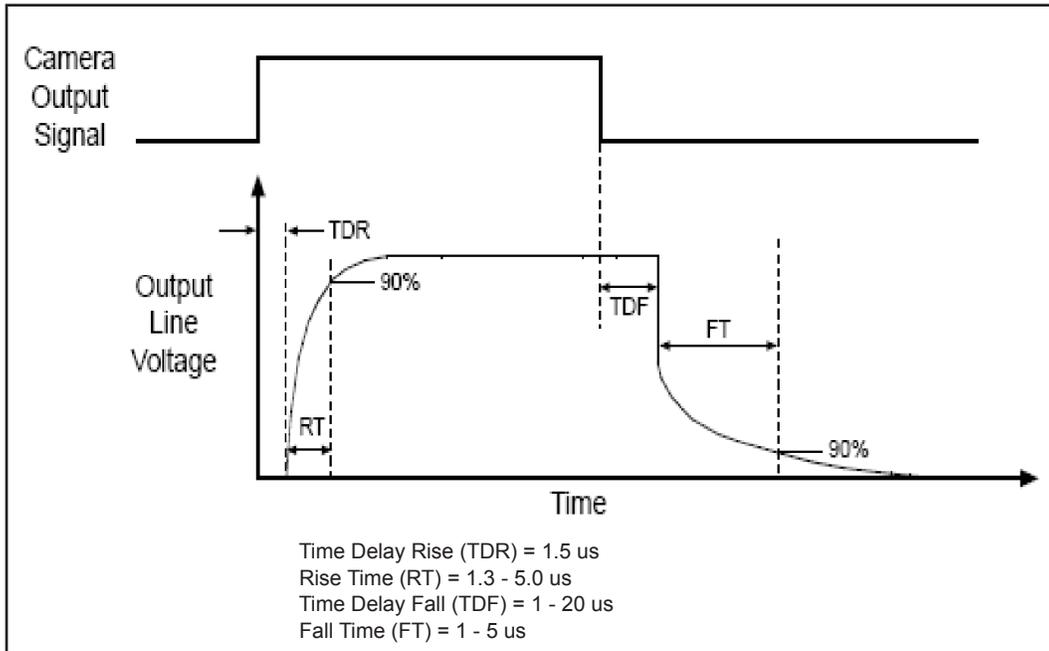
## 661-0400 Terminal Block Dimensions



**M2xx and M3xx Terminal Connections**



The response times for the strobe output on the M2xx and M3xx cameras will typically fall into the ranges specified below. The exact response time for your application will depend on the external resistor and the applied voltage you use.



## M565/M570/M575/M580 Camera Connection

To connect one of these cameras, use terminal block 661-0401 with cable 606-0673-xx (12-pin to HD-15 camera I/O) and cable 606-0674-xx (6 pin to DB9 camera power). For details about programming the Line Trigger, refer to the Impact Reference Guide (843-0093)



NOTE: Do NOT use the M2xx/M3xx terminal block (661-0400) or M1xx block (661-0399) to connect this camera. They will NOT provide the correct signal levels.

Terminal	Signal Name	Notes
Camera Power Ground	Camera Ground	See Note 1 Below
I/O Ground	I/O Ground	See Note 1 Below
Camera Power +12VDC	Camera Power	+12 VDC (+-10%) @ 700 mA Max
Input 1 -	No Connection	DO NOT USE
Input 1 +	Frame Start Trigger	As sinking input Off 0 to +0.8 VDC On: +2.0 to +5 VDC As sourcing input (see Input 1 Pullup) Off: +2.0 to +5 VDC On 0 to +0.8 VDC Maximum: +5 VDC
Input 2 -	No Connection	DO NOT USE

Terminal	Signal Name	Notes
Input 2 +	Single Line Trigger <b>OR</b> Phase A Line Trigger (Quadrature Encoder)	As sinking input Off 0 to +0.8 VDC On: +2.0 to +5 VDC As sourcing input (see Input 2 Pullup) Off: +2.0 to +5 VDC On 0 to +0.8 VDC Maximum: +5 VDC
Input 3 -	No Connection	DO NOT USE
Input 3 +	Phase B Line Trigger (Quadrature Encoder)	As sinking input Off 0 to +0.8 VDC On: +2.0 to +5 VDC As sourcing input (see Input 3 Pullup) Off: +2.0 to +5 VDC On 0 to +0.8 VDC Maximum: +5 VDC
Output 1 -	Not Currently Supported	DO NOT USE
Output 1 +	Not Currently Supported	DO NOT USE
Output 2 -	Not Currently Supported	DO NOT USE
Output 2 +	Not Currently Supported	DO NOT USE
Input 1 Pullup +5VDC	Frame Start Trigger Pullup - use if Input 1 needs sourcing input	Maximum: +5 VDC
Input 2 Pullup +5VDC	Line Trigger Pullup - use if Input 2 needs sourcing input	Maximum: +5 VDC
Input 3 Pullup +5VDC	Line Trigger Pullup - use if Input 3 needs sourcing input	Maximum: +5 VDC

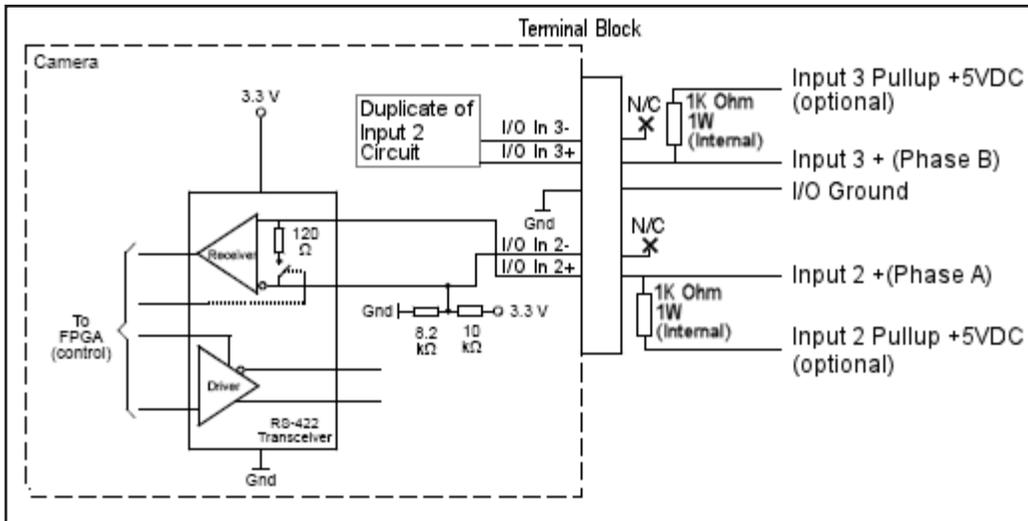
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**NOTE 1:** To help prevent ground loops and possible false triggering, we recommend connecting I/O Ground to Camera Power Ground.

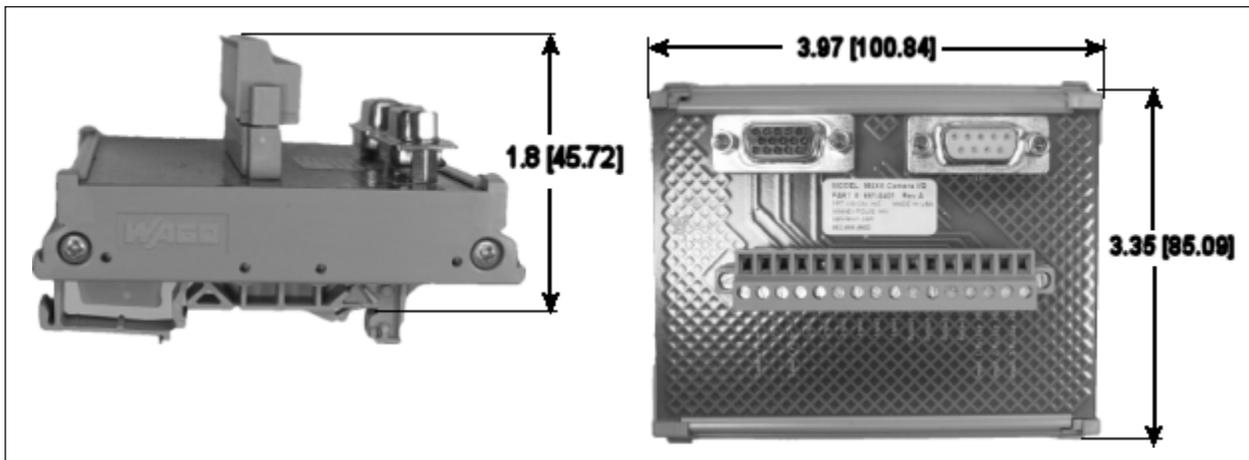
---



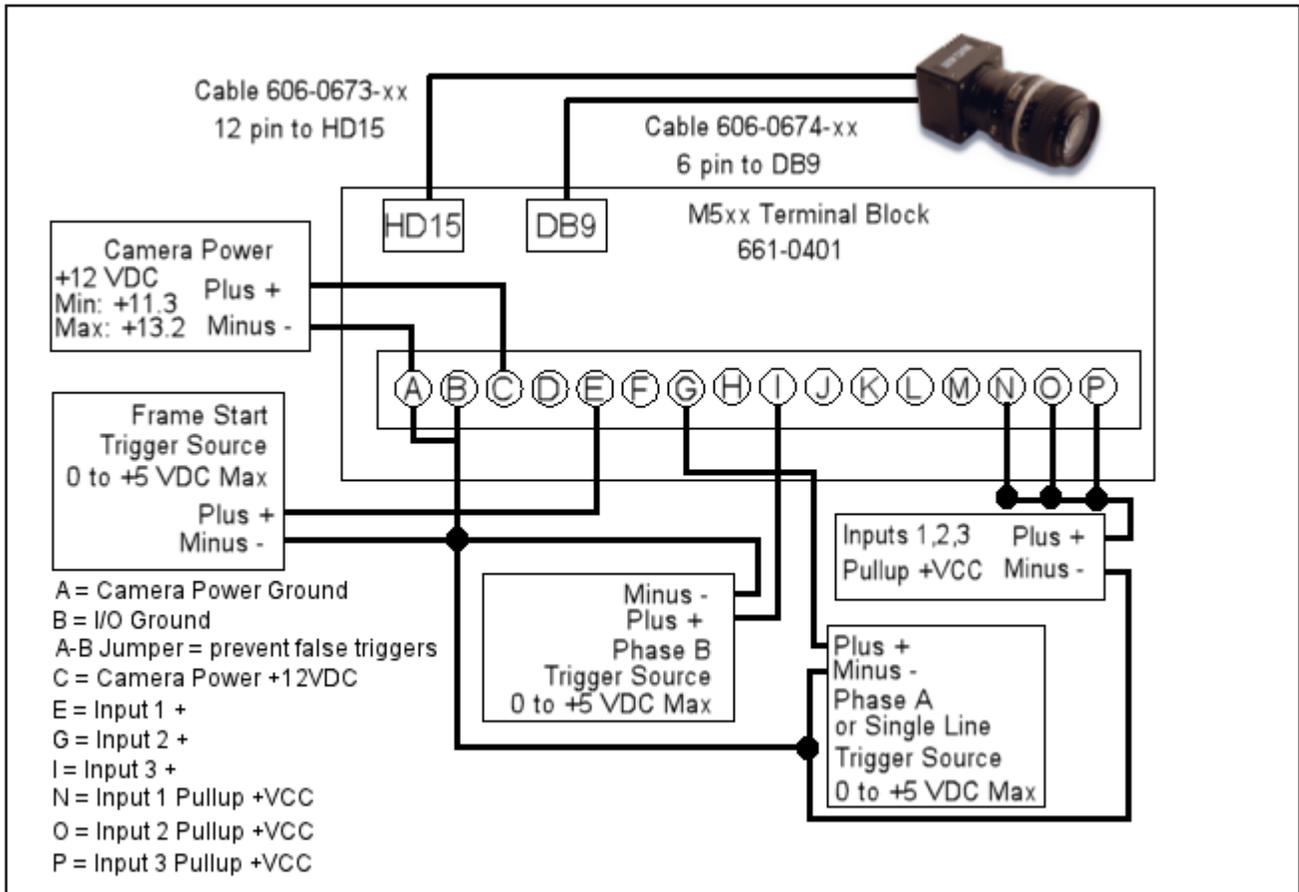
### Quadrature Encoder Line Trigger Input Circuit



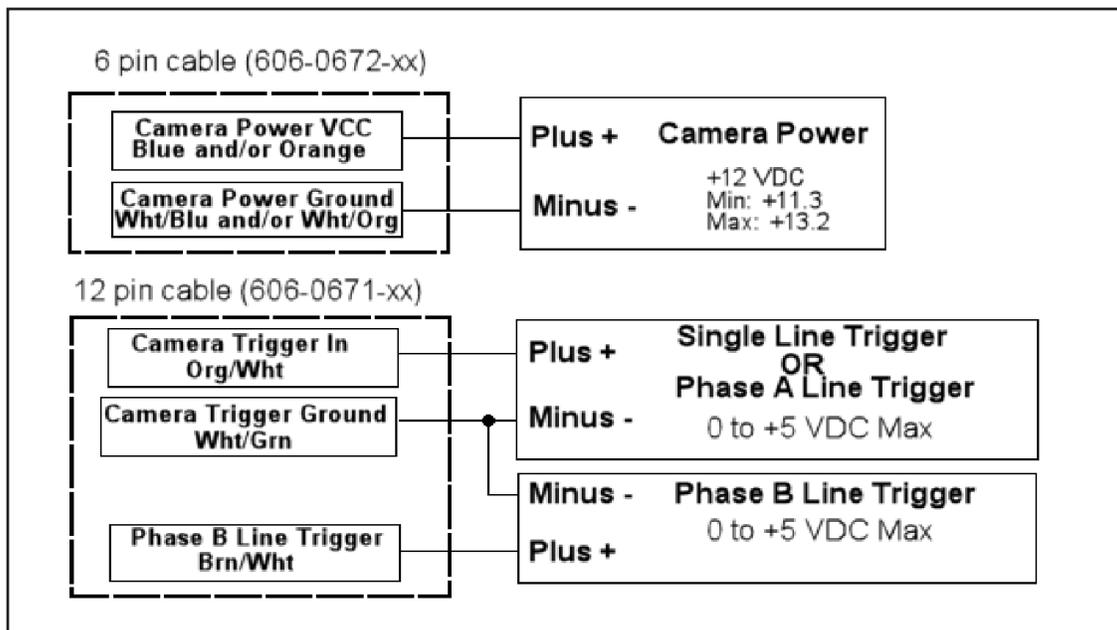
### 661-0401 Terminal Block Dimensions



## Terminal Connections

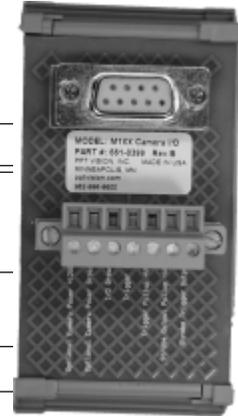


## Unterminated Cable Connections



## M6xx Camera Connection

To connect M6xx camera trigger signals and strobe outputs, use cable 606-0674-xx (6 pin Hirose Male to DB9) with terminal block 661-0399.



Terminal Name	Signal	Notes
Optional Camera Power	DO NOT USE	Do NOT apply power to this terminal. Power is supplied by Power over Ethernet (PoE)
Optional Camera Power Ground	DO NOT USE	Not required. Ground is supplied by Power Over Ethernet (PoE)
I/O Ground	I/O Ground	
Trigger In**	Camera Trigger In	0 to +24 VDC (recommended) Maximum +24 VDC As sinking input Off: 0 to + 0.5 VDC On: +3.3 to +24 VDC; 5 to 15 ma As sourcing input (see Trigger Pullup +VCC) Off: +3.3 to +24 VDC; 5 to 15 ma On: 0 to + 0.5 VDC
Trigger Pullup +VCC**	Trigger In Pullup - use if Trigger In needs sourcing (see Note 1 below)	+24 VDC recommended Maximum +24 VDC (**Block contains 1.6k Ohm 1W resistor between Trigger In and Trigger Pullup +VCC)
Strobe Output Pullup +VCC*	Strobe Supply Voltage - use if Strobe Trigger Output needs sourcing (see Note 2 below)	Based on Strobe requirement (optional) Max: +30 VDC; 50 ma (*Block contains 1.6k Ohm 1W resistor between Strobe Trigger Output and Strobe Output Pullup +VCC)
Strobe Trigger Output*	Trigger Out to Strobe (see Note 3 below)	DO NOT APPLY ANY VOLTAGE DIRECTLY TO THIS OUTPUT. DO NOT WIRE OUTPUTS IN PARALLEL.

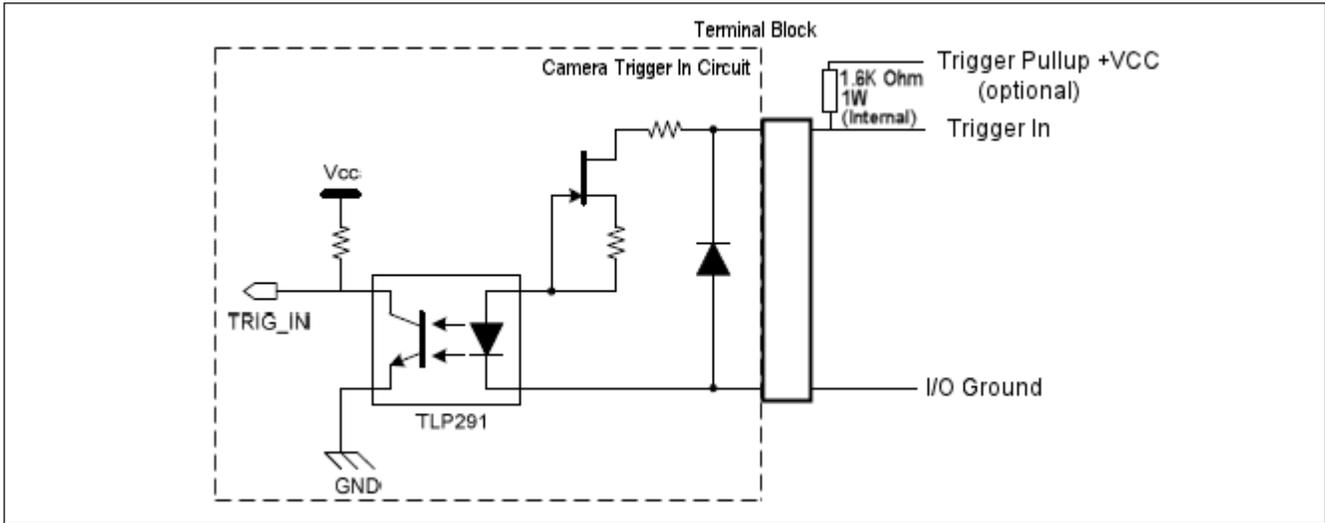
**NOTE 1:** If Camera Trigger In requires a sinking signal, set the Software Trigger Event to Rising Edge. If it requires a sourcing signal, set the Software Trigger Event to Falling Edge.

**NOTE 2:** If Strobe Trigger Output requires a sinking signal, set the Strobe Trigger Output to Falling Edge. If it requires a sourcing signal, set the Strobe Trigger Output to Rising Edge.

**NOTE 3:** Disconnecting the camera will turn on some strobe lights.

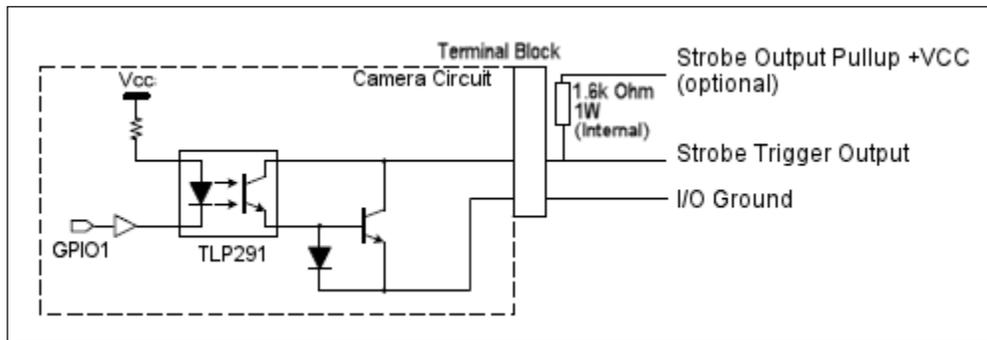
# M6xx Circuit Diagrams

## M6xx Trigger In Circuit

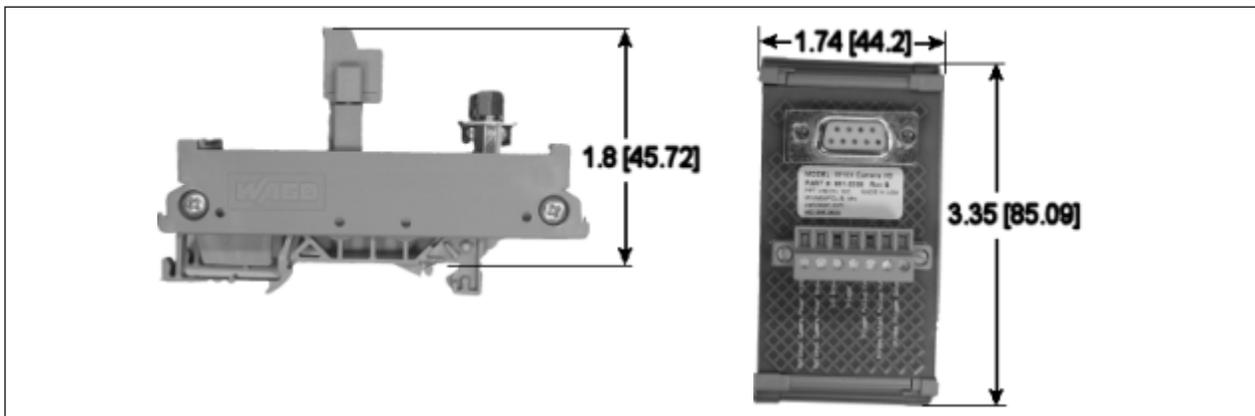


**WARNING:** Never wire M6xx Camera Strobe Outputs in parallel with M1xx, M2xx, or M3xx Camera Strobe Outputs. This will damage the cameras.

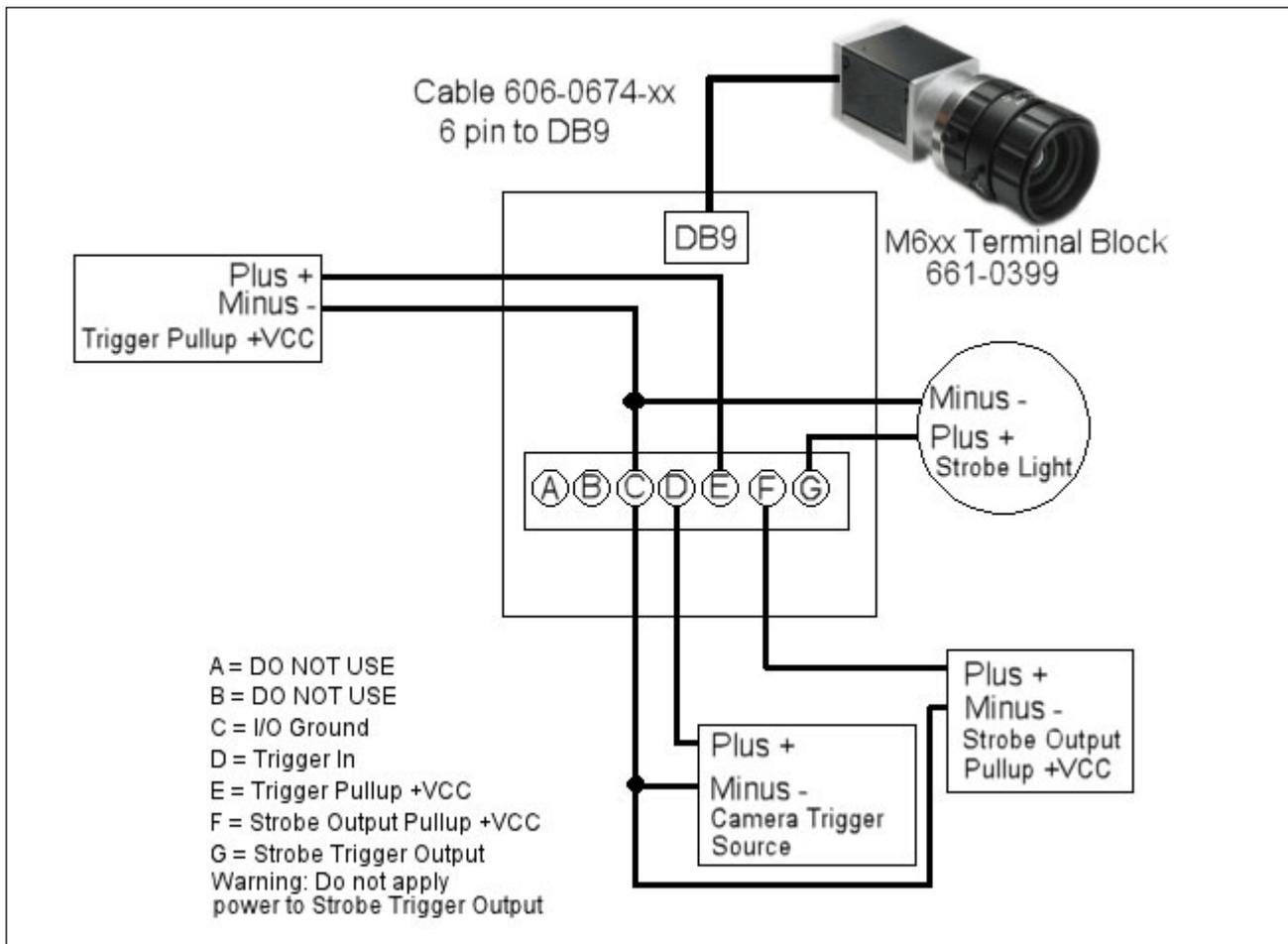
## M6xx Strobe Trigger Output Circuit



## 661-0399 Terminal Block Dimensions



### M6xx Terminal Connections



## Third-party Cameras

The MX-E Series Processor and Impact Software support only the third-party cameras listed in this section. This information, including power and trigger signal connections, are provided by us as a convenience. You must purchase a license from us to connect a third-party camera to the M-Series processor.

**Datalogic assumes no responsibility for the accuracy or timeliness of this third-party camera information.**

**For complete details and the most accurate specifications for these cameras, consult the manufacturer's documentation.**

# JAI Cameras

**NOTE:** See “JAI Camera I/O Signals” on page 3-32 for important information about camera and strobe signals.

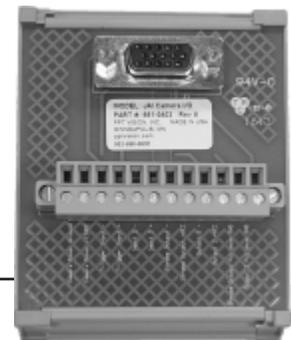
Model (GigE)	Resolution (Megapixels)	Color	Image Horizontal	Image Vertical	Minimum Software Version Required
AT-200GE*	2	Yes	1624	1236	10.3.0
AM-800GE	8	No	3296	2472	10.3.0
AM-1600-GE	16	No	4872	3248	10.6.0
CM-140GE	1.4	No	1392	1040	11.0.0
AT-140GE*	1.4	Yes (3 CCD)	1392	1040	10.5.0
CM-140GE-UV	1.4	Ultraviolet	1392	1040	10.2.0
CM-030GE-RH (remote head)	0.3	No	659	494	10.2.0

\*See “Color shading support” on page 3-31 for special camera configuration settings.

## JAI Camera Connection

To connect JAI camera power, trigger signals, and strobe outputs, use cable 606-0673-xx (12-pin to HD-15) with terminal block 661-0402.

NOTE: Do NOT use terminal block 248-0141 to connect this camera. It will NOT provide the correct signal levels.



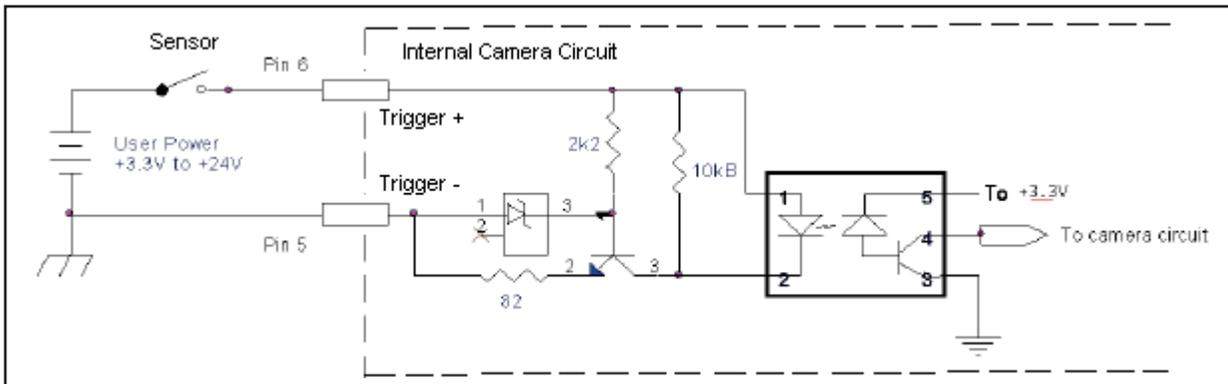
**WARNING: THE POWER AND GROUND CONNECTIONS FOR THIS CAMERA ARE DIFFERENT FROM OUR CAMERAS AND OTHER THIRD-PARTY CAMERAS. USE CAUTION WHEN CONNECTING POWER TO THESE CAMERAS.**

Terminal	Signal Name	Notes
Camera Power Ground	Camera Ground	
Camera Power +12VDC	Camera Power	<p><b>CM-140GE-UV and CM-030-GE-RH</b>                      +12 VDC @ 350 mA Max (4.1 W)                      Maximum: +13.2 VDC</p> <p><b>AM-800GE</b>                      +12VDC to +24VDC ±10%, 8.16W (at normal, Full resolution, DC+12V)</p> <p><b>AT-200GE</b>                      +10.8VDC to +26.4VDC, 0.67 A (Typical, Full frame, DC +12V in)</p> <p><b>AM-1600GE</b>                      +12.0VDC ±10%, 7.5W (Typical, Continuous Mode)</p>
Trigger Input -	Camera Trigger -	

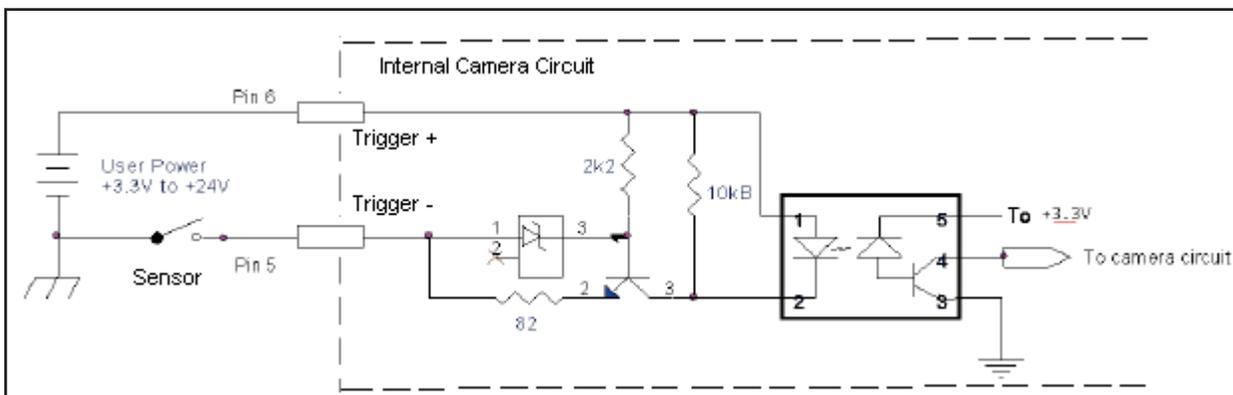
Terminal	Signal Name	Notes
Trigger Input +	Camera Trigger +	+0 to +24 VDC Off: 0 to +2.0 VDC On: +4.0 to + 24 VDC Maximum: +24 VDC
Input 2 -	Not Currently Supported	DO NOT USE
Input 2 +	Not Currently Supported	DO NOT USE
Strobe Output -	Strobe Output Ground	
Strobe Output +VCC	Power for Strobe Output	+5 to +24 VDC Maximum: +24 VDC; 100 mA
Output 2 -	Not Currently Supported	DO NOT USE
Output 2 +VCC	Not Currently Supported	DO NOT USE
Strobe Output Pull down GND	Strobe Output Pull down - use if Strobe Output needs sourcing output	
Output 2 Pull down GND	Not Currently Supported	DO NOT USE

## JAI Camera Circuit Diagrams

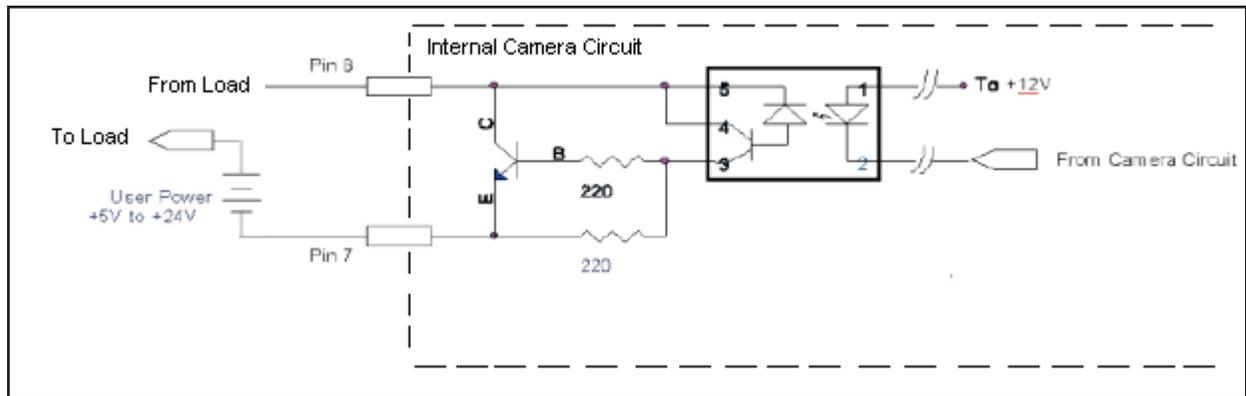
**JAI Camera Trigger Input Circuit (sourcing)**



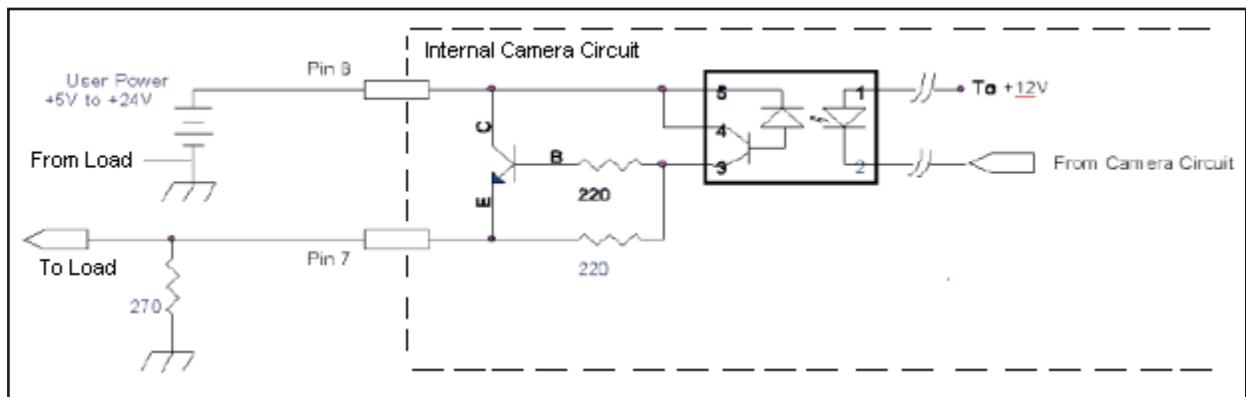
**JAI Camera Trigger Input Circuit (sinking)**



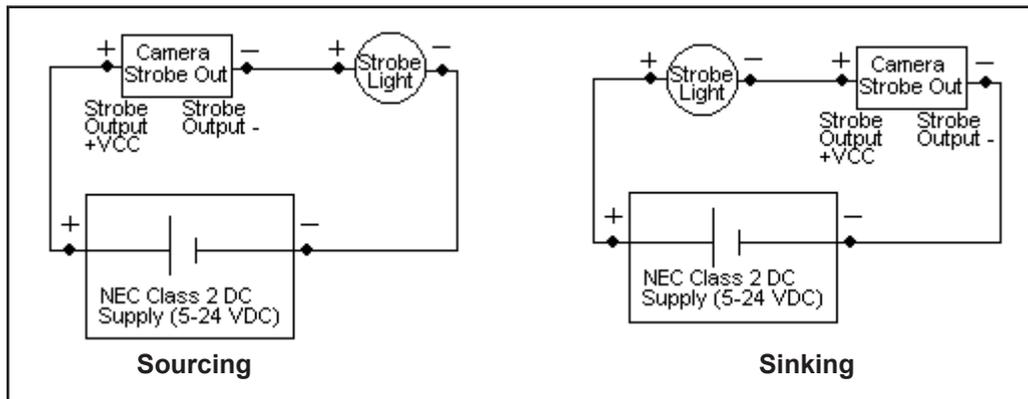
**JAI Camera Strobe Output Circuit (sinking)**



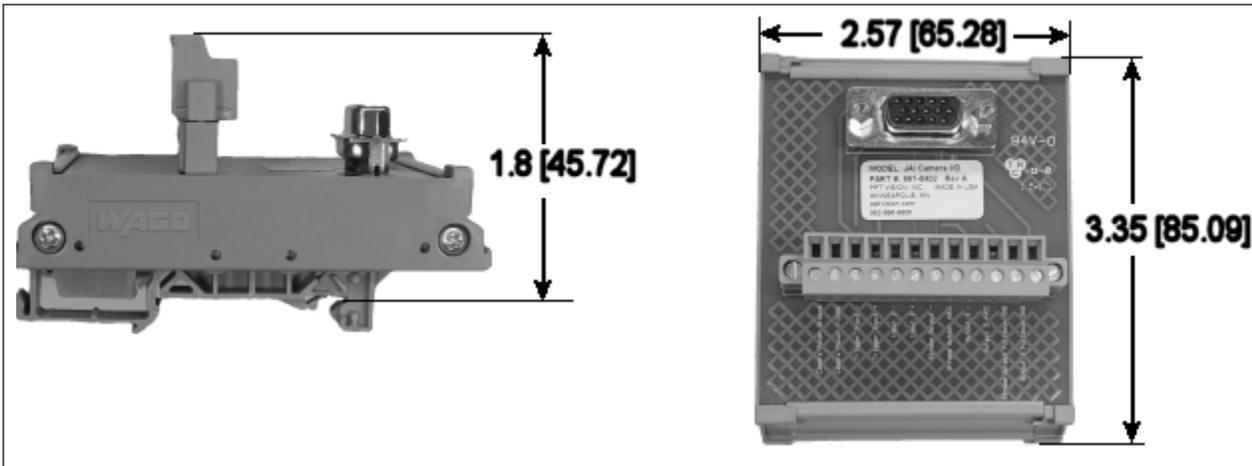
**JAI Camera Strobe Output Circuit (sourcing)**



**JAI Camera Strobe Output Circuits**

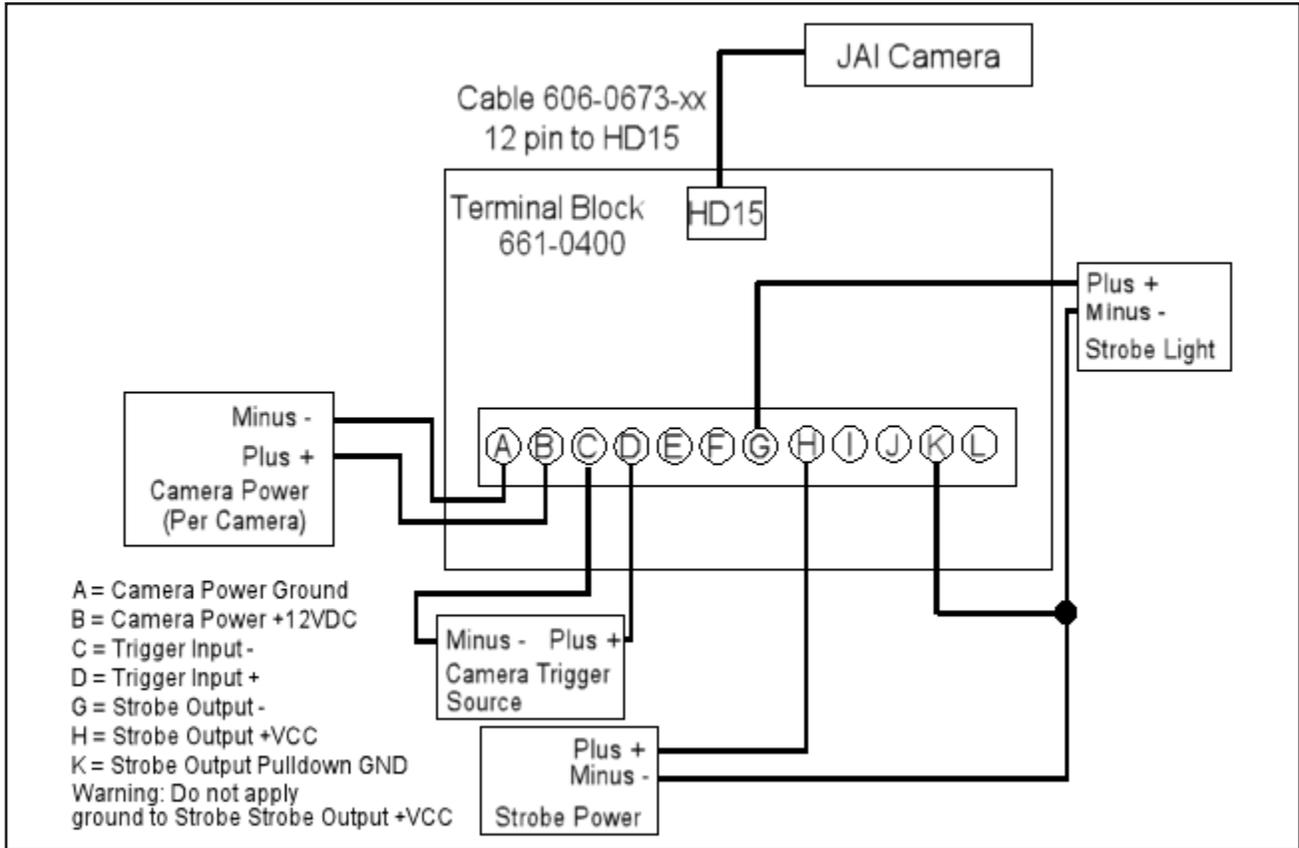


**661-0402 Terminal Block Dimensions**

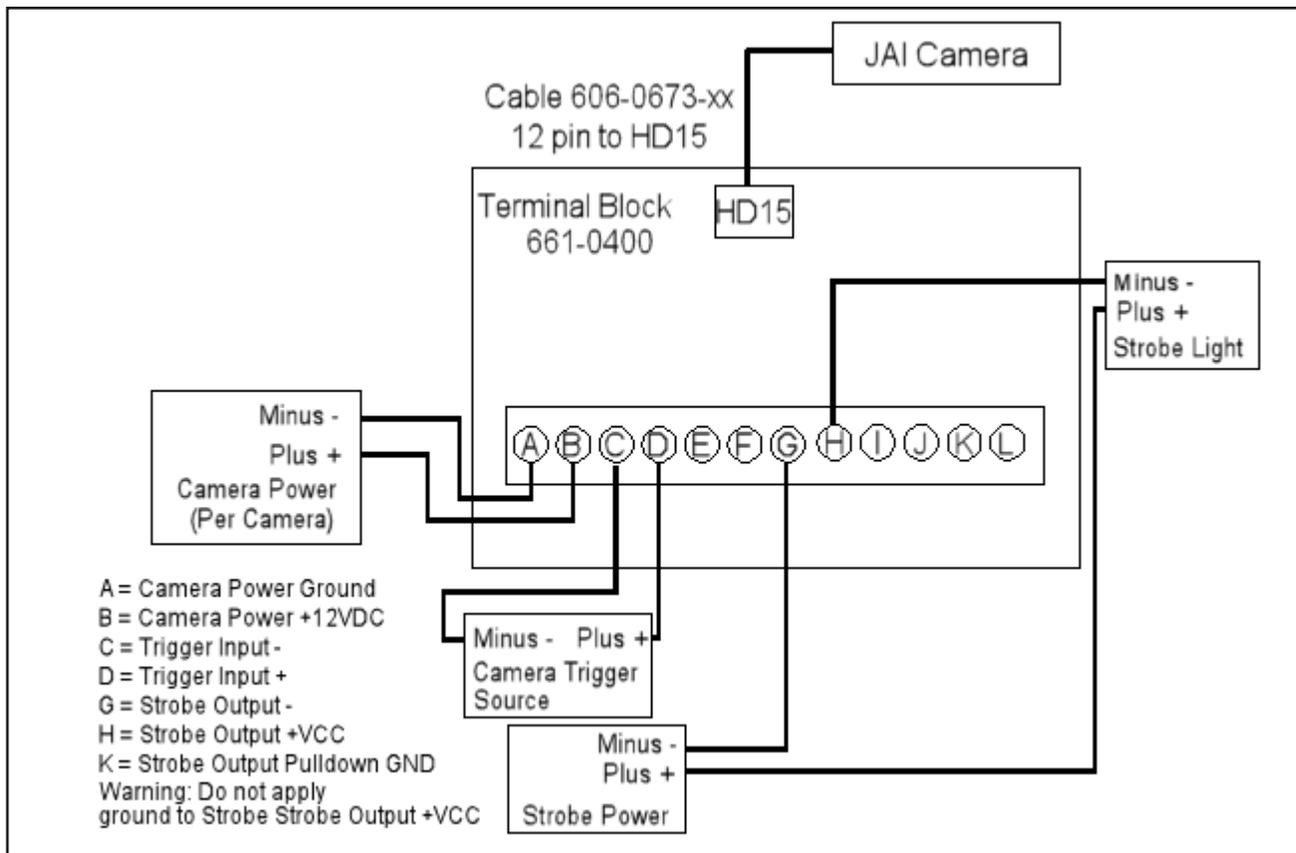


# JAI Terminal Connections

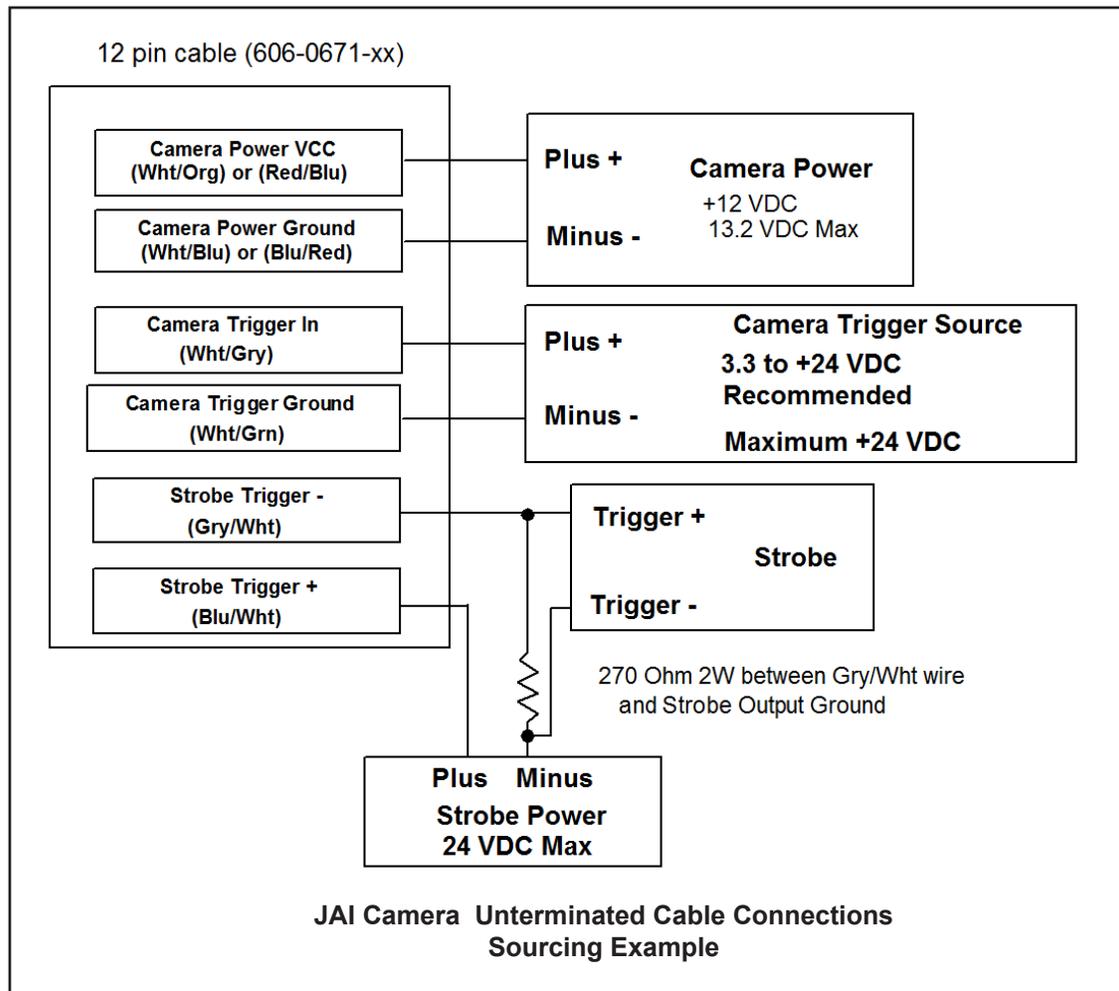
## JAI Terminal Connections (sourcing)



**JAI Terminal Connections (sinking)**



## JAI Unterminated Cable Connections



## Color shading support

The JAI Model AT-200GE camera has several special features that are not supported by the standard VPM camera setup. One of these features is color shading. Color shading corrects for image shading, particularly darkening in the corners. You can use the color shading feature of this camera after you complete the following offline calibration procedure.

### To calibrate color shading

1. Using the optics and lighting for the application, place a white or gray target that fills the field-of-view.
2. Using VPM camera settings, set the white balance to factory defaults. You should re-calibrate the white balance after the shading is corrected.
3. Adjust the exposure and other settings to create a grey level of 50 to 75% at the center of the image. Note the exposure setting.
4. Close VPM and IMPACTDevice.exe.
5. Start the Pylon Viewer by double-clicking on the following file:  
c:\Program Files\Basler\Pylon 2.x\apps\i386\PylonViewerApp.exe  
Note that Pylon Viewer and IMPACTDevice.exe cannot run at the same time.

6. In the Devices window, select the camera to be calibrated.
7. Switch to the Feature window.
8. Set the Transport Layer/Read Timeout and the Write Timeout to 3000.
9. Set the User Set Selector to Default and click the User Set Load button.
10. Set the Acquisition Control/Exposure Mode to Timed.
11. Set the Acquisition Control/Exposure Time to the setting found in Step 3 using VPM.
12. Snap and image using the One Shot button. An image should be displayed.
13. Verify that the image pixel values are medium intensity, not saturated or very dark. Adjust the exposure time and other settings, if necessary.
14. Move to the JAI Custom Control area of the Feature Window.
15. Select the preferred Shading Correction Mode. You will probably want Flat Shading, which corrects for both brightness variations and color variations. The other option of Color Shading will only correct for color variation and leaves brightness variation uncorrected.
16. Set Shading Selector to Red.
17. Turn On Shading Enable.
18. Click the Shading Correct Execute button.
19. Repeat steps 16, 17, and 18 for Green and Blue.
20. In the User Set Control area, set User Set Selector to User Set 1 and click the User Set Save button.
21. Close the Pylon Viewer and restart IMPACTDevice.exe and VPM.
22. The camera will now load the shading correction each time it starts.
23. Recalibrate the White Balance.

## JAI Camera I/O Signals

On JAI camera models AT200-GE and AM-800GE, the camera software setup in Vision Program Manager (VPM) provides a camera trigger delay debounce setting, but no holdoff debounce setting. VPM also does not provide a strobe trigger pulse width setting. The strobe trigger pulse width coincides with the camera shutter speed open time setting so that it turns on when the exposure starts (shutter opens) and turns off when the exposure ends (shutter closes). Refer to “Trigger Events” and “Strobe Pulse Length” in the Impact Reference Guide (843-0093) for more details.

# Basler Cameras

The MX-E Series Processor and Impact Software can support a wide variety of Basler GigE cameras, in addition to the models listed below, including all Ace and Scout models. Ace model numbers begin with “acA” and Scout model numbers begin with “scA.” For complete details and the most accurate specifications for these cameras, consult the manufacturer’s documentation.

**Datalogic assumes no responsibility for the accuracy or timeliness of this third-party camera information.**

**You must purchase a license from Datalogic to connect a third-party camera to the MX-E Series processor.**

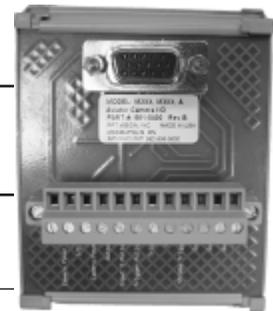
## Basler Aviator Cameras

Model (GigE)	Resolution (Megapixels)	Color	Image Horizontal	Image Vertical	FPS (approx)	Minimum Software Version Required
avA1000-100gm avA1000-100gc	1	No Yes	1024	1024	101	10.3.0
avA1600-50gm avA1600-50gc	1	No Yes	1600	1200	55	10.3.0
avA1900-50gm avA1900-50gc	2	No Yes	1920	1080	51	10.3.0
avA2300-25gm avA2300-25gc	3	No Yes	2239	1750	26	10.3.0

## Camera Connection

**WARNING: THIRD-PARTY CAMERA REQUIREMENTS ARE DIFFERENT. THESE CAMERAS REQUIRE +12 VDC POWER. USE CAUTION WHEN CONNECTING POWER TO THESE CAMERAS.**

To connect power, trigger signals, and strobe outputs for these Basler camera models, use cable 606-0673-xx (12-pin Hirose Male to HD-15) with terminal block 661-0400.



Terminal	Signal Name	Notes
Camera Power Ground	Camera Ground	
I/O Ground	I/O Ground	
Camera Power +VDC	Camera Power	+12 VDC recommended @ 500 mA Max <b>Maximum: +13.2 VDC</b>
Output +VCC	Power for Strobe Trigger Out	+3.3 to +24 VDC; 50 mA Max Maximum: +30 VDC
Input 2 Pullup +VCC	DO NOT USE	Not Currently Supported
Trigger Pullup +VCC	Trigger In Pullup - use if Trigger In needs sourcing input	Recommended: +24 VDC

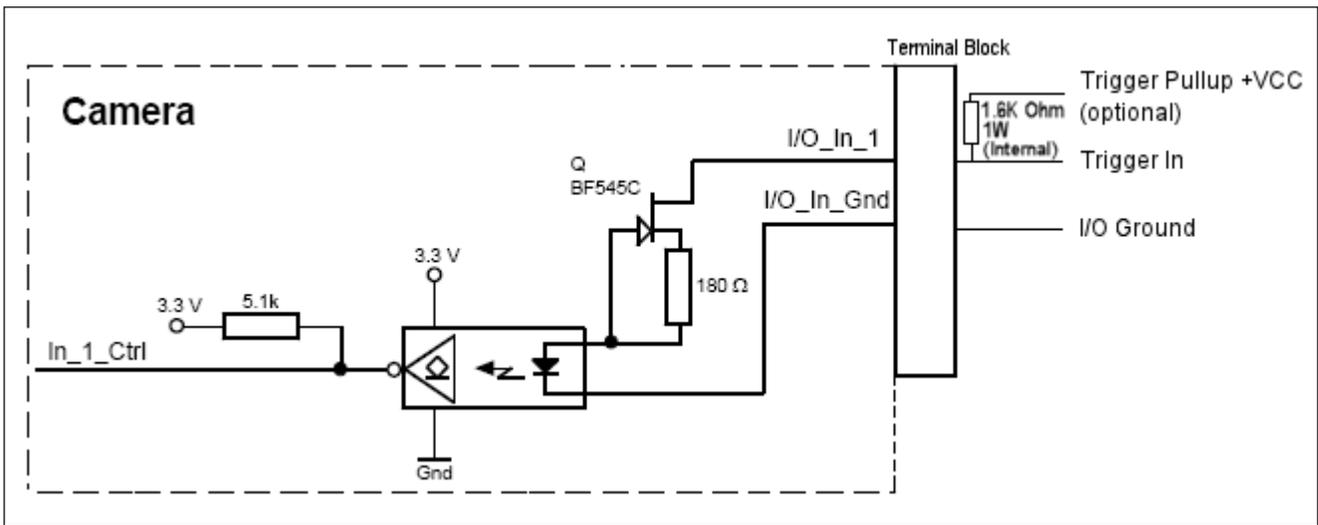
Terminal	Signal Name	Notes
Trigger In	Camera Trigger In (see Note 1 below)	0 to +24 VDC recommended Maximum +30 VDC As sinking input Off: 0 to +1.4 VDC On: +2.2 to +24 VDC; 5 to 15 ma As sourcing input (see Trigger Pullup +VCC) Off: +2.2 to +24 VDC; 5 to 15 ma On: 0 to +1.4 VDC
Input 2	DO NOT USE	Not Currently Supported
Strobe Trigger Out	Trigger Out to Strobe (see Note 2 below)	DO NOT APPLY GROUND DIRECTLY TO THIS OUTPUT.
Output 2	DO NOT USE	Not Currently Supported
Output 3	DO NOT USE	Not Currently Supported
Output 4	DO NOT USE	Not Currently Supported

NOTE 1: If Camera Trigger In requires a sinking signal, set the Software Trigger Event to Rising Edge. If it requires a sourcing signal, set the Software Trigger Event to Falling Edge.

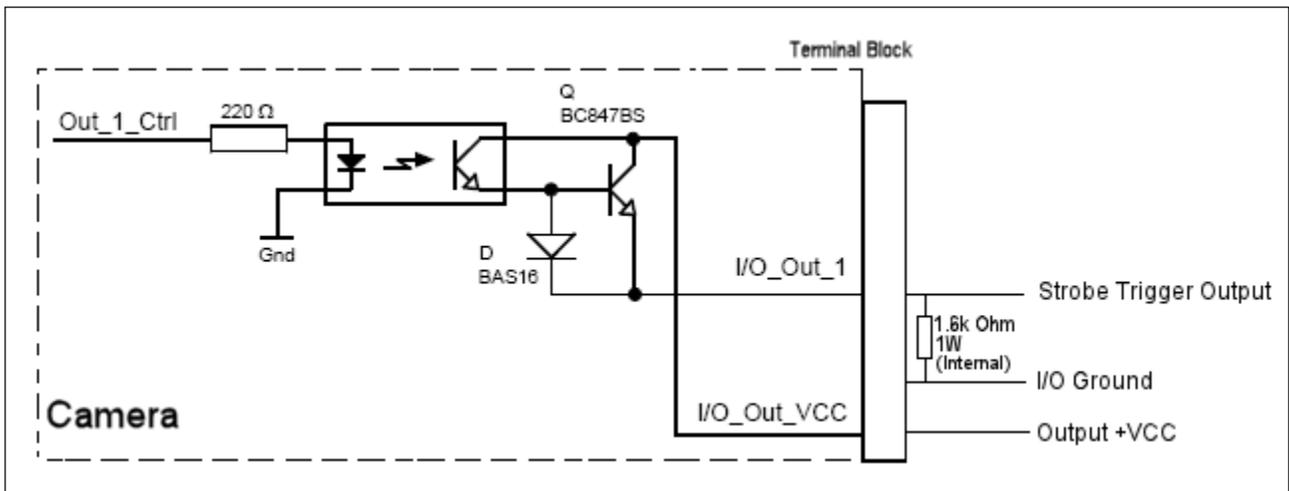
NOTE 2: If Strobe Trigger Output requires a sinking signal, set the Strobe Trigger Output to Falling Edge. If it requires a sourcing signal, set the Strobe Trigger Output to Rising Edge.

# Circuit Diagrams

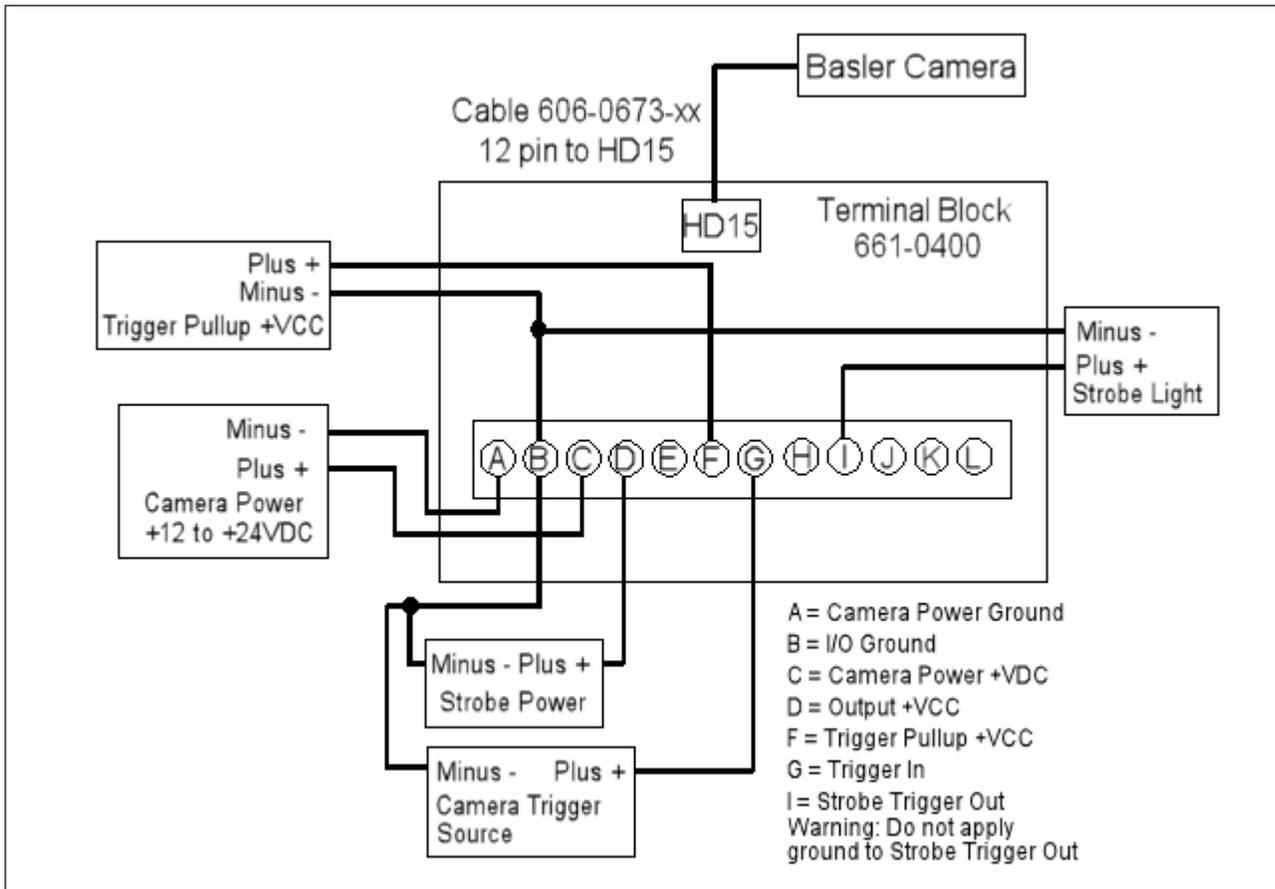
*Trigger In Circuit*



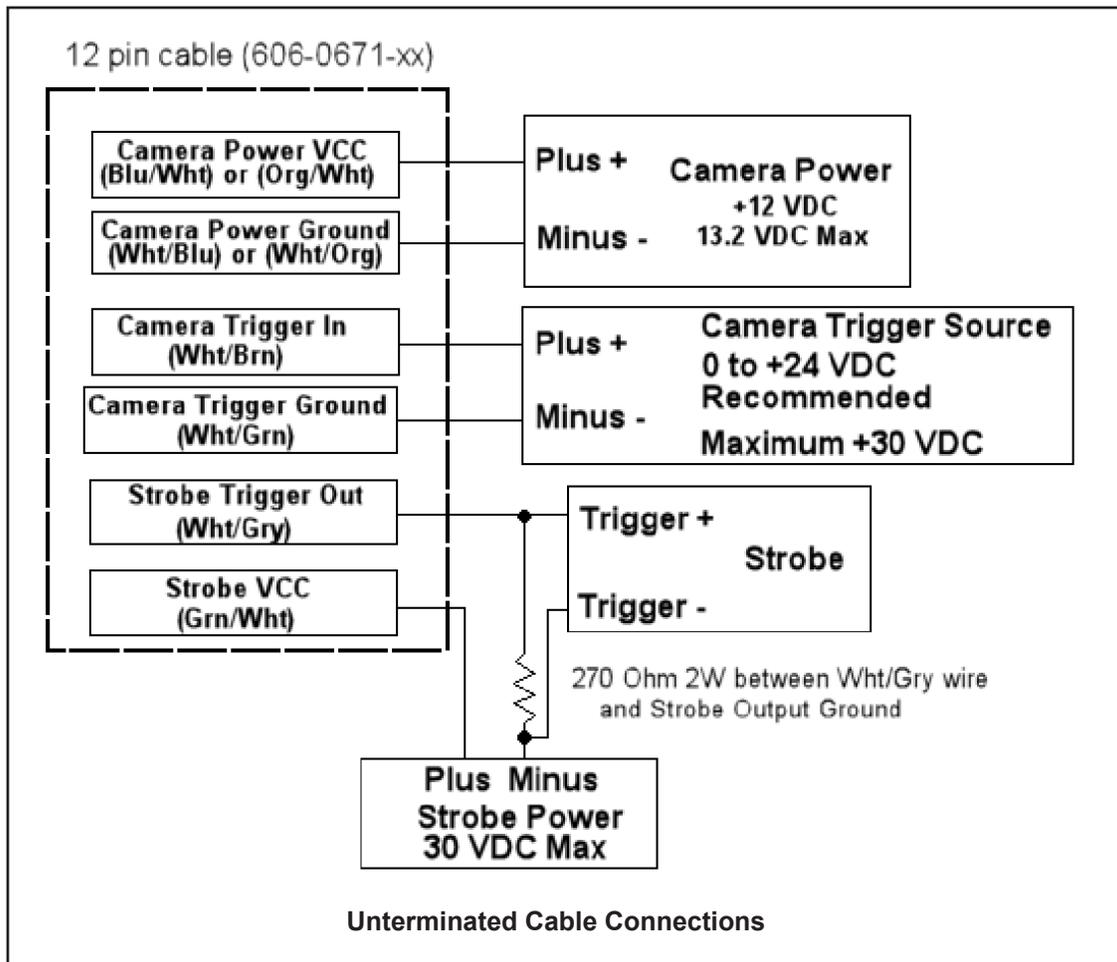
*Strobe Trigger Out Circuit*



**Terminal Connections**



## Aviator Underterminated Cable Connections



## Basler Line Scan Camera

Model (GigE)	Sensor Size	Color	Maximum Line Rate	Pixel Size	Maximum Frame Height	Minimum Software Version Required
ruL2098-10gc	2098 pixels x 3 lines	Yes	9.2 kHz	14 x 14 $\mu\text{m}$	1988 pixels	11.5.0
raL8192-12gm	8192 pixels x 1 line	No	12 kHz	3.5 x 3.5 $\mu\text{m}$	12288 pixels	11.7.0

## Basler Line Scan Camera Connection

This section includes information for the Basler color line scan camera model ruL2098-10gc and monochrome model raL8192-12gm.

To connect the camera, use terminal block 661-0401 with cable 606-0673-xx (12-pin to HD-15 camera I/O) and cable 606-0674-xx (6 pin to DB9 camera power). For details about programming the Line Trigger, refer to the Impact Reference Guide (843-0093)



**NOTE:** Do NOT use the M2xx/M3xx terminal block (661-0400) or M1xx block (661-0399) to connect this camera. They will NOT provide the correct signal levels.

Terminal	Signal Name	Notes
Camera Power Ground	Camera Ground	See Note 1 Below
I/O Ground	I/O Ground	See Note 1 Below
Camera Power +12VDC	Camera Power	+12 VDC (+-10%) @ 500 mA Max
Input 1 -	No Connection	DO NOT USE
Input 1 +	Frame Start Trigger	As sinking input Off 0 to +0.8 VDC On: +2.0 to +5 VDC As sourcing input (see Input 1 Pullup) Off: +2.0 to +5 VDC On 0 to +0.8 VDC Maximum: +5 VDC
Input 2 -	No Connection	DO NOT USE
Input 2 +	Single Line Trigger <b>OR</b> Phase A Line Trigger (Quadrature Encoder)	As sinking input Off 0 to +0.8 VDC On: +2.0 to +5 VDC As sourcing input (see Input 2 Pullup) Off: +2.0 to +5 VDC On 0 to +0.8 VDC Maximum: +5 VDC
Input 3 -	No Connection	DO NOT USE

Terminal	Signal Name	Notes
Input 3 +	Phase B Line Trigger (Quadrature Encoder)	As sinking input Off 0 to +0.8 VDC On: +2.0 to +5 VDC As sourcing input (see Input 3 Pullup) Off: +2.0 to +5 VDC On 0 to +0.8 VDC Maximum: +5 VDC
Output 1 -	Not Currently Supported	DO NOT USE
Output 1 +	Not Currently Supported	DO NOT USE
Output 2 -	Not Currently Supported	DO NOT USE
Output 2 +	Not Currently Supported	DO NOT USE
Input 1 Pullup +5VDC	Frame Start Trigger Pullup - use if Input 1 needs sourcing input	Maximum: +5 VDC
Input 2 Pullup +5VDC	Line Trigger Pullup - use if Input 2 needs sourcing input	Maximum: +5 VDC
Input 3 Pullup +5VDC	Line Trigger Pullup - use if Input 3 needs sourcing input	Maximum: +5 VDC

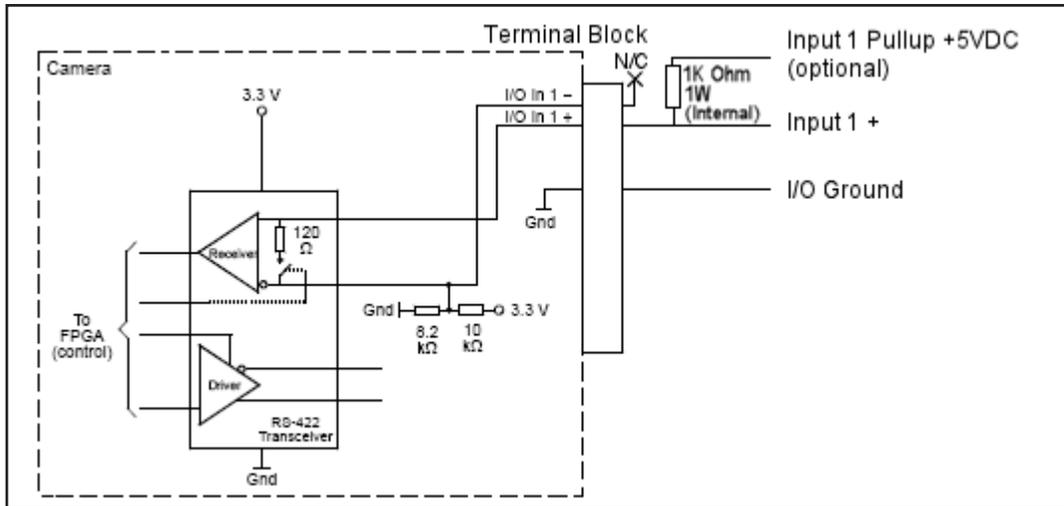
---

**NOTE 1:** To help prevent ground loops and possible false triggering, you must connect I/O Ground to Camera Power Ground.

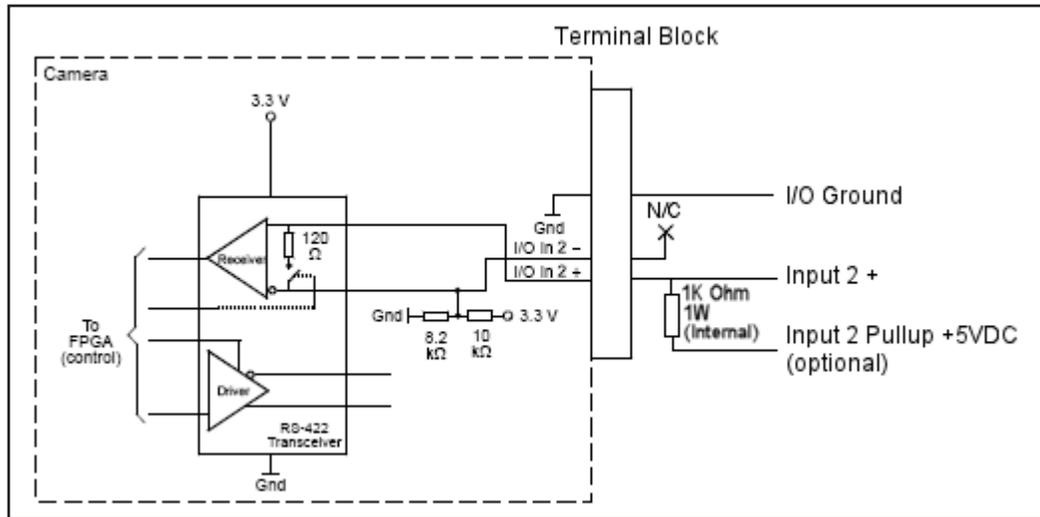
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# Basler Model ruL2098-10gc/raL8192-12gm Line Scan Circuit Diagrams

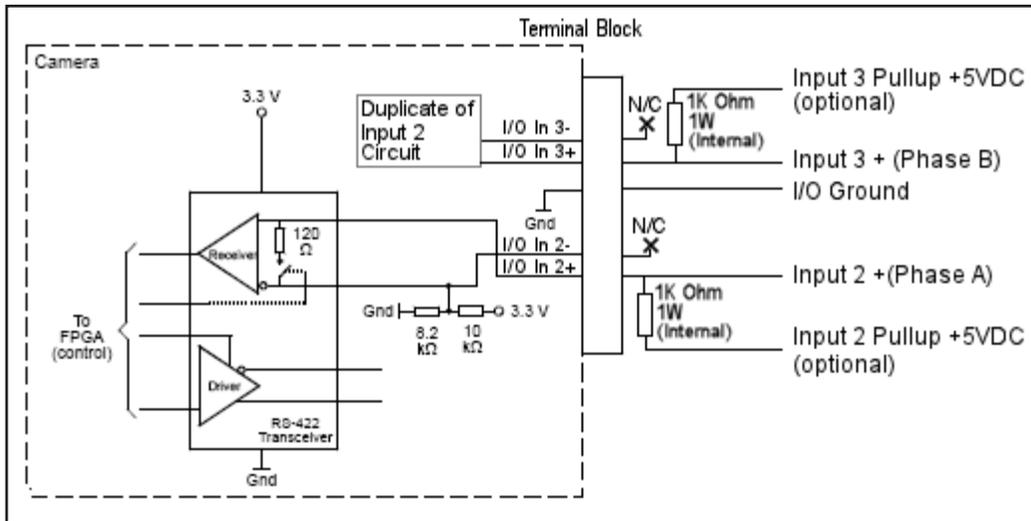
## Frame Trigger Input Circuit



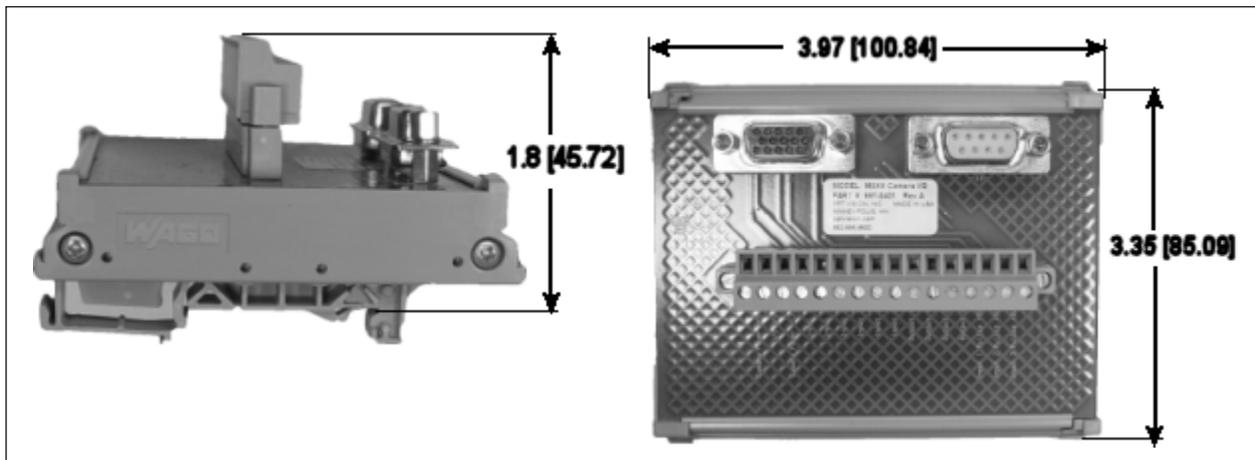
## Single Line Trigger Input Circuit



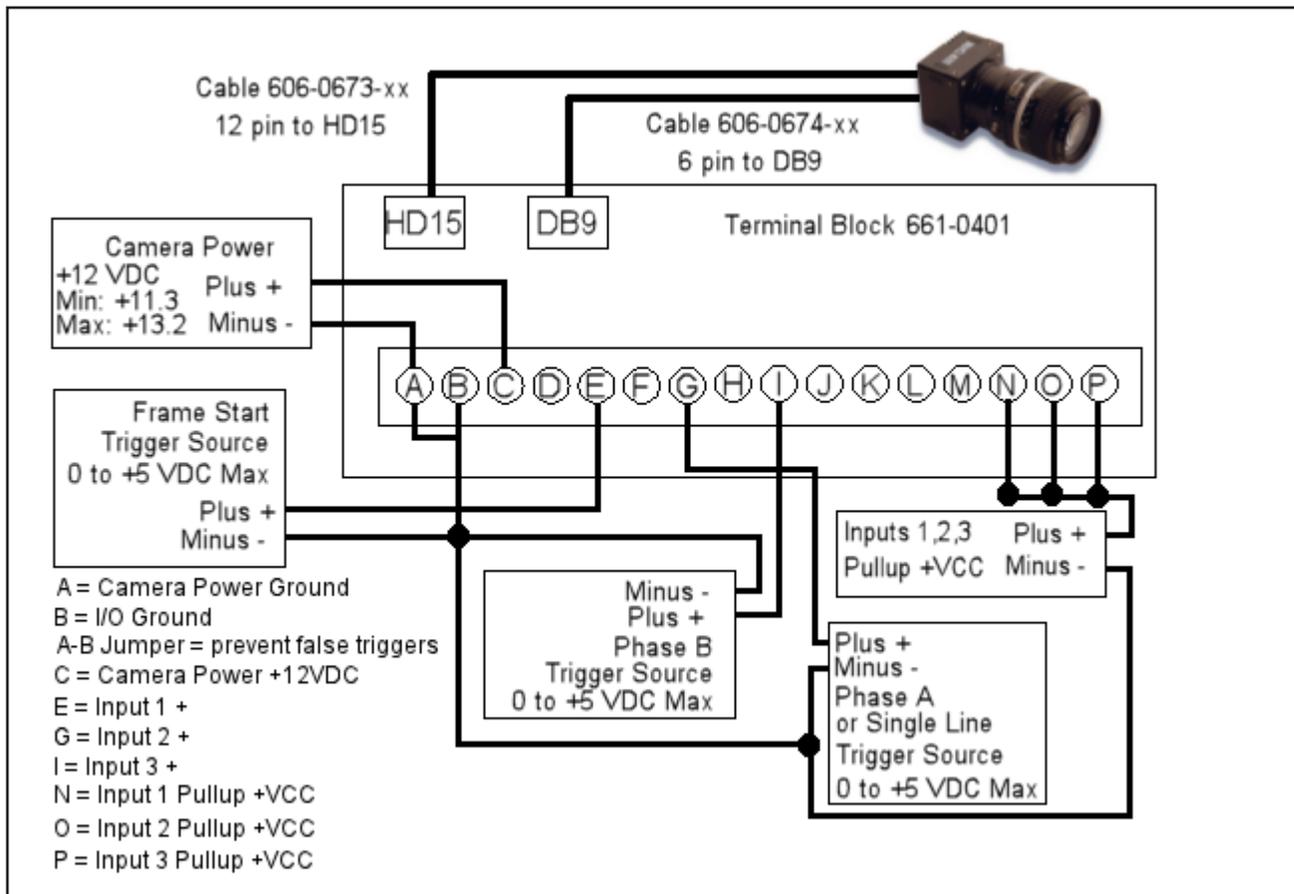
### Quadrature Encoder Line Trigger Input Circuit



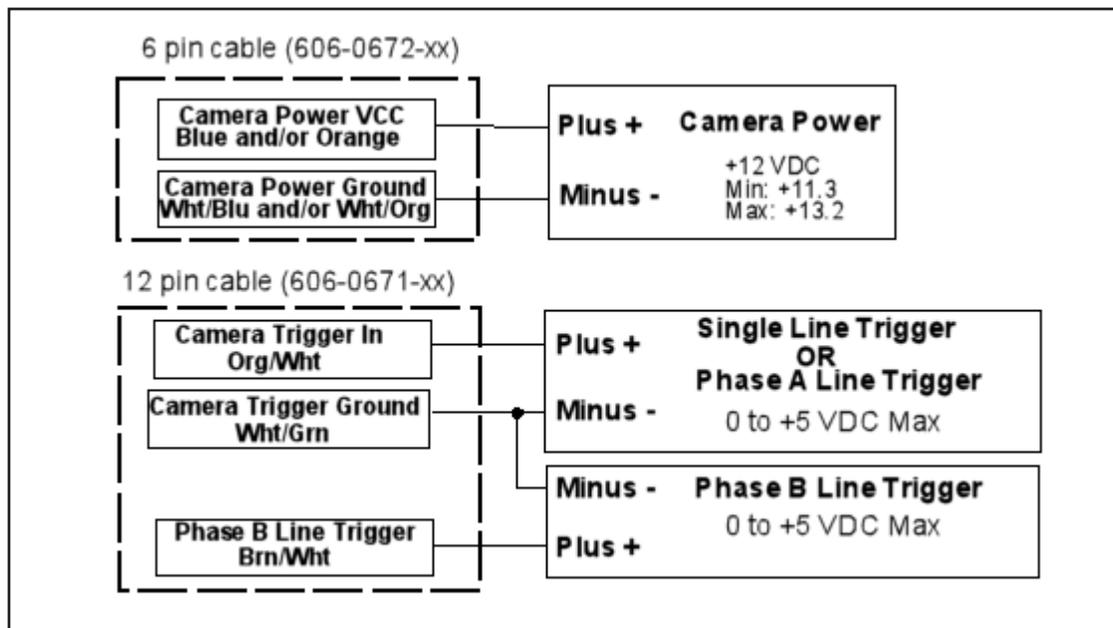
### 661-0401 Terminal Block Dimensions



## Terminal Connections



## Unterminated Cable Connections



## Baumer Cameras

Model numbers that include a “C” are color cameras.

Model (GigE)	Resolution (Megapixels)	Image Horizontal	Image Vertical	FPS (approx)	Minimum Software Version Required
TXG02 - TXG02c	.3	656	494	140	11.5.0
TXG03 - TXG03c	.3	656/656	494/490	90	11.5.0
TXG04 - TXG04c	.3	656/656	494/490	56	11.5.0
TXG04h	.3	640	480	210	11.5.0
TXG06 - TXG06c	.4	776/776	582/578	64	11.5.0
TXG08 - TXG08c	.8	1032/1032	776/772	28	11.5.0
TXG12 - TXG12c	1.3	1296	996	32	11.5.0
TXG13 - TXG13c	1.4	1392/1384	1040/1036	20	11.5.0
TXG14 - TXG14c	1.4	1392/1384	1040/1036	20	11.5.0
TXG14f - TXG14cf	1.4	1392/1384	1040/1036	30	11.5.0
TXG20 - TXG20c	2.0	1624/1624	1236/1232	16	11.5.0
TXG50 - TXG50c	5.0	2448	2050	15	11.5.0

## Baumer Camera Connection

Refer to the Baumer TXG User's Guide for Gigabit Ethernet Cameras for wiring diagrams and other technical specifications.

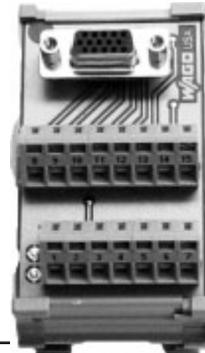
## Smartek Cameras

Model (GigE)	Resolution	Color	Image Horizontal	Image Vertical	FPS (Approx)	Minimum Software Version Required
GC651M	.3	No	659	494	120	11.2.0
GC652M	.3	No	659	494	90	11.2.0
GC653M	.3	No	659	494	90	11.2.0
GC781M	.5	No	782	682	64	11.2.0
GC1021M	1	No	1024	1024	60	11.2.1
GC1031M	.8	No	1034	770	30	11.2.0
GC1291M	1.2	No	1296	966	30	11.2.0
GC1391M	1.4	No	1392	1040	20	11.2.0
GC1392M	1.4	No	1392	1040	30	11.2.0
GC1601M	1.9	No	1600	1200	30	11.2.1
GC1621M	2	No	1628	1236	25	11.2.0
GC1921M	2	No	1920	1080	32	11.2.1
GC2441M	5	No	2448	2050	15	11.2.0

## Smartek Camera Connection

Camera power, trigger signal, and strobe trigger can be connected to the camera using one of two methods: a terminal block with a cable or an unterminated cable. Use a terminal block (248-0136) with the optional Hirose 12-pin to HD-15 camera cable (606-0673-xx). Without a terminal block, use the optional Hirose 12-pin to unterminated cable (part number 606-0671-xx).

NOTE: Do NOT use terminal block 248-0141 to connect this camera. It will NOT provide the correct signal levels.



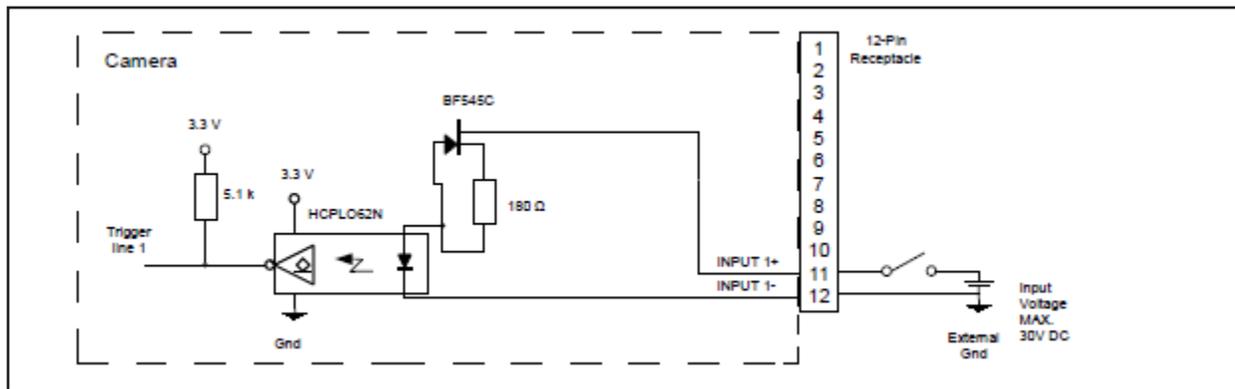
**WARNING: THE POWER AND GROUND CONNECTIONS FOR THIS CAMERA ARE DIFFERENT FROM OUR CAMERAS AND OTHER THIRD-PARTY CAMERAS. USE CAUTION WHEN CONNECTING POWER TO THESE CAMERAS.**

Terminal	Color	Signal Name	Notes
1	Wht/Blu	Camera Power Ground	
2	Wht/Org	Camera Power VCC	+12 VDC @ 300 mA Max (3.6 W) Minimum: +10 VDC Maximum: +24 VDC
3	Wht/Brn	Strobe Trigger -	270 Ohm 2W resistor between Wht/Brn wire and Strobe Power Ground
4	Brn/Wht	Strobe Trigger +	+5 to +24 VDC Maximum: +24 VDC
5	Wht/Grn	DO NOT USE	

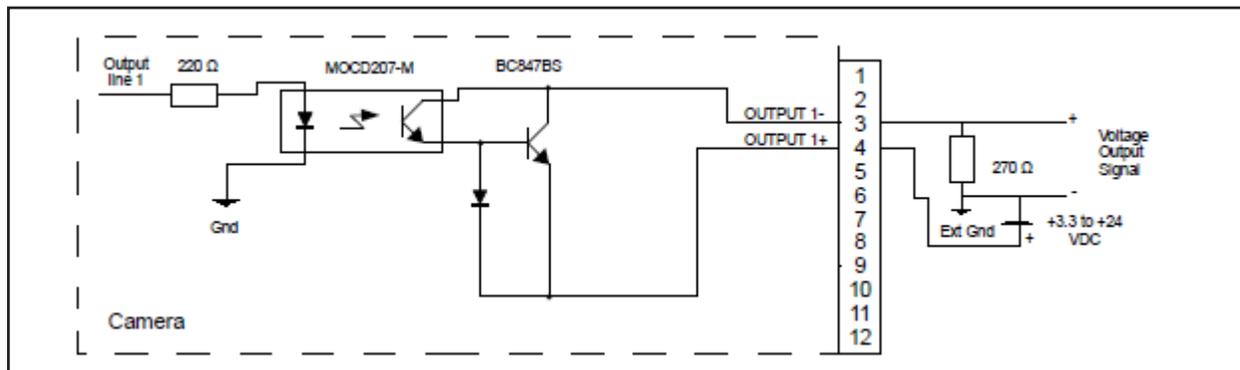
Terminal	Color	Signal Name	Notes
6	Wht/Gry	DO NOT USE	
7	Gry/Wht	DO NOT USE	
8	Blu/Wht	DO NOT USE	
9	Org/Wht	DO NOT USE	
10	Grn/Wht	DO NOT USE	
11	Red/Blu	Camera Trigger +	+0 to +24 VDC Off: 0 to + 1.4 VDC On: +2.2 to + 24 VDC Maximum: +24 VDC
12	Blu/Red	Camera Trigger -	

## Smartek Camera Circuit Diagrams

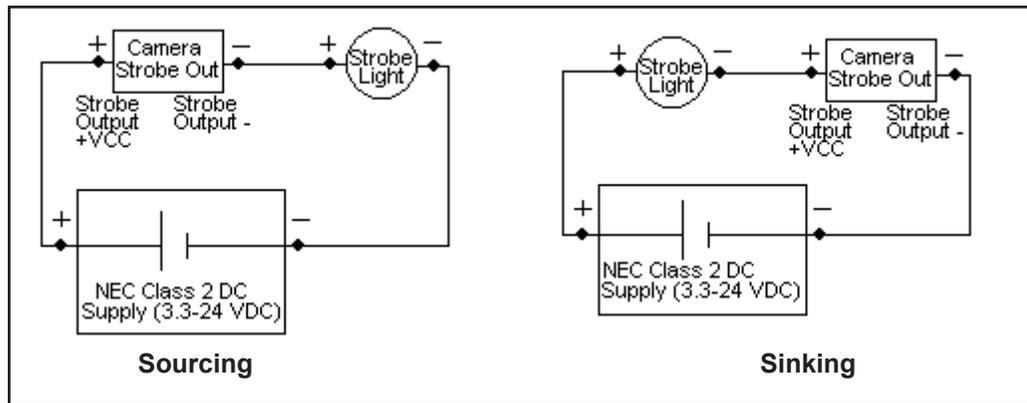
*Smartek Camera Trigger Input Circuit*



*Smartek Camera Strobe Output Circuit*

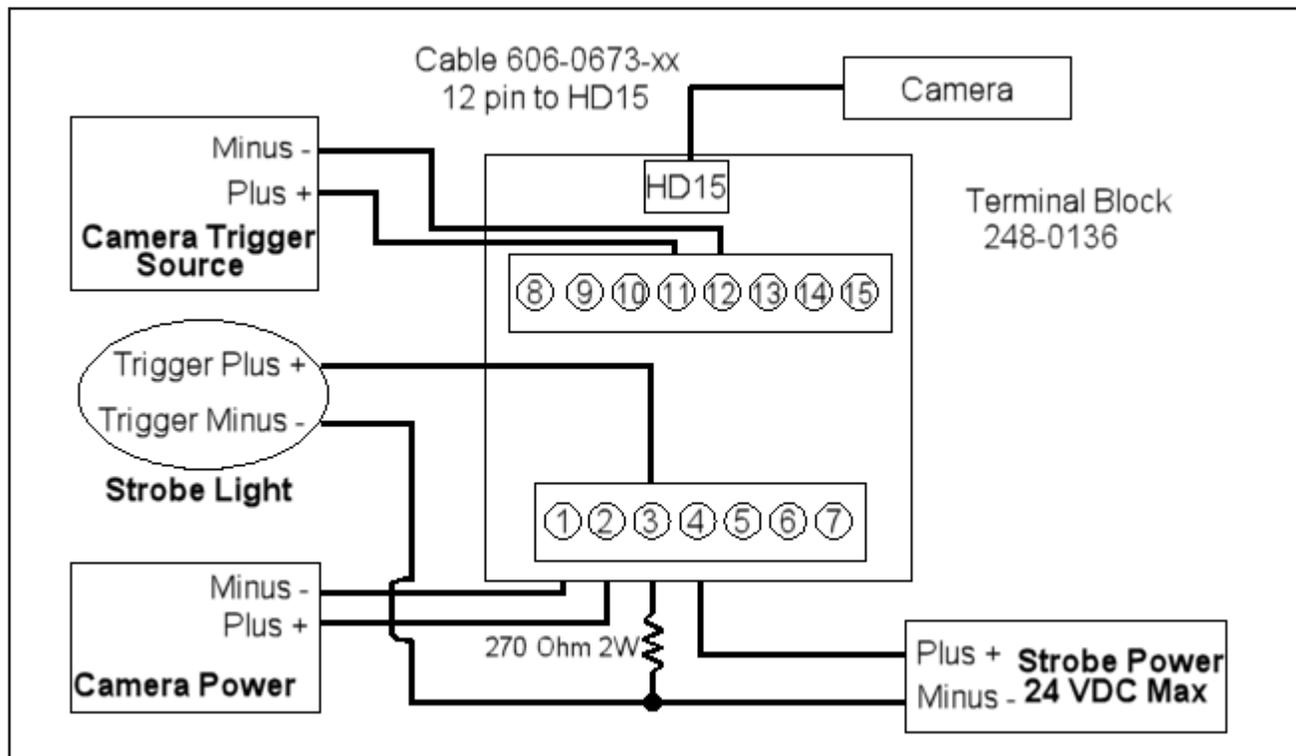


### Smartek Camera Strobe Output Circuits

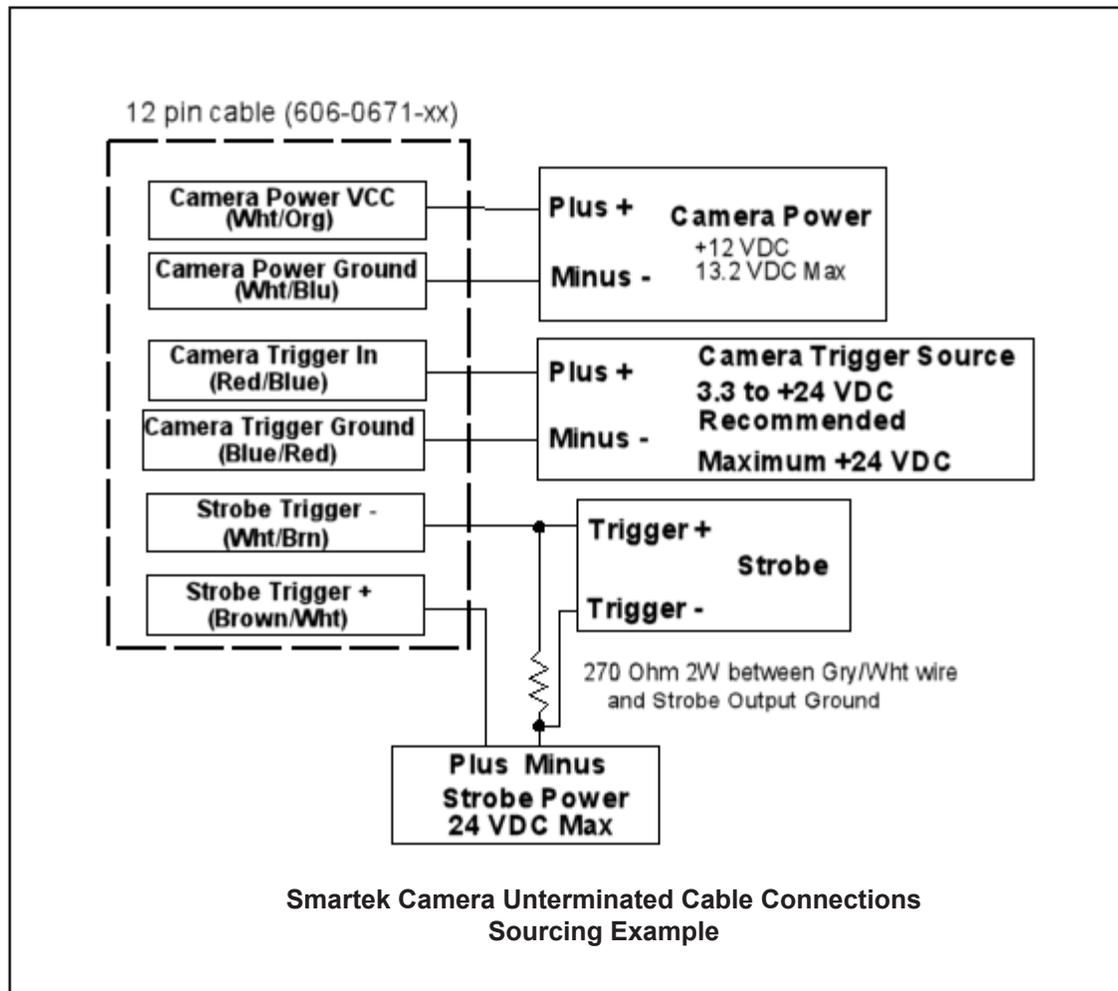


## Smartek Terminal Connections

### Smartek Terminal Connections (sourcing)



## Smartek Unterminated Cable Connections



## Smartek Camera Notes

Camera performance can be affected by the following conditions:

- There is some additional latency between the trigger and image acquisition in this camera compared to others because it reads the entire frame into the buffer before it starts sending. This does not affect the frame rate, but it can slow down cycle times if task timing is critical or other network communication is being done. Typically the GC651M, GC652M, and GC653M models add ten milliseconds compared to the M1xx. The GC2441M model adds approximately 77 milliseconds compared to the M390.
- No Power over Ethernet
- No trigger overrun detection.
- Strobe trigger pulse length cannot be set; it is the same as shutter time. This should not be a functional problem, but it is unlike the M-Series and E-Series cameras.
- The camera is slow to connect the first time it is connected to the Ethernet port. It may take up to 1 minute because of the camera's response time to IP address setting.
- The camera does not calculate the frame rate when partial scanning is implemented, so an estimate is listed.

## SVS-Vistek Cameras (non-IP67 rated)

The following SVS-Vistek camera models are supported:

- **eco and eco2 series**  
All monochrome models  
All color models up to five Mpixel
- **evo and hr series**  
All Monochrome models up to 16 Mpixel (NOT the 29 Mpixel camera)  
All color models up to 5 Mpixel  
Dual Ethernet connection NOT SUPPORTED. We only support a single Ethernet connection so our frame rate may be less than the SVS-Vistek spec.

evo and hr model cameras have dual Ethernet ports to support two Gigabit/sec image rates. The MX processors and IMPACT software do not support dual Ethernet connections, so the frame rate on these cameras may be lower than the frame rate published by SVS-Vistek.

$$\text{MX\_frame\_rate} = \min(\text{camera\_spec}, 125,000,000/(\text{width}*\text{height}))$$

Only the camera Ethernet connector furthest from the Hirose connector will work with the MX-E processor. If you connect a camera to the other connector, Impact will connect to the camera, but you cannot capture images and the error message “Image Capture Timeout” will be written in the system log.

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**IMPORTANT:** This section applies only to SVS-Vistek camera without an IP67 rating. For IP67 rated cameras (model ending in 67), see page 3-51.

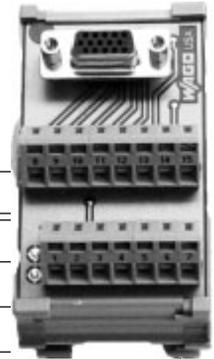
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Model	Resolution (Megapixels)	Color	Image Horizontal	Image Vertical	FPS (approx)	Minimum Software Version Required
eco204MVGE eco204CVGE	<1	No Yes	1024	768	47	10.4.0 10.5.0
eco267MVGE eco267CVGE	1.3	No Yes	1360	1024	25	10.4.0 10.5.0
eco274MVGE eco274CVGE	1.9	No Yes	1600	1200	25	10.4.0 10.5.0
eco285MVGE co285CVGE	1.3	No Yes	1360	1024	34	10.4.0 10.5.0
eco414MVGE eco414CVGE	<1	No Yes	640	480	125	10.4.0 10.5.0
eco415MVGE eco415CVGE	<1	No Yes	782	494	86	10.4.0 10.5.0
eco424MVGE eco424CVGE	<1	No Yes	640	480	124	10.4.0 10.5.0
eco445MVGE eco445CVGE	1.2	No Yes	1280	960	30	10.4.0 10.5.0
eco618MVGE eco618CVGE	<1	No Yes	640	480	160	10.4.0 10.5.0

eco655MVGE eco655CVGE	5	No Yes	2456	2048	10	10.4.0 10.5.0
eco814MT	9	No	3360	2712	7	11.2.1
eco694MT	6	No	2752	2204	10	11.2.1

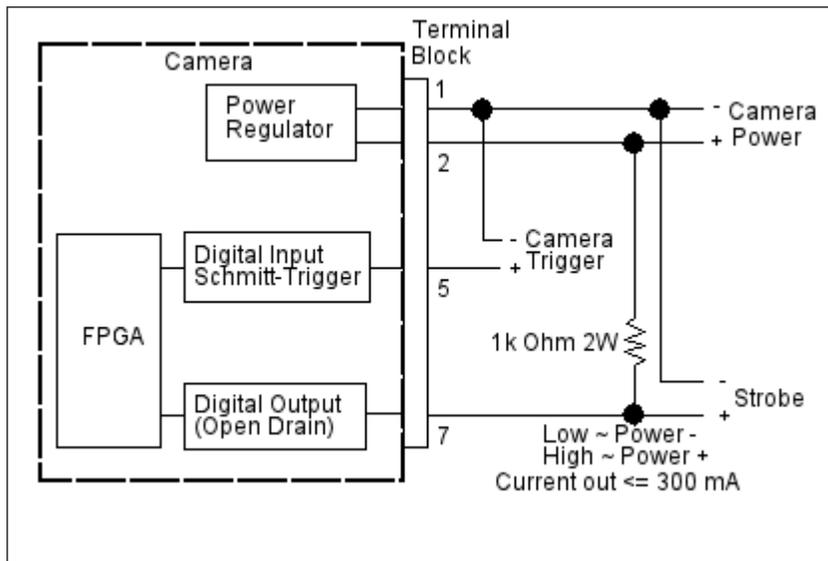
## SVS-Vistek (non-IP67) Camera Connection

This camera uses two cables, one for Ethernet and one for power and trigger signals. For the Ethernet connection, use cable 606-0677-xx. To connect power and trigger signals, use a terminal block (248-0136) with the optional Hirose 12-pin to HD-15 camera cable (606-0673-xx).

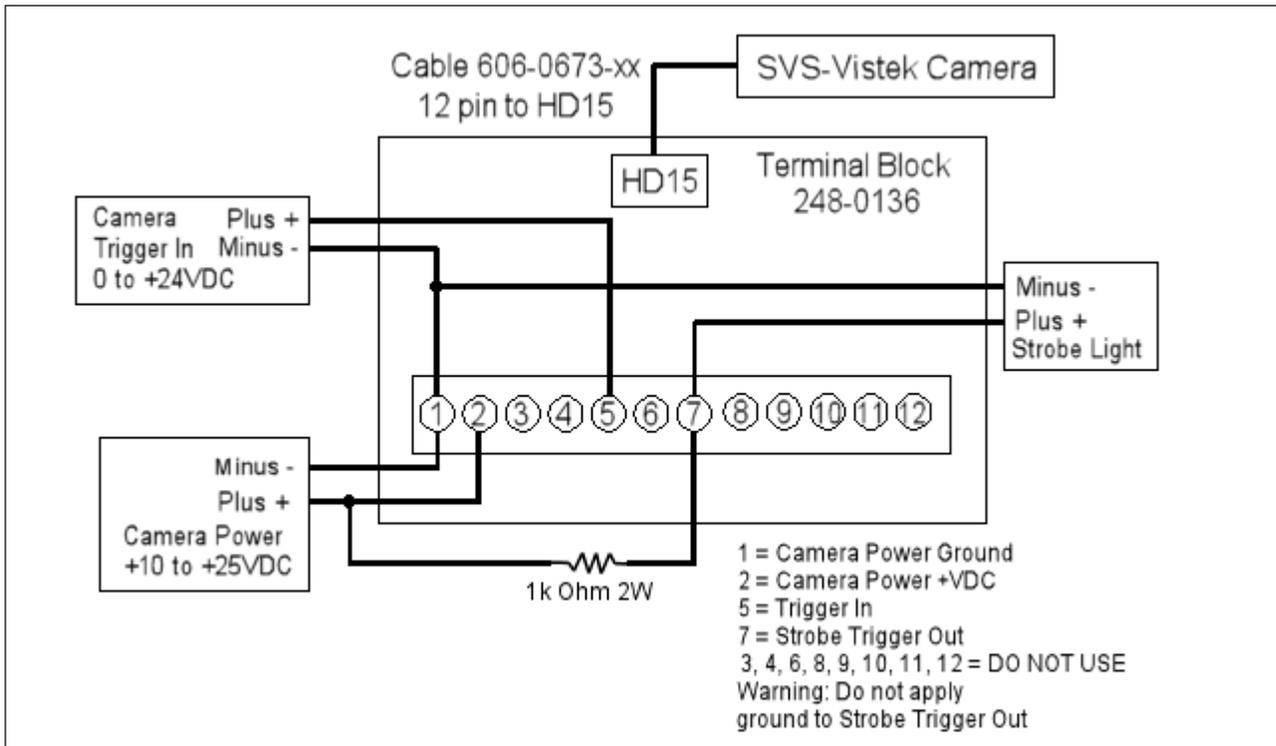


Terminal	Signal Name	Notes
1 (Wht/Blu)	Camera Ground	
2 (Wht/Org)	Camera Power	Min +10 VDC to Max +25 VDC
3 & 4	DO NOT USE	Not Currently Supported
5 (Wht/Grn)	Camera Trigger In	0 to +24 VDC
6	DO NOT USE	Not Currently Supported
7(Gry/Wht)	Trigger Out to Strobe	0 to +24 VDC; 300 mA Max
8, 9, 10, 11, 12	DO NOT USE	Not Currently Supported

### SVS-Vistek Non-IP67 I/O Circuit



**SVS-Vistek Non-IP67 Terminal Connections**



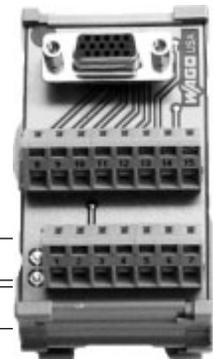
## SVS-Vistek Cameras (IP67 rated)

Model (GigE - IP67)	Resolution (Megapixels)	Color	Image Horizontal	Image Vertical	FPS (approx)	Minimum Software Version Required
eco204MVGE67 eco204CVGE67	<1	No Yes	1024	768	47	10.4.0 10.5.0
eco267MVGE67 eco267CVGE67	1.3	No Yes	1360	1024	25	10.4.0 10.5.0
eco274MVGE67 eco274CVGE67	1.9	No Yes	1600	1200	25	10.4.0 10.5.0
eco285MVGE67 co285CVGE67	1.3	No Yes	1360	1024	34	10.4.0 10.5.0
eco414MVGE67 eco414CVGE67	<1	No Yes	640	480	125	10.4.0 10.5.0
eco415MVGE67 eco415CVGE67	<1	No Yes	782	494	86	10.4.0 10.5.0
eco424MVGE67 eco424CVGE67	<1	No Yes	640	480	124	10.4.0 10.5.0
eco445MVGE67 eco445CVGE67	1.2	No Yes	1280	960	30	10.4.0 10.5.0
eco618MVGE67 eco618CVGE67	<1	No Yes	640	480	160	10.4.0 10.5.0
eco655MVGE67 eco655CVGE67	5	No Yes	2456	2048	10	10.4.0 10.5.0
eco1050MTLGE C67	1	No	1024	1024	56	11.2.0

### SVS-Vistek (IP67) Camera Connection

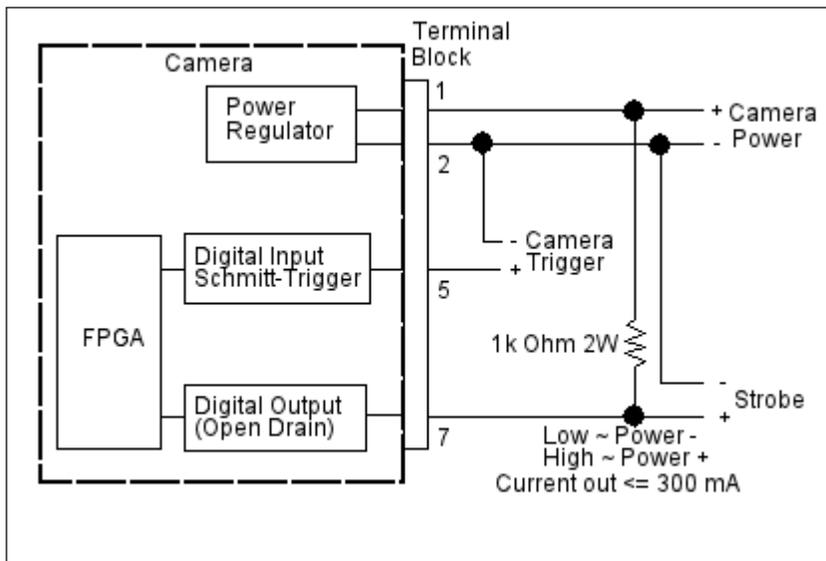
This camera uses two cables, one for Ethernet and one for power and trigger signals. For the Ethernet connection, use cable 606-0677-xx.

To connect power and trigger signals, use a terminal block (248-0136) with the optional M12 style 12-pin to HD-15 camera cable (606-0687-xx).

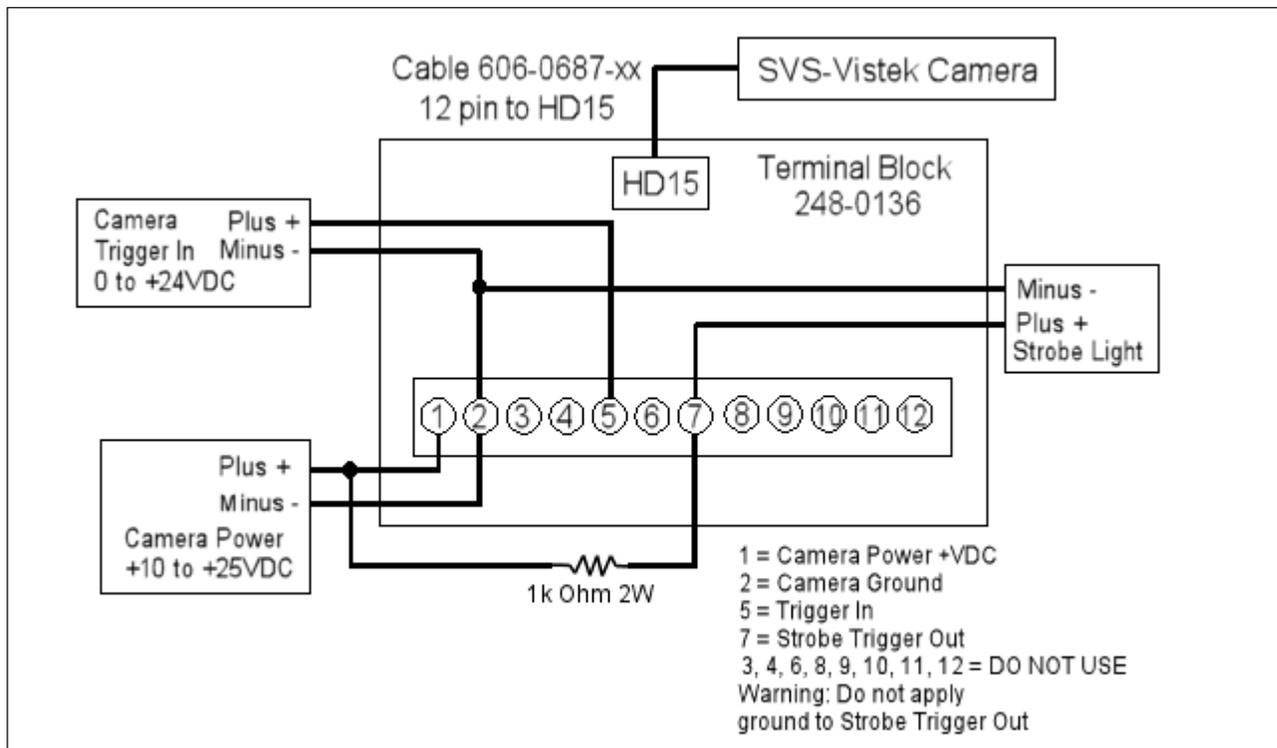


Terminal	Signal Name	Notes
1 (Brown)	Camera Power	Min +10 VDC to Max +25 VDC
2 (Blue)	Camera Ground	
3 & 4	DO NOT USE	Not Currently Supported
5 (Pink)	Camera Trigger In	0 to +24 VDC
6	DO NOT USE	Not Currently Supported
7(Black)	Trigger Out to Strobe	0 to +24 VDC; 300 mA Max
8, 9, 10, 11, 12	DO NOT USE	Not Currently Supported

**SVS-Vistek I/O Circuit**



**SVS-Vistek Terminal Connections**



# Camera Specifications

## E-Series

NOTE: E-Series cameras work only on MX-E Series processors.

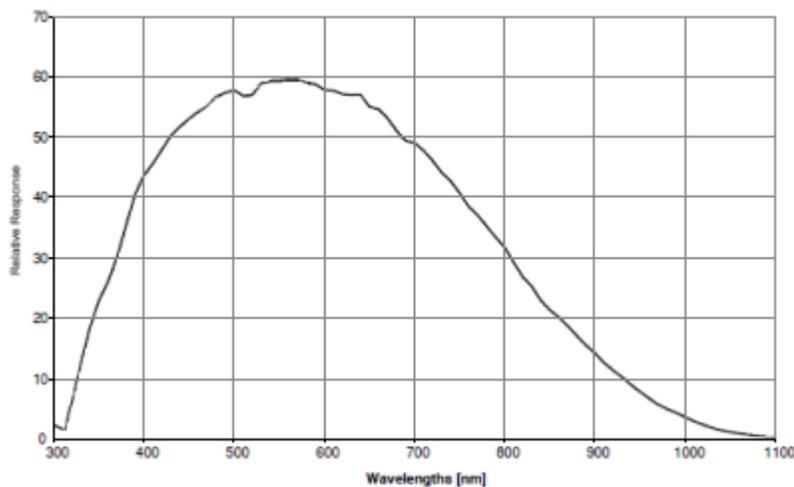
### E1xx, E1xxC

All E1xx cameras have the following specifications. Model numbers that end in “C” are color cameras.

E1xx Common Specifications	
Lens Mount	C mount
Cabling	Camera cable provides trigger. Ethernet cable transmits video and provides POE.
Operating Environment	Temperature: 0 to +50 C (+32 to 122 F) Humidity: 0 to 90% (non-condensed)
Vibration	5g (11 to 200 Hz)
Power	Provided by Power Over Ethernet
Weight	3.2 ounces (~90 g)

### E101, E101C

This camera captures a 640 x 480 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



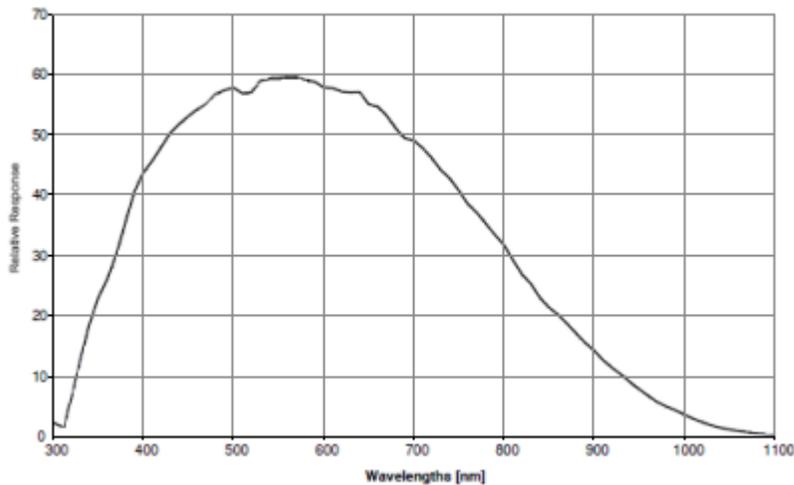
E101 Spectral Response (excludes lens and light source characteristics)

E101 Specifications	
Part Number	959933022; 959933023

<b>E101 Specifications</b>	
Pick-up Device	Global Shutter CMOS - 640 (H) x 480 (V) pixels
Sensor Size	1/4" (3.8 mm) diag - 3.07mm (H) x 2.3mm (V)
Capture Rate	300 full-resolution fps; higher with partial scan
Pixel Size	4.8 x 4.8 micrometers
Gain	100% to 1023%
Shutter Open	16 to 1,000,000 microseconds
Software Version	Impact Software Release 11.8.0.97 or greater

## E151, E151C

This camera captures a 1280 x 1024 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

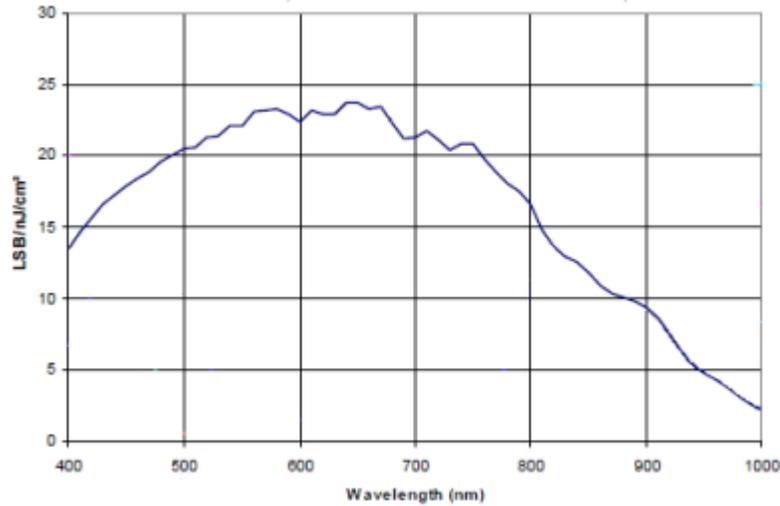


E151 Spectral Response (excludes lens and light source characteristics)

<b>E151 Specifications</b>	
Part Number	959933024; 959933025
Pick-up Device	Global Shutter CMOS - 1280 (H) x 1024 (V) pixels
Sensor Size	1/2" (8 mm) diag - 6.14mm (H) x 4.92mm (V)
Capture Rate	75 full-resolution fps; higher with partial scan
Pixel Size	4.8 x 4.8 micrometers
Gain	100% to 1023%
Shutter Open	16 to 1,000,000 microseconds
Software Version	Impact Software Release 11.8.0.97 or greater

# E182, E182C

This camera captures a 1600 x 1200 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

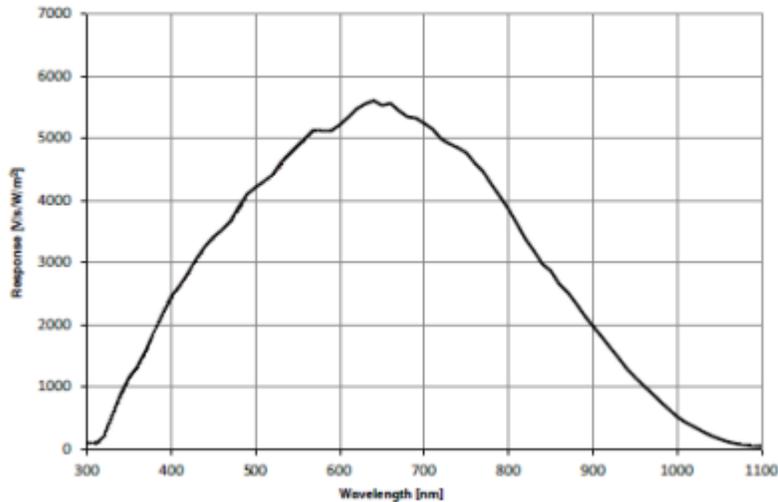


E182 Spectral Response (excludes lens and light source characteristics)

<b>E182 Specifications</b>	
Part Number	959933038; 959933039
Pick-up Device	Global Shutter CMOS - 1600 (H) x 1200 (V) pixels
Sensor Size	1/1.8" (8 mm) diag - 7.2mm (H) x 5.4mm (V)
Capture Rate	60 full-resolution fps; higher with partial scan
Pixel Size	4.5 x 4.5 micrometers
Gain	100% to 1023%
Shutter Open	16 to 1,000,000 microseconds
Software Version	Impact Software Release 11.8.1 or greater

## E198, E198C

This camera captures a 2590 x 2048 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



E198 Spectral Response (excludes lens and light source characteristics)

<b>E198 Specifications</b>	
Part Number	959933028; 959933029
Pick-up Device	Global Shutter CMOS - 2590 (H) x 2048 (V) pixels
Sensor Size	1" (16 mm) diag - 12.44mm (H) × 9.83mm (V)
Capture Rate	20 full-resolution fps; higher with partial scan
Pixel Size	4.8 x 4.8 micrometers
Gain	100% to 1023%
Shutter Open	16 to 1,000,000 microseconds
Software Version	Impact Software Release 11.8.0.97 or greater

# M-Series

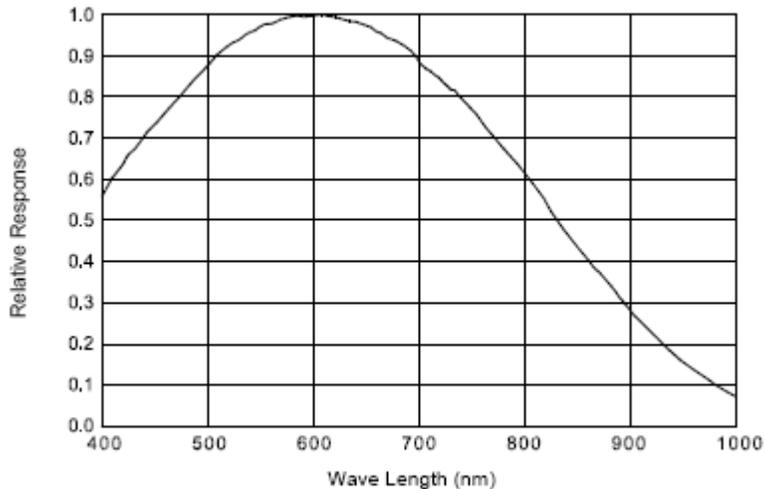
## M1xx, M1xxC

All M1xx cameras have the following specifications. Model numbers that end in “C” are color cameras.

M1xx Common Specifications	
Lens Mount	C mount
Cabling	Camera cable provides trigger. Ethernet cable transmits video and provides POE.
Operating Environment	Temperature: 0 to +50 C (+32 to 122 F) Humidity: 0 to 90% (non-condensed)
Vibration	5g (11 to 200 Hz)
Power	Provided by Power Over Ethernet
Weight	3.2 ounces (~90 g)

## M100, M100C

This camera captures a 659 x 494 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



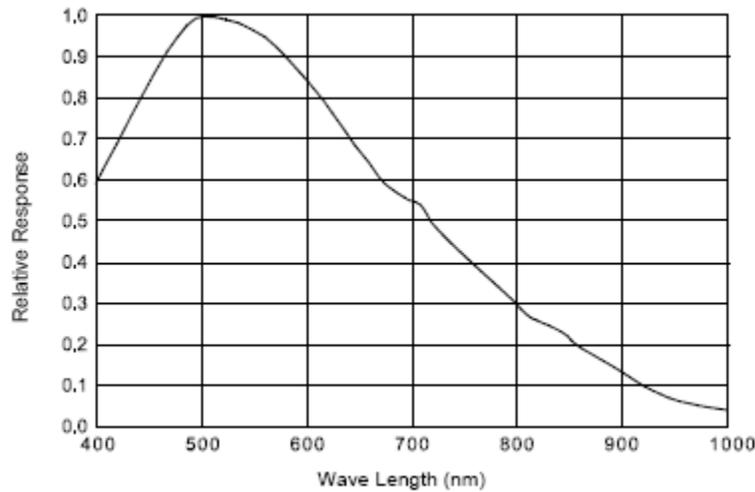
M100 Spectral Response (excludes lens and light source characteristics)

M100 Specifications	
Part Number	601-0351; 601-0378
Pick-up Device	Progressive Scan CCD - 659 (H) x 494 (V) pixels
Sensor Size	1/4" (4.5 mm) diag - 3.58mm (H) x 2.68mm (V)
Capture Rate	100 full-resolution fps; higher with partial scan
Pixel Size	5.6 x 5.6 micrometers
Gain	100% to 1023%

M100 Specifications	
Shutter Open	16 to 1,000,000 microseconds
Exposure Start Delay	17.62 $\mu$ sec
Software Version	Impact Software Release 10.0.0 or greater

## M110, M110C

This camera captures a 659 by 494 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

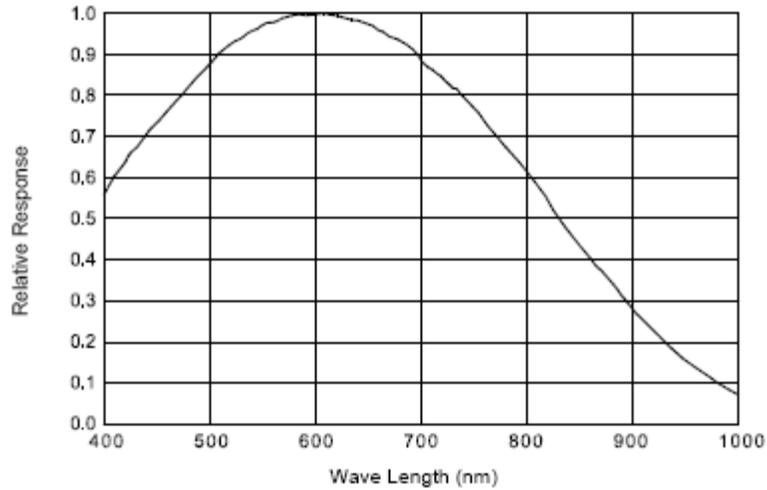


M110 Spectral Response (excludes lens and light source characteristics)

M110 Specifications	
Part Number	601-0423; 601-0424
Pick-up Device	Progressive Scan CCD - 659 (H) x 494 (V) pixels
Sensor Size	1/3" (6 mm) diagonal - 4.80mm (H) x 3.60mm (V)
Capture Rate	90 full-resolution fps; higher with partial scan
Pixel Size	7.4 x 7.4 micrometers
Gain	350% to 1023%
Shutter Open	24 to 1,000,000 microseconds
Exposure Start Delay	31.72 $\mu$ sec
Software Version	Impact Software Release 10.3.0 or greater

## M115, M115C

This camera captures a 659 by 494 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

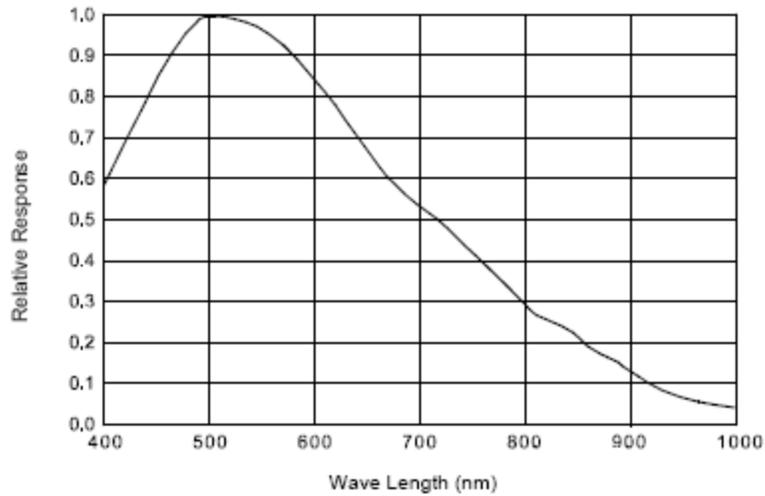


M115 Spectral Response (excludes lens and light source characteristics)

<b>M115 Specifications</b>	
Part Number	601-0450; 601-0451
Pick-up Device	Progressive Scan CCD - 659 (H) x 494 (V) pixels
Sensor Size	1/2" (8 mm) diag - 6.52 (H) mm x 4.89 mm (V)
Capture Rate	100 full-resolution fps; higher with partial scan
Pixel Size	9.9 x 9.9 micrometers
Gain	350% to 1023%
Shutter Open	24 to 1,000,000 microseconds
Exposure Start Delay	17.62 $\mu$ sec
Software Version	Impact Software Release 10.5.0 or greater

## M125, M125C

This camera captures a 782 by 582 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

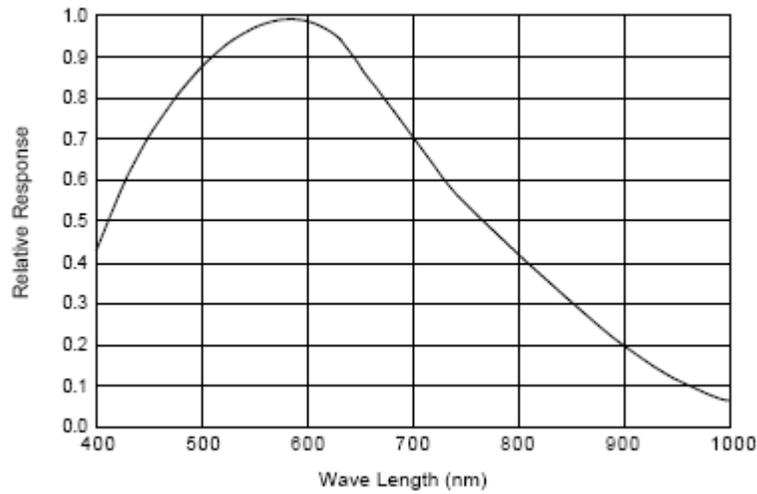


M125 Spectral Response (excludes lens and light source characteristics)

<b>M125 Specifications</b>	
Part Number	601-0452; 601-0453
Pick-up Device	Progressive Scan CCD - 659 (H) x 494 (V) pixels
Sensor Size	1/2" (8 mm) diag - 6.33mm (H) × 4.75mm (V)
Capture Rate	75 full-resolution fps; higher with partial scan
Pixel Size	8.3 x 8.3 micrometers
Gain	350% to 1023%
Shutter Open	24 to 1,000,000 microseconds
Exposure Start Delay	48.97 μsec
Software Version	Impact Software Release 10.5.0 or greater

## M150, M150C

This camera captures a 1296 by 966 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

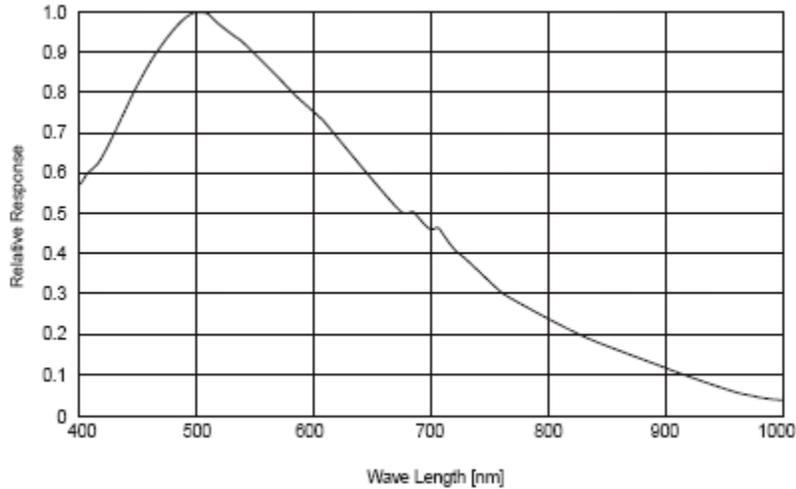


M150 Spectral Response (excludes lens and light source characteristics)

<b>M150 Specifications</b>	
Part Number	601-0352; 601-0379
Pick-up Device	Progressive Scan CCD - 1296 (H) x 966 (V) pixels
Sensor Size	1/3" (6 mm) diagonal - 4.80mm (H) x 3.60mm (V)
Capture Rate	30 full-resolution fps; higher with partial scan
Pixel Size	3.75 x 3.75 micrometers
Gain	100% to 1023%
Shutter Open	22 to 1,000,000 microseconds
Exposure Start Delay	34.50 $\mu$ sec
Software Version	Impact Software Release 10.0 or greater

## M180, M180C

This camera captures a 1628 by 1236 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



M180 Spectral Response (excludes lens and light source characteristics)

<b>M180 Specifications</b>	
Part Number	601-0357; 601-0384
Pick-up Device	Progressive Scan CCD - 1628 (H) x 1236 (V) pixels
Sensor Size	1/1.8" (8.992 mm) diag - 7.16mm (H) x 5.44 mm (V)
Capture Rate	20 full-resolution fps; higher with partial scan
Pixel Size	4.4 x 4.4 micrometers
Gain	100% to 1023%
Shutter Open	31 to 1,000,000 microseconds
Exposure Start Delay	34.50 $\mu$ sec
Software Version	Impact Software Release 10.0 or greater

## M190, M190C

This camera captures a 2048 by 1088 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



M190 Spectral Response (excludes lens and light source characteristics)

<b>M190 Specifications</b>	
Part Number	601-0454; 601-0455
Pick-up Device	CMOS - 2048 (H) x 1088 (V) pixels
Sensor Size	2/3" (12.749 mm) diag - 11.26 mm (H) × 5.98mm (V)
Capture Rate	50 full-resolution fps; higher with partial scan
Pixel Size	5.5 x 5.5 micrometers
Gain	100% to 1023%
Shutter Open	31 to 1,000,000 microseconds
Exposure Start Delay	34.50 μsec
Software Version	Impact Software Release 10.5.0 or greater

## M195, M195C

This camera captures a 2048 by 2048 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

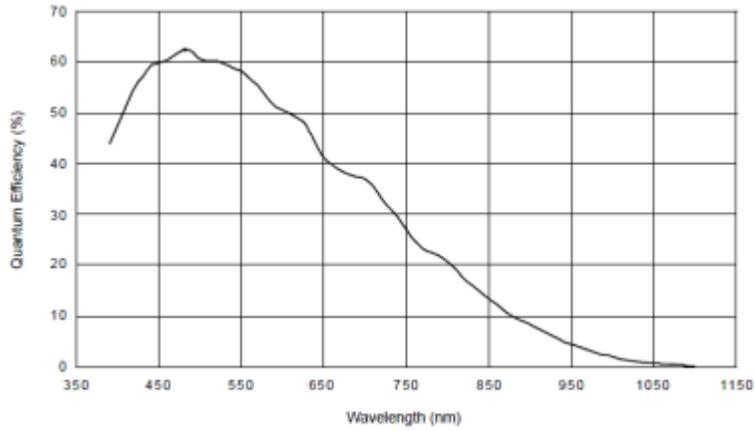


M195 Spectral Response (excludes lens and light source characteristics)

<b>M195 Specifications</b>	
Part Number	601-0456; 601-0457
Pick-up Device	CMOS - 2048 (H) x 2048 (V) pixels
Sensor Size	1" (15.92mm) diag - 11.26 mm (H) x 11.26 mm (V)
Capture Rate	25 full-resolution fps; higher with partial scan
Pixel Size	5.5 x 5.5 micrometers
Gain	100% to 1023%
Shutter Open	31 to 1,000,000 microseconds
Exposure Start Delay	34.50 $\mu$ sec
Software Version	Impact Software Release 10.5.0 or greater

# M197, M197C

This camera captures a 2592 by 1944 pixel size image with square pixels.



M197 Spectral Response (excludes lens and light source characteristics)

<b>M197 Specifications</b>	
Pick-up Device	Progressive Scan CMOS, Rolling Shutter - 2592(H) x 1944 (V) pixels
Sensor Size	1/2.5" 7.13mm diagonal 5.70 mm (H) x 4.28mm (V)
Capture Rate	14 full-resolution fps
Pixel Size	2.2 x 2.2 micrometers
Software Version	Impact Software Release 11.0.0 or greater

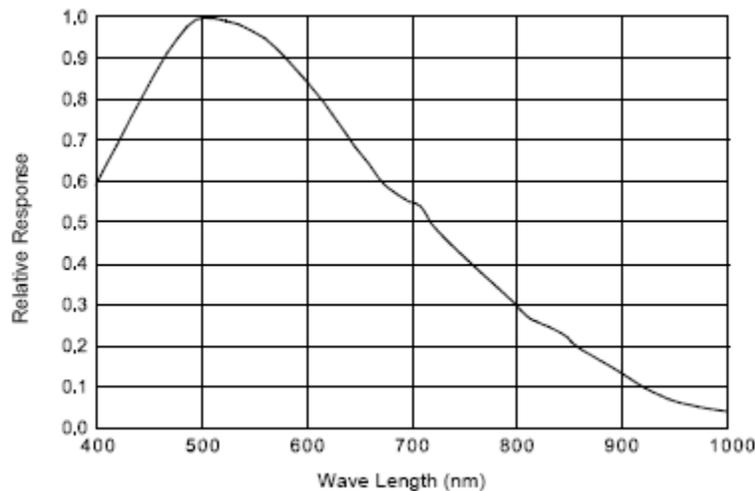
## M2xx, M2xx-RA, M2xxC, M2xxC-RA

All M2xx, M2xx-RA, M2xxC, and M2xxC-RA cameras have the following specifications. Model numbers that include a “C” are color cameras. Model numbers that end in “-RA” are right-angle mount cameras.

M2xx Common Specifications	
Lens Mount	C mount
Cabling	Camera cable provides power and trigger. Ethernet cable transmits video
Operating Environment	Temperature: 0 to +50 C (+32 to 122 F) Humidity: 0 to 90% (non-condensed)
Vibration	5g (11 to 200 Hz)
Weight	5.4 ounces (~150 g)

## M200 line

This camera line captures a 659 by 494 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



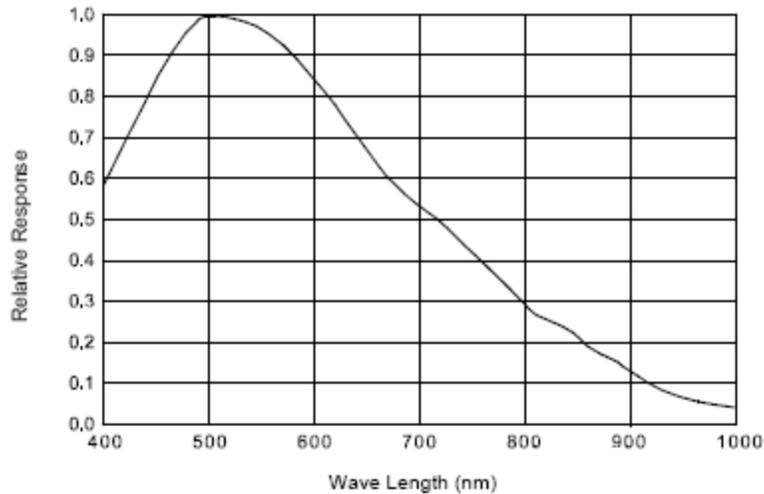
M200 Spectral Response (excludes lens and light source characteristics)

M200 Specifications	
Part Number	601-0358; 601-0358-RA; 601-0385; 601-0385-RA
Pick-up Device	Progressive Scan CCD - 659 (H) x 494 (V) pixels
Sensor Size	1/3" (6 mm) diag - 4.73mm (H) x 3.55mm (V)
Capture Rate	70 full-resolution fps; higher with partial scan
Pixel Size	7.4 x 7.4 micrometers
Gain	350% to 1023%
Shutter Open	24 to 1,000,000 microseconds
Exposure Start Delay	31.72 $\mu$ sec

M200 Specifications	
Power	24 VDC provided by camera cable (3 Watts)
Software Version	Impact Software Release 10.0.0 or greater

## M202 line

This camera line captures a 659 by 494 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

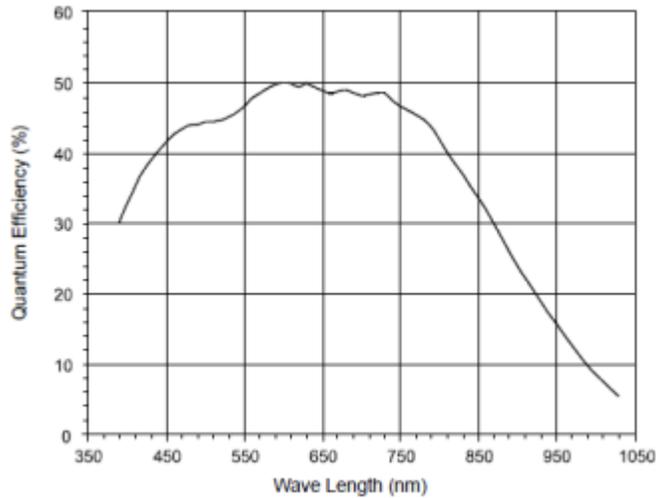


M202 Spectral Response (excludes lens and light source characteristics)

M202 Specifications	
Part Number	601-0359; 601-0359-RA; 601-0386 ;601-0386-RA
Pick-up Device	Progressive Scan CCD - 659 (H) x 494 (V) pixels
Sensor Size	1/2" (8 mm) diag - 6.33mm (H) × 4.75mm (V)
Capture Rate	79 full-resolution fps; higher with partial scan
Pixel Size	9.9 x 9.9 micrometers
Gain	100% to 1023%
Shutter Open	24 to 1,000,000 microseconds
Exposure Start Delay	28.19 μsec
Power	24 VDC provided by camera cable (3 Watts)
Software Version	Impact Software Release 10.0.0 or greater

## M205 line

This camera line captures a 752 by 480 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

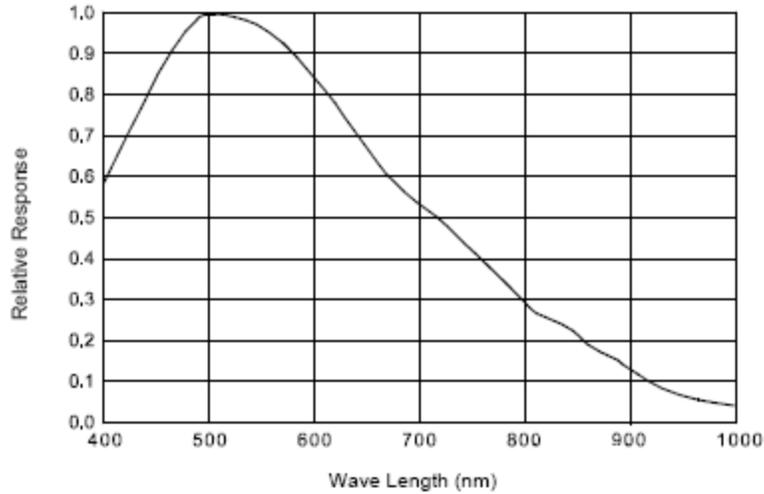


M205 Spectral Response (excludes lens and light source characteristics)

<b>M205 Specifications</b>	
Part Number	601-0426; 601-0427
Pick-up Device	Progressive Scan CMOS - 752 (H) x 480 (V) pixels
Sensor Size	1/3" diag (5.35 mm) diag - 4.51mm (H) x 2.88mm (V)
Capture Rate	64.9 full-resolution fps; higher with partial scan
Pixel Size	6.0 x 6.0 micrometers
Gain	100% to 1023%
Shutter Open	24 to 1,000,000 microseconds
Exposure Start Delay	28.19 $\mu$ sec
Power	24 VDC provided by camera cable (3 Watts)
Software Version	Impact Software Release 10.0.0 or greater

# M210 line

This camera line captures a 782 by 582 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

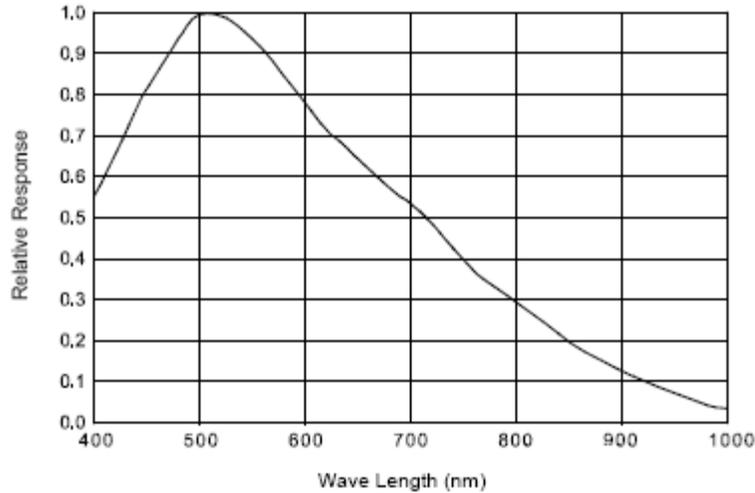


M210 Spectral Response (excludes lens and light source characteristics)

<b>M210 Specifications</b>	
Part Number	601-0360; 601-0360-RA; 601-0387; 601-0387-RA
Pick-up Device	Progressive Scan CCD - 782 (H) x 582 (V) pixels
Sensor Size	1/2" (8 mm) diag - 6.49mm (H) x 4.83mm (V)
Capture Rate	55 full-resolution fps; higher with partial scan
Pixel Size	8.3 x 8.3 micrometers
Gain	100% to 1023%
Shutter Open	26 to 1,000,000 microseconds
Exposure Start Delay	33.44 μsec
Power	24 VDC provided by camera cable (3 Watts)
Software Version	Impact Software Release 10.0.0 or greater

## M230 line

This camera line captures a 1034 by 779 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

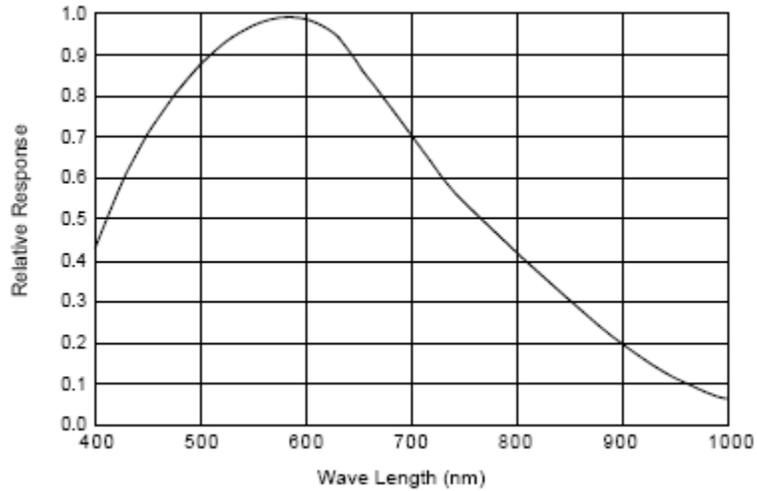


M230 Spectral Response (excludes lens and light source characteristics)

<b>M230 Specifications</b>	
Part Number	601-0361; 601-0361-RA; 601-0388; 601-0388-RA
Pick-up Device	Progressive Scan CCD - 1034 (H) x 779 (V) pixels
Sensor Size	1/3" (6 mm) diag - 4.76mm (H) × 3.57mm (V)
Capture Rate	31 full-resolution fps; higher with partial scan
Pixel Size	4.65 x 4.65 micrometers
Gain	360% to 1023%
Shutter Open	32 to 1,000,000 microseconds
Exposure Start Delay	43.87 μsec
Power	24 VDC provided by camera cable (3 Watts)
Software Version	Impact Software Release 10.0.0 or greater

# M250 line

This camera line captures a 1296 by 966 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

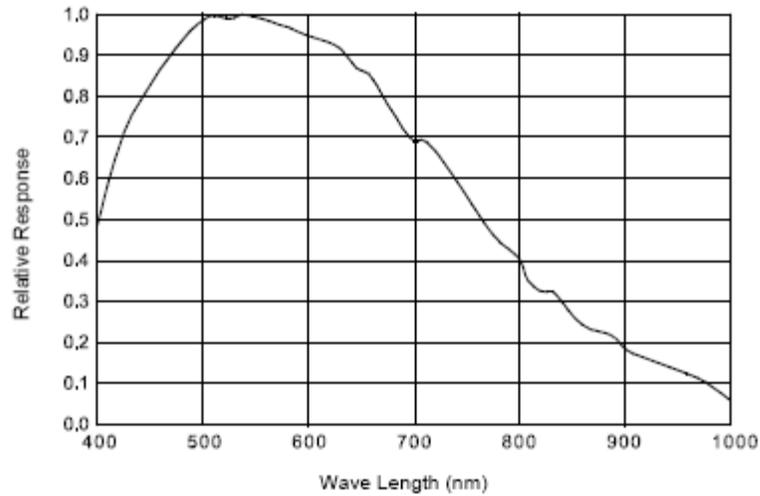


M250 Spectral Response (excludes lens and light source characteristics)

<b>M250 Specifications</b>	
Part Number	601-0362; 601-0362-RA; 601-0389; 601-0389-RA
Pick-up Device	Progressive Scan CCD - 1296 (H) x 966 (V) pixels
Sensor Size	1/3" (6 mm) diag - 4.80mm (H) x 3.60mm (V)
Capture Rate	32 full-resolution fps; higher with partial scan
Pixel Size	3.75 x 3.75 micrometers
Gain	100% to 850%
Shutter Open	22 to 1,000,000 microseconds
Exposure Start Delay	33.12 μsec
Power	24 VDC provided by camera cable (3.5 Watts)
Software Version	Impact Software Release 10.0.0 or greater

## M270 line

This camera line captures a 1392 by 1040 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

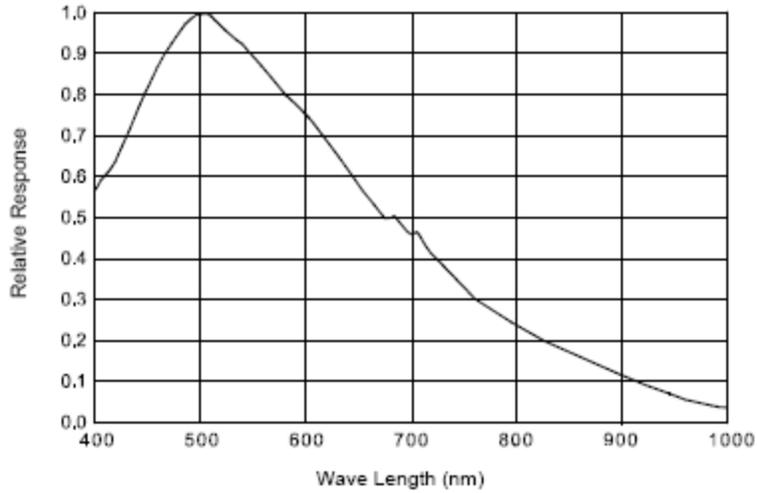


M270 Spectral Response (excludes lens and light source characteristics)

<b>M270 Specifications</b>	
Part Number	601-0363; 601-0363-RA; 601-0390; 601-0390-RA
Pick-up Device	Progressive Scan CCD - 1392 (H) x 1040 (V) pixels
Sensor Size	2/3"(11 mm) diag - 8.77mm (H) x 6.60mm (V)
Capture Rate	17 full-resolution fps; higher with partial scan
Pixel Size	6.45 x 6.45 micrometers
Gain	100% to 1023%
Shutter Open	28 to 1,000,000 microseconds
Exposure Start Delay	58.08 $\mu$ sec
Power	24 VDC provided by camera cable (3.5 Watts)
Software Version	Impact Software Release 10.0.0 or greater

# M290 line

This camera line captures a 1628 by 1236 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

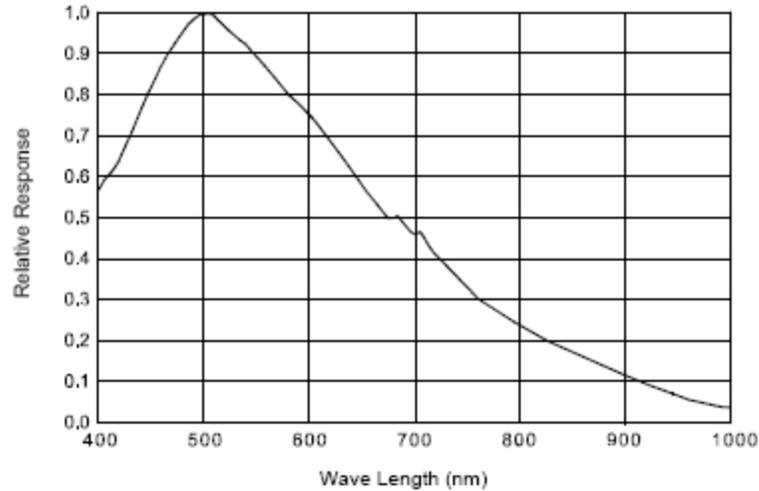


M290 Spectral Response (excludes lens and light source characteristics)

<b>M290 Specifications</b>	
Part Number	601-0353; 601-0353-RA; 601-0380; 601-0380-RA
Pick-up Device	Progressive Scan CCD - 1628 (H) x 1236 (V) pixels
Sensor Size	1/1.8" (8.923 mm) diag - 7.04mm (H) x 5.28mm (V)
Capture Rate	14 full-resolution fps; higher with partial scan
Pixel Size	4.4 x 4.4 micrometers
Gain	100% to 1023%
Shutter Open	31 to 1,000,000 microseconds
Exposure Start Delay	58.92 μsec
Power	24 VDC provided by camera cable (3.4 Watts)
Software Version	Impact Software Release 10.0.0 or greater

## M295 line

This camera line captures a 1628 by 1236 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



M295 Spectral Response (excludes lens and light source characteristics)

<b>M295 Specifications</b>	
Part Number	601-0420; 601-0420-RA; 601-0421; 601-0421-RA
Pick-up Device	Progressive Scan CCD - 1628 (H) x 1236 (V) pixels
Sensor Size	1/1.8" (8.923 mm) diag - 7.04mm (H) x 5.28mm (V)
Capture Rate	28 full-resolution fps; higher with partial scan
Pixel Size	4.4 x 4.4 micrometers
Gain	100% to 1023%
Shutter Open	31 to 1,000,000 microseconds
Exposure Start Delay	58.92 $\mu$ sec
Power	24 VDC provided by camera cable (4.3 Watts)
Software Version	Impact Software Release 10.0.0 or greater

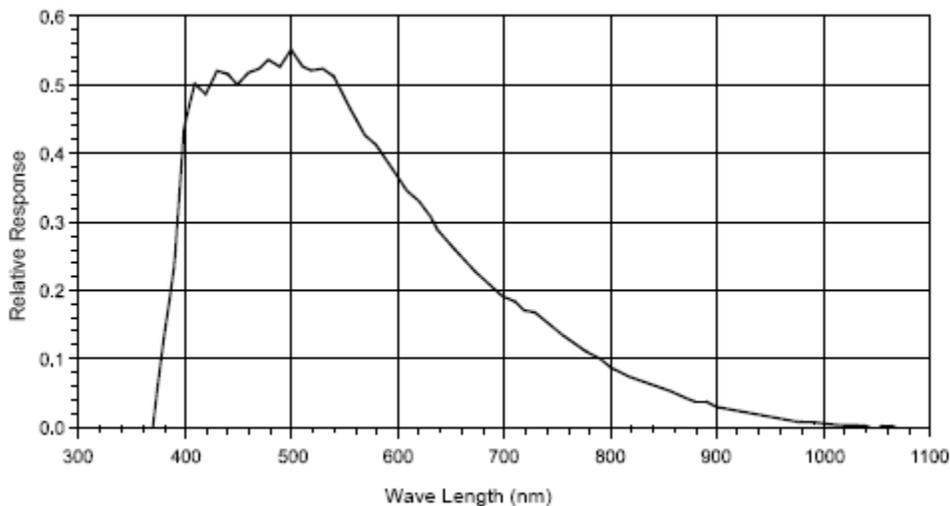
## M3xx, M3xx-RA, M3xxC, M3xxC-RA

All M3xx, M3xx-RA, M3xxC, and M3xxC-RA cameras have the following specifications. Model numbers that include a “C” are color cameras. Model numbers that end in “-RA” are right-angle mount cameras.

M3xx Common Specifications	
Lens Mount	C mount
Cabling	Camera cable provides power and trigger. Ethernet cable transmits video
Operating Environment	Temperature: 0 to +50 C (+32 to 122 F) Humidity: 0 to 90% (non-condensed)
Vibration	5g (11 to 200 Hz)
Power	24 VDC provided by camera cable (3 Watts)
Weight	7.7 ounces (~220 grams)
Software Version	Impact Software Release 10.0.0 or greater

## M300 line

This camera line captures a 648 by 488 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



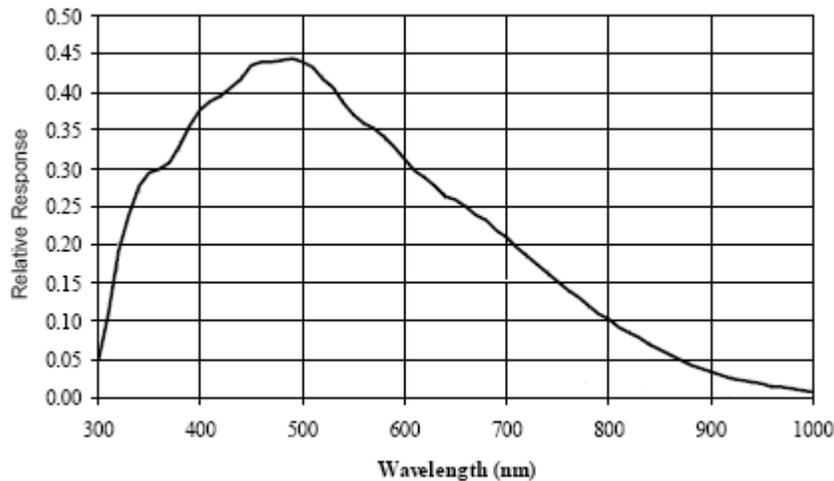
M300 Spectral Response (excludes lens and light source characteristics)

M300 Specifications	
Part Number	601-0354, 601-0354-RA, 601-0381, 601-0381-RA
Pick-up Device	Progressive Scan CCD - 648 (H) x 488 (V) pixels
Sensor Size	1/3" (5.92 mm) diag - 4.736mm (H) x 3.552mm (V)
Capture Rate	210 full-resolution fps; higher with partial scan
Pixel Size	7.4 x 7.4 micrometers
Gain	100% to 500%

M300 Specifications	
Shutter Open	28 to 1,000,000 microseconds
Exposure Start Delay	23.64 $\mu$ sec
Software Version	Impact Software Release 10.0.0 or greater

## M330 line

This camera captures a 1004 by 1004 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

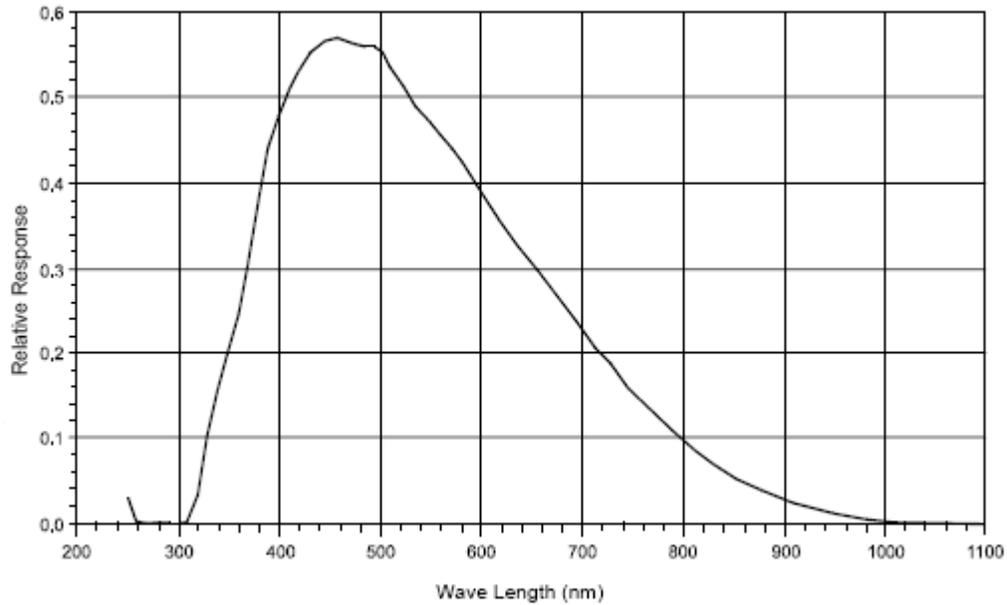


M330 Spectral

M330 Specifications	
Part Number	601-0364, 601-0364-RA, 601-0391, 601-0391-RA
Pick-up Device	Progressive Scan CCD - 1004 (H) x 1004 (V) pixels
Sensor Size	2/3" (10.5 mm) diag - 7.4 mm (H) x 7.4 mm (V)
Capture Rate	60 full-resolution fps; higher with partial scan
Pixel Size	7.4 x 7.4 micrometers
Gain	100% to 500%
Shutter Open	28 to 1,000,000 microseconds
Exposure Start Delay	23.64 $\mu$ sec
Software Version	Impact Software Release 10.0.0 or greater

# M350 line

This camera line captures a 1608 by 1208 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

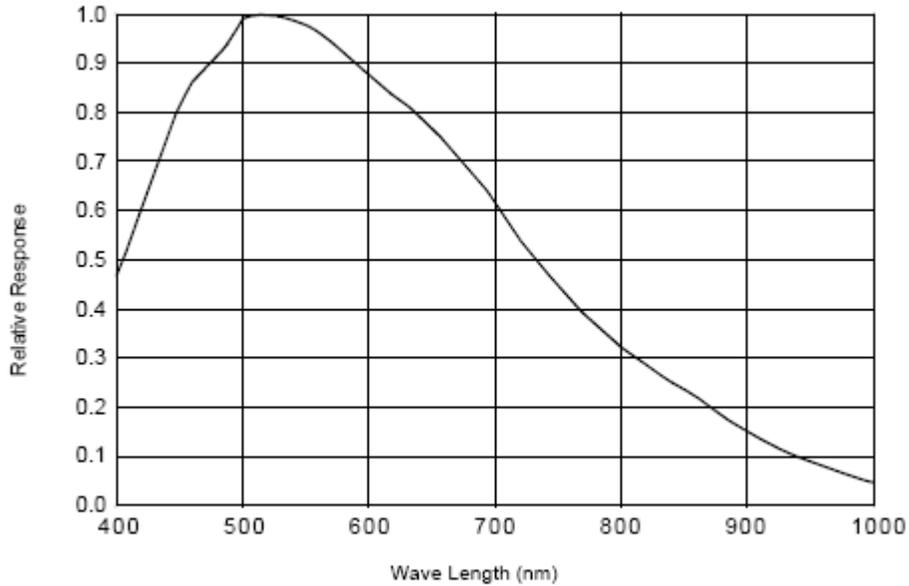


M350 Spectral Response (excludes

<b>M350 Specifications</b>	
Part Number	601-0365, 601-0365-RA, 601-0392, 601-0392-RA
Pick-up Device	Progressive Scan CCD - 1608 (H) x 1208 (V) pixels
Sensor Size	1" (14.8 mm) diag - 11.84 mm (H) x 8.88 mm (V)
Capture Rate	35 full-resolution fps; higher with partial scan
Pixel Size	7.4 x 7.4 micrometers
Gain	100% to 500%
Shutter Open	50 to 1,000,000 microseconds
Exposure Start Delay	65.98 µsec
Software Version	Impact Software Release 10.0.0 or greater

## M390 line

This camera line captures a 2456 by 2058 pixel size image with square pixels. It can partially scan the image horizontally and vertically.

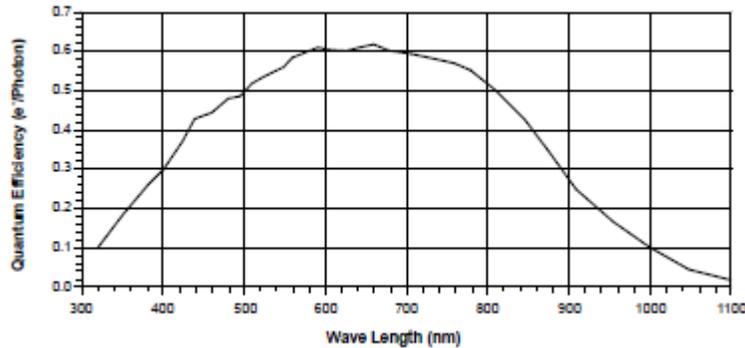


M390 Spectral

<b>M390 Specifications</b>	
Part Number	601-0355, 601-0355-RA, 601-0382, 601-0382-RA
Pick-up Device	Progressive Scan CCD - 2456 (H) x 2058 (V) pixels
Sensor Size	2/3" (11.016 mm) diag - 8.44mm (H) × 7.07mm (V)
Capture Rate	17 full-resolution fps; higher with partial scan
Pixel Size	3.45 x 3.45 micrometers
Gain	0% to 500%
Shutter Open	29 to 1,000,000 microseconds
Exposure Start Delay	32.06 μsec
Software Version	Impact Software Release 10.0.0 or greater

# M565/M570/M575/M580 Camera

These cameras have the following specifications.



Spectral Response (excludes lens and light source characteristics)

<b>M565/M570/M575/M580 Common Specifications</b>	
Lens Mount	F or C mount; Add -F to part number for F mount
Cabling	6-pin cable provides power. 12-pin cable provides frame and line triggers. Ethernet cable transmits video
Operating Environment	Temperature: 0 to +50 C (+32 to 122 F) Humidity: 20 to 80% (non-condensed)
Vibration	5g (11 to 200 Hz)
Weight	~8 ounces (240 grams); ~11.6 ounces (330 grams) with F-mount lens adapter
Pick-up Device	Linear CMOS

## M565 camera

This camera captures a 2048 pixel width image with a maximum line rate of 51khz. It is a monochrome, GigE line scan camera with the following specifications.

<b>M565 Specifications</b>	
Sensor Size	2048 pixels
Capture Rate	51,000 lines per second maximum
Pixel Size	7 x 7 micrometers
Power	+12 to +24 VDC provided by 6-pin camera cable (3 Watts maximum)
Maximum Frame Height	12288 Pixels
Software Version	Impact Software Release 11.2.1.11 or greater

## M570 camera

This camera captures a 4096 pixel width image with a maximum line rate of 26khz. It is a monochrome, GigE line scan camera with the following specifications.

<b>M570 Specifications</b>	
Sensor Size	4096 pixels
Capture Rate	26,000 lines per second maximum
Pixel Size	7 x 7 micrometers
Power	+12 to +24 VDC provided by 6-pin camera cable (4 Watts maximum)
Maximum Frame Height	7147 Pixels
Software Version	Impact Software Release 11.2.1.11 or greater

## M575 camera

This camera captures a 6144 pixel width image with a maximum line rate of 17khz. It is a monochrome, GigE line scan camera with the following specifications.

<b>M575 Specifications</b>	
Sensor Size	6144 pixels
Capture Rate	17,000 lines per second maximum
Pixel Size	7 x 7 micrometers
Power	+12 to +24 VDC provided by 6-pin camera cable (4.5 Watts maximum)
Maximum Frame Height	4765 Pixels
Software Version	Impact Software Release 11.8.0.97 or greater

## M580 camera

This camera captures a 8192 pixel width image with a maximum line rate of 12khz. It is a monochrome, GigE line scan camera with the following specifications.

<b>M580 Specifications</b>	
Sensor Size	8192 pixels
Capture Rate	12,000 lines per second maximum
Pixel Size	7 x 7 micrometers
Power	+12 to +24 VDC provided by 6-pin camera cable (4.5Watts maximum)
Maximum Frame Height	3573 Pixels
Software Version	Impact Software Release 11.8.0.97 or greater

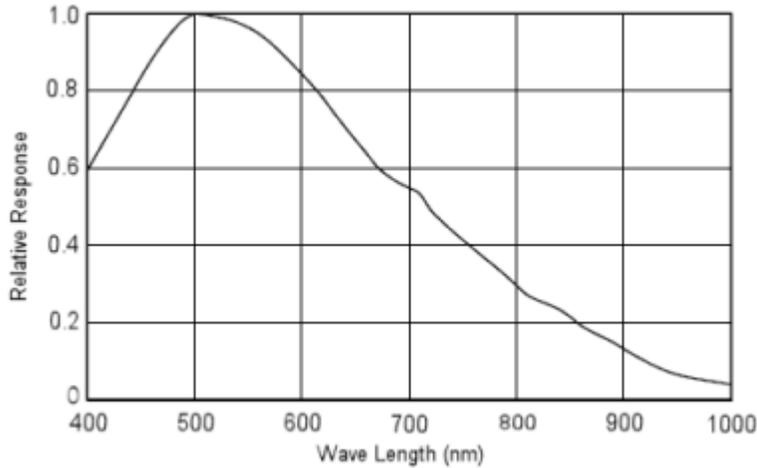
## M6xx, M6xxC

All M6xx and M6xxC cameras have the following specifications. Model numbers that include a “C” are color cameras.

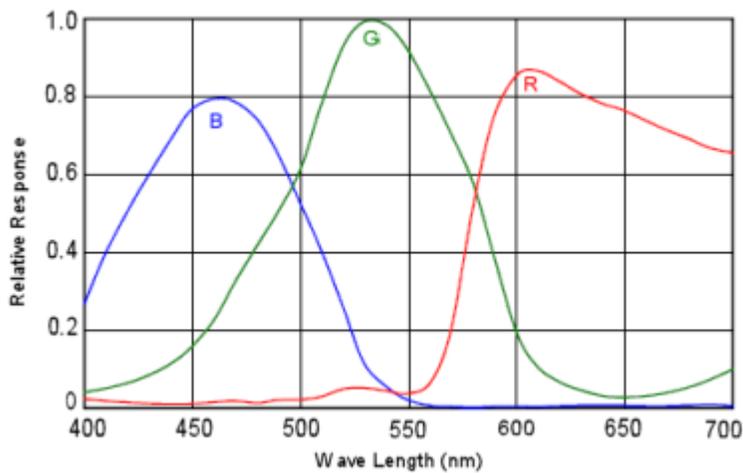
<b>M6xx Common Specifications</b>	
Lens Mount	C mount
Cabling	Camera cable provides trigger. Ethernet cable transmits video and provides POE.
Operating Environment	Temperature: 0 to ~+40 C (+32 to ~104 F) Housing must be less than 50 C. Humidity: 10 to 90% (non-condensed)
Power	Provided by Power Over Ethernet (3.2W Max) (M650 3.6W Max)
Weight	1.9 ounces (~53 grams)

# M610 and M610C

This camera line captures a 640 by 480 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



M610 Spectral Response (excludes lens and light source characteristics)



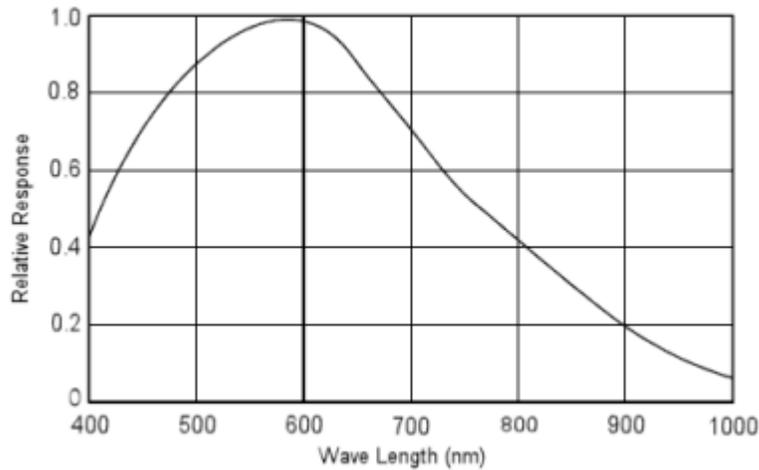
M610C Spectral Response (excludes lens and light source characteristics)

<b>M610 and M610C Specifications</b>	
Part Number	959932001, 959932002
Pick-up Device	Global Shutter CCD - 640 (H) x 480 (V) pixels
Sensor Size	1/3" (6.1 mm) diag - 4.88mm (H) x 3.66mm (V)
Capture Rate	125 full-resolution fps; higher with partial scan
Pixel Size	7.4 x 7.4 micrometers
Gain	0% to 18%
Shutter Open	10 to 1,000,000 microseconds

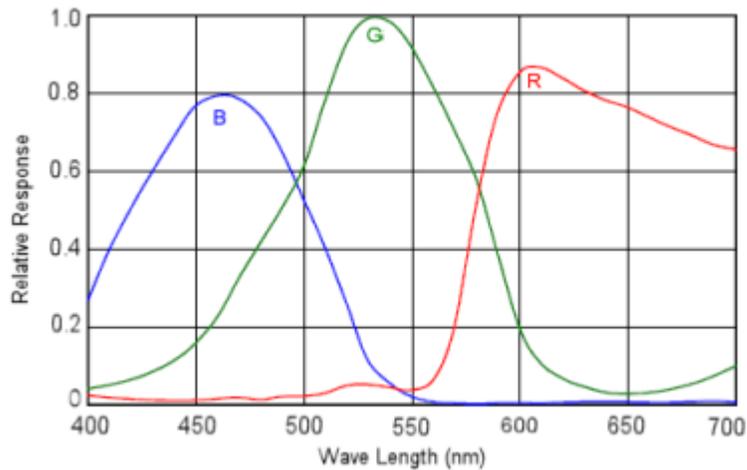
M610 and M610C Specifications	
Software Version	Impact Software Release 11.7.0 or greater

## M650 and M650C

This camera captures a 1280 by 960 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



M650 Spectral Response (excludes lens and light source characteristics)



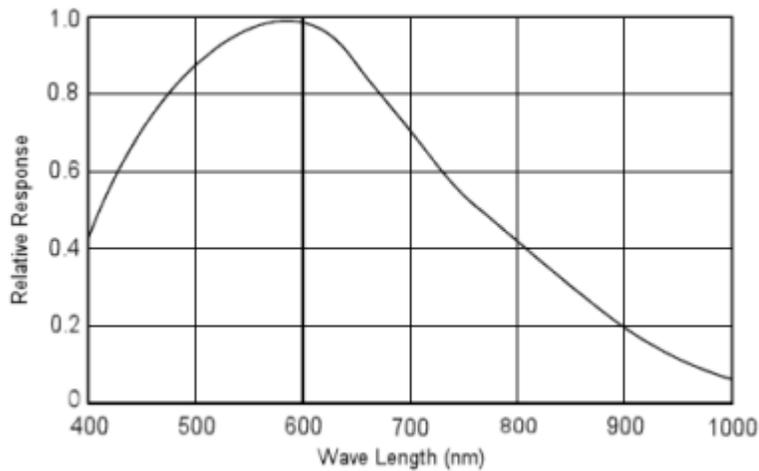
M650C Spectral Response (excludes lens and light source characteristics)

M650 and M650C Specifications	
Part Number	959932007, 959932008
Pick-up Device	Global Shutter CCD - 1280 (H) x 960 (V) pixels
Sensor Size	1/3" (6.06 mm) diag - 4.86 mm (H) x 3.62 mm (V)
Capture Rate	30 full-resolution fps; higher with partial scan

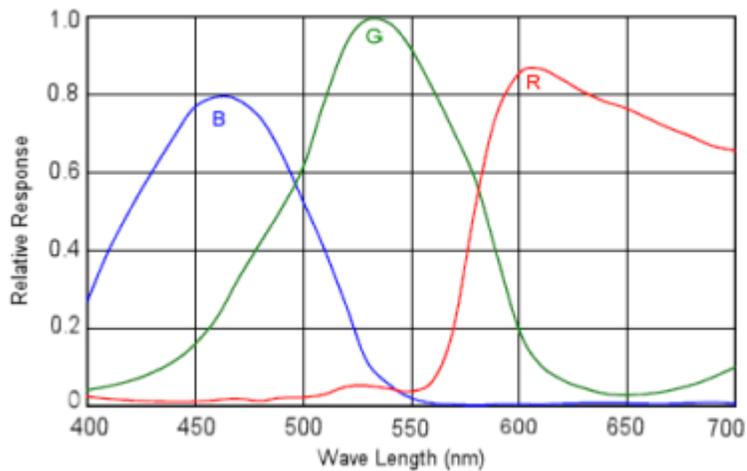
M650 and M650C Specifications	
Pixel Size	3.75 x 3.75 micrometers
Gain	0% to 18%
Shutter Open	30 to 1,000,000 microseconds
Software Version	Impact Software Release 11.7.0 or greater

## M680 and M680C

This camera captures a 1600 by 1200 pixel size image with square pixels. It can partially scan the image horizontally and vertically.



M680 Spectral Response (excludes lens and light source characteristics)



M680C Spectral Response (excludes lens and light source characteristics)

M680 and M680C Specifications	
Part Number	959932009, 959932010

<b>M680 and M680C Specifications</b>	
Pick-up Device	Global Shutter CCD - 1688 (H) x 1248 (V) pixels
Sensor Size	1/1.8" (8.99 mm) diag - 7.16 mm (H) x 5.44 mm (V)
Capture Rate	20 full-resolution fps; higher with partial scan
Pixel Size	4.40 x 4.40 micrometers
Software Version	Impact Software Release 11.7.0 or greater



# Processor I/O

There are two versions of the MX-E processor, one with sourcing outputs - the model number contains a “P” (for example MX-E20-2-P-1) and one with sinking outputs - the model number contains an “N” (for example MX-E20-2-N-1)

This section discusses the MX-E Series Processor I/O scheme. Refer to this section for all specifications when wiring your inputs and outputs into the Processor.

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**Note:** Your MX-E Series Processor does not provide a voltage source for inputs and outputs – it must be provided by an external source. Refer to the module tables below for more voltage requirement information.

**Note:** The Trigger Signal and Strobe Output for M-Series cameras are separate and not part of the MX-E Series Processor inputs and outputs. See M-Series and E-Series Cameras on page 3-1 for details.

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## Processor I/O Connection

To connect MX-E Series processor input and output signals use either cable 606-0675-xx (37 pin D-sub Male to Male Cable) with terminal block 248-0110 or remove one end (to create pigtail) with no terminal block. Use shielded cable for all connections.

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**IMPORTANT:** Do not connect or disconnect the cable while power is on.

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### Current Sinking (NPN) I/O

Connector and terminal numbers for model numbers containing the letter “N” are listed in the following table.

Connector or terminal number	Color Code	Signal Name
1	Black	Output Minus (Note 1)
2	Brown	Input 1- and Event 1-
3	Red	Input 2- and Event 2-
4	Orange	Input 3-
5	Yellow	Input 4-
6	Green	Input 5-
7	Blue	Input 6-
8	Purple	Input 7-
9	Gray	Input 8-
10	White	Input 9-
11	Pink	Input 10-
12	Light Green	Input 11-
13	Black/White	Input 12-
14	Brown/White	Input 13-

Connector or terminal number	Color Code	Signal Name
15 16	Red/White Orange/White	Input 14- Input 15-
17 18	Green/White Blue/White	Input 16- Input Plus (Note 2)
19	Purple/White	No Connection
20 21	Red/Black Orange/Black	Output Minus (Note 1) Output 1
22 23	Yellow/Black Green/Black	Output 2 Output 3
24 25	Gray/Black Pink/Black	Output 4 Output 5
26 27	Pink/Red Pink/Blue	Output 6 Output 7
28 29	Pink/Green Light Blue	Output 8 Output 9
30 31	Light Blue/Black Light Blue/Red	Output 10 Output 11
32 33	Light Blue/Blue Light Blue/Green	Output 12 Output 13
34 35	Gray/Red Gray/Green	Output 14 Output 15
36 37	Purple/Black Blue/Black	Output 16 Output Plus (Note 3)

Pin 1 →      ← Pin 37

**J1 (37 Pin "D" Sub Female)**  
 AMP Part 747916-4  
 Part 244-0287  
 (Solder Side)

**NPN NOTES:**

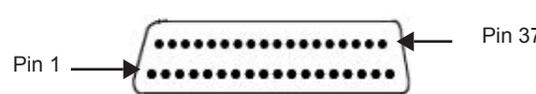
1. Common Minus for output ports (External 12 to 24VDC Minus)
2. Common Plus for input ports (External 12 to 24VDC Plus)
3. Common Plus for output ports (Not an output voltage source. External 12 to 24VDC Plus is required)

**Current Sourcing (PNP) I/O**

Connector and terminal numbers for model numbers containing the letter "P" are listed in the following table.

Connector or terminal number	Color Code	Signal Name
1 2	Black Brown	Input Minus (Note 4) Input 1- and Event 1-
3 4	Red Orange	Input 2- and Event 2- Input 3-

Connector or terminal number	Color Code	Signal Name
5 6	Yellow Green	Input 4- Input 5-
7 8	Blue Purple	Input 6- Input 7-
9 10	Gray White	Input 8- Input 9-
11 12	Pink Light Green	Input 10- Input 11-
13 14	Black/White Brown/White	Input 12- Input 13-
15 16	Red/White Orange/White	Input 14- Input 15-
17 18	Green/White Blue/White	Input 16- Output Plus (Note 5)
19 20	Purple/White Red/Black	No Connection No Connection
21	Orange/Black	Output 1
22 23	Yellow/Black Green/Black	Output 2 Output 3
24 25	Gray/Black Pink/Black	Output 4 Output 5
26 27	Pink/Red Pink/Blue	Output 6 Output 7
28 29	Pink/Green Light Blue	Output 8 Output 9
30 31	Light Blue/Black Light Blue/Red	Output 10 Output 11
32 33	Light Blue/Blue Light Blue/Green	Output 12 Output 13
34 35	Gray/Red Gray/Green	Output 14 Output 15
36 37	Purple/Black Blue/Black	Output 16 Output Plus (Note 5)



Pin 1 →      ← Pin 37

**J1 (37 Pin "D" Sub Female)**  
 AMP Part 747916-4  
 Part 244-0287  
 (Solder Side)

PNP NOTES:

- 4. Common Minus for input ports (External 12 to 24VDC Minus)
- 5. Common Plus for output ports (Not an output voltage source. External 12 to 24VDC Plus is required)

# Processor Inputs

The MX-E Series Processors contain sixteen general-purpose input connections.

Two inputs serve as both event and polled inputs (Inputs 1 and 2). The remaining inputs are polled. The event inputs are interrupt-driven which means that a change of state on the input will immediately cause an action and any inspection task that uses that input will be queued to run. Polled input means that the input's status is checked based on conditions defined in the inspection task.

Interrupt-driven inputs are edge-triggered and the duration of the input pulse must be longer than the debounce time. The active trigger edge (rising, falling, or both), input pulse duration, and debounce, are all configured in the Vision Program Manager Settings tab.

This table describes the input characteristics.

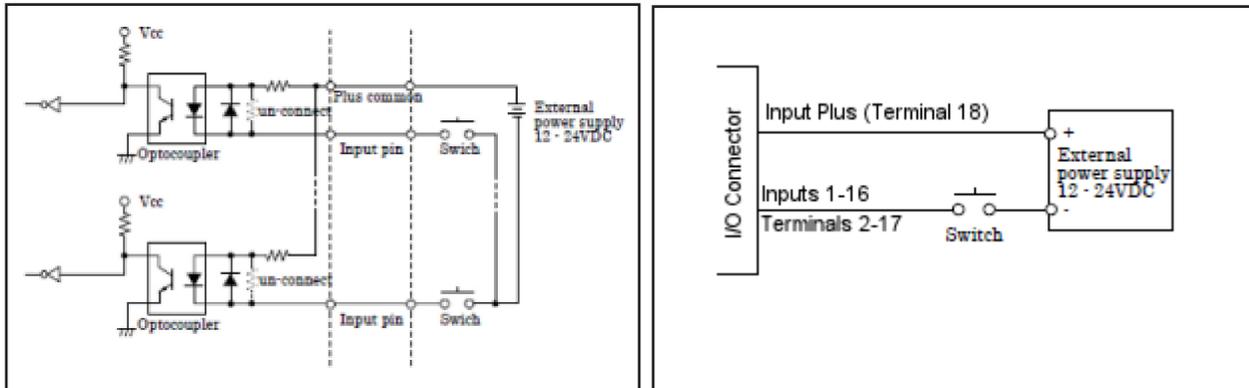
Input Resistance (nominal)	Input Voltage	Turn On Current	Turn Off Current	Maximum Current	Isolated Voltage
4.7k @	5-24 Vdc	>2 mA	< 0.16Ma	5.1 mA @ 24Vdc	1000 Vrms

## Input Wiring

**Note:** All connections to inputs must be made using properly grounded shielded cable.

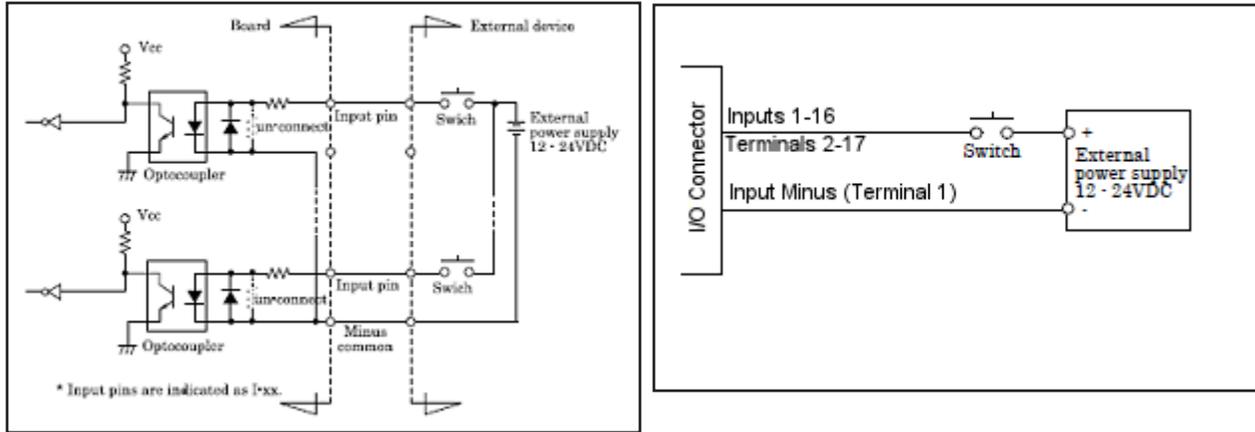
### Current Sinking (NPN) Input Circuit

The diagram below shows how to wire a sensor to a general purpose or event input for model numbers containing the letter "N." All inputs are compatible with current sinking output signals. Pin 18 is the "Input Plus Common" connection for all the inputs.



### Current Sourcing (PNP) Input Circuit

The diagram below shows how to wire a sensor to a general purpose or event input for model numbers containing the letter “P.” All inputs are compatible with current sourcing output signals. Pin 1 is the “Input Minus Common” connection for all the inputs.



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## Processor Outputs

The MX-E Series Processors contain sixteen general-purpose output connections.

The table below describes the output's electrical characteristics.

<b>Supply Voltage</b>	+12 to +24 VDC ( $\pm 10\%$ )
<b>Maximum Output</b>	+35 VDC
<b>Output Current</b>	100 Milliamperes per channel (maximum)

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**Note:** An external power source is required to power an output load. The outputs are merely switches that are open or closed. All output connections must use properly grounded and shielded cable.

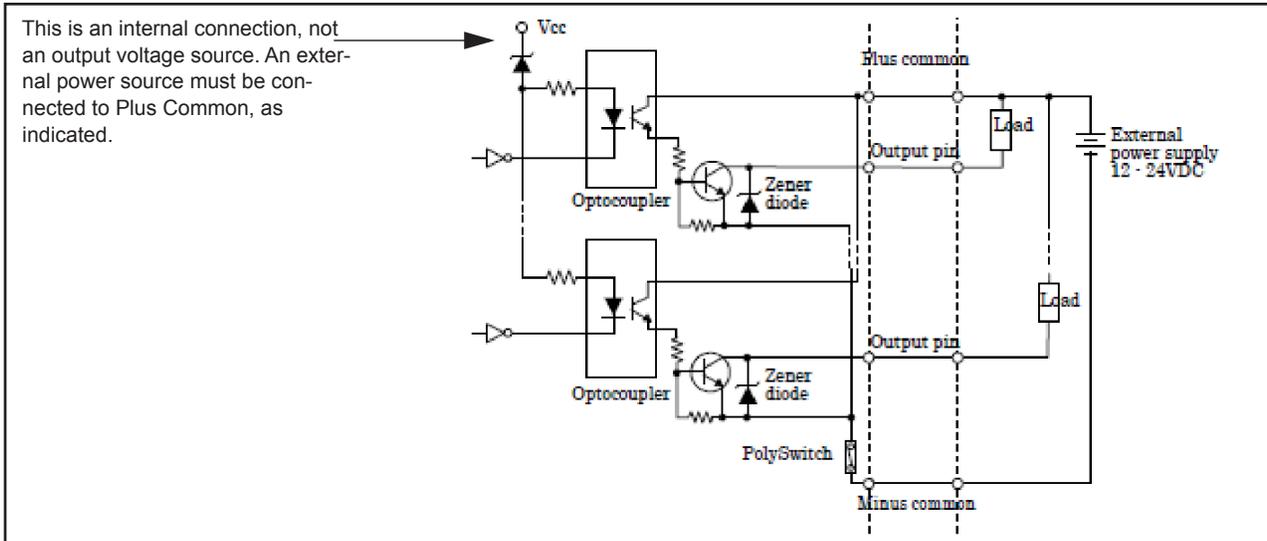
**Note:** The Trigger Signal and Strobe Output for M-Series and E-Series cameras are separate and not part of the MX-E Series Processor inputs and outputs. See M-Series and E-Series Cameras on page 3-1 for details.

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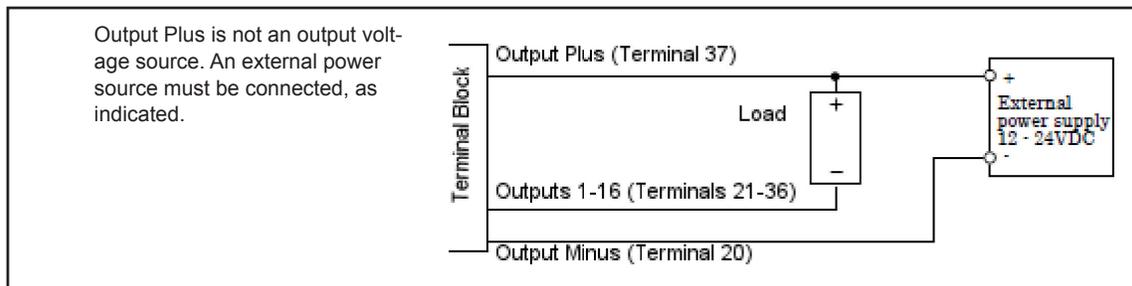
# Output Wiring

## Current Sinking (NPN) Output Circuit

The diagrams below show internal circuit diagrams and how to wire processor outputs for model numbers containing the letter “N.”

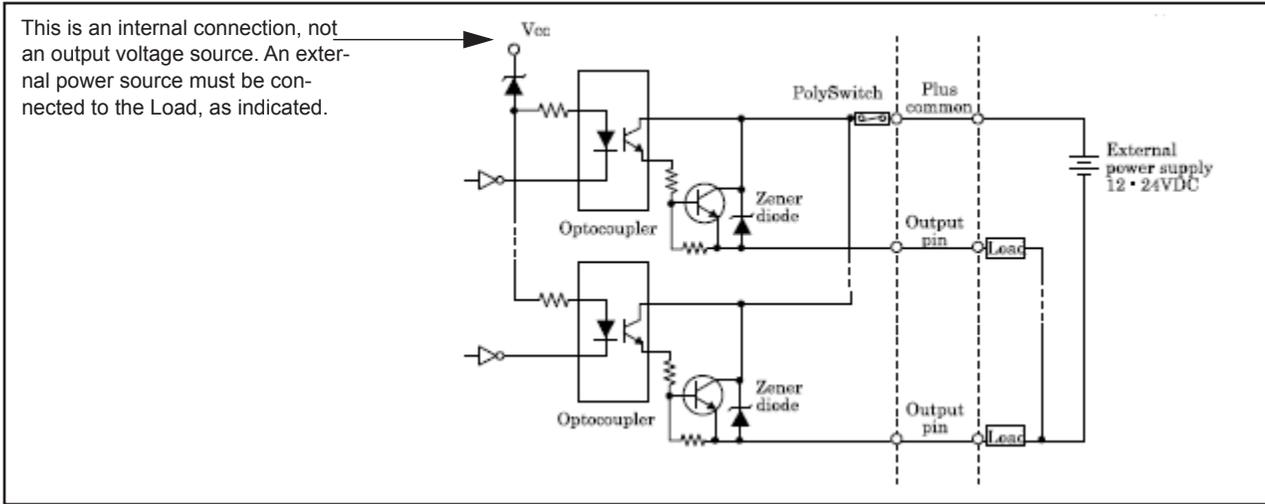


**NOTES:** To prevent output damage, all inductive loads must have noise suppressors connected directly across the load, as close to the load as possible.

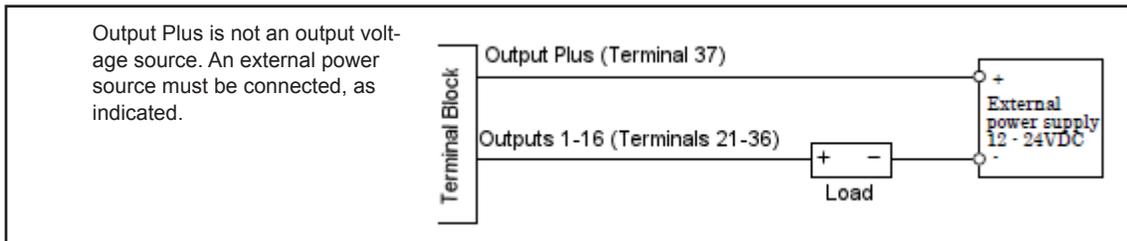


### Current Sourcing (PNP) Output Circuit

The diagrams below show internal circuit diagrams and how to wire processor outputs for model numbers containing the letter "P."



**NOTES:** To prevent output damage, all inductive loads must have noise suppressors connected directly across the load, as close to the load as possible.



# Cable Reference

This chapter documents MX-E Series Processor and Camera cable assemblies.

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## Processor Cables

The following cables connect different hardware devices to the Processor.

### Ethernet

An Ethernet cable (Part number 606-0677-xx) is used to connect the MX-E Series Processor to the GigE camera and between the Processor and any external network. The last two digits of the part number indicate the cable length in feet. We recommend you use shielded Cat5e Ethernet cable or better to connect the camera and the Processor. Cat6 cable is required for distances greater than 25 meters. Using any other cable may cause intermittent data transmission.

A crossover cable is not required because the Ethernet ports are auto-negotiating; that is they can tell the difference between a peer-to-peer connection and a router/switch connection and they configure themselves and the communications to suit the environment.

### Input/Output

The terminal block and cable for connecting MX-E Series processor are listed in the table below. For connection diagrams, see “Processor I/O Connection” on page 4-1. The last two digits of the part number indicate the cable length in meters.

Connector Type	Part Number
Terminal Block - 37 pin D-sub to Screw Terminal	248-0110
I/O Cable - 37 pin D-sub Male to Male Cable (for use with above terminal block)	606-0675-xx
37 pin D-sub Male to pigtail (for use with no terminal block)	431-0592-xx

### Power Supply

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This equipment is to be powered by a Listed power supply for the U.S. and Canada, or a power supply that meets the requirements for use where either IEC 60950 or EN60950 is applicable.

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See “Power Supply Connection” on page 2-5 for more details on wiring the power supply cable.

## Serial Port

A standard serial cable is used to connect the Processor to the serial port on an external device (e.g. terminal, PLC, motion controller, data recorder). This may require using a null modem cable or adapter. The serial port does not support hardware (CTS/RTS) or software (Xon/Xoff) data flow control. Impact software supports RS-232 communication protocol only. RS-485 is not supported.

Pin Number	Signal Name
1	No Connection
2	Received Data (RXD)
3	Transmitted Data (TXD)
4	No Connection
5	Signal Ground (GND)
6	No Connection
7	Request To Send (RTS)
8	Clear To Send (CTS)
9	No Connection



**9 Pin Male**  
(Pin Side)

## Monitor/Panel

The monitor/panel port provides RGB, DVI, and SDL video signals. The processor requires a monitor and keyboard when it first starts, and to configure the system. A VGA cable (5 meters maximum) with the appropriate adapter can be used on this connector.

## Display Port

The display port provides DVI and HDMI video signals.

## USB Ports

USB Ports can be used to connect a mouse and keyboard. The processor requires a monitor and keyboard when it first starts, and to configure the system. Other USB devices connected to these ports may interfere with normal vision system operations and are not supported. USB cameras cannot be used with the MX-E processors.

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## Camera Cable

### M1xx and E1xx

The terminal block and cable for connecting M1xx and E1xx cameras are listed in the table below. For cable wire color codes and connection diagrams, see “M1xx and E1xx Camera Connection” on page 3-10. The last two digits of the part number indicate the cable length in meters.

<b>Connector Type</b>	<b>Part Number</b>
Terminal Block	661-0399
Camera Cable - DB9 to 6-pin Hirose Male (for use with above terminal block)	606-0674-xx
Hirose 6-pin Male to pigtail (for use with no terminal block)	606-0672-xx



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# MX-E SERIES HARDWARE GUIDE

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