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MICROSCAN

Vision HAWK Smart Camera Guide



84-016800-02 Rev J

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Warning and Caution Summary

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 in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna;
- Increase the separation between the equipment and receiver;
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected;
- Consult the dealer or an experienced radio/TV technician for help.

For connection to a UL-listed direct plug-in power unit marked Class II and rated 10 to 28 VDC at 5 watts or greater.

U.S. models must use a similarly rated Class I or Class II power supply that is certified to comply with standards for safety IEC 60950-1 Ed. 2 (2005) and IEC 60825-1 Ed. 3 (2014).

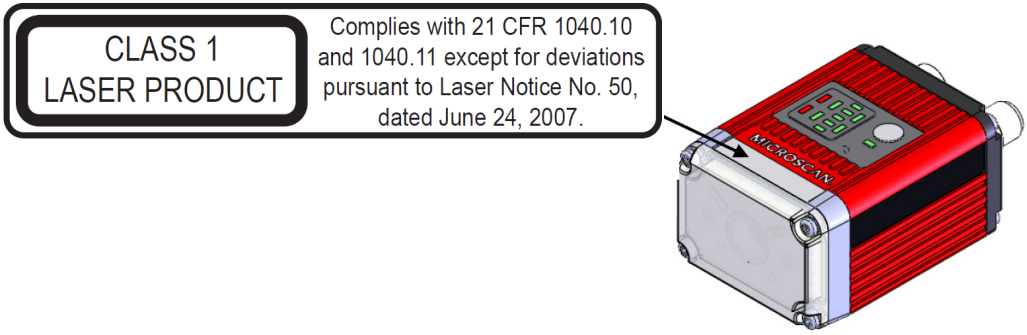
European models must use a similarly rated Class I or Class II power supply that is certified to comply with standard for safety EN 60950-1 (2006) with Am. 11 (2009).

Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous laser or LED light radiation exposure.

There are no user-serviceable parts in the imager. Opening the imager voids the Omron Microscan Systems, Inc. warranty.

Warning Label Placement

This warning label is located on the Vision HAWK Smart Camera:



Statement of RoHS Compliance

All Omron Microscan readers with a ‘G’ suffix in the FIS number are RoHS-Compliant. All compliant readers were converted prior to March 1, 2007. All standard accessories in the Omron Microscan Product Pricing Catalog are RoHS-Compliant except 20-500013-01 and 98-000039-02. These products meet all the requirements of “Directive 2002/95/EC” European Parliament and the Council of the European Union for RoHS compliance. In accordance with the latest requirements, our RoHS-Compliant products and packaging do not contain intentionally added Deca-BDE, Perfluorooctanes (PFOS) or Perfluorooctanic Acid (PFOA) compounds above the maximum trace levels. To view the document stating these requirements, please visit:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:EN:HTML

and

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:372:0032:0034:EN:PDF

Please contact your sales manager for a complete list of Omron Microscan’s RoHS-Compliant products.

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In regards to “RoHS Directive 2011_65_EU” Omron Microscan produces Monitoring and Control Instruments as well as Industrial Monitoring & Control Instruments as defined within the directive. Omron Microscan has developed and is implementing a RoHS2 compliance plan with the intention of bringing all active products listed in our current marketing literature within full compliance as per the directive deadlines.

Key milestones for the transition plan are as follows:

- Complete internal product audit by July 2014.
- Initial “Monitoring and Control Instruments” RoHS2 compliant products available by December 2014
- Initial “Industrial Monitoring & Control Instruments” RoHS2 compliant products available by July 2015
- All new products introduced in 2015 are expected to be WEEE & RoHS2 compliant.

Omron Microscan will mark the products with the ‘CE’ marking that complies with the RoHS2 process to acquire ‘CE’ certification per the example given: Example >> Machinery directive + EMC directive + RoHS2 = Declaration of Conformity

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PREFACE

Welcome

Purpose of This Manual

This manual contains detailed information about how to configure and operate the Vision HAWK Smart Camera.

Manual Conventions

The following typographical conventions are used throughout this manual.

- Items emphasizing important information are **bolded**.
- Menu selections, menu items and entries in screen images are indicated as: Run (triggered), Modify..., etc.

CHAPTER 1 Introduction

FIGURE 1–1. Vision HAWK Smart Camera, C-Mount and Standard Models



Product Summary

The Vision HAWK Smart Camera is a compact industrial smart camera that provides powerful machine vision capabilities with a small form factor and intuitive software interface. The Vision HAWK is designed for industrial environments where IP65/67 enclosure and rugged M12 connectivity are required.

Fully-integrated I/O and communications make the Vision HAWK easy to incorporate in virtually any machine vision application. Patented liquid lens autofocus and modular optical zoom enables the Vision HAWK to inspect objects at distances from 33 mm to 2 m and beyond.

Pressing the AutoVISION button at the back of the Vision HAWK enables real time dynamic autofocus. When an object is centered in the field of view and the AutoVISION button is pressed, the camera automatically adjusts focal distance and sets internal parameters to optimize image captures.

AutoVISION software, designed for use with the Vision HAWK, provides an intuitive interface, step-by-step configuration, and a library of presets that allow easy setup and deployment. For more complex vision applications, the system can be upgraded from AutoVISION to Visionscape.

Features and Benefits

- Color and monochrome models available
- Standard and C-Mount models available
- SXGA (1280 x 960), WVGA (752 x 480), and WUXGA (2048 x 1088, C-Mount model only) resolutions available
- World's first vision system with liquid lens autofocus (standard models)
- Integrated lighting (standard models)
- Integrated Ethernet
- Flexible programming options for custom applications
- AutoVISION button for automatic targeting, calibration, and triggering
- Simplified configuration with AutoVISION software
- Fully scalable with Visionscape
- Applications can be ported to Visionscape PC-based machine vision

Applications

- Automotive assembly verification
- Part identification
- Label positioning
- Contents verification
- Electronics assembly verification and identification
- Semiconductor packaging and component inspection
- Auto ID (Data Matrix and other 2D symbologies, 1D, OCR)

Package Contents

Before you install AutoVISION software and connect your Vision HAWK Smart Camera, please take a moment to confirm that the following items are available:

- Vision HAWK Smart Camera — Your package contains one of the available models listed in Table 1–1
- Microscan Tools Drive — USB flash drive containing AutoVISION software
- Required accessories such as a power supply or power cable

Vision HAWK Smart Camera Models

Table 1–1 lists and describes the Vision HAWK Smart Camera models.

TABLE 1–1. Vision HAWK Smart Camera Models

Part Number	Vision HAWK Smart Camera Model
GMV-6800-1000G	Vision HAWK, SXGA, AutoVISION, C-Mount
GMV-6800-1002G	Vision HAWK, SXGA, AutoVISION+Visionscape, C-Mount
GMV-6800-1004G	Vision HAWK, SXGA, AutoVISION+Verification/OCV, C-Mount
GMV-6800-1006G	Vision HAWK, SXGA, AutoVISION+Visionscape+Verification/OCV, C-Mount
GMV-6800-1010G	Vision HAWK, WVGA, AutoVISION, C-Mount
GMV-6800-1012G	Vision HAWK, WVGA, AutoVISION+Visionscape, C-Mount
GMV-6800-1014G	Vision HAWK, WVGA, AutoVISION+Verification/OCV, C-Mount
GMV-6800-1016G	Vision HAWK, WVGA, AutoVISION+Visionscape+Verification/OCV, C-Mount
GMV-6800-1022G	Vision HAWK, SXGA, Color, AutoVISION+Visionscape, C-Mount
GMV-6800-1030G	Vision HAWK, WUXGA, Mono, AutoVISION, C-Mount
GMV-6800-1032G	Vision HAWK, WUXGA, Mono, AutoVISION+Visionscape, C-Mount
GMV-6800-1034G	Vision HAWK, WUXGA, Mono, AutoVISION+Verification/OCV, C-Mount
GMV-6800-1036G	Vision HAWK, WUXGA, Mono, AutoVISION+Visionscape+Verification/OCV, C-Mount
GMV-6800-1200G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION, 30° Lens
GMV-6800-1202G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Visionscape, 30° Lens
GMV-6800-1204G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Verification/OCV, 30° Lens
GMV-6800-1206G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV, 30° Lens
GMV-6800-1210G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION, 30° Lens
GMV-6800-1212G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Visionscape, 30° Lens
GMV-6800-1214G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Verification/OCV, 30° Lens
GMV-6800-1216G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV, 30° Lens
GMV-6800-1222G	Vision HAWK, SXGA, Built-In Lighting, Color, AutoVISION+Visionscape, 30° Lens
GMV-6800-1300G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION, 45° Lens
GMV-6800-1302G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Visionscape, 45° Lens
GMV-6800-1304G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Verification/OCV, 45° Lens
GMV-6800-1306G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV, 45° Lens
GMV-6800-1310G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION, 45° Lens
GMV-6800-1312G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Visionscape, 45° Lens
GMV-6800-1314G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Verification/OCV, 45° Lens
GMV-6800-1316G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV, 45° Lens
GMV-6800-1322G	Vision HAWK, SXGA, Built-In Lighting, Color, AutoVISION+Visionscape, 45° Lens
GMV-6800-1400G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION, 12° Lens
GMV-6800-1402G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Visionscape, 12° Lens

TABLE 1–1. Vision HAWK Smart Camera Models

Part Number	Vision HAWK Smart Camera Model
GMV-6800-1404G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Verification/OCV, 12° Lens
GMV-6800-1406G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV, 12° Lens
GMV-6800-1410G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION, 12° Lens
GMV-6800-1412G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Visionscape, 12° Lens
GMV-6800-1414G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Verification/OCV, 12° Lens
GMV-6800-1416G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV, 12° Lens
GMV-6800-1422G	Vision HAWK, SXGA, Built-In Lighting, Color, AutoVISION+Visionscape, 12° Lens
GMV-6800-1500G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION, 15° Lens
GMV-6800-1502G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Visionscape, 15° Lens
GMV-6800-1504G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Verification/OCV, 15° Lens
GMV-6800-1506G	Vision HAWK, SXGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV, 15° Lens
GMV-6800-1510G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION, 15° Lens
GMV-6800-1512G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Visionscape, 15° Lens
GMV-6800-1514G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Verification/OCV, 15° Lens
GMV-6800-1516G	Vision HAWK, WVGA, Built-In Lighting, AutoVISION+Visionscape+Verification/OCV, 15° Lens
GMV-6800-1522G	Vision HAWK, SXGA, Built-In Lighting, Color, AutoVISION+Visionscape, 15° Lens

Part Number Structure

<table>
<tr><th>GMV</th><th>6800</th><th>Comm</th><th>Lens</th><th>Sensor</th><th>Software</th><th>RoHS</th></tr>
<tr><td rowspan="6">General Machine Vision</td><td rowspan="6">Vision HAWK</td><td rowspan="6">1 = Ethernet</td><td>0 = C-Mount</td><td>0 = CCD (SXGA) Mono</td><td>0 = AutoVISION</td><td rowspan="6">G = RoHS-compliant</td></tr>
<tr><td>2 = 30° Lens</td><td>1 = CMOS (WVGA) Mono</td><td>2 = AutoVISION + Visionscape</td></tr>
<tr><td>3 = 45° Lens</td><td>2 = CCD (SXGA) Color</td><td>4 = AutoVISION + Verification/OCV</td></tr>
<tr><td>4 = 12° Lens</td><td rowspan="2">3 = CMOS (WUXGA) Mono</td><td rowspan="2">6 = AutoVISION + Visionscape + Verification/OCV</td></tr>
<tr><td>5 = 15° Lens</td></tr>
</table>

2

CHAPTER 2 System Components

This section contains information about system components as well as information to help you connect the Vision HAWK Smart Camera. Specific information describes connectors, adapters, cables, pinouts, and signals.

Note: There are no user-serviceable parts inside.

Hardware Components

Table 2-1 lists Vision HAWK Smart Camera hardware components.

TABLE 2–1. Vision HAWK Smart Camera Hardware Components

Part Number	Description
Demo Kit	
98-000215-01	Demo Kit (Power Supply, Camera Stand, Ethernet Host Cable, Carrying Case, Documentation)
Power Supplies	
97-000012-01	Power Supply, M12 12-pin Socket, 1.3 m
97-000012-04	Power Supply, M12 12 pin Plug, 1.3m
Communication Devices and Cables	
98-000103-01	QX-1 Interface Device
61-000148-02	Cordset, Common, M12 12 Pin, Socket to M12 12 Pin Plug, 3M
61-000162-02	Cordset, Common, M12 12 Pin, Socket to M12 12 Pin Plug, 1M
61-000153-02	Cordset, Host, Serial M12 12 pin Socket to DB9 Socket, 1M
61-000164-02	Cordset, Host, Serial, M12 12 pin Socket to DB9 Socket, 3M
61-000152-02	Cordset, Host, Serial, M12 12 pin Plug to DB9 Socket, 1M

TABLE 2–1. Vision HAWK Smart Camera Hardware Components (Continued)

Part Number	Description
61-000165-02	Cordset, Host, Serial M12 12 pin Plug to DB9 Socket, 3M
61-000163-02	Cordset, Host, Ethernet, M12 8 pin Plug to RJ45, 3M
61-000160-02	Cordset, Host, Ethernet, M12 8 pin Plug to RJ45, 1M
61-000166-02	Cordset, M12 12 Pin Plug to Flying Leads, 3M
61-000167-02	Cordset, M12 12 Pin Socket to Flying Leads, 3M
61-000207-01	Cordset, C-Mount-to-Smart Series Light
FIS-0210-0001G	MS-Connect 210, Connectivity Box with Display
FIS-0210-0002G	MS-Connect 210, Connectivity Box
FIS-0210-0003G	MS-Connect 210, Connectivity Box with Display and Ethernet
FIS-0210-0004G	MS-Connect 210, Connectivity Box with Ethernet
98-000013-04	Relay Module, 120VAC, 3 Amp Output, Series 70, Type SM, for MS-Connect 210
98-000013-05	Relay Module, 240VAC, 3 Amp Output, Series 70, Type SM for MS-Connect 210
98-000013-06	Relay Module, 24VDC, 3 Amp Output, Series 70, Type SM for MS-Connect 210
Accessories	
98-000143-01	Adapter Plate Kit
98-000148-01	L-Bracket Kit
98-000144-01	Right Angle Mirror Kit
98-000146-01	Window Replacement Kit
98-000147-04	12° Lens Kit
98-000147-01	15° Lens Kit
98-000147-02	30° Lens Kit
98-000147-03	45° Lens Kit
98-000205-01	Glass Window Kit with Infrared (IR) Filter
98-000206-01	Glass Window Kit
98-500006-01	Mounting Plate Kit, Flat, Custom Surfaces
20-610024-01	Trigger Connector, 4-pin Plug (screw terminal and field-wireable) (for self-wiring)
98-000037-01	Extension Kit, All Cameras, 6 inch
98-000054-01	Kit, Mounting Stand Base Plate, Small
98-000016-01	Mounting Arm/Adapter Kit, 6 inch
99-000056-01	Accessory, Bracket, DOAL 50 to Vision HAWK
99-000058-01	Accessory, Bracket, DOAL 75 to Vision HAWK
99-000060-01	Accessory, Bracket, DOAL 100 to Vision HAWK
99-000061-01	Accessory, Bracket, DOAL to C-MOUNT Vision HAWK
99-000050-01	Accessory, Bracket,R-100 to Vision HAWK
99-000052-01	Accessory, Bracket,R-60/70 to Vision HAWK
99-000049-01	Accessory, Bracket,R-100 to C-MOUNT Vision HAWK
99-000051-01	Accessory, Bracket,R-60/70 to C-MOUNT Vision HAWK
98-92800471	5MM Extension Tube for C-Mount Lenses
98-CO206	Lens Extension Tube Set 0.5, 1, 5, 10, 20, 40mm

TABLE 2–1. Vision HAWK Smart Camera Hardware Components (Continued)

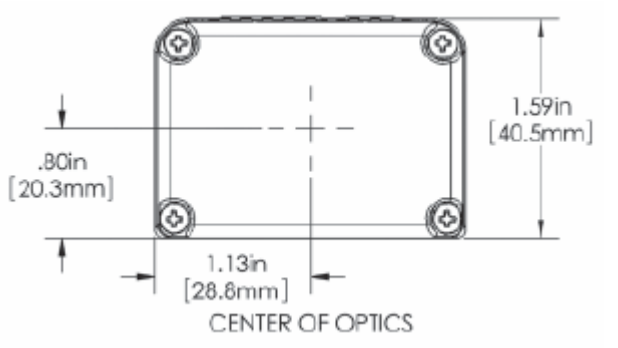
Part Number	Description
98-92800571	Lens 8mm F/1.4-16, FT 25.5mm P 0.5mm, 2/3" C-MNT
98-92800572	Lens 12mm F/1.8-16, FT 25.5mm P 0.5mm, 2/3" C-MNT
98-92800573	Lens 16mm F/1.4-16, FT 25.5mm P 0.5mm, 2/3" C-MNT
98-92800574	Lens 25mm F/1.6-16, FT 25.5mm P 0.5mm, 2/3" C-MNT
98-92800575	Lens 35mm F/2.1-22, FT 25.5mm P 0.5mm, 2/3" C-MNT
98-92800576	Lens 50mm F/2.8-22, FT 25.5mm P 0.5mm, 2/3" C-MNT
98-92800577	Lens 75mm F/3.9-32, FT 25.5mm P 0.5mm, 2/3" C-MNT
98-92800311	Lens, Skylight UV Filter 25.5mm Thread
98-92800371	Polarizing Filter 25.5mm Thread
98-000218-01	Lens Protection Housing, Standard Length (up to 48 mm)
98-000226-01	Lens Protection Housing, Long (up to 72 mm)
Object Detectors	
99-000020-01	Photo Sensor, M12 4pin Plug, NPN, Dark Off, 2m
99-000020-02	Photo Sensor, M12 4-pin Plug, NPN, Dark On, 2 m
Documentation	
37-000010-01	Microscan Tools Drive (Software, User Manuals, Quick Start Guides, Configuration Guides, links to other documents on Microscan website)

Note: Additional hardware components are available in the Microscan Product Pricing Catalog.

Standard Vision HAWK Front

Figure 2-1 shows the front of the Vision HAWK Smart Camera.

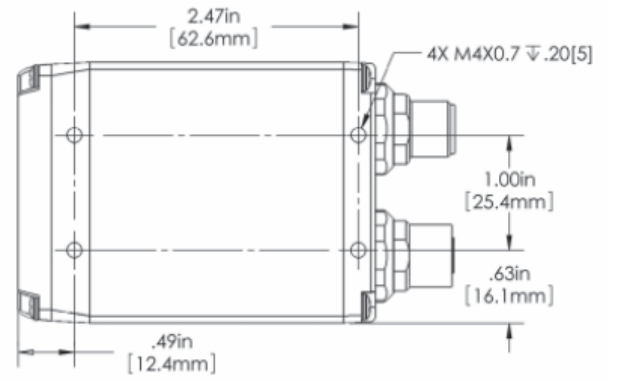
FIGURE 2–1. Front



Standard Vision HAWK Base

Figure 2–2 shows the base of the Vision HAWK Smart Camera.

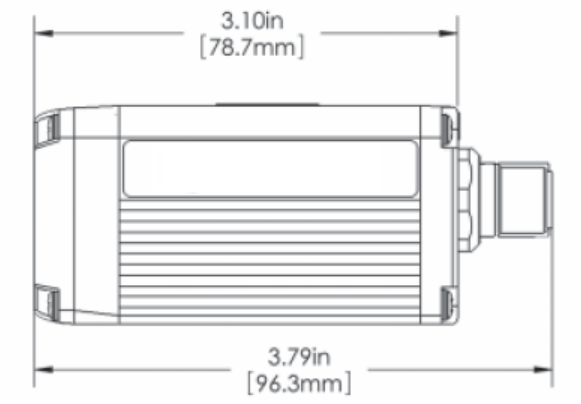
FIGURE 2–2. Base



Standard Vision HAWK Side

Figure 2-3 shows the side of the Vision HAWK Smart Camera.

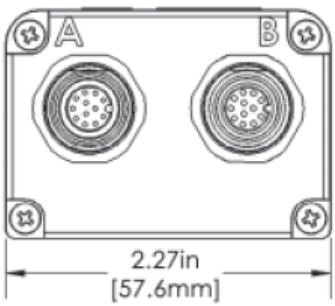
FIGURE 2–3. Side



Standard Vision HAWK Back

Figure 2-4 shows the back of the Vision HAWK Smart Camera.

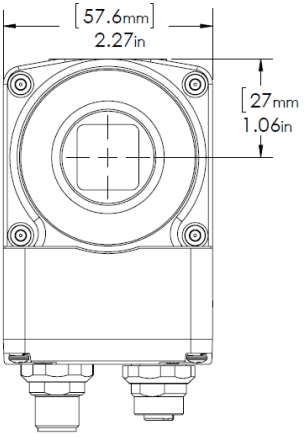
FIGURE 2–4. Back



Vision HAWK C-Mount Front

Figure 2-5 shows the front of the Vision HAWK C-Mount Smart Camera.

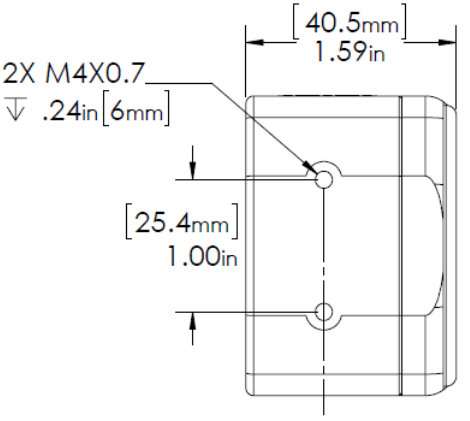
FIGURE 2–5. Front



Vision HAWK C-Mount Base

Figure 2–6 shows the top of the Vision HAWK C-Mount Smart Camera.

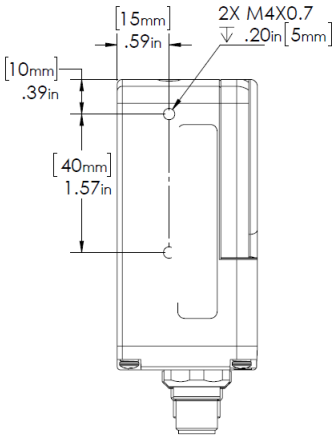
FIGURE 2–6. Top



Vision HAWK C-Mount Side

Figure 2-7 shows the side of the Vision HAWK C-Mount Smart Camera.

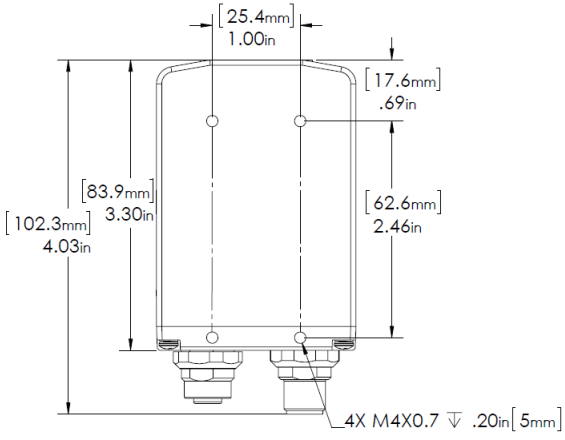
FIGURE 2–7. Side



Vision HAWK C-Mount Back

Figure 2-8 shows the back of the Vision HAWK C-Mount Smart Camera.

FIGURE 2–8. Back



Important Label Information

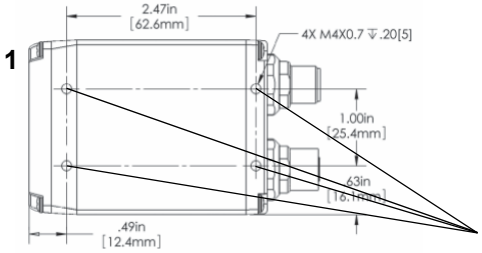
Each Vision HAWK Smart Camera has its own label, which contains important information about that camera.

- P/N – The Microscan part number of your Vision HAWK Smart Camera.
- S/N — The serial number of your Vision HAWK Smart Camera.
- MAC — The MAC address of your Vision HAWK Smart Camera.

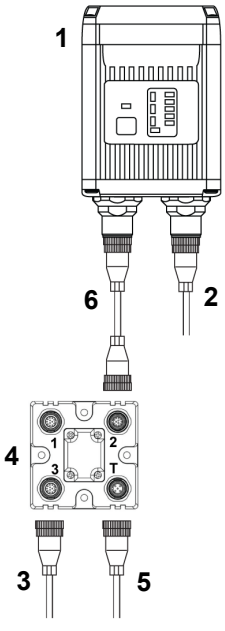
Mounting and Wiring the Vision HAWK Smart Camera

Important: Pin 9 (Host RxD) must be tied to ground (Pin 7) when using a flying lead cable and the serial port is not being used. The camera may not boot to completion if RxD is not grounded. Isolate unused wires. The ends of unused wires must not touch each other.

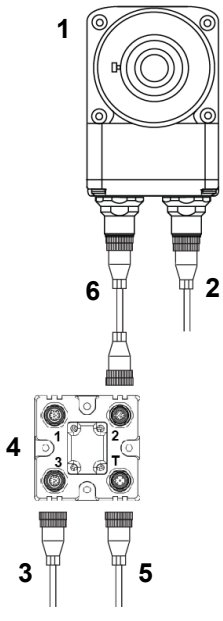
- Mount the camera (**1**) securely as required by the application.



- Connect the Ethernet cable (**2**) from "B" on the camera (**1**) to the network.
- Connect the power supply cable (**3**) to "3" on the QX-1 (**4**).
- Connect the trigger (**5**) to "T" on the QX-1 (**4**).
- Connect the "Common" cable (**6**) from "A" on the camera (**1**) to "2" on the QX-1 (**4**).
- Plug in the power supply (**3**).



Standard Vision HAWK



Vision HAWK C-Mount

For most C-Mount lenses:

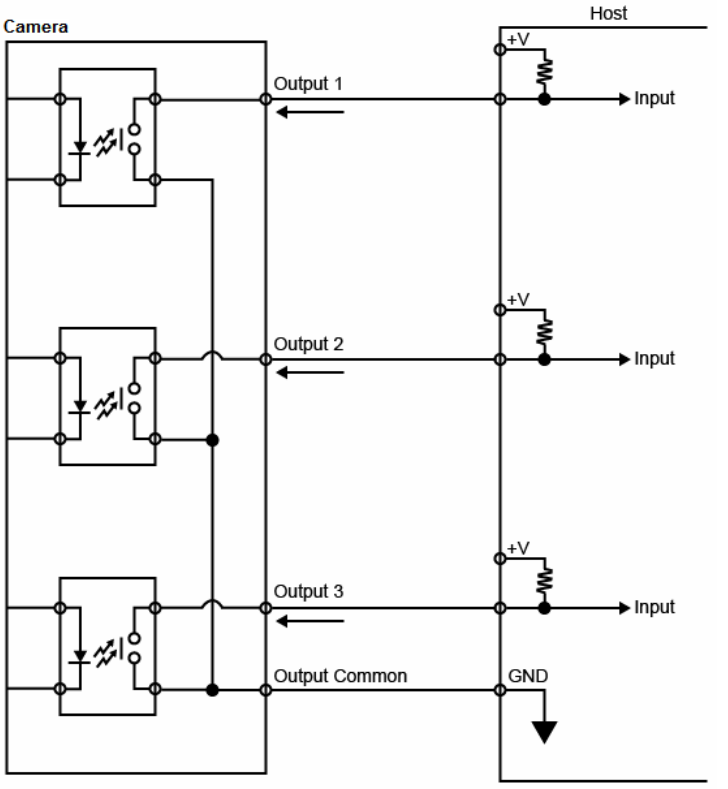
- Loosen all lens screws to allow free lens movement.
- Install first set screw in the available slot.
- Remove one lens screw and install second set screw to allow for adjustment.

Important: Configuration details may vary by lens model.

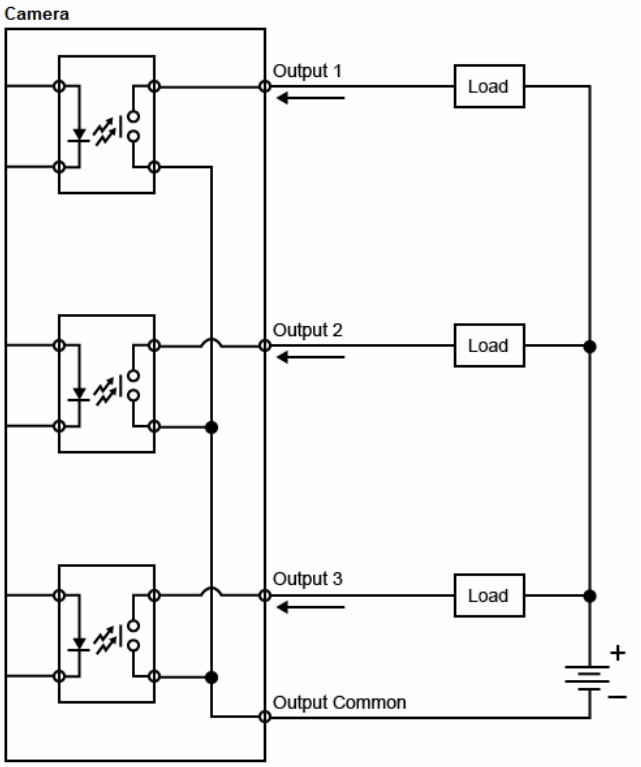
Optoisolated Outputs

The reader has optoisolated outputs that can transfer signals from the camera to peripherals. Outputs can be configured as either NPN or PNP, but NPN and PNP cannot be mixed in a system, because the output common is shared by all outputs.

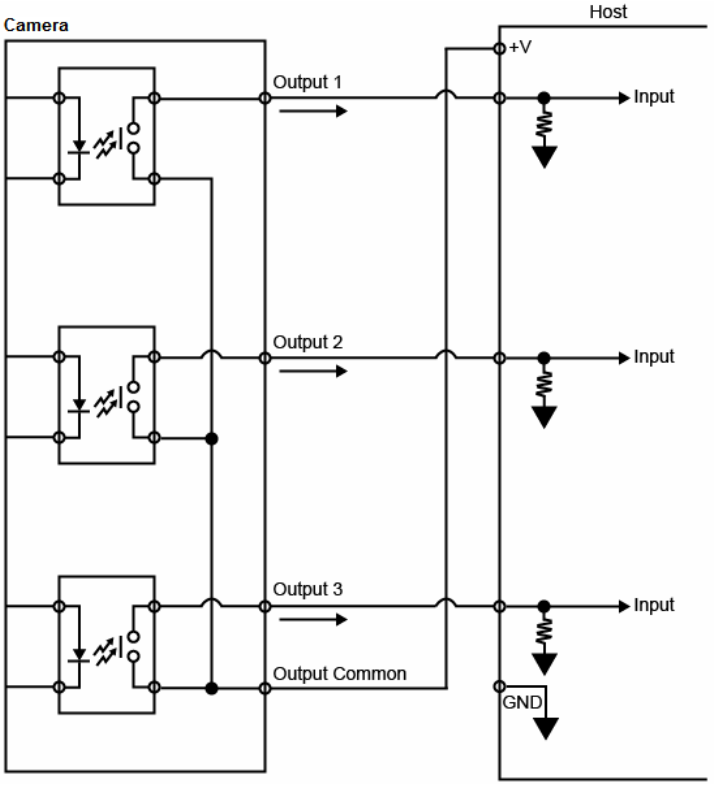
NPN Output for Host Input



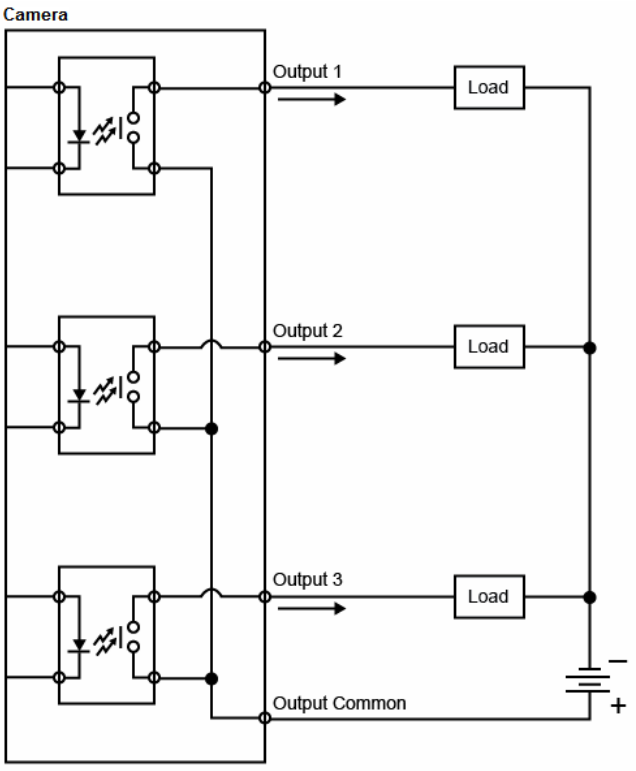
NPN Output for External Load



PNP Output for Host Input



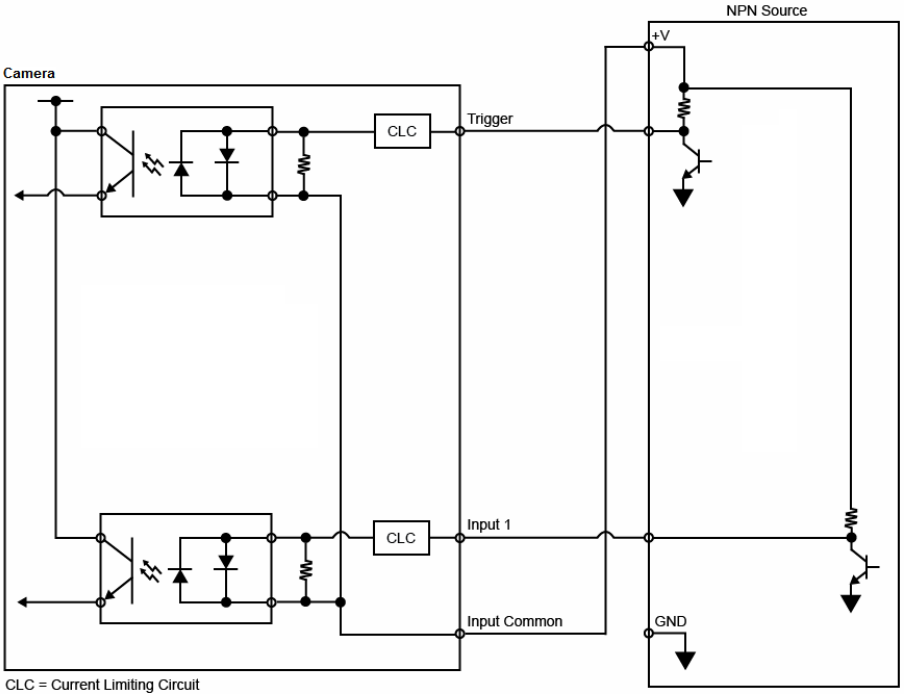
PNP Output for External Load



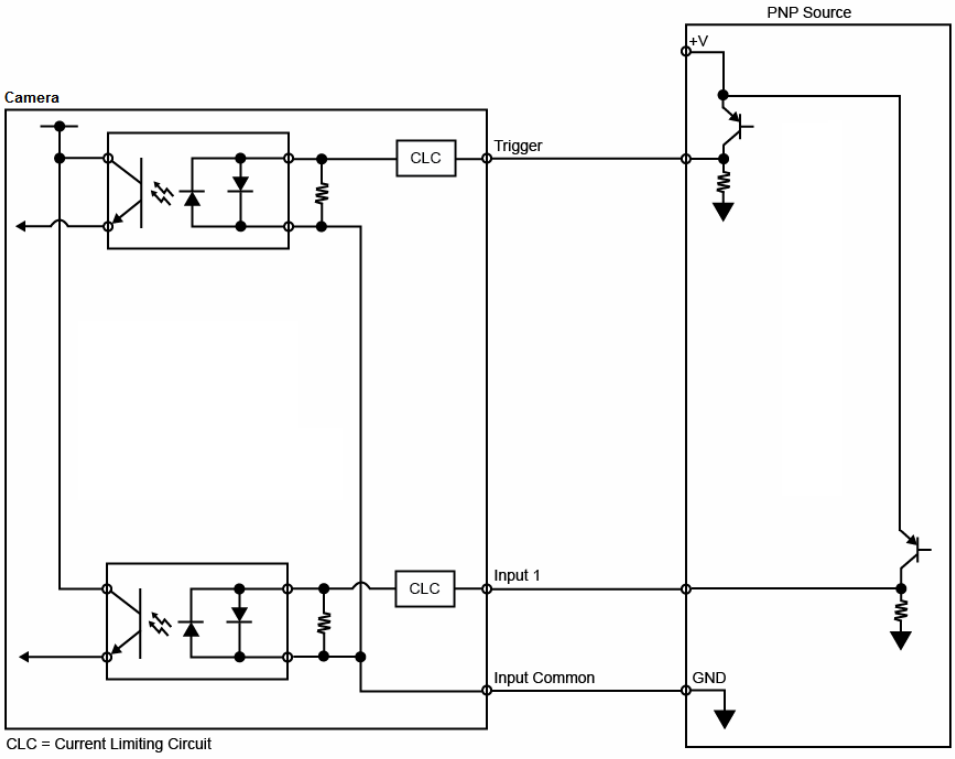
Optoisolated Inputs

All discrete inputs are optoisolated. Inputs can be configured as either NPN or PNP, but NPN and PNP cannot be mixed in a system, because the input common is shared by all inputs.

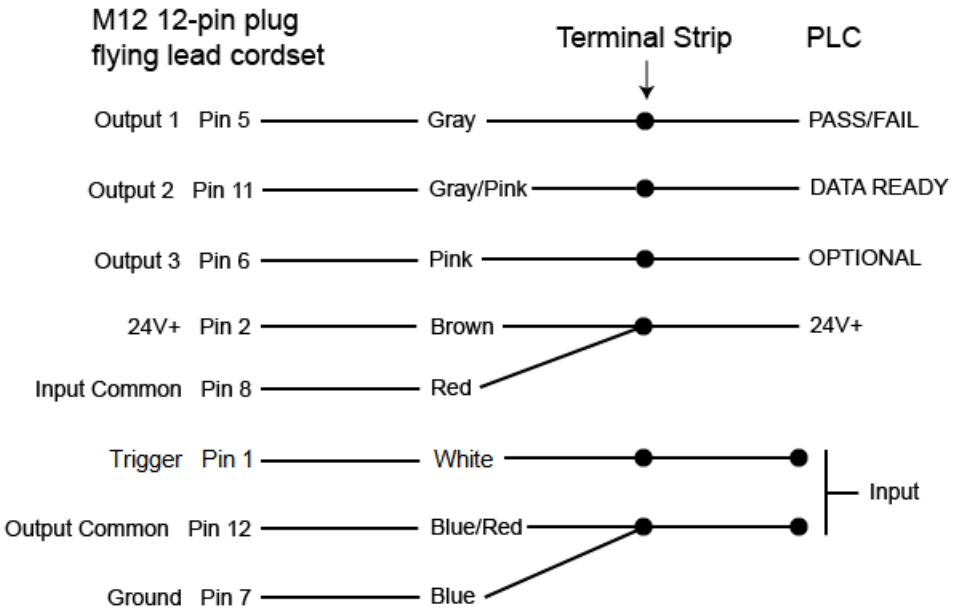
NPN



PNP

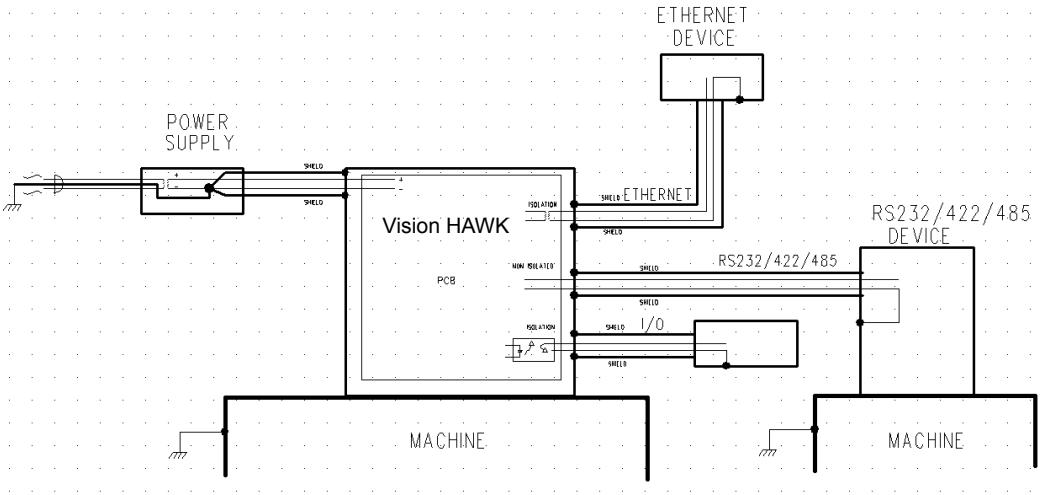

PNP Source
+V
Camera
CLC
Trigger
CLC
Input 1
Input Common
GND
CLC = Current Limiting Circuit

Input/Output Wiring



Ground and Shield Considerations

Proper grounding is necessary for operator safety, noise reduction, and the protection of equipment from voltage transients. Buildings, including any steelwork, all circuits, and all junction boxes must be grounded directly to an earth ground in compliance with local and national electrical codes.

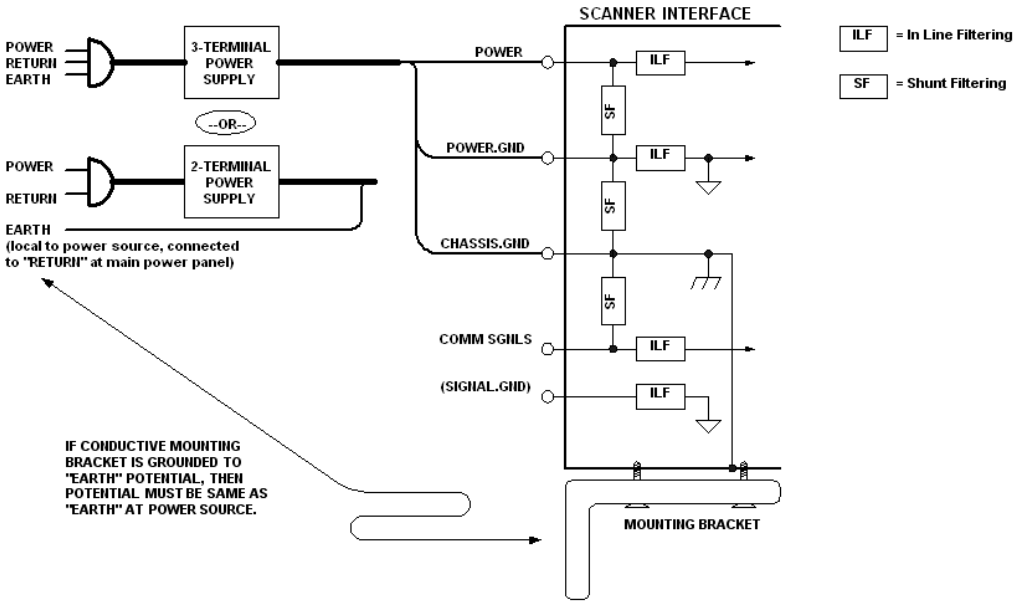


An earth ground is provided through the cable shields and chassis of the imager.

Ground Loops

Ground loops (signal degradation due to different ground potentials in communicating devices) can be eliminated or minimized by ensuring that both the host, imager, and their power supplies are connected to a common earth ground.

Expected Power and Ground Connections for Proper Operation



Grounding Notes:

- Ensure that mounting bracket “Earth” is at the same potential as power source “Earth”.
- Supply “Return” and “Earth” ground must be stable, low-impedance reference points.
- “2-Terminal Power Supply” must still provide an “Earth” connection to the imager.
- “Signal Ground” can be used for communications and/or discrete signal ground reference. It must **not** be used as Power Ground or Earth Ground.

Power Requirements

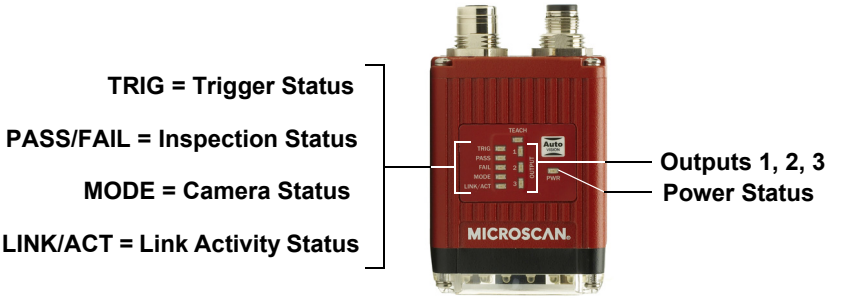
Refer to Table 2-3 when determining the power supply requirements for your camera.

TABLE 2–3. Camera Power Requirements

Component	
Vision HAWK Smart Camera, CCD, SXGA	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.) 15.5 watts (max.)
Vision HAWK Smart Camera, CMOS, SXGA	5-28VDC, 200mV p-p max ripple, 135mA at 24VDC (typ.) 13 watts (max.)
Vision HAWK C-Mount Smart Camera, CCD, SXGA	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.) 7 watts (max.)
Vision HAWK C-Mount Smart Camera, CMOS, WVGA	5-28VDC, 200mV p-p max ripple, 135mA at 24VDC (typ.) 4 watts (max.)
Vision HAWK C-Mount Smart Camera, CMOS, WUXGA	5-28VDC, 200mV p-p max ripple, 140mA at 24VDC (typ.) 5.7 watts (max.)

Status Indicators

The top of the Vision HAWK Smart Camera has multiple LEDs that indicate different trigger, inspection, camera, communication, and power states.



TRIG	**On Steady**	Continuous Trigger
	Off	Waiting for Trigger Event
	On Flashing	Trigger Event
PASS/FAIL	**On**	Active State
	Off	Inactive State
MODE	**On Steady**	Unit Ready
	Off	Unit Not Ready
LINK/ACT	**On Steady**	Link Established
	Off	No Link/Activity
	On Flashing	Link Established and Activity on Link
PWR	**On**	Power On
	Off	No Power Applied to Unit
OUTPUTS	**On**	Signal Sent to External Output
	Off	No Signal Sent to External Output

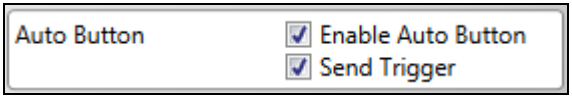
Additional User Feedback

- Green Flash – A green flash from the front of the unit indicates a Good Read.
- Red X Targeting Pattern – The red X targeting pattern from the front of the unit allows the user to center an object in the camera's field of view.
- Beeper – The beeper is an audible verification that either a Pass or a Fail has occurred.

AutoVISION Button



The AutoVISION Button has three positions, selectable by the length of time the button is held down, and indicated by one, two, or three beeps and LED flashes in succession. It can also be used to send a trigger signal when **Send Trigger** is checked in AutoVISION software's **Connect** view. When the trigger functionality is enabled, pushing the AutoVISION Button triggers the camera to capture an image.



1st Position: Red Targeting Pattern

The first AutoVISION Button position turns the targeting system on. This overrides any other targeting modes that have been configured.

2nd Position: Auto Calibration

The second AutoVISION Button position starts the Auto Calibration process, which selects the appropriate photometry and focus settings for the camera. The selected values are then saved for power-on.

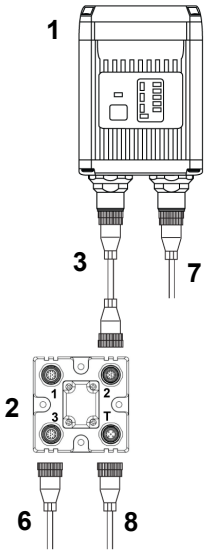
3rd Position: Teach

The third AutoVISION Button position sets the Match String to the next OCR string or symbol data that is decoded.

Setting Up a Job in AutoVISION

AutoVISION is a critical component of the Vision HAWK's functionality. Designed for use with the Vision HAWK, AutoVISION provides an intuitive interface, step-by-step configuration, and a library of presets that allow easy setup and deployment. For more complex vision applications, the system can be upgraded from AutoVISION to Visionscape.

1. Configure Vision HAWK hardware.



See Appendix A, **Connector Pinouts**, for Vision HAWK pin assignments.

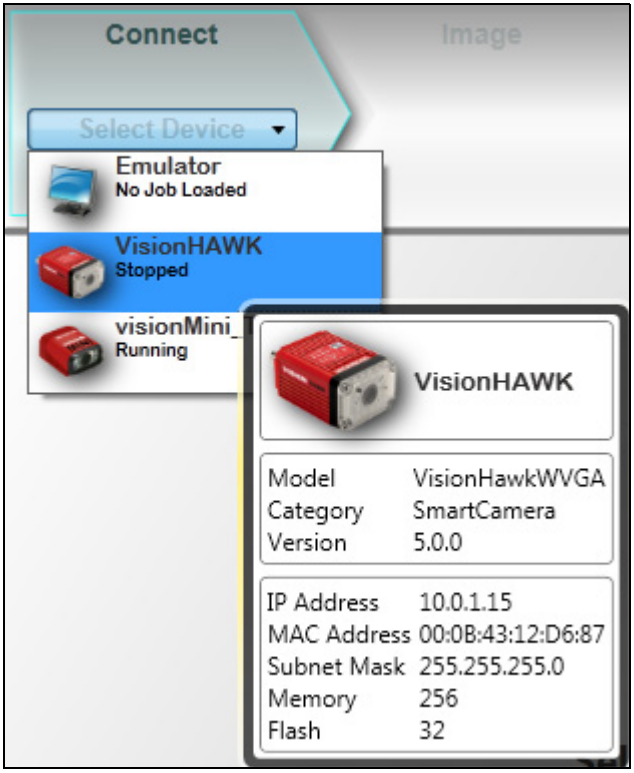
Item	*Description*	*Part Number*
1	Vision HAWK Smart Camera	GMV-6800-XXXXG
2	QX-1 Interface Device	98-000103-02
3	Cordset, Common, M12 12-pin Plug to M12 12-pin Socket, 1 m	61-000162-01
4	Cordset, Host, Serial, M12 12-pin Plug to DB9, 1 m	61-000152-01
5	Cordset, Host, Serial, M12 12-pin Socket to DB9, 1 m	61-000153-01
6	Power Supply, M12 12-pin Socket, 1.3 m	97-000012-01
7	Cordset, Host, Ethernet, M12 8-pin Plug to RJ45, 1 m	61-000160-03
8	Trigger, M12 4-pin Plug, NPN, Dark On, 2 m	99-000020-02

Note: Additional cables available in the Microscan Product Pricing Catalog.

- Mount the camera as required by the application.
- Connect the Ethernet cable from "B" on the camera to the network.
- Connect the power supply to "3" on the QX-1.
- Connect the photo sensor to "T" on the QX-1.
- Connect the "Common" cable to "2" on the QX-1 and "A" on the camera.
- Plug in the power supply.

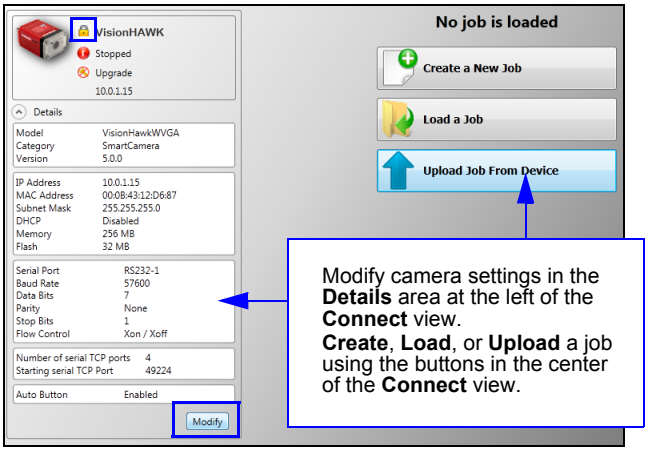
2. Select your Vision HAWK in the AutoVISION Connect view, create a job, and adjust camera settings.

   AutoVISION's **Connect** view allows you to select your device and configure its settings, and to create a new job. The **Select Device** dropdown menu provides a list of available devices. Hover the mouse over a device to see its details.



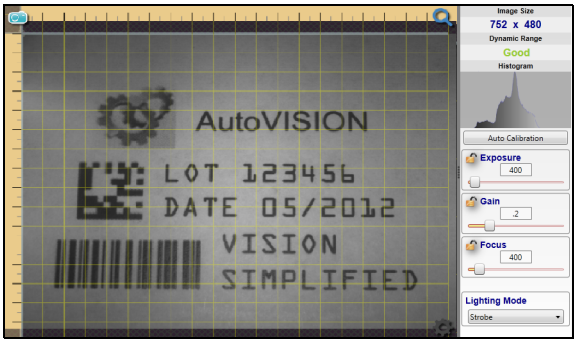
Click the lock icon to take control of the camera. When you have control of the camera, the **Modify** button will appear beneath the camera settings. Click the Modify button to adjust camera settings.

Note: The default IP address of the camera is: **192.168.0.10**. Be sure your PC is on the same subnet (**192.168.0.100**, for example).



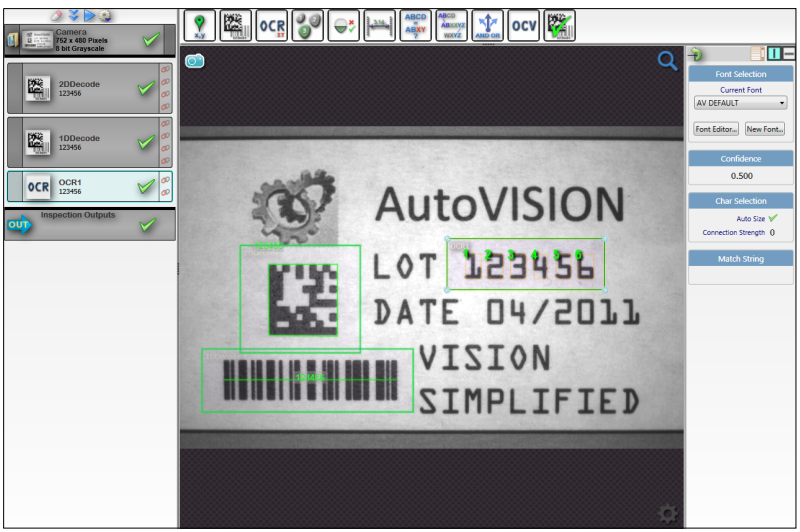
Important: When modifying camera settings, you will need to enter a username and password for the camera if a password has been defined.

Once you have selected your camera, adjusted its settings, and created a new job, you will move to the **Image** view. This view allows you to **Auto Calibrate** the camera, and to manually adjust the camera's Exposure, Gain, and Focus, and also to set the Lighting Mode (On, Off, or Strobe).



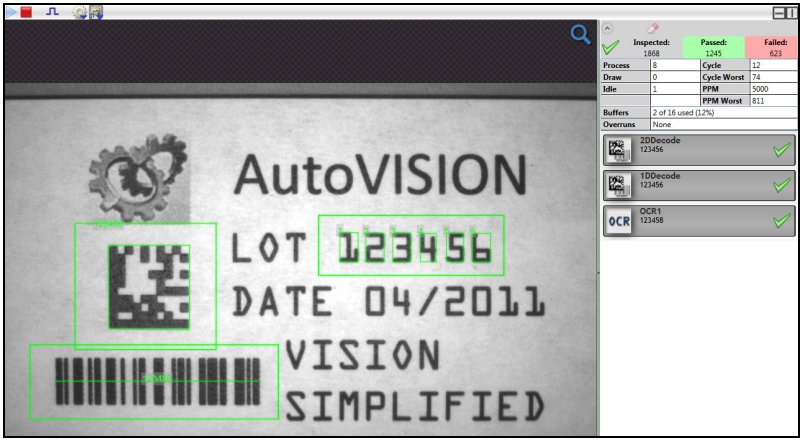
3. Edit the Job in AutoVISION.

   After you have created a new job, loaded a job from your PC, or uploaded a job from the camera, you will proceed to the **Edit** view to refine your machine vision job. The Camera parameters below the captured image allow you to set Gain, Exposure, Focus, Trigger, and Lighting. Inspection Outputs options allow you to connect your job to the outside world. This is also the view where you can add multiple tools to the job. The tool icons are located above the main view area.



4. Run the Job in AutoVISION.

   Going to the **Run** view will automatically download your job to the camera and start it running.



5. Save the Job.

   Click the **Save to Camera** icon on the File menu bar to save the job to the Vision HAWK.



Trigger Debounce

Trigger Debounce is the ability of the system to accomodate switching noise on a trigger state change – a common issue with relays that have some intermittent contact while engaging.

Trigger overruns (when the vision system is triggered faster than the device can process) can be avoided by increasing the “debounce” time in the camera definition file located in the C:\Microscan\Vscape\Drivers\CamDefs directory.

The IO Line Debounce High Time and IO Line Debounce Low Time can be added to the file as in the example below. The default debounce time is 1 ms (1,000 µs).

Note: Although the value entered for the "IO Line Debounce Time" is in microseconds, it will only be rounded up to a millisecond value. For example, entering the value **1001** will resolve to 2 ms; entering a value of **2800** will resolve to 3 ms.

The min value for "IO Line Debounce Time" is 0, which disables software debounce altogether. The maximum value is 100000 (100 ms).

Camera Definition File Example

```
// Camera Definition File
// Version: 1.10
Camera Name                          VisionHAWK 752x480 CMOS   // Name Displayed
in Camdef Selection Dialog
Digitizer Type               4000                                    // Number
associated with VisionHawk CMOS Camera
Stride                                       752            // Image Width
Rows                                         480            // Image Height
X Offset                                0            // Image X Offset
Y Offset                                0            // Image Y Offset
Bits Per Pixel                  8     // Bits that represent Pixel Value
Pixel Type                              0     // Type of Pixel: MONOCHROME=0,
COLOR_RGB=1, COLOR_BGR=2, COLOR_BAYGR8=3, COLOR_BAYRG8=4, COLOR_BAYGB8=5,
COLOR_BAYBG8=6, COLOR_HSI=7
Image Structure         1            // Pixel Organization: Packed=1, TwoPlanes =
2, ThreePlanes = 3
Async Control                1              // Controllable shutter time. Usually
using a pulse width specified in usecs
Usecs Per Frame              16667   // Fastest time to acquire a frame: 60 FPS
for VisionHawk  CMOS Camera                          // -1 Disables timeout feature
// IO Configuration
GPIO Edit Mask               0x0000
GPIO Defaults                0x0001  // 1 General Purpose Input 3 General Purpose
Outputs
GPIO Count                           4
GPIO Inputs                          1
GPIO Outputs                 3
Sensors                                      1              // One input dedicated
to Trigger signal
Strobes                                      0
Virtual IO                           2048
IO Line Debounce High Time 2000           //usecs
IO Line Debounce Low Time  2000         //usecs
// Focus & Photometry Ranges
Gain Dflt                            20
Gain Min                             0
```

```
Gain Max                                100             // 0 to 100%
Exp Dflt                                400
Exp Min                                         25
Exp Max                                         100000  // 1/10 to 1/40,000
Focus Dflt                              400
Focus Min                               100
Focus Max                               4000    // 1 to 40 inches
// Lens Configuration
C-Mount                                         0       // 0 = false, 1 = true
```

CHAPTER 3 Optics and Lighting

This section describes the optical and illumination characteristics of the Vision HAWK Smart Camera.

Optics

P/N / Model	Sensor	Shutter	Focal Range	Image Acquisition
GMV-6800-1000G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)	Depends on lens 2" (51 mm) to 8" (203 mm) (liquid lens autofocus - standard Vision HAWK only)	Progressive scan, square pixel
GMV-6800-1002G				
GMV-6800-1004G				
GMV-6800-1006G				
GMV-6800-1010G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1012G				
GMV-6800-1014G				
GMV-6800-1016G				
GMV-6800-1022G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1030G	2/3", WUXGA (2048 x 1088) CMOS, up to 48 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1032G				
GMV-6800-1034G				
GMV-6800-1036G				
GMV-6800-1200G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1202G				
GMV-6800-1204G				
GMV-6800-1206G				
GMV-6800-1210G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1212G				
GMV-6800-1214G				
GMV-6800-1216G				
GMV-6800-1222G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1300G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono			
GMV-6800-1302G				
GMV-6800-1304G				
GMV-6800-1306G				
GMV-6800-1310G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		Progressive scan, square pixel
GMV-6800-1312G				
GMV-6800-1314G				
GMV-6800-1316G				
GMV-6800-1322G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1400G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono			
GMV-6800-1402G				
GMV-6800-1404G				
GMV-6800-1406G				
GMV-6800-1410G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1412G				
GMV-6800-1414G				
GMV-6800-1416G				
GMV-6800-1422G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1500G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono			
GMV-6800-1502G				
GMV-6800-1504G				
GMV-6800-1506G				
GMV-6800-1510G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1512G				
GMV-6800-1514G				
GMV-6800-1516G				
GMV-6800-1522G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		

Lens Substitution

The following procedure will change the appropriate settings in the Vision HAWK to allow the camera to focus properly after the lens has been changed. Please note that the Vision HAWK camera will use default lookup tables for the focus when the lens selection is changed, so the actual focus distances may not be as accurate as the lens that was shipped with the unit that was factory calibrated. Since default lookup tables are used, the Vision HAWK may not focus over the full focus range that is normally seen when using the factory calibrated lens.

After the lens has been changed via the parameters below, the new values will take effect the next time that the lens focus is modified.

1. Boot the Vision HAWK Smart Camera.
2. Connect to the Vision HAWK via Telnet using the IP address of the camera.
3. Send the following command after the Vision HAWK has booted:

   stopAll

   The response should be **"value = 1 = 0x1"**.
4. Send the following command:

   GetCurrentLens()

   One of these 4 responses will appear:

   1 = 15°

   2 = 30°

   3 = 45°

   4 = 12°
5. After the camera has booted, send the following command (choose the appropriate number based on the new lens):

   SetCurrentLens(1) (to change to 15° lens)

   The response should be:

   "Now Set to 1 = 15deg"

   "value = 0 = 0x0"

   SetCurrentLens(2) (to change to 30° lens)

   The response should be:

   "Now Set to 2 = 30deg"

   "value = 0 = 0x0"

   SetCurrentLens(3) (to change to 45° lens)

   The response should be:

   "Now Set to 3 = 45deg"

   "value = 0 = 0x0"

SetCurrentLens(4) (to change to 12° lens)

The response should be:

"Now Set to 4 = 12deg"

"value = 0 = 0x0"

Return Values:

int – True if successful

6. Send the following command to set focus limits:

   SetFocusLimits (min., max.)

Min. Focal Distance	**Max. Focal Distance**
100 to 4,000 (1/100 in.)	100 to 4,000 (1/100 in.)
Default = 100	**Default = 4,000**

Minimum Focal Distance

Sets the minimum focal distance to which the camera can be set – input is in inches only (no support for metric).

Maximum Focal Distance

Sets the maximum focal distance to which the camera can be set – input is in inches only (no support for metric).

	Inches		Parameter
Lens Model	Min. Distance	Max. Distance	Range
15°	1.5	9.0	150 to 900
30°	1.0	40.0	100 to 4000
45°	1.0	40.0	100 to 4000
12°	3.0	13.5	300 to 1350

7. Send the following command:

   startAll

   The response should be **"value = 1 = 0x1"**

Illumination

The standard version of the Vision HAWK Smart Camera has built-in lighting. The LEDs can be configured to operate in multiple modes – Continuous, Strobe, and Off.

Warning: Running a red LED board on a camera with a white or blue LED color profile will damage both the board and the camera.

The Vision HAWK C-Mount does not have built-in lighting. The Machine Vision Lighting Principles on the following page provide some suggestions for how to determine the appropriate external lighting for your application.

Lighting Specifications

Part Number	GMV-6800-1200G	GMV-6800-1202G	GMV-6800-1204G	GMV-6800-1206G	GMV-6800-1210G	GMV-6800-1212G
	GMV-6800-1214G	GMV-6800-1216G	GMV-6800-1222G	GMV-6800-1300G	GMV-6800-1302G	GMV-6800-1304G
	GMV-6800-1306G	GMV-6800-1310G	GMV-6800-1312G	GMV-6800-1314G	GMV-6800-1316G	GMV-6800-1322G
	GMV-6800-1400G	GMV-6800-1402G	GMV-6800-1404G	GMV-6800-1406G	GMV-6800-1410G	GMV-6800-1412G
	GMV-6800-1414G	GMV-6800-1416G	GMV-6800-1422G	GMV-6800-1500G	GMV-6800-1502G	GMV-6800-1504G
	GMV-6800-1506G	GMV-6800-1510G	GMV-6800-1512G	GMV-6800-1514G	GMV-6800-1516G	GMV-6800-1522G
Illumination	**Integrated High Output LEDs**					
Part Number	GMV-6800-1000G	GMV-6800-1002G	GMV-6800-1004G	GMV-6800-1006G	GMV-6800-1010G	GMV-6800-1012G
	GMV-6800-1014G	GMV-6800-1016G	GMV-6800-1022G	GMV-6800-1030G	GMV-6800-1032G	GMV-6800-1034G
	GMV-6800-1036G					
Illumination	**External Illumination Required**					

Machine Vision Lighting Principles

Proper lighting is critical to the success of a machine vision application. Depending on the requirements of your application, you may also need to add external lighting from Microscan's NERLITE family of machine vision lighting products.

Consider the following when setting up your application:

– Is the surface of the object flat, slightly bumpy, or very bumpy?

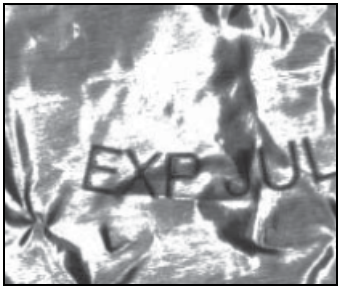
– Is the surface matte or shiny?

– Is the object curved or flat?

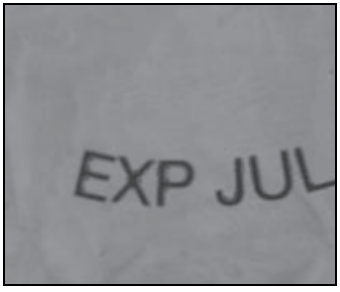
– What is the color of the object or area being inspected?

– Is the object moving or stationary?

Machine vision lighting should maximize contrast of the areas or features being inspected while minimizing the contrast of everything else.



Before correct lighting



After correct lighting with a NERLITE illuminator

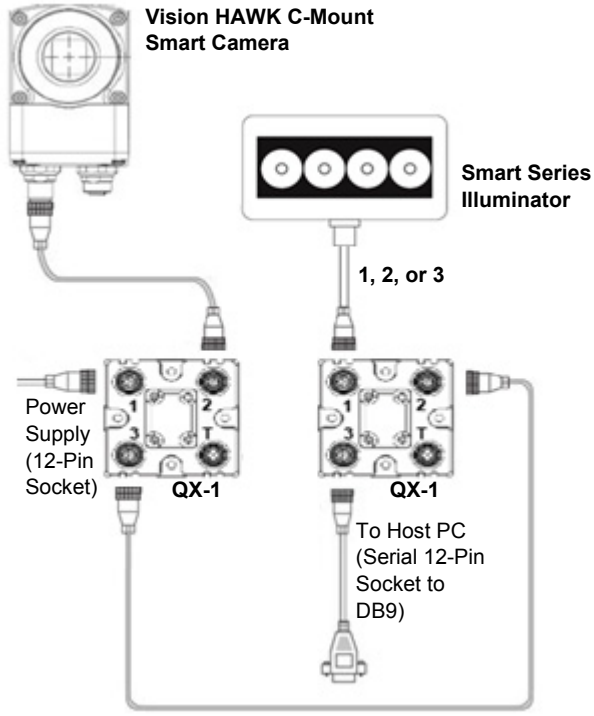
External Illumination Control and Wiring

The Vision HAWK C-Mount Smart Camera supports external lighting with Microscan's NERLITE Smart Series lights. The diagram below demonstrates how the camera and light can be configured with the QX-1 interface device. The light is controlled using the **Lighting** control in the **Camera** configuration settings of AutoVISION software.

In **Strobe** mode, the external illuminator is strobed with the exposure of the camera to maximize light for the short exposure times needed in dynamic applications.

ON/OFF allows the external illuminator to be enabled and disabled using the Vision HAWK's I/O.

	Operation	Cable
1	**Strobe**	**61-000218-01**, Smart Series-to-QX-1, Strobe, NPN
2	**ON/OFF**	**61-000207-01**, Smart Series-to-QX-1, ON/OFF
3	**Continuous ON**	**61-000204-01**, Smart Series-to-QX-1, Continuous

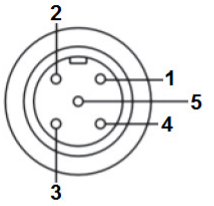


Note: The second QX-1 is only necessary if RS-232 or I/O connections are required by the application.

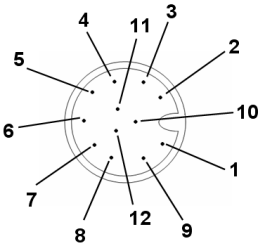
Wiring for Strobe Illumination (NPN)

In **Strobe** mode, the external illuminator is strobed with the exposure of the camera to maximize light for the short exposure times needed in dynamic applications.

Warning: Contact between Pin 5 (gray wire) and any ground or voltage source less than or equal to 3.5VDC may cause erratic operation in this configuration. Contact between Pin 5 (gray wire) and any voltage source greater than 3.5VDC will damage the illuminator.



Smart Series Illuminator Connector



Vision HAWK Connector A

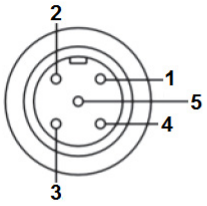
Smart Series Illuminator			Vision HAWK (Connector A)	
Pin	**Signal Name**		**Pin**	**Signal Name**
1	+24VDC	to	2	Power
2	Trigger –	to	6	Output 3
3	DC Ground	to	7 and 12	Ground and Output Common
4	Trigger +	to	2	Power
5	Dim	to	No Connection*	N/A

* Insulate Pin 5 (gray wire)

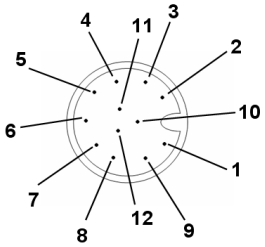
Wiring for Strobe Illumination (PNP)

In **Strobe** mode, the external illuminator is strobed with the exposure of the camera to maximize light for the short exposure times needed in dynamic applications.

Warning: Contact between Pin 5 (gray wire) and any ground or voltage source less than or equal to 3.5VDC may cause erratic operation in this configuration. Contact between Pin 5 (gray wire) and any voltage source greater than 3.5VDC will damage the illuminator.



Smart Series Illuminator Connector



Vision HAWK Connector A

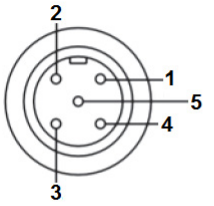
Smart Series Illuminator			Vision HAWK (Connector A)	
Pin	**Signal Name**		**Pin**	**Signal Name**
1	+24VDC	to	2 and 12	Power and Output Common
2	Trigger –	to	7	Ground
3	DC Ground	to	7	Ground
4	Trigger +	to	6	Output 3
5	Dim	to	No Connection*	N/A

* Insulate Pin 5 (gray wire)

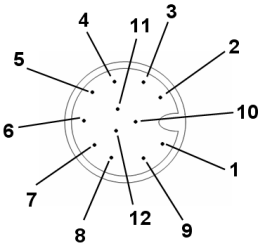
Wiring for ON/OFF Illumination (NPN Only)

ON/OFF allows the external illuminator to be enabled and disabled using the Vision HAWK's I/O.

Warning: Contact between Pin 5 (gray wire) and any voltage source greater than 3.5VDC will damage the illuminator.



Smart Series Illuminator Connector

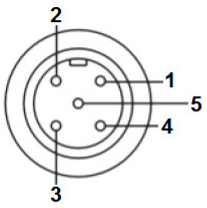


Vision HAWK Connector A

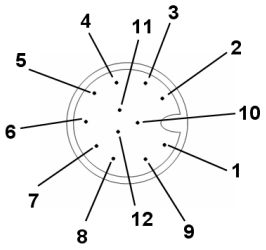
Smart Series Illuminator			Vision HAWK (Connector A)	
Pin	**Signal Name**		**Pin**	**Signal Name**
1	+24VDC	to	2	Power
2	Trigger –	to	7 and 12	Ground and Output Common
3	DC Ground	to	7 and 12	Ground and Output Common
4	Trigger +	to	2	Power
5	Dim	to	6	Output 3

Wiring for Continuous Illumination

Warning: Contact between Pin 5 (gray wire) and any ground or voltage source less than or equal to 3.5VDC may cause erratic operation in this configuration. Contact between Pin 5 (gray wire) and any voltage source greater than 3.5VDC will damage the illuminator.



Smart Series Illuminator Connector



Vision HAWK Connector A

Smart Series Illuminator			Vision HAWK (Connector A)	
Pin	**Signal Name**		**Pin**	**Signal Name**
1	+24VDC	to	2	Power
2	Trigger –	to	7	Ground
3	DC Ground	to	7	Ground
4	Trigger +	to	2	Power
5	Dim	to	No Connection*	N/A

* Insulate Pin 5 (gray wire)

Vision HAWK Color

This section describes Vision HAWK Smart Camera color functionality, which is available for the following models:

- **GMV-6800-1022G** Vision HAWK, SXGA, Color, AV+VS, C-Mount
- **GMV-6800-1222G** Vision HAWK, SXGA, Color, AV+VS, 30° Lens
- **GMV-6800-1322G** Vision HAWK, SXGA, Color, AV+VS, 45° Lens
- **GMV-6800-1422G** Vision HAWK, SXGA, Color, AV+VS, 12° Lens
- **GMV-6800-1522G** Vision HAWK, SXGA, Color, AV+VS, 15° Lens

The following topics are outlined in this section:

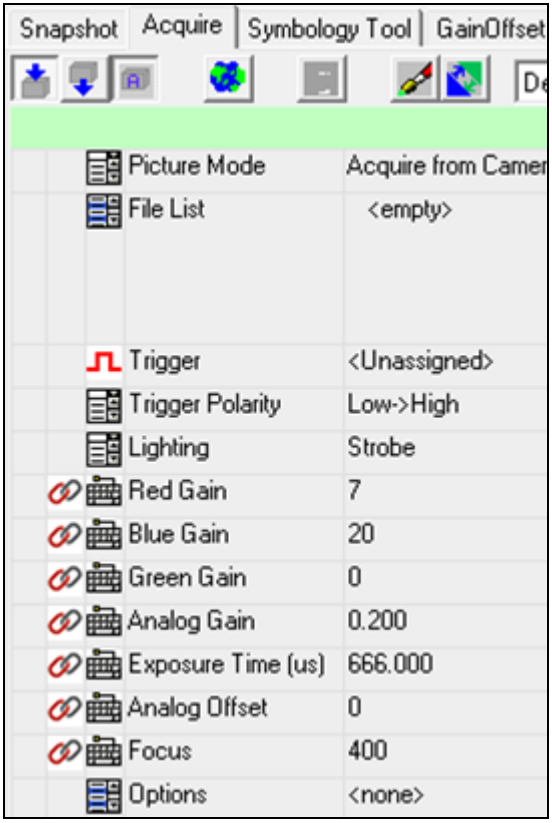
- White balance operation
- White balance factory setup
- White balance calibration
- White balance customer parameter setup
  - Ability to restore factory default values

FrontRunner Support for the Vision HAWK Color

This section outlines the white balance support provided by FrontRunner for the Vision HAWK Color.

White Balance Gain Values

The color channel gain values can be viewed by clicking the **Snapshot** step, selecting the **Acquire** tab and then activating the **Advanced** parameters as shown below:



The parameters are **Red Gain**, **Blue Gain**, and **Green Gain**. These values can be manually adjusted for optimal color fidelity or by using the white balance calibration operation outlined in the next section.

White Balance Calibration

Before running white balance calibration, place a white object such as a piece of paper in front of the camera at the current focus plane. Then initiate the white balance operation by selecting the white balance icon shown below. The color channel gains are then equalized such that the white object appears white.



After white balance calibration, the white balance gain values are updated and the results are saved as customer parameters.

Restore Preset White Balance Configuration

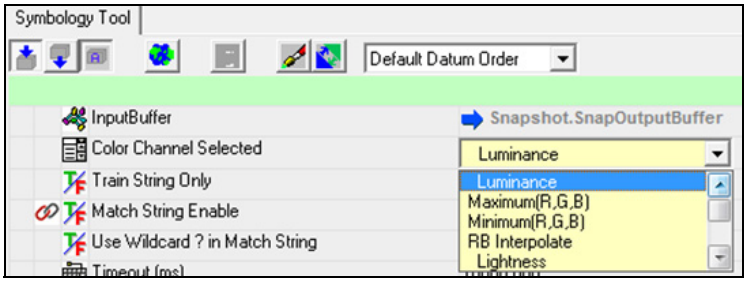
The Vision HAWK unit is pre-configured with factory calibrated white balance settings. To restore the color channel gain to these preset values, select the preset white balance icon as illustrated below:



After this operation, the white balance gain values are restored to the factory preset values and saved as customer parameters.

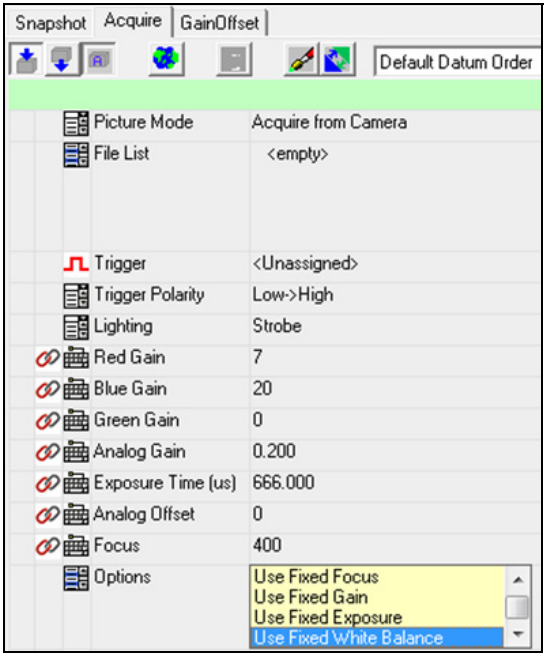
Color Channel Options

When a step is inserted in FrontRunner, the **Color Channel** or **Interpolation** operation can be selected or applied to the step as shown below:



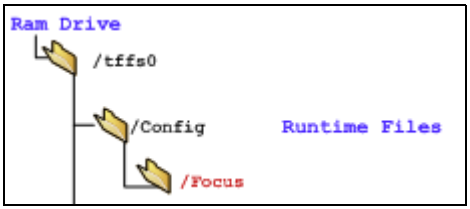
Use Fixed White Balance

The color channel gain values can be fixed by clicking the **Snapshot** step, selecting the **Acquire** tab and then activating the **Advanced** parameters. To fix white balance parameters, select the **Options** dropdown and click the **Use Fixed White Balance** option as show below:



Device parameters are referred to as camera parameters that are saved outside of a job, such that they can be applied globally or independent of a job as well as updated outside a job. These parameters include photometry settings (gain and exposure), focus, and white balance gain.

- A new job will always inherit the current “device data” so you do not need to re-calibrate the device.
- The device data for focus, photometry, white balance, and dimensional calibration exists in two places at all times:
  - In the job (copied from the device data at job creation);
  - On the device’s global /Config flash folder.



- Whenever the device parameters are calibrated, two things happen:
  - The device global data is updated in the /Config flash folder;
  - The job loaded in RAM is updated with the new data.
- The **Use Fixed White Balance** option controls whether the device parameters (white balance gains) are updated when the job is loaded from flash or downloaded to RAM with the device-wide values, or if the values last saved in the job are used instead.
  - **Normal:** Device parameters are updated when the job is loaded from flash or downloaded to RAM with the device-wide parameter values (from the **acqcfg** file).
    - If a job is opened on the PC or from a flash job slot on the device, and if a device parameter is unlocked, the value saved in the global device parameter file (acqcf) is used.
      - Job device parameter value (RAM) = Global device parameter value (/Config flash folder).

- Whenever an “unlocked” device parameter is updated, two things happen:
  - The device global data in RAM is updated;
  - The job loaded in RAM is updated.
- When a job is saved to a job slot, the device global data file in the /Config flash folder is updated.

– **Fixed:** Values last saved in the job are used.

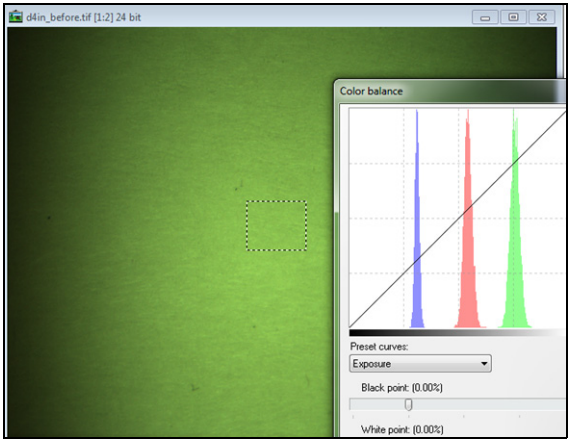
- If a job is opened on the PC or from a flash job slot on the device, and if a device parameter is locked, the value saved in the job is used.
  - Job device parameter loaded in RAM = Job device parameter opened (Flash Slot/PC).
  - The global device parameter file is untouched.
- Whenever a “locked” device parameter is updated, the job loaded in RAM is updated.

White Balance Implementation

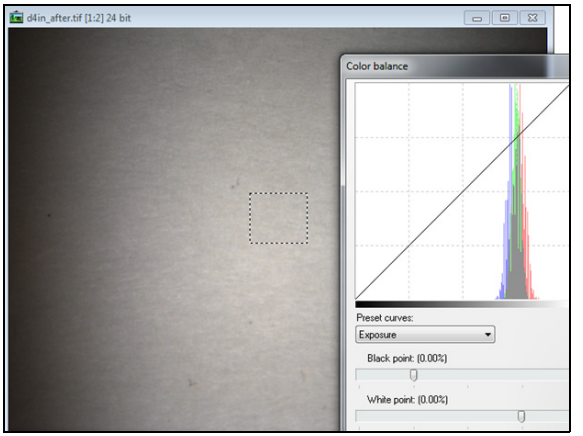
White balance is a processing operation performed to ensure proper color fidelity in a captured digital image. The image sensor does not detect light exactly as the human eye does, and so some processing or correction of the detected image is necessary to ensure that the final image realistically represents the colors of the original image. Proper white balance is required to take into account the “color temperature” of the light source, which refers to the relative “coolness” of white light. The main purpose of white balance as it relates to the Vision HAWK is to render neutral colors correctly (gray/white) and to provide consistent color results.

Factory pre-set white balance calibration should be satisfactory for most applications, but the Vision HAWK allows for user adjustment or calibration of the white balance to account for exposure to different lighting conditions.

Before white balance:



After white balance:



APPENDIX A Connector Pinouts

This section contains information about Vision HAWK Smart Camera connectors:

- M12 12-Pin Plug on page A-2
- M12 8-Pin Socket on page A-3

Vision HAWK Smart Camera Connectors

Connector A – M12 12-Pin Plug – Power, I/O, and Serial

Figure A–1 shows the M12 12-pin plug at connector A.

FIGURE A–1. Connector A – M12 12-Pin Plug

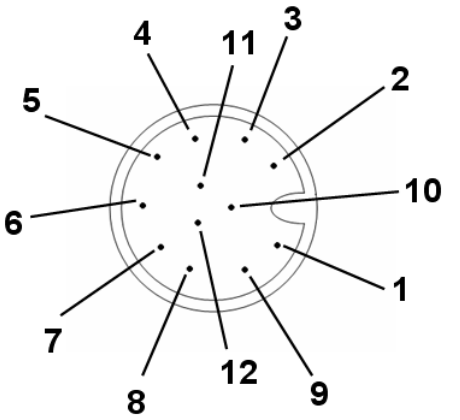


Table A–1 describes the M12 12-pin plug signals.

TABLE A–1. Connector A – M12 12-Pin Plug

Pin	Function
1	Trigger
2	Power
3	Default
4	Input 1
5	Output 1
6	Output 3
7	Ground
8	Input Common
9	Host RxD
10	Host TxD
11	Output 2
12	Output Common

Connector B – M12 8-Pin Socket – Ethernet

Figure A-2 shows the M12 8-pin socket at connector B.

FIGURE A–2. Connector B – M12 8-Pin Socket

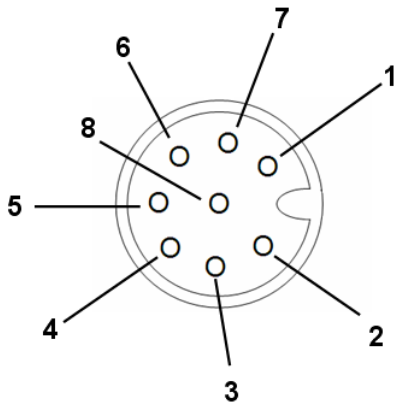


Table A-2 describes the M12 8-pin socket signals.

TABLE A–2. Connector B – M12 8-Pin Socket

Pin	Function
1	Terminated
2	Terminated
3	Terminated
4	TX (–)
5	RX (+)
6	TX (+)
7	Terminated
8	RX (–)

Appendix A Connector Pinouts

APPENDIX B

Cable Specifications

This section contains information about Vision HAWK Smart Camera cables.

Note: Cable specifications are published for information only. Microscan does not guarantee the performance or quality of cables provided by other suppliers.

TABLE B–1. Cable Part Numbers and Descriptions

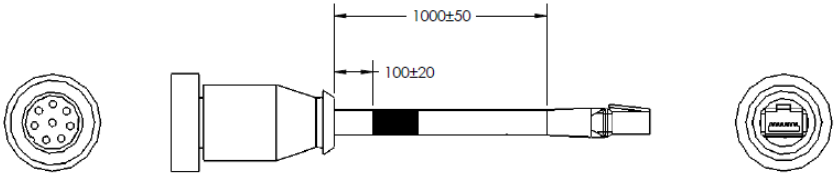
Part Number	Descriptions
61-000160-03	Cable, Host, Ethernet, M12 8-pin Plug to RJ45, 1 m
61-000162-01	Cable, Common, M12 12-pin Plug to M12 12-pin Socket, 1 m
97-000012-01	Power Supply, M12 12-pin Socket, 1.3 m
99-000020-02	Trigger, M12 4-pin Plug, NPN, Dark On, 2 m

61-000160-03 Cable, Host, Ethernet, M12 8-pin Plug to RJ45, 1 m

The 61-000160-03 Cable, Host, Ethernet, M12 8-pin Plug to RJ45, 1 m is a 1 meter cable with an 8-pin M12 connector on one end and a standard RJ45 connector on the other end.

Figure B-1 shows the 61-000160-03 Cable, Host, Ethernet, M12 8-pin Plug to RJ45, 1 m.

FIGURE B–1. Cable, Host, Ethernet, M12 8-pin Plug to RJ45, 1 m



Important: Be sure that the retaining clip on the RJ45 connector has locked into place in the Ethernet receptacle on the PC and is not being impeded by the rubber housing.

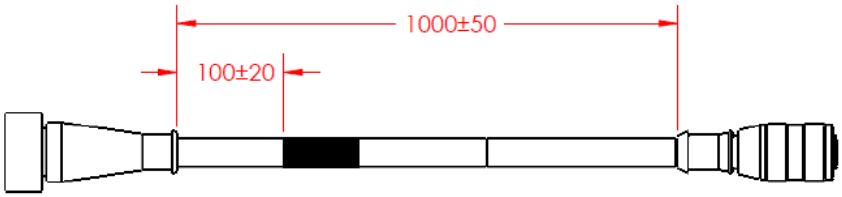
Note: A screw-down version of this cable is also available (61-000160-02).

61-000162-01 Cable, Common, M12 12-pin Plug to M12 12-pin Socket, 1 m

The 61-000162-01 Cable, Common, M12 12-pin Plug to M12 12-pin Socket, 1 m is a 1 meter cable with a 12-pin M12 plug on one end and a 12-pin M12 socket on the other end.

Figure B-2 shows the 61-000162-01 Cable, Common, M12 12-pin Plug to M12 12-pin Socket, 1 m.

FIGURE B–2. Cable, Common, M12 12-pin Plug to M12 12-pin Socket, 1 m



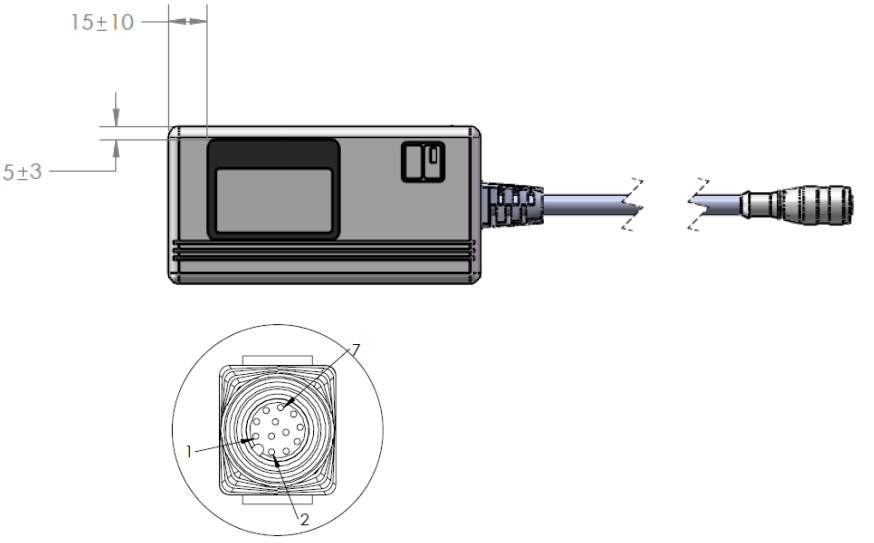
Note: A screw-down version of this cable is also available (61-000162-02).

97-000012-01 Power Supply, M12 12-pin Socket, 1.3 m

The 97-000012-01 Power Supply, M12 12-pin Socket, 1.3 m is a 90-254 VAC, +24VDC power supply.

Figure B-3 shows the 97-000012-01 Power Supply, M12 12-pin Socket, 1.3 m.

FIGURE B–3. Power Supply, M12 12-pin Socket, 1.3 m



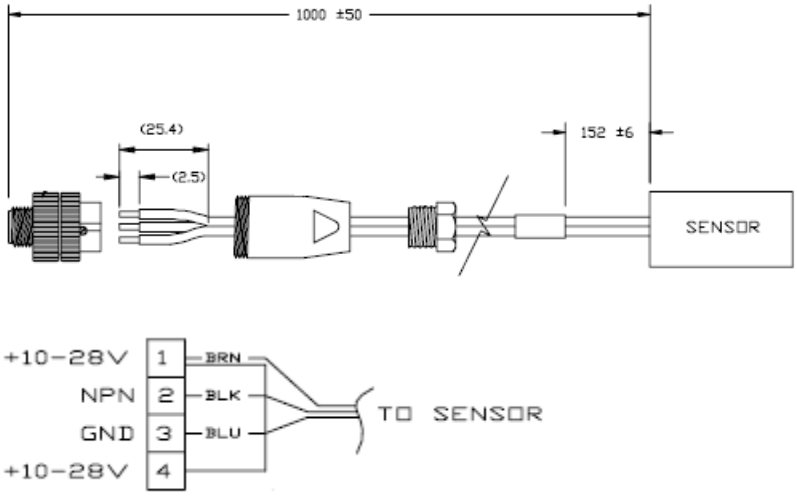
M12 12-Pin Socket

99-000020-02 Trigger, M12 4-pin Plug, NPN, Dark On, 2 m

The 99-000020-02 Trigger, M12 4-pin Plug, NPN, Dark On, 2 m is a photo sensor with a 4-pin M12 connector.

Figure B-4 shows the 99-000020-02 Trigger, M12 4-pin Plug, NPN, Dark On, 2 m.

FIGURE B–4. Trigger, M12 4-pin Plug, NPN, Dark On, 2 m



99-000020-02 Schematic

APPENDIX C

General Specifications

This section contains specifications and dimensions for the Vision HAWK Smart Camera and Vision HAWK C-Mount Smart Camera.

Vision HAWK Smart Camera General Specifications

Physical Characteristics

P/N / Model	Lens Type	Dimensions	Weight	Connector
GMV-6800-1000G	C-Mount Lens	4.03” (102.3 mm) x 2.27” (57.6 mm) x 1.59” (40.5 mm)	11 oz. (320 g)	M12 12-pin (Connector A) and M12 8-pin (Connector B)
GMV-6800-1002G				
GMV-6800-1004G				
GMV-6800-1006G				
GMV-6800-1010G				
GMV-6800-1012G				
GMV-6800-1014G				
GMV-6800-1016G				
GMV-6800-1022G				
GMV-6800-1030G				
GMV-6800-1032G				
GMV-6800-1034G				
GMV-6800-1036G				
GMV-6800-1200G	Built-In Liquid Lens (standard Vision HAWK only)	1.59” (40.5 mm) x 2.27” (57.6 mm) x 3.79” (96.3 mm)	10 oz. (280 g)	
GMV-6800-1202G				
GMV-6800-1204G				
GMV-6800-1206G				
GMV-6800-1210G				
GMV-6800-1212G				
GMV-6800-1214G				
GMV-6800-1216G				
GMV-6800-1222G				
GMV-6800-1300G				
GMV-6800-1302G				
GMV-6800-1304G				
GMV-6800-1306G				
GMV-6800-1310G				
GMV-6800-1312G				
GMV-6800-1314G				
GMV-6800-1316G				
GMV-6800-1322G				
GMV-6800-1400G				
GMV-6800-1402G				
GMV-6800-1404G				
GMV-6800-1406G				
GMV-6800-1410G				
GMV-6800-1412G				
GMV-6800-1414G				
GMV-6800-1416G				
GMV-6800-1422G				
GMV-6800-1500G				
GMV-6800-1502G				
GMV-6800-1504G				
GMV-6800-1506G				
GMV-6800-1510G				
GMV-6800-1512G				
GMV-6800-1514G				
GMV-6800-1516G				
GMV-6800-1522G				

Optics

P/N / Model	Sensor	Shutter	Focal Range	Image Acquisition
GMV-6800-1000G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)	Depends on lens	Progressive scan, square pixel Progressive scan, square pixel
GMV-6800-1002G				
GMV-6800-1004G				
GMV-6800-1006G				
GMV-6800-1010G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1012G				
GMV-6800-1014G				
GMV-6800-1016G				
GMV-6800-1022G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1030G	2/3", WUXGA (2048 x 1088) CMOS, up to 48 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1032G				
GMV-6800-1034G				
GMV-6800-1036G				
GMV-6800-1200G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)	2" (51 mm) to 8" (203 mm) (liquid lens autofocus - standard Vision HAWK only)	
GMV-6800-1202G				
GMV-6800-1204G				
GMV-6800-1206G				
GMV-6800-1210G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1212G				
GMV-6800-1214G				
GMV-6800-1216G				
GMV-6800-1222G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1300G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono			
GMV-6800-1302G				
GMV-6800-1304G				
GMV-6800-1306G				
GMV-6800-1310G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1312G				
GMV-6800-1314G				
GMV-6800-1316G				
GMV-6800-1322G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1400G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono			
GMV-6800-1402G				
GMV-6800-1404G				
GMV-6800-1406G				
GMV-6800-1410G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1412G				
GMV-6800-1414G				
GMV-6800-1416G				
GMV-6800-1422G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		
GMV-6800-1500G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Mono			
GMV-6800-1502G				
GMV-6800-1504G				
GMV-6800-1506G				
GMV-6800-1510G	1/3", WVGA (752 x 480) CMOS, up to 60 FPS, Mono	25µs to 100ms (1/40,000 to 1/10) Default = 400µs (1/2,500)		
GMV-6800-1512G				
GMV-6800-1514G				
GMV-6800-1516G				
GMV-6800-1522G	1/3", SXGA (1280 x 960) CCD, up to 20 FPS, Color	6µs to 100ms (1/150,000 to 1/10) Default = 666µs (1/1,500)		

Communications, I/O, Illumination, Laser Output

P/N / Model	Comm.	Discrete I/O	Indicators	Illumination	LED / Laser Output
GMV-6800-1000G	Ethernet	**Learn/Trigger:** Bi-directional, optoisolated, 4.5–28V rated, (13mA at 24VDC); **Outputs (1, 2, 3):** Bi-directional, optoisolated, 1–28V rated, (I_{CE} <100mA at 24VDC, current limited by user)	**LEDs:** Trigger, Pass, Fail, Mode, Power, Network Activity, I/O	External Illumination Required	N/A
GMV-6800-1002G					
GMV-6800-1004G					
GMV-6800-1006G					
GMV-6800-1010G					
GMV-6800-1012G					
GMV-6800-1014G					
GMV-6800-1016G					
GMV-6800-1022G					
GMV-6800-1030G					
GMV-6800-1032G					
GMV-6800-1034G					
GMV-6800-1036G					
GMV-6800-1200G			**LEDs:** Trigger, Pass, Fail, Mode, Power, Network Activity, I/O; **Green Flash:** Pass; **Red X:** Target	**High Output LEDs:** .564mW, 470, 525, 617nm	5.0mW max.; **Type:** Laser diode; **Red LED Output Wavelength:** 655nm nominal; **White LED Output Wavelength (GMV-6800-1022G, GMV-6800-1222G, GMV-6800-1322G, GMV-6800-1422G, GMV-6800-1522G):** 6500k nm (typ.); **Operating Life:** 50,000 hours @ 25° C; **Safety Class:** Class 1 Visible Laser
GMV-6800-1202G					
GMV-6800-1204G					
GMV-6800-1206G					
GMV-6800-1210G					
GMV-6800-1212G					
GMV-6800-1214G					
GMV-6800-1216G					
GMV-6800-1222G					
GMV-6800-1300G					
GMV-6800-1302G					
GMV-6800-1304G					
GMV-6800-1306G					
GMV-6800-1310G					
GMV-6800-1312G					
GMV-6800-1314G					
GMV-6800-1316G					
GMV-6800-1322G					
GMV-6800-1400G					
GMV-6800-1402G					
GMV-6800-1404G					
GMV-6800-1406G					
GMV-6800-1410G					
GMV-6800-1412G					
GMV-6800-1414G					
GMV-6800-1416G					
GMV-6800-1422G					
GMV-6800-1500G					
GMV-6800-1502G					
GMV-6800-1504G					
GMV-6800-1506G					
GMV-6800-1510G					
GMV-6800-1512G					
GMV-6800-1514G					
GMV-6800-1516G					
GMV-6800-1522G					

Power

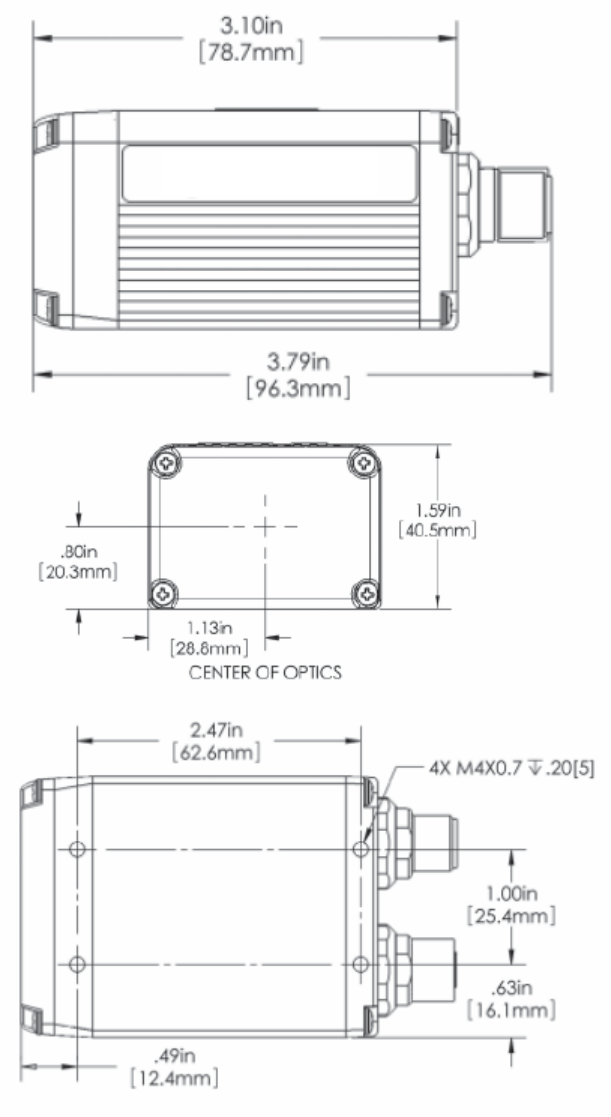
P/N / Model	Power
GMV-6800-1000G	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.)
GMV-6800-1002G	
GMV-6800-1004G	
GMV-6800-1006G	
GMV-6800-1010G	5-28VDC, 200mV p-p max ripple, 135mA at 24VDC (typ.)
GMV-6800-1012G	
GMV-6800-1014G	
GMV-6800-1016G	
GMV-6800-1022G	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.)
GMV-6800-1030G	5-28VDC, 200mV p-p max ripple, 140mA at 24VDC (typ.)
GMV-6800-1032G	
GMV-6800-1034G	
GMV-6800-1036G	
GMV-6800-1200G	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.)
GMV-6800-1202G	
GMV-6800-1204G	
GMV-6800-1206G	
GMV-6800-1210G	5-28VDC, 200mV p-p max ripple, 135mA at 24VDC (typ.)
GMV-6800-1212G	
GMV-6800-1214G	
GMV-6800-1216G	
GMV-6800-1222G	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.)
GMV-6800-1300G	
GMV-6800-1302G	
GMV-6800-1304G	
GMV-6800-1306G	
GMV-6800-1310G	5-28VDC, 200mV p-p max ripple, 135mA at 24VDC (typ.)
GMV-6800-1312G	
GMV-6800-1314G	
GMV-6800-1316G	
GMV-6800-1322G	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.)
GMV-6800-1400G	
GMV-6800-1402G	
GMV-6800-1404G	
GMV-6800-1406G	
GMV-6800-1410G	5-28VDC, 200mV p-p max ripple, 135mA at 24VDC (typ.)
GMV-6800-1412G	
GMV-6800-1414G	
GMV-6800-1416G	
GMV-6800-1422G	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.)
GMV-6800-1500G	
GMV-6800-1502G	
GMV-6800-1504G	
GMV-6800-1506G	
GMV-6800-1510G	5-28VDC, 200mV p-p max ripple, 135mA at 24VDC (typ.)
GMV-6800-1512G	
GMV-6800-1514G	
GMV-6800-1516G	
GMV-6800-1522G	5-28VDC, 200mV p-p max ripple, 170mA at 24VDC (typ.)

Operating Environment; Agency Compliance

P/N / Model	Operating Temperature	Storage Temperature	Humidity	Agency Compliance
GMV-6800-1000G	0° to 45° C (32° to 113° F)	–29° to 70° C (–20° to 158° F)	Up to 90% (non-condensing)	**CDRH**, **FCC**, **UL/cUL**, **CE (General Immunity for Light Industry:** EN 55024:1998 ITE Immunity Standard; **Radiated and Conducted Emissions of ITE Equipment:** EN 55022:98 ITE Disturbances**)**, **CB**, **BSMI**
GMV-6800-1002G				
GMV-6800-1004G				
GMV-6800-1006G				
GMV-6800-1010G	0° to 50° C (32° to 122° F)			
GMV-6800-1012G				
GMV-6800-1014G				
GMV-6800-1016G				
GMV-6800-1022G	0° to 45° C (32° to 113° F)			
GMV-6800-1030G	0° to 50° C (32° to 122° F)			
GMV-6800-1032G				
GMV-6800-1034G				
GMV-6800-1036G				
GMV-6800-1200G	0° to 45° C (32° to 113° F)			
GMV-6800-1202G				
GMV-6800-1204G				
GMV-6800-1206G				
GMV-6800-1210G	0° to 50° C (32° to 122° F)			
GMV-6800-1212G				
GMV-6800-1214G				
GMV-6800-1216G				
GMV-6800-1222G	0° to 45° C (32° to 113° F)			
GMV-6800-1300G				
GMV-6800-1302G				
GMV-6800-1304G				
GMV-6800-1306G				
GMV-6800-1310G	0° to 50° C (32° to 122° F)			
GMV-6800-1312G				
GMV-6800-1314G				
GMV-6800-1316G				
GMV-6800-1322G	0° to 45° C (32° to 113° F)			
GMV-6800-1400G				
GMV-6800-1402G				
GMV-6800-1404G				
GMV-6800-1406G				
GMV-6800-1410G	0° to 50° C (32° to 122° F)			
GMV-6800-1412G				
GMV-6800-1414G				
GMV-6800-1416G				
GMV-6800-1422G	0° to 45° C (32° to 113° F)			
GMV-6800-1500G				
GMV-6800-1502G				
GMV-6800-1504G				
GMV-6800-1506G				
GMV-6800-1510G	0° to 50° C (32° to 122° F)			
GMV-6800-1512G				
GMV-6800-1514G				
GMV-6800-1516G				
GMV-6800-1522G	0° to 45° C (32° to 113° F)			

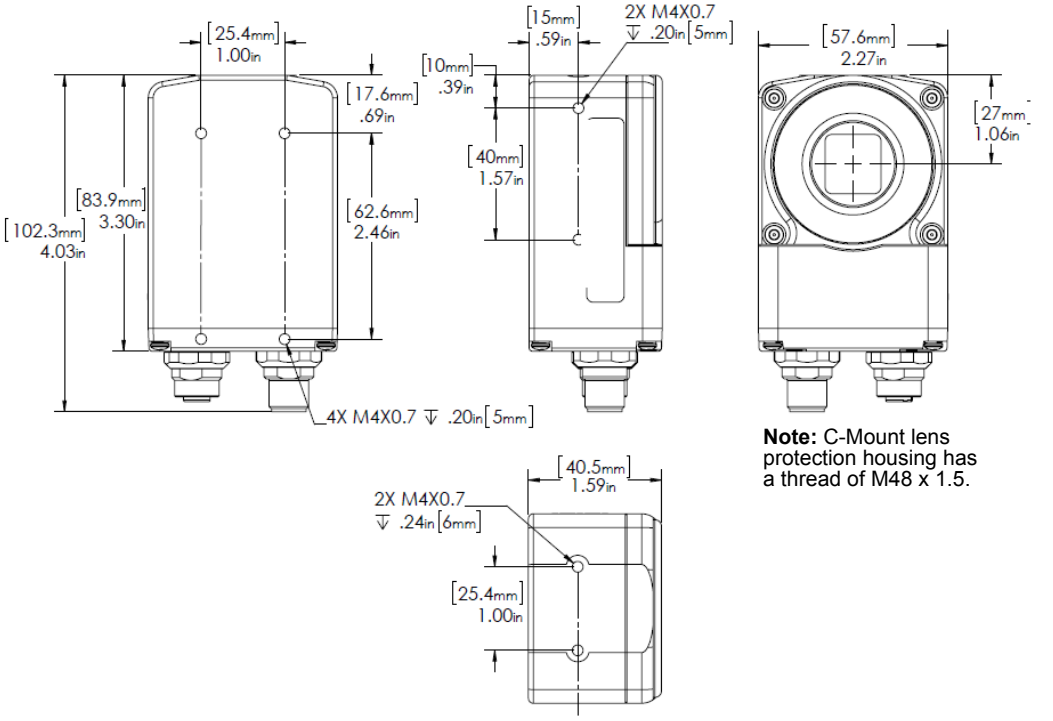
Dimensions

FIGURE C–1. Vision HAWK Smart Camera Dimensions



Note: Nominal dimensions shown. Typical tolerances apply.

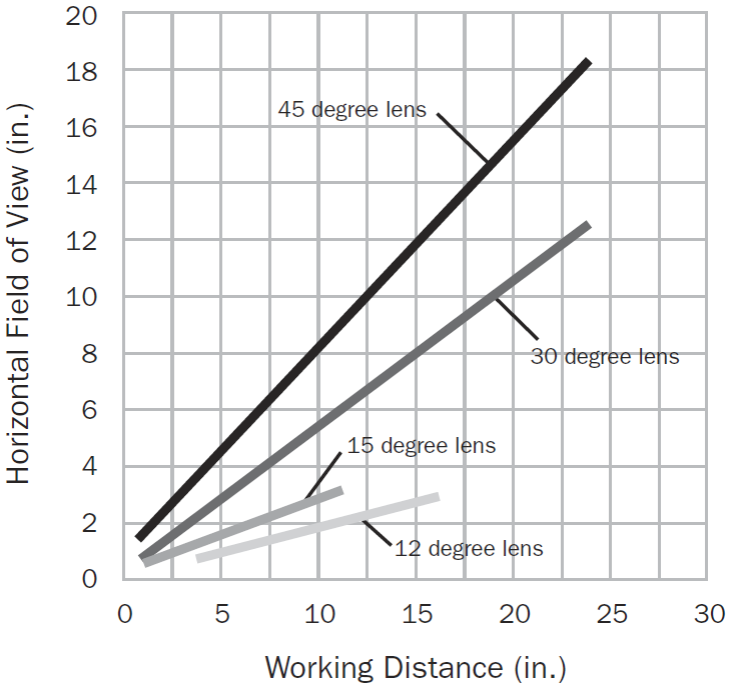
FIGURE C–2. Vision HAWK C-Mount Smart Camera Dimensions



Note: C-Mount lens protection housing has a thread of M48 x 1.5.

Note: Nominal dimensions shown. Typical tolerances apply.

Field of View and Working Distance



APPENDIX D

CloudLink Web HMI

CloudLink allows you to visualize **Microscan Link** values and images from compatible Microscan smart cameras and vision systems. It runs in your web browser, and is compatible with a wide variety of modern browsers including those found on tablets and smart phones.

This appendix contains information about CloudLink support for the Vision HAWK. Refer to *Getting Started with CloudLink* – installed in the documentation folder **C:\Microscan\Vscape\Documentation** during AutoVISION/Visionscape installation – for detailed information about configuring and using the CloudLink web HMI.

CloudLink requires an HTML5-compatible browser.

- Internet Explorer 10 or later
- Google Chrome
- Firefox
- Mobile Safari (iPhone / iPad)
- Mobile Chrome on Android devices

The following browswers were explicitly tested for compatibility:

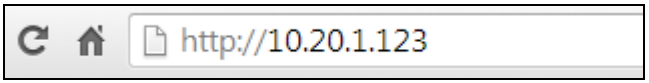
- Internet Explorer 10.0.9
- Internet Explorer 11.0.2
- Google Chrome 33.0
- Firefox 28.0

Additional Notes:

- Windows Safari is not supported.
- Internet Explorer 11 or later and Google Chrome 33 or later are recommended for extended CloudLink sessions.

Connecting

To launch CloudLink, use your favorite web browser and enter the address of your device in the browser's address bar. For example, if you have a Microscan smart camera on your network at address **10.20.1.123**, you would enter:



CloudLink also works with **Visionscape Software** and with **AutoVISION**'s Emulator.

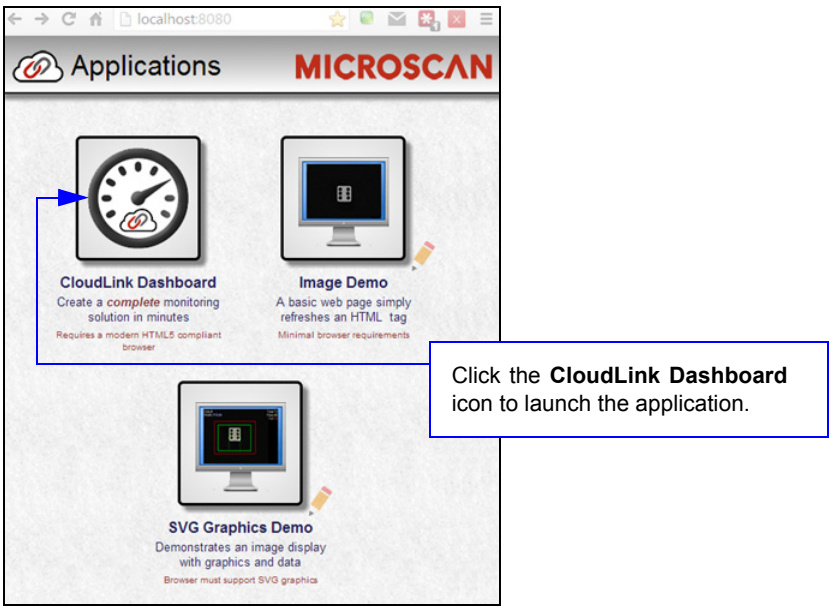
To connect to a software-based job running in FrontRunner or AutoVISION:

First, be sure the job is running, and then type the following into your browser's address bar:



Note: You must specify port **8080** for a PC-based connection. If you are connecting to a PC-based system from a different machine on the network, use the IP address of the PC instead of the local host. For example, use **http://10.20.1.234:8080** if the PC's IP address is **10.20.1.234**.

Once you press the **Enter** key, you should see the following home page:



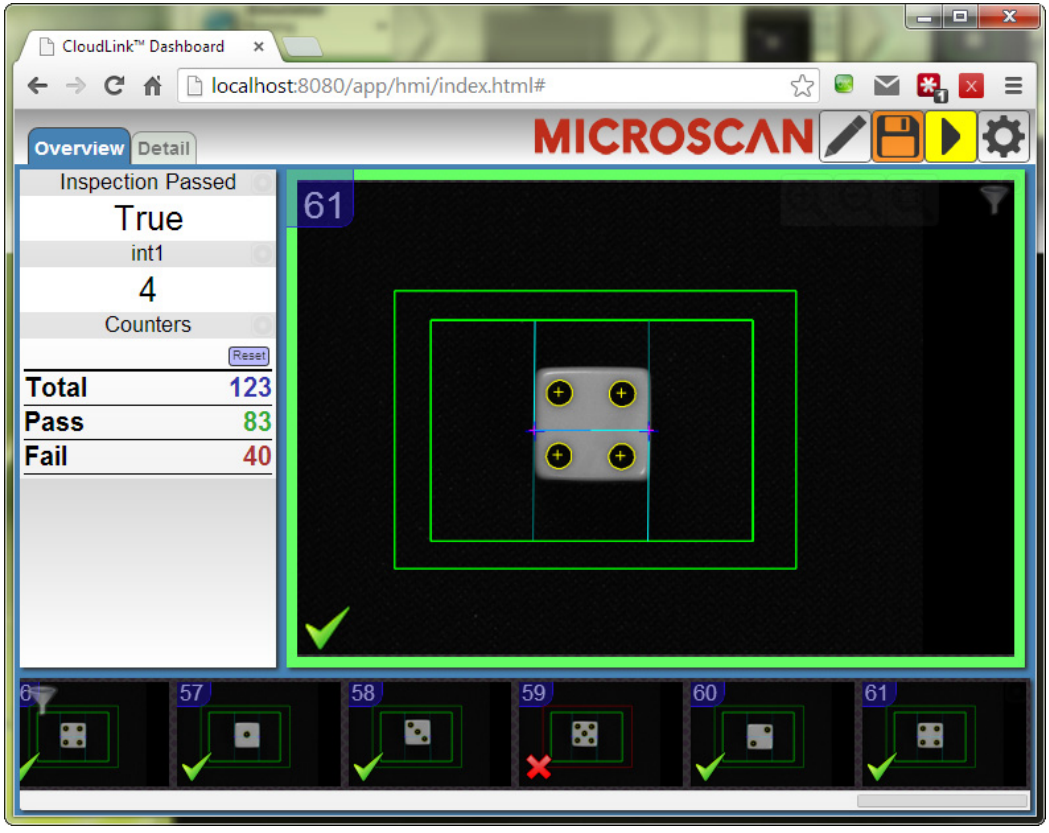
Application Overview

The CloudLink Dashboard user interface is a single page web app-style application. Most web pages show information that can typically extend beyond the bottom of the browser window, requiring the user to scroll to see it. They typically contain links to other pages, which is how the user navigates around a web site.

In contrast, CloudLink behaves more like an application, expanding to fill the browser window, and automatically adapting to any changes in the dimensions of the window. Although CloudLink allows you to define and use multiple display pages, they are all contained within a single web page.

The browser stores a maximum of 50 images. The camera stores images, image thumbnails, and data records that can be requested via the web page or API. When memory is full, the camera will first delete full-size images, then thumbnails, and ultimately the data records on a first in-first out basis.

This is a typical view of a CloudLink page.



Note: CloudLink does not currently support display of color images from color cameras.

Application Bar

The **Application Bar** is located at the top of the CloudLink interface.



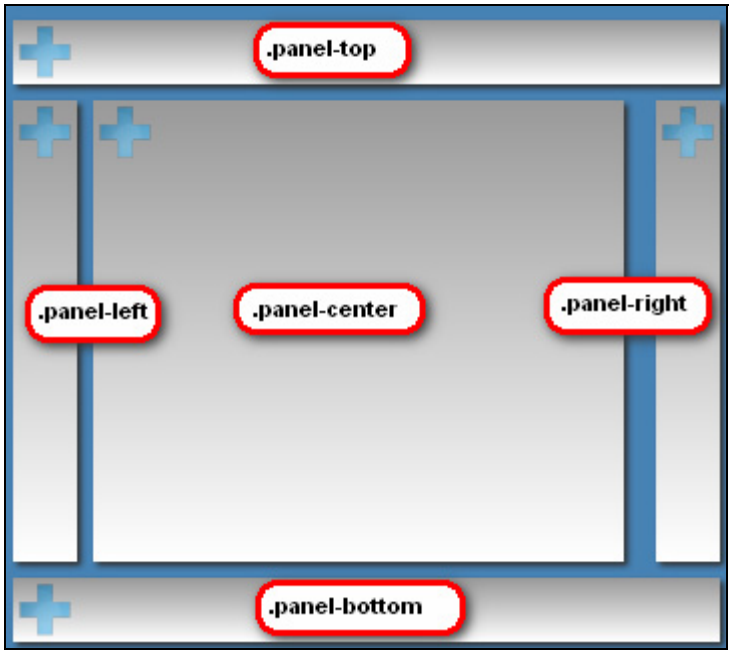
There are three components to the Appplication Bar:

- **A set of page selection buttons.** In the example above they appear as tabs, but the style can be customized if necessary.
- **A logo.** The position and contents of the logo can be customized.
- **A toolbar.** The toolbar provides access to various CloudLink settings and modes. The position and size of the toolbar can be customized.

Pages, Panels, and Widgets

The main area of CloudLink displays one of a number of **pages**. If there is more than one page defined, you can switch between them by using the page selection buttons on the application bar, or by using the arrow keys on your keyboard.

Each page is organized into a set of regions called **panels**. The following image shows an empty page to demonstrate the arrangement of the panels on a page.



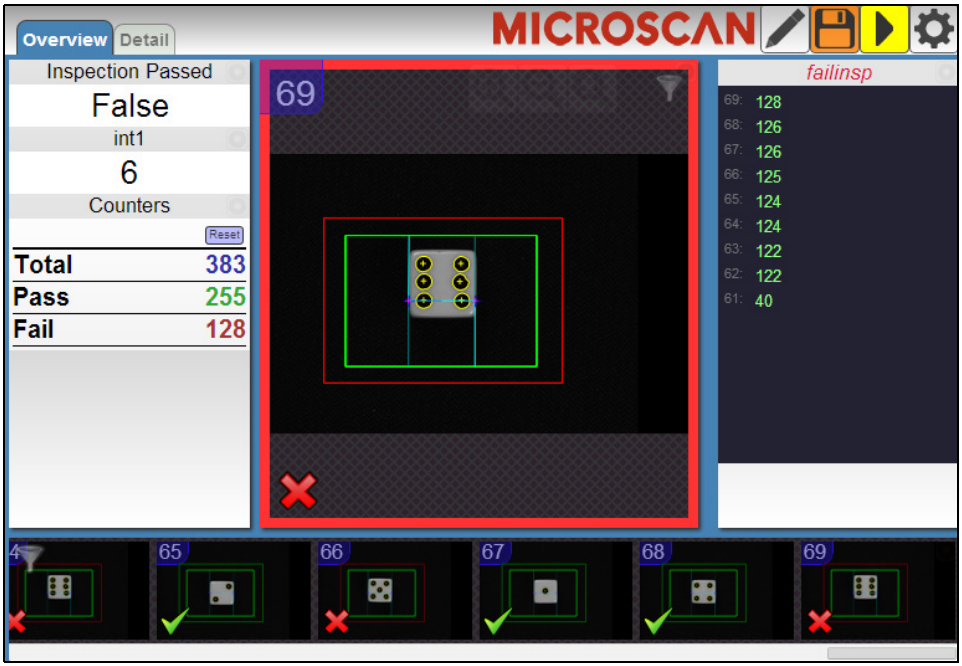
Note the names, which start with **.panel-**. It is not necessary to know these names to use CloudLink; however they do have significance if there should be need for customization. Customizing CloudLink requires the modification of CSS (Cascading Style Sheets). The names shown correspond to the CSS class selector for that panel.

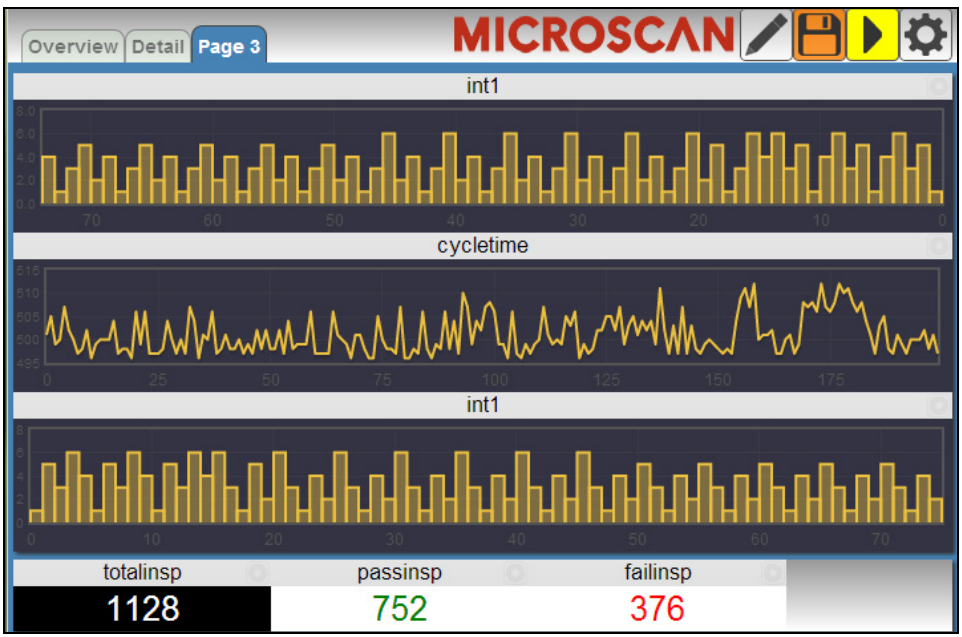
The purpose of the panels is to act as containers for a number of **widgets**. Each widget has the ability to visualize and interact with one or more items of inspection data such as Microscan Link values, inspection counters, timing information, or images.

Each panel has special layout and behavior properties that can be exploited to create a wide variety of different layouts. The following table summarizes the position and properties of each panel:

Panel	Position	Properties
.panel-top .panel-bottom	Docked at the top or bottom of the page, fully stretching from the left edge to the right edge of the window.	Certain types of widgets are automatically stretched to fill the panel space horizontally. For example, if you should add a chart or a filmstrip to these panels, by default they will automatically stretch.
.panel-left .panel-right	Docked at the left or right of the page, they extend between .panel-top and .panel-bottom. The width of these panels is fixed (by default 194 pixels)	Widgets in these panels are typically stretched to fit exactly in the fixed width. If there is not enough vertical room to display all the content, scroll bars are made available.
.panel-center	This panel automatically stretches to fill the center area bounded by the other panels	An image widget placed in this panel automatically stretches to occupy the entire panel area. Any other widgets would then appear over the image.

If a panel does not have content (i.e. no widgets are placed in it), it is hidden from view, with the other panels adjusted to occupy the available space. Examples of possible page layouts:





APPENDIX E

Serial Commands

This section provides descriptions of the serial commands that can be sent to the camera via TCP (Telnet) port, AutoVISION Terminal, or HyperTerminal.

Serial Command Syntax

< > = Required argument. Replace appropriately.

For example:

-u <DB_User_name> becomes **-u av** where **av** replaces **DB_User_name**.

| = Mutually exclusive arguments. Choose one from the list.

{ } = Used with **|** to specify a list of choices for an argument.

[ ] = Optional parameter.

Important: Unless otherwise stated, commands will respond with **!OK** on success and **!ERROR** on failure.

GETIMAGE <-transfer=ymodem> [-format={jpg|png}] [-quality={0-100}] [-woi=left,top,right,bottom] [-inspection=n]

Initiates serial transfer of inspection image (RS-232 only).

Note: This command always returns the last (most recent) image.

-transfer=ymodem is currentlynot optional - only Ymodem protocol is supported.

-format={jpg|png} specifies the format of the image. If omitted, the image format is JPG.

-quality=*n* specifies a JPG compression quality of ***n*** less than or equal to 100. The default quality is **80** if not specified.

Note: The PNG format provides lossless image compression. If **format** is set to **PNG**, the **quality** setting does not apply.

woi=left,top,right,bottom specifies a rectangular area of the image to be included in the output image. If omitted, the full image buffer is returned.

-inspection=*n* specifies the inspection from which to retrieve an image. The image will be from the first snapshot within that inspection. If not specified, the image will be from the first inspection that does contain a snapshot.

The following example will retrieve an image from the camera with these settings: **Protocol:** ymodem; **Format:** png; **Quality:** N/A; **Inspection:** second inspection.

GETIMAGE –transfer=ymodem –format=png –inspection=2

The following example will retrieve an image from the camera with these settings: **Protocol:** ymodem; **Format:** jpg (default); **Quality:** 50; **Inspection:** first inspection (default).

GETIMAGE –transfer=ymodem –quality=50

ONLINE

Starts all inspections.

OFFLINE

Stops all inspections.

TRIGGER

Triggers an inspection.

vt [n]

Triggers an inspection by pulsing a Virtual I/O point.

For example:

vt 1

will return pulse **VIO1**. The inspection will run if it is configured to use **VIO 1** as a trigger.

If specified, the VIO index must be in the allowed range for Virtual I/O points within Visionscape. The virtual I/O line will be set high then low.

If VIO Index is not specified, VIO1 is assumed.

Fail Return: Return **!ERROR** followed by the reason for the failure.

For example:

!ERROR No such trigger

when the index specified '**n**' is out of range of virtual triggers.

REBOOT [-noload]

Reboots the device.

-noload = do not load BOOT job.

MEMAVAIL [-cp]

Returns available memory for device or coprocessor.

MEMCONTIG [-cp]

Returns maximum memory block for device or coprocessor.

MEMFRAGS [-cp]

Returns memory fragments for device or coprocessor.

MEMINFO [-cp] [-v]

Returns memory summary "avail/contig/frags" for device or coprocessor. Verbose.

VERSION

Returns Visionscape software version.

JOBSAVE [-slot=]<n>

Saves current job to slot ***n***.

JOBDELETE {[-slot=]n|-all}

Deletes job in slot ***n***, or all jobs if **-all**.

Important: Does not delete the current job loaded in camera memory.

JOBINFO [[-slot=]n] [-v]

Gets job summary or info about slot ***n***.

JOBINFO with no arguments returns a list of all jobs on the device.

-v = Verbose ***n***. This option shows the amount of space that would be freed if the job were deleted. It also lists the total disk space and free disk space.

JOBBOOT [-slot=]<n>

Sets bootup job slot ***n*** (RS-232 only).

JOBDOWNLOAD <-transfer={ymodem|ftp}> [-size=value] [-c]

Downloads a **.avz** job file via the specified transfer method (ymodem supported only over RS-232; FTP supported only over network connection).

The **ymodem transfer method** only requires that the user send the .avz file via the ymodem protocol over RS-232, and the job will load automatically after the transfer is complete.

The **FTP transfer method** requires the user to perform the following steps to load the job:

1. **JOBDOWNLOAD: -transfer=ftp [-size=avpsizeinbytes]**
2. User FTPs the job to /streamd0
3. **JOBLOAD: -mem -r**

Step 1: Pre-creates a fixed-size /streamd0 RAMdisk to receive the .avz over FTP. If size is omitted, the default RAM disk size is used to create /streamd0. The size of /streamd0 is limited to (available contiguous RAM – minimum target contiguous RAM) / 2.

Camera Model	*Default RAM Disk Size*	*Minimum Target Continuous RAM*
Vision HAWK	10 MB	15 MB

Step 3: Loads .avz from /streamd0 into RAM, deletes the RAMDisk /streamd0, and optionally starts the job (if -r is specified).

JOBLOAD {[-slot=]<n>|-mem} [-r]

Loads a job from slot *n* or from memory when used with the JOBDOWNLOAD command via FTP.

-r = Start inspections.

SET <tagname> <value>

Sets value of a global tag.

The tagname must correspond to one of the supported tags within the device. Use the **INFO** command to get a full list of tags and services, as well as attributes of the tag and list of subtags.

The value can contain spaces.

The command is terminated by a carriage return and/or line feed character.

The value can be a list of comma-separated items to set a sequence of tags:

Send **SET int1 1, 2, 3** to set int1 = 1, int2 = 2, int3 = 3.

The AVP service allows setting of step and datum information from the job tree using forward slash '/' in the symbolic name path. **SET avp/insp1/snapshot1/acq1/gain 2.0** paths are not case-sensitive and do not need to be fully qualified if unique.

SET avp/acq1/gain 2.0 will set the same gain value if there is only one acquire.

Control tags in the AVP service such as **START**, **STOP**, and **TRIGGER** act as momentary switches. **SET avp.start 1** is equivalent to the **ONLINE** command. **avp.start** will reset immediately and always read as **0**.

Success Return: On success will return **!OK** followed by an echo of the command.

For example:

!OK SET matchstring1

Fail Return: On failure will return **!ERROR** followed by the reason for the failure.

For example:

!ERROR Tag matchstring66 not found

GET {tagname|service|service.tagname}

Gets value of a global tag.

The tagname must correspond to one of the supported tags within the device. Use the **INFO** command to get a full list of tags and services, as well as attributes of the tag and list of subtags.

The command is terminated by a carriage return and/or line feed character.

Include an index to get a single value from an array such as **GET int1**. If the index is omitted, the full array of values will be returned in a comma-separated list of values.

Send **Get {tagname|service.tagname|service}** to get the value of a tag within the global data service. To get the value of a tag within another service, prefix the tagname with the service name. For example, a **GET <service.tagname>** command such as **GET eip.input** for the EIP input assembly.

The AVP service allows retrieval of step and datum information from the job tree using forward slash '/' in the symbolic name path. **GET avp/insp1/snapshot1/status** paths are not case-sensitive and do not need to be fully qualified if unique.

GET avp/snapshot1/status will return the same result if there is only one inspection.

When issued against a step, **GET avp/snapshot1** will return the values for all datums.

Success Return: On success will return the value stored in the tag.

For example:

ABCD

Fail Return: On failure will return !ERROR followed by the reason for the failure.

For example:

!ERROR Tag matchstring66 not found

INFO [tagname|service]

Gets information about a tag or service.

INFO with no arguments gets a list of services.

INFO <service> gets a list of tags in that service.

INFO <service.tagname> gets attributes of the tag as well as a list of subtags.

The AVP service allows retrieval of step and datum information from the job tree using forward slash '**/**' in the symbolic name path. **INFO avp/insp1/snapshot1/status** paths are not case-sensitive and do not need to be fully qualified if unique.

INFO avp/snapshot1/status will return the same result if there is only one inspection.

When issued against a step, **INFO avp/snapshot1** returns properties of the step, a list of child datums, and a list of child steps. Child steps are indicated by a trailing forward slash.

QUERYAUTOCAL

Returns photometry settings: Gain, Exposure, and Focus.

AUTOCAL

Performs automatic calibration of photometry settings: Gain, Exposure, and Focus.

TARGET {0|1|off|on}

Turns targeting LEDs On or Off.

target 1 = Turn Target On

target 0 = Turn Target Off

CHECKSUM {BOOT | KERNEL | BOOTPARAM}

Gets a checksum on an individual part of the system.

HELP

Returns a list of all serial commands showing correct syntax and functionality descriptions.

APPENDIX F

Vision HAWK Boot Modes

This section describes the Vision HAWK's Diagnostic Boot Mode and Boot Error Mode.

Diagnostic Boot Mode

The Vision HAWK supports a special boot mode used for diagnostics and recovery. There are two ways in which the camera can be put into this mode:

1. This method requires an Ethernet connection between the host PC and Vision HAWK. Power-on the unit and hold the AutoVISION button down until the green flash illuminates once. For C-Mount versions, hold the button down for approximately 30 seconds. The unit is now configured for IP address 192.168.0.10 with subnet mask 255.255.255.0. Establish a telnet connection between the host PC and Vision HAWK. The [SAFE-KERNEL] prompt is displayed.

2. This method requires a QX-1 and a serial connection between the host PC running a terminal emulator and Vision HAWK camera. Power-on the unit and hold down the Tab key down for several seconds. The unit will boot to a [SAFE-KERNEL] prompt with communication settings of 115200, N, 8, 1 (baud, parity, data bits, stop bits).

Once the unit is booted, there are many possible actions the user can take. However, the most useful actions are listed below.

In rare situations, the boot job executed at camera startup can cause unexpected behavior. If this is the suspected case, it is possible to disable loading and running of the boot job at startup using the following command.

[SAFE-KERNEL] BP_UpdateStartupOptions(0, 0)

Note that the loading and running of the boot job is automatically re-enabled the next time a job is saved to camera flash from AutoVISION or FrontRunner.

At boot time, the system configures itself using a set of information known as boot parameters. To obtain a list of the current configuration's boot parameters, issue the following command:

[SAFE-KERNEL] BP_Dump()

Should your device need to be configured with different IP information, follow the example below and substitute the appropriate settings for IP address, subnet mask, and gateway address, respectively.

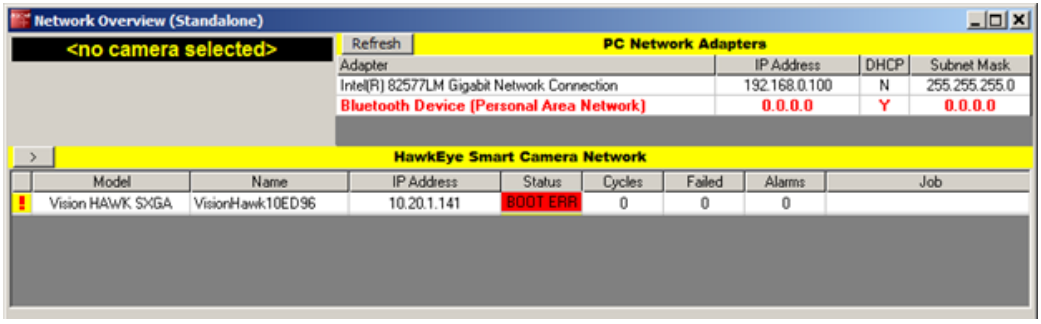
[SAFE-KERNEL] BP_UpdateIP(“192.168.0.10”, “255.255.255.0”, “192.168.0.100”)

It is possible to configure the system to acquire its IP address via DHCP or to use a static IP address. Issue the following command with a ‘0’ for static IP or a ‘1’ for DHCP.

[SAFE-KERNEL] BP_UpdateDHCP(0)

Boot Error Mode

The Vision HAWK enters an error mode on boot if it’s unable to fully load Visionscape. This mode is visually displayed to the user by flashing the Error LED along with the OUTPUT 1, OUTPUT 2, and OUTPUT 3 LEDs on the front of the unit. Additionally, this mode is represented as a “BOOT_ERR” in the Network Overview tool.



If you encounter this error condition, you will need to reload the firmware using the Smart Camera Firmware Update Tool.

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