MICROSCAN.

Vision MINI Xi Smart Camera Guide

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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.

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

Warning and Caution Summary

- Viewing the Vision MINI Xi's LED output with optical instruments such as magnifiers, eye loupes, or microscopes within a distance of 100 mm could cause serious eye injury.
- Maximum LED output: .564 mW; Wavelength: 470 nm; 525 nm; 617 nm.
- Location of the Vision MINI Xi's LED aperture window:

 LED Aperture Window

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

IMPORTANT: The Vision MINI Xi is intended for connection to a UL-listed direct plug-in power unit marked Class II and rated 24 VDC at 5 Watts, or greater if using electrical accessories.

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.

WARNING: Baseplate temperature may exceed 70° C at maximum operating temperature and may cause burns. Use caution when handling.

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Contents

PREFACE — # Welcome

Purpose of This Manual

This manual contains detailed information about how to configure and operate the Vision MINI Xi 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.

Preface

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CHAPTER 1 Introduction

FIGURE 1–1. Vision MINI Xi Smart Camera

Product Summary

The Vision MINI Xi Smart Camera is designed for reliable vision performance in embedded identification and inspection applications. As the world's smallest fully-integrated vision system, the Vision MINI Xi's compact size and wide angle optics provide the best performance available for machine vision tasks at close range.

The Vision MINI Xi allows OEM design engineers to implement inspection, color matching, symbol decoding, OCR, and more, in a single compact solution. The camera's small form factor allows flexible positioning in tight spaces. The lightweight and durable magnesium alloy case weighs less than 2 ounces.

Pressing the AutoVISION button at the back of the Vision MINI Xi 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 MINI Xi, 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

- World's smallest fully functional vision system

- Ethernet communications

- OEM-ready for easy integration

- Integrated lighting and autofocus lens

- Flexible programming options for custom applications

- AutoVISION button for automatic targeting, calibration, and triggering

- Simplified configuration with AutoVISION software

Applications

- Part presence/absence

- Color detection and matching

- Medical device inspection

- Fiducial location

- Part location/orientation detection

- Packaging

- Robotics

- Auto ID (Data Matrix and other 2D symbologies, 1D, OCR)

Package Contents

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

- Vision MINI Xi Smart Camera — Your package contains one of the available models listed in Table 1–1.

- AutoVISION Software Installation USB Drive

Vision MINI Xi Smart Camera Models

Table 1–1 lists and describes the Vision MINI Xi Smart Camera models, including acquisition modes and resolutions.

TABLE 1–1. Vision MINI Xi Smart Camera Models

Part Number	Vision MINI Xi Smart Camera Model
GMV-6310-1100G	Vision MINI Xi, Ethernet, SD, WVGA, AutoVISION
GMV-6310-1102G	Vision MINI Xi, Ethernet, SD, WVGA, AutoVISION+Visionscape
GMV-6310-1104G	Vision MINI Xi, Ethernet, SD, WVGA, AutoVISION+Verification/OCV
GMV-6310-1106G	Vision MINI Xi, Ethernet, SD, WVGA, AutoVISION+Visionscape+Verification/OCV
GMV-6310-1110G	Vision MINI Xi, Ethernet, SD, SXGA, AutoVISION
GMV-6310-1112G	Vision MINI Xi, Ethernet, SD, SXGA, AutoVISION+Visionscape
GMV-6310-1114G	Vision MINI Xi, Ethernet, SD, SXGA, AutoVISION+Verification/OCV
GMV-6310-1116G	Vision MINI Xi, Ethernet, SD, SXGA, AutoVISION+Visionscape+Verification/OCV
GMV-6310-1172G	Vision MINI Xi, Ethernet, SD, QXGA, Color, AutoVISION+Visionscape
GMV-6310-1200G	Vision MINI Xi, Ethernet, HD, WVGA, AutoVISION
GMV-6310-1202G	Vision MINI Xi, Ethernet, HD, WVGA, AutoVISION+Visionscape
GMV-6310-1204G	Vision MINI Xi, Ethernet, HD, WVGA, AutoVISION+Verification/OCV
GMV-6310-1206G	Vision MINI Xi, Ethernet, HD, WVGA, AutoVISION+Visionscape+Verification/OCV
GMV-6310-1210G	Vision MINI Xi, Ethernet, HD, SXGA, AutoVISION
GMV-6310-1212G	Vision MINI Xi, Ethernet, HD, SXGA, AutoVISION+Visionscape
GMV-6310-1214G	Vision MINI Xi, Ethernet, HD, SXGA, AutoVISION+Verification/OCV
GMV-6310-1216G	Vision MINI Xi, Ethernet, HD, SXGA, AutoVISION+Visionscape+Verification/OCV
GMV-6310-1272G	Vision MINI Xi, Ethernet, HD, QXGA, Color, AutoVISION+Visionscape

Part Number Structure

GMV	6310	Comm	Lens	Sensor	Options	RoHS
General Machine Vision	Vision MINI Xi	1 = Ethernet	1 = Standard Density	0 = WVGA	0 = AutoVISION	G = RoHS compliant
				1 = SXGA	2 = AutoVISION + Visionscape	
			2 = High Density	7 = Color QXGA	4 = AutoVISION + Verification/OCV	
					6 = AutoVISION + Visionscape + Verification/OCV	

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CHAPTER 2 System Components

This section contains information about system components as well as information to help you connect the Vision MINI Xi 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 MINI Xi Smart Camera hardware components.

TABLE 2–1. Vision MINI Xi Smart Camera Hardware Components

Part Number	Description
Demo Kit	
98-000215-01	Demo Kit (camera not included)
Power Supply	
97-000012-01	Power Supply, M12 12-Pin Socket, 1.3 m
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
61-000165-02	Cordset, Host, Serial M12 12 pin Plug to DB9 Socket, 3M
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
Mounting Options	
20-610024-01	Trigger Connector, 4-pin Plug (Field-Wireable Screw Terminal) (Self-Wiring)
98-000048-01	Mounting Arm / Adapter, 4"
98-000053-01	Mounting Arm Extension, 4"
98-000053-02	Mounting Arm Extension, 3"
98-000054-01	Mounting Stand Base Plate
98-000057-01	Bracket, Through-Hole Mount
98-000059-01	Bracket, Angle Mount
98-000060-01	Bracket, Side Mount
98-000088-01	Right Angle Mirror
99-000053-01	Bracket, Smart Series Ring Illuminator 60/70 mm
99-000054-01	Bracket, Smart Series Ring Illuminator 100 mm
99-000055-01	Bracket, Smart Series DOAL Illuminator 50 mm
99-000057-01	Bracket, Smart Series DOAL Illuminator 75 mm
99-000059-01	Bracket, Smart Series DOAL Illuminator 100 mm
Object Detectors	
99-000020-01	Photo Sensor, M12 4-Pin Plug, NPN, Dark Off, 2 m
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

Front

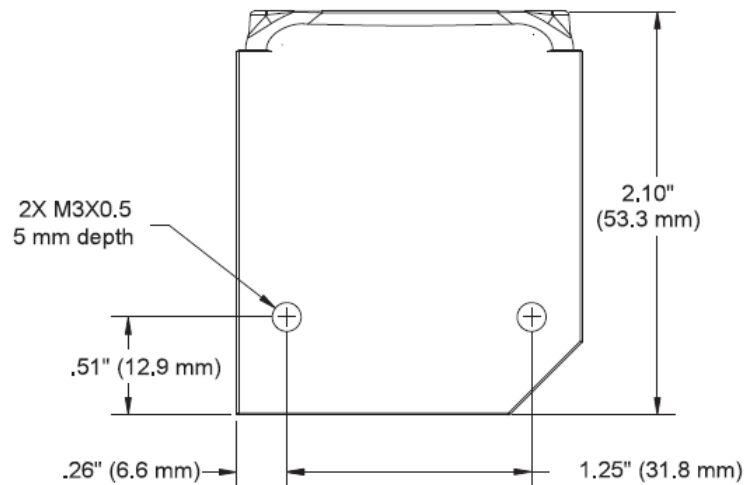Figure 2–1 shows the front of the Vision MINI Xi Smart Camera.

FIGURE 2–1. Front
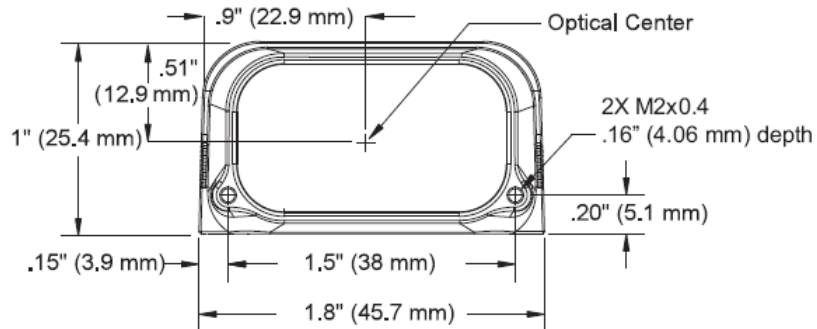
Base

Figure 2–2 shows the base of the Vision MINI Xi Smart Camera.

FIGURE 2–2. Base

Back

Figure 2-3 shows the back of the Vision MINI Xi Smart Camera.

FIGURE 2–3. Back

AutoVISION Button

Cable (attached)

Status Indicators (TRIG, PASS, FAIL, MODE, LINK/ACT, PWR)
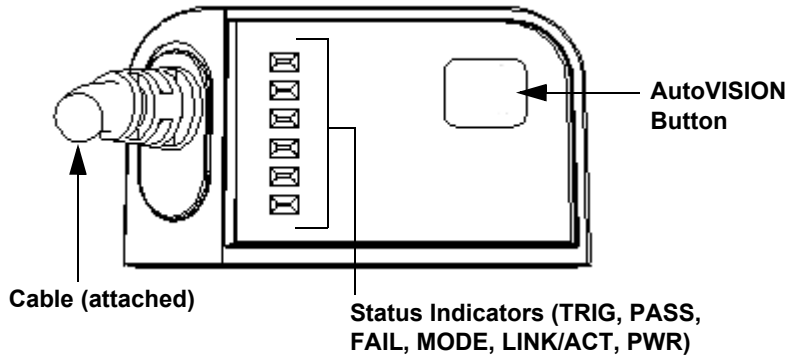
Important Label Information

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

- P/N – The Microscan part number of your Vision MINI Xi Smart Camera.
- S/N — The serial number of your Vision MINI Xi Smart Camera.
- MAC — The MAC address of your Vision MINI Xi Smart Camera.
- Type — The model type of your Vision MINI Xi Smart Camera.

Mounting and Wiring the Vision MINI Xi Smart Camera
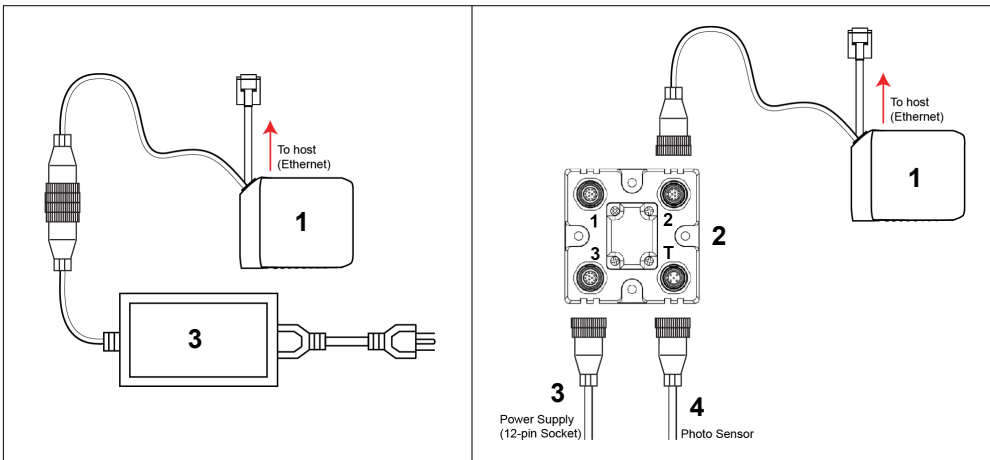
Ethernet Standalone without QX-1

• Mount the camera (**1**) as required by the application.
• Ensure that the camera (**1**) is the optimal distance of 2" to 6" from the inspection area.
• Connect the M12 (power and I/O) end of the camera's cable to the power supply (**3**).
• Connect the RJ45 (Ethernet) end of the camera's cable to the host.
• Plug in the power supply (**3**) and apply power to the camera (**1**).

Ethernet Standalone with QX-1

• Mount the camera (**1**) as required by the application.
• Ensure that the camera (**1**) is the optimal distance of 2" to 6" from the inspection area.
• Connect the M12 (power and I/O) end of the imager's cable to "2" on the QX-1 (**2**).
• Connect the RJ45 (Ethernet) end of the imager's cable to the host.
• Connect the power supply (**3**) to "3" on the QX-1.
• Connect the photo sensor (**4**) to "T" on the QX-1.
• Plug in the power supply (**3**) and apply power to the camera (**1**).

***Ethernet Standalone
without QX-1***

***Ethernet Standalone
with QX-1***

Direct Input / Output Diagrams

Trigger Input Example

Trigger, New Master Inputs: 3 to 24V rated, 1mA @ 5VDC
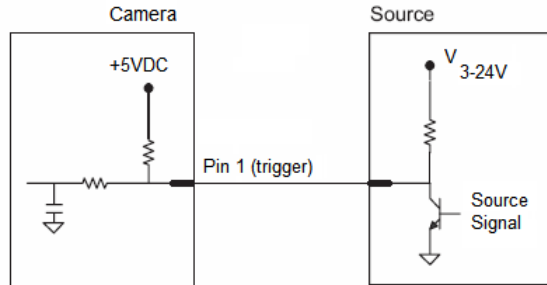
Output Examples

Outputs (1, 2, 3): 5V TTL compatible, can sink 10mA and source 2mA
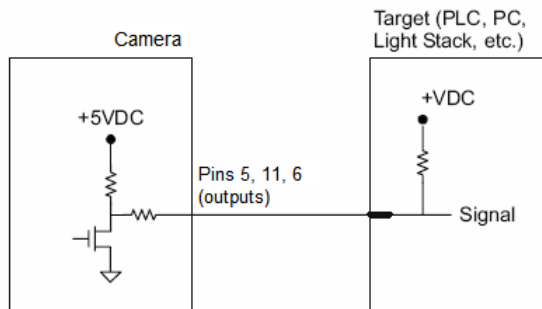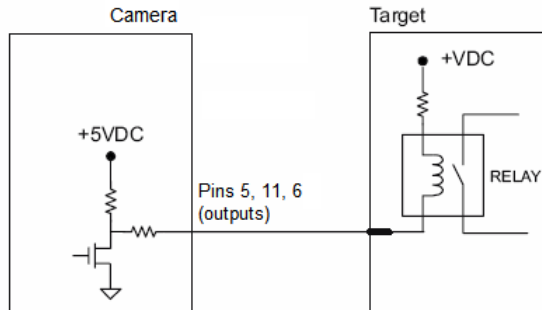
Isolated Trigger Input

Trigger input can be fully electrically isolated from an NPN or PNP signal source.

	Minimum	Maximum
$V_{IN-HIGH}/I_{IN-HIGH}$	4.5V/3.0mA	28V/15mA
V_{IN-LOW}/I_{IN-LOW}	0V/0mA	2.0V/1mA
Pulse Width$_{min}$	48 µs	
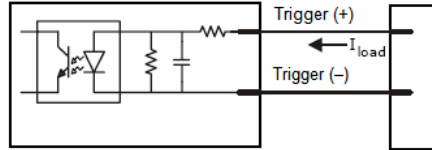
Input Examples

Fully Optoisolated
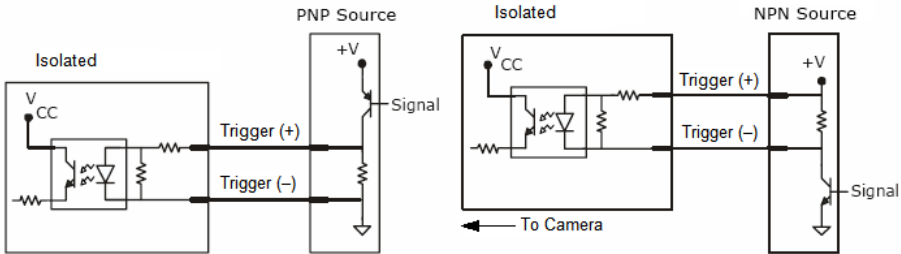
Not Optoisolated
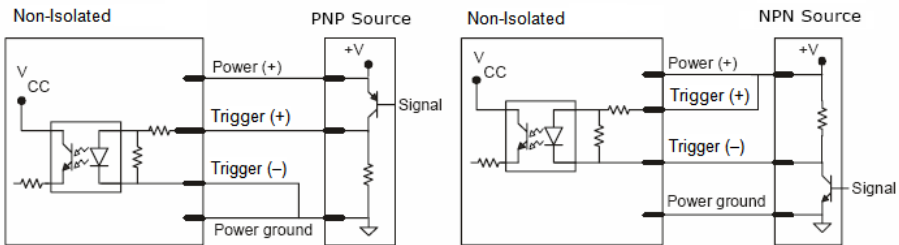
New Master Input

The Vision MINI Xi converts N/M input to TTL signal through an optoisolator.

Note that the return for N/M is internally grounded, and therefore it is not fully electrically isolated.

	Minimum	Maximum
$V_{IN-HIGH}/I_{IN-HIGH}$	4.5V/3.0mA	28V/15mA
V_{IN-LOW}/I_{IN-LOW}	0V/0mA	2.0V/1mA
Pulse Width$_{min}$	48µS	

Example Circuit

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System Components
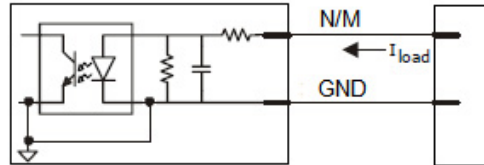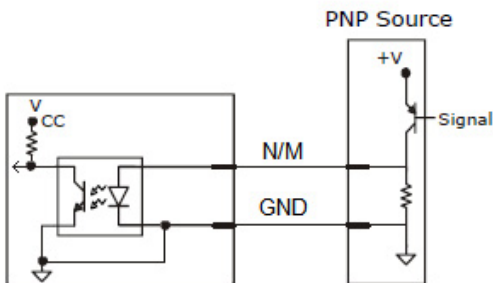
Power Requirements

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

TABLE 2–3. Camera Power Requirements

Component	Power
Vision MINI Xi Smart Camera WVGA and SXGA	10-30VDC, 200 mV p-p max. ripple, 132mA @ 24VDC (typ.)

Status Indicators

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

Trigger Status

Inspection Status

Camera Status

Communication Status

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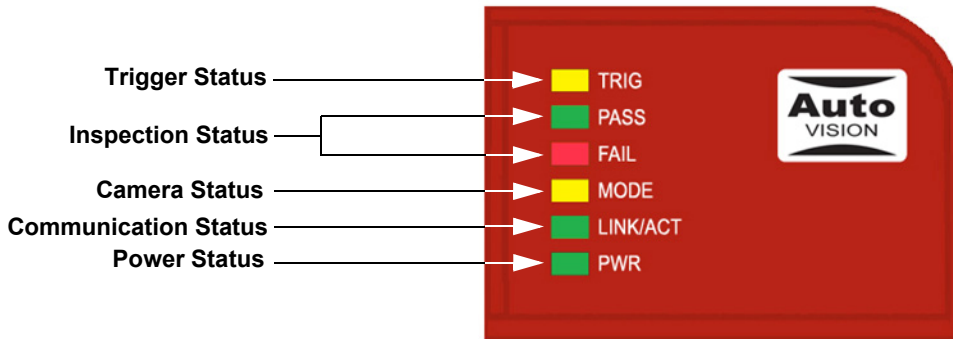
TRIG	**On Steady**	Continuous Trigger
	Off	Waiting for Trigger Event
	On Flashing	Trigger Event
PASS/FAIL	**On**	Active State
	Off	Inactive State
MODE	**On Steady**	Unit Ready
	Off	Unit Not Ready
LINK/ACT	**On Steady**	Link Established
	Off	No Link/Activity
	On Flashing	Link Established and Activity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

Additional User Feedback

- Green Flash – A green flash from the front of the unit indicates a Good Read.
- Blue Targeting Pattern – The blue 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.
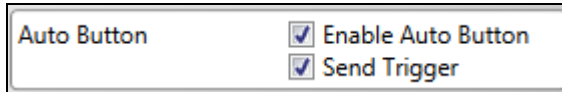
1st Position: Blue Targeting Pattern

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.

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: 1.02
Camera Name                         VisionMINI 1280x1024 // Name Displayed in
Camdef Selection Dialog
Digitizer Type          5000                                // Number
associated with VisionMini SXGA
Stride                                  1280    // Image Width
Rows                                    1024    // 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         62500   // Fastest time to acquire a frame:  16 FPS
                                        // -1 Disables timeout feature
X Offset                        0
Y Offset                        0
// 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                       4000
Exp Min                              66
Exp Max                              66667  // 1/15 to 1/15,000
Focus Dflt                     400
Focus Min                      200
Focus Max                      600          // 2 to 6 inches
```

Chapter 2 System Components

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CHAPTER 3 ——— Optics and Lighting

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

Optics

The monochrome and color versions of the Vision MINI Xi Smart Camera have a built-in CMOS sensor, available in Standard Density or High Density (2.5 mm).

WVGA (752 x 480) Field of View

Standard Density			High Density		
Working Distance	Horizontal FOV	Vertical FOV	Working Distance	Horizontal FOV	Vertical FOV
2	1.486	0.949	2	0.663	0.560
3	2.188	1.396	3	0.954	0.824
4	2.889	1.844	4	1.246	1.089
5	3.591	2.292	5	1.537	1.354
6	4.292	2.740	6	1.828	1.619

SXGA (1280 x 1024) Field of View

Standard Density			High Density		
Working Distance	Horizontal FOV	Vertical FOV	Working Distance	Horizontal FOV	Vertical FOV
2	2.186	1.749	2	1.264	1.011
3	3.182	2.545	3	1.850	1.480
4	4.177	3.342	4	2.436	1.949
5	5.173	4.138	5	3.022	2.418
6	6.168	4.935	6	3.608	2.886

QXGA (2048 x 1536) Field of View

Standard Density			High Density		
Working Distance	Horizontal FOV	Vertical FOV	Working Distance	Horizontal FOV	Vertical FOV
2	2.165	1.749	2	1.264	0.948
3	3.180	2.545	3	1.850	1.388
4	4.195	3.342	4	2.436	1.827
5	5.210	4.138	5	3.022	2.267

Illumination

The Vision MINI Xi Smart Camera has built-in lighting (red LEDs). The LEDs can be configured to operate in multiple modes – Continuous, Strobe, and Off.

Lighting Examples

The following lighting examples were captured using a Standard Density Vision MINI Xi with built-in lighting (red LEDs).

FIGURE 3–1. On-Axis – Semi-Specular Surface (Fine Matte Metal Ruler) at 2", Optical Axis of Camera Positioned at 90° from Image Plane

FIGURE 3–2. Off-Axis – Semi-Specular Surface (Fine Matte Metal Ruler) at 2", Optical Axis of Camera Positioned at 60° from Image Plane
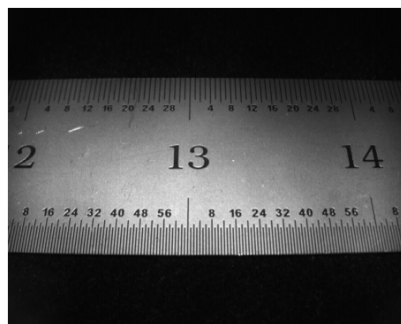
Machine Vision Lighting Principles

Proper lighting is critical to the success of a machine vision application. The Vision MINI Xi features integrated lighting (built-in red LEDs @ 617nm). 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.
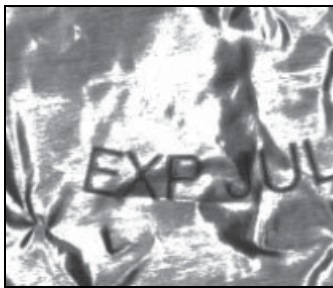
Before correct lighting
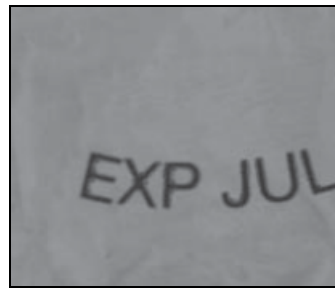
After correct lighting with a NERLITE Illuminator

A

Connector Pinouts

This section contains information about the Vision MINI Xi Smart Camera's connector pin assignments.

Vision MINI Xi Smart Camera Connectors

Vision MINI Xi M12 12-Pin Plug and RJ45 Plug Connectors
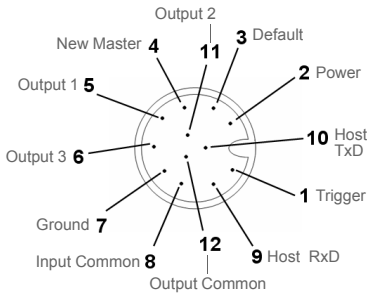
M12 12-pin Plug
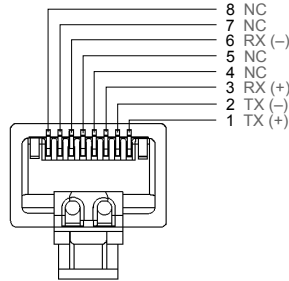
RJ45 Plug

M12 12-Pin Plug Pin Assignments

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

RJ45 Plug Pin Assignments

Pin	Function
1	TX (+)
2	TX (−)
3	RX (+)
4	NC
5	NC
6	RX (−)
7	NC
8	NC

B

Cable Specifications

This section contains information about cables used in simple Vision MINI Xi Smart Camera hardware configurations.

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	Description
61-000153-02	Cordset, Host, Serial, M12 12-Pin Socket to DB9 Socket, 1 M
61-000167-02	Cordset, M12 12-Pin Socket to Flying Leads, 3 M
97-000012-01	Power Supply, 90-254VAC, 24V, M12 12-Pin Socket
99-000020-02	Photo Sensor, M12 4-Pin Plug, NPN, Dark On, 2 M

61-000153-02 Cordset, Host, Serial, M12 12-Pin Socket to DB9 Socket, 1 M

The 61-000153-02 Host Cordset, M12 12-Pin Socket to DB9 Socket, is a shielded RS-232 cordset ending in a 12-pin M12 socket and a 9-pin D-sub socket.

Figure B-1 shows the 61-000153-02 Host Cordset, M12 12-Pin Socket to DB9 Socket.

FIGURE B–1. Host Cordset, M12 12-Pin Socket to 9-Pin D-sub Socket

M12 12-Pin Socket	9-Pin D-sub Socket	61-000153-02 Schematic
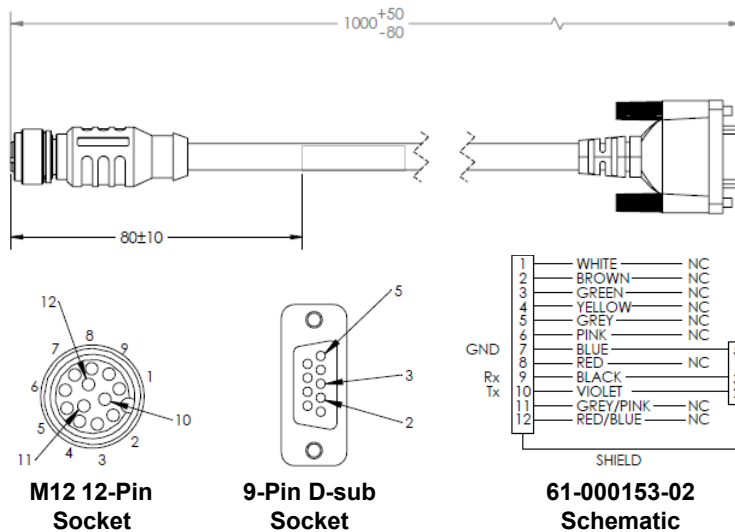
Table B-2 describes the signals for the 61-000153-02 Host Cordset, M12 12-Pin Socket.

TABLE B–2. Host Cordset, M12 12-Pin Socket Pin Assignments

Pin	Function
7	Ground (Blue)
9	RxD (Black)
10	TxD (Violet)

Table B-3 describes the signals for the 61-000153-02 Host Cordset, 9-Pin D-sub Socket.

TABLE B–3. Host Cordset, 9-Pin D-sub Socket Pin Assignments

Pin	Function
2	TxD (Violet)
3	RxD (Black)
5	Ground (Blue)

61-000167-02 Cordset, M12 12-Pin Socket to Flying Leads, 3 M

The 61-000167-02 Cordset, M12 12-Pin Socket to Flying Leads, is a shielded RS-232 cordset ending in a 12-pin M12 socket and flying leads.

Figure B-2 shows the 61-000167-02 Cordset, M12 12-Pin Socket to Flying Leads.

FIGURE B–2. Cordset, M12 12-Pin Socket to Flying Leads

M12 12-Pin Socket

61-000167-02 Wire Colors

Pin	Wire Color
1	WHITE
2	BROWN
3	GREEN
4	YELLOW
5	GRAY
6	PINK
7	BLUE
8	RED
9	BLACK
10	VIOLET
11	GRAY STRIPED PINK
12	RED STRIPED BLUE
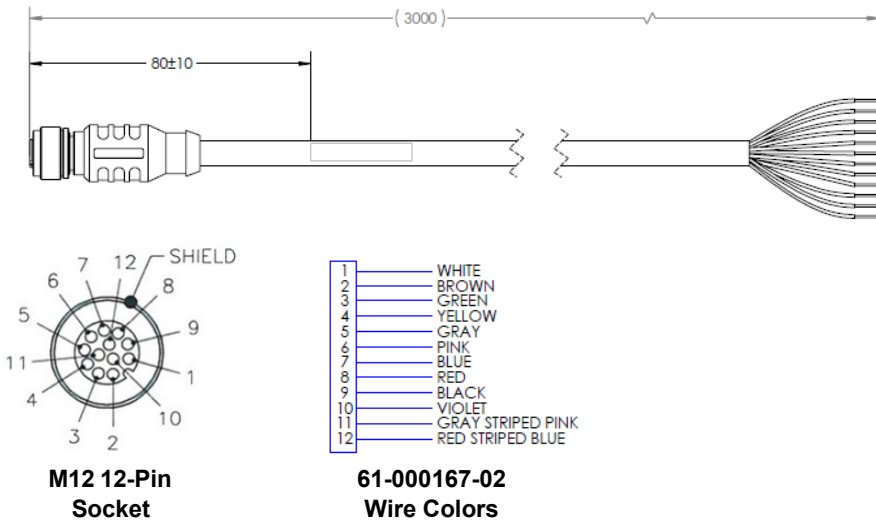
97-000012-01 Power Supply, 90-254VAC, 24V, M12 12-Pin Socket

The 97-000012-01 Power Supply, 90-254VAC, 24V, M12 12-Pin Socket ends in a 12-pin socket connector.

Figure B-3 shows the 97-000012-01 Power Supply, 90-254VAC, 24V.

FIGURE B–3. **Power Supply, 90-254 VAC, 24V, M12 12-Pin Socket**

M12 12-Pin Socket
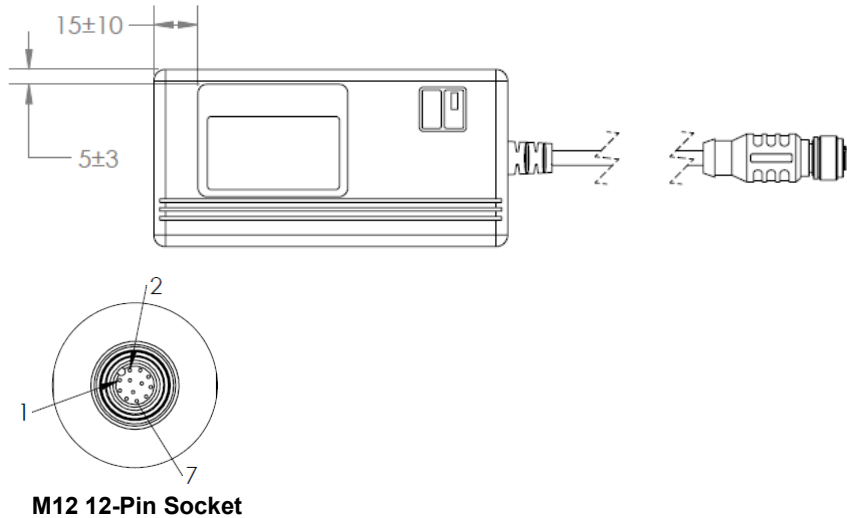
99-000020-02 Photo Sensor, M12 4-Pin Plug, NPN, Dark On, 2 M

The 99-000020-02 Photo Sensor, M12 4-Pin Plug, NPN, Dark On, 2 M is an external trigger device with an M12 4-pin connector.

Figure B-4 shows the 99-000020-02 Photo Sensor, M12 4-Pin Plug, NPN, Dark On, 2 M.

FIGURE B–4. **Photo Sensor, M12 4-Pin Plug, NPN, Dark On, 2 M Configuration**

99-000020-02 Schematic

Appendix **B** Cable Specifications

C
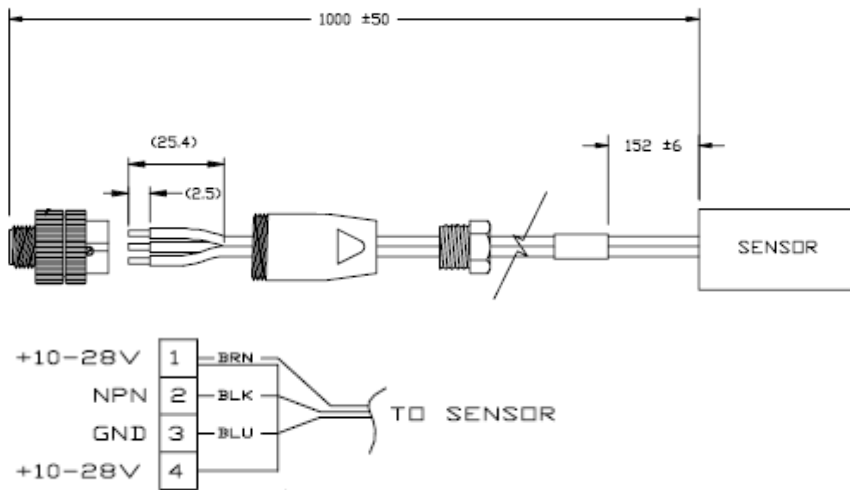
APPENDIX C General Specifications

This section contains specifications and dimensions for the Vision MINI Xi Smart Camera.

Physical Characteristics

P/N / Model	Lens Type	Dimensions	Weight	Connector
GMV-6310-1100G	Fixed Lens	1" (25.4 mm) x 1.80" (45.7 mm) x 2.10" (53.3 mm)	3.2 oz. (91 g)	Dual Cable: 6 ft. industrial Ethernet cable; 3 ft. cable with M12 plug
GMV-6310-1102G				
GMV-6310-1104G				
GMV-6310-1106G				
GMV-6310-1110G				
GMV-6310-1112G				
GMV-6310-1114G				
GMV-6310-1116G				
GMV-6310-1172G				
GMV-6310-1200G				
GMV-6310-1202G				
GMV-6310-1204G				
GMV-6310-1206G				
GMV-6310-1210G				
GMV-6310-1212G				
GMV-6310-1214G				
GMV-6310-1216G				
GMV-6310-1272G				

Optics

P/N / Model	Sensor	Shutter	Focal Range	Image Acquisition
GMV-6310-1100G	Standard Density 1/2" WVGA (752 x 480) CMOS, up to 60 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Global Shutter	2 to 6" (50.8 mm to 152.4 mm – autofocus)	Progressive scan, square pixel
GMV-6310-1102G				
GMV-6310-1104G				
GMV-6310-1106G				
GMV-6310-1110G	Standard Density 1/2" SXGA (1280 x 1024) CMOS, up to 15 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter		
GMV-6310-1112G				
GMV-6310-1114G				
GMV-6310-1116G				
GMV-6310-1172G	Standard Density 1/2" QXGA (2048 x 1536) CMOS, up to 5 FPS, Color	Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter		
GMV-6310-1200G	High Density 1/2" WVGA (752 x 480) CMOS, up to 60 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Global Shutter		
GMV-6310-1202G				
GMV-6310-1204G				
GMV-6310-1206G				
GMV-6310-1210G	High Density 1/2" SXGA (1280 x 1024) CMOS, up to 15 FPS, Mono	Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter		
GMV-6310-1212G				
GMV-6310-1214G				
GMV-6310-1216G				
GMV-6310-1272G	High Density 1/2" QXGA (2048 x 1536) CMOS, up to 5 FPS, Color	Software-adjustable, 10 µs to 16.7 ms; Rolling Shutter		

Communications, I/O, Indicators, Illumination

P/N / Model	Comm.	Discrete I/O	Indicators	Illumination
GMV-6310-1100G				High-Output Red LEDs @ 617nm
GMV-6310-1102G				
GMV-6310-1104G				
GMV-6310-1106G				
GMV-6310-1110G				
GMV-6310-1112G		**Trigger Input, Learn:** Bi-directional, optoisolated, 4.5-28V rated (10mA at 28VDC) **Outputs (1, 2, 3):** Bi-directional, optoisolated, 1-28V rated, I_{CE}<mA at 24VDC, current limited by user)	**LEDs:** Trigger, Pass, Fail, Mode, Power, Link/Act; **Green Flash:** Pass; **Blue V:** Target	
GMV-6310-1114G				
GMV-6310-1116G				
GMV-6310-1172G	RS-232 and Ethernet			High-Output White LEDs
GMV-6310-1200G				High-Output Red LEDs @ 617nm
GMV-6310-1202G				
GMV-6310-1204G				
GMV-6310-1206G				
GMV-6310-1210G				
GMV-6310-1212G				
GMV-6310-1214G				
GMV-6310-1216G				
GMV-6310-1272G				High-Output White LEDs

Power

P/N / Model	Power
GMV-6310-1100G	10-30VDC, 200 mV p-p max. ripple, 132mA @ 24VDC (typ.)
GMV-6310-1102G	
GMV-6310-1104G	
GMV-6310-1106G	
GMV-6310-1110G	
GMV-6310-1112G	
GMV-6310-1114G	
GMV-6310-1116G	
GMV-6310-1172G	
GMV-6310-1200G	
GMV-6310-1202G	
GMV-6310-1204G	
GMV-6310-1206G	
GMV-6310-1210G	
GMV-6310-1212G	
GMV-6310-1214G	
GMV-6310-1216G	
GMV-6310-1272G	

Operating Environment; Agency Compliance

P/N / Model	Operating Temperature	Storage Temperature	Humidity	Enclosure	Agency Compliance
GMV-6310-1100G	0° to 40° C (32° to 104° F)	–50° to 75° C (–58° to 167° F)	Up to 90% (non-condensing)	IP54 (category 2)	**FCC, UL/cUL, CE (General Immunity for Light Industry:** EN 55024 ITE Immunity Standard; **Radiated and Conducted Emissions of ITE Equipment:** EN 55022 ITE Disturbances**), CB, Class A, RoHS/WEEE**
GMV-6310-1102G					
GMV-6310-1104G					
GMV-6310-1106G					
GMV-6310-1110G					
GMV-6310-1112G					
GMV-6310-1114G					
GMV-6310-1116G					
GMV-6310-1172G					
GMV-6310-1200G					
GMV-6310-1202G					
GMV-6310-1204G					
GMV-6310-1206G					
GMV-6310-1210G					
GMV-6310-1212G					
GMV-6310-1214G					
GMV-6310-1216G					
GMV-6310-1272G					

Dimensions

Front
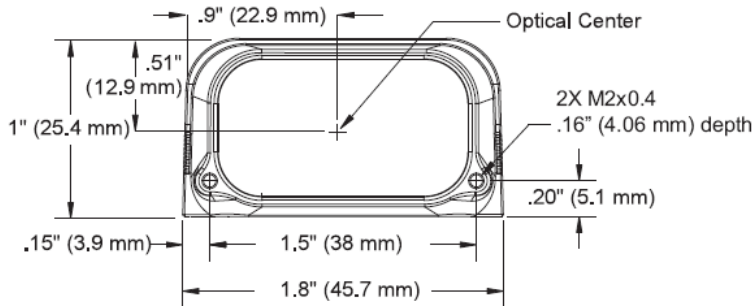
Base
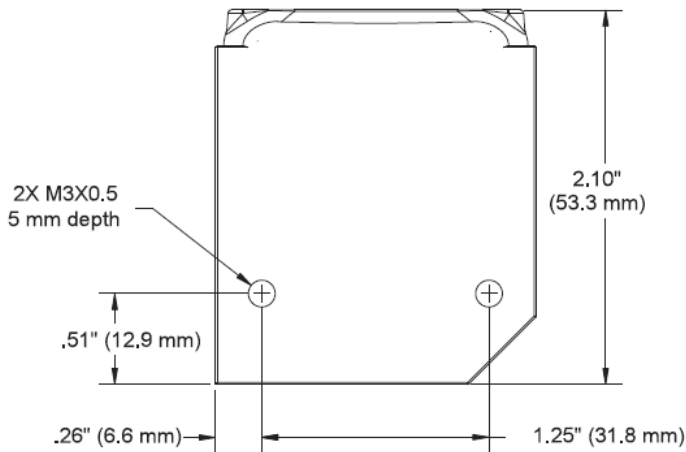
Note: Nominal dimensions shown. Typical tolerances apply.

Field of View and Working Distance

WVGA/SXGA

WVGA/SXGA

Working Distance (in.) vs Horizontal Field of View (in.)

High Density — Standard Density

WVGA SXGA

Horizontal Field of View (in.)

QXGA

QXGA

Working Distance (in.) vs Horizontal Field of View (in.)

High Density

Standard Density

Horizontal Field of View (in.)

D
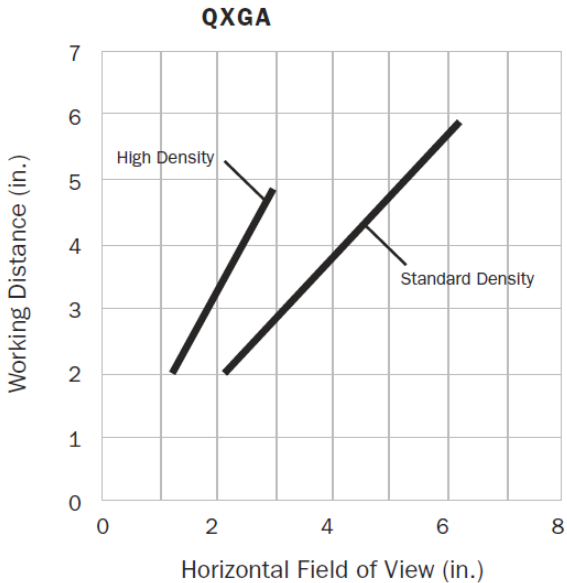
Serial Commands

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.*

JOBLOAD [-slot=]<n> [-r]

Loads job from slot *n*.

-r = Start inspections.

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>

Downloads .avz job packaged via transfer method (RS-232 only).

SET <tagname> <value>

Sets value of a global tag.

The tagname must correspond to one of the supported tags within the device.

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.

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.

E

APPENDIX E Vision MINI Xi Diagnostic
Boot Mode

This section describes the Vision MINI Xi's Diagnostic Boot Mode and
other boot parameters.

Diagnostic Boot Mode

The Vision MINI Xi 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 MINI Xi. Power-on the unit and hold down the AutoVISION button until the green flash illuminates once. 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 MINI Xi. The [SAFE-KERNEL] prompt is displayed.

2. This method requires a serial connection between the host PC running a terminal emulator and Vision MINI Xi camera. Power-on the unit and hold down the Tab key 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", "192.168.188.1")

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)

Additional Boot Parameters

BP_UpdateCameraName(cameraName)

where **cameraName** is a double-quoted string representing the new camera name.

Function: Allows you to change the name of the smart camera.

BP_UpdateLaserOn(state)

where **state** = **0** or **1**

Function: Allows you to disable or enable the state of the targeting laser during image acquisition. The actual display of the targeting laser is a logical AND of job settings with this parameter. Note that when the laser is disabled it is still possible to turn the laser on when a job is not running by issuing the serial command **target 1** (Turn Target On).

BP_UpdateGreenFlash(state)

where **state** = **0** or **1**

Function: Allows you to disable the flash-on-pass feature to eliminate green flash interference during color image processing.

F

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 MINI Xi. 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.
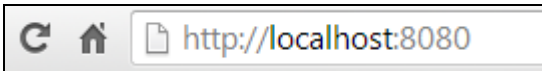
Connecting

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:

C   🏠   📄 http://10.20.1.123
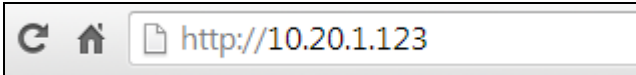
CloudLink also works with **Visionscape Software** and with **AutoVISION**'s Emulator.

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:

C   🏠   📄 http://localhost:8080

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:
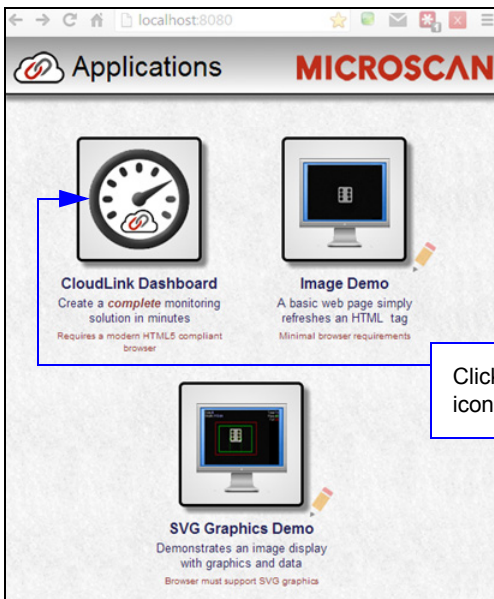
Click the **CloudLink Dashboard** icon to launch the application.

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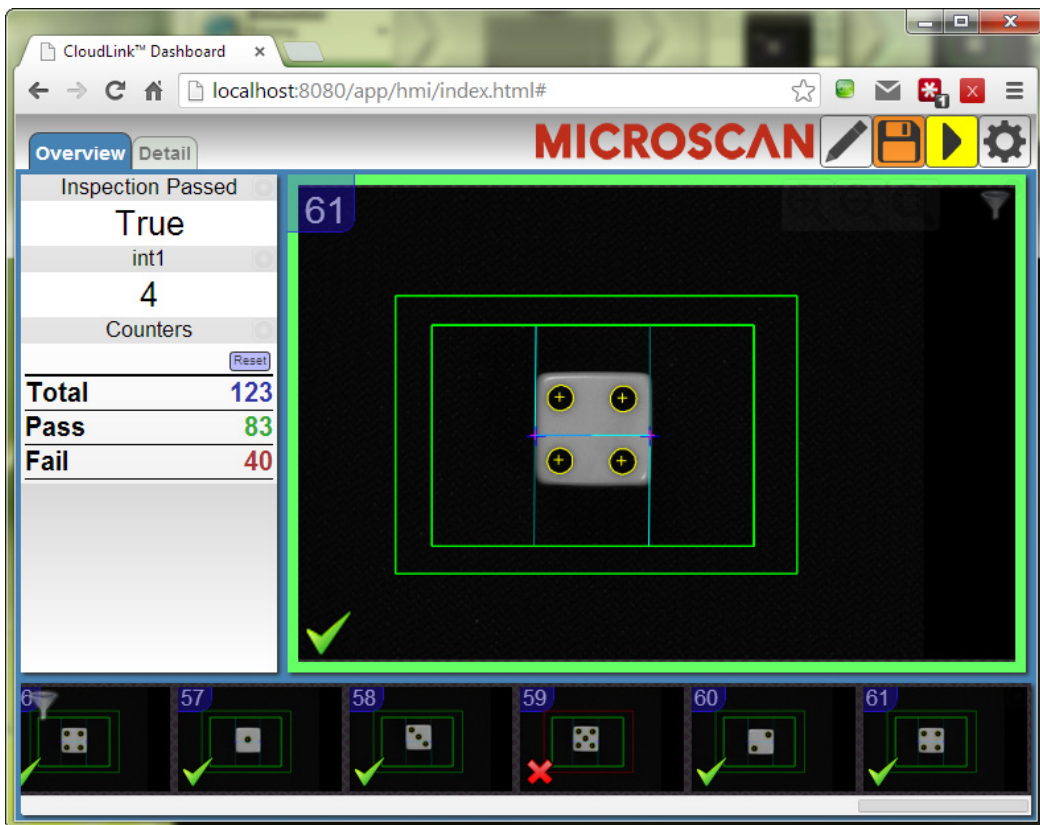
Note: CloudLink does not currently support display of color images from color cameras.

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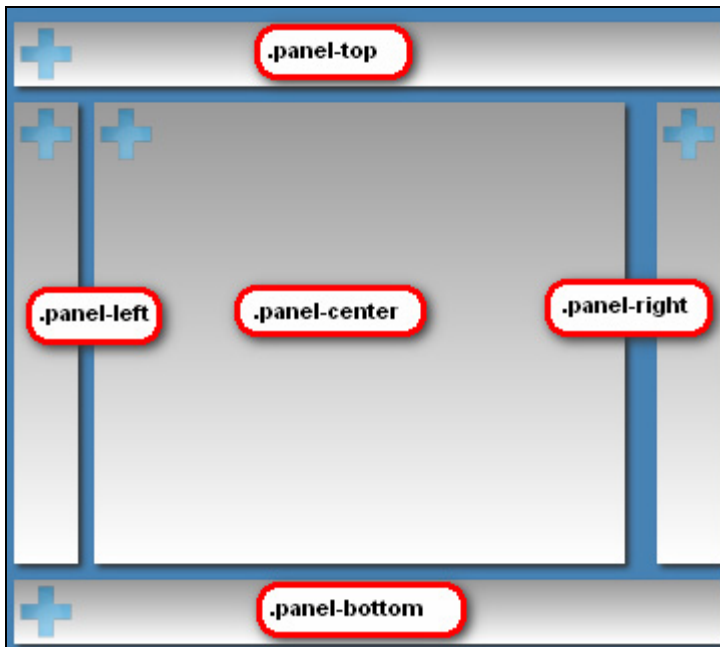
Note the names, which start with **.panel-**. It is not necessary to know these names to use CloudLink; however they do have significance if there should be need for customization. Customizing CloudLink requires the modification of CSS (Cascading Style Sheets). The names shown correspond to the CSS class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