

BOA2-XAX-INS

Smart Vision System with iNspect Express Software

Installation Guide



Notice

BOA2 Vision System Installation Manual
Document Number 405-00049-00

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Teledyne Digital Imaging US, Inc.
Information: TDI_Sales.ipd@teledyne.com
Support: TDI_Support.ipd@teledyne.com
Web: <http://www.teledynedalsa.com/visionsystems>

700 Technology Park Drive
Billerica, MA, USA 01821

Tel 1.978.670.2002 **Fax** 1.978.670.2010

Certifications

Declaration of Conformity	
Manufacturer	Teledyne Digital Imaging US, Inc. 700 Technology Park Drive Billerica MA 01867 USA
CE	We declare that this product has been tested to comply with the EC Directive for a class A digital device in accordance with EN55022/CISPR22
FCC	We declare that this product 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 may cause harmful interference to radio communication.
Other	
IP67	This product meets the requirements for industrial applications that require IP67 wash down protection - requires fitted sealing lens cover and sealing plugs on unused connectors
CFR 21 Part 11	This product provides the tools needed for users to implement an auditing program that could be in compliance with CFR 21 Part 11. These tools include: <ul style="list-style-type: none">• System or software backup and restore• System software security (password login and access limits)• Protection of system backup files from modification.• Record of actions by users with time stamp information• Time stamp information on data output.

Handling Precautions

Care should always be exercised when handling and operating your BOA2 Vision System. Even though the system is encased within a rugged, industrial enclosure, incorrect use or handling can result in damage to your investment. To prevent this, we recommend following these precautions:

- Avoid “hot-plugging” cables and devices. Always shut the system down and remove power before connecting or disconnecting anything to it.
- Do not use in a Free-standing operation. Mount the BOA system properly to prevent it from falling accidentally. Mounting holes are provided on each side of the BOA.
- Always use the BOA within its recommended operating conditions. Refer to page [31](#) for complete specifications.
- Do not install BOA in a location that will expose it to excessive heat, humidity, vibration, impact, corrosive substances, flammable substances, static electricity or Electro Static Discharge (ESD).
- Never expose the internal electronics by opening the enclosure.
- Do not attempt to modify the BOA vision system or open the case. This unit has no field-replaceable components (beyond replacing the lens or ring-light). Tampering with the unit will void the product warranty.

Warranty

Teledyne Imaging warrants the BOA2 Vision System against defects in materials and workmanship for a period of twenty four (24) months from the date of delivery. Teledyne Imaging and its representatives expressly disclaim any and all other warranties.

Your sole remedy shall be repair or replacement of the BOA2 Vision System product and associated optional components, provided that the defective product is returned within the warranty period.

If you need to return the BOA2 Vision System, you must contact the Teledyne Imaging representative who sold you the product. Do not return your product to Teledyne Digital Imaging without prior authorization.

Teledyne Imaging assumes no liability for damages resulting from the use of this manual.

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BOA2 Vision System Overview

BOA2 is a fully integrated vision system in a compact “smart” camera format that has been specifically designed for industrial use. Packaged complete with application software embedded, BOA2 provides an easy-to-deploy automated inspection system for the factory floor.

BOA2 vision systems are configured and monitored remotely using an Ethernet connection to a PC or factory network. An inspection can be quickly set up using a web browser portal into the resident iNspec Express application. The software interface is fully equipped with a suite of vision tools and capabilities that satisfy a range of inspection needs, from positioning, identification and measuring, to verification and flaw detection.

BOA2 vision systems are rugged devices that can be integrated into existing production lines, machinery or moving equipment. They are supported by standard industrial M12 cordsets to further simplify and reduce implementation costs. Rated for IP67 deployment when fitted with a compatible lens cover, BOA2 systems can be mounted in wash down factory environments without the need for additional protective enclosures.

For a complete list of specifications, refer to “Specifications” on page [31](#).

Product Support

In addition to this installation manual, the following information is available for this product:

1. Online help: Fingertip help is available on every screen (panel) of the iNspec Express User Interface
2. The iNspec Express User Manual is included in the software download file.
3. Self help material and sample job files are included in the software download file.
4. Factory support is available at TDI_Support.ipd@teledyne.com
5. Call, fax or email your local representative who sold you the product

BOA2 Vision System Components

BOA2 vision systems are shipped with the components listed below. Take a few moments to verify that everything has arrived in good condition. If your product has been visibly damaged during shipment or is missing parts, please contact your Teledyne Imaging representative immediately.

Standard components (ship with every BOA2 Vision System):

Component	Description
<u>BOA2 Vision System:</u> BVS2-XA5M-INS BVS2-XA3M-INS BVS2-XA2M-INS	Fully integrated BOA2 Vision System with 2560x2048 (XA5) or 1920x1440 (XA3) or 1600x1216 (XA2) mono sensor, processing engine, iNspec Express embedded software, communications and light control.
Mounting Screw Kit	M4 screws for mounting the sensor (Qty 4)

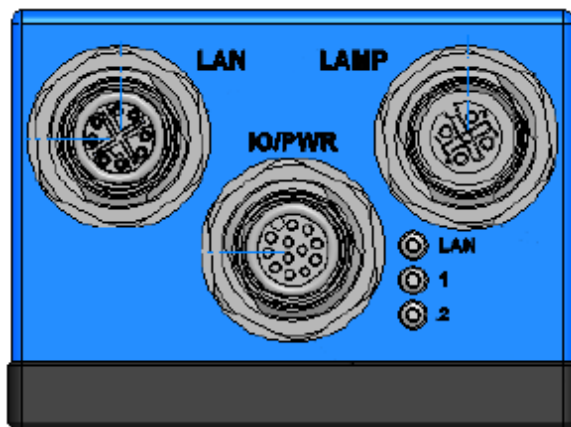
Optional components (sold separately):

Component	Description
<u>Cables</u> A-BVS2-E8S-X A-BVS2-IO12S-X A-BVS-L5S-X	M12-RJ45 X-coded Ethernet cordset (X; 5=5m, 10=10m) M12 single-ended IO cordset (X ;5=5m, 10=10m) M12 single-ended lamp cordset (X; 2=2m, 5=5m)
BVS-PL-101 A-BVS-PL101S-X	Panel Link breakout modules. Provide convenient panel access to BOA2 I/O M12 IO cordset to PL-101 (X ;5=5m, 10=10m)
Lens	Various Lens options available from Teledyne Imaging
A-BVS2-LCG-X	Lens cover for BOA2 Vision System. Required for IP67 compliance. (x=35, 40 or 45 mm internal lens length)
A-BVS-M12-P	M12 plug for IP67 compliance
Lights	Various Lighting options available from Teledyne Imaging

Connecting the BOA2 Vision System

This section details how to connect the BOA2 vision system with its associated components and factory environment.

Camera Connectors and Indicators

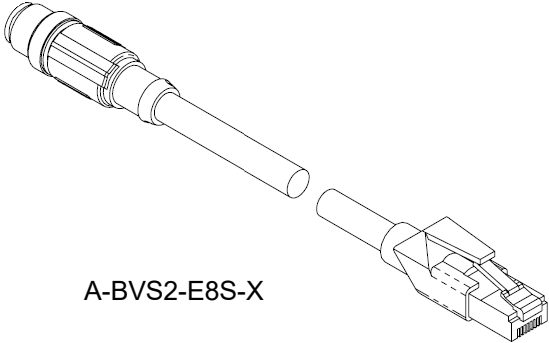


Designator	Definitions
LAN	10/100/1000 BaseT Ethernet connection. Provides the primary interface for configuring the camera, developing the application and monitoring results.
I/O PWR	Provides access to the camera I/O – 3 IN, 3 OUT, RS232. Also provides PWR input (12-30V).
LAMP	Provides PWR and strobe control to a local LED light source. NOTE: Lamp PWR is identical to BOA2 PWR input (24V).
LAN LED	Red/Green/Yellow = Network activity Blue = Warm Reset
LED1	Blue = Camera booted, not configured (no Solution file) Green = Solution loaded, ready to run, or acquisition in progress. Red = Camera Fault
LED2	Blue blink = Booting (should stop after 20 seconds). In a few releases LED2 continued to blink until the first trigger if a solution that requires a trigger is auto-loaded at boot. Fixed in release 2006. Green = Inspection Pass (runtime) Blue = Inspection Recycle (runtime); Red = Inspection Fail (runtime) Off = Waiting for trigger (runtime)


















Cable Pinouts

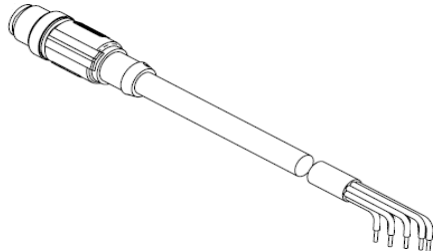
The BOA2 vision system is compatible with M12 factory cordsets as show below:

LAN Connector Pinout		
M12	Name	RJ45
1	MDX0+	1
2	MDX0-	2
3	MDX1+	3
4	MDX1-	6
7	MDX2-	5
8	MDX2+	4
5	MDX3+	7
6	MDX3-	8



A-BVS2-E8S-X

I/O-PWR Connector Pinout				LAMP Connector Pinout			
M12	Name	Wire		M12	Name	Wire	
1	PWR		Brown	1	PWR		Brown
2	GND		Blue	2	No connect		White
3	OUT2		White	3	GND		Blue
4	OUT CMN		Green	4	STRB		Black
5	IN0 / TRIG		Pink	5	No connect		Gray
6	IN2		Yellow				
7	IN CMN		Black				
8	RS232 TX		Gray				
9	RS 232 RX		Red				
10	OUT 1		Purple				
11	OUT 0		Gray/Pink				
12	IN 1		Red/Blue				



A-BVS2-IO12S-X

Cable Configurations

The BOA2 vision system offers flexible cabling to suit a number of application configurations:

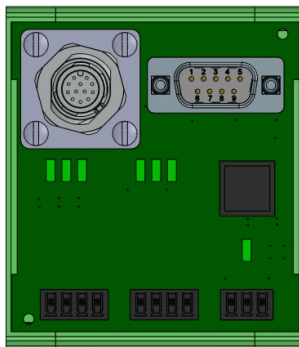
1. For typical applications, both the Ethernet and I/O-PWR cables are connected to provide flexibility between the camera and the control environment.
2. For single cable applications that do not require a runtime Ethernet connection, the I/O-PWR cable provides limited communications and power between the camera and the control environment. **Note: Ethernet is still required for setup.**
3. In all configurations, the Lamp cable can be connected between the camera and a compatible LED light source. The BOA2 vision system supplies power and strobe control to the external light. Power is routed from camera power input to the lamp.

BEWARE: Connecting a voltage on pin 1 of the lamp connector that is lower than the input power voltage to BOA2 could result in damage to the camera!!

Panel Link Module (A-BVS-PL-101)

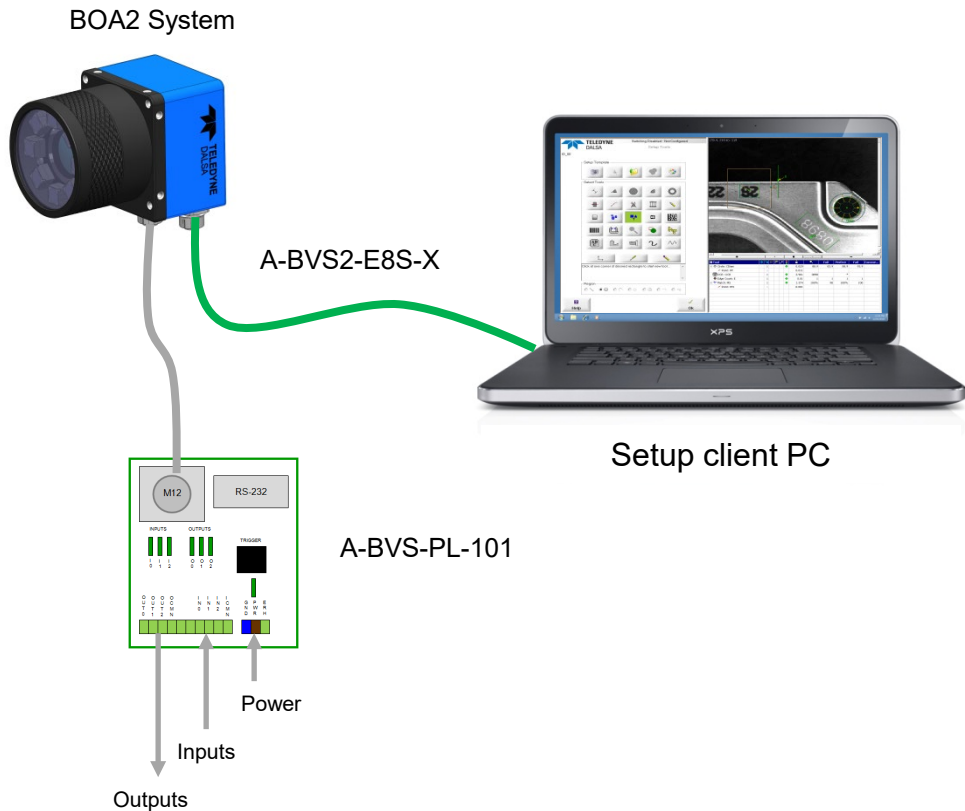
The PL-101 module is an optional module that provides a safe and convenient way to interface with BOA2. It provides an isolation barrier between the factory and the camera (differential isolation) and allows convenient panel wiring. The PL-101 also provides a manual trigger button and status lights for application debug.

A-BVS-PL-101



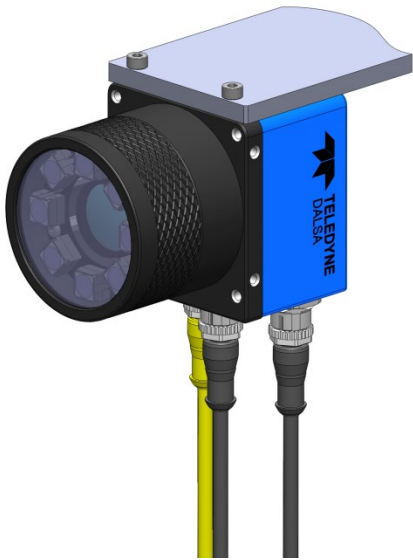
Ethernet and I/O Setup

1. Connect the M12-8 male end of the Ethernet cordset (A-BVS2-E8S-X) to the M12-8 female connector labeled “LAN” on the camera.
2. Connect the RJ45 end of the Ethernet cordset to the RJ45 on the client PC, PLC or factory LAN (PC is only required for setup)
3. Connect camera PWR, GND and I/O from the control panel to the breakout screw terminals on the PL-101.
4. Connect the M12-12 male end of the IO-PWR cordset (A-BVS2-IO12S-X) to the M12-12 female connector on the camera labeled “IO/PWR”
5. If required, connect the M12-5 lamp cable (A-BVS-L5S) between the camera “LAMP” connector and the light
6. Connect the Trigger and I/O to the PL-101 as required for the application

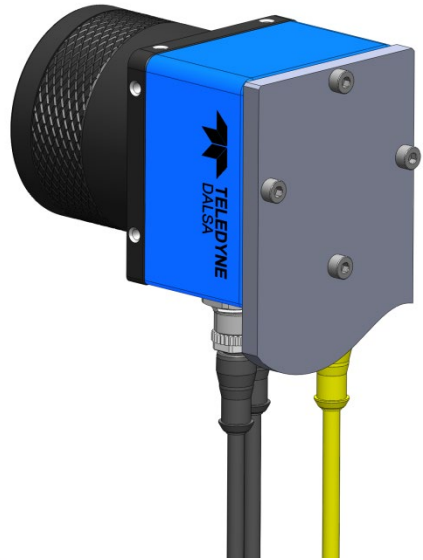


Camera Mounting Options

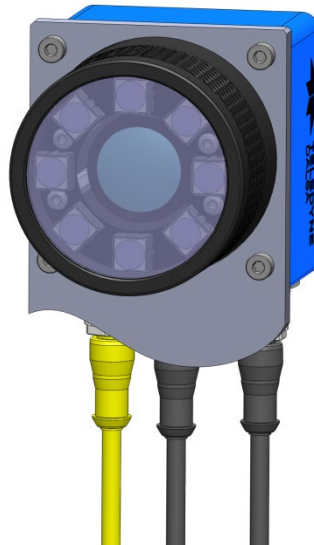
The BOA2 Vision System provides M4 holes on the sides, front and back of the camera for convenient mounting as shown in the following illustrations:



Top/Side Mount



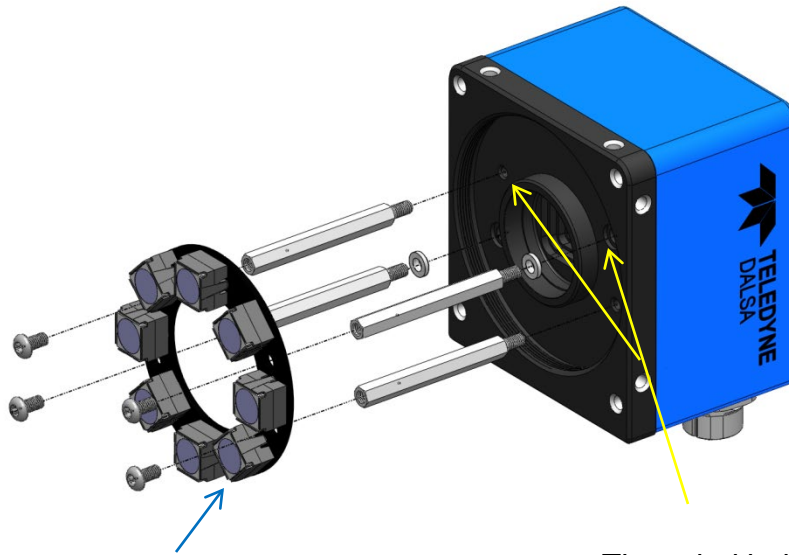
Back Mount



Front Mount

Optional LED Ring Light

The BOA2-XA2/XA3 models support the option of adding a ring light inside the lens cover. The light mounts to the camera through 4 HEX M3 threaded stand-offs. Two of the stand-offs are conductive to supply power to the light. **Note: The ring light opening is not large enough to support the 1" lens needed for the BOA2-XA5 model.**



High power white LED ring light attached to BOA2-XA2/XA3 models

Threaded holes (4) for light ring supports. Two on each side

Assembly Instructions:

1. Remove the nylon screws in the camera front plate where the light ring attaches
2. Install the two nylon washers from the light ring kit into the two larger mounting holes on the inside front of the camera body
3. Screw the 4 HEX light support posts into the inside threads of the light mounting holes, making sure not to knock out the nylon washers from step 1
4. Align the ring light over the four support posts and secure using the 4 screws in the light ring kit. **Note: The light mounting holes are staggered to avoid incorrect assembly.**
5. With the light installed, carefully adjust the focus on the lens before installing the protective lens cover

How to Access BOA

The BOA Vision System is supplied with the vision software embedded. The application runs directly on the device and does not require a PC connection at runtime. However, a PC client is required to access, setup and store a Solution (job file) on the device. We provide two methods for accessing the application from the client PC. iNspect Express, Nexus and the BOA are compatible with Windows 7 and Windows 10.

Note: The Performance changes on page [15](#) are required for any PC that will access a BOA vision system or use the Emulator software. The iNspect Express application will not work correctly if these changes are not made. The changes to UAC (page [16](#)) and Firewall (page [17](#)) are preferred, but there are ways to work around them.

• Method 1: Using Nexus for BOA

Access the BOA home page (page [18](#)) to download the Nexus application. After Nexus is installed, access iNspect Express for BOA directly, using Nexus to launch the connection.

Note: Nexus is designed to manage multiple BOAs (and BOA Spots) and different versions of firmware (“version tolerant”).

• Method 2: Using the BOA Emulator

Install the iNspect Express Software Emulator provided in the BOA software download file. Access iNspect Express for BOA directly, without using a web browser or Nexus.

Note: The Emulator version must match the firmware version on the BOA (“version intolerant”). Using the Emulator connection requires you to clean (remove) files from the PC using the iAssistant utility, then uninstall the Emulator and install a new version if BOAs have different versions of firmware.

1. Install the Emulator software.
2. Open the Windows Start menu and expand the group “Teledyne DALSA iNspect Express for BOA”
3. Click the shortcut “Connect to a BOA Camera”.
4. Enter the IP Address of your BOA. Enter just the numbers without the web prefix. For example: 192.168.0.100
5. Click OK to connect and launch iNspect Express.

Note: For both methods you must configure the network options of the client PC. Follow the instructions beginning on the next page.

Configure the PC for BOA2

Note: The paths to some tools depend on the Windows configuration and appearance settings. Some items may appear in the left or the right pane in menus.

A: System Performance

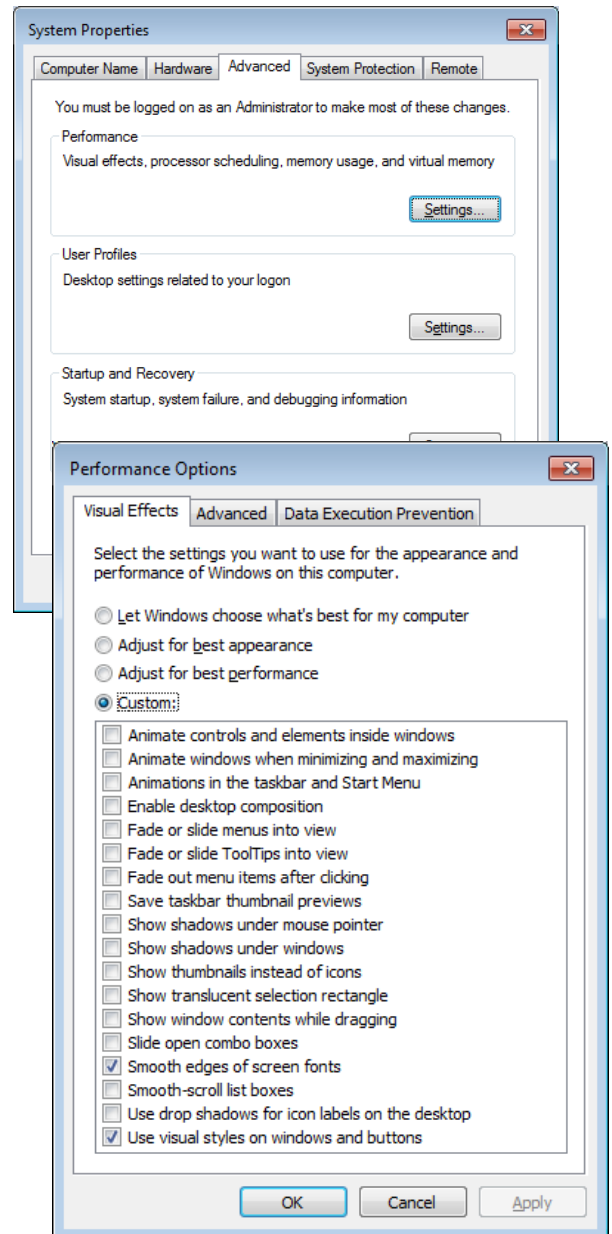
This will increase the performance of your PC in general, and will make the BOA client application perform better. However, this turns off some advanced visual effects. The application will work incorrectly if you do not perform these steps.

1. Open the Control Panel. Click on “System” & Security”. Click on “System”.
2. Click on “Advanced Settings” or the “Advanced” tab. Under “Performance”, click on “Settings”.

3. Click the Visual Effects tab, shown here.
4. Click the “bubble” beside “Adjust for Best Performance”.
5. Click the check boxes beside “Smooth edges of screen fonts” and “Use visual styles on windows and buttons”. The performance setting will change to “Custom”.

Note: Some installations may not have the “Use visual styles...” option.

6. Click “OK”. The appearance will change to resemble Windows Classic.



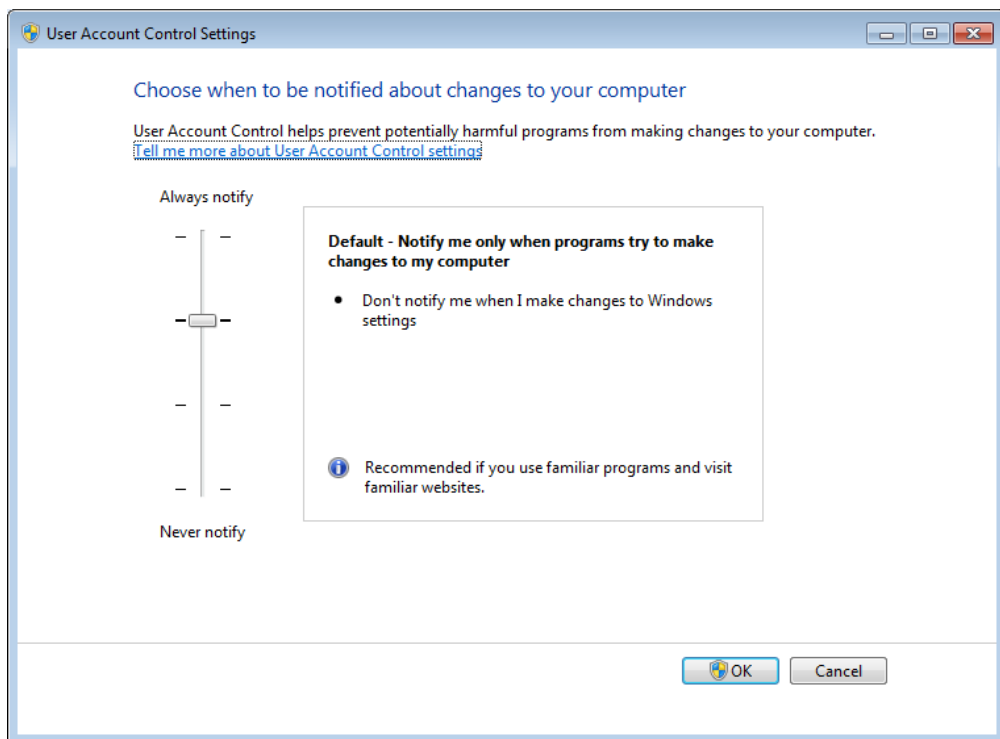
B: User Account Control (UAC) Settings

UAC will interfere with loading and running the iNspecT Express for BOA software. You will get warning messages when you launch iNspecT Express. You may need to supply an Administrator password depending on the UAC level.

- If your PC is in a closed factory environment not connected to the Internet, and you are using only one administrative account, it is usually safe to turn off UAC. (Your network administrator may not agree or allow this.)
- If your PC is connected to an office network and the Internet, you should use the default or higher security setting, and manually approve software at the prompt messages.

Note: If you create multiple user accounts with UAC turned off, the non-administrator accounts will not be asked for an administrative password, and some actions will be cancelled without any notice.

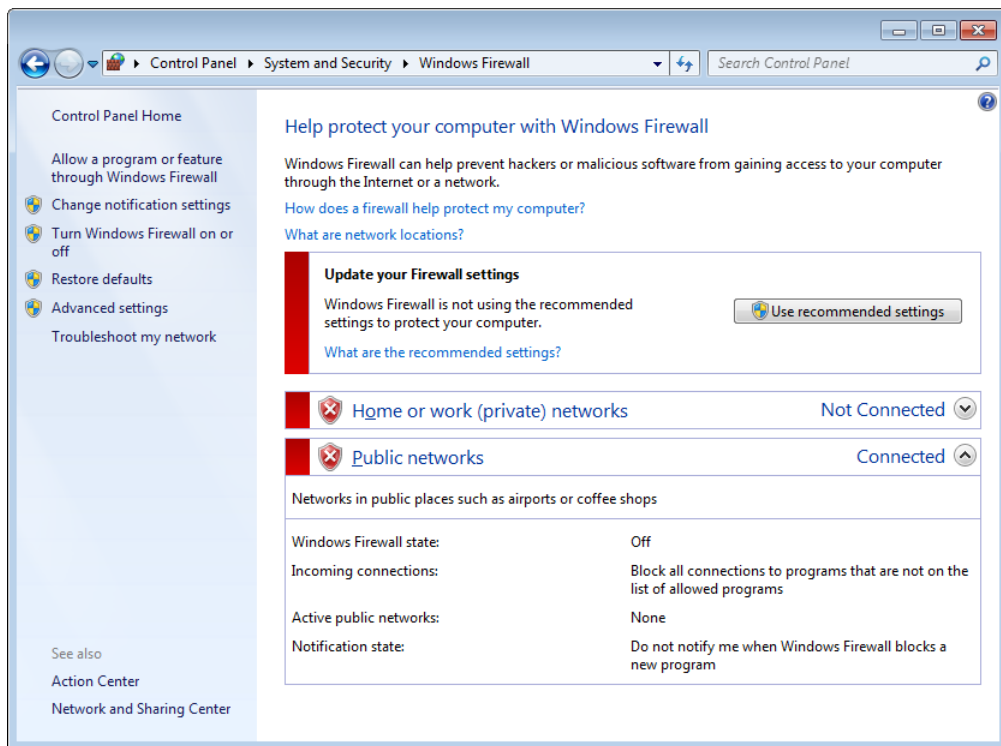
1. Open the Control Panel. Click on “System & Security”. Click on “Change User Account Control”.
2. To turn UAC off, pull the slider all the way to the bottom and then click “OK”.



C: Windows Firewall

BOA communicates with the PC through the Network connection. Windows Firewall will block this communication. It is easiest to turn off the firewall. If you must connect to an office network or to the Internet you can turn the firewall back on.

1. Open the Control Panel. Click on “System and Security”. Click on “Windows Firewall”. If you get a message that says the service is not running, click “No” (do not start the firewall). Skip forward to “D. Internet Explorer.”
2. Click “Turn Windows Firewall on or off”. Click the bubble beside “Off (not recommended)” in all categories. Click “OK”.



Note: If you prefer to leave the Firewall on, you can run the Application and approve each process as it gets reported by the firewall as “potentially unsafe”.

1. Return to the Windows Firewall, and click on “Allow a program or feature through Windows Firewall”
2. Verify what processes are being allowed or denied.
3. Approve processes related to iNspec Express for BOA.

Network Ports & Security: BOA and iNspec require access to use network ports 80 and the range 5005 through 5025 plus any ports you configure for TCP communications.

Download Nexus from BOA

The web server is accessed from a PC (client) using Microsoft Internet Explorer version 6 through 11, as follows:

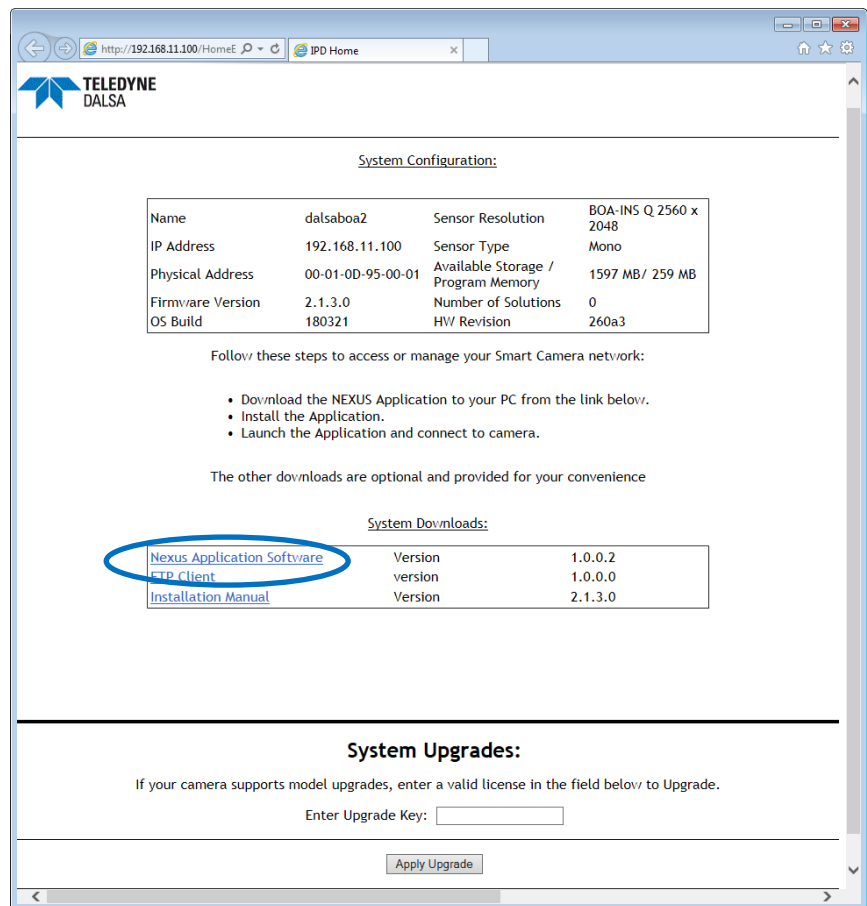
1. If you have not yet changed the default address, the PC used to access BOA initially will need to be configured on the same network neighborhood, but with a different address (i.e. 192.168.0.1). Consult your system administrator for instructions on how to do this. The subnet mask should be set to 255.255.255.0
2. Open Internet Explorer and enter the BOA address (192.168.0.100) in Internet Explorer's address bar and click "Go" or press Enter.
3. The BOA web server home page is displayed in the browser, as shown below. The web server provides a quick snapshot of the state of the BOA and provides a download for the Nexus application which provides access to the BOA.

4. Click on the link for "Nexus Application Software" and save the file to your PC.

5. After the download has finished, you may close Internet Explorer.

6. You can now change your PC back to the original IP Address.

Note: 192.168.0.100 is a default address used by many network enabled devices. You should change your BOA to a different address range.



The screenshot shows the BOA web server interface. At the top, the TELEDYNE DALSA logo is visible. Below it, the "System Configuration:" section contains a table with the following data:

Name	dalsaboa2	Sensor Resolution	BOA-INS Q 2560 x 2048
IP Address	192.168.11.100	Sensor Type	Mono
Physical Address	00-01-0D-95-00-01	Available Storage / Program Memory	1597 MB / 259 MB
Firmware Version	2.1.3.0	Number of Solutions	0
OS Build	180321	HW Revision	260a3

Below the table, instructions are provided: "Follow these steps to access or manage your Smart Camera network:"

- Download the NEXUS Application to your PC from the link below.
- Install the Application.
- Launch the Application and connect to camera.

The other downloads are optional and provided for your convenience

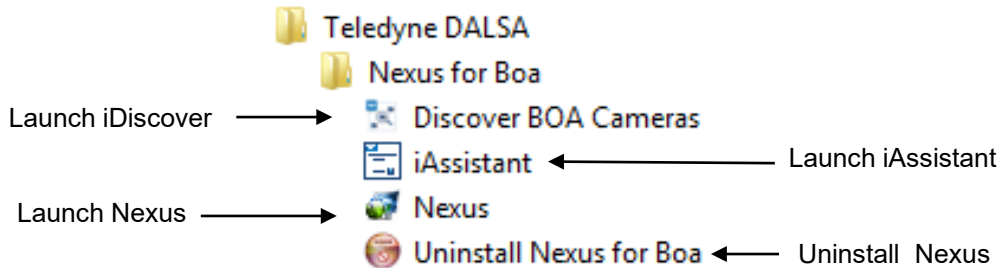
The "System Downloads:" section contains a table with the following data:

Download Name	Version
Nexus Application Software	1.0.0.2
FTP Client	1.0.0.0
Installation Manual	2.1.3.0

The "Nexus Application Software" link is circled in blue. Below this, the "System Upgrades:" section is visible, with a text input field for "Enter Upgrade Key:" and an "Apply Upgrade" button.

7. Open the Downloads folder on your PC.
8. Right-click on “Nexus.exe” and select “**Run as Administrator**”.

After the installation, the following related shortcuts will be available from the Windows Start menu at: [Start->All Programs->Teledyne DALSA->Nexus for Boa](#)



iDiscover is used to change the BOA system’s IP Address or change the Device name. You can use this shortcut to launch iDiscover (page [20](#)) or you can use the Nexus application to change a BOA’s address (page [22](#)).

Note: All BOA vision systems are shipped with the same address and name. It is necessary to change the address if more than one BOA is on the network. Changing the name is optional but is recommended, to avoid confusion.

iAssistant is used to clean up (delete) outdated files on the PC (page [24](#)). Nexus can manage multiple versions of the BOA firmware. However, cleanup may be needed if you run into issues. . If you use this shortcut to launch iAssistant right-click on the shortcut and select “Run as administrator”. Or you can use the Nexus application to launch iAssistant.

Nexus is used access and manage the BOA and open the GUI programming or Client application (page [21](#)).

The iDiscover Utility

The iDiscover utility is provided for discovering BOA cameras connected to the local PC network. You can use this utility or Nexus to change a BOA system's address and name.

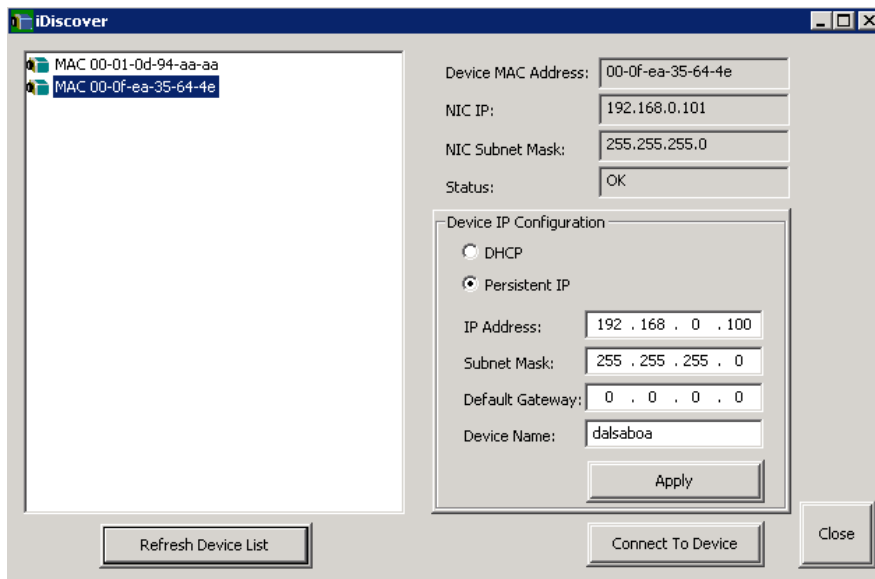
1. Open iDiscover from the Windows Start menu:

Start->Programs->Teledyne DALSA->Nexus for BOA->iDiscover

The left panel (below) shows the MAC addresses of all reachable BOA vision systems. **Blue** cameras have compatible addresses. **Red** cameras have incompatible addresses.

2. Click on a camera, to populate the associated network configuration on the right.
3. You can then change the BOA IP address to match the associated NIC settings displayed at the top right, and then click "Apply". You can also change the default Device Name in this window.

Note: The "Connect to Device" button opens Internet Explorer and connects to the BOA web server's home page ([page 18](#)).



Note: If all the fields on the right are blank, it means the PC and the BOA have the same IP address. Windows cannot support this condition. Change the PC's IP address (Network Adapter Settings in Windows).

Note: WIFI or wireless LAN adapters can interfere with connecting to BOAs in the 192.168.x.x. range. If you have trouble temporarily disable the WIFI adapter and configure the BOA to a different address range.

Launch the Nexus Application

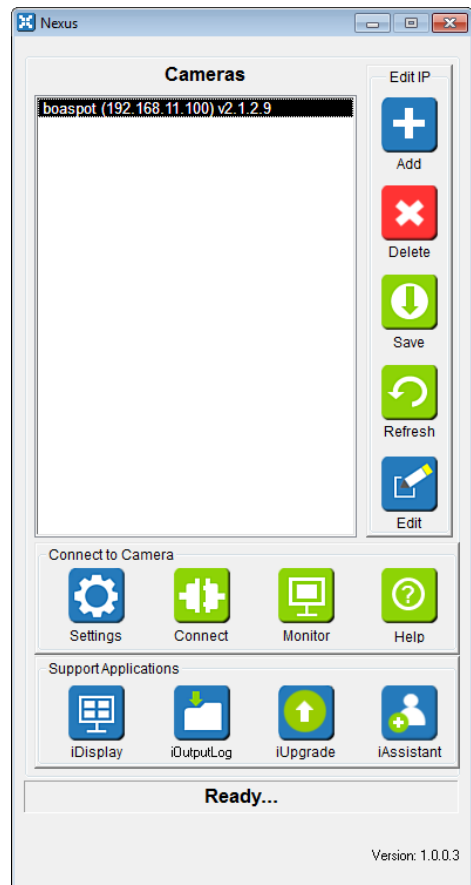
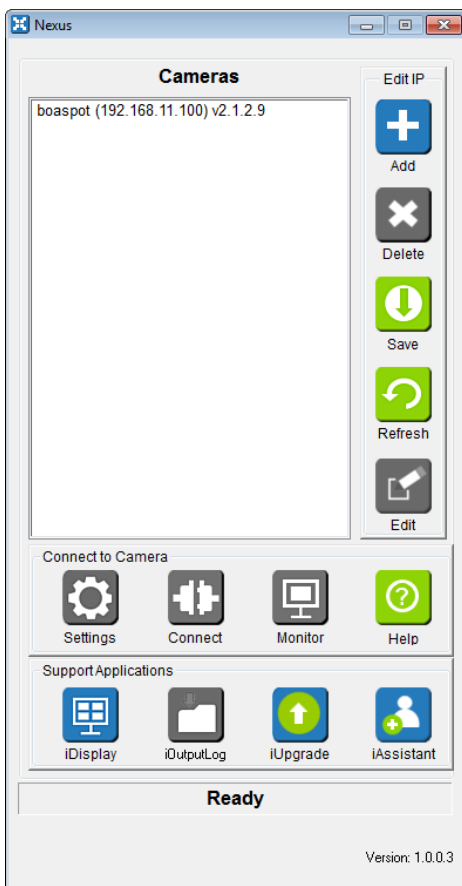
1. Open the Nexus application from the Windows Start menu (pictured on page [19](#)):

Start->Programs->Teledyne DALSA->Nexus for BOA->Nexus

Nexus will scan your network for connected BOA (and BOA Spot) devices. This may take up to a minute or more. The next time you open Nexus it should take less time.

The Nexus interface is shown below. The Status field at the bottom will first show “Discovering” while Nexus finishes scanning for BOA devices. The Status changes to “Ready” and the “Cameras” field displays all BOA and BOA Spot devices.

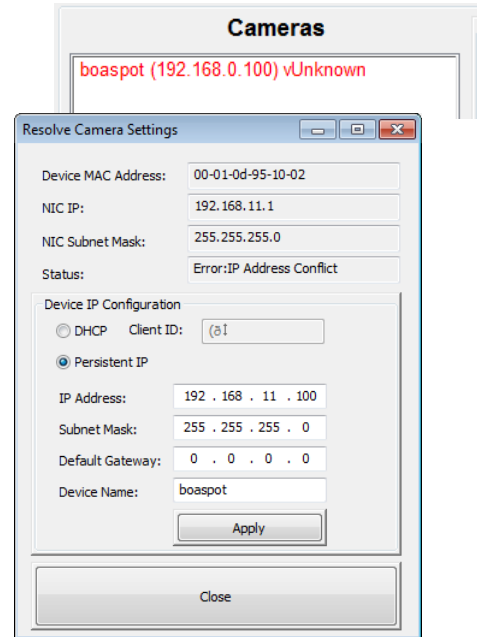
2. Click on a BOA in the “Cameras” list and all buttons become active.
3. Click on “Settings” to change camera settings (page [22](#)).
4. Click on “Connect” to open the iNInspect Express for BOA application and begin job programming.



Change BOA Address

If the BOA name and address appears in **Red**, the address is not compatible and must be changed.

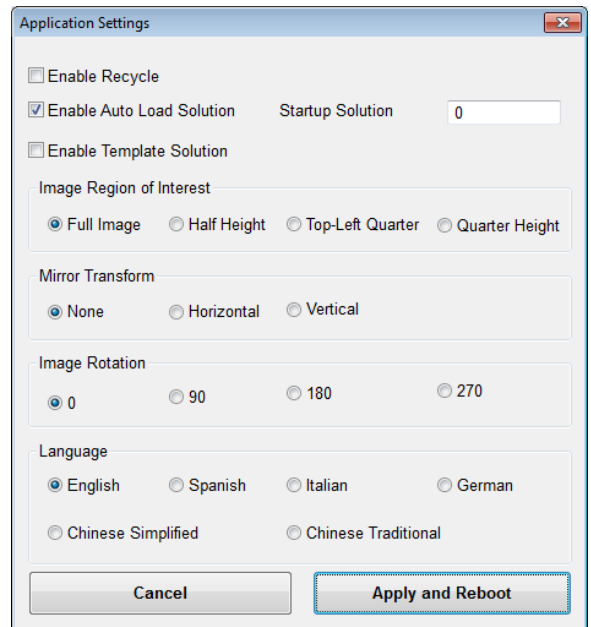
1. Click on the red BOA in the list, and then click the “Edit” button.
2. Use the “Resolve Camera Settings” window to change the BOA IP Address (shown in the bottom half) to be compatible with the NIC IP on your PC (shown in the top half). You can also change the BOA device name if you wish.
3. Click “Apply” and then click “Close”.
4. The Nexus application rescans your network for the BOA at its new address.



Note: A network switch or router can interfere with changing the address. Connect the BOA directly to the PC to change the address. Reinstall the router and use the Add button in Nexus to manually add the BOA address to the list and save the list.

Change BOA Settings

1. In the Nexus application window (page [21](#)), click on a Camera, then click “Settings”.
 - You can enable “Recycle” tolerances in measurements.
 - You can enable a specific Solution (job file) to load when BOA is powered on.
 - You can enable using a “Template Solution” file to use your defaults in new Solutions.
 - You can reduce the image size.
 - You can mirror and rotate the image.
 - You can change the display language in the iNspec application software.
2. When you are finished, click “Apply and Reboot” to apply your new settings. The BOA will reboot.



Upgrade BOA Firmware

BOA firmware may need to be updated to add new features or fix reported problems. We recommend against upgrading if the current firmware is performing to your expectations.

Obtain the binary upgrade file from the BOA software download file, or from your Teledyne Imaging representative. Copy the file to the client PC. When you upgrade by any of the methods, you need to browse to the location of the binary file.

Note: Export your saved solution files before upgrading the firmware.

There are two ways to open the upgrade utility:

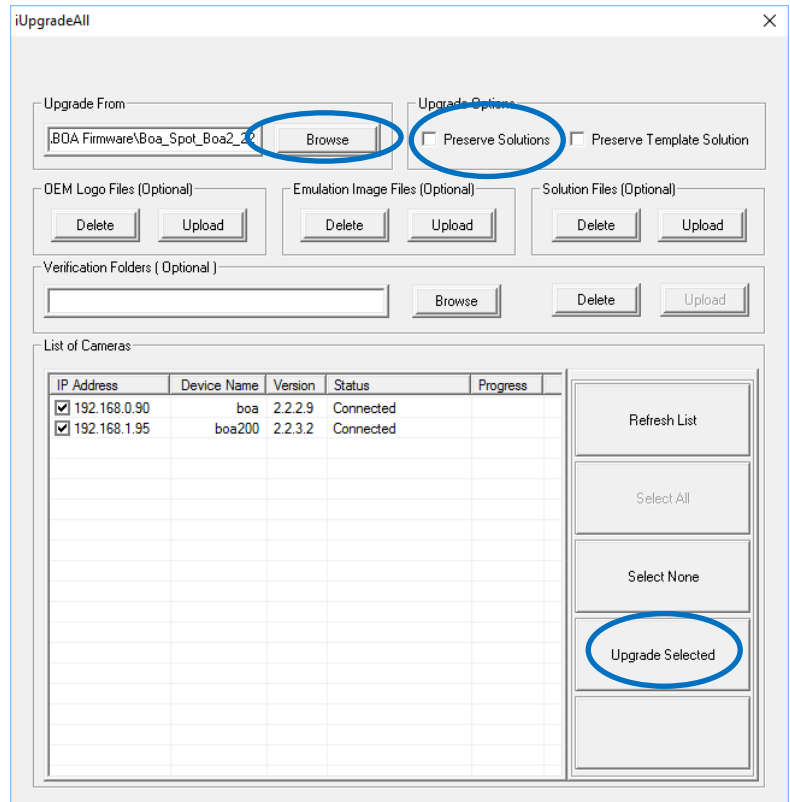
- Nexus installed: open Nexus (page [21](#)) and click the “Launch Upgrade Utility” button.
- Emulator installed: open the Start menu (page [28](#)) and click “Upgrade firmware of a Boa Camera”

1. Click the “Browse” button and find the binary upgrade file. Click “Preserve Solutions” if you desire.
2. Check all the devices you want to upgrade. The camera list shows all BOA systems on the network.
3. Click “Upgrade Selected”.

The BOA systems are upgraded **one at a time** and rebooted.

4. Close the utility after all upgrades are completed.
5. If you use the Emulator link or Internet Explorer to connect to the BOA, use iAssistant (page [24](#)) to delete outdated files (not needed if you use Nexus).

6. Uninstall the Emulator. Reboot the PC and install the new Emulator version that matches the new firmware.



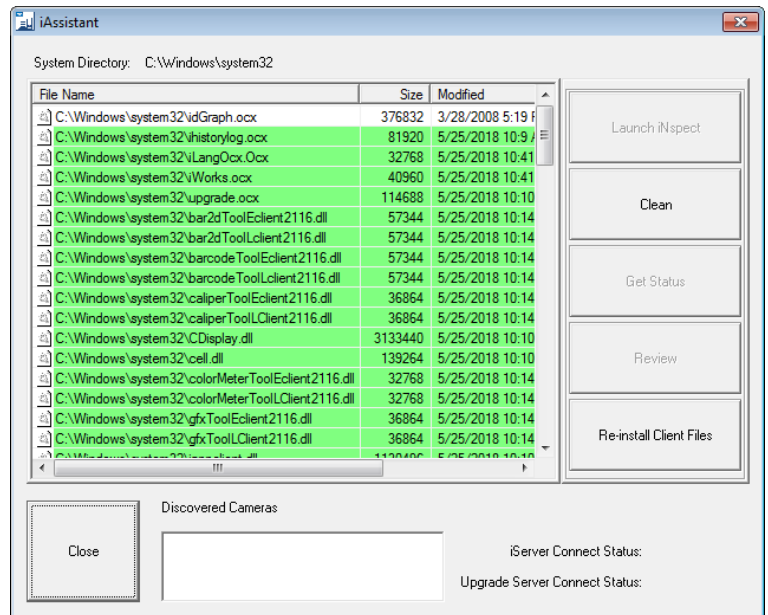
The iAssistant Utility

After a firmware upgrade, PC can be “cleaned” of outdated software components associated with the previous firmware. Nexus usually updates itself, but there are still times when you should clean the files.

There are a few ways to access the iAssistant utility.

- From the Start menu if you have installed Nexus (page [19](#)) or the BOA Emulator (page [28](#)) or from the Nexus application (page [21](#)).
- From the Nexus Application click the “iAssistant” button.

1. Close all other BOA application windows, and Internet Explorer.
2. Open iAssistant using one of the methods listed above.
3. When the iAssistant application opens, click the “Clean” button. All the files in the list will be deleted.
4. Click “Close”.



Note: If you get error messages and not all the files are deleted, verify Internet Explorer and all BOA related applications are closed. If you continue to get errors, reboot the PC and run iAssistant again. . If you open iAssistant from Nexus, it has full Administrator privileges, and can delete all files. If you open iAssistant from the Start menu shortcut, it does not have administrative privileges and may not delete all files. From the Start menu right-click on the shortcut and select “Run as administrator.”

The updated iAssistant uses a color display to inform you of file status or issues that you need to correct.

Nexus is designed to manage files for multiple versions of BOA (and BOA Spot) firmware. The core components are usually kept at the latest version and some tool-specific files from older versions may be added to ensure backwards compatibility.

- No highlight indicates non-critical or non-versioned files.
- **Green highlight** indicates the files are the newest version that Nexus has found.

No action is required.

1. Click Close.

- **Blue highlight** indicates Nexus has downloaded some files from an earlier version, to maintain compatibility. These are usually tool specific files.

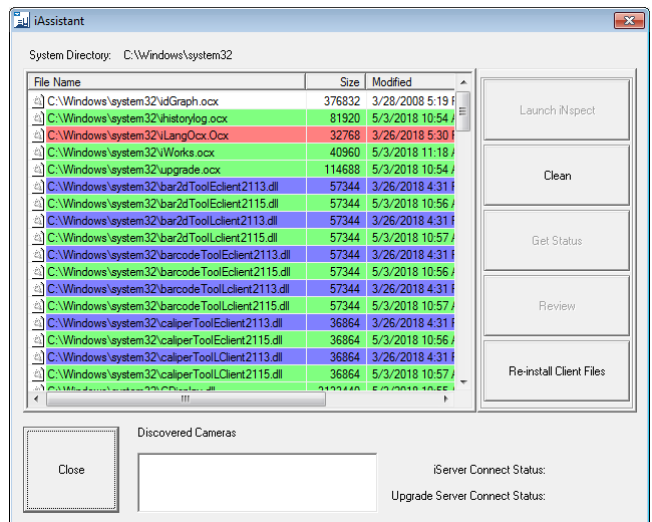
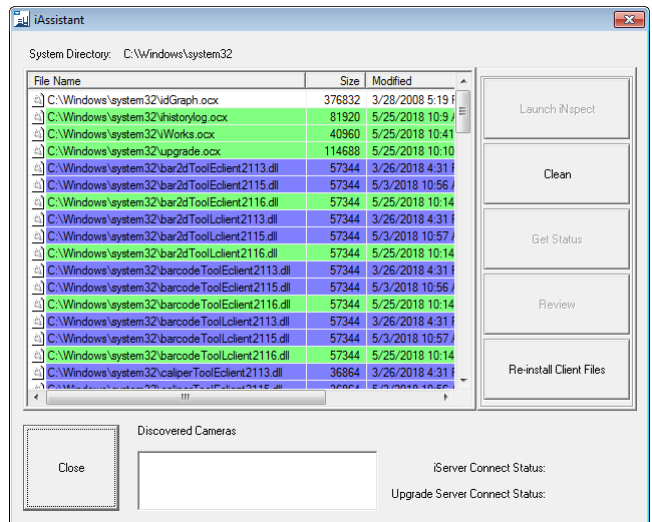
No action is required.

1. Click Close.

- **Red highlight** indicates important files are outdated. The iNspec application may not work correctly.

Your action is required:

1. Click “Clean” to remove all files.
2. Then click “Reinstall Client Files”.
3. Wait for the list to fill again before closing.
4. Click Close.



Note: If you get error messages and not all the files are deleted, verify Internet Explorer and all BOA related applications are closed. If you continue to get errors, reboot both the PC and BOA, and run iAssistant again.

The iDisplay Program

iDisplay is an application developed for PCs and Win32 based HMI's that can display images and results from up to 8 BOA cameras. It is installed with the Nexus application or the Emulator software. The application provides the following features:

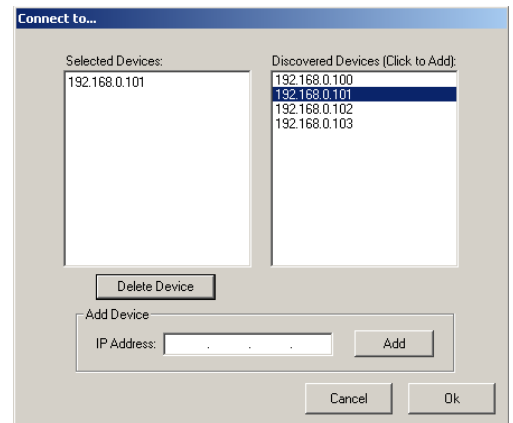
- Multiple, simultaneous image update with graphics and zoom
- Selectable results panel (select by IP address of camera)
- Solution switching and history recall by camera
- Manual triggering
- Tolerance editing for privileged users
- Customer logo (installed using the "iUpgrade All" utility)

There are two ways to launch iDisplay. Open the Nexus application and click the iDisplay button, or use the Windows Start menu shortcut if the Emulator software is installed:

Start>All Programs>Teledyne DALSA>iNspect Express Emulator for BOA>iDisplay

When launched for the first time, the dialog on the right will prompt you to select which cameras to connect for display. The list on the right shows all the cameras that were found on the network segment. Click on a camera to add it to the configuration. Click "OK" to launch the program.

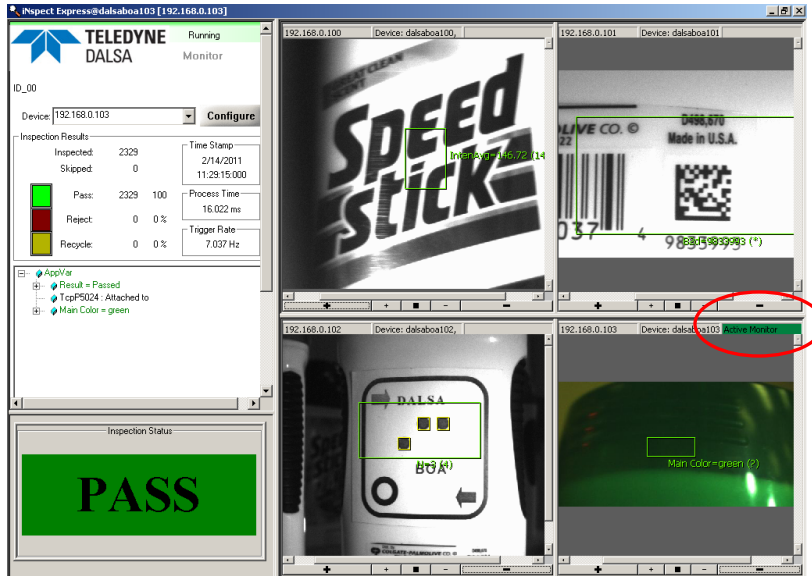
Next time the program is launched, it will only try to connect to the cameras selected in the dialog. If any cameras are not available, it will connect only the cameras that are.



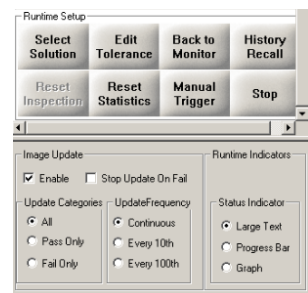
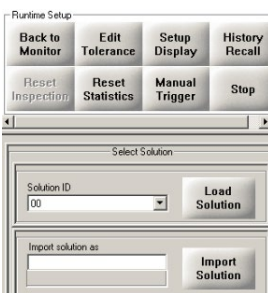
Note: The camera configuration can be changed by either clicking the "Configure" button in the iDisplay GUI or launching the iDisplay program from the command prompt with the config switch - "iDisplay /config". You can add or delete cameras to the list.

The order of cameras in iDisplay is based upon their order of discovery. The order is not configured or controlled separately. This means they may show in different order after a system reboot. You can delete all but one camera and add them back in the order you wish.

Below is a screenshot of the iDisplay application connected to 4 standard BOA cameras. The panel on the left shows the results from the “Active Monitor”, indicated in the upper right corner of the associated image window. The active monitor can be changed by selecting the device IP address in the drop-down menu.



Scrolling the left panel will expose controls for changing solutions, viewing history and configuring display updates on the selected camera.



Note: iDisplay is built on the same framework as iInspect Express and includes the same runtime controls.

The BOA Emulator Configurator

This GUI provides a quick and easy way to setup the emulator. It is launch from the windows start menu:

Start>All Programs>Teledyne DALSA>iNspect Express Emulator for BOA>BOA Emulator Config

Select the BOA model, software application and location of the stored images, then click “Apply Settings and Launch Emulator”. If the images don’t match the standard BOA resolutions exactly, select the “custom resolution” option and add the image dimensions.



The emulator installation provides some basic VGA test images to get started. These are selected when the “use default location” box is checked. The application data directories are hidden under Windows 7, but they are accessible using the browse images, solutions or application data buttons provided.

Note: If you select an image directory that also contains a solution00.bin file the Emulator uses that directory as the source for both images and solution files, not the default solutions directory. The “Browse Images” and “Browse Solutions” buttons will point to that directory. The Import Solution function still uses the default location.

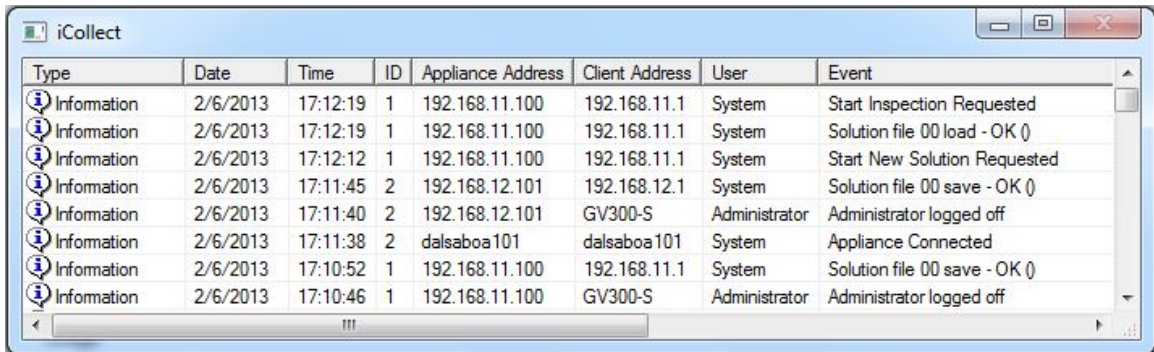
Data Collection

iCollect is a useful tool for some industries, such as Pharmaceutical, that require logging of system events. The iCollect program records activity or system events on networked BOA cameras that have Event Logging enabled. Types of system events collected are:

- ✓ Log on - successful and failed attempts
- ✓ Log off
- ✓ Save or load solution
- ✓ Stop or start inspecting

A copy of iCollect.exe is installed with the Emulator software. You can copy the exe file to a PC you wish to use for collecting event data. Any networked Windows PC will work as the iCollect data host. When started, the iCollect icon will appear in the system tray at the bottom of PC. Click on the icon to show or hide logged system events.

To enable sending of events on each connected BOA, go to the “User Admin” page on the iInspect Express GUI. Log in and check the Enable Event Logging box and enter the IP Address of the system collecting data (where iCollect.exe is running). For networked setups enter the IP address of the collection PC NIC. Click the “OK” button to complete the setup.



Type	Date	Time	ID	Appliance Address	Client Address	User	Event
Information	2/6/2013	17:12:19	1	192.168.11.100	192.168.11.1	System	Start Inspection Requested
Information	2/6/2013	17:12:19	1	192.168.11.100	192.168.11.1	System	Solution file 00 load - OK ()
Information	2/6/2013	17:12:12	1	192.168.11.100	192.168.11.1	System	Start New Solution Requested
Information	2/6/2013	17:11:45	2	192.168.12.101	192.168.12.1	System	Solution file 00 save - OK ()
Information	2/6/2013	17:11:40	2	192.168.12.101	GV300-S	Administrator	Administrator logged off
Information	2/6/2013	17:11:38	2	dalsaboa101	dalsaboa101	System	Appliance Connected
Information	2/6/2013	17:10:52	1	192.168.11.100	192.168.11.1	System	Solution file 00 save - OK ()
Information	2/6/2013	17:10:46	1	192.168.11.100	GV300-S	Administrator	Administrator logged off

The iCollect System Event Log

The iCollect log is stored as in a text file as “CSV” or Comma Separated Variables “iCollect.txt” in the same directory where iCollect.exe was run.

Note: If iCollect is enabled on BOA and not running on the connected PC, you will experience a delay at BOA boot up as it attempts to find the collection server. Data will be stored on the BOA if possible and transferred when the host PC reconnects.

General Specifications

This following table lists the specifications of the BOA2 vision system:

Specification		Definition	
Memory	Storage	2 GB Storage; 1GB Program	
Image	Sensor	1" CCD; 5 μ m pixel size	
	Resolution	2560 x 2048 (XA5), 1920x1440 (XA3), 1664x1216 (XA2)	
	Type	Mono Progressive Scan	
	Exposure	50 us to 1000 ms	
	Acquisition	Global Reset, full-frame integration, 25 f/s (application dependent)	
	Lens	C Mount (1" lens recommended for XA5 model)	
	I/O	Trigger	1 opto-isolated hardware trigger input Software trigger via Ethernet or internal timer
Inputs		2 General purpose opto-isolated.	
Outputs		3 General purpose opto-isolated	
Strobe		1 dedicated strobe output for LED light source	
Status		Network + 2 application assigned LEDs	
Network		Ethernet	10/100/1000 BaseT
Serial		RS232	1 Port – flying leads on I/O connector
Power	21-30 V	Via I/O or Lamp connectors	
	Device	300 mA maximum @ 24V (~7 Watts)	
	Lamp	300 mA maximum (BOA2 powering light source directly)	
Mechanical	Material	Machined Aluminum with anodize/paint finish	
	Mounting	8 x M4 plus optional mounting block	
	Size	83 mm x 66 mm x 48 mm (without lens cover)	
	Weight	297.7 grams (10.5 oz) without lens or lens cover	
Environment	Temp	-10°C (14°F) to 50°C (122°F) Operating (-60°C to 80°C) Storage	
	Protection	IP67 with cables attached	
	Shock	70 G	
Certification		FCC Class A and EU CE	

Input Specifications

The BOA2 vision system provides three (3) dedicated opto-isolated, polarity independent inputs. One of the inputs provides the acquisition Trigger function, while the other two are general purpose.

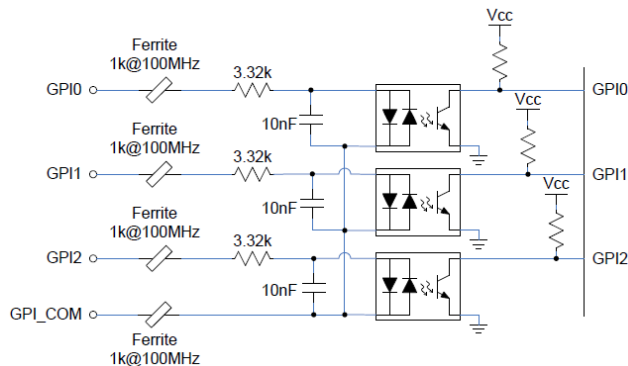
Specification		Definition
Voltage	ON	11-30 V
	OFF	0-3 V (12 V nominal threshold)
Current	ON	7.5 mA typ (24 V applied)
Protection	Resistance	3.3 K Ohms
	Isolation	4000 V RMS
Common pin	Input	PWR or GND
Switch Time	ON	20 Microseconds
	OFF	10 Microseconds
Latency	Trigger	62 Microseconds from trigger input to start of acquisition

The active polarity of each input is configured in the iNspec Express application. The camera includes a noise filter on the input which is also configurable.

To connect with an NPN source, connect the camera trigger input (pin 5) to the NPN source output and the camera common input (pin 7) to PWR. When the source output turns ON, the camera input will be pulled down turning the opto-coupler ON.

To connect with a PNP source, connect the camera trigger input (pin 5) to the PNP source output and the camera common input (pin 7) to GND. When the source output turns ON, the camera input will be pulled up turning the opto-coupler ON.

Input Diagram



Output Specifications

The BOA2 vision system provides three (3) dedicated opto-isolated, solid state relay outputs and a separate dedicated light strobe (pin 2 of lamp connector).

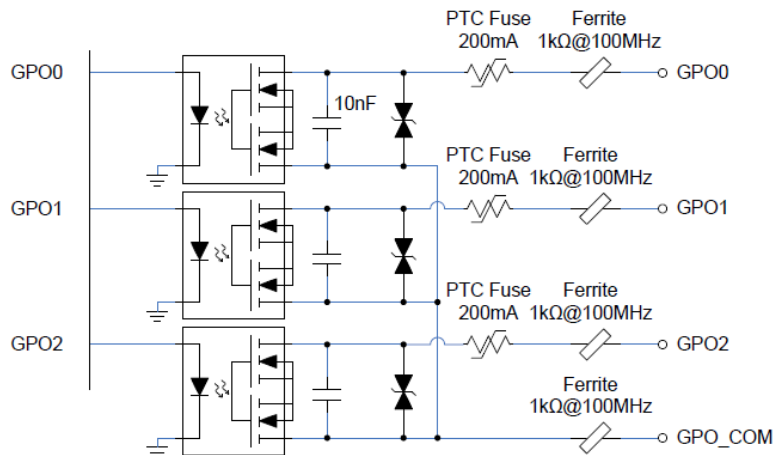
Specification		Definition
Voltage (Vin)	Load	30V maximum (lamp voltage = $V_{in}-0.56V$)
Current	GPO[0:2]	200 mA max @ 20°C (drives to OCMN when active)
	STRB	200 mA max (drives to $V_{in}-1V$ when active) <i>Note: Strobe timing is selected in iNspec Express Sensor Setup</i>
Protection	Fuse	PTC fuses to 200 mA at 20°C or 150 mA at 70°C
Common pin	Out	PWR or GND
Switch Time	ON	400 Microseconds
	OFF	80 Microseconds

The active polarity of each output is configured in the iNspec Express application as detailed on the following page.

To connect with an PNP input source, connect the camera output (pin 3, 10 or 11) to the PNP source input and the camera common output (pin 4) to GND. When the camera output turns ON, the opto switch closes and $OUTX = 0$ (current flows through load).

To connect with an NPN input source, connect the camera output (pin 3, 10 or 11) to the NPN source input and the camera common output (pin 4) to PWR. When the camera output turns ON, the opto switch closes and $OUTX =$ output common.

Output Diagram



Input Control via iNspect Express

The iNspect Express application provides two options for controlling the inputs on BOA2. These are selected in the “Control” panel of the GUI as shown below. Click on the GUI cells to change the control parameters.

Input	Polarity	Debounce (us)	Value
GPI0 (Trigger)	Active High	200	
GPI1		200	
GPI2		200	

Each input supports a noise filter called “debounce”. A signal must remain active for the duration of the filter to be considered valid. The debounce settings range from 1us to 64ms. GPI0 is a special input that is used either as a Trigger or general-purpose input. When used for triggering, the polarity of this input is programmable.

BOA2 inputs are available to the script tool for synchronizing with external events.

Output Control via iNspect Express

The iNspect application provides two options for controlling the outputs on BOA2. These are selected in the “Control” panel of the GUI as shown below. Click on the GUI cells to set the Driver, polarity and associated pulse parameters.

Output	Driver	Polarity	Pulse Offset (ms)	Pulse Duration	Initial Value
GPO0	Pass Soft Pu...	Active High	60	1	0
GPO1	Fail Soft Pul...	Active High	60	1	0
GPO2	Script Setting	Active High	60	1	0
STROBE		Active Low			0

Output	Driver
GPO0	Pass Pulse
GPO1	Script Setting
GPO2	Pass Pulse
STROBE	Recycle Pulse
	Fail Pulse
	Pass Soft Pulse
	Fail Soft Pulse

Output	Driver	Polarity
GPO0	Pass Pulse	Active High
GPO1	Fail Soft Pul...	Active High
GPO2	Script Setting	Active High
STROBE		Active Low
		Active Low
		Active High

Note: The Strobe driver uses the offset/duration settings defined in the Sensor Setup panel. The active polarity only affects the external STROBE output.

Selecting the Right Output Driver

Each BOA2 output can be configured by an equation in the script tool or a programmable pulse based on the inspection result (either Pass, Fail or Recycle):

Script Setting: Use the script tool to configure an output to provide a programmable level or a pulse based on the application need ([Note: the GUI pulse settings are disabled in this mode – shown as dark gray above](#)). Script selection is non-deterministic, meaning the output timing may vary if the processor is heavily loaded. This may occur, for example, when the trigger and inspection times are close and BOA2 is serving images to a connected PC.

Example: A script equation that generates an active high 10ms pulse based on a PASS result would be:

[If \(Result = 1\) Global.GPO\[0\] = pulse\(1, 0 ,10\)](#)

Soft Pulse Setting: Selecting this setting will automatically define scripts based on the pulse settings defined in the GUI. This offers a convenient alternative to learning the script tool if you only need to generate a pulse output.

Pulse Setting: This mode offers a deterministic output with an offset and duration synchronized to the incoming trigger. In this mode, the output will pulse IF the result is TRUE and the total inspection time is less than the pulse offset from the trigger. If the pulse offset is too short, BOA2 will not generate a pass pulse even if the inspection passes. In this case, BOA2 will always generate a FAIL pulse if FAIL is selected on the second output. This would result in false rejects if the output is being used to control a directional device.

[Min Pulse Offset = Exposure Time + Acquisition Time + Inspection Time](#)

Example: Pulse 10 ms on GPO0 for a PASS result OR pulse 30 ms on GPO1 for a FAIL result. Sensor exposure time is 9 ms, acquisition time is ~16 ms and inspection time is ~35 ms. Minimum Pulse Offset = 9+16+35=60 ms. IF the minimum offset is satisfied, BOA2 will output a PASS pulse on a good result, ELSE BOA2 will output a FAIL pulse instead. The duration of the pulse is not significant in this decision. However, setting the pulse longer than the trigger period is not advised. [The maximum pulse offset and duration is 16 seconds](#). (the max duration was 65 ms in version 1881 and earlier).

[Note: Processing overhead can also affect the minimum pulse offset requirement. It is good practice to calibrate this time based on your typical expected usage of the system \(i.e. inspection time overhead + system access overhead\)](#)

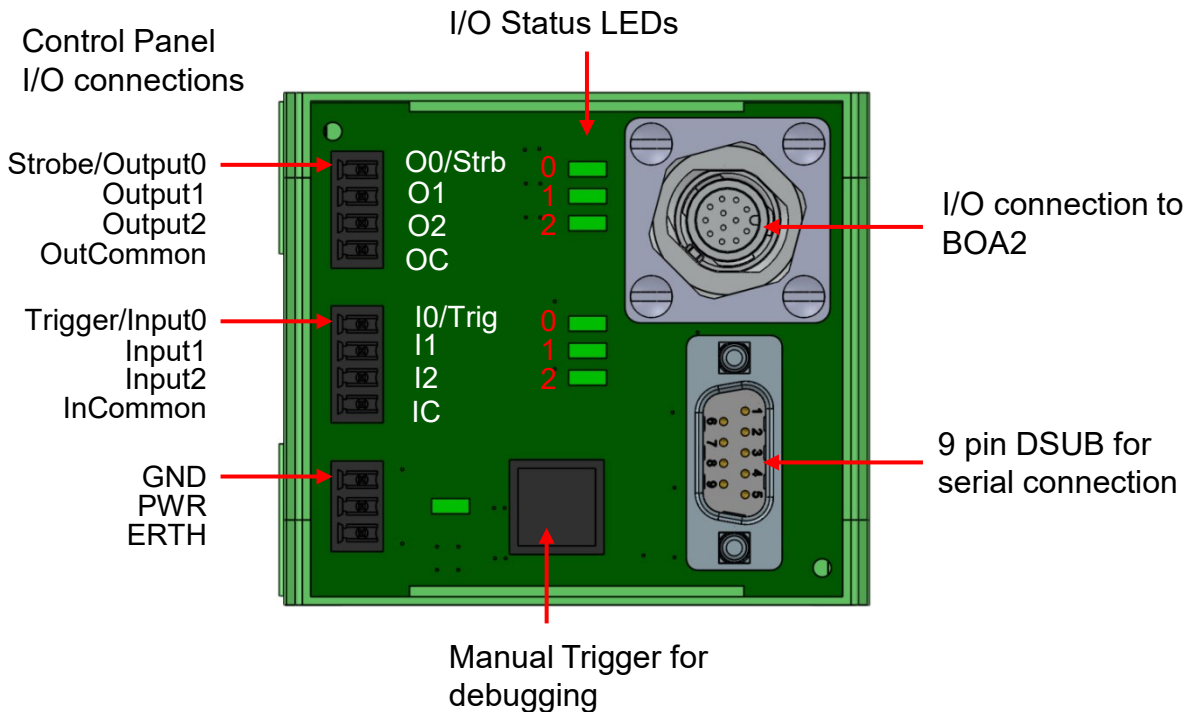
PL-101 Specifications

The PL-101 module offers additional isolation for the BOA2 camera and simplifies wiring at the control panel. The PL-101 is connected to the camera through a single M12 cordset.

The I/O and RS-232 connections of BOA2 are available through the PI-101. Specification for these signals are as follows:

Specification		Definition
Voltage	Load	24 V maximum
Current	GPO[0-2]	200 mA max @ 20°C
Protection	Fuse	PTC fuses to 200 mA at 20°C or 150 mA at 70°C
Common	ICMN/OCMN	PWR or GND as wired on respective OPTOs
Switch Time	GPO[0-2]	800 Microseconds (ON or OFF, includes camera switch time)

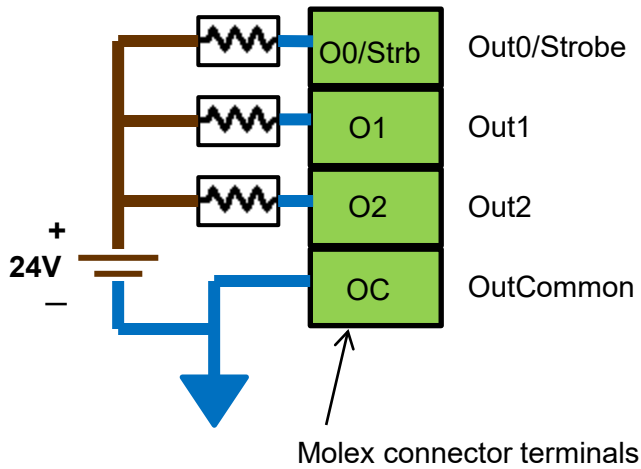
PL-101 Connections



PL-101 Wiring Diagrams

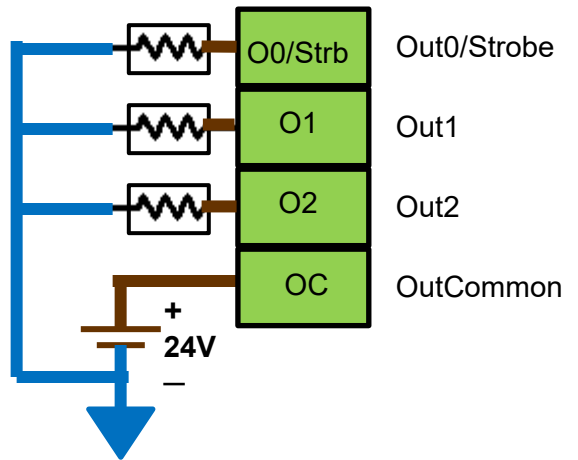
Current Sinking Outputs (NPN)

Turning on an output pulls it to 0V.



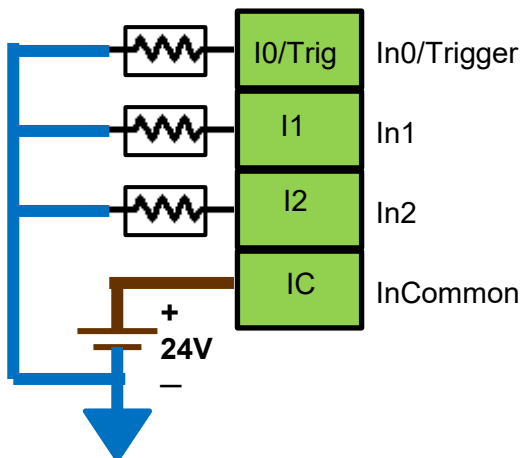
Current Sourcing Outputs (PNP)

Turning on an output pulls it to 24V.



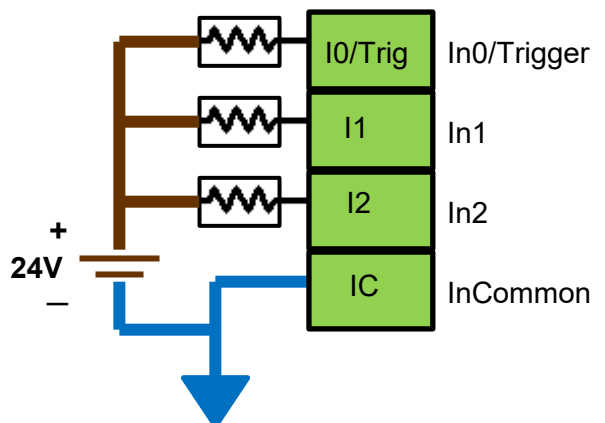
Current Sourcing Inputs (NPN)

A low voltage turns the input on.



Current Sinking Inputs (PNP)

A positive voltage turns the input on.



Serial Port Connection




The RS-232 serial port is exposed through the I/O connector and is made available on the PL-101. By default, the serial port settings are set as follows:

Port definition	Setting
Baud Rate	115200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

These port settings can be changed through the GUI by configuring the “RS232 Stream Settings” in the Setup Control panel. Refer to the iNspect Express Software Users Manual for details.

RS-232 Hardware Configuration

Electrically, three (3) signals are required to make a serial port connection between BOA2 and another device as shown below. RS232 is a “point-to-point” connection, so the Receive and Transmit lines must be crossed in the cable.

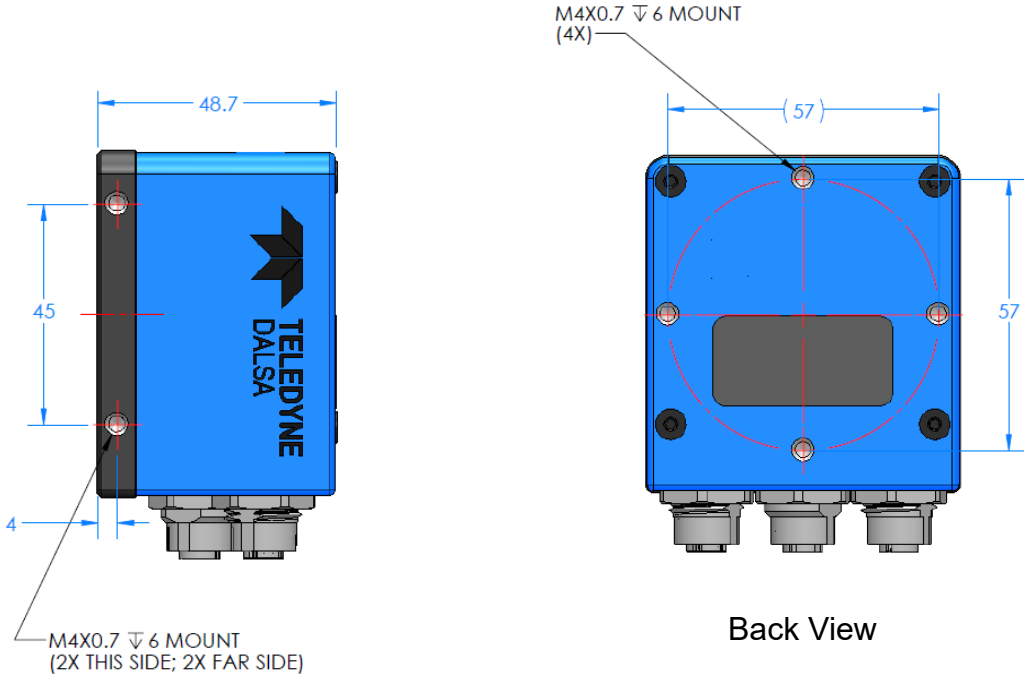
BOA2 I/O M12-12 Connector			
Pin	Name	Color	
9	RS232 RX		White
2	GND		Blue
8	RS232 TX		Gray
1,4	Not required		

3 rd Party DSUB-9 Connector	
Pin	Name
3	TX
5	GND
2	RX
1,4,6,7,8,9	Not required

Note: It is important to establish a common ground connection between BOA2 and the connecting 3rd party device.

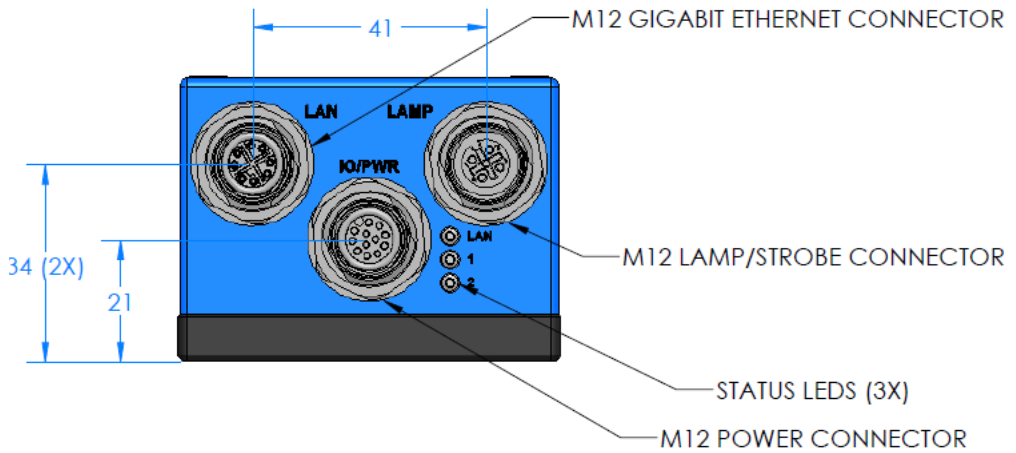
BOA2 Mechanical Dimensions

Note: All dimensions in mm



Side View

Back View



Bottom View

PL-101 Mechanical Dimensions

Note: All dimensions in mm

