iVu Plus BCR Gen2 Series Sensor

Instruction Manual

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179047

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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1 Product Description

The iVu Plus Barcode Reader (BCR) Gen2 Series Sensor reads a wide variety of barcodes. The package consists of device, lighting, lens, and display. Cables and mounting brackets can be ordered for each application. Additionally, other lenses, filters, and external lights are available. Installation, setup, and configuration can be done quickly with or without PC.



- All-in-one solution with barcode reader, controller, lens, and light included in one package
- Configure in minutes using Vision Manager PC software, onboard touchscreen display or using remote touchscreen to access to hard to reach places
- Highly capable 1D and 2D barcode reader for traceability applications
- Compact, rugged, IP67 housing available with a variety of integrated ring lights including red, blue, green, white, infrared or UV
- Interchangeable lenses, including C-mount, for maximum application flexibility
- Factory communications (EtherNet/IP™ [2], Modbus/TCP, PROFINET® [3], PCCC and Serial RS-232) for integration on the manufacturing floor

The device reads the following barcode types:

- 1D Barcodes: Code 128, Code 39, Code 93, CODABAR, DataBar, Interleaved 2 of 5, EAN13, EAN8, UPCE, PDF417, Postnet, IMB, and Pharmacode
- 2D Barcodes: DataMatrix, QR Code & Micro QR Code

WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

CAUTION: Electrostatic Discharge

Avoid the damage that electrostatic discharge (ESD) can cause to the Sensor.

Always use a proven method for preventing electrostatic discharge when installing a lens or attaching a cable.

1.1 Models

Table 1: iVu BCR Models with an Integrated Display

Ring Light Options	Micro Video Lens Options (Focal Length)						C-Mount Lens Options
	4.3 mm	6 mm	8 mm	12 mm	16 mm	25 mm	
None	**IVU2PTBX04**	**IVU2PTPX06**	**IVU2PTBX08**	**IVU2PTBX12**	**IVU2PTBX16**	**IVU2PTBX25**	**IVU2PTBXC**
Red	**IVU2PTBR04**	**IVU2PTBR06**	**IVU2PTBR08**	**IVU2PTBR12**	**IVU2PTBR16**	**IVU2PTBR25**	N/A
Blue	**IVU2PTBB04**	**IVU2PTBB06**	**IVU2PTBB08**	**IVU2PTBB12**	**IVU2PTBB16**	**IVU2PTBB25**	N/A
Green	**IVU2PTBG04**	**IVU2PTBG06**	**IVU2PTBG08**	**IVU2PTBG12**	**IVU2PTBG16**	**IVU2PTBG25**	N/A
IR	**IVU2PTBI04**	**IVU2PTBI06**	**IVU2PTBI08**	**IVU2PTBI12**	**IVU2PTBI16**	**IVU2PTBI25**	N/A
White	**IVU2PTBW04**	**IVU2PTBW06**	**IVU2PTBW08**	**IVU2PTBW12**	**IVU2PTBW16**	**IVU2PTBW25**	N/A
UV 365 [4]	**IVU2PTB604**	**IVU2PTB606**	**IVU2PTB608**	**IVU2PTB612**	**IVU2PTB616**	**IVU2PTB625**	N/A
UV 395 [4]	**IVU2PTB904**	**IVU2PTB906**	**IVU2PTB908**	**IVU2PTB912**	**IVU2PTB916**	**IVU2PTB925**	N/A

[2] EtherNet/IP™ is a trademark of ODVA, Inc.
[3] PROFINET® is a registered trademark of PROFIBUS Nutzerorganisation e.V.
[4] Blue Filter Kit (FLTMB) is included with UV models.

Table 2: iVu BCR Models with a Remote Display

Ring Light Options	Micro Video Lens Options (Focal Length)						C-Mount Lens Options
	4.3 mm	6 mm	8 mm	12 mm	16 mm	25 mm	
None	**IVU2PRBX04**	**IVU2PRBX06**	**IVU2PRBX08**	**IVU2PRBX12**	**IVU2PRBX16**	**IVU2PRBX25**	**IVU2PRBXC**
Red	**IVU2PRBR04**	**IVU2PRBR06**	**IVU2PRBR08**	**IVU2PRBR12**	**IVU2PRBR16**	**IVU2PRBR25**	N/A
Blue	**IVU2PRBB04**	**IVU2PRBB06**	**IVU2PRBB08**	**IVU2PRBB12**	**IVU2PRBB16**	**IVU2PRBB25**	N/A
Green	**IVU2PRBG04**	**IVU2PRBG06**	**IVU2PRBG08**	**IVU2PRBG12**	**IVU2PRBG16**	**IVU2PRBG25**	N/A
IR	**IVU2PRBI04**	**IVU2PRBI06**	**IVU2PRBI08**	**IVU2PRBI12**	**IVU2PRBI16**	**IVU2PRBI25**	N/A
White	**IVU2PRBW04**	**IVU2PRBW06**	**IVU2PRBW08**	**IVU2PRBW12**	**IVU2PRBW16**	**IVU2PRBW25**	N/A
UV 365 [5]	**IVU2PRB604**	**IVU2PRB606**	**IVU2PRB608**	**IVU2PRB612**	**IVU2PRB616**	**IVU2PRB625**	N/A
UV 395 [5]	**IVU2PRB904**	**IVU2PRB906**	**IVU2PRB908**	**IVU2PRB912**	**IVU2PRB916**	**IVU2PRB925**	N/A

Note: This product emits UV light. Exempt Risk Group (RG 0) product. No optical hazard is considered reasonably foreseeable, even for continuous, unrestricted use (IEC 62471).

[5] Blue Filter Kit (FLTMB) is included with UV models.

2 Overview

The iVu Vision Sensor can be configured in just minutes with a few simple steps. Program through the integrated or remote touch screen without the use of a PC. As an alternate, use Vision Manager PC software to configure and monitor devices. Use the grayscale, color, or barcode versions to solve a wide variety of factory automation applications.

2.1 Features and Indicators

The iVu BCR comes fully assembled with the lens and an integrated ring light (optional).

Integrated display models: The touchscreen display has a plastic cover to protect the display. Remove this cover when configuring the device. When the display is not in use, keep the display covered to protect it.

Remote display models: The remote touchscreen display is not required for normal device operation, however, it is needed to configure the device and to monitor inspections.

If an integrated ring light is not used, another light source is needed. Various lights are available from Banner Engineering. Operating in external trigger mode requires a triggering source.

Figure 1. Features



1. Power LED
   - Green: Ready/Power
   - Red (blinking or steady): Error
2. Pass/Fail LED
   - Green (steady): Pass
   - Green (blinking): Error
   - Red: Fail
3. Ethernet I/O LED
   - Green: Connected
   - Off: Disconnected
4. Focusing Window
5. Focusing Window Locking Clip
6. Integrated Display (integrated display models only)

2.2 Vision Manager Software

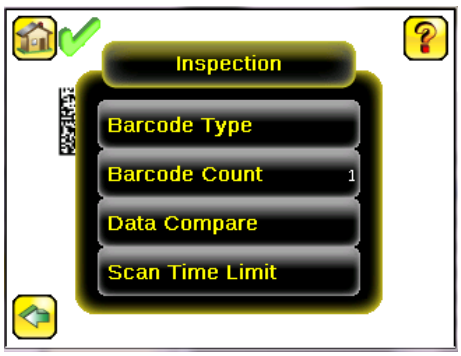
Set up the iVu Plus Barcode Reader (BCR) Gen2 Series Sensor using the free Vision Manager Software, available for download at www.bannerengineering.com.

Use Vision Manager to connect to, monitor, and configure iVu BCR devices. The simple user interface allows for quick setup of inspections, the ability to make changes on the fly and remote monitoring of live sensors. Also included in Vision Manager are iVu BCR emulators, allowing users to create or troubleshoot inspections offline, without being connected to a device.

Use Vision Manager to configure Banner vision devices including iVu Vision Sensors and VE Smart Cameras.

2.3 Live Mode Overview

The iVu BCR can be configured to evaluate one or more of the supported barcode types and can look for a specific number of barcodes from 1 to 10. Select the barcode types by going to **Main Menu** > **Inspection** > **Barcode** > **Barcode Type**. Select the barcode count by going to **Main Menu** > **Inspection** > **Barcode** > **Barcode Count**.



2.3.1 Read/No Read, Pass/Fail, Match/No Match

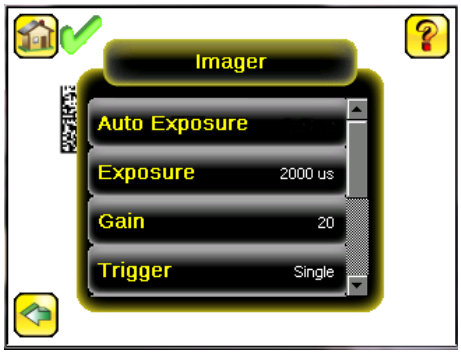
- A Read condition occurs when the configured number of barcodes are found in a scan. These barcodes must be error-free.
- A No Read condition occurs when the configured number of barcodes are not found in a scan.
- If the device is configured where Data Compare is **disabled**, Pass and Fail are the same as Read and No Read.
- If the device is using the Data Compare feature, Pass indicates that a good barcode was found and the data compared.
- If the device is using the Data Compare feature, Fail indicates that either no good barcode was found or the data did not compare.
- A Match condition occurs when the required number of barcodes are found and the compare is successful.
- A No Match condition occurs when the required number of barcodes are found, but the compare is not successful.

2.3.2 Trigger Modes

The iVu BCR has five trigger modes that determine how the sensor captures and processes images:

- Continuous Scan—the sensor uses internal timing to continuously capture images
- External - Single—inspections are triggered in response to an electrical signal on the Trigger input line
- External - Gated—the sensor continues to capture images and run barcode scans, while an external trigger input signal is active, until a successful Read occurs or until the External Trigger input signal becomes inactive
- Industrial Ethernet Only— only Trigger commands from the Industrial Ethernet communications channel are accepted
- Command—the command channel triggers the iVu BCR from a remote device

Select one of the trigger modes by going to **Main Menu** > **Imager** > **Trigger** . Trigger on p. 47 describes these trigger modes in more detail.



2.3.3 Compare Data

The iVu BCR has a data compare feature for comparing read barcode data against reference data. To manually enter data, go to **Main Menu** > **Inspection** > **Barcode** > **Data Compare** > **Set Data** . Enter data of up to 3200 characters. Additionally, the data compare feature provides for masking characters within the data.

There are two additional ways to enter compare data:

- Import the last read data while viewing the **Set Data** screen. The new data is effective on the first trigger that occurs after this action.
- Use Remote Teach.

  When a Remote Teach occurs, the data of the first read barcode is saved as Data Compare input. Inspections executed on the next trigger use the new data for comparison with subsequently read barcodes. If the previous input data contained any masked characters, Remote Teach retains the masked characters **only** if the new data is of the same length as the previous input data. If the length does not match, masking is removed.

The sensor tries to compare the full length of this string with the data read from the barcode. If it is not equal, the inspection is marked as Fail.

Note: If the sensor reads more than one barcode in the field of view, only the first barcode data that the sensor reads can be compared.

2.3.4 Output 1, Output 2, and Output 3

Configure the three output signals for Pass, Fail, Read, No Read, Match, No Match, System Error, and Missed Trigger. The default settings are Pass for Output 1, Fail for Output 2, and Pass for Output 3.

Note: For all outputs, the default setting is Latched, which means that the signal is active until the results of an inspection cause a change in the signal output. If Pulsed is selected, the default pulse width is 50 ms.

2.3.5 Serial and Ethernet Output

The iVu BCR communicates with other devices via Ethernet or a UART serial communications port (RS-232). To establish an Ethernet connection to the iVu BCR, configure the external device with the correct IP address and TCP port. To use the serial communications connection, configure the port settings for baud rate, data bits, parity, and stop bits on the iVu BCR to match the settings of the external device.

The iVu BCR RS-232 port or Ethernet port can be used to output barcode data to other applications. To access the Data Export screen, go to **Main Menu** > **System** > **Communications** > **Data Export**. The user can enable or disable this feature. When enabled:

- If the sensor is configured for either **External-Single** or **External-Gated** trigger modes, every trigger results in the transmission of output data (if the sensor does not successfully read a barcode, the output is NO_READ)
- If the sensor is configured for **Continuous** trigger mode, the sensor transmits output barcode data only upon a successful read

To access the Serial Output screen, go to **Main Menu** > **System** > **Communications** > **Serial I/O**.

When RS-232 serial output is enabled, configure the following:

- Serial Port Settings (listed below)
- Type of Data to Export (listed below)
- Output Format (listed below)

To access the Ethernet Output screen, go to **Main Menu** > **System** > **Communications** > **Ethernet I/O**.

When Ethernet output is enabled, configure the following:

- IP Address, Port number, Subnet Mask, and Gateway
- Type of Data to Export (listed below)
- Output Format (listed below)

Type of Data to Export:

- Pass/Fail Output
- Inspection Name
- Barcode Count
- Data Length
- Symbol Type
- Barcode Data
- Frame Number
- Inspection Time (ms)

Serial Port Settings:

- Baud Rates
- Start Bits
- Stop Bits
- Data Bits
- Parity Control

Output Format:

- Start String
- Delimiter
- End String

2.4 Imager Resolution

The iVu BCR includes an adjustable resolution up to 752×480 pixels.

3 Specifications and Requirements

3.1 Specifications

Power Connection
12-pin M12/Euro-style male connector; accessory cable required for operation

USB 2.0 Host
4-pin M8/Pico female connector; optional USB cable required for operation of USB flash drive

Ethernet Connection
4-pin M8/Pico male connector

Remote Display Connection
8-pin M12/Euro-style female connector; accessory cable required for remote display

Power Requirements
Voltage: 10 V dc to 30 V dc
Current: 1 A maximum (exclusive of I/O load)

Output Configuration
NPN or PNP, software selectable

Demo Mode
Full tool functionality on canned images

Sensor Lock
Optional password protection

Integrated Ring Light
Models with red, blue, green, infrared, white, ultraviolet or no integrated ring light

Output Rating
150 mA

Acquisition
60 fps (frames per second) [6]

Exposure Time
0.1 ms to 1.049 s

Imager
1/3 inch CMOS 752 × 480 pixels; adjustable Field of View (FOV)

Lens Mount
Micro Video Lens models: M12 × 1 mm thread; micro video lens 4.3 mm, 6 mm, 8 mm, 12 mm, 16 mm, 25 mm
C-Mount models: Standard C-mount (1 inch-32 UN)

Construction
Black PBT sensor housing; die cast zinc back cover; acrylic window
Integrated Display **Weight:** 0.36 kg (0.80 lbs)
Remote Display **Weight:** 0.41 kg (0.90 lbs)

Vibration and Mechanical Shock
Meets IEC 60068-2-6 requirements (Vibration: 10 Hz to 55 Hz, 0.5 mm amplitude, 5 minutes sweep, 30 minutes dwell)
Meets IEC 60068-2-27 requirements (Shock: 30G 11 ms duration, half sine wave)

Environmental Rating
IEC IP67, micro video lens models only

Operating Conditions
Integrated Display **Stable Ambient Temperature:** 0 °C to +45 °C (+32 °F to +113 °F)
Remote Display **Stable Ambient Temperature:** 0 °C to +40 °C (+32 °F to +104 °F)

Certifications

CE

3.2 PC Requirements

Operating System
Microsoft® Windows® operating system version 7, 8, or 10 [7]

System Type
32-bit, 64-bit

Hard Drive Space
80 MB (plus up to 280 MB for Microsoft .NET 4.5, if not already installed)

Memory (RAM)
512 MB minimum, 1 GB+ recommended

Processor
1 GHz minimum, 2 GHz+ recommended

Screen Resolution
1024 × 768 full color minimum, 1650 × 1050 full color recommended

Third-Party Software
Microsoft .NET 4.5, PDF Viewer (such as Adobe Acrobat)

USB Port
USB 3.0, recommended if a USB to Ethernet adapter used to communicate with the sensor

Important: Administrative rights are required to install the Vision Manager software.

[6] This value can vary based on inspection settings.
[7] Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries.

3.3 Dimensions

Micro Video Lens Dimensions

Figure 2. Micro Video Lens, Remote Display Models

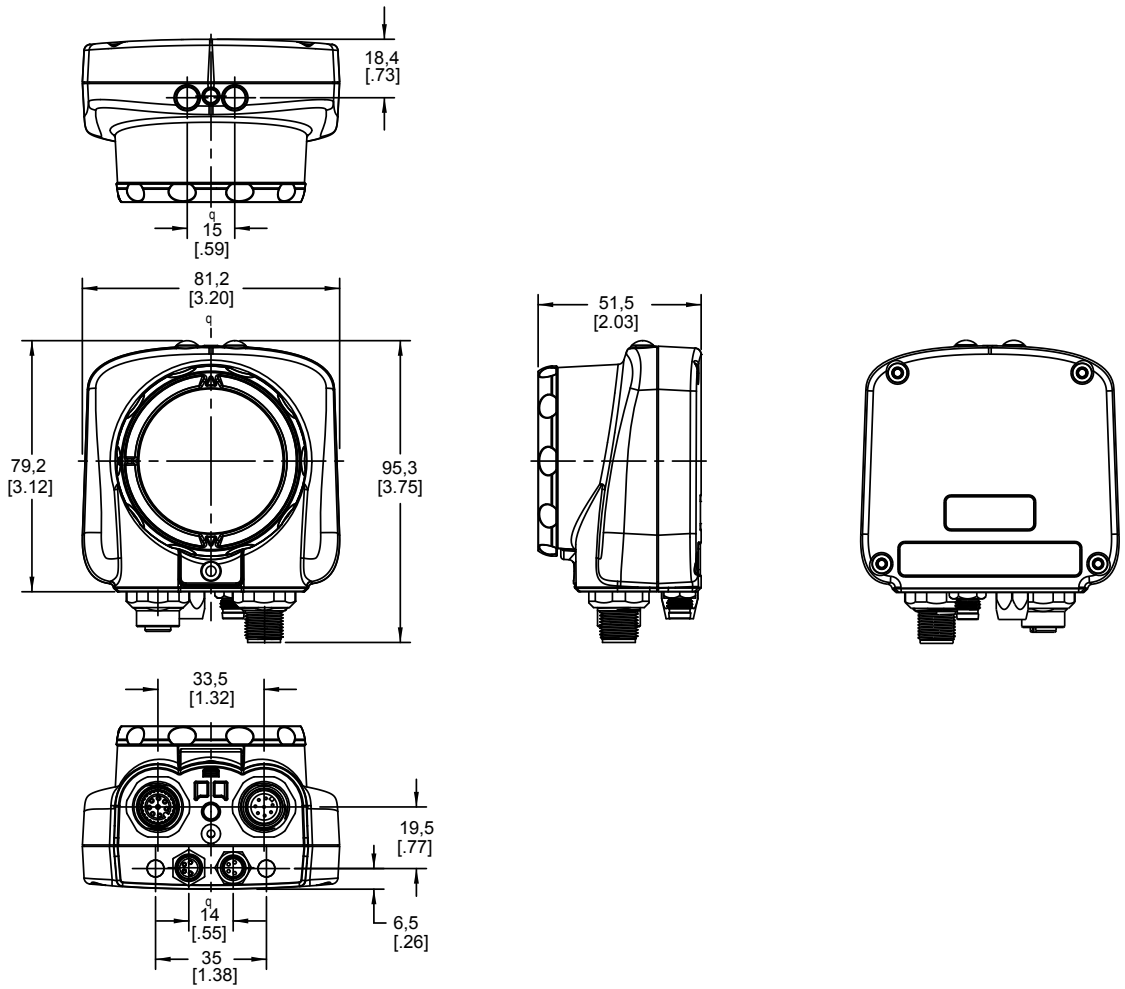
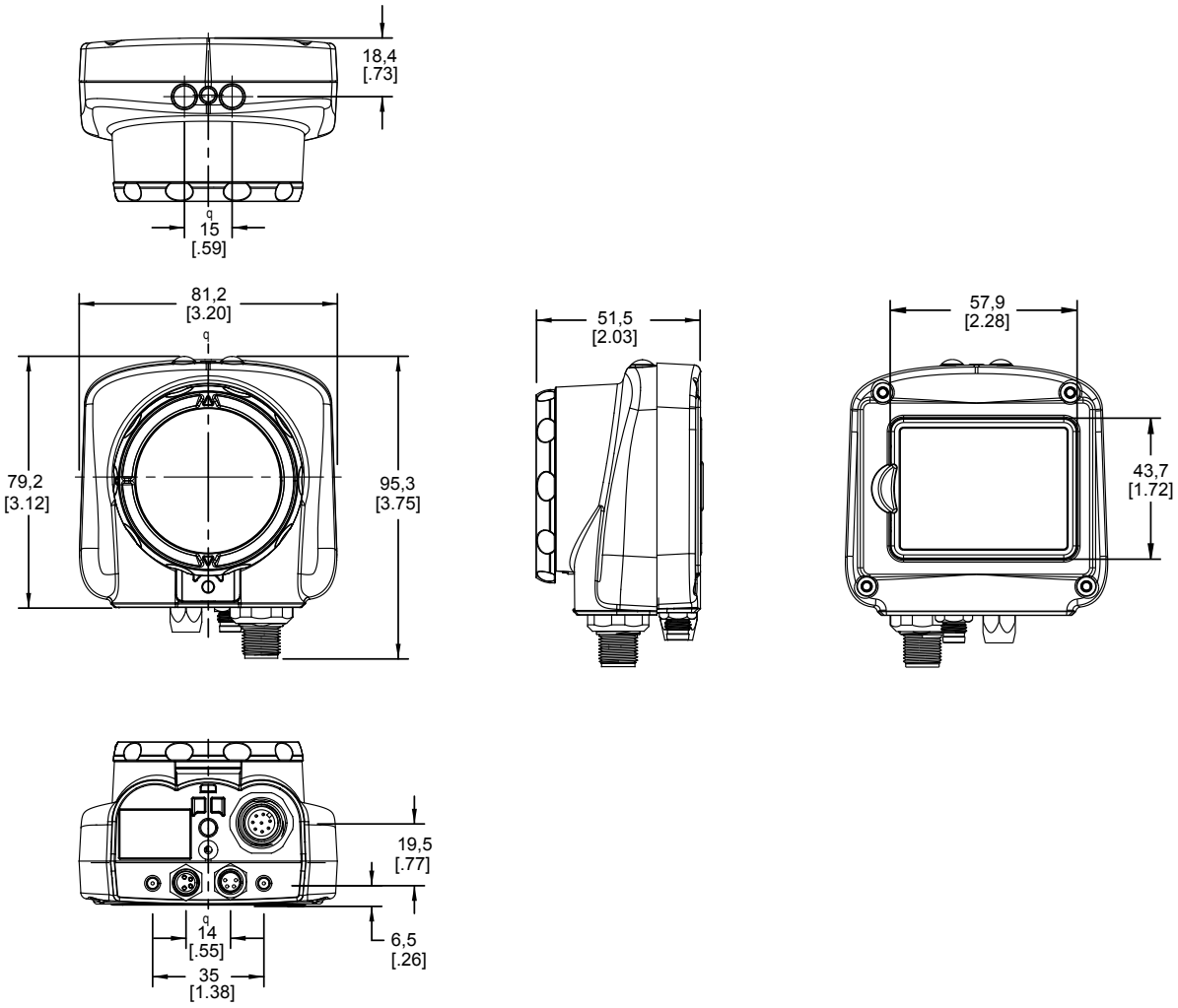


Figure 3. Micro Video Lens, Integrated Display Models



All measurements are listed in millimeters [inches], unless noted otherwise.

C-Mount Lens Dimensions

Figure 4. C-Mount Lens, Remote Display Models

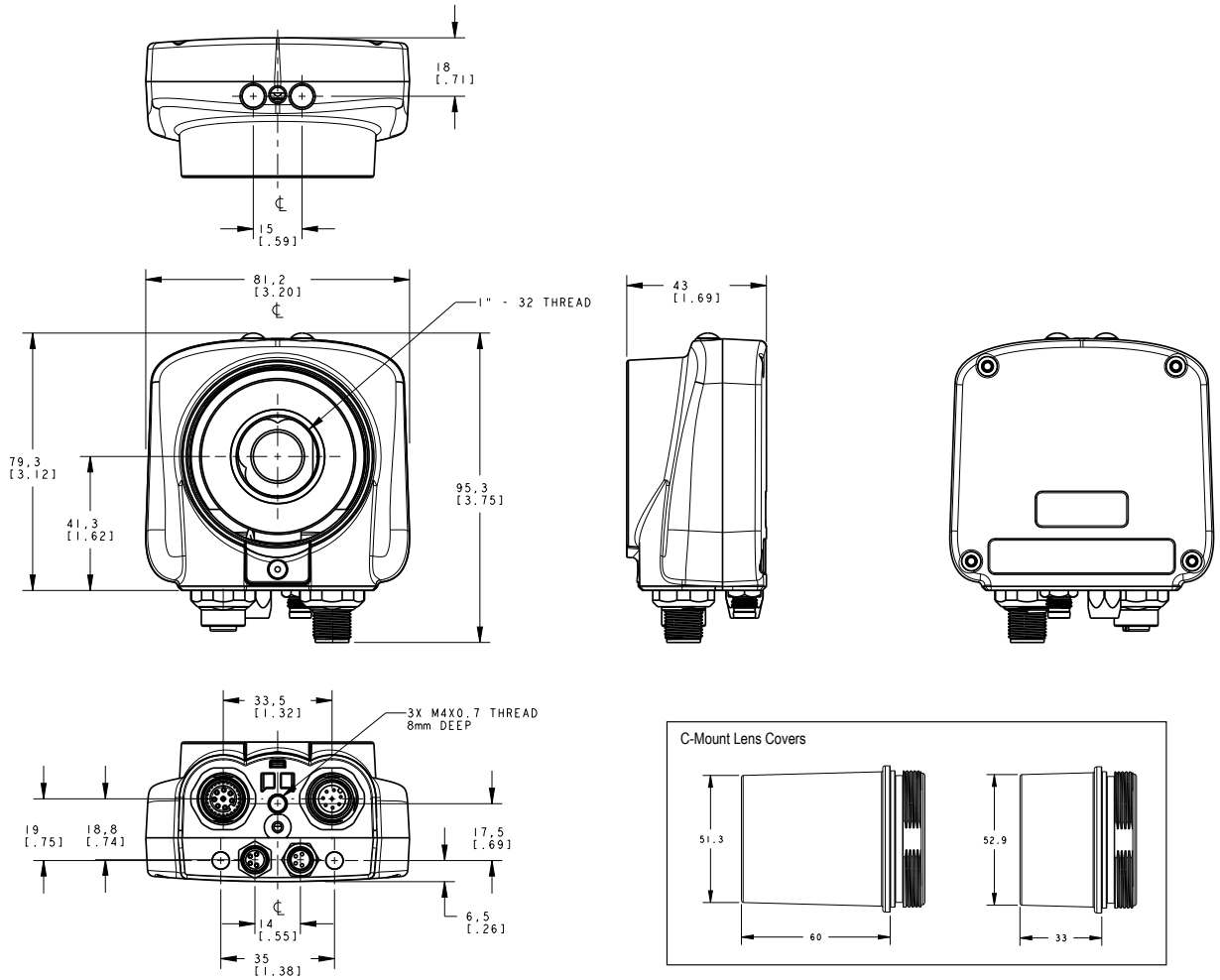
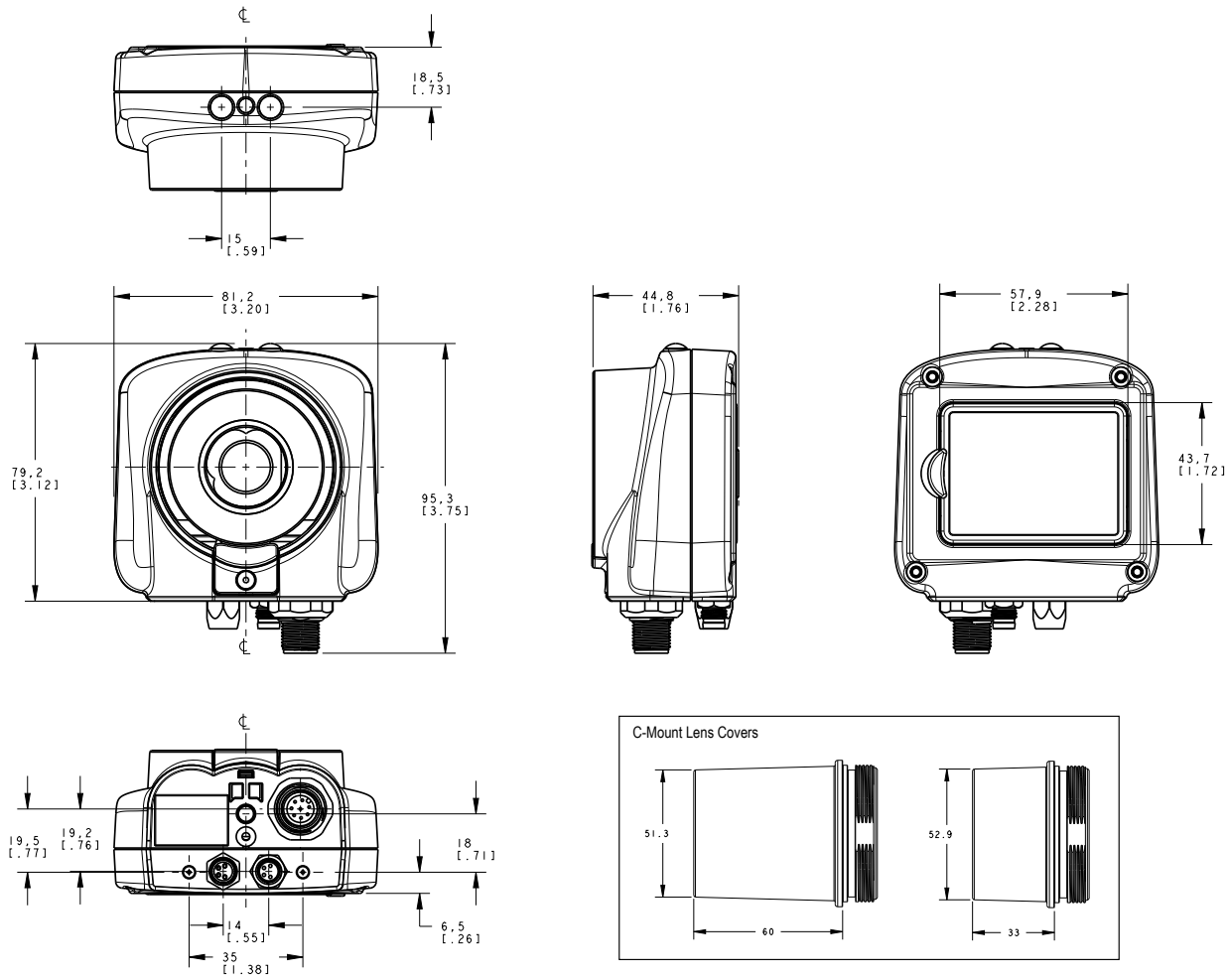


Figure 5. C-Mount Lens, Integrated Display Models



All measurements are listed in millimeters [inches], unless noted otherwise.

3.4 Using iVu Gen1 and Gen2 Devices in the Same Application

Generation 1 and Generation 2 iVu devices can be used in the same application, however steps must be taken to ensure compatibility. Gen2 output files, such as configuration and log files, are not compatible with Gen1 devices. In order to have one configuration file that applies to both Gen1 and Gen2 devices, configure inspections using a Gen1 device or the Gen1 Emulator. Settings from Gen1 are automatically converted to Gen2 when they are loaded onto a Gen2 device. Confirm all inspections after loading to ensure that they are correct.

Note: New features available on Gen2 devices will not be available when creating the inspection on Gen1 software.

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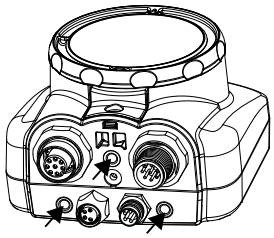
4 Installation Instructions

4.1 Mount the iVu BCR

The iVu BCR requires a bracket for mounting. Brackets are available from Banner Engineering. See www.bannerengineering.com. The brackets allow the iVu BCR to be mounted either perpendicular to the part or at an adjustable angle.

1. Position the iVu BCR on the bracket.
2. Thread three M4 x 4 mm screws (supplied) through the bracket into the mounting holes in the bottom of the iVu BCR.

Figure 6. Mounting Bracket Mounting Holes



3. Tighten all three screws.
4. Mount the iVu BCR and bracket to the machine or equipment at the desired location. Do not tighten the mounting screws at this time.
5. Check the iVu BCR alignment.
6. Tighten the mounting screws to secure the iVu BCR and the bracket in the aligned position.

4.2 Cable Connections

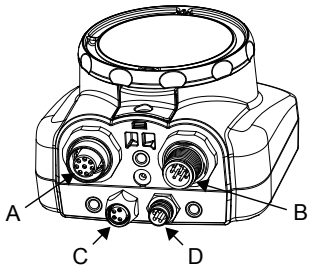
The cable connections on the iVu BCR are shown below, and power I/O connections (**B**) are defined in the **Power I/O Connections** table below.

CAUTION: Electrostatic Discharge

Avoid the damage that electrostatic discharge (ESD) can cause to the Sensor.

Always use a proven method for preventing electrostatic discharge when installing a lens or attaching a cable.

Figure 7. iVu BCR Cable Connections—Micro Video Lens Model



A Remote Display Connector (remote display models only)

B Power and I/O Cable Connector

C USB Connector

D Ethernet Connector

Note: Micro video lens model shown, C-Mount model connections are identical.

Table 3: Power I/O Connections

Pin #	Wire Color	Description	Direction
1	White	Output 1	Output
2	Brown	10 V dc to 30 V dc	Input
3	Green	Output 2	Output
4	Yellow	Strobe Out (5 V dc only)	Output
5	Gray	Remote Teach	Input
6	Pink	External Trigger	Input

Pin #	Wire Color	Description	Direction
7	Blue	Common (Signal Ground)	Input
8	Red	Ready	Output
9	Orange	Output 3	Output
10	Light Blue	RS-232 TX	Output
11	Black	RS-232 Signal Ground	Output
12	Violet	RS-232 Rx	Input

4.3 Installing a Filter on an iVu BCR

Installing a Filter on the Micro Video Lens Model

To install a filter on the iVu BCR with Micro Video Lens, use the illustration as a guide and follow the steps listed below.

CAUTION: Failure to follow these instructions may cause damage to your iVu BCR.

CAUTION: Electrostatic Discharge

Avoid the damage that electrostatic discharge (ESD) can cause to the Sensor.

Always use a proven method for preventing electrostatic discharge when installing a lens or attaching a cable.

Figure 8. Micro Video Lens Model Components



A Lens
B Focusing Window
C Locking Clip
D Locking Screw
E Filter Cap
F Filter

Note: Filter kits are available separately.

1. Remove the locking screw (D) using the 1/16-inch hex key.

   Note: The locking clip (C) inserts in a groove near the top of the focusing window (B). When removing the window, the locking clip will be loose. Do not to lose the clip while removing the window.

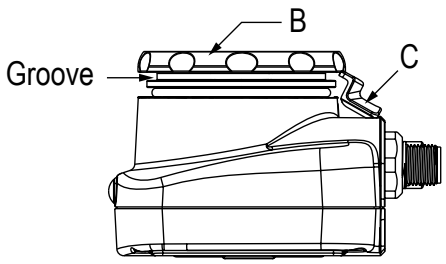
2. Unscrew the focusing window by turning it clockwise approximately 5 complete turns or until the focusing window disengages from the light/lens assembly.

   Note: The light/lens assembly may include an integrated ring light or a blank disk if an integrated ring light is not used. Be careful that the light/lens assembly does not pull out when removing the focusing window. Pull gently on the focusing window. If the lens assembly moves with the window, continue to rotate the window clockwise until the lens assembly does not move.

3. Set the focusing window aside. Do not to get any debris on the window's O-ring.
4. If present, remove the protective covering on the filter.

5. Place the filter into the filter cap and press the cap onto the lens.
6. After the filter is installed, place the focusing window back into the housing while inserting the locking clip into the groove as shown.

Figure 9. Locking Clip in the Groove



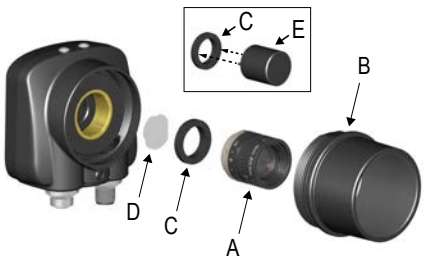
7. Press the focusing window onto the housing to make sure that there is no gap between the window and the housing. Rotate the window counter-clockwise at least two turns.
8. Replace the locking tab screw but do not tighten it until you have set up and focused the iVu BCR again.

Installing a Filter on the C-Mount Lens Model

To install a filter on the iVu BCR with C-Mount lens, use the illustration as a guide and follow the steps listed below.

CAUTION: Failure to follow these instructions may cause damage to your iVu BCR.

Figure 10. C-Mount Lens Model Components



A C-Mount Lens
B Lens Enclosure
C Retainer Ring
D Filter
E Filter Retainer Ring Tool

Note: Filter kits are available separately.

1. Remove the lens enclosure and C-mount lens.
2. Install filter behind the retainer ring. Make sure it is fully seated.
3. Using the provided retainer ring tool, thread the retainer ring into the iVu BCR until it firmly seats the filter.
4. Replace the lens and lens enclosure on the iVu BCR.

4.4 Install the Software

Important: Administrative rights are required to install the Vision Manager software.

1. Download the latest version of the software from www.bannerengineering.com.
2. Navigate to and open the downloaded file.
3. Click **Next** to begin the installation process.
4. Confirm the software destination and availability for users and click **Next**.
5. Click **Install** to install the software.
6. Depending on your system settings, a popup window may appear prompting to allow Vision Manager to make changes to your computer. Click **Yes**.
7. Click **Close** to exit the installer.

5 Vision Manager

Connect to the iVu BCR using Vision Manager PC Software to control the device remotely. After connecting to the device, the interface displays on the **Sensor** tab. Use the interface in the same manner as the iVu BCR display.

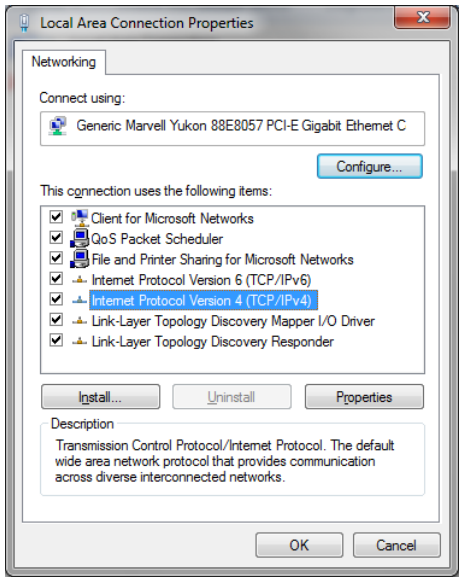
Vision Manager is not required to configure or run the iVu BCR.

5.1 Connect to the Sensor

These instructions use Windows® operating system version 7, 8, or 10. [8]

1. Confirm the network connections.
   a) Click the **Start** button, then on the **Start** menu, click **Control Panel**.
   b) In **Control Panel**, click **Network and Internet**, then click **Network and Sharing Center**, and then click **Change adapter settings**.
   c) Right-click on the connection that you want to change, then click **Properties**.
   If you are prompted for an administrator password or confirmation, enter the password or provide confirmation.
   d) In the connection properties, click **Internet Protocol Version 4 (TCP/IPv4)**, and then click **Properties**.

Figure 11. Local Area Connection Properties



   e) In the **Internet Protocol (TCP/IPv4) Properties**, select **Use the following IP address**.
   f) Make sure that the IP address is 192.168.0.2, and the subnet mask is `255.255.255.0`.
2. Open Vision Manager from the desktop or the **Start** menu.
   The **Sensor Neighborhood** tab displays and lists the available sensors.
3. From **Sensor Neighborhood**, click to connect to the desired sensor.
   The status changes from **Available** to **Connected** and the **Sensor** screen displays. Click to disconnect from the sensor.
4. If the desired sensor is not listed, verify that:
   - The network adapter connected to the sensor has the same subnet mask as the sensor (for example, 192.168.0.xxx); view the subnet mask in the Network Adapters list at **Home** > **Sensor Neighborhood** > **Network Adapters**
   - The Ethernet cable is the correct type
   - The TCP/IPv4 settings are correct

   Or, manually enter the sensor's IP address.

Note: The sensor's IP address and subnet mask are also available from the sensor display.

[8] Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.

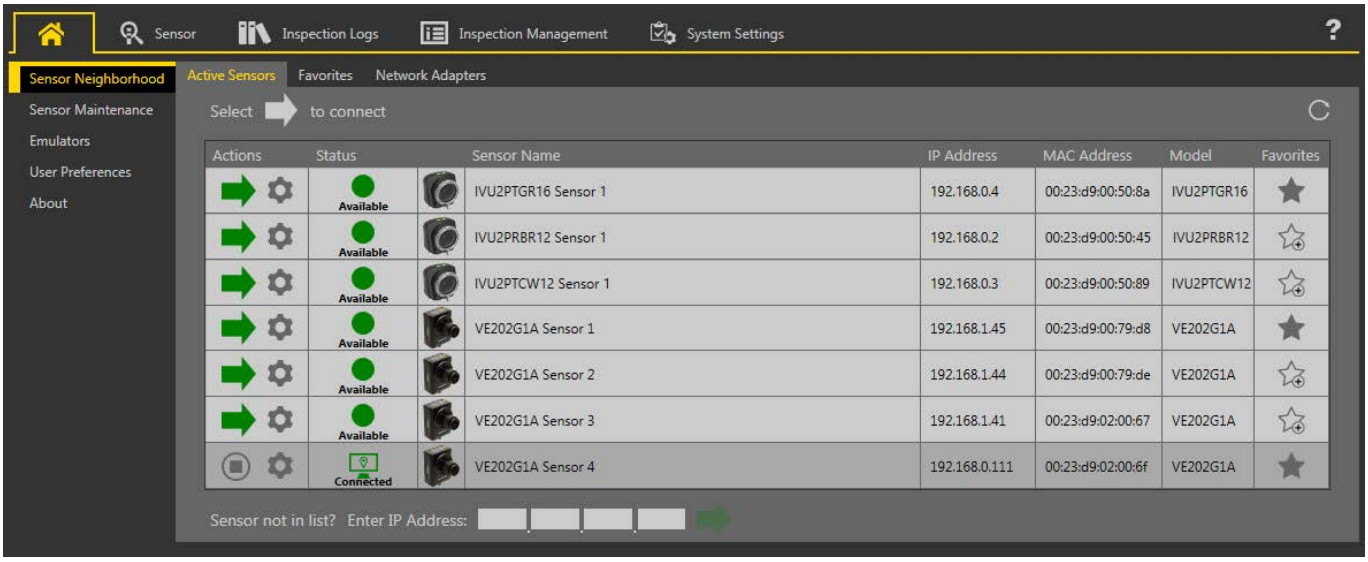
5.2 Home Screen

The **Home** screen provides access to connect to a sensor or emulator, update firmware, and view sensor and Vision Manager software information.

The following are available from the **Home** screen:

- Sensor Neighborhood
- Sensor Maintenance
- Emulators
- User Preferences (VE product interface preferences only)
- About

Figure 12. Home Screen



Only one sensor can be connected to each instance of the software. Open more than one instance of Vision Manager if you want to connect to more than one sensor at a time. Only one instance of the software can be connected to the Emulator at a time.

5.2.1 Sensor Neighborhood

Use **Sensor Neighborhood** on the **Home** screen to connect to active sensors. **Sensor Neighborhood** opens by default when the software is launched.

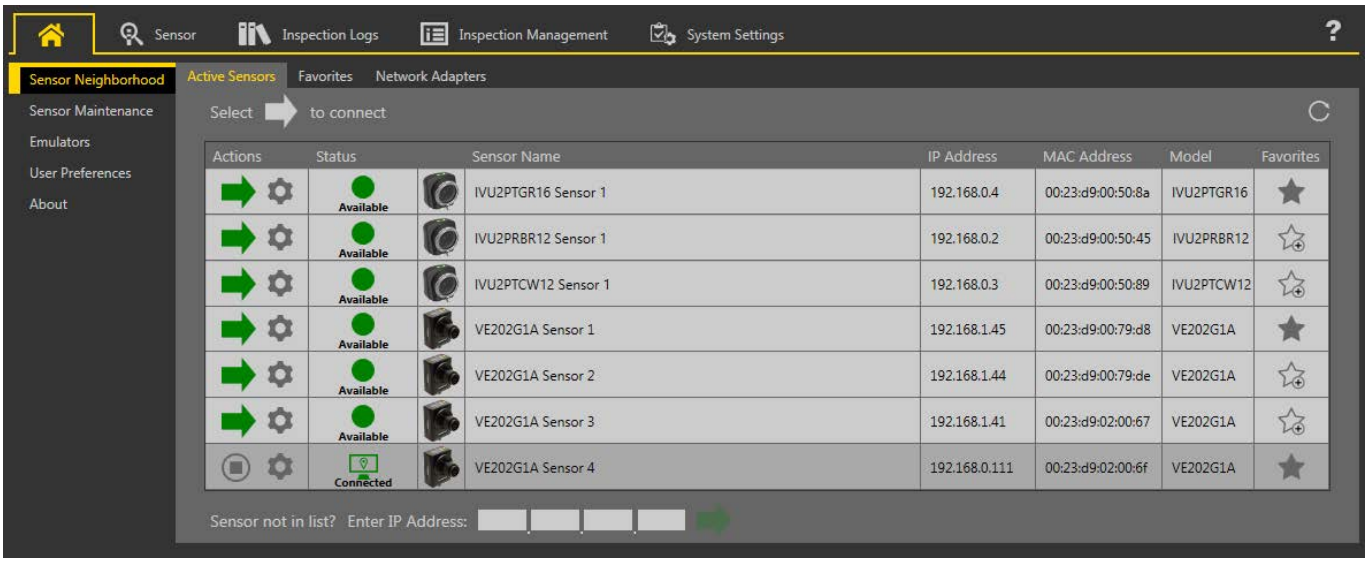
Active Sensors Tab

Use the **Active Sensors** tab in **Sensor Neighborhood** to connect to an active sensor. Available options vary depending on the type of sensor to which Vision Manager is connected.

Navigate: **Home** > **Sensor Neighborhood** > **Active Sensors**.

This tab includes sensor information such as sensor status, sensor name, IP address, MAC address, and model number. Sensors can also be added to Favorites.

Figure 13. Active Sensors Tab



To connect to a sensor, click ➡ next to the desired sensor. To disconnect from a sensor, click ⏹.

To view or change sensor Status, MAC Address, Sensor Name, IP Address, Subnet Mask, and Gateway, click ⚙.

To add the sensor to a Favorites Group, click ☆. The icon changes to ★.

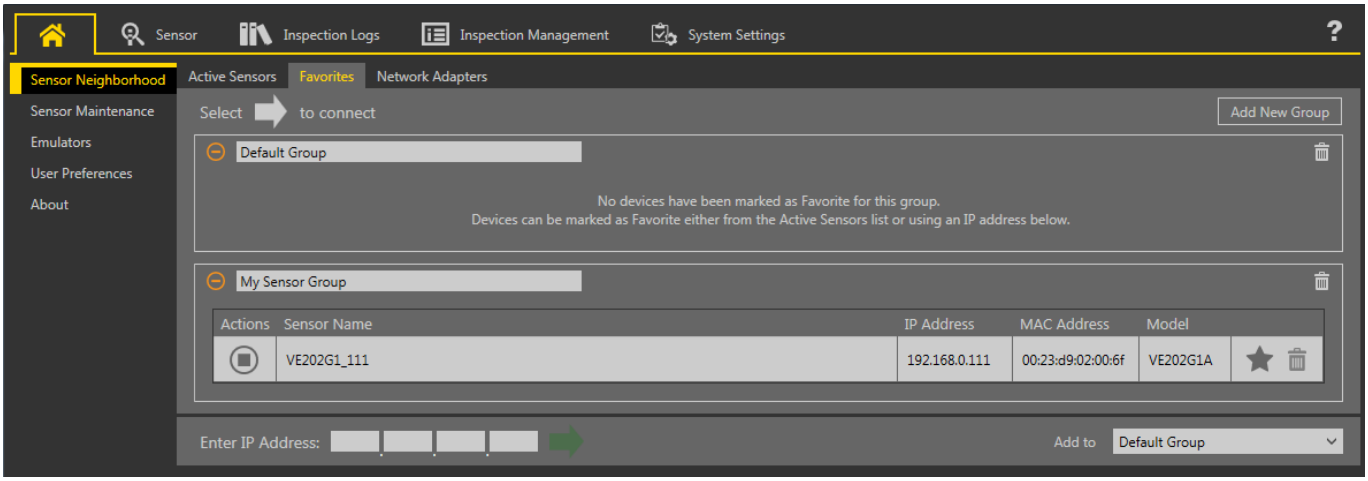
To manually connect to a sensor with a known IP address, enter the IP address in the **Enter IP Address** field and click ➡.

Favorites Tab

Save sensors to the **Favorites** tab for easy access to them. Sensors are saved to groups.

Navigate: 🏠 **Home** > **Sensor Neighborhood** > **Favorites**.

Figure 14. Favorites Tab



Click **Add New Group** to create a new Favorites Group. To add a sensor to the group, on the **Active Sensors** tab, click ☆ or from the **Favorites** tab, enter the sensor IP address and click ➡ to verify the connection to the sensor and automatically save it to the selected group.

To manually add a sensor with a known IP address to the **Favorites** tab, enter the IP address in the **Enter IP Address** field and select the desired group.

To remove a sensor from a group, click the 🗑 across from the sensor name. To move the sensor to another group, click the ★ and select the desired group.

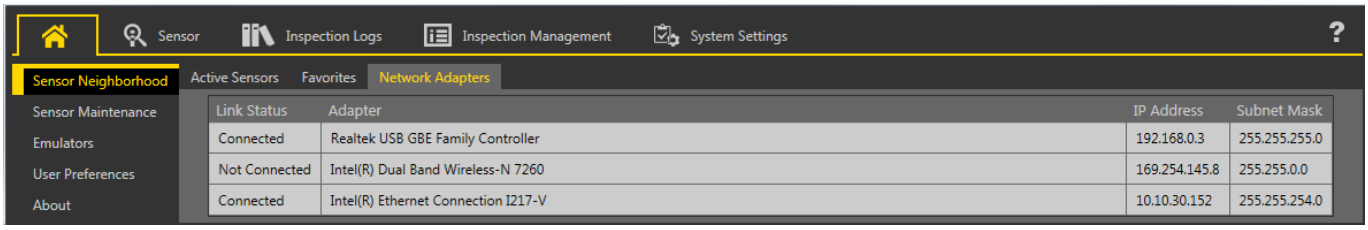
To remove a group and all the sensors within the group, click the 🗑 across from the group name.

Network Adapters Tab

Use the **Network Adapters** tab on **Sensor Neighborhood** to view the network adapters that the system searches to find sensors.

Navigate: **Home** > **Sensor Neighborhood** > **Network Adapters**.

Figure 15. Network Adapters Tab

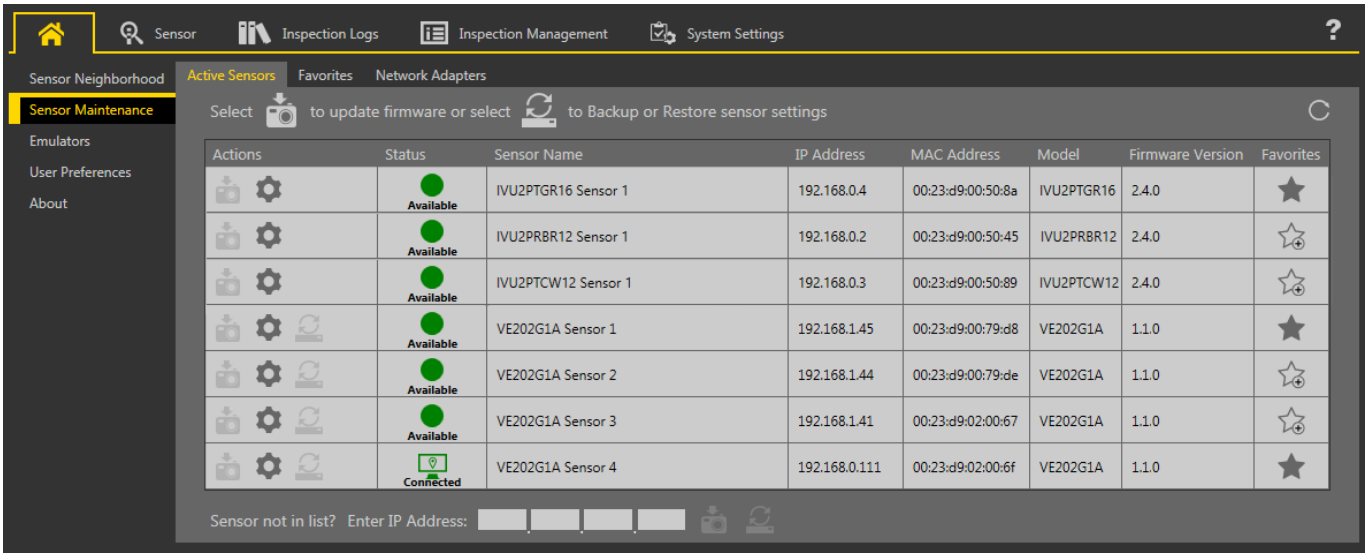


Network adapter information including Link Status (connected/not connected), Adapter name, IP Address, and Subnet Mask is also available.

5.2.2 Sensor Maintenance

Use **Sensor Maintenance** on the **Home** screen to view or change device properties.

Figure 16. Sensor Maintenance Tab



Sensor Maintenance includes sensor information such as sensor Status, Sensor Name, IP address, MAC address, Model number, Firmware Version, and which sensors are tagged as favorites.

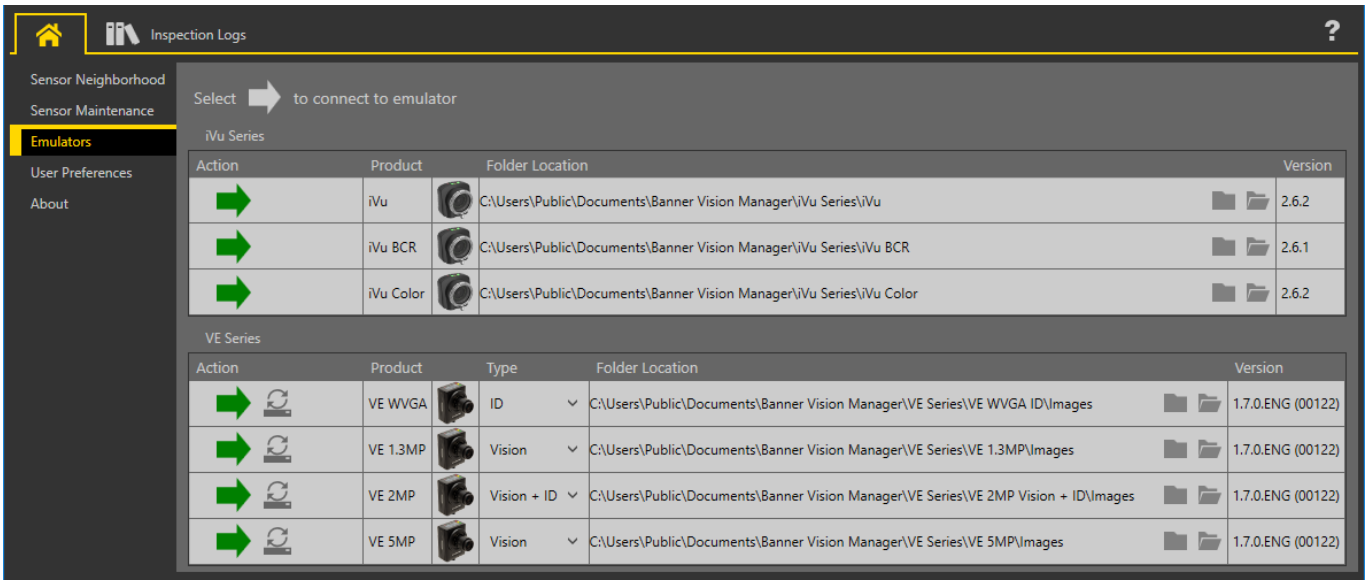
Actions include update firmware and view or change some sensor settings. Backup or restore sensor data is not available through Vision Manager. See .

Note: A firmware update requires a cable and a USB flash drive. See .

5.2.3 Emulators

Use **Emulators** on the **Home** screen to connect to the emulator.

Figure 17. Emulators



Click to connect to the desired emulator. This tab also displays the Image location on the computer, as well as the emulator version information.

Click under Folder Location to change the directory for inspections, logs, and the reference images. The default directory for images is `C:\Users\Public\Documents\Banner Vision Manager\iVu Series\[iVu model]\InspLog`. Both 8-bit monochrome bitmap (.bmp) images and inspection logs are supported. If inspection logs are placed in the InspLog directory, the emulator automatically extracts the image out of the inspection log and uses it to run the currently loaded inspection. Click to open the directory.

The **Emulators** tab includes all available features and all tools function the same as they do when running on a sensor. On the emulator, execution time is not calculated.

In general, the emulator is an inspection debugging tool where you can:

- Import stored inspections and a configuration from an iVu BCR device
- Modify inspection parameters
- Restore the updated configuration back to the iVu BCR device

To load files onto a live device, use a USB flash drive.

How to Use Bitmap Image Files with the iVu BCR Emulator

You can use bitmap (.bmp) image files with the iVu BCR Emulator for developing and simulating iVu BCR inspections. The iVu BCR Emulator only accepts image files in .bmp format. If you have other image file formats, use an image viewer/editor program to convert the files to 8-bit grayscale .bmp format.

Note: Images smaller than the FOV are black-filled starting in the upper-right. Images larger than the FOV are cropped starting in the upper-left.

1. Copy the .bmp files into the InspLog folder in the corresponding iVu BCR emulator folder.

   For example, copy .bmp files to `C:\Users\Public\Documents\Banner Vision Manager\iVu Series\[iVu model]\InspLog`.

   Note: Remove any existing .bmp or Log files in that folder to avoid confusion. The iVu BCR Emulator automatically runs all .bmp/.log files sequentially according to filename.

2. Start Vision Manager and click **Emulators**.
3. Connect to the desired emulator.
4. Set the Trigger option to Internal.
   a. Go to **Main Menu** > **Image** > **Trigger**.

b. Set the **Trigger Interval** as desired.

The iVu BCR Emulator runs using the .bmp files from Step 1.

Note: Banner does not recommend setting up inspections using these 8-bit grayscale images because you will need to modify the configuration after loading it on the iVu BCR on the line. A better choice is to set up the inspection on the iVu BCR Emulator using the Inspection Logs from the iVu BCR.

5.2.4 About

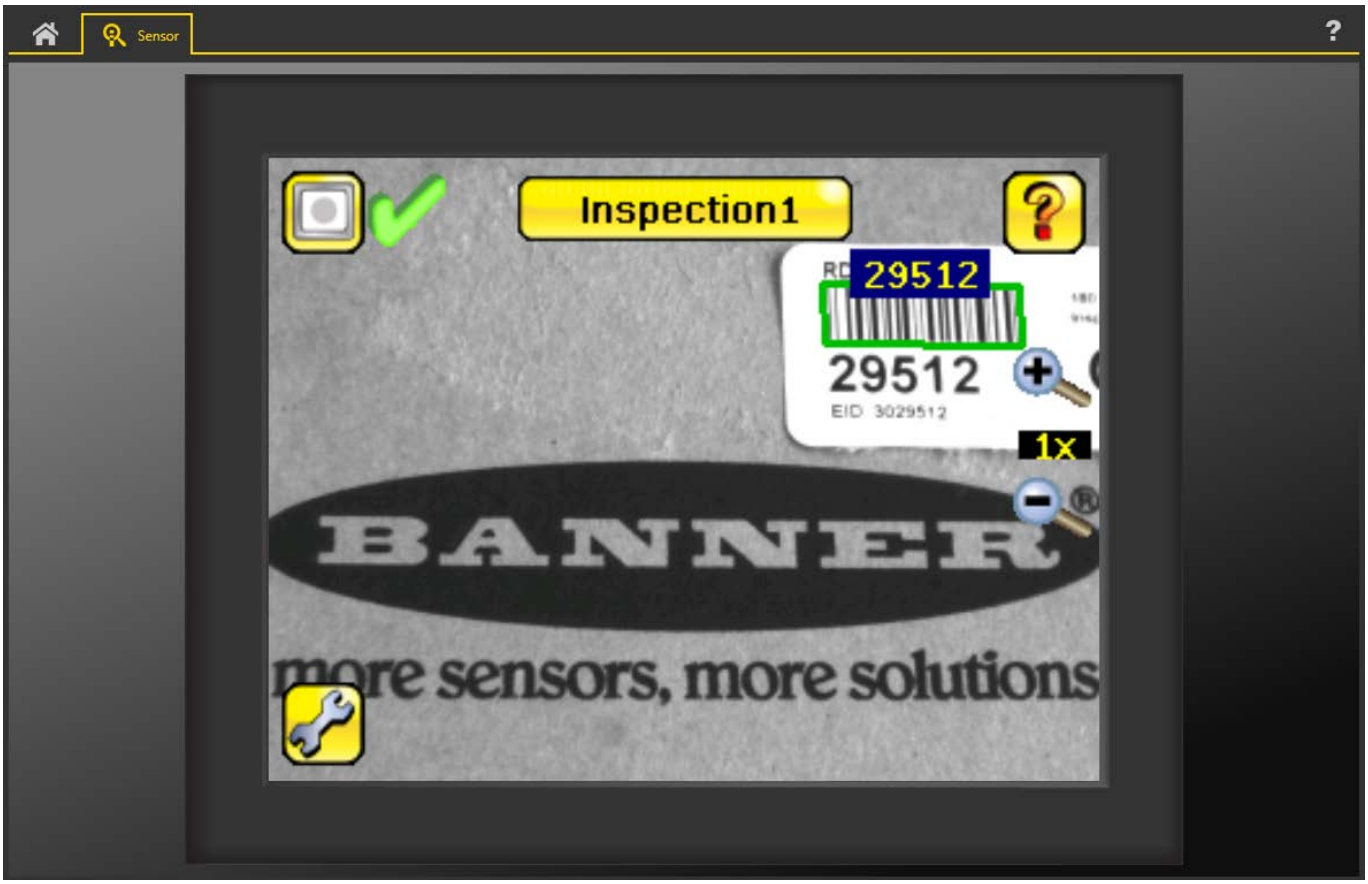
Use **About** to view Vision Manager software information, including the version number.

5.3 Sensor Screen

Displays the device interface the same as on the actual device display or remote display.

Use the interface in the same manner as the iVu BCR display.

*Figure 18. **Sensor** Screen*



6 Getting Started

Power up the iVu BCR, and verify that the Power LED is ON green.

6.1 Setting up an Inspection

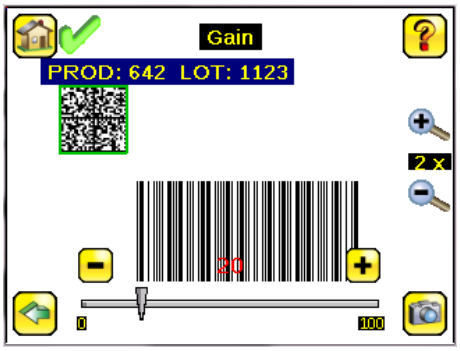
To set up an inspection:

1. Acquire a good image.
2. Set up a barcode application.
3. Set data compare parameters.

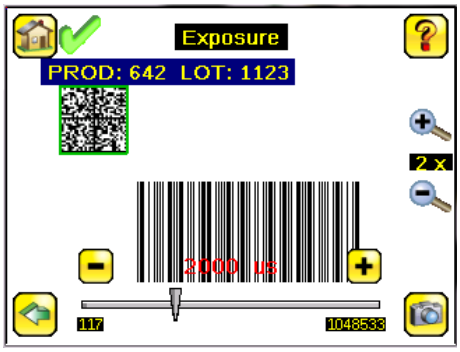
6.1.1 Acquiring a Good Image

The iVu BCR needs to capture a good image to ensure that it can correctly read the barcode(s).

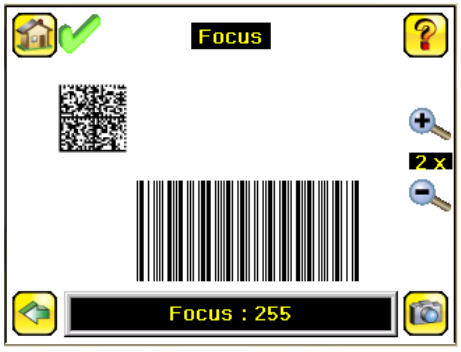
1. Go to **Main Menu** > **Imager** > **Auto Exposure** to run the **Auto Exposure** routine.
2. Check the lighting.
   - Make sure that the lighting is constant and consistent (unchanging over time, no shadows or hot spots).
   - Capture the barcode with lighting that optimizes its contrast and separates it from the background. Depending on the target, this may mean the integral ring light is not the best choice and other Banner lights should be considered.
   - Adjust the mounting angle to provide the clearest image of the barcode. The mounting bracket lets you easily position and adjust the iVu BCR. Typically, a slight angle helps with read robustness.
3. If needed, go to **Main Menu** > **Imager** > **Auto Exposure** to run the **Auto Exposure** routine a second time or adjust **Gain** and **Exposure** manually:
   - **Main Menu** > **Imager** > **Gain**



   - **Main Menu** > **Imager** > **Exposure**



4. Go to **Main Menu** > **Imager** > **Focus** to adjust the focus while monitoring the **Focus Number**:



Adjust the Focus on a Micro Video Lens Model

1. Use the supplied 1/16 inch hex key to loosen the focusing window locking screw (**D**), then adjust focus on the iVu BCR using the clear focusing window (**B**).
2. Adjust focus while monitoring the focus number. To ensure the best image, adjust the focus until the focus number peaks.

Figure 19. Adjust the Focus



Note: Turning the focusing window counter-clockwise focuses on closer objects, while turning the focusing window clockwise focuses on more distant objects.

3. After the best image has been acquired, lock the focusing window.

Figure 20. Micro Video Lens Model Components



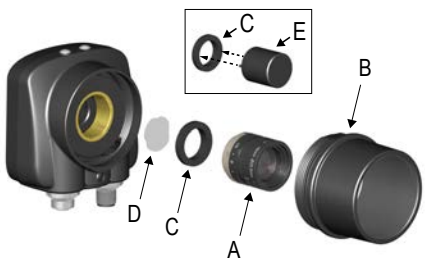
A	Lens
B	Focusing Window
C	Locking Clip
D	Locking Screw
E	Filter Cap
F	Filter

Note: The filter cap (E) and filter (F) are optional. Filter kits are available separately.

Adjust the Focus on a C-Mount Lens Model

1. Remove the lens enclosure.
2. Adjust the focus while monitoring the focus number. To ensure the best image, adjust the focus until the focus number peaks.
3. Replace the lens enclosure on the camera.

Figure 21. C-Mount Lens Model Components



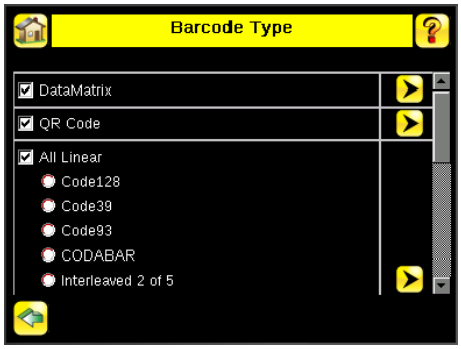
A	C-Mount Lens
B	Lens Enclosure
C	Retainer Ring
D	Filter
E	Filter Retainer Ring Tool

Note: The retainer ring (C) and filter (D) are optional. Filter kits are available separately.

6.2 Setting Up a Barcode Application

This section describes how to set up the iVu BCR sensor.

1. Go to **Main Menu** > **Inspection** > **Barcode** > **Barcode Type** .
2. Select one or more Barcode Types from the list.



Note: To ensure optimal performance, select only the barcode types for your application. For example, if you use only one of the of the barcode types listed for All Linear, uncheck the box next to All Linear, and select the desired linear barcode type. If you use only DataMatrix, uncheck all the boxes except the one next to DataMatrix.

3. Go to **Main Menu** > **Inspection** > **Barcode** > **Barcode Count** to select the number of barcodes (1 to 10) to be read at one time.



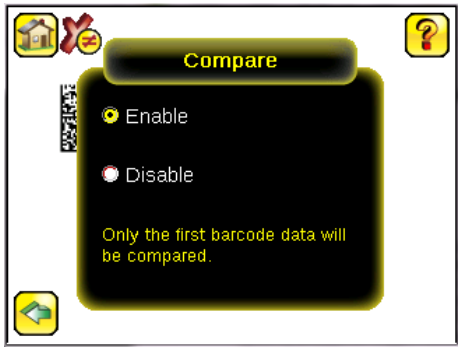
After the sensor has been set up as described:

- Each successfully read barcode is marked by a green bounding box. If annotations are on, the barcode data is also displayed.
- Any case where data does not compare is marked with a solid red bounding box. If the barcode is marked with a dotted red bounding box, this indicates a checksum error or quiet zone violation.
- Any barcodes in the field of view that the sensor does not detect (for example, because they are not one of the barcode types selected), are unmarked.

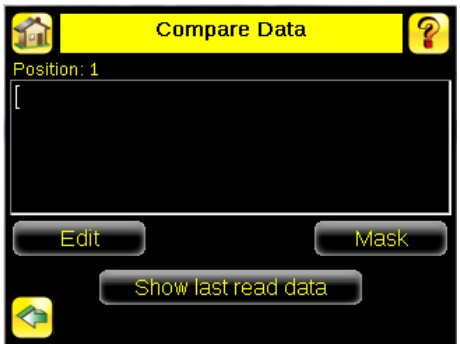
6.3 Setting up for Data Compare

This section describes how to set up the data compare feature. For this example, the reference data is from a previously decoded barcode.

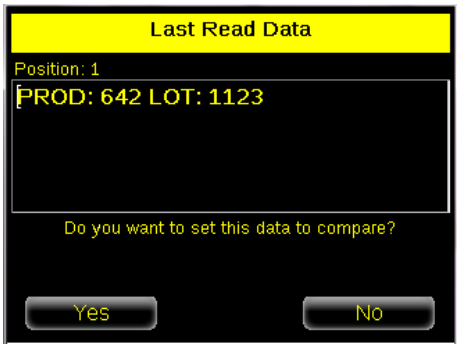
1. Go to **Main Menu** > **Inspection** > **Barcode** > **Data Compare** > **Compare** and enable data compare.



2. Go to the **Main Menu** > **Inspection** > **Barcode** > **Data Compare** > **Set Data**, and click **Show last read data**.



3. Click **Yes**.



4. Click  to return to the **Home** screen.



For all subsequent triggers, when the sensor reads the barcode data, it compares it against this reference data.

6.3.1 Remote Teach

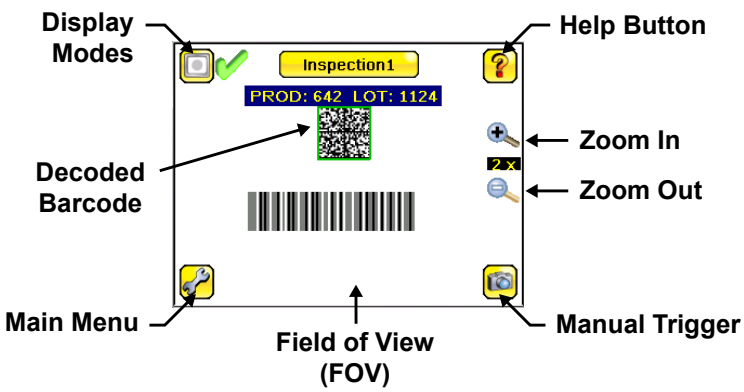
The Remote Teach function is a method of remotely updating inspection parameters while the iVu BCR is running. The sequence of events for executing a Remote Teach are:

1. With the device Ready (see Installation Instructions on p. 17), pulse the Remote Teach line.
2. The iVu BCR recognizes that the Remote Teach line has been pulsed and waits for the next valid trigger.
3. At the next valid trigger, Ready goes inactive (the Green Ready LED shuts OFF), and the iVu BCR acquires a new image.

When a Remote Teach occurs, the data of the first read barcode is saved as Data Compare input. Inspections executed on the next trigger use the new data for comparison with subsequently read barcodes. If the previous input data contained any masked characters, Remote Teach retains the masked characters **only** if the new data is of the same length as the previous input data. If the length does not match, masking is removed.

7 Device Home Screen

Use the Home screen on theiVu BCR display to monitor inspections and to configure the iVu BCR. Typically, the part being inspected is centered on the screen.



7.1 Display Modes

Main Menu > **Home** > **Display Mode (icon)**

Use the display mode button on the upper left corner of the display to cycle through all three display modes. The three display modes include:

- Display Annotations
- Hide Annotations
- Inspection Statistics

7.1.1 Display/Hide Annotations

Click the icon in the upper-left of the display to show annotations. When annotations are on, the display shows the data the sensor has read.

If the sensor reads more than one barcode in the field of view (FOV), in addition to the read data, the display indicates the index of each read barcode. In the example below, the top barcode is 1 and the bottom barcode is 2. It is important to note that, if the sensor reads more than one barcode, only the first barcode data (index #1) can be compared or used in a remote teach operation

Click the icon in the upper-left of the display to hide annotations.

7.1.2 Inspection Statistics

Click **Display Mode** to access the Inspection Statistics.

The Inspection Statistic mode has three screens:

- History
- Inspection Result
- Inspection Inputs

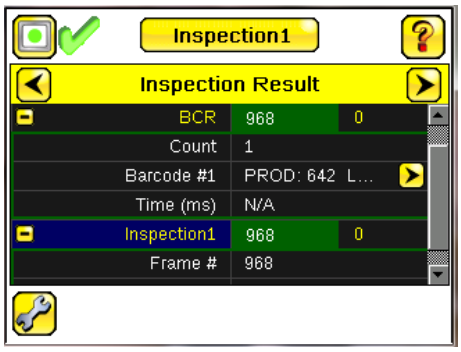
Click the arrows to access the other screens.

Inspection Results

The **Inspection Result** screen shows data about the current inspection being viewed, including the following:

- Barcode (BCR) Pass and Fail count
- Count of barcodes found in current image
- Data for each barcode found
- Execution time of Barcode sensor
- Frame Number (total number of objects since bootup)
- Execution time of entire inspection

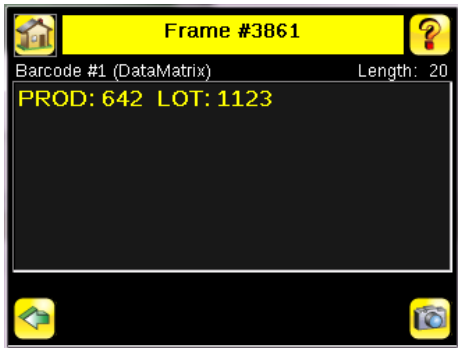
Figure 22. Inspection Result



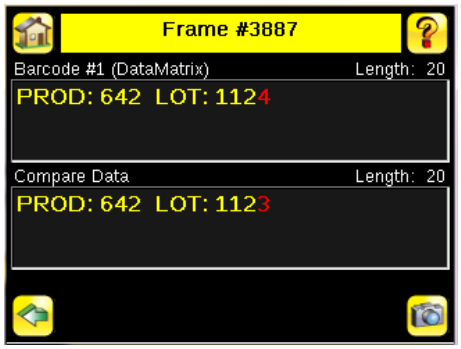
Barcode Viewer

To view detailed information about a particular barcode, click the arrow next to the Barcode # to access the **Barcode Viewer** screen.

If Data Compare is disabled, the **Barcode Viewer** screen shows a single text box indicating the index number of the barcode and the data the sensor is reading. The data displays in yellow.



If Data Compare is enabled and the barcode is the first one, there are two text boxes. The upper text box displays the data read from the barcode. The lower text box shows the data from the **Data Compare** screen. The sensor does a position-by-position match and the characters that match are in yellow and mismatches are in red.



History

The **History** screen shows inspection history from the last iVu BCR reboot, or from the last time the statistics were reset. The history includes:

- Total Barcodes (BCR)—The pass count is on the left and the fail count is on the right
- Count Range—The minimum and maximum number of barcodes found
- Time Range (ms)—Minimum and maximum inspection times observed
- Passed (green)—Running total of barcodes that passed this inspection (for example, Inspection1)
- Failed—Running total of barcodes that failed this inspection (for example, Inspection1)
- Total Frames—Total number of images captured for this inspection
- Missed triggers—Running total of missed triggers for this inspection

- Time Range (ms)—Minimum and maximum inspection times observed for this inspection

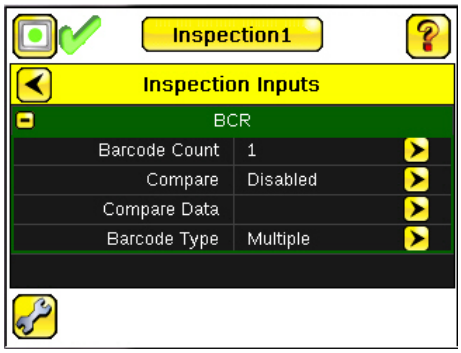
Click **Reset** to reset the statistics.

The table contains history of each sensor in the inspection. Expand or collapse data of each sensor as required using **+** and **–**. The green area indicates that the sensor passed. Red indicates that the sensor failed. If a sensor fails, an icon beside the sensor name indicates the reason for the failure.

Inspection Inputs

The **Inspection Input** screen lists the sensor settings. Use this screen to verify what inspection input settings were used on the latest inspection. Click **+** to expand the inspection information, or **–** to collapse the inspection information. Use the right arrows as a shortcut go to a sensor setting screen.

*Figure 23. **Inspection Inputs** Screen*



8 Device Main Menu

The **Main Menu** has four sections:

- **Inspection**—Modify inspection settings
- **Imager**—Run the Auto Exposure routine and make adjustments to functions like exposure, gain, and strobe
- **Logs**—Configure and view System and Inspection Logs
- **System**—Set output signals, communication channel parameters, and manage the device



8.1 Icon Reference

8.1.1 Action Icons

Icon	Description
	The **Main Menu** icon is on the bottom-left corner of the display on the **Home** screen. Click this icon to access to sub-menus that are used to set up the iVu BCR.
	The **Inspection menu** icon is located on the **Main Menu**. Click this icon to access parameters that need to be set for an inspection.
	The **Imager menu** icon is located on the **Main Menu**. Click this icon to adjust parameters that affect the characteristics of the captured image.
	The **System menu** icon is located on the **Main Menu**. Click this icon to manage the device.
	The **Logs menu** icon is located on the **Main Menu**. Click this icon to set up, view, and save Inspection, Communication, and System Logs.
	The **Home Screen** icon is in the upper-left corner of the display when viewing menus and parameter screens in the **Main Menu**. Click this icon to quickly return to the **Home** screen.
	The **Display Annotations** icon is one of three icons in the upper-left corner of the display while monitoring inspections on the **Home** screen. Click this icon to highlight features that the sensor finds.
	The **Hide Annotations** icon is one of three icons in the upper-left corner of the display while monitoring inspections on the **Home** screen. Click this icon to disable highlighting.
	The **Show Statistics** icon is one of three icons in the upper-left corner of the display while monitoring inspections. Click this icon to show inspection results and input parameters.
	The **Hide System Log Details** icon is one of the icons in the upper-left corner of the **System Logs** screen. Click this icon to hide the time stamp for the System Logs.
	The **Show System Log Details** icon is one of the icons in the upper-left corner of the **System Logs** screen. Click this icon to show the time stamp for the System Logs.
	The **Go Back** icon is on the lower-left of the display while working in the **Main Menu**. Click this icon to return to the previous screen or menu.
	The **Help** icon is located in the upper-right corner of the display. Click this icon to view context-sensitive help for each screen.
	The **Manual Trigger** icon is located on the lower-right of the display on the **Home** screen. Click this icon to manually capture a new image.
	The **Save** icon is available at the bottom of screens such as the **View Logs** and **System Logs** screens. Click this icon to save data to USB flash drive.
	The **Touch Calibration** screen displays the Touch Calibration point at various locations on the display. Every time the point displays, tap the center of the point to calibrate the touchscreen display.
	The **Zoom Out** icon is located on the right of the display. Click this icon to reduce the magnification of the image being displayed.
	The **Zoom In** icon is located on the right of the display. Click this icon to magnify the image being displayed.
	The **Decrement** icon decreases the currently displayed parameter value by one interval. Click and hold the icon to quickly decrement the value.
	The **Increment** icon increases the currently displayed parameter value by one interval. Click and hold the icon to quickly decrement the value.

8.1.2 Display Icons

Icon	Description
	The **Inspection Passed** icon is located in the upper-left of the display. This icon indicates that the last inspection passed the test conditions.
	One of the possible **Inspection Failed** icons located in the upper-left of the display. This icon indicates that the last inspection failed.
	In External - Single or External Gated trigger mode, this is one of the possible **Inspection Failed** icons in the upper-left of the display. This icon indicates that the inspection failed because there were fewer barcodes than specified by the **Barcode Count**.
	In Continuous Scan mode this icon is in the upper-left of the display. This icon indicates that the sensor is still scanning the captured image and hasn't yet found the number of barcodes specified by the **Barcode Count**.
	In External - Single trigger mode, this is one of the possible **Inspection Failed** icons in the upper-left of the display. This icon indicates that the inspection failed because the inspection timed out based on the **Scan Time Limit** value.
	In Continuous Scan or External - Gated trigger mode, this icon, in the upper-left of the display, indicates a busy timeout. That is, the scan timed out based on the **Scan Time Limit**, but the outputs are not affected.
	One of the possible **Inspection Failed icons** in the upper-left of the display. This icon indicates that the sensor is in fail hold mode.
	One of the possible **Inspection Failed** icons in the upper-left of the display. This icon indicates that the data compare has failed for the barcode that the sensor read.
	The **Device Locked** icon is located in the upper-left of the display. This icon indicates that the device is in a locked state. If no icon is displayed, the device is unlocked.

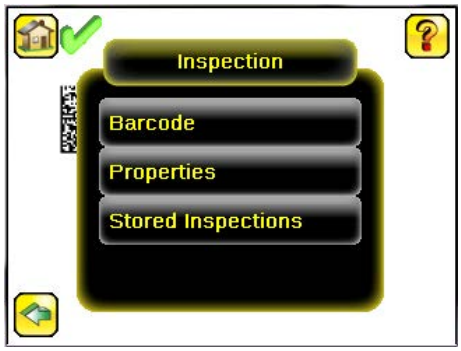
8.1.3 Communications Log Icons

Icon	Description
	Port open.
	Port closed.
	Indicates that the command has been processed without errors.
	Indicates that the incoming entry is stalled (no new bytes), or end-of-frame delimiter was not received, or client is not reading data on Ethernet.
	Indicates whether the response frame contains an error or is dropped, the log entry icons for the request and the response frames are red, and the displayed error count increments by one.
	If the command takes a long time to process, the last long entry changes to an hourglass (for example, during trigger of long inspections).

9 Device Inspection Menu

Main Menu > **Inspection**

The **Inspection** menu icon is located on the **Main Menu**. Use the **Inspection** Menu to set inspection parameters for the currently running inspection and to manage stored inspections.

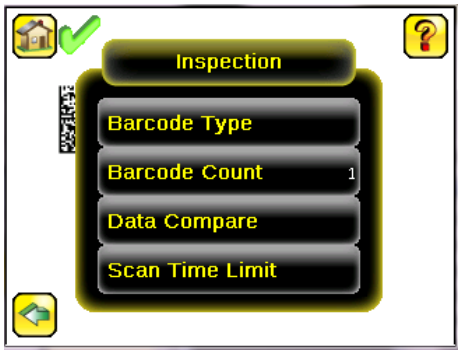


9.1 Barcode Menu

Main Menu > **Inspection** > **Barcode**

The Barcode Menu includes Barcode Type, Barcode Count, Data Compare, and Scan Time Limit.

Figure 24. Barcode Menu



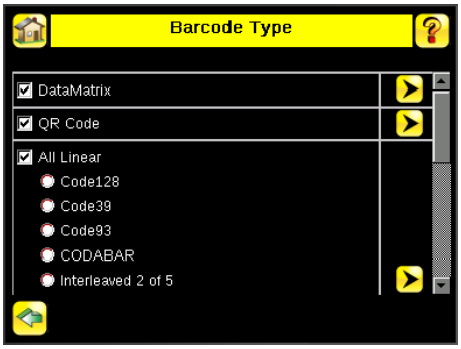
9.1.1 Barcode Type

Main Menu > **Inspection** > **Barcode** > **Barcode Type**

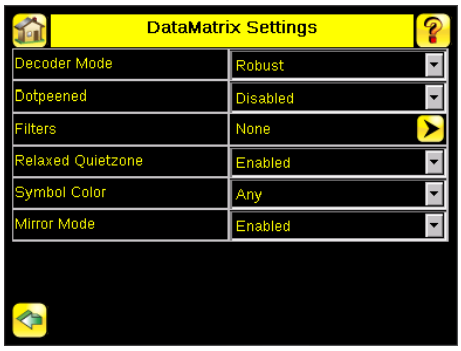
The first time the sensor is powered up, DataMatrix, QR Code, and All Linear barcode types are selected. Select the desired barcode types to be read. As a best practice, select only the applicable barcode type(s) for your particular application. Note that if **All Linear** is not selected, a single linear barcode type can be selected instead.

The following barcode types are available:

- DataMatrix (ECC 200) barcodes
- QR Code (QR and Micro QR)
- Linear barcodes: Code 128, Code 39, Code 93, CODABAR, Interleaved 2 of 5, EAN13, EAN13-Addon, EAN8, UPCE, UPCE-Addon, Postnet, IMB, and Pharmacode
- DataBar, DataBar Limited, DataBar Expanded
- PDF417



DataMatrix Settings



Decoder Mode

The Decoder Mode determines which decode algorithm to use and how imperfections in barcode images are handled.

Fast

The sensor uses an algorithm that is tailored for speed. The algorithm does NOT correct for barcode image imperfections. The Fast setting has the best results on high-contrast images that contain high-quality barcodes.

Robust

The sensor uses an algorithm that performs routines to correct for imperfections of the barcode image.

Equalization

The sensor tries to improve the contrast within the symbol to improve readability.

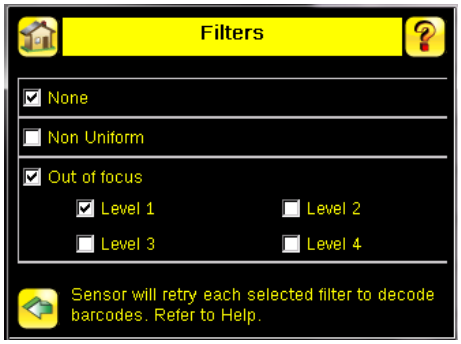
Accurate

The sensor methodically runs multiple image improvement strategies in an attempt to read poorer quality barcodes. The **Accurate** setting is the slowest setting.

Dotpeened

When Dotpeened is enabled, the decoder runs in a method that is optimized for dot peened data matrix barcodes.

Filters



Use filters to improve decode rates in conditions in which the barcodes are blurred or have nonuniform module sizes.

Out-of-focus

Iimprove the decode rate of out-of-focus barcodes. Select one or more **Out-of-focus** filters.

Non Uniform

Improves the decode rate of barcodes with non-uniformly sized data modules. The time required to read the barcode data may increase with the number of selected filters. The sensor will run the most successful filter (since boot-up) first before trying other filters.

None

Forces the sensor to first try to decode barcodes without applying any filters.

Relaxed Quietzone

The Quietzone is a blank margin on either side of a barcode that indicates where the barcode begins and ends. If this Quietzone isn't big enough, the sensor can have trouble decoding the barcode. By enabling Relaxed Quietzone there is a greater tolerance with respect to the quiet zone required before and after the barcode.

Symbol Color

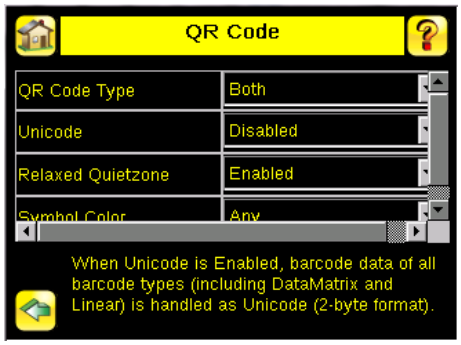
Select the appropriate symbol color for the application:

- **Black on White**—Select if the barcode symbol color is darker than the background
- **White on Black**—Select if the barcode symbol color is lighter than the background
- **Any**—Select to decode both color schemes, however, this setting may result in longer decoding time and reduced accuracy

Mirror Mode

When Mirror Mode is **Enabled**, both normal and mirrored images are decoded. When it is **Disabled**, only normal images are decoded.

QR Code Settings



QR Code Type

The QR Code Type determines whether the device should decode a QR Code, Micro QR code, or both.

Unicode

The device is capable of decoding Kanji characters embedded in a QR Code. In order for the device to display the decoded data correctly, and be able to export the decoded data in Unicode format (2 byte), this setting should be enabled. Decoded data sent out on Communication Channels will also be in unicode format. The Compare Data will also be stored in unicode format. Enabling this feature affects data decoded from all barcodes in the inspection, irrespective to their symbology.

Relaxed Quietzone

The Quietzone is a blank margin on either side of a barcode that indicates where the barcode begins and ends. If this Quietzone isn't big enough, the sensor can have trouble decoding the barcode. By enabling Relaxed Quietzone there is a greater tolerance with respect to the quiet zone required before and after the barcode.

Symbol Color

Select the appropriate symbol color for the application:

- **Black on White**—Select if the barcode symbol color is darker than the background
- **White on Black**—Select if the barcode symbol color is lighter than the background
- **Any**—Select to decode both color schemes, however, this setting may result in longer decoding time and reduced accuracy

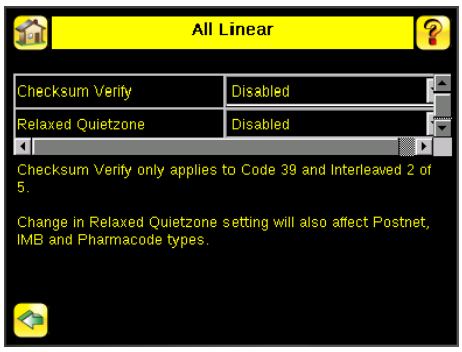
Mirror Mode

When Mirror Mode is **Enabled**, both normal and mirrored images are decoded. When it is **Disabled**, only normal images are decoded.

All Linear Settings

The All Linear settings described below apply to the following barcode types:

- Code 128
- Code 39
- Code 93
- CODABAR
- Interleaved 2 of 5
- EAN13
- EAN13-Addon
- EAN8
- UPCE
- UPCE-Addon
- Postnet
- IMB



Checksum Verify

When checksum is enabled, the sensor uses a checksum to verify the integrity of the barcode being read.

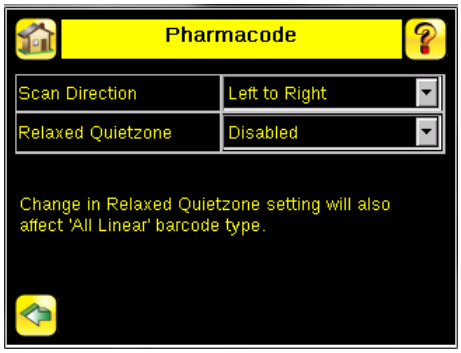
Note: Most linear barcode types always contain checksum verification. This setting only applies to Code 39 and Interleaved 2 of 5 because the checksum verification is optional in these types.

Relaxed Quietzone

The Quietzone is a blank margin on either side of a barcode that indicates where the barcode begins and ends. If this Quietzone isn't big enough, the sensor can have trouble decoding the barcode. By enabling Relaxed Quietzone there is a greater tolerance with respect to the quiet zone required before and after the barcode.

Changing the **Relaxed Quietzone** setting also affects the Postnet, IMB, and Pharmacode barcode types.

Pharmacode Settings



Scan Direction

For Pharmacode, select one of the following for Line Scanning:

- Left to Right
- Right to Left
- Top to Bottom
- Bottom to Top
- Omnidirectional

Use Omnidirectional scanning if barcodes can appear inverted on part being inspected. If **Compare** is enabled, the sensor attempts to compare that string to decode data in both scan directions. The inspection is marked as Pass if at least one string matches. The data that successfully matched displays on the screen and exports through communication channels as requested.

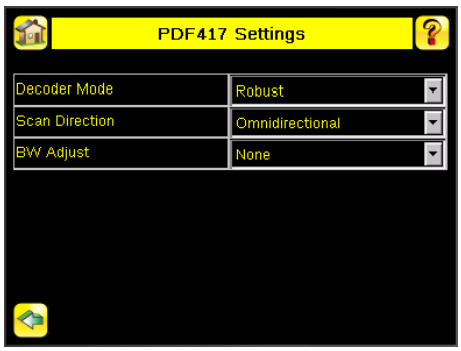
If Omnidirectional scan is selected, but **Compare** is disabled, the data decoded from left-to-right scan is reported.

Relaxed Quietzone

The Quietzone is a blank margin on either side of a barcode that indicates where the barcode begins and ends. If this Quietzone isn't big enough, the sensor can have trouble decoding the barcode. By enabling Relaxed Quietzone there is a greater tolerance with respect to the quiet zone required before and after the barcode.

Changing the **Relaxed Quietzone** setting also affects the linear barcode types.

PDF417 Settings



Decoder Mode

The Decoder Mode determines which decode algorithm to use and how imperfections in barcode images are handled.

Fast

The sensor uses an algorithm that is tailored for speed. The algorithm does NOT correct for barcode image imperfections. The Fast setting has the best results on high-contrast images that contain high-quality barcodes.

Robust

The sensor uses an algorithm that performs routines to correct for imperfections of the barcode image.

Scan Direction

For PDF417, select one of the following for Line Scanning:

- Horizontal
- Vertical
- Omnidirectional

The Omnidirectional setting should decode more barcodes, however it takes longer to do so.

BW Adjust

Setting a bar width (BW) adjusts the bar widths with respect to spaces. These settings promote print gain correction.

None

No bar width adjustments are made.

Add Pixel

Enlarges the bar widths with respect to spaces.

Subract Pixel

Reduces the bar widths with respect to spaces.

9.1.2 Barcode Count

Main Menu > **Inspection** > **Barcode** > **Barcode Count**

In the Barcode Count screen, select the number of barcodes to decode. Select from 1 to 10.

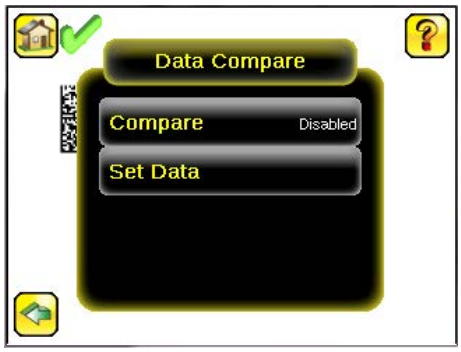
Note: For IMB, Postnet, and Pharmacode barcode types, the sensor decodes only one barcode for each of these types regardless of the **Barcode Count** setting. This means that if there is one of each of these types in an image, and the Barcode Count is set to 3, the sensor decodes all three; however, if there are three IMB barcodes, for example, the sensor will always only decode one IMB barcode.



9.1.3 Data Compare

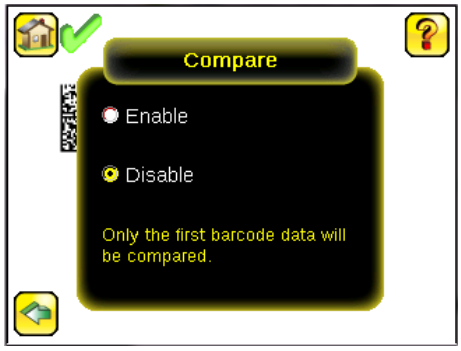
Main Menu > **Inspection** > **Barcode** > **Data Compare**

Use the Data Compare menu options to set up the sensor for Data Compare. Note that if the Barcode Count is greater than 1, only the first barcode data can be compared or used in a remote teach operation. Turn on annotations to see which barcode is first.



Compare

Use this screen to enable or disable Data Compare. If Data Compare is enabled, data can be defined in the Compare Data screen. The data can be retrieved from a previously scanned barcode, or it can be entered using the software keyboard on the display, and insignificant characters can be masked within the data.

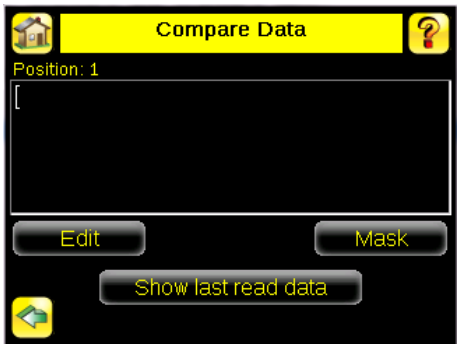


Set Data/Compare Data

Use the **Compare Data** screen to specify data against which a read barcode is compared. Note that, if the Barcode Count is greater than 1, only the first barcode data can be compared or used in a remote teach operation. To see which barcode is the first one, turn on annotations.

- **Show last read data**—Use the last read barcode data for the data compare

- **Edit**—Enter data using a software keyboard on the display
- **Mask**—Select characters in the data to mask from the data compare



Edit Compare Data

Click **Edit** to access the **Edit** screen. The Edit screen displays data that was previously read or entered in the text field. **Position** displays the position of the cursor within the characters displayed ([). **Length** indicates the number of characters.

Use the left and right arrows below the software keyboard to move the cursor between the displayed characters. Place the cursor to the right of any character and use the back-arrow delete that character. Use the button at the bottom right of the screen to cycle through different character entry keyboards: text entry (with a button to toggle between upper- and lower-case characters), numeric entry, special character entry, and hex character entry.

Last Read Data

Click **Show last read data** to use the last read barcode data for the data compare.

Mask Data

Click **Mask** to enter the **Mask** screen and to select characters in the data to mask from the data compare.

To mask characters in the data, move the cursor to the left of the character(s) to be masked, and click **Mask**. A masked character appears gray with a strikeout (\) indicator. To unmask a previously masked character, click **UnMask**. Note that, when using Remote Teach to set new barcode data, if the previous input data contained any masked characters, Remote Teach retains the masked characters only if the new data is of the same length as the previous input data. If the length does not match, masking is removed.



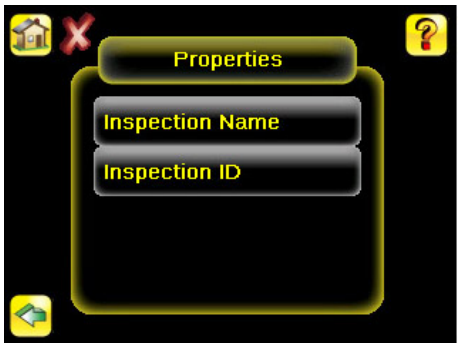
9.1.4 Scan Time Limit

Use the slider to set the maximum amount of time the sensor attempts to decode barcodes in an image. The trigger mode **External - Gated** uses this value.

9.2 Properties Menu

Main Menu > **Inspection** > **Properties**

Use the **Properties** menu to specify an Inspection Name and Inspection ID.



9.2.1 Inspection Name

Main Menu > **Inspection** > **Properties** > **Inspection Name**

The **Inspection Name** screen displays the name of the current inspection. Edit the name of the inspection on this screen.

9.2.2 Inspection ID

Main Menu > **Inspection** > **Properties** > **Inspection ID**

Click the dropdown arrow to view a list of IDs assigned to all inspections on this device. Choose any unused ID to change the ID of this inspection. The original ID is marked as **Unused**.

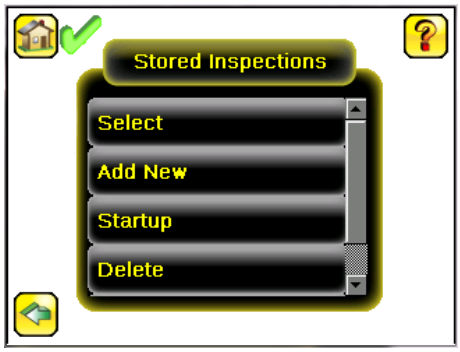
Swap the ID of this inspection with another inspection by selecting that inspection on the list.

9.3 Stored Inspections Menu

Main Menu > **Inspection** > **Stored Inspections**

Use the **Stored Inspections** menu to manage stored inspections. Managing stored inspections includes adding or deleting inspections, and specifying which inspection is the startup inspection.

*Figure 25. **Stored Inspections** Menu*



From the **Stored Inspections** menu, click **Select**, **Add New**, **Startup**, **Delete**, or **Set Name/ID**.

9.3.1 Select

Main Menu > **Inspection** > **Stored Inspections** > **Select**

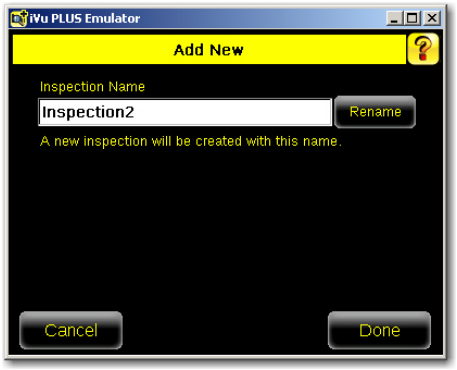
Use the **Select** screen to select a new running inspection. Click the name of the inspection to start, and click **Start Running**.

9.3.2 Add New

Main Menu > **Inspection** > **Stored Inspections** > **Add New**

Use **Add New** to add a new inspection. The iVu BCR can store up to 30 inspections. When you add a new inspection, it begins running. When adding a new inspection, specify the name for the new inspection.

*Figure 26. **Add New** Screen*



9.3.3 Startup

Main Menu > **Inspection** > **Stored Inspections** > **Startup**

Click **Startup** to select the inspection to use as the startup inspection. The selected inspection automatically starts after the iVu BCR powers up.

9.3.4 Delete Inspections

Main Menu > **Inspection** > **Stored Inspections** > **Delete**

Click **Delete** to delete stored inspections. Note that any running inspection, or the inspection marked as the Startup inspection, cannot be deleted.

9.3.5 Set Name/ID

Main Menu > **Inspection** > **Stored Inspections** > **Set Name/ID**

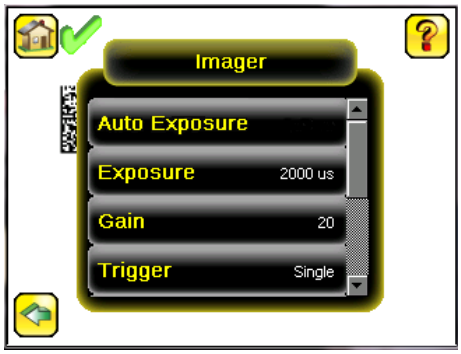
Use **Set Name/ID** to change the name or ID of an inspection. Sort the inspections in numeric or alphabetical order by clicking on the icon beside the Help icon. Click **Name** to edit the name of the inspection. Click **ID** to change the ID of the inspection.

10 Device Imager Menu

Main Menu > **Imager**

The **Imager** menu icon is on the **Main Menu**, and lists parameters that affect the characteristics of the captured image. Use **Imager** menu to access the auto exposure routine, manually adjust exposure and gain, set trigger and strobe options, as well as set the size of the Field of View (FOV).

*Figure 27. **Imager** Menu*



10.1 Auto Exposure

Main Menu > **Imager** > **Auto Exposure**

Auto Exposure optimizes the exposure time and gain for the current lighting conditions. Multiple triggers are required to complete this function.

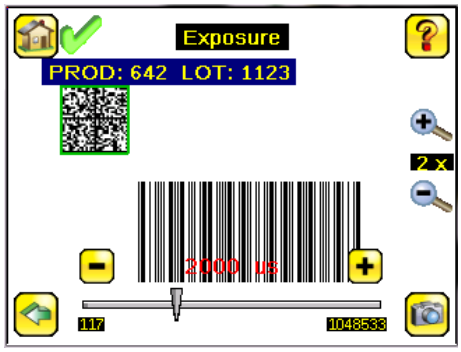
Note: The Auto Exposure option is not available on the Emulator.

10.2 Exposure

Main Menu > **Imager** > **Exposure**

Exposure is the amount of time the iVu BCR allows light to energize the imager. Increasing the exposure time by moving the slider to the right allows more light to energize the imager, which brightens the image.

*Figure 28. **Exposure** Screen*



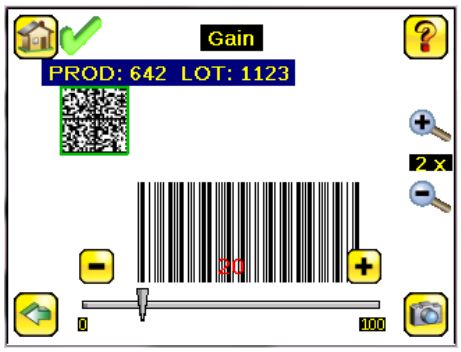
Note: This feature is not effective on the emulator.

10.3 Gain

Main Menu > **Imager** > **Gain**

Gain is an electronic boost to the image signal. Increasing Gain by using the '-' and '+' buttons or moving the slider to the right increases image brightness without increasing exposure time. Note that Gain brightens both the light pixels and dark pixels and may reduce the image quality.

*Figure 29. **Gain** Screen*

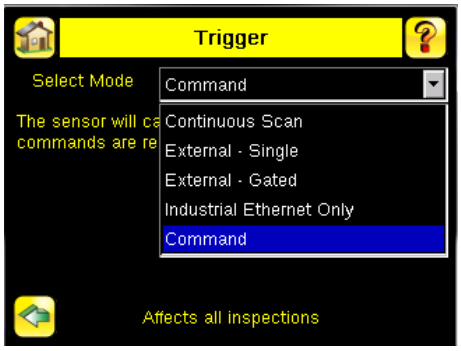


Note: This feature is not effective on the emulator.

10.4 Trigger

Main Menu > **Imager** > **Trigger**

A trigger is a signal that tells the iVu BCR to capture a barcode image and decode it. Five trigger options are available: Continuous Scan, External - Single, External - Gated, Industrial Ethernet Only, or Command.



10.4.1 Continuous Mode

In **Continuous** mode, the sensor uses internal timing to continuously capture images. For each captured image, the sensor scans through the configured barcode types looking for the specified number of barcodes. If the specified number of barcodes is found, a Read event occurs. If the specified number of barcodes is not found, the sensor captures another image and repeats the scan. Two parameters fine-tune how **Continuous Scan** mode operates:

- Same Code Reject Time (set at the bottom of **Main Menu** > **Imager** > **Trigger**)—The time, in seconds, that must elapse before the scanner reports a previously scanned symbol again. A different symbol is read immediately
- Scan Time Limit (**Main Menu** > **Inspection** > **Barcode** > **Scan Time Limit**)—limits the amount of time the sensor attempts to scan for barcodes on an image

Note: A No Read condition will **not** occur in Continuous mode as another image capture and scan automatically follows.

10.4.2 External-Single Mode

In **External-Single** mode, the sensor depends on an external trigger. For each trigger, the sensor captures an image and executes one scan through the configured barcode types looking for the specified number of barcodes. This trigger mode uses the **Scan Time Limit** parameter (**Main Menu** > **Inspection** > **Barcode** > **Scan Time Limit**) to limit the amount of time the sensor attempts to scan for barcodes on an image.

10.4.3 External-Gated Mode

External - Gated mode is similar to Continuous mode. While an external trigger input signal is active, the sensor continues to capture images and run barcode scans until a successful Read occurs or until the External Trigger input signal becomes inactive. The **External - Gated** mode uses the **Scan Time Limit** parameter (**Main Menu** > **Inspection** > **Barcode** > **Scan Time Limit**) to limit the amount of time the sensor attempts to decode barcodes on an image.

Note: A No Read condition will **not** occur in External - Gated mode while the external trigger is active.

10.4.4 Industrial Ethernet Only

When the Industrial Ethernet communication channel is enabled, triggers can be received from the modes listed in this manual. Triggers through Industrial Ethernet will not be executed if the selected Trigger Mode is **Continuous Scan**. To receive triggers only through the Industrial Ethernet channel, select **Industrial Ethernet Only**.

10.4.5 Command Mode

In Command mode, the sensor captures images when Trigger commands are received. The various trigger command modes can also be set through a command channel. For specific commands, refer to Communications Guide on p. 68. The commands can come from either Serial I/O or Ethernet I/O.

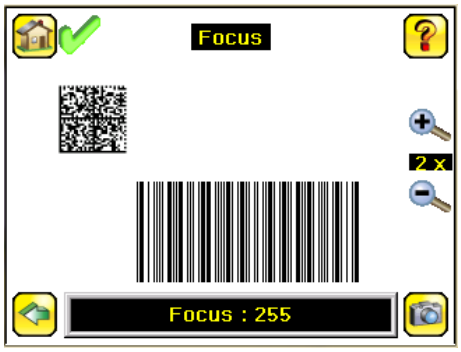
10.5 Focus

Main Menu > **Imager** > **Focus**

The Focus Number displayed at the bottom of this screen is used to fine-tune image focus. Loosen the lock on the lens cover, turn the focus ring on the iVu BCR until the Focus Number peaks (or the image appears sharp), then lock the focus ring.

Note: For the Focus Number to work, the iVu BCR must be triggering and the images must be similar over time.

*Figure 30. **Focus** Screen*

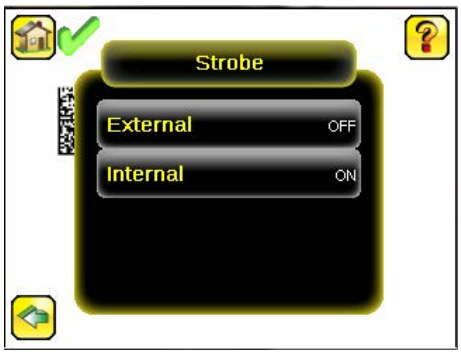


10.6 Strobe Menu

Main Menu > **Imager** > **Strobe**

The Internal Strobe configures the operation of the integrated ring light. The External Strobe configures the operation of an external light.

*Figure 31. **Strobe** Menu*



10.6.1 External

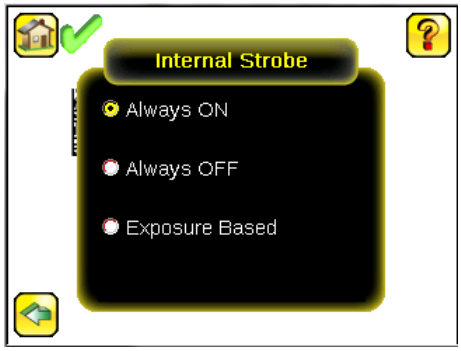
Main Menu > **Imager** > **Strobe** > **External**

The External Strobe is a 5 V dc output used for an external light. Setting options are **Always ON**, **Always OFF**, or **Exposure Based**. If **Exposure Based** is selected, the external light is on during the time the iVu BCR is capturing an image.

10.6.2 Internal

Main Menu > **Imager** > **Strobe** > **Internal**

The Internal Strobe setting configures the operation of the integrated ring light. Strobe options are **Always ON**, **Always OFF**, or **Exposure Based**. If **Exposure Based is selected**, the ring light is on during the time the iVu BCR is capturing an image. For ultraviolet (UV) models, the **Always ON** option is not available.



10.7 FOV (Field of View)

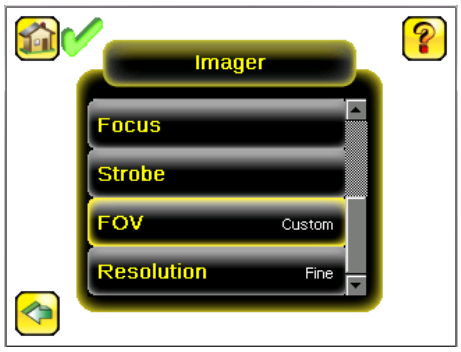
Main Menu > **Imager** > **FOV**

The Field of View (FOV) is the area that the iVu BCR can see at a given working distance. The working distance is the distance from the lens cover to the part being inspected. The effective FOV can be reduced to speed up the processing time of an inspection or to decrease background noise.

10.7.1 Adjust the Field of View

Select the resize icons to adjust the FOV. After pressing the back button, the **Imager** menu **FOV** button updates to say "Custom" to indicate that a custom FOV is in use.

*Figure 32. **Imager** Menu*



The maximum FOV is 752×480 for Fine resolution and 376×240 for Coarse resolution. To set the FOV to the maximum, click **Set Max**. The green box representing the FOV expands to fill the screen.

Figure 33. Maximum FOV

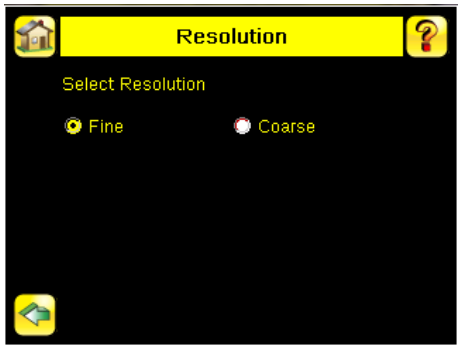


10.8 Resolution

System > **Imager** > **Resolution**

Two resolution options are available on the iVu BCR: Fine and Coarse.

*Figure 34. **Resolution** Screen*



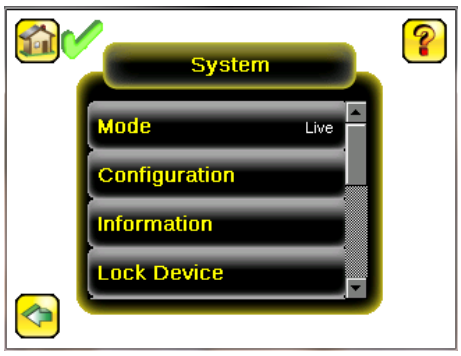
Coarse resolution has a maximum FOV of 376×240 pixels, and Fine resolution has a maximum FOV of 752×480 pixels. Fine resolution has four times more pixels than Coarse resolution. Inspection performance may be affected when using Fine resolution, depending on the application. By default, the FOV is set to the maximum FOV size (752×480) in Fine resolution mode.

11 Device System Menu

Main Menu > **System**

The **System** menu icon is on the **Main Menu**, and is used to manage the iVu BCR device. From the **System** menu, select **Mode**, update the device firmware, back up or restore the device configuration, and perform other general system level operations.

*Figure 35. **System** Menu*

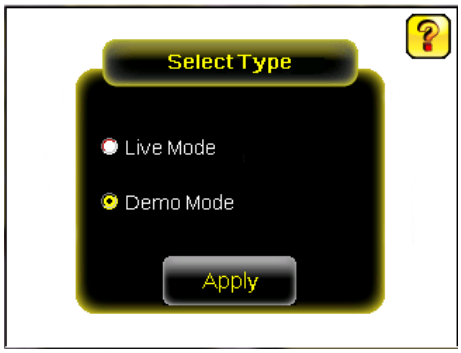


11.1 Mode

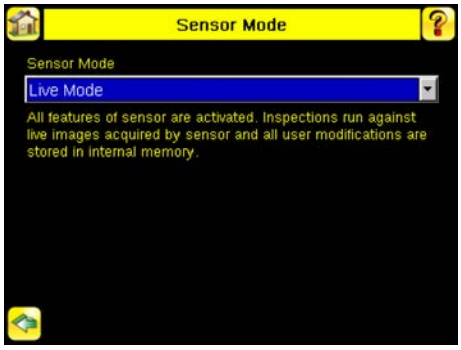
Main Menu > **System** > **Mode**

The iVu BCR has two operating modes:

- Live Mode, which is the normal operating mode where the sensor captures live images, scans, and verifies barcodes
- Demo Mode, where inspections are run on stored images and inspection parameters



The first time the iVu BCR is powered up, it starts in Demo Mode. You can choose whether to stay in Demo Mode or exit to Live Mode. Demo Mode uses stored images and inspection parameters that demonstrate how the sensor is set up, without having to worry about focus, lighting, or triggers. In this mode, practice making adjustments while working with the different sensor types and observing how the adjustments affect the results. To exit Demo Mode go to **Main Menu** > **System** > **Mode** and select **Exit Demo Mode**. Upon exit, the iVu BCR restarts in the normal operating mode with the default settings.



Note: Switch between Live Mode and Demo Mode any time by going to **Main Menu** > **System** > **Mode**.

11.2 System Configuration Menu

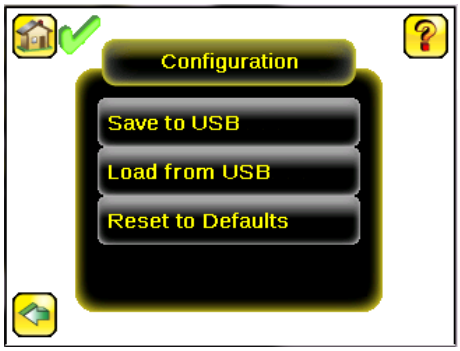
Main Menu > **System** > **Configuration**

The **Configuration** screen allows users to save configurations, load new configurations, or reset the device to default values.

The configuration options are:

- **Save to USB**—Save the device configuration to a USB flash drive
- **Load from USB**—Load the device configuration from the USB flash drive
- **Reset to Defaults**—Reset the device configuration to defaults

*Figure 36. **Configuration** Menu*



11.2.1 Save to USB

Main Menu > **System** > **Configuration** > **Save to USB**

The **Save to USB** screen allows the device configuration to be saved to a USB flash drive. The saved configuration information can be used as a backup or to clone configuration information for other devices.

Note: On the Emulator, this option is **Save Configuration.**

11.2.2 Load from USB

Main Menu > **System** > **Configuration** > **Load from USB**

The **Load from USB** screen allows the device configuration to be restored from a USB flash drive. This operation removes all existing inspections and replaces them with inspections contained in the configuration file on the USB flash drive.

Note: On the Emulator, this option is **Load Configuration**.

11.2.3 Reset to Defaults

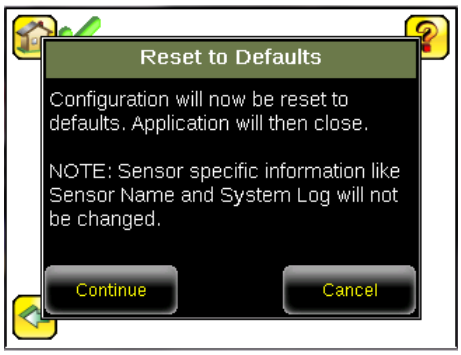
Main Menu > **System** > **Configuration** > **Reset to Defaults**

Resets the device to factory default state:

- All existing inspections are deleted
- All imager and system settings are reset to factory defaults
- Device-specific information such as the sensor name and Ethernet settings are not changed
- System Log information is retained

The device reboots after this operation is complete.

*Figure 37. **Reset to Defaults** Screen*



11.3 System Information

Main Menu > **System** > **Information**

The **Information** screen displays device information:

- Serial Number
- Firmware Version
- Boot Number
- Up Timer—the time elapsed since last boot up of the device
- Hour Count—the total hours of operation in the device's lifetime
- Model Number
- Device Name

Click the right-arrow next to **Device Name** to display a keyboard that allows you to change the name of the device.

11.4 Lock device

Main Menu > **System** > **Lock device**

Lock the device to prevent accidental modification of settings. When locked, the device only provides access to pass/fail statistics, as well as the ability to view logs and to save them to a USB device. A lock icon in the upper left corner of the display indicates that the device is locked.

The device can be locked with or without a password. If a password is not used, click **Unlock device** to unlock the device. When a password is used, it must be 4 digits entered using the keypad. If the password is lost, contact Banner Engineering to obtain a Reset Key.

Note: This menu option is not available in the Emulator.

11.5 Communications Menu

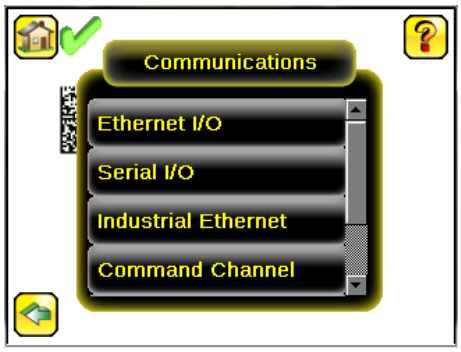
Main Menu > **System** > **Communications**

Use the **Communications** menu to configure the serial I/O channel. There are six menu options:

- **Ethernet I/O** for configuring the Ethernet port
- **Serial I/O** for configuring the Serial port
- **Industrial Ethernet** settings
- **Command Channel** for sending commands to get specific data through Serial or Ethernet channels.
- **Data Export Channel** for enabling or disabling the channel for data export only
- **Image Export Channel** for enabling or disabling the channel for image export only

Note: Serial I/O can be configured either for Data Export or Command Channel. Image Export is only available on Ethernet.

*Figure 38. **Communications** Menu*

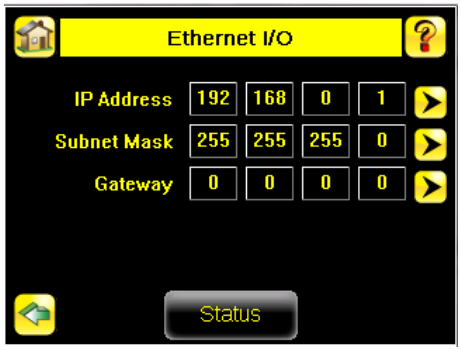


11.5.1 Ethernet I/O

Main Menu > **System** > **Communications** > **Ethernet I/O**

Use Ethernet communications to send data out the Ethernet port as part of an inspection, and so that remote devices can communicate with the iVu BCR. Configure the IP Address, Subnet Mask, and Gateway settings from the **Ethernet I/O** screen. Use the expand arrow next to each field to display a keypad to enter values for each field. Click **Status** to verify communications as you connect to remote devices.

*Figure 39. **Ethernet I/O** Screen*

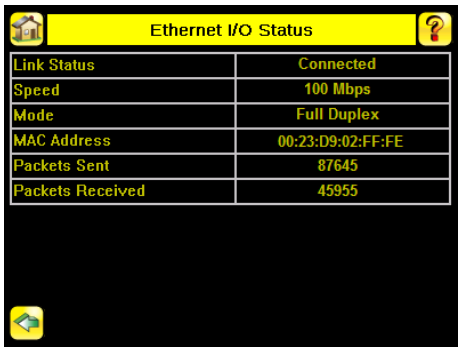


Ethernet I/O Status

Main Menu > **System** > **Communications** > **Ethernet I/O** > **Status**

Use the **Ethernet I/O Status** screen to verify that the Ethernet wiring is correct. In addition to determining whether the link has been established, incoming and outgoing traffic can be monitored.

*Figure 40. **Ethernet I/O Status** Screen*

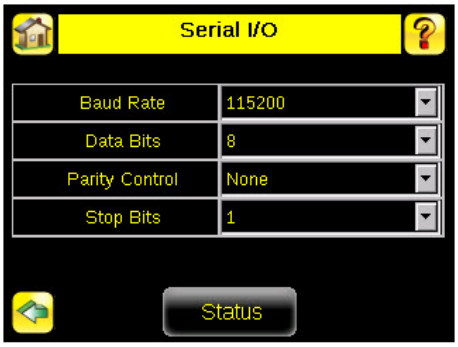


11.5.2 Serial I/O

Main Menu > **System** > **Communications** > **Serial I/O**

Use the **Serial I/O** screen to adjust the settings for Baud Rate, Data Bits, Parity Control, and Stop Bits. Click **Status** to display recent bytes transmitted through this channel.

*Figure 41. **Serial I/O** Screen*

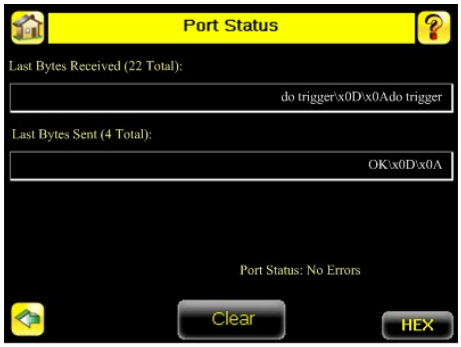


Port Status

Main Menu > **System** > **Communications** > **Serial I/O** > **Status**

Use the **Port Status** screen to make sure that data is entering and exiting the device. This can be useful for debugging issues such as improper wiring, mismatched baud rates, or other serial I/O issues.

*Figure 42. **Port Status** Screen*



11.5.3 Industrial Ethernet

Main Menu > **System** > **Communications** > **Industrial Ethernet**

The iVu BCR device can be controlled or monitored over Industrial Ethernet using Ethernet/IP™, Modbus/TCP, PCCC, or PROFINET® protocols. This document will help you to set up the iVu BCR in the desired configuration and provide you with information you will need to connect to the master device (PLC, HMI, etc.).

Connection

Main Menu > **System** > **Communications** > **Industrial Ethernet** > **Connection**

Use the **Connection** to enable Ethernet/IP, PROFINET, Modbus or or PCCC protocols on the Industrial Ethernet channel. Select **Disable** to completely disable the Industrial Ethernet channel.

Status

Main Menu > **System** > **Communications** > **Industrial Ethernet** > **Status**

The **Status** screen displays information about the current connection. This information is protocol specific.

View Logs

Main Menu > **System** > **Communications** > **Industrial Ethernet** > **View Logs**

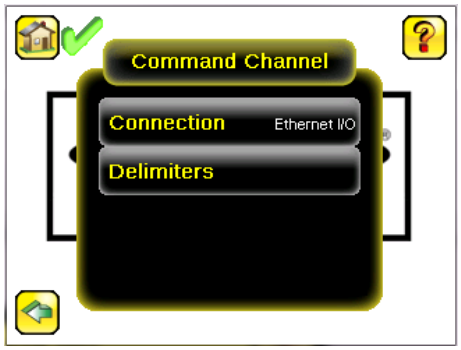
The **View Logs** screen displays the list of recent events on Industrial Ethernet channel. When troubleshooting, select detailed logs under **Setup**.

11.5.4 Command Channel

Main Menu > **System** > **Communications** > **Command Channel**

The iVu BCR command channel is a bi-directional communication protocol that currently supports ASCII via the RS-232 serial interface or Ethernet interface, and enables other devices to remotely control the iVu BCR and to access device information and inspection results.

*Figure 43. **Command Channel** Menu*

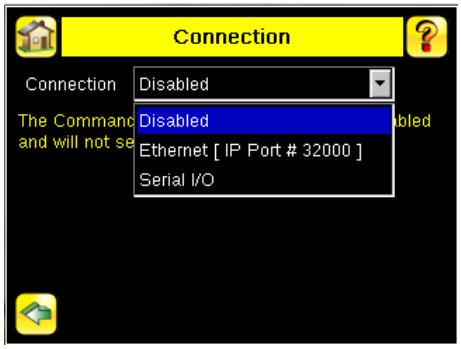


Connection

Main Menu > **System** > **Communications** > **Command Channel** > **Connection**

Use the **Connection** screen to enable or disable the Command Channel.

*Figure 44. **Connection** Screen*



Delimiters

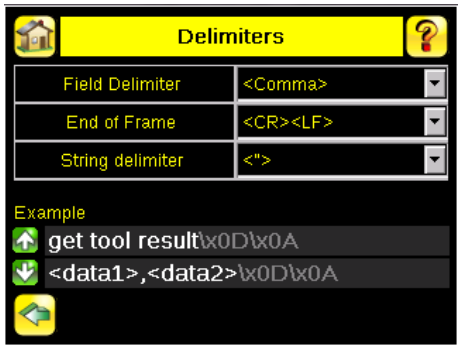
Main Menu > **System** > **Communications** > **Command Channel** > **Delimiters**

Three delimiter options are available from the **Delimiters** screen:

- **Field Delimiter**—Determines what is used to separate data that the iVu BCR is sending out to a remote device.
- **End of Frame**—Determines the delimiter used to indicate the end of a frame.
- **String Delimiter**—Determines what is used to enclose a string field during both input and output operations.

Use the drop-down lists to select the appropriate delimiter. The example at the lower part of the screen displays how the data will look in the output or input streams.

*Figure 45. **Delimiters** Screen*



11.5.5 Data Export

Main Menu > **System** > **Communications** > **Data Export**

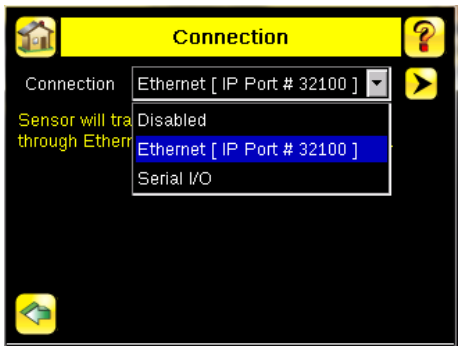
When **Data Export** is enabled, the iVu BCR transmits selected inspection data when triggered.

Connection

Main Menu > **System** > **Communications** > **Data Export** > **Connection**

Use the **Connection** screen to enable or disable the Data Export.

*Figure 46. **Connection** Screen*



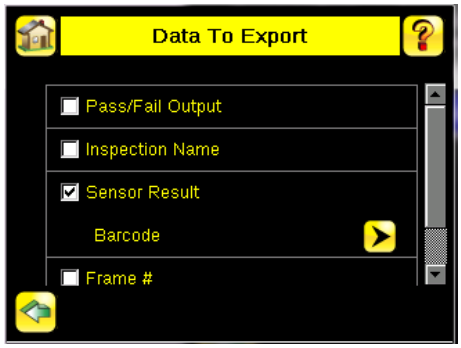
Data To Export

Main Menu > **System** > **Communications** > **Data Export** > **Data To Export**

The options in the **Data To Export** screen determine what barcode data is exported via the serial port.

Note: Grab the edge of the **Data To Export** screen and pull down to allow all information to show.

*Figure 47. **Data to Export** Screen*

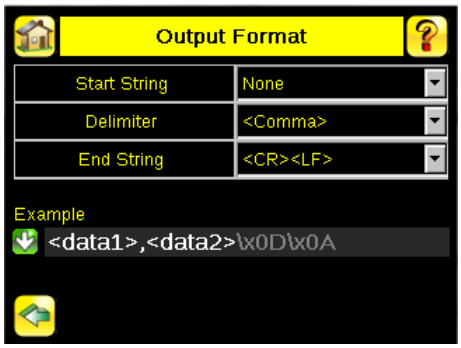


Output Format

Main Menu > **System** > **Communications** > **Data Export** > **Output Format**

In the **Output Format** screen, use the drop-down lists to select Start and End Strings as well as Delimiter. The **Example** field shows how the data will look when it is output.

*Figure 48. **Output Format** Screen*



Data Export Advanced

Main Menu > **System** > **Communications** > **Data Export** > **Advanced**

During the Data and Image export operation, the iVu BCR output channels might become full. This can occur if the iVu BCR is producing export data (frames) faster than the data can be exported from the device or faster than the client is reading the channel export data (due to bandwidth limitations).

The **Advanced** setting affects how the iVu BCR behaves in this situation.

Select **Hold READY** to ensure that all frames are transmitted. In this case, the READY signal remains inactive (iVu BCR is busy) until the new frame has been added to the channel for transmission. Triggers might be missed during this time.

Select **Do not hold READY** to cause the iVu BCR to discard the new frame if the channel is full and thus activate the READY signal immediately after the current inspection is complete. In this case, the discarded frames are not transmitted.

Note: This setting affects both the Data Export Channel and Image Export Channel.

11.5.6 Image Export

Main Menu > **System** > **Communications** > **Image Export**

When the Image Export Channel is enabled, the iVu BCR transmits the acquired image on every trigger. The image is transmitted as a bitmap (.bmp) file. This operation is only available over Ethernet I/O.

Connection

Main Menu > **Communications** > **Image Export** > **Connection**

Use the **Connection** screen to enable or disable the Image Export.

Image Type

Main Menu > **System** > **Image Export** > **Image Type**

On the **Image Type** screen, choose between .jpg or .bmp format for the exporting image file.

Image Export Advanced

Main Menu > **System** > **Communications** > **Image Export** > **Advanced**

During the Data and Image export operation, the iVu BCR output channels might become full. This can occur if the iVu BCR is producing export data (frames) faster than the data can be exported from the device or faster than the client is reading the channel export data (due to bandwidth limitations).

The **Advanced** setting affects how the iVu BCR behaves in this situation.

Select **Hold READY** to ensure that all frames are transmitted. In this case, the READY signal remains inactive (iVu BCR is busy) until the new frame has been added to the channel for transmission. Triggers might be missed during this time.

Select **Do not hold READY** to cause the iVu BCR to discard the new frame if the channel is full and thus activate the READY signal immediately after the current inspection is complete. In this case, the discarded frames are not transmitted.

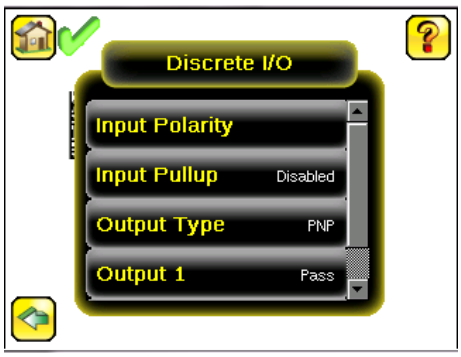
Note: This setting affects both the Data Export Channel and Image Export Channel.

11.6 Discrete I/O Menu

Main Menu > **System** > **Discrete I/O**

Use the **Discrete I/O** menu to adjust iVu BCR input and output settings.

*Figure 49. **Discrete I/O** Menu*



11.6.1 Input Polarity

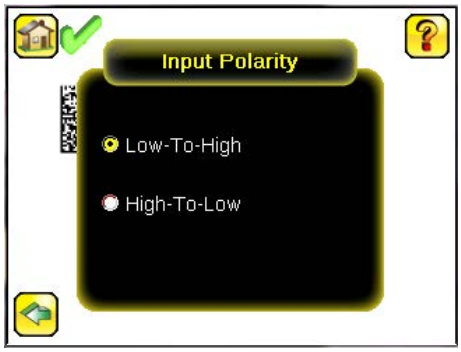
Main Menu > **System** > **Discrete I/O** > **Input Polarity**

The iVu BCR has two input signals—Trigger and Remote Teach. Both of these signals are edge sensitive. The operation of these signals is dependent on the Input Polarity setting.

- **Low-To-High**—The Trigger and Remote Teach are detected on a low to high transition of the signal
- **High-To-Low**—The Trigger and Remote Teach are detected on a high to low transition of the signal

The default setting for a PNP device is Low-To-High, and for an NPN device it is High-To-Low. Change the setting on the **Input Polarity** screen.

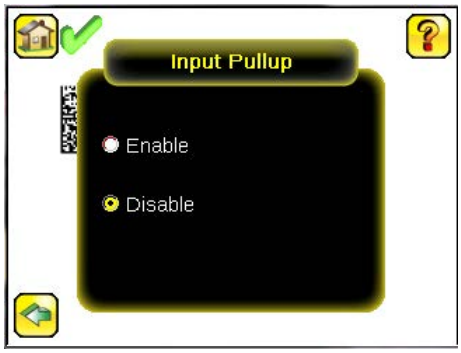
*Figure 50. **Input Polarity** Screen*



11.6.2 Input Pullup

Main Menu > **System** > **Discrete I/O** > **Input Pullup**

By default, the Input Pullup is disabled. If the device used to trigger and remote teach the iVu BCR is a NPN device then you will only need to enable Input Pullup here if that device does not have its own pullup resistor. Otherwise, this should be disabled.



11.6.3 Output Type

Main Menu > **System** > **Discrete I/O** > **Output Type**

Select NPN to configure the device's outputs to sink current. Select PNP to configure the device's output for source current.

11.6.4 Output 1

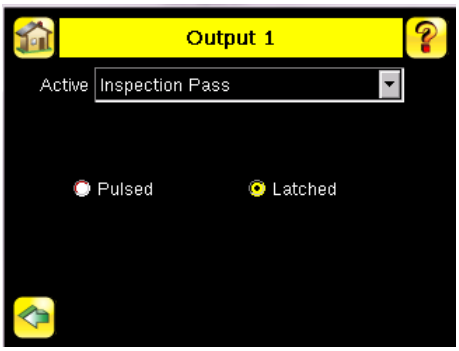
Main Menu > **System** > **Discrete I/O** > **Output 1**

Output 1 can be configured for Inspection Pass, Inspection Fail, Read, No Read, Match, No Match, Missed Trigger, or System Error.

- A Read condition is when the configured number of barcodes are found in a scan. These barcodes must be error-free.
- A No Read condition is when the configured number of barcodes are not found in a scan sequence. This will not occur in Continuous Scan mode.
- If Data Compare is disabled, Inspection Pass and Inspection Fail are the same as Read and No Read.
- If the sensor is using Data Compare, Inspection Pass indicates that a good barcode was found, and the data compared.
- If the sensor is using Data Compare, Inspection Fail indicates that either no good barcode was found, or the data did not compare.
- A Match condition occurs when the required number of barcodes are found and the compare is successful.
- A No Match condition occurs when the required number of barcodes are found, but the compare is not successful.
- A Missed Trigger condition occurs when a trigger is received while the sensor is busy inspecting the pervious image. This output signal is set to the active state. This signal is reset up on resetting the History on the statistics page.
- A System Error condition occurs when a fatal error is detected on the sensor. This output signal is set to the active state. This signal can be reset upon resetting the History on the statistics page, or executing a ClearSystemError command through command channel.

The default setting is Inspection Pass and Latched for Output 1. If Pulsed is selected, the default Pulse width is 50 ms.

Note: For Latched the signal is active until the results of an inspection cause a change in the signal output.



11.6.5 Output2 and Output3

Main Menu > **System** > **Discrete I/O** > **Output 2**

Main Menu > **System** > **Discrete I/O** > **Output 3**

Output 2 and Output 3 can be configured in a similar way as Output 1.

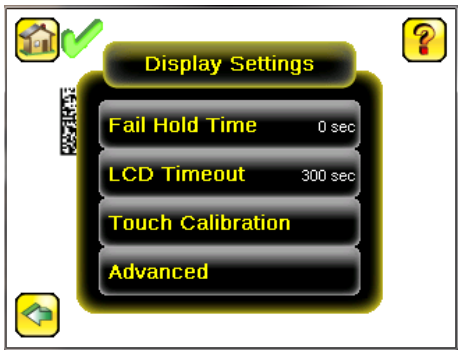
The default setting for Output 2 is Fail and Latched. The default setting for Output 3 is Pass and Latched.

11.7 Display Settings

Main Menu > **System** > **Display Settings**

Use the **Display Settings** menu to set the **Fail Hold Time**, **LCD Timeout**, and to perform a **Touch Calibration** for the touchscreen display. Enable display optimization from the **Advanced** menu.

*Figure 51. **Display Settings** Menu*



11.7.1 Fail Hold Time

Main Menu > **System** > **Display Settings** > **Fail Hold Time**

The **Fail Hold Time** determines how long a failed image is shown on the display so that you can see what failed. The iVu BCR continues to process any triggers and the inspection continues normally. This time delay is only for the touchscreen display. Set this parameter from 0 seconds to 3600 seconds using the slider.

11.7.2 LCD Timeout

Main Menu > **System** > **Display Settings** > **LCD Timeout**

When the device is not being used, the display dims after a user-selectable period of time. Use the arrow keys or the slider to set the display time out.

Note: This screen is not available in the Emulator.

11.7.3 Touch Calibration

Main Menu > **System** > **Display Settings** > **Touch Calibration**

Touchscreen calibration may be necessary if the software does not correctly respond when an icon on the screen is pressed. The calibration routine aligns the touchscreen's coordinates to the display behind it. Follow the prompts on the screen when executing the touchscreen calibration function.

Note: This screen is not available in the Emulator.

11.7.4 Advanced

Main Menu > **System** > **Display Settings** > **Advanced**

The **Advanced Display** screen allows you to enable advanced display features.

Optimize Display Response

This feature helps make the display more responsive when the iVu BCR is busy (either inspection times are long and/or no idle time exists between inspections). Disable this feature if missed triggers occur due to touchscreen presses. With this setting disabled, the display may become sluggish when the iVu BCR is busy.

Invert Display

This feature rotates the display 180 degrees for applications where the device is mounted upside down.

11.8 Reboot Sensor

Main Menu > **System** > **Reboot Sensor**

The **Reboot Sensor** screen allows you to force a reboot of the device.

Note: This option is not available on the Emulator.

11.9 Firmware Update

Main Menu > **System** > **Firmware Update**

Use the **Firmware Update** screen to load the latest device firmware. The **Firmware Update** screen lists the firmware versions it finds in the `BANNER\FIRMWARE` folder on the USB flash drive. When you receive a firmware update from Banner Engineering, be sure to put it in the `BANNER\FIRMWARE` folder on the USB flash drive.

Note: The **Firmware Update** menu is not available in the Emulator.

11.10 Set the Language

Set the device display and/or the Vision Manager software iVu BCR interface to one of several languages as needed.

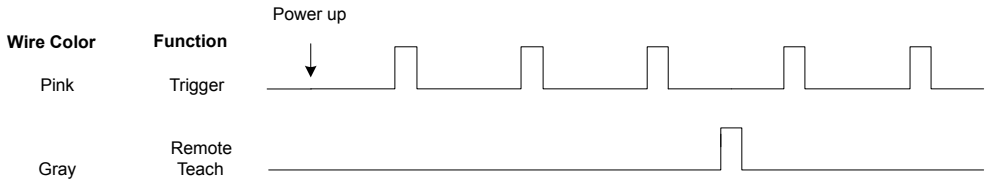
1. Go to **Main Menu** > **System**.
2. Click **Language**.
3. Click the desired language.
   A message displays that the program needs to close to change the language.
4. Click **Yes**.
5. If you are changing the language in the Vision Manager software, re-open the program.

Note: In the Vision Manager software, there is a also a language setting under **User Preferences** on the **Home** screen. This changes the language for the VE product interface and not for the iVu BCR product interface.

11.11 iVu Trigger, Remote Teach, and I/O Waveforms

The iVu BCR has two input signals—Trigger and Remote Teach. The default setting is to detect the low to high transition. To change this setting, go to **Main Menu** > **System** > **Discrete I/O** > **Input Polarity** on the iVu BCR.

11.11.1 PNP (Low-to-High) Trigger and Remote Teach Input Waveforms



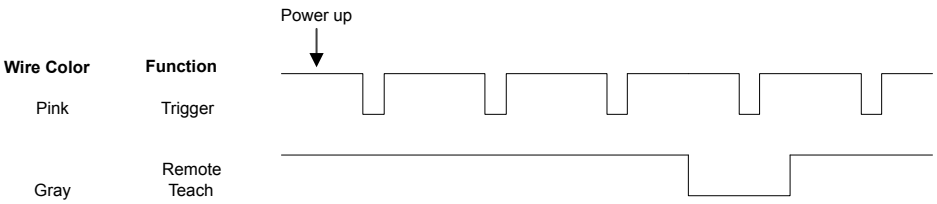
The iVu BCR triggers from low to high, and Remote Teach behaves electrically like trigger.

Note:

Table 4: Required iVu Input Signal Voltage

	ON	OFF
PNP	+10 V dc to 30 V dc	< 2 V dc

11.11.2 NPN (High-to-Low) Trigger and Remote Teach Input Waveforms



The iVu BCR triggers from high to low, and Remote Teach behaves electrically like trigger.

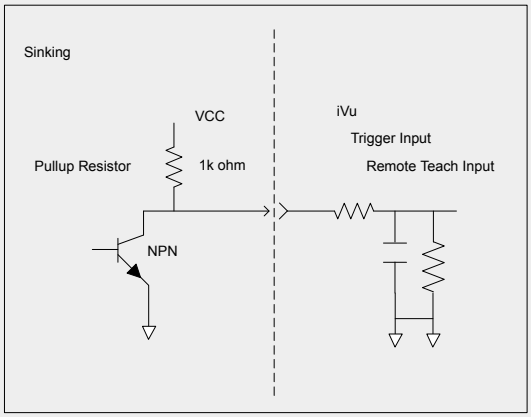
Note:

Table 5: Required iVu Input Signal Voltage

	ON	OFF
NPN	< 2 V dc	+10 V dc to 30 V dc

Note: If the device used to trigger or remote teach the iVu BCR is a sinking device, these are the options regarding the use of a pull-up resistor:

Option 1: Put a pull-up resistor, rated approximately 1 kΩ, between the device's positive (+) voltage and the device's input as shown below.



Option 2: Enable the Input Pullup. Go to iVu BCR **Main Menu** > **System** > **Discrete I/O** > **Input Pullup**.

11.11.3 iVu Output Waveforms

Figure 52. PNP Outputs

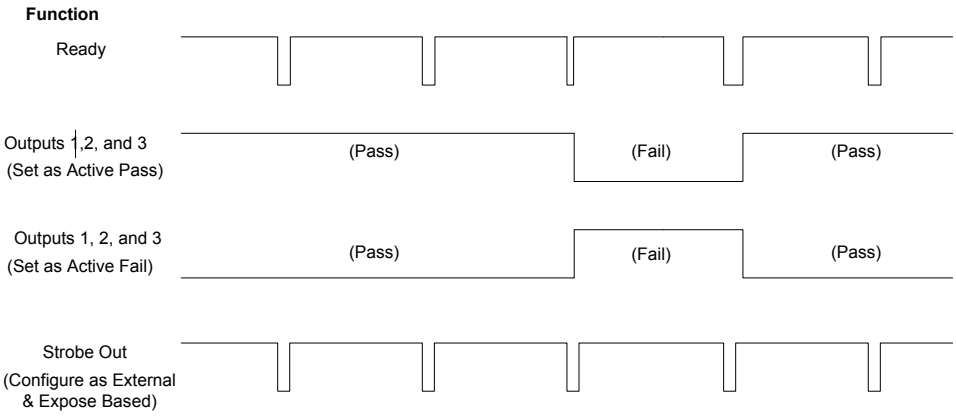
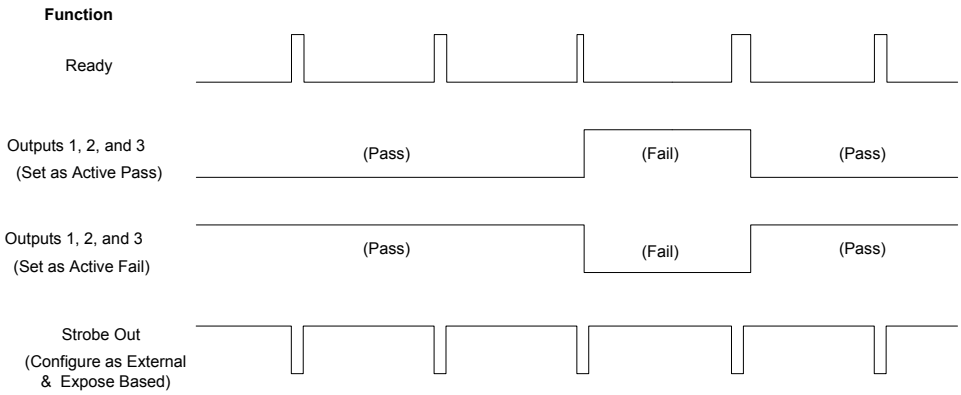


Figure 53. NPN Outputs



Note:

Table 6: Expected iVu Output Signal Voltage

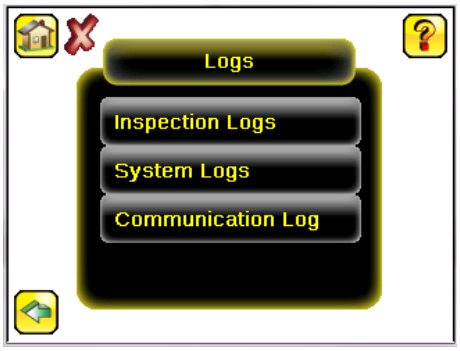
	ON	OFF
PNP	+ V	0 V
NPN	+1 V	+V

12 Device Logs Menu

Main Menu > **Logs**

The **Logs menu** icon is on the **Main Menu**, and is used to set up, view, and save **Inspection Logs**, **Communication Logs**, and **System Logs**.

*Figure 54. **Logs** Menu*

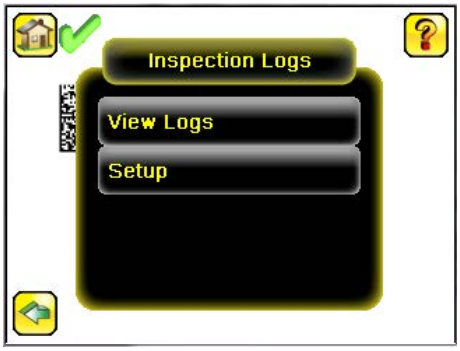


12.1 Inspection Logs Menu

Main Menu > **Logs** > **Inspection Logs**

Configure and view inspection logs from the **Inspection Logs** menu. Inspection Logs are stored inspection records that include a captured image, the parameters used to inspect it, and the results of that inspection. Up to ten Inspection Logs can be held in memory on the device. The next ten logs overwrite the previous ten logs. Save Inspection Logs to the USB flash drive so that the logs can be imported to the emulator.

*Figure 55. **Inspection Logs** Menu*

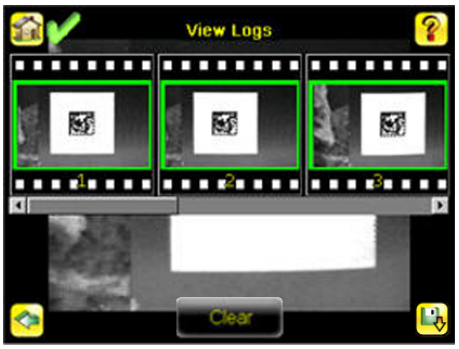


12.1.1 View Logs

Main Menu > **Logs** > **Inspection Logs** > **View Logs**

Inspection Logs appear as a strip of film. Select a frame to view a specific image in the **Frame** screen. Click **Save** to save the logs to the USB flash drive. Logs saved to the USB flash drive can be imported into the emulator. Click **Clear** to clear Inspection Logs.

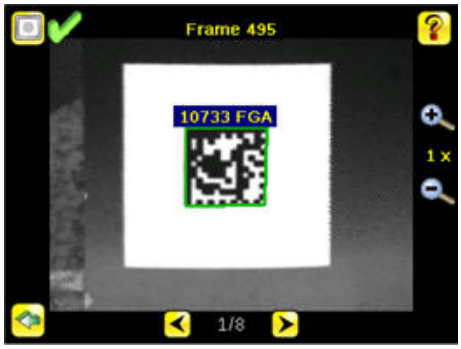
*Figure 56. **View Logs** Screen*



Use the **Frame** screen to debug an inspection. The screen shows one inspection in read-only mode. Click the upper-left icon to cycle through views: image with annotations, image without annotations, and inspection statistics. When in the **Statistics** view, the table title has arrows to switch between the **Inputs** and the **Results** of the inspection.

Use the left and right arrow keys at the bottom of the screen to navigate through all of the stored inspection logs.

*Figure 57. **Frame** Screen*

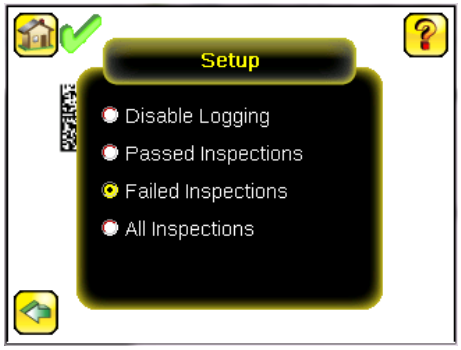


12.1.2 Setup

Main Menu > **Logs** > **Inspection Logs** > **Setup**

On the **Setup** menu, use the option buttons to Disable Logging, or to log Passed Inspections, Failed Inspections, or All Inspections.

*Figure 58. **Setup** Screen*



12.2 System Logs

Main Menu > **Logs** > **System Logs**

The System Log contains configuration change information, other notifications, and any errors or warnings that were encountered.

In the log, "(D)" indicates a change made by the device, "(I)" indicates a change made through Industrial Ethernet, "(C)" indicates a change made through Command Channel, and "(VM)" indicates a change made through Vision Manager, such as changing the device name or the IP address using the Vision Manager button.

Click the icon in the upper left corner of the screen to show/hide the time column.

Click **Clear Log** at the bottom of the screen to clear the System Log.

Click **Save** to save the System Log to the USB flash drive.

Note: System log will not log changes while in Demo mode. Additionally, the Emulator does not log changes.

12.3 Communication Logs Menu

Main Menu > **Logs** > **Communication Logs**

The Communication Log contains logs for the four communications channels: **Industrial Ethernet**, **Command Channel**, **Data Export**, and **Image Export**.

The following features are available for each of the logs:

- Click the icon in the upper left corner of the screen to show/hide the time column
- Click **Clear Log** at the bottom of the screen to clear the log
- Click **Save** to save the Log to the USB flash drive

Note: Communication log does not log changes while in Demo mode. Additionally, the Emulator does not log changes.

13 Communications Guide

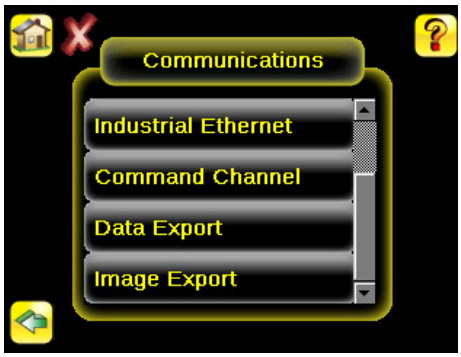
13.1 iVu Plus Communication Summary of Ethernet and Serial

The iVu BCR communicates with other devices via Ethernet or a UART serial communications port (RS-232). To establish an Ethernet connection to the iVu BCR, configure the external device with the correct IP address and TCP port. To use the serial communications connection, configure the port settings for baud rate, data bits, parity, and stop bits on the iVu BCR to match the settings of the external device.

13.1.1 Communication Channels

The iVu BCR supports up to four communications channels. To access the channels, go to **Main Menu** > **System** > **Communications**.

*Figure 59. **Communications** Menu*



- Command Channel—A bi-directional communication protocol that currently supports ASCII and enables other devices to remotely control the iVu BCR and access device information and inspection results
- Industrial Ethernet—A bi-directional communication channel that allows the user to control the device and access device results using Ethernet/IP™, Modbus/TCP, PCCC, or PROFINET® protocol
- Data Export—Used to export selected inspection data to a remote device
- Image Export—Used to export inspection images to a remote device

Data export and command channel can be configured for either Ethernet or Serial I/O, but not both. Image export is only available over Ethernet. The following table summarizes valid communication channel configuration options.

Command Channels	Scenario #1		Scenario #2		Scenario #3	
	Ethernet	Serial I/O	Ethernet	Serial I/O	Ethernet	Serial I/O
Command Channel	Yes	No	No	Yes	Yes	No
Industrial Ethernet	Yes	No	Yes	No	Yes	No
Data Export	Yes	No	Yes	No	No	Yes
Image Export	Yes	No	Yes	No	Yes	No

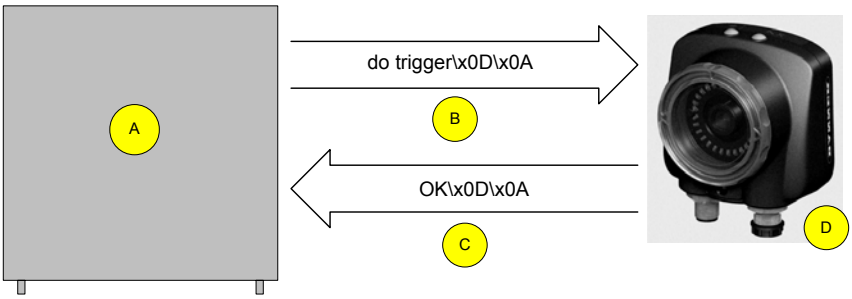
13.1.2 Industrial Ethernet

Main Menu > **System** > **Communications** > **Industrial Ethernet**

The iVu BCR device can be controlled or monitored over Industrial Ethernet using Ethernet/IP™, Modbus/TCP, PCCC, or PROFINET® protocols. This document will help you to set up the iVu BCR in the desired configuration and provide you with information you will need to connect to the master device (PLC, HMI, etc.).

13.1.3 Command Channel

The iVu BCR command channel is a bi-directional communication protocol that currently supports ASCII via either Ethernet or the RS-232 serial interface, and enables other devices to remotely control the iVu sensor and access sensor results.



A	Control Device, such as a PLC, PC program, or a terminal	**C**	Response Frame
B	Request Frame	**D**	iVu BCR Device

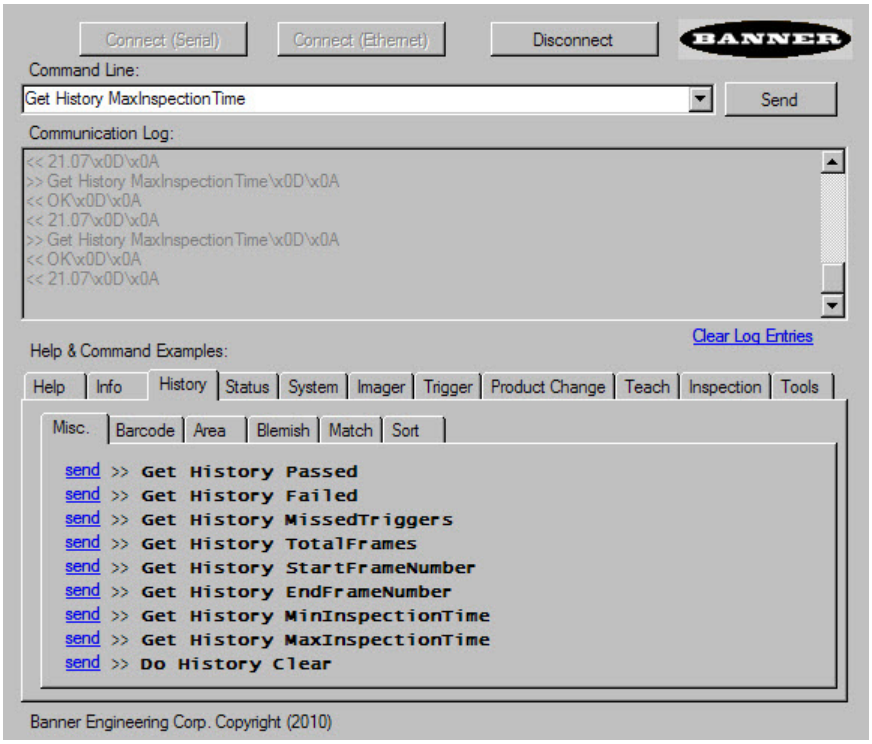
The following are some of the functionality available via the command channel:

- Get device information (such as version and device name)
- Control discrete I/O (such as trigger and teach)
- Get sensor results (such as sensor status)
- Change the running inspection

Command Channel Sample Application

The iVu BCR installation package has a Command Channel sample application that provides an easy interface to execute commands. In a production environment, you will need to create your own application for bi-directional communication with the iVu BCR.

Figure 60. Command Channel Sample Application



13.1.4 Data Export

Export user-selected inspection data via either Ethernet or the RS-232 serial interface. Inspection data that can be exported includes:

- Pass/Fail Output
- Inspection Name
- Sensor Result
  - Pass/Fail
  - Sensor Result (see Table 7 on p. 70 for additional information)
- Frame #
- Inspection Time (ms)

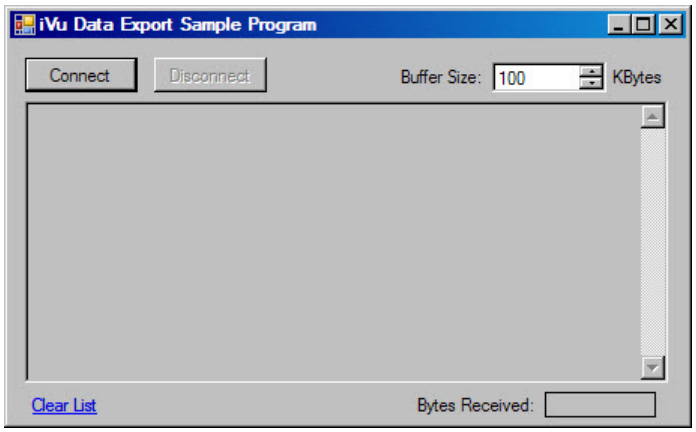
Table 7: Sensor Results

Sensor Type	Data to Export
Barcode	Barcode Count
	Data Length
	Symbol Type
	Barcode Data

Data Export Sample Application

The iVu BCR installation package has a Data Export sample application that allows you to view exported data while setting up the sensor, etc. In a production environment, you need to create your own application to process data exported from the inspection.

Figure 61. Data Export Sample Application



13.1.5 Image Export

Image export is only supported on Ethernet ports. Inspection images are a maximum 752×480 8-bits per pixel grayscale images in .bmp format. The images represent all the data in a full Field of View (FOV).

Each exported image is comprised of a header (64 bytes) followed by the image data. All 16- and 32-bit numeric entries are little endian.

The header includes the following information:

Byte Offset	Field ID	Size in Bytes	Data Type	Description
0-15	Header Prefix	16	char	"IVU PLUS IMAGE"
16-19	Header Version	4	UInt32	2
20-23	Image Size	4	UInt32	Total number of bytes for exported image
24-27	Image Frame Number	4	UInt32	Image frame number
28-29	Image Width	2	UInt16	752 (maximum)
30-31	Image Height	2	UInt16	480 (maximum)
32-33	Image Format	2	UInt16	0: Bitmap, 1: JPEG

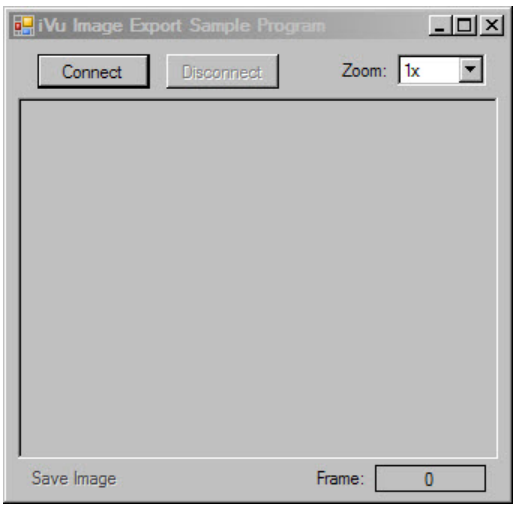
Byte Offset	Field ID	Size in Bytes	Data Type	Description
34-63	Reserved	30	byte	Reserved for future use

Note: If FOV's are adjusted so that they are smaller, the bitmaps will also be smaller.

Image Export Sample Application

The iVu BCR installation package has an Image Export sample application that provides a way to save exported images. In a production environment, you need to write your own application to process exported images, for example to display them on an HMI or to save them to disk.

Figure 62. Image Export Sample Application



13.2 Enabling Communications

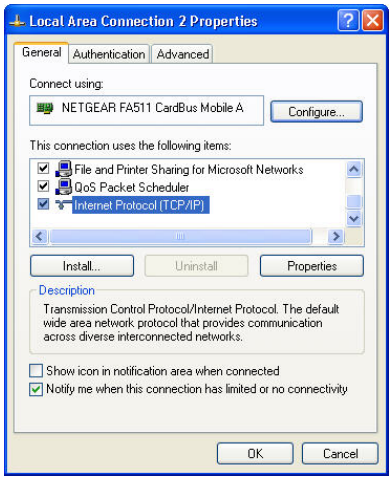
13.2.1 Setting Up Ethernet Communications

Configure both the PC and the iVu BCR using the following instructions.

Windows XP

1. Open **Network Properties** on the Windows XP [9] PC (right-click on the **Network Neighborhood** icon).
2. On the Local Area Connection, right-click on **Properties**.
3. In the dialog, click **Internet Protocol (TCP/IP)** and click **Properties**.

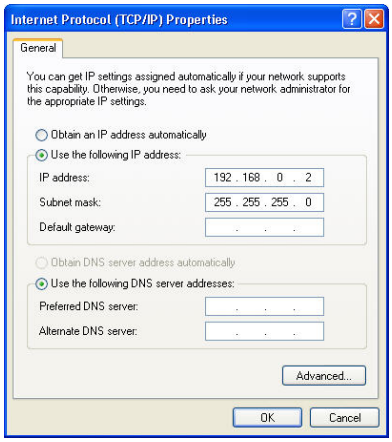
*Figure 63. **Local Area Connection Properties** Screen*



[9] Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries.

4. In the **Internet Protocol (TCP/IP) Properties** dialog, select **Use the following IP address** and make sure that the IP address is 192.168.0.2, and the subnet mask is 255.255.255.0.

*Figure 64. **Internet Protocol (TCP/IP) Properties** Screen*

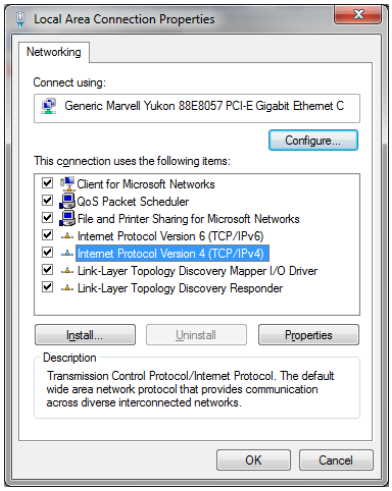


Windows 7

1. On the Windows 7 [10] PC, click the **Start** button, then on the **Start** menu, click **Control Panel**.
2. In **Control Panel**, click **Network and Internet**, then click **Network and Sharing Center**, and then click **Change adapter settings**.
3. Right-click on the connection that you want to change, then click **Properties**.

   If you are prompted for an administrator password or confirmation, enter the password or provide confirmation.
4. In the connection properties, click **Internet Protocol Version 4 (TCP/IPv4)**, and then click **Properties**.

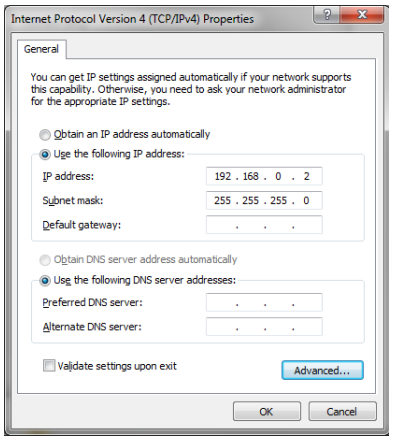
*Figure 65. **Local Area Connection Properties** Screen*



5. In **Internet Protocol (TCP/IPv4) Properties**, select **Use the following IP address**.
6. Make sure that the IP address is 192.168.0.2, and the subnet mask is `255.255.255.0`.

[10] Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries.

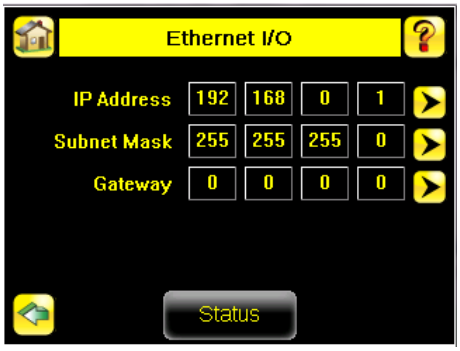
*Figure 66. **Internet Protocol (TCP/IPv4) Properties** Screen*



iVu BCR Setup for Ethernet Communications

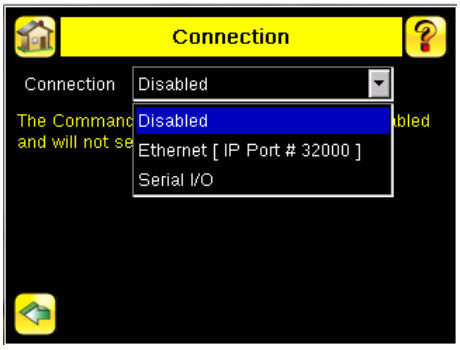
1. Go to **Main Menu** > **System** > **Communications** > **Ethernet I/O** and make sure that the iVu BCR is configured as shown.

*Figure 67. **Ethernet I/O** Screen*



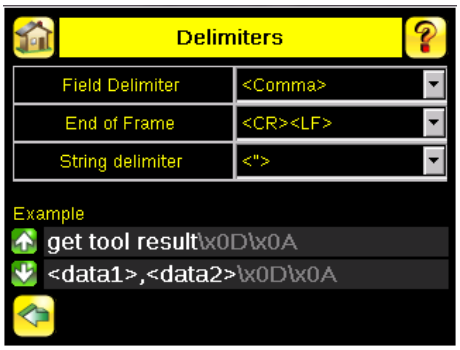
2. Enable the command channel over Ethernet.
   a. Go to **Main Menu** > **System** > **Communications** > **Command Channel** > **Connection**, and select Ethernet [IP Port # 32000].

*Figure 68. **Connection** Screen*



   b. Configure the field and end-of-frame delimiters. Go to **Main Menu** > **System** > **Communications** > **Command Channel** > **Delimiters**.

*Figure 69. **Delimiters** Screen*



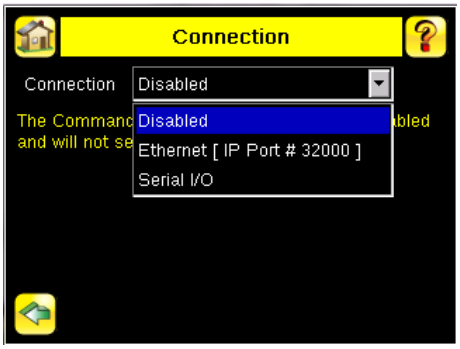
Valid end-of-frame delimiters are: <comma>, <colon>, <semicolon>, <CR>, <CR><LF>, <LF><CR>, or <ETX>.

c. Verify that the iVu BCR receives and transmits data correctly.

3. Enable Data Export over Ethernet.

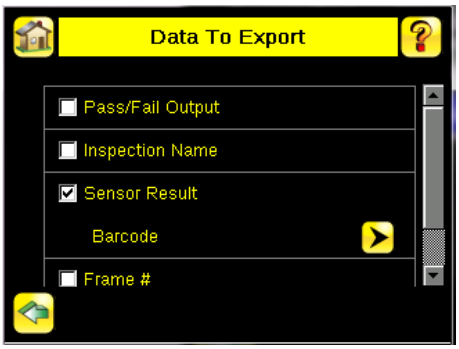
a. Go to **Main Menu** > **System** > **Communications** > **Data Export** > **Connection** and select Ethernet from the drop-down.

*Figure 70. **Connection** Screen*



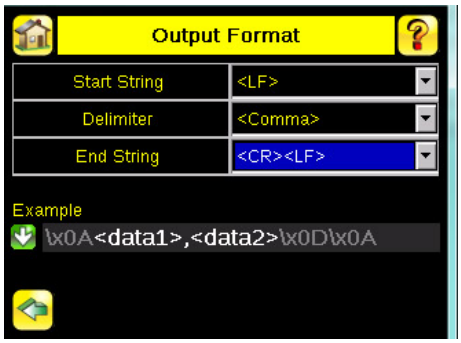
b. Go to **Main Menu** > **System** > **Communications** > **Data Export** > **Data To Export** and select the inspection data to export.

*Figure 71. **Data to Export** Screen*



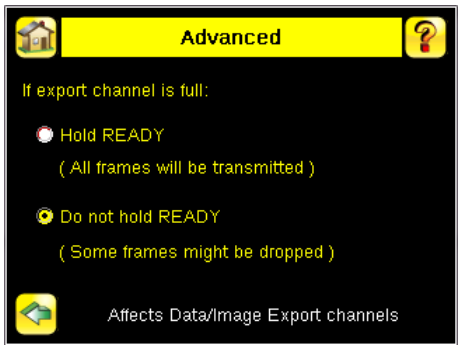
c. Go to **Main Menu** > **System** > **Communications** > **Data Export** > **Output Format** and select the Start String, Delimiter, and End String.

*Figure 72. **Output Format** Screen*



d. Go to **Main Menu** > **System** > **Communications** > **Data Export** > **Advanced**.

*Figure 73. **Advanced** Screen*



During the Data and Image export operation the sensor's output channels might become full. This can occur if the sensor is producing export data (frames) faster than the data can be exported from the device (due to bandwidth limitations) or faster than the client is reading the channel export data.

This setting affects how the sensor will behave in this situation.

- Select **Hold READY** to ensure that all frames are transmitted. In this case, the READY signal remains inactive (sensor is busy) until the new frame has been added to the channel for transmission. Triggers might be missed during this time.
- Select **Do not hold READY** to cause the sensor to discard the new frame if the channel is full and activate the READY signal immediately after the current inspection is complete. In this case, the discarded frames are not transmitted.

Communications Channel Ports

The following are the default Ethernet port settings for the communications channels:

- Command Channel — 32200
- Data Export — 32100
- Image Export — 32000

13.2.2 Setting Up Serial Communications

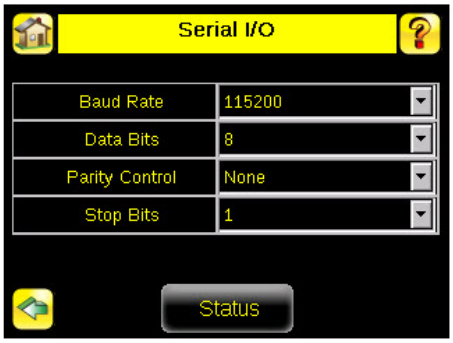
1. Electrically connect the control device and the iVu BCR device. On the iVu BCR, the pins/wire colors used for serial communications via RS-232 are shown in the following table.

   Table 8: iVu BCR RS-232 Connections

Pin #	Wire Color	Description
10	Light-Blue	TX
11	Black	Signal Ground
12	Violet	RX

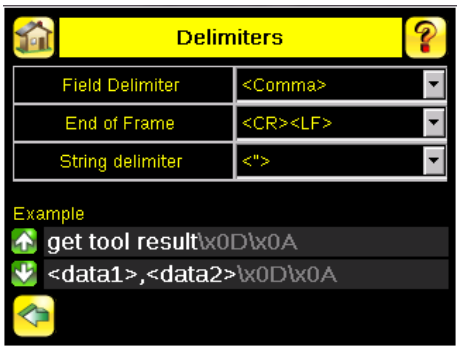
2. Configure the port settings (baud rate, data bits, parity, and stop bits) on the iVu BCR to match the settings on the control device. Go to **Main Menu** > **System** > **Communications** > **Serial I/O**.

*Figure 74. **Serial I/O** Screen*



3. Enable the command channel over the serial connection.
    a. Go to **Main Menu** > **System** > **Communications** > **Command Channel** > **Connection** and select Serial I/O.
    b. Configure the field and end-of-frame delimiters. Go to **Main Menu** > **System** > **Communications** > **Command Channel** > **Delimiters**.

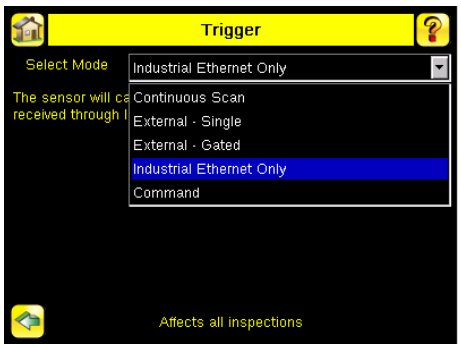
*Figure 75. **Delimiters** Screen*



Valid end-of-frame delimiters are: <comma>, <colon>, <semicolon>, <CR>, <CR><LF>, <LF><CR>, or <ETX>.

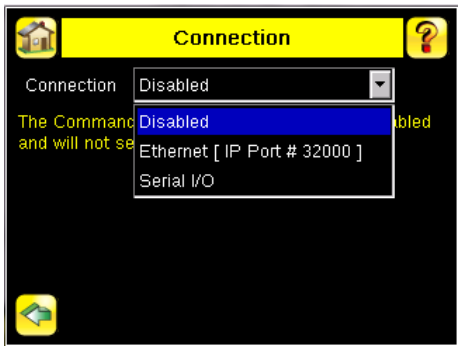
    c. If you want to trigger the iVu BCR from the control device, set the trigger mode to Command. Go to **Main Menu** > **Imager** > **Trigger** and select Command from the drop-down list.

*Figure 76. **Trigger** Screen*



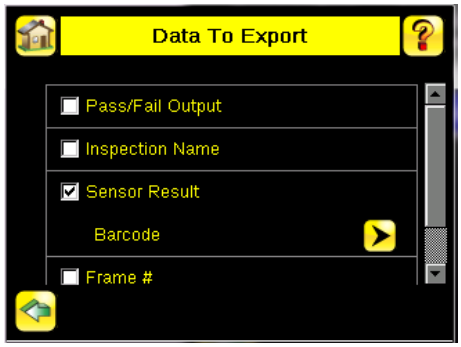
    d. Verify that the iVu BCR receives and transmits data correctly.
4. Enable Data Export over the serial connection.
    a. Go to **Main Menu** > **System** > **Communications** > **Data Export** > **Connection** and select Serial I/O from the drop-down.

*Figure 77. **Connection** Screen*



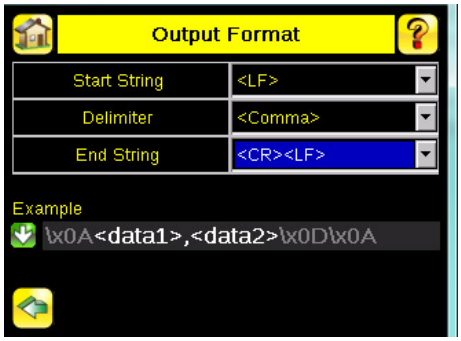
b. Go to **Main Menu** > **System** > **Communications** > **Data Export** > **Data To Export** and select the inspection data to export.

*Figure 78. **Data to Export** Screen*



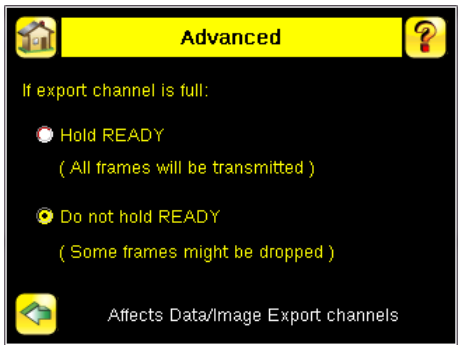
c. Go to **Main Menu** > **System** > **Communications** > **Data Export** > **Output Format** and select the Start String, Delimiter, and End String.

*Figure 79. **Output Format** Screen*



d. Go to **Main Menu** > **System** > **Communications** > **Data Export** > **Advanced**.

*Figure 80. **Advanced** Screen*



During the Data and Image export operation the sensor's output channels might become full. This can occur if the sensor is producing export data (frames) faster than the data can be exported from the device (due to bandwidth limitations) or faster than the client is reading the channel export data.

This setting affects how the sensor will behave in this situation.

- Select **Hold READY** to ensure that all frames are transmitted. In this case, the READY signal remains inactive (sensor is busy) until the new frame has been added to the channel for transmission. Triggers might be missed during this time.
- Select **Do not hold READY** to cause the sensor to discard the new frame if the channel is full and activate the READY signal immediately after the current inspection is complete. In this case, the discarded frames are not transmitted.

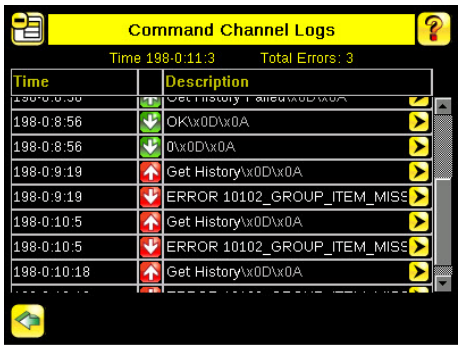
13.3 Testing and Troubleshooting iVu BCR Communications

13.3.1 Understanding the Communication Log

The iVu BCR includes the following Communication Logs:

- Command Channel Log—Ensures that commands are properly formed (syntax is correct), and provides a history of commands issued along with responses to these commands. To access the Command Channel Log, go to **Main Menu** > **Logs** > **Communication Logs** > **Command Channel**
- Data Export and Image Output logs—These logs are purely output logs (that is, there is no receive activity to log)

*Figure 81. **Command Channel Logs** Screen*



Some notes about the logs:

- To see an expanded view of each entry, click the small right-triangle control on each entry
- To save the log, click the save icon. The saved communication log can be loaded into the emulator for troubleshooting offline

The following table describes the icons used in the Communication Log. The up-arrow indicates an incoming request to the iVu BCR from the control device. The down-arrow indicates an outgoing response from the iVu BCR to the control device.

Icon	Description
	Port open.
	Port closed.
	Indicates that the command has been processed without errors.
	Indicates that the incoming entry is stalled (no new bytes), or end-of-frame delimiter was not received, or client is not reading data on Ethernet.
	Indicates whether the response frame contains an error or is dropped, the log entry icons for the request and the response frames are red, and the displayed error count increments by one.
	If the command takes a long time to process, the last long entry changes to an hourglass (for example, during trigger of long inspections).

For Ethernet channels:

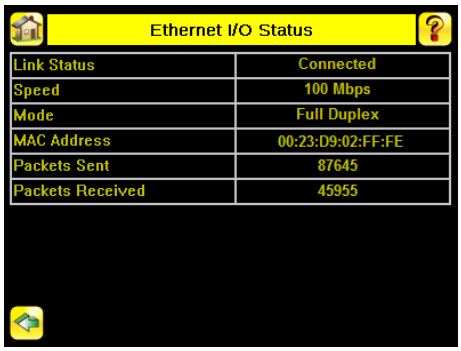
- The channel's log shows an Enabled entry that indicates which port is being listened to
- When a client connects, a log entry is added that indicates which IP address connected
- When a client closes the connection, a log entry indicates that the channel is no longer being listened to

13.3.2 Ethernet I/O

Ethernet I/O Status

Use the **Ethernet I/O Status** screen to verify that the Ethernet wiring was correctly set up. In addition to determining if the link has been established, incoming and outgoing traffic can be monitored.

*Figure 82. **Ethernet I/O Status** Screen*



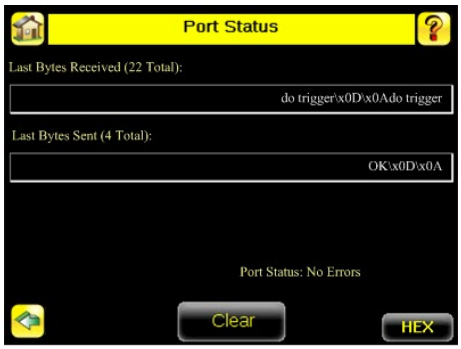
13.3.3 Serial I/O

Using the Port Status Screen for Testing RS-232 Communications

Use **Port Status** screen to ensure data is entering and exiting the iVu BCR. This can be useful for debugging issues such as improper wiring, mismatched baud rates, or other serial I/O issues. To access the **Port Status** screen, go to **Main Menu** > **System** > **Communications** > **Serial I/O** and click **Status**.

- The upper field shows the bytes received (request frame) on the iVu BCR from the control device
- The lower field shows the bytes sent (response frame) from the iVu BCR to the control device

*Figure 83. **Port Status** Screen*



Port Errors

The **Port Errors** screen can help to debug communications channel issues: Parity, Break, and Framing indicate mismatched port settings or, in the case of Break, incorrect cabling.

Using the iVu BCR Command Channel Sample Application or a Terminal Program for Testing

The easiest way to test that the iVu command channel is correctly receiving and transmitting data is to use either the iVu BCR Command Channel Sample App (available in the iVu BCR installation package) or to use a terminal program running on a PC.

If you are using a terminal program, in the terminal program's configuration:

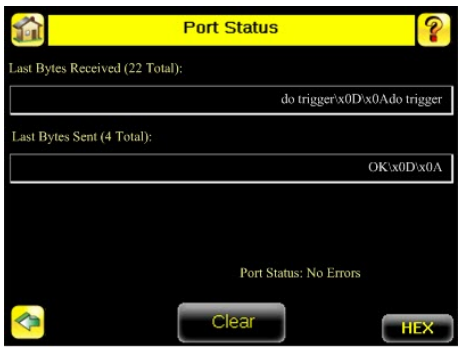
- Set new-line transmit to <CR><LF> (and set the end-of-frame delimiters on the iVu BCR to match)
- Enable local echo
- Set the Serial port so that the PC port number's baud rate, data, parity, and stop bits match those set up on the iVu BCR

Verifying Basic Receive Functionality

Use the following instructions to verify that the iVu BCR can receive request frames from the requesting device:

1. On the iVu BCR, go to **Main Menu** > **System** > **Communications** > **Serial I/O** > **Port Status** .

*Figure 84. **Port Status** Screen*



2. On the requesting device, transmit one or more bytes to the iVu BCR.
    - If the data byte values appear correct and the number sent by the requesting device matches the number received by the iVu BCR, then the transmit/receive functionality is working properly.
    - If the connection is incorrect (electrically) or if the baud rate is mismatched, no bytes will appear in the upper field on the **Port Status** screen.
    - If the connection is correct (electrically), bytes will appear in the upper field of the **Port Status** screen in the order they were received.
    - If the Port Status: Errors at the bottom of the **Port Status** screen highlights red, then the connection is correct electrically but there is likely a settings mismatch between the iVu BCR and the requesting device. Verify the settings on both devices.
    - If the bytes appear with no errors but appear incorrect or there are too many or too few, then the port settings (for example, baud rate) are likely mismatched in a way that does not generate serial hardware errors. Verify the settings on both devices match exactly.

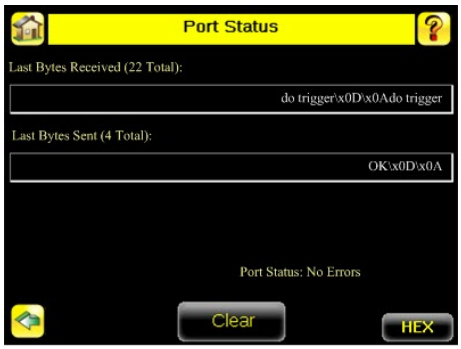
Verifying Basic Transmit Functionality

The iVu BCR command channel only sends response frames to the requesting device if it receives a valid end-of-frame delimiter from the requesting device. To verify transmit functionality:

1. Transmit an end-of-frame delimiter sequence from the requesting device to the iVu BCR. For example, in a terminal program, press **Enter**.

    If a valid end-of-frame delimiter is received, the iVu BCR immediately transmits a short error message back to the requesting device (for example, ERROR 10000_COMMAND_MISSING).
2. Verify that the number of bytes sent by the requesting device are the same as the number shown in the lower field of the **Port Status** screen on the iVu BCR. Go to **Main Menu** > **System** > **Communications** > **Serial I/O** > **Port Status** .

*Figure 85. **Port Status** Screen*



3. If the byte count does not match, re-verify that the settings on both devices match exactly. If no bytes are received, re-check the wiring.

If the correct response frame is received, then basic electrical and port settings are correct.

13.4 Command Channel Primer

13.4.1 Command Channel Commands

All iVu BCR command channel request command frames use the following syntax:

```
>> command group item value<EOF>
```

Notes

<EOF> is the end-of-frame delimiter. See below for a description.

All commands are in ASCII and are case-insensitive.

command

An action to be performed on an iVu BCR group. For example, get, set, do, login, or logout.

group

Identifies the iVu BCR group that the command should act upon. For example, info, system, trigger, or bcr_input.

item

Further qualifies the action by specifying an item within the identified group. For example, comparedata or status.

value

For set commands, this identifies the data that must be set for the specified group item.

Note: Item is not used with get commands.

<EOF>

Identifies the end-of-frame for the command so that the iVu BCR knows to begin processing. The iVu BCR will return a response that includes the end-of-frame delimiter. The options for the <EOF> are set in the iVu BCR **Serial I/O** screen, and are:

- <comma>
- <colon>
- <semicolon>
- <CR>
- <CR><LF>
- <LF><CR>
- <ETX>

Note: When data displays on iVu BCR screens, such as the **Port Status** screen, printable delimiters display as expected. Non-printable characters, such as <CR> are displayed in hex notation (\x0D).

Command Flow

The command flow should be such that a new command request should not be issued until the iVu BCR command channel acknowledges the previous command request.

For example, the following is a series of command requests and responses. The first request sets the trigger mode to command and, once the iVu BCR responds with an "OK," the next command request is issued to do (or execute) the trigger.

```
>>  set trigger mode command\x0D\x0A
<<  OK\x0D\x0A
>>  do trigger\x0D\x0A
<<  OK\x0D\x0A
```

String Delimiters and Escaping

By default, all strings used in commands are enclosed in quotation marks (""). All text in quotes is part of the command. Quotes (") or back-slashes (\) that are part of the string must be escapted with a back-slash. For example:

```
"abc\"def\"ghi\\jkl"
```

Set the String Delimiter parameters to 'None' if strings should not be enclosed in quotation marks.

Command Channel Command Synopsis

There are a number of general types of commands to do, set, and get sensor data.

Command Channel Response Frames

The iVu BCR responds to all request frames with one or two responses, depending on the type of command.

Do commands

All do commands are followed by one response that identifies the command status. For example:

```
>>  do trigger\x0D\x0A
<<  OK\x0D\x0A
```

Get commands

All get commands are followed by two responses: the first identifies the status of the command, and the second contains the retrieved information. For example:

```
>>  get info serialnumber\x0D\x0A
<<  OK\x0D\x0A
<<  "012345ABCDEF"\x0D\x0A
```

Set commands

All set commands are followed by one response that identifies the command status. For example:

```
>>  set imager gain 20\x0D\x0A
<<  OK\x0D\x0A
```

Command Channel Command Status

The command status is either OK or ERROR. If OK, then the command has fully and successfully completed. If an error is returned it is in the form *ERROR nnnnn_ERROR_IDENTIFIER* (for example ERROR 10001_COMMAND_NOT_RECOGNIZED). Refer to Command Channel Error Codes on p. 89 for a list of errors.

13.4.2 Conventions Used for Examples

Some command channel examples are included here. The following are the conventions used in the examples:

- All examples use <CR><LF> for the end-of-frame delimiter, and this delimiter is always denoted in hex (\x0D\x0A) because that is what is displayed in the iVu BCR logs and, for example, the **Port Status** screen
- All commands are in **bold** text
- For each example, a command request to the iVu BCR device is prefaced with a **>>**, and a command response frame from the iVu BCR device is prefaced by a **<<** as shown below. These are only used to make the documentation clearer

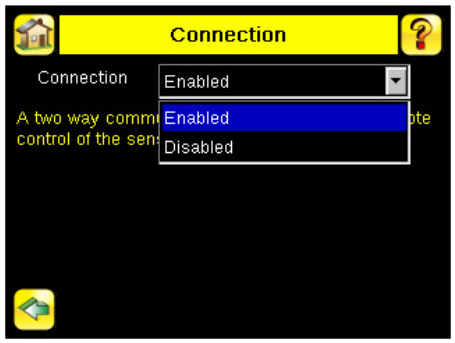
```
>>  get info companyname\x0D\x0A
<<  OK\x0D\x0A
<<  "Banner Engineering Corp."\x0D\x0A
```

13.4.3 Examples

How to Trigger the Sensor and Retrieve Barcode Data using the Command Channel

To trigger the sensor and retrieve barcode data, do the following:

1. Go to **Main Menu** > **System** > **Sensor Configuration** > **Serial I/O.**
2. Click **Channel Mode**.
3. In the Channel Mode dialog, select **Command** from the drop-down list.



4. Set Trigger to Command. Go to **Main Menu** > **Imager** > **Trigger** , and from the drop-down list select **Command**.
5. Issue a trigger command as follows:

```
>>  do trigger\x0D\x0A
<<  OK\x0D\x0A
```

6. Check that the inspection passed.

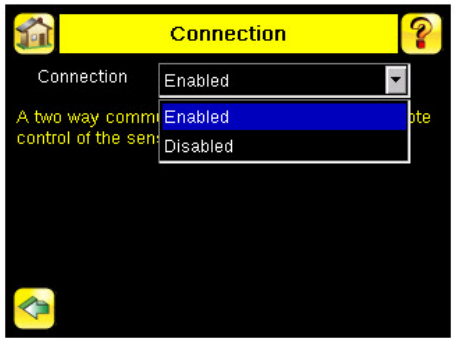
```
>>  get inspection status\x0D\x0A
<<  OK\x0D\x0A
<<  Pass\x0D\x0A
```

7. Get the barcode data read by the iVu sensor.

```
>>  get bcr_result\x0D\x0A
<<  OK\x0D\x0A
<<  "0043000011201"x0D\x0A
```

How to Modify Barcode Compare Data Using the Command Channel

1. Go to **Main Menu** > **System** > **Sensor Configuration** > **Serial I/O.**
2. Click **Channel Mode**.
3. In the Channel Mode dialog, select **Command** from the drop-down list.



4. Set Trigger to Command. Go to **Main Menu** > **Imager** > **Trigger** , and from the drop-down list select **Command**.
5. Set the compare data.

```
>>  set bcr_input comparedata "0043000011201"\x0D\x0A
<<  OK\x0D\x0A
```

6. Trigger the sensor.

```
>>  do trigger\x0D\x0A
<<  OK\x0D\x0A
```

7. Check that the inspection passed.

```
>>  get inspection status\x0D\x0A
<<  OK\x0D\x0A
<<  Pass\x0D\x0A
```

8. Get the barcode data read by the iVu sensor.

```
>>  get bcr_result data\x0D\x0A
<<  OK\x0D\x0A
<<  "0043000011201"\x0D\x0A
```

13.4.4 Command Channel Reference

Info Command Group

Command	Group	Item	Description
Get	Info	CompanyName	The company name as a string.
Get	Info	ModelNumber	The device model number as a string.
Get	Info	FirmwareVersion	The device firmware version as a string.
Get	Info	SerialNumber	The device serial number as a string.
Get	Info	Name	The device name as a string.
Get	Info	BootNumber	The number of device bootups.
Get	Info	UpTimer	The elapsed time the device has been running. The format is hh:mm:ss:msec.
Get	Info	HourCount	The number of hours the device has been running.
Get	Info	RemoteConnected	The remote display connected status as a Boolean value (true or false).
Get	Info	RemoteModelNumber	The model number of the remote display as a string.
Get	Info	RemoteSerialNumber	The serial number of the remote display as a string.

Examples

```
>>  get info companyname\x0D\x0A
<<  OK\x0D\x0A
<<  "Banner Engineering Corp."\x0D\x0A
```

```
>>  get info bootnumber\x0D\x0A
<<  OK\x0D\x0A
<<  42\x0D\x0A
```

```
>>  get info uptimer\x0D\x0A
<<  OK\x0D\x0A
<<  4:42:42:324\x0D\x0A
```

System Command Group

Command	Group	Item	Description
Do	System	Reboot	Reboots the device. Pre-empts other commands except Save.
Do	System	Save	Saves inspection and configuration parameters. Blocks until finished. Should be used sparingly.
Get	Ethernet	IPAddress	Get the current active IP address of the device as a string.
Get	Ethernet	SubnetMask	Get the current active subnet mask of the device as a string.
Get	Ethernet	Gateway	Get the current active Gateway address of the device as a string.
Set	Ethernet	IPAddress	Set the IP address of the device. A valid IP address must be supplied as a string (for example: 192.168.0.1). A Reboot command from the command channel must follow to make the new IP address effective. You may also set new Subnet Mask and Gateway address as required before a Reboot command is sent to the device.

Command	Group	Item	Description
Set	Ethernet	SubnetMask	Set a new subnet mask. A Reboot command is required to be sent from the command channel to make the new mask effective.
Set	Ethernet	Gateway	Set a new Gateway IP address. A Reboot command is required to be sent from the command channel to make the new address effective.

Examples

```
>>  Do System Reboot\x0D\x0A
<<  (No response received)
```

```
>>  Get Ethernet IP Address\x0D\x0A
<<  OK\x0D\x0A
<<  "192.168.0.115"\x0D\x0A
```

```
>>  Set Ethernet IPAddress 192.168.0.114\x0D\x0A
<<  OK\x0D\x0A
```

Status Command Group

Command	Group	Item	Description
Get	Status	Ready	Flag indicating whether the system is ready to trigger (true) or busy (false).
Get	Status	SystemError	Flag indicating whether a system error is active (true) or cleared (false).
Do	Status	ClearSystemError	Clears the system error LED and sets the internal flag to false.

Examples

```
>>  get status ready\x0D\x0A
<<  OK\x0D\x0A
<<  True\x0D\x0A
```

```
>>  get status systemerror\x0D\x0A
<<  OK\x0D\x0A
<<  False\x0D\x0A
```

```
>>  do status clearsystemerror\x0D\x0A
<<  OK\x0D\x0A
```

Trigger Command Group

Command	Group	Item	Description
Get	Trigger	Mode	Get the trigger mode.
Set	Trigger	Mode	Sets the trigger mode to one of the valid trigger modes for the device. This remotely modified value is not persisted to the device's permanent memory. The Save command is required to persist this value.
Do	Trigger	Immediate	Initiates a single trigger and inspection. The device does not transmit a response until the device has completed the action and returned to the READY state. This command requires the Command trigger mode. The device must be in the ready state to perform the desired operation.
Do	Trigger	Gated	Initiates the gated triggering mode. Images are repeatedly acquired until a valid object is detected or this mode is aborted. The device does not transmit a response until the device has completed the action and returned to the READY state. This command requires the Command trigger mode. The device must be in the ready state to perform the desired operation.

Command	Group	Item	Description
Do	Trigger	AbortGated	Aborts the gated triggering mode. The device does not transmit a response until the gated triggering option has been aborted and the device has returned to the READY state. This command requires the Command trigger mode.

Examples

```
>>  get trigger mode\x0D\x0A
<<  OK\x0D\x0A
<<  Command\x0D\x0A
```

```
>>  set trigger mode command\x0D\x0A
<<  OK\x0D\x0A
```

Imager Command Group

Command	Group	Item	Description
Get	Imager	Gain	Get the device's value used to electronically brighten all image pixels. This remotely modified value is not persisted to the device's permanent memory. The Save command is required to persist this value.
Set	Imager	Gain	The device's value used to electronically brighten all image pixels. This remotely modified value is not persisted to the device's permanent memory. The Save command is required to persist this value.
Get	Imager	Exposure	Get the device's value used to control the amount of time the imager gathers light for the image. This remotely modified value is not persisted to the device's permanent memory. The Save command is required to persist this value.
Set	Imager	Exposure	The device's value used to control the amount of time the imager gathers light for the image.This remotely modified value is not persisted to the device's permanent memory. The Save command is required to persist this value.

Examples

```
>>  get imager exposure\x0D\x0A
<<  OK\x0D\x0A
<<  Command\x0D\x0A
```

```
>>  set imager exposure"11900"\x0D\x0A
<<  OK\x0D\x0A
```

Teach Command Group

Command	Group	Item	Description
Do	Teach	NextTrigger	Forces the device to perform the Remote Teach operation on the next trigger. This command can be performed using the device's display.

Examples

```
>>  do teach\x0D\x0A
<<  OK\x0D\x0A
```

ProductChange Command Group

Command	Group	Item	Description
Do	ProductChange	[*Name*]	Forces the device to switch to the specified inspection. The device does not transmit a response until it has completed the action. Inspections results will be invalid until the next trigger.
Get	ProductChange	InspectionNames	List of all inspections stored in the device.

Examples

```
>>  get productchange inspectionnames\x0D\x0A
<<  OK\x0D\x0A
```

```
>>  do productchange "inspection2"\x0D\x0A
<<  OK\x0D\x0A
```

History Command Group

Command	Group	Item	Description
Get	History	Passed	Indicates the number of passed inspections for the active inspection. This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	Failed	Indicates the number of failed inspections for the active inspection. This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	MissedTriggers	Indicates the number of missed triggers for the active inspection. This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	StartFrameNumber	Indicates the starting frame number for the active inspection. This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	EndFrameNumber	Indicates the latest frame number for the active inspection. This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	TotalFrames	Indicates the total number inspections (frames) for the active inspection. This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	MinInspectionTime	Indicates the minimum (fastest) inspection time for the active inspection. This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	MaxInspectionTime	Indicates the maximum (slowest) inspection time for the active inspection. This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	MinBarcodeCount	Indicates the minimum number of barcodes read for the active inspection This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	History	MaxBarcodeCount	Indicates the maximum number of barcodes read for the active inspection This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Do	History	Clear	Clears all history fields for the active inspection. History values include pass count, fail count, execution times and sensor specific history values. This command can be performed using the sensor's touchscreen.

Examples

```
>>  get history passed\x0D\x0A
<<  OK\x0D\x0A
<<  13\x0D\x0A
```

```
>>  get history startframenumber\x0D\x0A
<<  OK\x0D\x0A
<<  3\x0D\x0A
```

```
>>  do history clear\x0D\x0A
<<  OK\x0D\x0A
```

Inspection Command Group

Command	Group	Item	Description
Get	Inspection	Status	The status of the most recent inspection either Pass, Fail, or Idle (no triggers).
Get	Inspection	Name	The name of the active inspection.
Get	Inspection	FrameNumber	The most recent inspection frame number.
Get	Inspection	ExecutionTime	The most recent inspection execution time in milliseconds.

Examples

```
>>  get inspection status\x0D\x0A
<<  OK\x0D\x0A
<<  Fail\x0D\x0A
```

```
>>  get inspection executiontime\x0D\x0A
<<  OK\x0D\x0A
<<  37.739\x0D\x0A
```

BCR_INPUT Command Group

Command	Group	Item	Description
Get	BCR_INPUT	CompareData	Get the Barcode inspection compare data string. This string must start and end with the double quote character.
Set	BCR_INPUT	CompareData	The Barcode inspection compare data string. This string must start and end with the double quote character. This value can be modified using the sensor's touchscreen. The Save command is required to persist this value.
Get	BCR_INPUT	CompareMask	Get the Barcode inspection compare string mask in binary format.
Set	BCR_INPUT	CompareMask	The Barcode inspection compare string mask in binary format; that is, masked characters are indicated by a "1" and unmasked characters are "0." Note that the mask character string must match the length of the compare string. This remotely modified value is not persisted to the sensors permanent memory. The Save command is required to persist this value.

Example

```
>> set BCR_Input CompareData "mydata"
<< OK\x0D\x0A
```

BCR_RESULT Command Group

Command	Group	Item	Description
Get	BCR_RESULT	Count	The total number of barcodes found. The most recent inspection value is used. Access to this value requires a valid trigger.
Get	BCR_RESULT	Data	The decoded barcode data strings. Each string starts and ends with the double quote character. Multiple values are separated by the field delimiter The most recent inspection value is used. Access to this value requires a valid trigger.
Get	BCR_RESULT	Type	The decoded barcode symbol type(s). Multiple values are separated by the field delimiter The most recent inspection value is used. Access to this value requires a valid trigger.

Example

```
>> Get BCR_Result Data
<<  OK\x0D\x0A
>> "mydata"\x0D\x0A
```

BCR_HISTORY Command Group

Command	Group	Item	Description
Get	BCR_HISTORY	MinCount	Indicates the minimum number of barcodes read for the active inspection This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.
Get	BCR_HISTORY	MaxCount	Indicates the maximum number of barcodes read for the active inspection This value is cleared (reset) whenever history is cleared. This value is cleared (reset) when the device starts up or is rebooted.

Example

```
>> Get BCR_History MinCount
<<  OK\x0D\x0A
>> 1\x0D\x0A
```

13.4.5 Command Channel Command Status Register

The command status register will confirm receipt of a command by reflecting the exact command ID received, regardless of whether the command was valid or not.

13.4.6 Command Channel Error Codes

Table 9: Plus BCR Command Channel Error Codes

Numeric ID	Text ID	Description
00000	SUCCESS	Command processed successfully
10000	EMPTY_FRAME_RECEIVED	Indicates that the request was empty. The command channel requires a command, any arguments, and an end-of-frame delimiter.
10001	COMMAND_NOT_RECOGNIZED	The command specified is not recognized
10100	GROUP_MISSING	A Group ID must be specified immediately after the command
10101	GROUP_NOT_FOUND	The specified Group ID is invalid / unknown
10102	GROUP_ITEM_MISSING	A Group Item ID must be specified immediately after the Group ID
10103	GROUP_ITEM_NOT_FOUND	The specified Group Item ID is invalid / unknown

Numeric ID	Text ID	Description
10152	NOT_READABLE	Attempt to get a value that is not readable
10153	NOT_WRITEABLE	Attempt to set a value that is not writeable
10250	NOT_A_METHOD	Method ID specified is not a method
10251	WRONG_ARGUMENT_COUNT	Total method arguments specified do not match method
10252	COMMAND_NOT_FINISHED	Attempt to issue command when a previous command has not finished
10300	SET_WITH_ARGUMENT_TYPE_INVALID	Item ID specified must be an item (not a group or method)
10301	DATA_VALUE_MISSING	Command missing item's data value
10340	MINIMUM_VALUE_EXCEEDED	New item value is below the minimum
10341	MAXIMUM_VALUE_EXCEEDED	New items value is above the maximum
10350	ARGUMENTS_DETECTED	Get command received with unneeded arguments
10351	GET_WITH_ARGUMENT_TYPE_INVALID	Item ID specified must be an item (not a group or method)
10500	DATA_SET_EMPTY	Data export operation returned no results
10900	SENSOR_NOT_READY	Command specified requires the iVu BCR to be in the READY state
10920	SENSOR_TYPE_NOT_ACTIVE	Command specified belongs to a different sensor type
15000	VALUE_INVALID	Text value is invalid / unknown
15050	VALUE_INVALID	Text value is invalid - expecting True or False
15100	STRING_TOO_LONG	String value specified exceeds maximum allowable length
20000	BARCODE_TIMEOUT	Attempt to obtain Barcode result data when decoder has timed out
20001	NO_BARCODES_FOUND	Attempt to obtain Barcode result data when no barcodes were found
20002	COMPARE_DATA_DISABLED	Operation requires Barcode compare to be enabled
20003	COMPARE_MASK_INVALID	Compare mask invalid. Expecting string of 1's and 0's with length equal to compare data string
20004	NUMBER_TO_FIND_NOT_ONE	Barcode number to find must be set to one for this operation
80000	REMOTE_DISPLAY_NOT_CONNECTED	Remote Display must be connected to obtain this value
80001	REMOTE_DISPLAY_NOT_SUPPORTED	This device does not have Remote Display capability
80100	COMMAND_MODE_EXPECTED	The Trigger Mode must be set to **Command** perform this operation
80101	COMMAND_TIMED_OUT	The command timed out before finishing
80102	TRIGGER_REQUIRED	Access to the specified data requires a triggered inspection
80103	TRIGGER_NOT_GATED	Command requires a active Gated Trigger
80150	COMMAND_TIMED_OUT	The command timed out before finishing
80200	SYSTEM_ERROR_NOT_ACTIVE	A System Error must be active to execute this command

13.5 iVu BCR Discovery Protocol

The iVu BCR Discovery Protocol is a method to dynamically discover Banner iVu BCR devices on an Ethernet network.

The goal is to both be able to find a device and, if necessary, change the IP address of that device so that it is on the same subnet as the controlling PC. This is done without requiring the PC to change its IP address or using anything more than an Ethernet cable connected to the device.

The iVu BCR Discovery Protocol is implemented using UDP broadcast packets that are mapped to Ethernet Broadcast packets by the TCP/IP stack. Broadcast packets are the only mechanism that ensures delivery of the data if the device and controlling PC are configured for different subnets and on the same bridged Ethernet network. The contents of the packets used for Banner's iVu BCR devices are proprietary.

The iVu BCR Discovery Protocol is supported by **iVu** devices from the 2012R1 or later releases.

13.5.1 UDP Usage

All packets are sent with the source and destination port number set to 19995.

The destination IP address is always set to a broadcast value of 255.255.255.255.

13.5.2 Packet Format

The packets used by the Discovery Protocol follow the same general format. The packets have a short header and a larger body area with ASCII text.

Header Format

The header of the packets is as follows:

Name	Offset	Length (bytes)	Description
Protocol ID	0	4	The number that identifies this as a Discovery Protocol Packet. Always set to 0x6956752b. This appears as “iVu+” when viewed with packet dump software.
Message Type	4	4	Identifies the type of message: DISCOVER = 0x44495343, ASCII translates as “DISC” DISCOVER_REPLY = 0x52504c59, ASCII translates as “RPLY” DISCOVER_SETIP = 0x53455449, ASCII translates as “SETI” See the following for a detailed description of each of these messages: • DISCOVER Message on p. 92 • DISCOVER_REPLY Message on p. 92 • DISCOVER_SETIP Message on p. 93
Correlation Tag	8	4	A number chosen by the sender of a DISCOVER packet. The value sent in a DISCOVER packet is returned in the DISCOVER_REPLY packet. This allows the sender to match its requests with responses it receives.

Body Format

The Body of the packet follows the header and consists of a long string of ASCII text. The ASCII text section contains some strings in the format of “<name>=<value>,” Those names and values are detailed in the following table. Note that the comma is required, and is used as a string separator.

Name	Values	Description
SerialNumber	String	Device serial number
Version	String	Firmware version string
Name	String	Name of the device as an ASCII string. This field is filled in only if the device is configured for English. For all other languages, this field is omitted.
MAC	xx:xx:xx:xx:xx:xx – Each 'x' is a hexadecimal character.	Ethernet MAC address of this device
IP	String in decimal dot notation	IP address of the device
NetMask	String in decimal dot notation	Network mask of the device
Gateway	String in decimal dot notation	IP address of the device's default gateway

DISCOVER Message

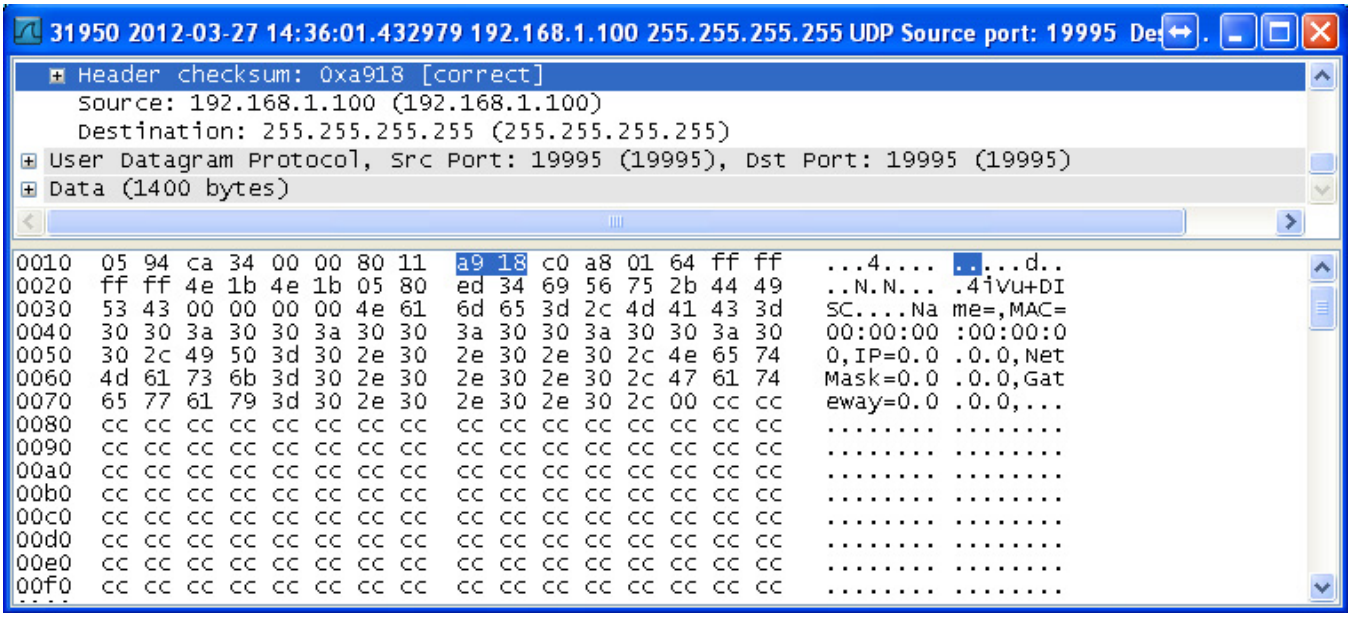
A controlling PC sends the packet with DISCOVER message to find which devices are present on its network. The DISCOVER message should broadcast on all Ethernet interfaces of the controlling PC. After sending the DISCOVER message packet, the PC should wait to receive DISCOVER_REPLY packets from the devices.

The controlling PC does not know how many devices are connected. Therefore, it should wait up to 5 seconds for any reply packets to allow for any variation in time needed for the devices to reply.

Sending more than one DISCOVER packet is recommended because a single UDP packet may be lost by network switches or the iVu BCR. The probability of multiple packets being lost is much smaller. Separate the packets in time by 100 milliseconds or more.

This and the following packet capture examples were created using a free network tracing and troubleshooting software called Wireshark. Banner Engineering Corporation does not provide support for this product nor endorses it.

Figure 86. Wireshark DISCOVER Packet



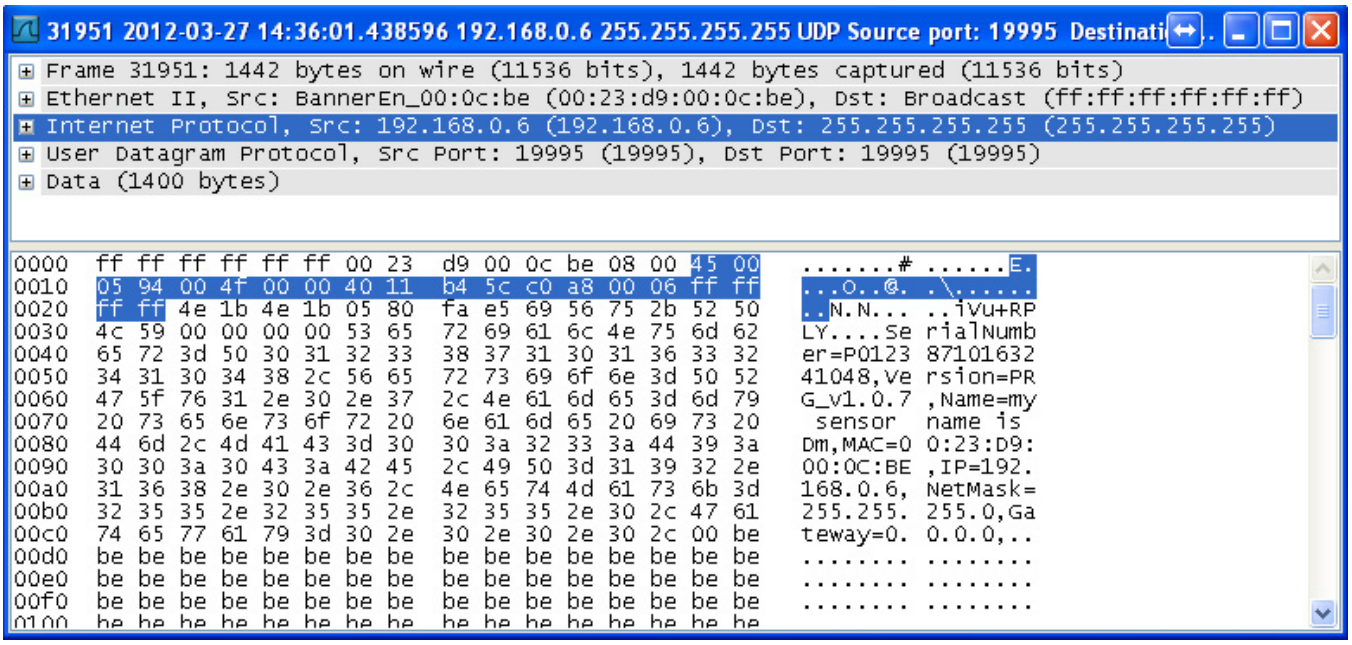
Note: In some situations, it is possible for a PC to receive a copy of the packet it sent. This condition is subject to the operating system and/or network configuration. If received, such a received packet should be detected (by checking the message type) and discarded.

In this example for the DISCOVER packets, empty sections for Name, MAC, IP, NetMask and Gateway are shown. These empty fields in the DISCOVER packet are not necessary and are an artifact of the application used to test the iVu BCR Discovery Protocol.

DISCOVER_REPLY Message

The device sends a DISCOVER_REPLY packet in reply to a DISCOVER message. The body portion of the message contains all of the parameters detailed in Body Format on p. 91.

Figure 87. Wireshark DISOVER_REPLY Packet



Note: In some situations, a network switch/router receives a broadcast packet and duplicates it. This results in the controlling PC receiving multiple responses that are completely identical. Discard multiple replies that have the same correlation tag.

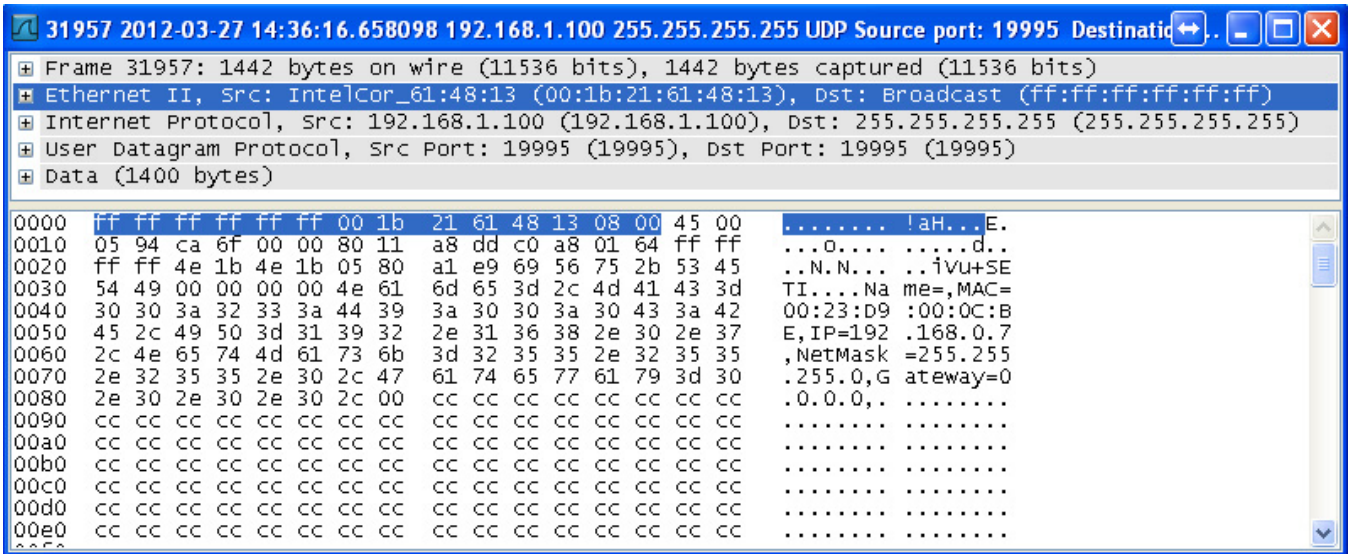
DISCOVER_SETIP Message

The controlling PC sends the DISCOVER_SETIP message to instruct a device to change its IP address, subnet mask, and default gateway. The message sent by the PC must always have the following parameters in the body portion:

- Either MAC or SerialNumber or both. If both are present, the match will be performed on both fields.
- IP
- NetMask
- Gateway

Any other parameters in the body are ignored by the device.

Figure 88. Wireshark DISCOVER_SETIP Packet

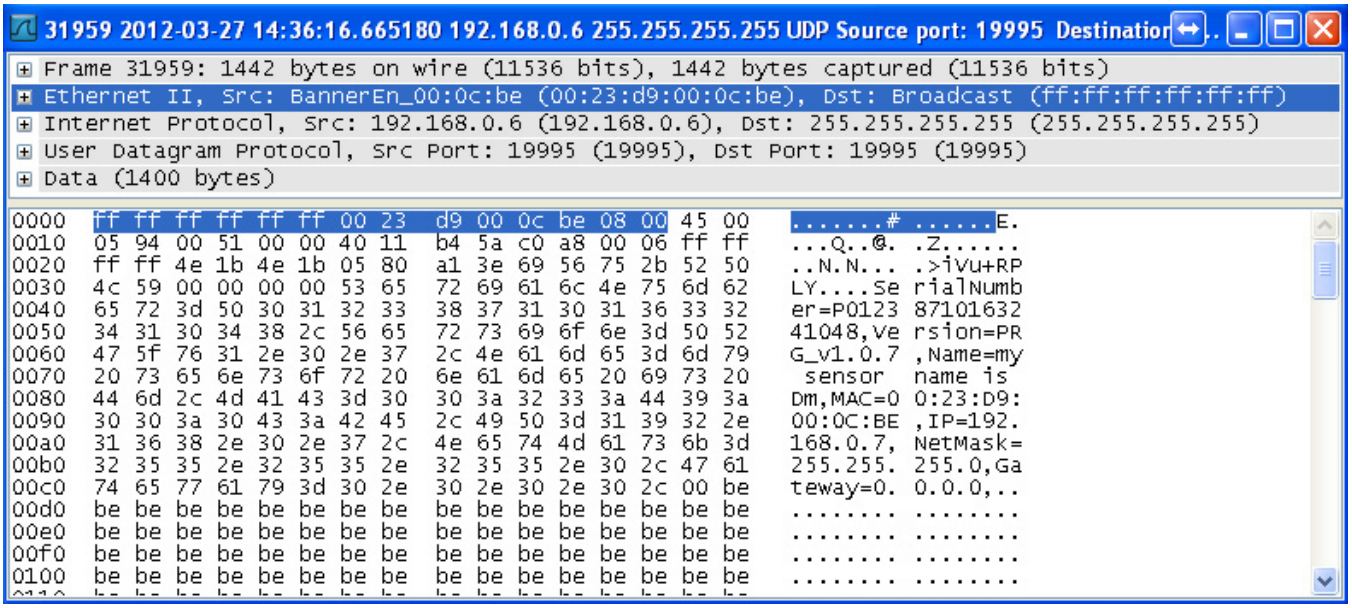


When the device receives a DISCOVER_SETIP message, the following actions are performed:

1. The device compares the specified MAC address, the SerialNumber, or both, if both are present, with its own.

2. If the above field(s) does not match the device's equivalent, the device discards the packet and no replay is generated.
3. If the above field(s) match the device's equivalent:
    a. The device compares the new values with the current values.
    b. If the new values are the same as the current values, the device discards the packet and no further reply is generated.
    c. If the new values are different from the current values, the device set its IP address, subnet mask, and default gateway to match what is in the packet.
        - The device performs only syntactic checks on the supplied data. It will not perform gateway presence or duplicate IP address checks.
        - The change is logged in iVu BCR system log as a success
        - A DISCOVER_REPLY packet is sent by the device back to the request originator
        - The device reboots after approximately 1 second

Figure 89. Wireshark DISOVER_REPLY with New IP Address



13.5.3 Message Flow

The following are examples of typical message flows for various interactions with the device.

Discovery of a Device

1. The PC broadcasts as DISCOVER message.

    Only the header values need to be filled:
    - The Protocol ID field should be set to 0x6956752b, “iVu+"
    - The Message Type field should be set to 0x44495343, “DISC”
    - The Correlation tag should be set by the sender to the non-zero value that will allow the sender to identify the response.

    The packet with the header values is sent using the broadcast address of 255.255.255.255.

    Note: Not all the switches are configured to pass broadcast packets by default. A switch configuration change may be necessary to enable the passing of broadcast packets.

2. Upon receipt of the broadcast message the device verifies that the message is addressed to it by comparing the Protocol ID field to value 0x6956752b.
    - If the value matches, the device examines the Message Type field.
    - If the value does not match any of the commands, the device discards the packet.
    - If the Message Type field matches 0x44495343, “DISC”, the device prepares the response in the form of DISCOVER_REPLY packet:
        - The Protocol ID field is set to 0x6956752b, “iVu+”
        - The Message Type field is set to 0x52504c59, “RPLY”
        - The Correlation Tag is copied from the received message

- The body of the message is populated with the following fields, separated by a comma:
  - SerialNumber (“SerialNumber=P01238710163241048”)
  - Version (“Version=TB_v1.1.4”)
  - Name (“Name=Sensor1”)
  - MAC (“MAC=00:11:22:33:44:55”)
  - IP (“IP=192.168.0.1”)
  - NetMask (“NetMask=255.255.255.0”)
  - Gateway (“Gateway=0.0.0.0”)

  The body of the message looks like the following:
  ```
  SerialNumber=P01238710163241048,Version=TB_v1.1.4,Name=Sensor1,MAC=00:11:22
  :33:44:55,IP=192.168.0.1,NetMask=255.255.255.0,Gateway=0.0.0.0
  ```
- The packet is broadcast on the network to port 19995. The device uses a pseudo-random back-off time to minimize collisions with other devices.

Change the IP Address of a Device Using the MAC

1. The PC broadcasts a DISCOVER_SETIP message.

   The header values are filled as follows:
   - Protocol ID field must be set to 0x6956752b, “iVu+”
   - Message Type field should be set to 0x53455449, “SETI”
   - Correlation tag must be set by the sender to a non-zero value that will allow the originator to identify the response

   The body of the message must be filled as follows:
   - MAC (“MAC=00:11:22:33:44:55”)
   - IP (“IP=192.168.0.1”)
   - NetMask (“NetMask=255.255.255.0”)
   - Gateway (“Gateway=0.0.0.0”)

   The body of the message looks like the following:
   ```
   MAC=00:11:22:33:44:55,IP=192.168.0.1,NetMask=255.255.255.0,Gateway=0.0.0.0
   ```
   The packet must be sent out using the broadcast address of 255.255.255.255

   Note: Not all the switches are configured to pass broadcast packets by default. A switch configuration change may be necessary to enable the passing of broadcast packets.
2. Upon receipt of the broadcast message, the device verifies that the message is addressed to it by comparing the Protocol ID field to value 0x6956752b, “iVu+”.
   - If the value matches, the device examines the Message Type field.
   - If the Message Type field matches 0x53455449, “SETI”, the received MAC address is compared with the MAC address of the device.
   - If the MAC address does not match, the packet is discarded and no further replies or logs are generated.
   - If the received MAC address matches that of the device, the device performs the following actions:
     - IP, NetMask, and Gateway addresses are extracted from the body of the message.
     - Values are verified to be syntactically correct.
       - For example, Gateway address of 255.255.255.255 is not allowed.
       - IP address of 0.0.0.0 or 255.255.255.255 is not allowed.
       - The check for duplicate IP address is not performed.
     - If the values do not pass the syntax check:
       - The packet is discarded.
       - The attempt is logged in the System Log.
       - A DISCOVER_REPLY (RPLY) reply with current values is generated and sent (see Discovery of a Device on p. 94 for details).
     - If the values pass the syntax check:
       - The new values are stored in the device.
       - The change is logged in the System Log.
       - A DISCOVER_REPLY (“RPLY) reply with new values is generated and sent (see Discovery of a Device on p. 94 for details).
       - The device restarts.

Change the IP Address of a Device Using the Serial Number

1. The PC broadcasts a DISCOVER_SETIP message.

   The header values are filled as follows:
   - Protocol ID field must be set to 0x6956752b, “iVu+”

- Message Type field should be set to 0x53455449, “SETI”
- Correlation tag must be set by the sender to a non-zero value that will allow the originator to identify the response

The body of the message must be filled as follows:

- SerialNumber (“SerialNumber=P0123871016324104 8”)
- IP (“IP=192.168.0.1”)
- NetMask (“NetMask=255.255.255.0”)
- Gateway (“Gateway=0.0.0.0”)

The body of the message looks like the following:

```
SerialNumber=P01238710163241048,IP=192.168.0.1,NetMask=255.255.255.0,Gateway=0.0.0.0
```

The packet must be sent using the broadcast address of 255.255.255.255.

Note: Not all the switches are configured to pass broadcast packets by default. A switch configuration change may be necessary to enable the passing of broadcast packets.

2. Upon receipt of the broadcast message the device verifies that the message is addressed to it by comparing Protocol ID field to value 0x6956752b, “iVu+”.
   - If the value matches, the device examines the Message Type field.
   - If the Message Type field matches 0x53455449, “SETI”, the received SerialNumber is compared with the SerialNumber of the device.
   - If the received serial number does not match, the packet is discarded and no further replies or logs are generated.
   - If the received serial number matches that of the device, the device performs the following actions:
     - IP, NetMask, and Gateway addresses are extracted from the body of the message.
     - Values are verified to be syntactically correct.
       - For example, Gateway address of 255.255.255.255 is not allowed
       - IP address of 0.0.0.0 or 255.255.255.255 is not allowed
       - The check for duplicate IP address will not be performed
     - If the values do not pass the syntax check:
       - The packet is discarded.
       - The failed attempt is logged in the System Log.
       - A DISCOVER_REPLY (RPLY) reply with current values is generated and sent (see Discovery of a Device on p. 94 for details).
     - If the values pass the syntax check:
       - The new values are stored in the device.
       - The change is logged in the System Log.
       - A DISCOVER_REPLY (“RPLY) reply with new values is generated and sent (see Discovery of a Device on p. 94 for details).
       - The device restarts.

14 Industrial Ethernet Overview

14.1 Device Setup

14.1.1 Set IP Address

When shipped, the device is assigned a default IP address of 192.168.0.1, a default Subnet Mask of 255.255.255.0, and a default Gateway of 0.0.0.0. To change these defaults, go to **Main Menu** > **System** > **Communications** > **Ethernet I/O**.

14.1.2 Set the Industrial Ethernet Protocol (Ethernet/IP™/Modbus/PCCC/PROFINET®)

The Industrial Ethernet communication channel is disabled by default. To enable this channel, go to **Main Menu** > **System** > **Communications** > **Industrial Ethernet** > **Connection**. Select the desired channel: Ethernet/IP, MODBUS, PCCC, or PROFINET. Only one type of connection can be established at a time.

View information about an established connection from **Main Menu** > **System** > **Communications** > **Industrial Ethernet** > **Status**. Click the desired connection to view details.

This device provides extensive logging for the communication that occurs over the Industrial Ethernet connection. View logs from either **Main Menu** > **System** > **Communications** > **Industrial Ethernet** > **View Logs** or **Main Menu** > **Logs** > **Communication Logs** > **Industrial Ethernet**.

14.1.3 Set Trigger Mode

Trigger the iVu BCR using the hardware trigger input line or an internally supplied software trigger, or by toggling a bit over Industrial Ethernet. To only accept triggers generated through the Industrial Ethernet communication channel, go to **Main Menu** > **Imager** > **Trigger**, and select **Industrial Ethernet Only** from the drop-down list.

14.2 Supported Functions

Control the iVu BCR over EtherNet/IP, PCCC, Modbus/TCP, or PROFINET using the input and output data the iVu BCR makes available as a slave device for those protocols.

The following are some of the device operations that can be performed using input and output values:

- Product Change
- Teach Enable
- Trigger the iVu BCR
- Read output indicators (pass, fail, ready, error)
- Read counters (pass, fail, system error, missed trigger, frame count, iteration count)
- Read sensor results

14.2.1 iVu BCR Input Values

The operation of the iVu BCR can be controlled through input bits and commands.

Register/Input Coil Bits

The following commands can only be executed using bits:

Input Coil Bit	Command	Description
0	Product Change	Execute a product change (inspection number specified in the "Product Change Number" 32-bit integer register)
1	Teach Latch	Latch a teach flag. The Teach is executed on the next trigger
2	Trigger	Causes the iVu BCR to run the current inspection
3	Gated Trigger	Causes the iVu BCR to start looking for requested barcodes
5	Set BCR String	Sets the barcode compare string
6	Set BCR Mask	Sets masks for the barcode compare string
15	Command	Set this bit to 1 to execute the command entered in the Command ID Register

14.2.2 iVu BCR Output Values

Using output values, the following information can be obtained:

- ACK bits (acknowledgement bits) for input commands, including error codes
- System indicators (Ready, Pass/Fail, Read/No Read, Output signals, Command Error, etc.)
- Inspection History (Iteration Count, Pass Count, Fail Count, etc.)
- Current Inspection Results (data of the sensor type contained in the inspection)
- Command Responses

Refer to the sections on protocols for more information.

ACK Bits

For each of the Command bits there is a corresponding ACK bit. The iVu BCR sets the ACK bit when the corresponding action is complete. Command bits cause actions to occur on the low-to-high transition of that bit. **You must clear the command bit after the corresponding ACK bit has been observed to be high**.

As an example, to use the Trigger ACK bit, the programming steps for triggering an inspection are:

1. Wait for ready.
2. Set Trigger command bit to 1.
3. Wait for Trigger ACK to go to 1.
4. Set Trigger command bit to 0.

Command Responses

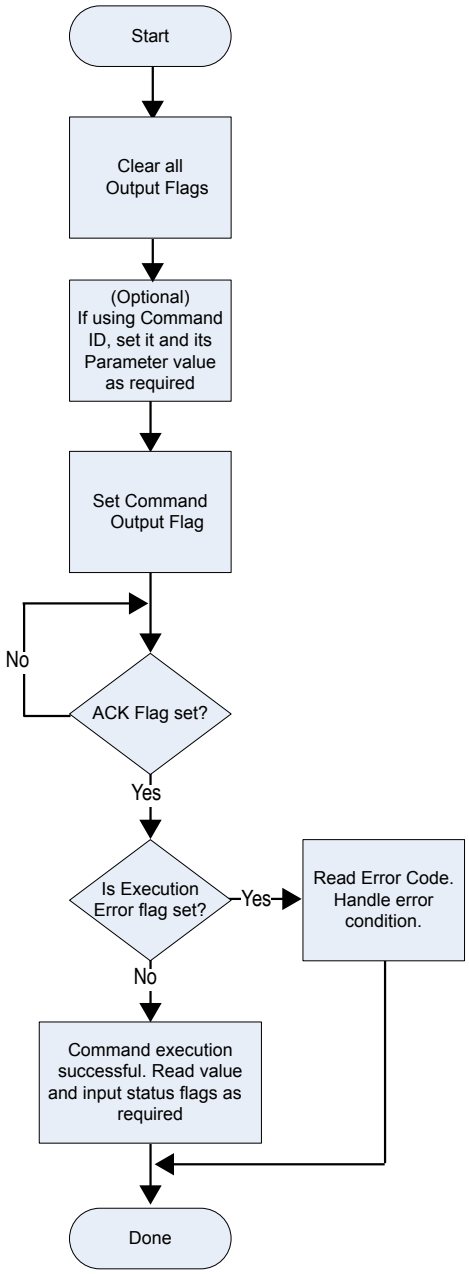
iVu BCR Command Channel commands executed using command IDs may have a response value. Depending on the Data Type, the response value is contained in one or multiple registers. Refer to iVu BCR Command Channel Commands (iVu BCR Command Channel over Industrial Ethernet) on p. 173 and Communications Guide on p. 68for more information about the iVu BCR Command Channel.

14.3 iVu BCR Operation

Any Industrial Ethernet protocol can be used to trigger inspections, remote teach, and perform command functions. On iVuPlus BCR models, compare strings can also be set.

14.3.1 General Command Execution

Point of View of the PLC



The following rules apply for the use of input bit commands:

- Only one iVu BCR input bit can be set at a time
- Corresponding ACK bits are set high only on completion of the command (if the iVu BCR input bit is still high)
- Corresponding ACK bits are cleared when the iVu BCR input bit is cleared
- When multiple iVu BCR input bits are set simultaneously, the Execution Error input bit is set and an Error Code value is reported in the Error Code register
- The Execution Error iVu BCR output bit is cleared when all ACK bits are cleared, or a new valid command is received

14.4 EtherNet/IP™

In this context, references to EtherNet/IP™ [12] refer specifically to EtherNet/IP transport class 1. Sometimes referred to as cyclic EtherNet/IP IO data transfer or implicit messaging, this connection is meant to approximate a real-time data transfer to and from the PLC and the target device.

Allen-Bradley's CompactLogix and ControlLogix family of PLCs uses this communication protocol. The programming software used by these PLCs is RSLogix5000 or Studio 5000 Logix Designer.

[12] EtherNet/IP™ is a trademark of ODVA, Inc.

The iVu BCR can be controlled via EtherNet/IP using assembly objects. From the point of view of a PLC, there are three input assemblies and two output assemblies.

The Originator of the EtherNet/IP connection is the PLC. The Target of the EtherNet/IP connection is the iVu BCR. The direction of communication can be described as T > O or O > T (sometimes also shown as T2O or O2T).

14.4.1 Inputs to the iVu BCR (Outputs from the PLC)

PLC Assembly Instance 112 (0×70) - 6 Registers (iVu BCR Inputs/PLC Outputs)

Data transfer direction: Originator (PLC) to Target (iVu BCR). Assembly Instance 112 (0×70) is a small group of registers used for basic control of the iVu BCR.

WORD #	WORD NAME	DATA TYPE
0	Input Bits Register (see Input and Output Flags Bits on p. 104)	16-bit integer
1-2	Product Change Number	32-bit integer
3-5	*reserved*	16-bit integer

PLC Assembly Instance 113 (0×71) - 240 Registers (iVu BCR Inputs/PLC Outputs)

Data transfer direction: Originator (PLC) to Target (iVu BCR). Assembly Instance 113 (0×71) has more registers than Assembly Instance 112. This allows for more comprehensive control of the iVu BCR, including Command Channel functionality.

WORD #	WORD NAME	DATA TYPE
0	Inputs Bit Register (see Input and Output Flags Bits on p. 104	16-bit integer
1-2	Product Change Number	32-bit integer
3-49	*reserved*	32-bit integer
50	Command ID	16-bit integer
51	Command Parameter Int16	16-bit integer
52-53	Command Parameter Int32	32-bit integer
54-55	Command Parameter Float	Float
56-57	String Length	32-bit integer
58-107	String Parameter	100-Byte Array
108	*reserved*	16-bit integer
109-110	Barcode String/Mask Length	32-bit integer
111-210	Barcode String/Mask	200-Byte Array
211-239	*reserved*	16-bit integer

14.4.2 Outputs from the iVu BCR (Inputs to the PLC)

PLC Assembly Instance 100 (0×64) - 30 Registers (iVu BCR Outputs/PLC Inputs)

Data transfer direction: Target (iVu BCR) to Originator (PLC). Assembly Instance 100 is a small block of registers providing basic inspection results from the iVu BCR.

Note: Assembly Instance 100 does not provide barcode data.

WORD #	WORD NAME	DATA TYPE
0	Input Bits ACK Register (see Input and Output Flags Bits on p. 104)	16-bit integer
1	Output Bits Register (see Input and Output Flags Bits on p. 104)	16-bit integer
2-3	Error Code	32-bit integer
4-5	Inspection Number	32-bit integer
6-7	Iteration Count	32-bit integer
8-9	Pass Count	32-bit integer
10-11	Fail Count	32-bit integer
12-13	Missed Triggers	32-bit integer
14-15	Current Inspection Time	Float
16	Sensor P/F Coil	16-bit integer
17-29	*reserved*	16-bit integer

PLC Assembly Instance 101 (0×65) - 240 Registers (iVu BCR Outputs/PLC Inputs)

Assembly Instance 101 provides space for a single block of barcode data (up to ASCII characters in length) as well as space for Command Channel replies.

WORD #	WORD NAME	DATA TYPE
0	Input Bits ACK Register (see Input and Output Flags Bits on p. 104)	16-bit integer
1	Output Bits Register (see Input and Output Flags Bits on p. 104)	16-bit integer
2-3	Error Code	32-bit integer
4-5	Inspection Number	32-bit integer
6-7	Iteration Count	32-bit integer
8-9	Pass Count	32-bit integer
10-11	Fail Count	32-bit integer
12-13	Missed Triggers	32-bit integer
14-15	Current Inspection Time	Float
16	Sensor Pass/Fail Coil	16-bit integer
17-29	*reserved*	16-bit integer
30-52	Inspection Name	2-Word Length + 20-unicode characters
53-54	Frame Number	32-bit integer
55	Sensor Type ID	16-bit integer
56	Barcode Count	16-bit integer
57	Barcode-1 Type	16-bit integer
58	Barcode-1 Actual Decoded Data Length	16-bit integer
59-60	Barcode-1 Data Array Length	32-bit integer
61-162	Barcode-1 Data Array	100 Byte Array
163-170	*reserved*	16-bit integer
171	Command Status	16-bit integer
172	Command Response Int16	16-bit integer
173-174	Command Response Int32	32-bit integer

WORD #	WORD NAME	DATA TYPE
175-176	Command Response Float	Float
177-178	Command Response Length	32-bit integer
179-228	Command Response Data	100 Byte Array
229-239	*reserved*	16-bit integer

PLC Assembly Instance 102 (0×66) - 240 Registers (iVu BCR Outputs/PLC Inputs)

Data transfer direction: Target (iVu BCR) to Originator (PLC). Assembly Instance 102 provides space for data from up to ten different barcodes read in the same inspection.

WORD #	WORD NAME	DATA TYPE
0	Input Bits ACK Register (see Input and Output Flags Bits on p. 104)	16-bit integer
1	Output Bits Register (see Input and Output Flags Bits on p. 104)	16-bit integer
2-3	Error Code	32-bit integer
4-5	Inspection Number	32-bit integer
6-7	Iteration Count	32-bit integer
8-9	Pass Count	32-bit integer
10-11	Fail Count	32-bit integer
12-13	Missed Triggers	32-bit integer
14-15	Current Inspection Time	Float
16	Sensor Pass/Fail Coil	16-bit integer
17-29	*reserved*	16-bit integer
30	Barcode Count	16-bit integer
31	Barcode-1 Type	16-bit integer
32	Barcode-1 Length	16-bit integer
33-50	Barcode-1 Data	32-bit length + 32-byte array
51	Barcode-2 Type	16-bit integer
52	Barcode-2 Length	16-bit integer
53-70	Barcode-2 Data	32-bit length + 32-byte array
71	Barcode-3 Type	16-bit integer
72	Barcode-3 Length	16-bit integer
73-90	Barcode-3 Data	32-bit length + 32-byte array
91	Barcode-4 Type	16-bit integer
92	Barcode-4 Length	16-bit integer
93-110	Barcode-4 Data	32-bit length + 32-byte array
111	Barcode-5 Type	16-bit integer
112	Barcode-5 Length	16-bit integer
113-130	Barcode-5 Data	32-bit length + 32-byte array
131	Barcode-6 Type	16-bit integer
132	Barcode-6 Length	16-bit integer
133-150	Barcode-6 Data	32-bit length + 32-byte array

WORD #	WORD NAME	DATA TYPE
151	Barcode-7 Type	16-bit integer
152	Barcode-7 Length	16-bit integer
153-170	Barcode-7 Data	32-bit length + 32-byte array
171	Barcode-8 Type	16-bit integer
172	Barcode-8 Length	16-bit integer
173-190	Barcode-8 Data	32-bit length + 32-byte array
191	Barcode-9 Type	16-bit integer
192	Barcode-9 Length	16-bit integer
193-210	Barcode-9 Data	32-bit length + 32-byte array
211	Barcode-10 Type	16-bit integer
212	Barcode-10 Length	16-bit integer
213-230	Barcode-10 Data	32-bit length + 32-byte array
231-239	*reserved*	16-bit integer

Barcode Type Numeric Codes

Symbol	Type ID
No Symbol	0
DataMatrix	1
Code 39	10
Code 128	11
CODABAR	20
EAN8	30
EAN13	31
EAN13-Addon	32
Interleaved 2 of 5	40
UPCE	50
UPCE-Addon	51
Postnet	60
IMB	70
Pharmacode	80
QR Code	90
Code 93	91
DataBar	92
DataBar Limited	93
DataBar Expanded	94
PDF417	95

14.4.3 Input and Output Flags Bits

The Input Bits are used to command execution of basic functions. The Output Bits are used to push single bit outputs from the iVu BCR device to the PLC. The 32 bits of iVu BCR output can also be accessed using the bits of the first two Output Registers (Input Bits ACK Register(word 0) and Output Bits Register (word1)).

Table 10: Inputs Bits Register (Command Flag Bits)

Bit Position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Command									Set BCR Mask	Set BCR String		Gated Trigger	Trigger	Teach Latch	Product Change

Table 11: Input Bits ACK Register (ACK Flag Bits)

Bit Position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Command ACK									Set BCR Mask ACK	Set BCR String ACK		Gated Trigger ACK	Trigger ACK	Teach Latch ACK	Product Change ACK

Table 12: Output Bits Register (iVu BCR Status Flag Bits)

Bit Position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Execution Error	System Error	Teach Error	Missed Trigger					Output 3	Output 2	Output 1		Ready to Latch	Read/No Read	Pass/Fail	Ready

14.4.4 Configuration Assembly Object

The iVu BCR EtherNet/IP implementation does not support an assembly object Configuration instance. However, one is required for the creation of implicit Class 1 connections on a ControlLogix® [16] family PLC. Therefore, a configuration instance is defined as instance number 128 (0×80). Its size is zero.

14.4.5 Data Formats

The iVu BCR EtherNet/IP implementation supports 32-bit Integers in LSW_MSW data format. The LSW_MSW data format is such that the least significant word is stored first, then the most significant word. This format is used for Allen-Bradley ControlLogix PLCs.

The string format is compatible with the Allen-Bradley ControlLogix built-in string data type. This format is a 32-bit (DINT) length followed by character bytes (SINT). This results in the following string format as viewed from the iVu BCR:

Word	0	1	2		3		4			
	Length LSW	Length MSW	byte 1	byte 0	byte 3	byte 2	byte 5	byte 4	...	...

14.4.6 Minimum Requested Packet Interval (RPI) Value

The iVu BCR can operate with input and output Requested Packet Intervals (RPIs) as low as 50 milliseconds. **The device may not operate reliably if a lower RPI value is selected.**

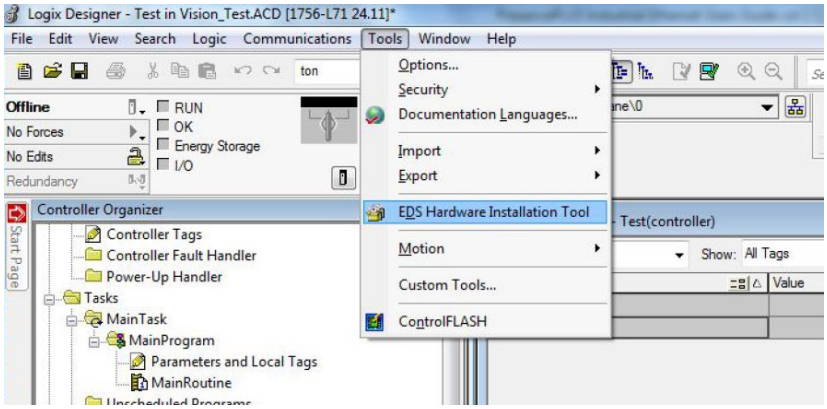
14.4.7 iVu Plus Barcode Reader (BCR) Gen2 Series Sensor EDS File Installation in ControlLogix Software

Use the **EDS Hardware Installation Tool** to register the Electronic Data Sheet (EDS) file.

1. On the **Tools** menu, click **EDS Hardware Installation Tool**.
   The **Rockwell Automation's EDS Wizard** dialog displays.

[16] ControlLogix® is a trademark of Rockwell Automation, Inc.

Figure 90. Tools—EDS Hardware Installation Tool



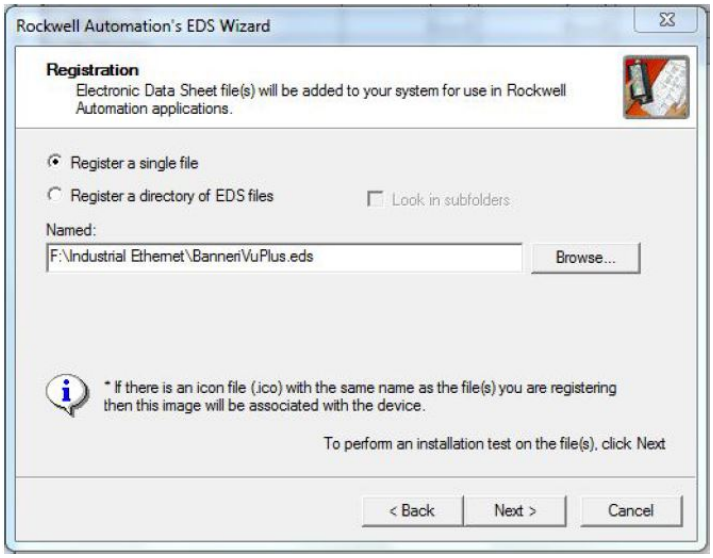
2. Click **Next**.
3. Select the **Register an EDS file(s)** option.

Figure 91. Rockwell Automation's EDS Wizard—Options



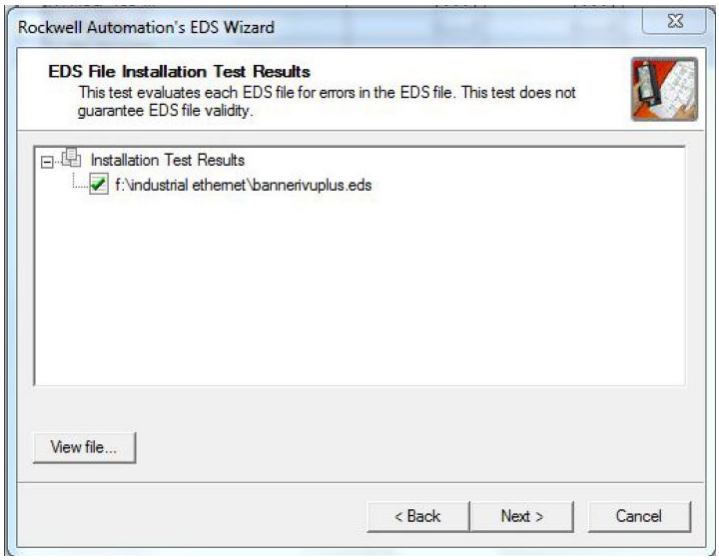
4. Browse to locate the EDS file and click **Next**.

Figure 92. Select File to Register



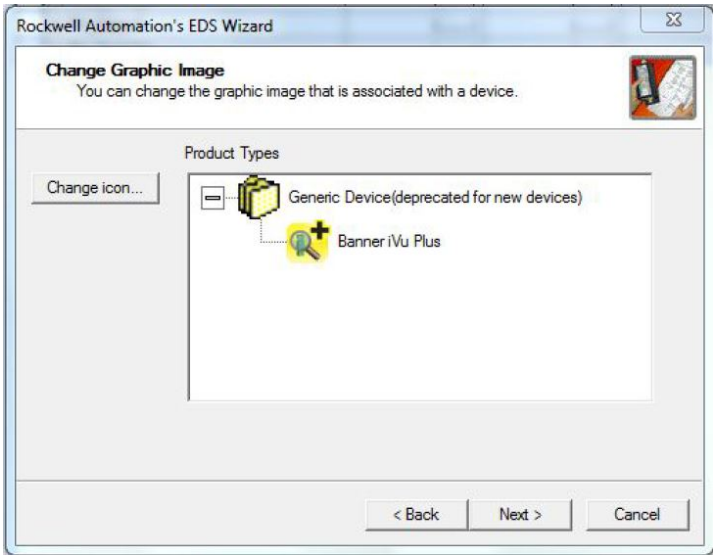
5. Click **Next** to register the tested file.

Figure 93. Register the Tested File



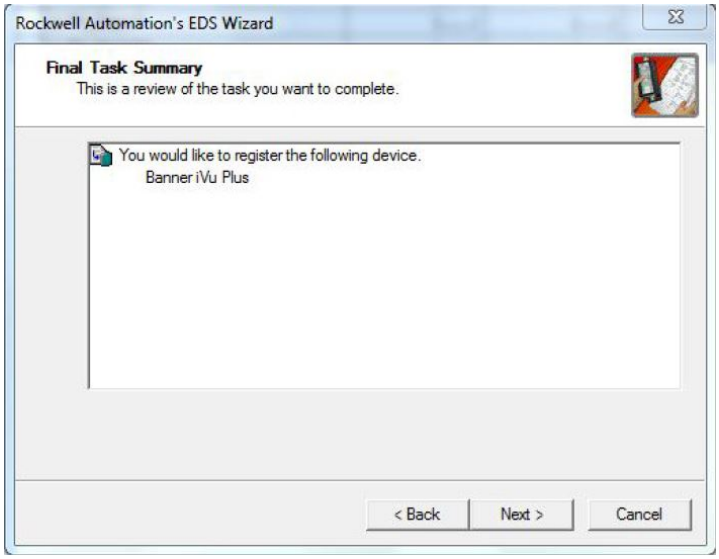
6. Click **Next** when you see the icon associated with the EDS file.

Figure 94. Rockwell Automation's EDS Wizard



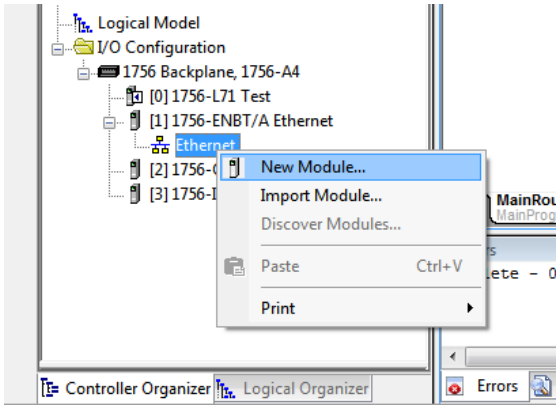
7. Click **Next** to register the EDS file.

Figure 95. Register the EDS File



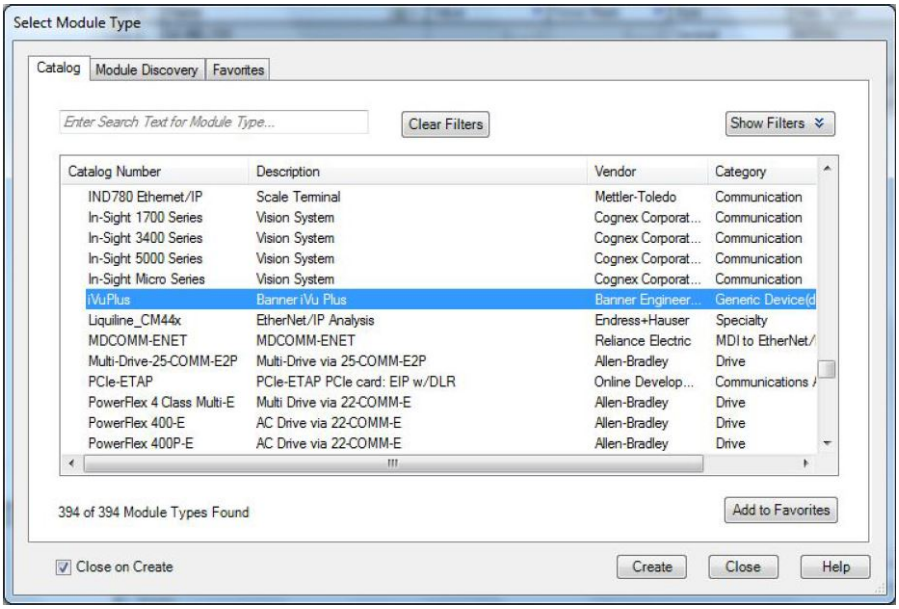
8. Click **Finish** to close the **EDS Wizard** .
9. Right-click on the PLC's Ethernet adapter and select **New Module...**

Figure 96. New Module



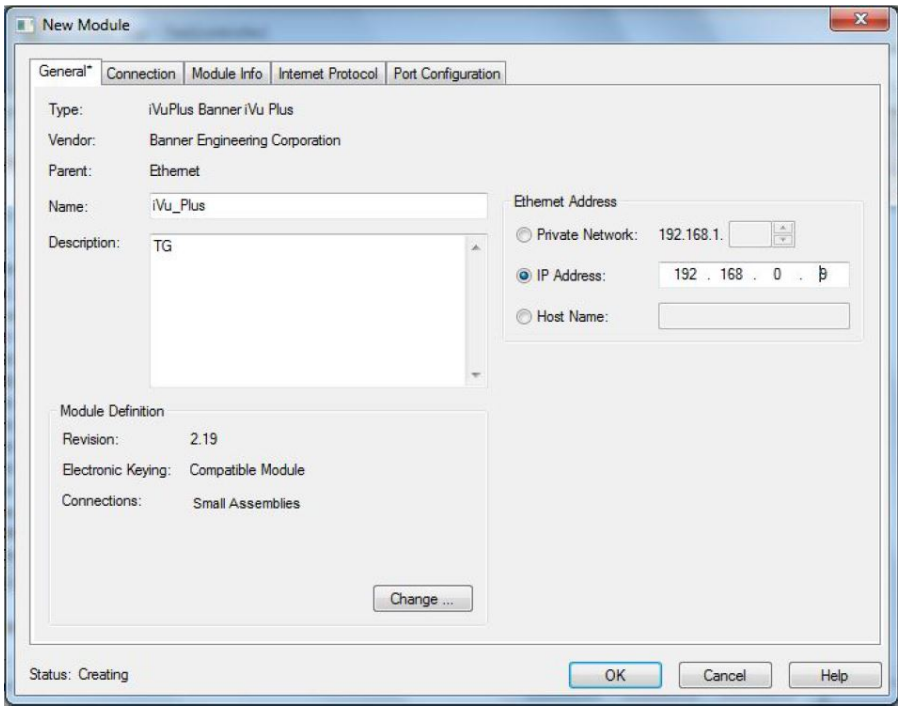
10. Locate the device in the catalog and click **Create**.

Figure 97. Select Module Type



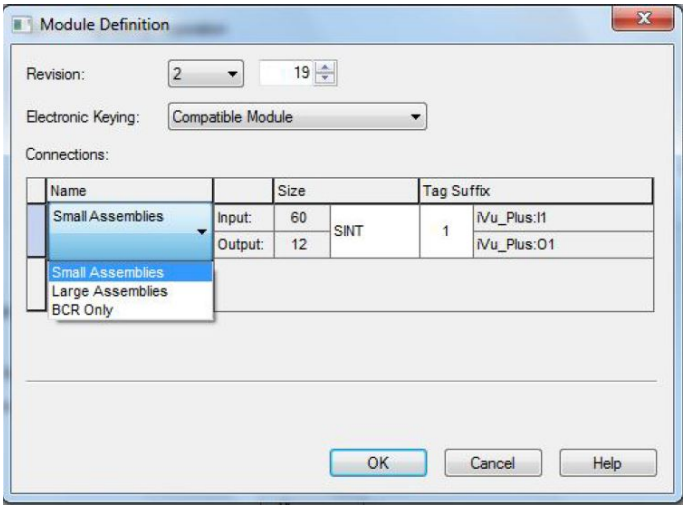
11. Enter a name, description (optional), and IP address for the device.

Figure 98. New Module



12. Click **Change** in the **Module Definition** field.

Figure 99. Module Definition

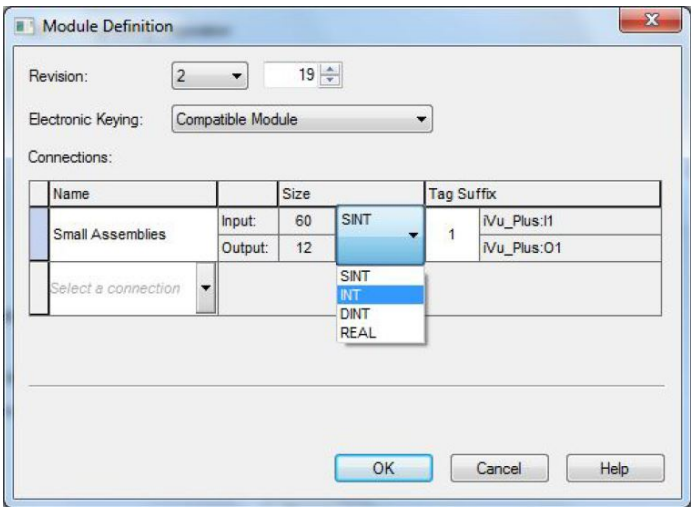


13. Select the desired connection in the **Module Definition** window. Each of the items in the **Name** list represents a fixed grouping of input and output assembly instances:

Small Assemblies	• O>T PLC/iVu Plus Assembly 112 (0x70) • T>O PLC/iVu Plus Assembly 100 (0x64)
Large Assemblies	• O>T PLC/iVu Plus Assembly 113 (0x71) • T>O PLC/iVu Plus Assembly 101 (0x65)
BCR Only	• O>T PLC/iVu Plus Assembly 113 (0x71) • T>O PLC/iVu Plus Assembly 102 (0x66)

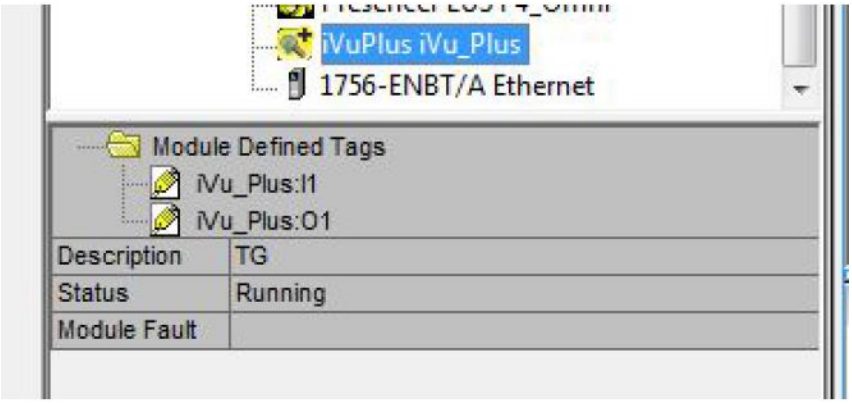
14. Select **INT** as the data type.

Figure 100. Module Definition—Data Type



15. Click **OK** twice and download the program to the PLC.

Figure 101. Download to the PLC



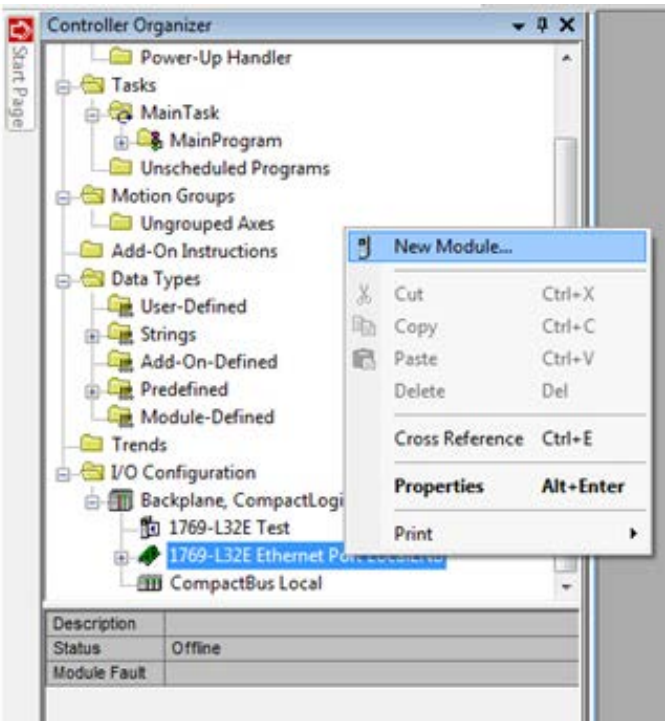
The connection looks like the one in Figure 101 on p. 109.

14.4.8 RSLogix5000 Configuration

To create an implicit Class 1 configuration to the iVu BCR using EtherNet/IP when using a ControlLogix family PLC, configure the iVu BCR as a “Generic Ethernet Module” under the ENET_MODULE. The following is a sample setup of a Banner device:

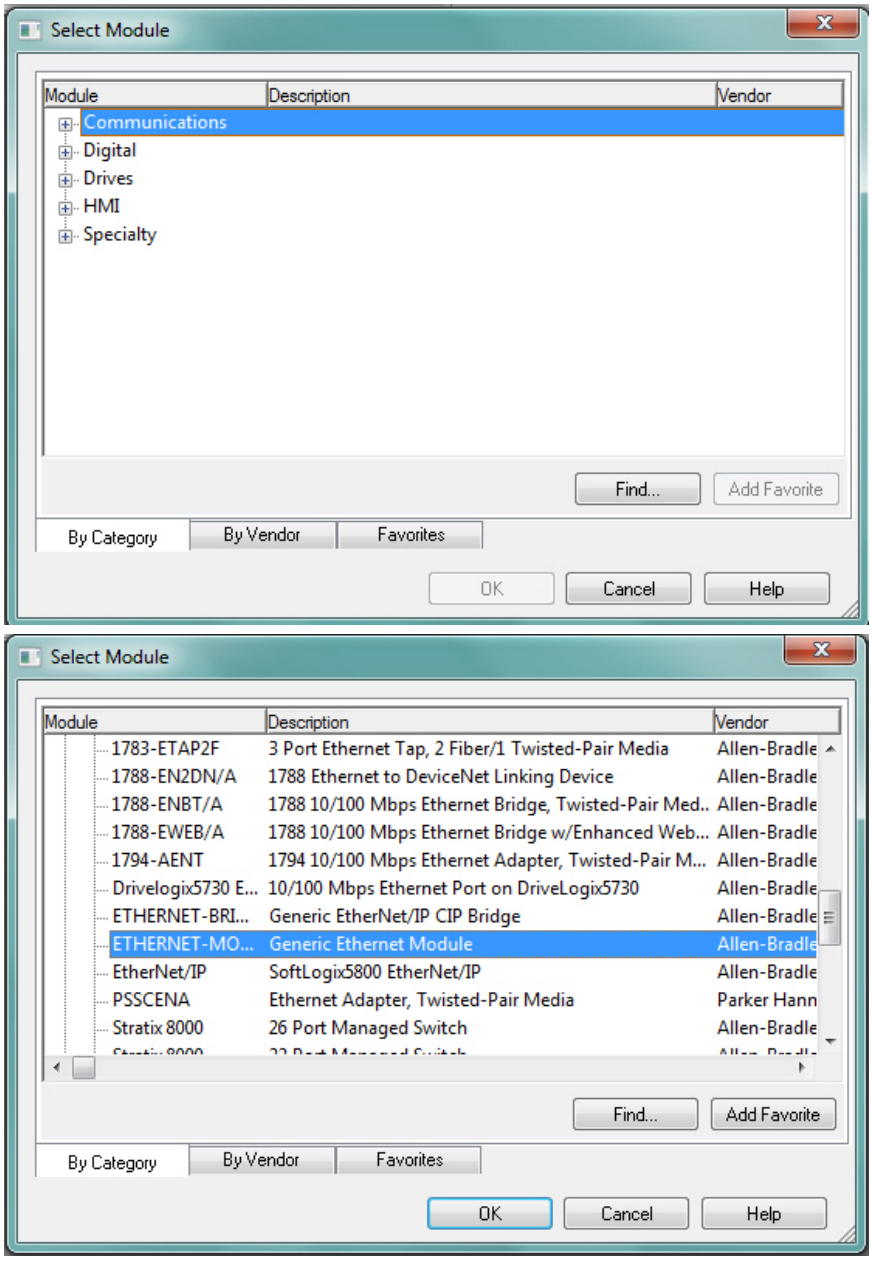
1. Add a generic Ethernet module to the PLC's Ethernet card.
    a. Click **New Module**.

Figure 102. Add Ethernet Module



b. Click **Communications**, then **Generic Ethernet Module**.

Figure 103. Select Module



2. Configure the Module Properties.

Note: The data type in the Comm Format must be changed to an INT.

See Inputs to the iVu BCR (Outputs from the PLC) on p. 100 and Outputs from the iVu BCR (Inputs to the PLC) on p. 100 for more information on each specific assembly instance.

Figure 104. Example: PLC Input Assembly Instance 0×64 (100), PLC Output Assembly Instance 0×70 (112)

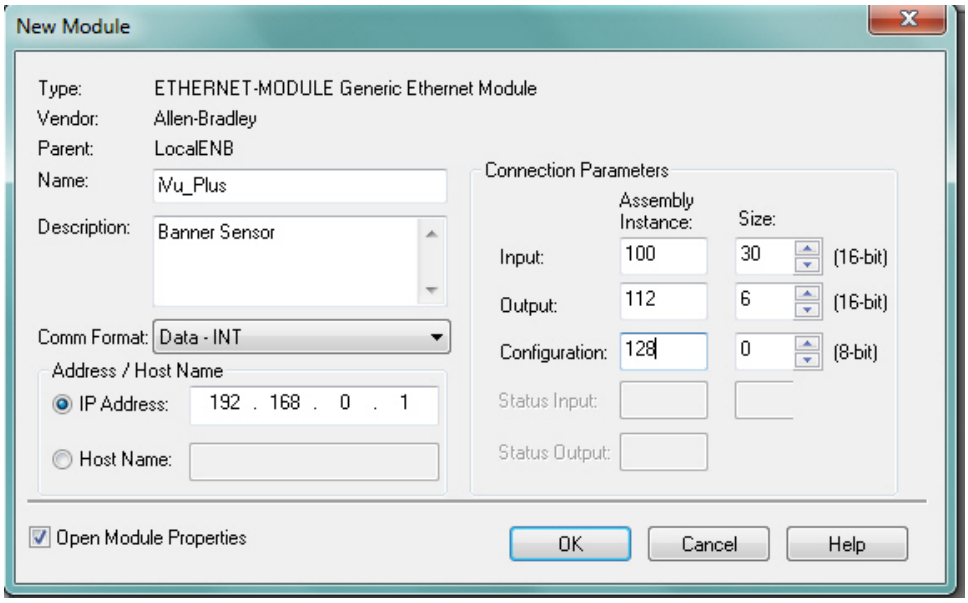


Figure 105. Example: PLC Input Assembly Instance 0×65 (101), PLC Output Assembly Instance 0×71 (113)

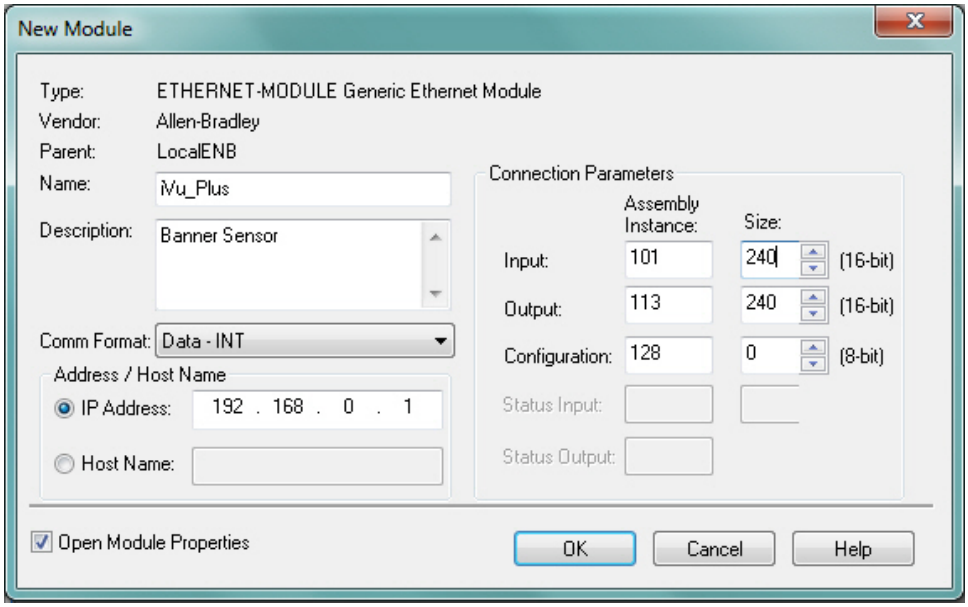


Figure 106. iVu Plus BCR—PLC Input Assembly (102), PLC Output Assembly (113)

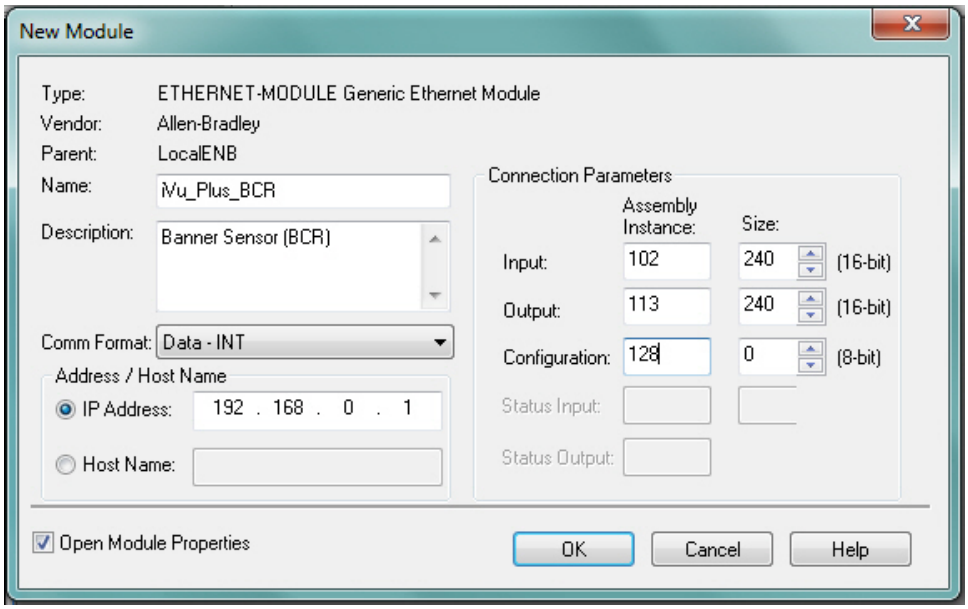
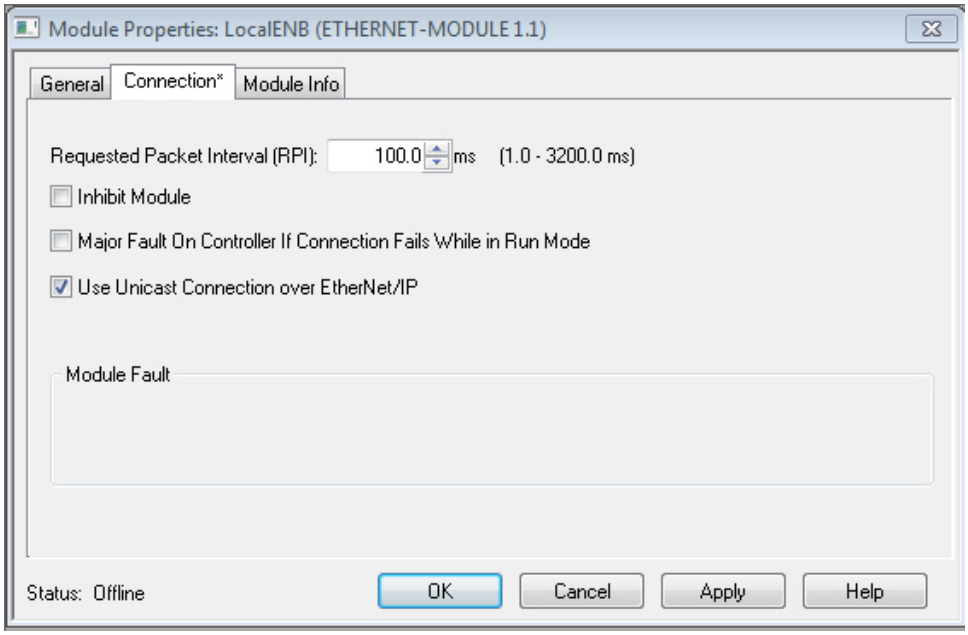


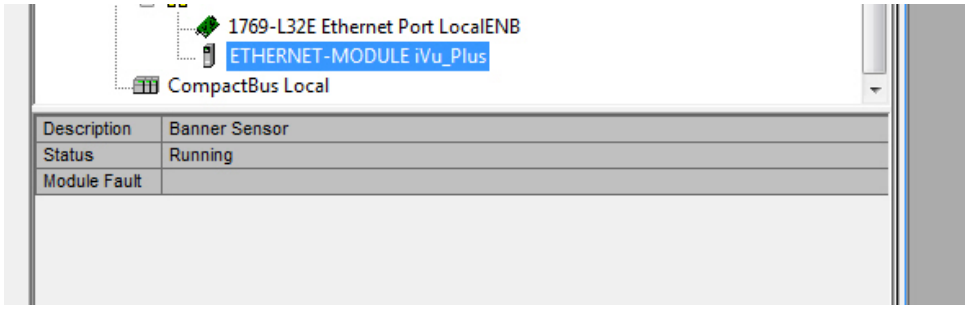
Figure 107. Select or clear the Unicast Connection checkbox as desired



Note: The minimum allowed RPI is 50 ms.

3. If the module configuration was successful, the following information displays:

Figure 108. Successful Configuration



If the module configuration was not successful, the RSLogix 5000 software will indicate errors similar to the following figures:

Figure 109. ERROR: Assembly Instance Number and/or Size Incorrect

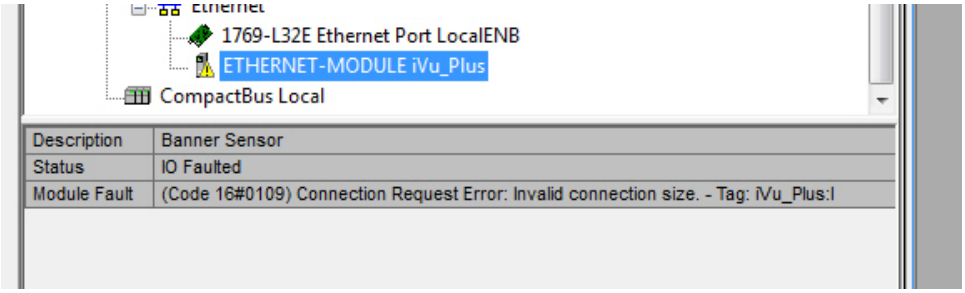
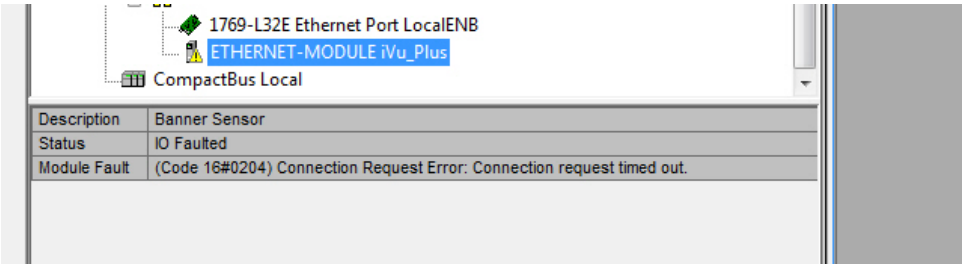
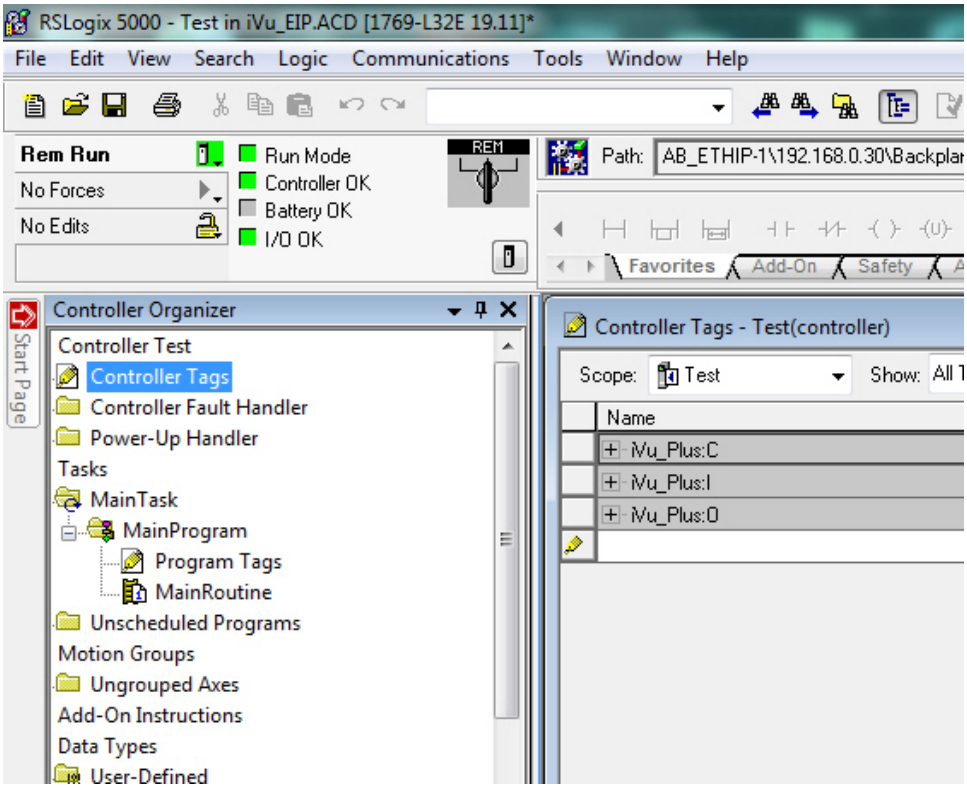


Figure 110. ERROR: iVu BCR Not Powered Up or Ethernet Cable Not Attached



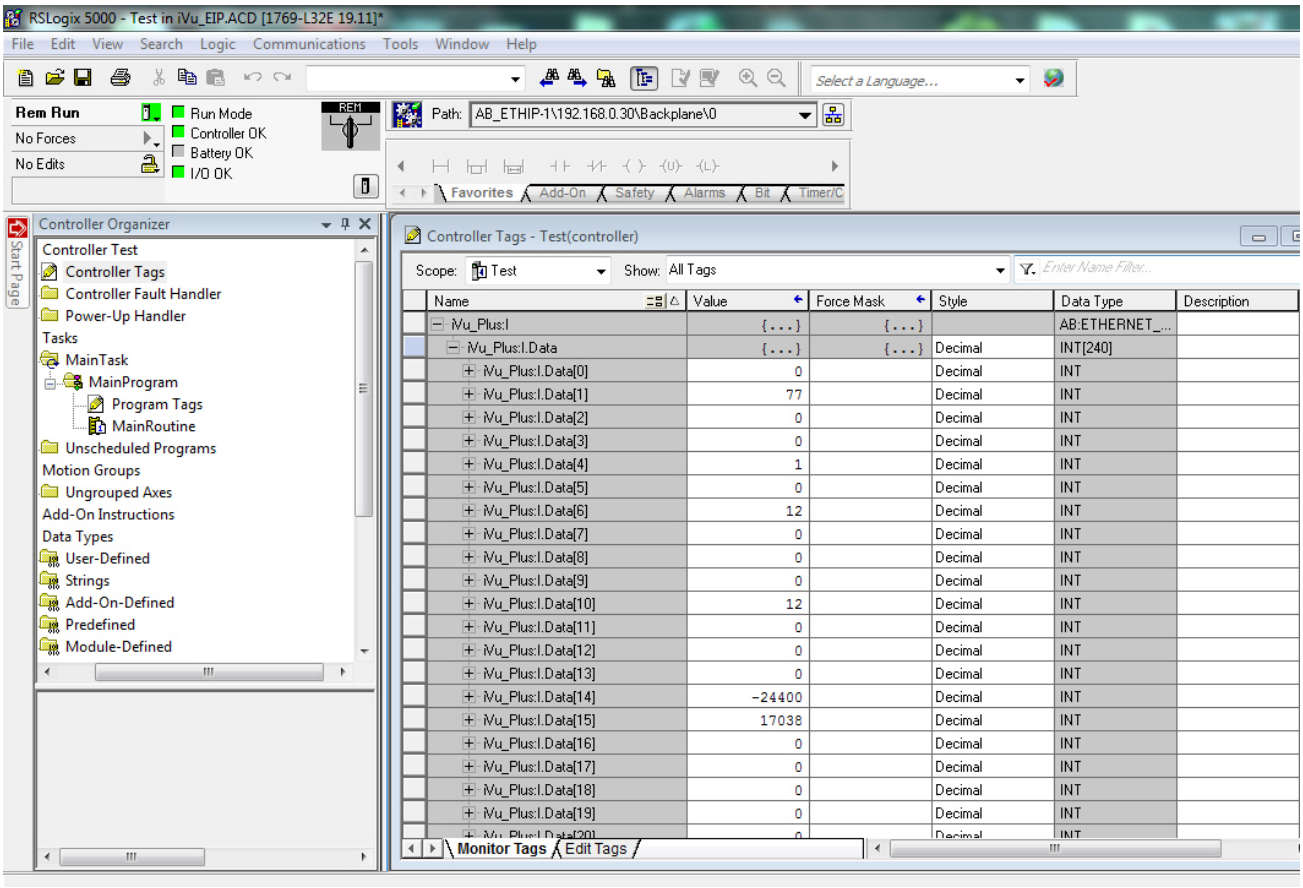
4. Locate the memory map setup from the Banner module to the PLC memory map.

Figure 111. Memory Map



C = Configuration (not used)
I = Inputs to PLC (outputs from the device)
O = Outputs from PLC (inputs to the device)

Figure 112. Memory Map Expanded



The iVu BCR memory map expanded. I = Inputs to PLC (outputs from the device).

Sample map demonstrating string values:

Figure 113. Memory Map: Default

iVu_Plus:I.Data[55]	1		Decimal	INT
iVu_Plus:I.Data[56]	1		Decimal	INT
iVu_Plus:I.Data[57]	1		Decimal	INT
iVu_Plus:I.Data[58]	20		Decimal	INT
iVu_Plus:I.Data[59]	20		Decimal	INT
iVu_Plus:I.Data[60]	0		Decimal	INT
iVu_Plus:I.Data[61]	22121		Decimal	INT
iVu_Plus:I.Data[62]	20597		Decimal	INT
iVu_Plus:I.Data[63]	30060		Decimal	INT
iVu_Plus:I.Data[64]	8307		Decimal	INT
iVu_Plus:I.Data[65]	27977		Decimal	INT
iVu_Plus:I.Data[66]	26465		Decimal	INT
iVu_Plus:I.Data[67]	8293		Decimal	INT
iVu_Plus:I.Data[68]	25939		Decimal	INT
iVu_Plus:I.Data[69]	29550		Decimal	INT
iVu_Plus:I.Data[70]	29295		Decimal	INT

Note: ControlLogix string format. "iVu Plus Image Sensor"

Figure 114. Memory Map: "Style" changed to ASCII

iVu_Plus:I.Data[55]	1		Decimal	INT
iVu_Plus:I.Data[56]	1		Decimal	INT
iVu_Plus:I.Data[57]	1		Decimal	INT
iVu_Plus:I.Data[58]	20		Decimal	INT
iVu_Plus:I.Data[59]	20		Decimal	INT
iVu_Plus:I.Data[60]	0		Decimal	INT
iVu_Plus:I.Data[61]	'Vi'		ASCII	INT
iVu_Plus:I.Data[62]	'Pu'		ASCII	INT
iVu_Plus:I.Data[63]	'ul'		ASCII	INT
iVu_Plus:I.Data[64]	' s'		ASCII	INT
iVu_Plus:I.Data[65]	'mI'		ASCII	INT
iVu_Plus:I.Data[66]	'ga'		ASCII	INT
iVu_Plus:I.Data[67]	' e'		ASCII	INT
iVu_Plus:I.Data[68]	'eS'		ASCII	INT
iVu_Plus:I.Data[69]	'sn'		ASCII	INT
iVu_Plus:I.Data[70]	'ro'		ASCII	INT

All data is initially transferred as "INT" data type. An ASCII string looks like gibberish in this format. Changing the "style" to ASCII instead of "Decimal" reveals the correct string data.

14.5 Modbus/TCP

The Modbus/TCP protocol provides device information using register and coil banks defined by the slave device. This section defines the register and coil banks. By specification, Modbus/TCP uses TCP port 502.

The following registers are used to send values back and forth from the iVu BCR to the PLC. iVu BCR read-only output data can be read as Input Registers (30000) using Modbus function code 04 (Read Input Registers). Because some devices like the Modicon family of PLCs cannot access data using the 30000 range of registers, the same values can also be read from Holding Registers (40000) using Modbus function code 03 (Read Holding Registers).

The Input Bits can be set as Coils using Modbus function code 05 (Force Single Coil). The state of the Input ACK Bits and Status Bits can be read as Inputs (10000) using Modbus function code 02 (Read Input Status).

Modbus Function Codes Supported

01: Read Coil Status
02: Read Input Status
03: Read Holding Registers
04: Read Input Registers
05: Force Single Coil
06: Preset Single Register
07: Read Exception Status
16: Preset Multiple Registers

Table 13: Input Bits (Coils 00001-00016)

05: Force Single Coil		
Register	**Bit Position**	**WORD Name**
00001	0	Product Change
00002	1	Teach Latch
00003	2	Trigger
00004	3	Gated Trigger
00005	4	*reserved*
00006	5	Set BCR String
00007	6	Set BCR Mask
00008	7	*reserved*
00009	8	*reserved*

05: Force Single Coil		
Register	**Bit Position**	**WORD Name**
00010	9	*reserved*
00011	10	*reserved*
00012	11	*reserved*
00013	12	*reserved*
00014	13	*reserved*
00015	14	*reserved*
00016	15	Command

Table 14: Input ACK Bits (Inputs 10001-10016)

02: Read Input Status		
Register	**Bit Position**	**WORD Name**
10001	0	Product Change ACK
10002	1	Teach Latch ACK
10003	2	Trigger ACK
10004	3	Gated Trigger ACK
10005	4	*reserved*
10006	5	Set BCR String ACK
10007	6	Set BCR Mask ACK
10008	7	*reserved*
10009	8	*reserved*
10010	9	*reserved*
10011	10	*reserved*
10012	11	*reserved*
10013	12	*reserved*
10014	13	*reserved*
10015	14	*reserved*
10016	15	Command ACK

Table 15: Status Bits (Inputs 10017-10032)

02: Read Input Status		
Register	**Bit Position**	**WORD Name**
10017	0	Ready
10018	1	Pass/Fail
10019	2	Read/No Read
10020	3	Ready Latch
10021	4	*reserved*
10022	5	Output 1
10023	6	Output 2

02: Read Input Status		
Register	**Bit Position**	**WORD Name**
10024	7	Output 3
10025	8	*reserved*
10026	9	*reserved*
10027	10	*reserved*
10028	11	*reserved*
10029	12	Missed Trigger
10030	13	Teach Error
10031	14	System Error
10032	15	Execution Error

14.5.1 iVu BCR Input Values

Holding Registers (40000) are used by the PLC or HMI to write values to the iVu BCR device. To write, use function codes 6 (Preset Single Register) or 16 (Preset Multiple Registers).

Table 16: iVu BCR Input Values (Modbus/TCP Holding Registers)

06: Preset Single Register or 16: Preset Multiple Registers		
REG #	**WORD NAME**	**DATA TYPE**
1	Input Bits (See Input and Output Bits on p. 120 and Coils 00001-16)	16-bit integer
2-3	Product Change Number	32-bit integer
4-50	*reserved*	16-bit integer
51	Command ID	16-bit integer
52	Command Parameter Int16	16-bit integer
53-54	Command Parameter Int32	32-bit integer
55-56	Command Parameter	Float
57-58	Command Parameter ASCII String Length	32-bit integer
59-108	Command Parameter ASCII String	100 byte Unicode character array
109	*reserved*	16-bit integer
110-111	BCR ASCII String/Mask Length	32-bit integer
112-211	BCR ASCII String/Mask	200 byte Unicode character array
212-240	*reserved*	16-bit integer

14.5.2 iVu BCR Output Values

The iVu BCR sends output data to the PLC or HMI via a bank of Input Registers (30000). Some devices, like the Modicon family of PLCs, cannot access data using the 30000 range of register addresses. For these devices, the iVu BCR output data is also made available as Holding Registers (40000). To access this data, use either function code 04 (Read Input Registers) or function code 03 (Read Holding Registers).

Table 17: iVu Plus Output Values (Modbus/TCP Input or Holding Registers)

04: Read Input Registers or 03: Read Holding Registers			
Input REG #	**Holding REG #**	**WORD NAME**	**DATA TYPE**
1	1001	Input ACK Bits (see Input and Output Bits on p. 120) see also Inputs 10001-16	16-bit integer
2	1002	Status Bits (see Input and Output Bits on p. 120) see also Inputs 10017-32	16-bit integer
3-4	1003-4	Error Code	32-bit integer
5-6	1005-6	Inspection Number	32-bit integer
7-8	1007-8	Iteration Count	32-bit integer
9-10	1009-10	Pass Count	32-bit integer
11-12	1011-12	Fail Count	32-bit integer
13-14	1013-14	Missed Triggers	32-bit integer
15-16	1015-16	Current Inspection Time	Float
17	1017	Sensor Pass/Fail Bits	16-bit integer
18-30	1018-30	*reserved*	16-bit integer
31-53	1031-53	Inspection Name	2-word length + 20 Unicode characters
54-55	1054-55	Frame Number	32-bit integer
56	1056	Sensor Type ID	16-bit integer
57	1057	Barcode Count	16-bit integer
58	1058	Barcode-1 Type	16-bit integer
59	1059	Barcode-1 Actual Decoded Data Length	16-bit integer
60-61	1060-61	Barcode-1 Data Array Length	32-bit integer
62-163	1062-163	Barcode-1 Data Array	100 Byte Array
164-171	1164-171	*reserved*	16-bit integer
172	1172	Command Status	16-bit integer
173	1173	Command Response Int16	16-bit integer
174-75	1174-75	Command Response Int32	32-bit integer
176-77	1176-77	Command Response	Float
178-79	1178-79	Command Response ASCII String Length	16-bit integer
180-229	1180-229	Command Response ASCII String Data	100 byte Unicode character array
230-40	1230-40	*reserved*	16-bit integer
241	1241	Barcode Count	16-bit integer
242	1242	Barcode-1 Type	16-bit integer
243	1243	Barcode-1 Length	16-bit integer
244-61	1244-61	Barcode-1 Data	32-bit length + 32 Unicode chararacter array
262	1262	Barcode-2 Type	16-bit integer
263	1263	Barcode-2 Length	16-bit integer
264-81	1264-81	Barcode-2 Data	32-bit length + 32 Unicode character array
282	1282	Barcode-3 Type	16-bit integer
283	1283	Barcode-3 Length	16-bit integer
284-301	1284-301	Barcode-3 Data	32-bit length + 32 Unicode character array

04: Read Input Registers or 03: Read Holding Registers			
Input REG #	**Holding REG #**	**WORD NAME**	**DATA TYPE**
302	1302	Barcode-4 Type	16-bit integer
303	1303	Barcode-4 Length	16-bit integer
304-21	1304-21	Barcode-4 Data	32-bit length + 32 Unicode character array
322	1322	Barcode-5 Type	16-bit integer
323	1323	Barcode-5 Length	16-bit integer
324-41	1324-41	Barcode-5 Data	32-bit length + 32 Unicode character array
342	1342	Barcode-6 Type	16-bit integer
343	1343	Barcode-6 Length	16-bit integer
344-61	1344-61	Barcode-6 Data	32-bit length + 32 Unicode character array
362	1362	Barcode-7 Type	16-bit integer
363	1363	Barcode-7 Length	16-bit integer
364-81	1364-81	Barcode-7 Data	32-bit length + 32 Unicode character array
382	1382	Barcode-8 Type	16-bit integer
383	1383	Barcode-8 Length	16-bit integer
384-401	1384-401	Barcode-8 Data	32-bit length + 32 Unicode character array
402	1402	Barcode-9 Type	16-bit integer
403	1403	Barcode-9 Length	16-bit integer
404-21	1404-21	Barcode-9 Data	32-bit length + 32 Unicode character array
422	1422	Barcode-10 Type	16-bit integer
423	1423	Barcode-10 Length	16-bit integer
424-41	1424-41	Barcode-10 Data	32-bit length + 32 Unicode character array

14.5.3 Input and Output Bits

Writeable **Input Bits** are inputs to the iVu BCR (outputs from the PLC or HMI). They are used for basic control of the iVu BCR. They are accessible using function code 6 (Preset Single Register). The same control is also possible using Coils 00001-16, function code 05 (Force Single Coil).

Table 18: Input Bits: PLC Holding Register 1, also Coils 00001-16

Coil 16	Coil 15	Coil 14	Coil 13	Coil 12	Coil 11	Coil 10	Coil 9	Coil 8	Coil 7	Coil 6	Coil 5	Coil 4	Coil 3	Coil 2	Coil 1
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Command	*reserved*	*reserved*	*reserved*	*reserved*	*reserved*	*reserved*	*reserved*	*reserved*	Set BCR Mask	Set BCR String	*reserved*	Gated Trigger	Trigger	Teach Latch	Product Change

Read-only **Input ACK Bits** are outputs from the iVu BCR (inputs to the PLC or HMI). They are used to acknowledge each of the input bits sent from the PLC. For example, if the PLC changes the Trigger bit (from Input Bits, above) from a 0 to a 1, the iVu BCR changes the Trigger ACK bit from a 0 to a 1 in response. This information is available as Input Registers or Holding Registers. Use either function code 04 (Read Input Registers) or function code 03 (Read Holding Registers). The same data can also be read from Inputs (10000) using Modbus function code 02 (Read Input Status).

Table 19: Input ACK Bits: PLC Input Register 1 or Holding Register 1001, also Inputs 10001-16

Input 16	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Command ACK	*reserved*	*reserved*	*reserved*	*reserved*	*reserved*	*reserved*	*reserved*	*reserved*	Set BCR Mask ACK	Set BCR String ACK	*reserved*	Gated Trigger ACK	Trigger ACK	Teach Latch ACK	Product Change ACK

Read-only **Status Bits** are outputs from the iVu BCR (inputs to the PLC or HMI). They are used to report the basic status of the iVu BCR and the last inspection run. This information is available as Input Registers or Holding Registers. Use either function code 04 (Read Input Registers) or function code 03 (Read Holding Registers). The same data can also be read from Inputs (10000) using Modbus function code 02 (Read Input Status).

Table 20: Status Bits: PLC Input Register 2 or Holding Register 1002, also Inputs 10017-32

Input 32	Input 31	Input 30	Input 29	Input 28	Input 27	Input 26	Input 25	Input 24	Input 23	Input 22	Input 21	Input 20	Input 19	Input 18	Input 17
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Execution Error	System Error	Teach Error	Missed Trigger	*reserved*	*reserved*	*reserved*	*reserved*	Output 3	Output 2	Output 1	*reserved*	Ready Latch	Read/No Read	Pass/Fail	Ready

14.6 PLC5, SLC500, and MicroLogix (PCCC)

Allen-Bradley's PLC5, SLC 500, and MicroLogix family of devices uses PCCC communications protocol.

PCCC is also known as EtherNet/IP transport class 3 and uses explicit Read and Write message commands, or EIP messaging, placed into the ladder logic program, to interface with the iVu BCR.

These PLCs do not support cyclic EtherNet/IP IO data transfer (referred to as EtherNet/IP in this manual). The programming software used by these PLCs is RSLogix 5 (PLC5) or RSLogix 500 (SLC500 and MicroLogix series).

The iVu BCR supports these PLCs using input and output register arrays.

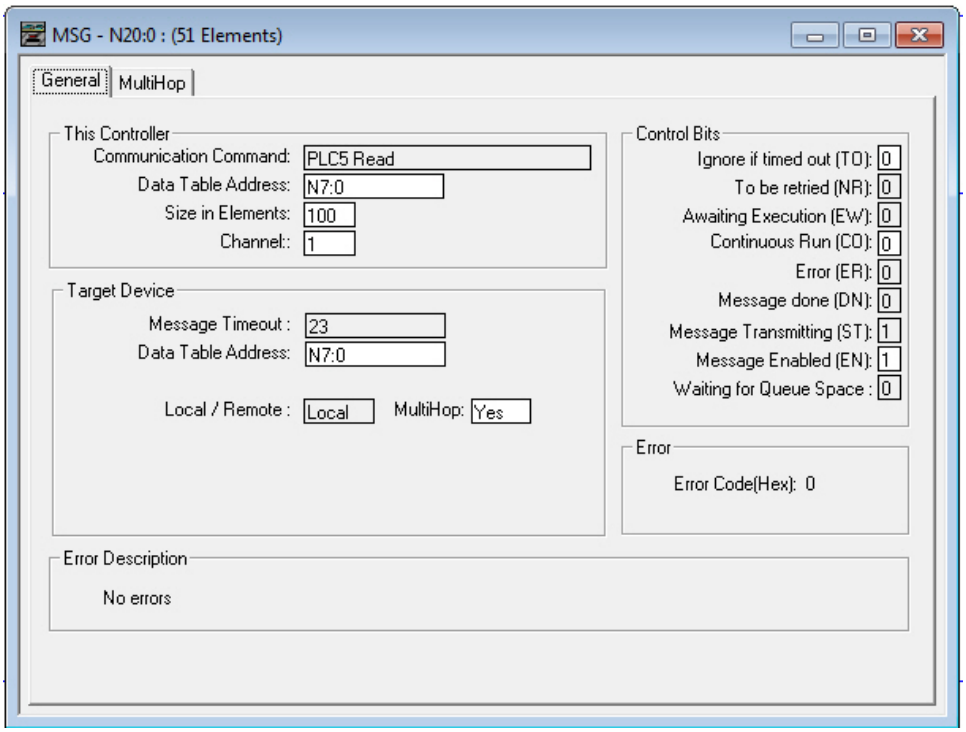
The Output bits, ACK bits and Input bits bit definitions are the same as defined in Input and Output Bits on p. 120. The terms "Input" and "Output" are from the point of view of the PLC.

14.6.1 Configuration

The following images represent a typical configuration.

PLC Read Message Command

Figure 115. General tab: Example message command reading from N7 table on the iVu BCR and sending the data to the N7 table on the PLC



This Controller

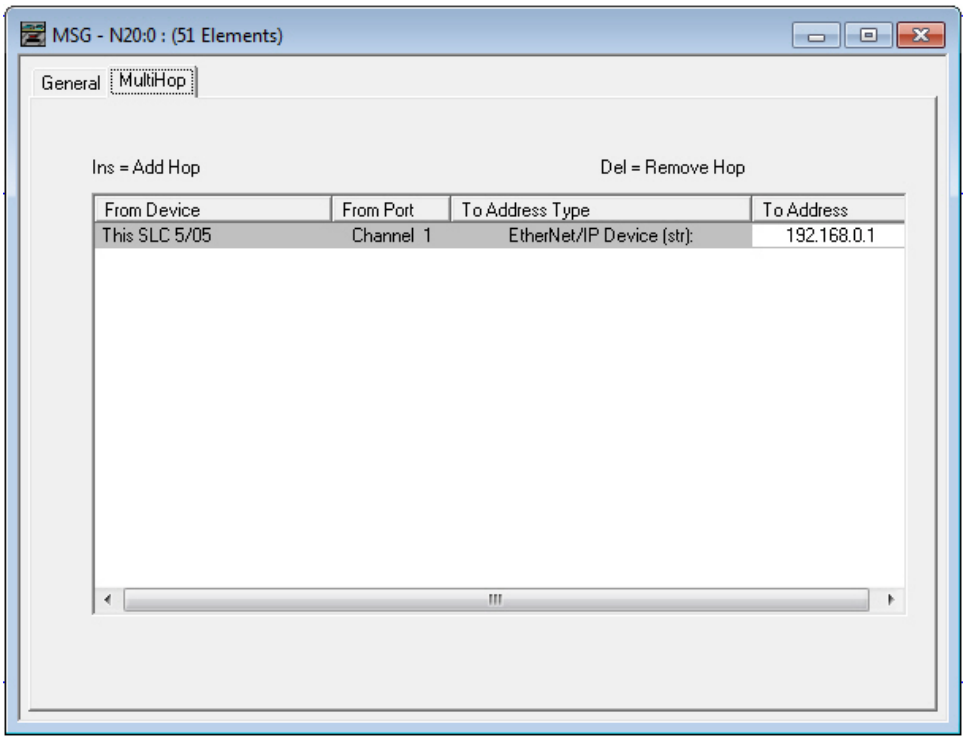
Communications Command = PLC5 Read

Data Table Address = Integer table "Nx"

Target Device

Data Table Address = N7:x

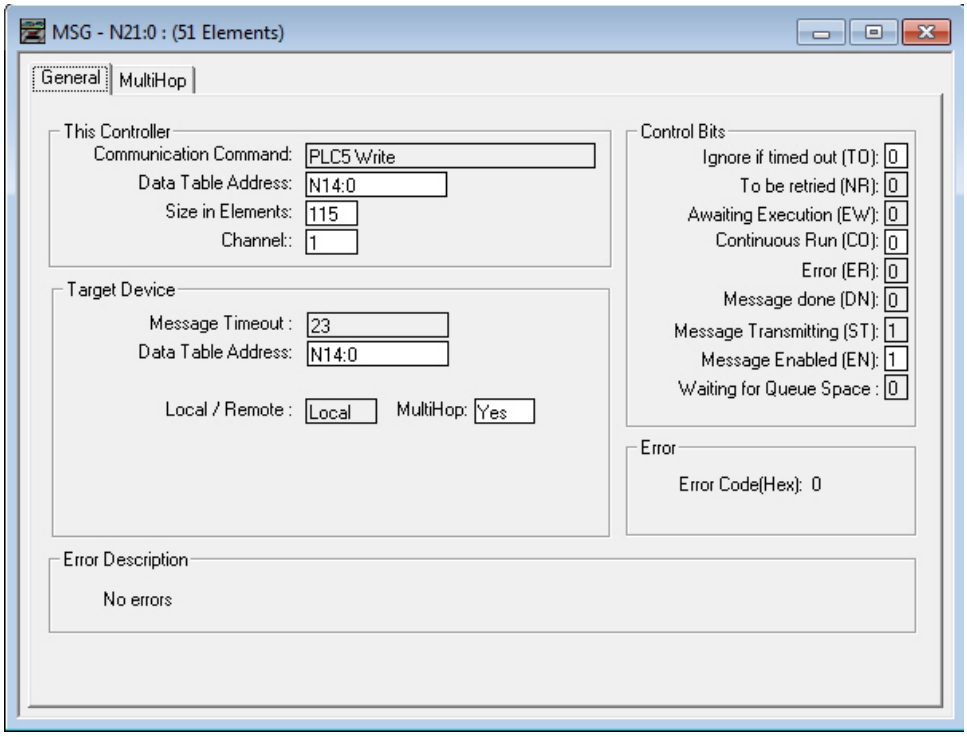
Figure 116. MultiHop tab: IP Address of the iVu BCR is entered here



To Address = IP address of the iVu BCR

PLC Write Message Command

Figure 117. General tab: Example message command writing to N14 table on the iVu BCR from the N14 table of the PLC



This Controller

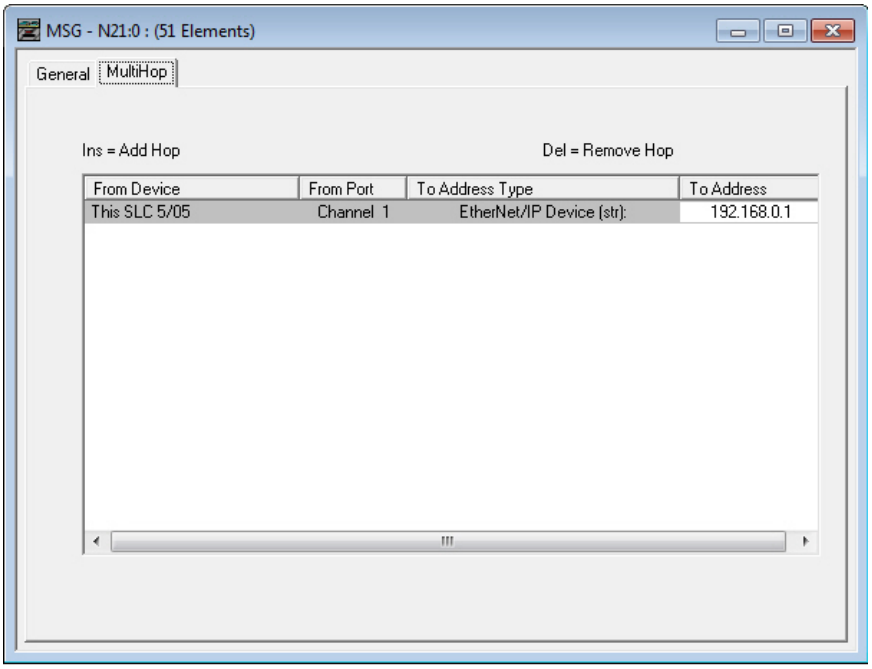
Communications Command = PLC5 Write

Data Table Address = Integer table "Nx"

Target Device

Data Table Address = N14:x

Figure 118. MultiHop tab: IP address of the iVu BCR is entered here



To Address = IP address of the iVu BCR

14.6.2 Inputs to iVu BCR (Outputs from PLC)

The registers below are used by the PLC to push values to the iVu BCR device. MSG (message) commands are used to write (N14) to the iVu BCR.

See Barcode Type Numeric Codes on p. 103 for additional information.

Table 21: PCCC PLC Output Registers (iVu BCR Inputs, N14 Table)

WORD #	WORD NAME	DATA TYPE
0	Input Bits Register (see Input and Output Flags on p. 127)	16-bit integer
1-2	Product Change Number	32-bit integer
3-49	*reserved*	32-bit integer
50	Command ID	16-bit integer
51	Command Parameter Int16	16-bit integer
52-53	Command Parameter Int 32	32-bit integer
54-55	Command Parameter	Float
56-57	Command Parameter String Length	32-bit integer
58-107	Command Parameter String	100-Byte Array
108	*reserved*	16-bit integer
109-110	BCR String/Mask Length	32-bit integer
111-120	BCR String/Mask	200-Byte Array
211-239	*reserved*	16-bit integer

14.6.3 Outputs from iVu BCR (Inputs to PLC)

The registers below are used to send output values from the iVu BCR device to the PLC. MSG (message) commands are used to read (N7) from the iVu BCR.

Table 22: PCCC PLC Input Registers (iVu BCR Outputs, N7 Table)

WORD #	WORD NAME	DATA TYPE
0	Input Bits ACK Register (see Input and Output Flags on p. 127)	16-bit integer
1	Output Bits Register (see Input and Output Flags on p. 127)	16-bit integer
2-3	Error Code	32-bit integer
4-5	Inspection Number	32-bit integer
6-7	Iteration Count	32-bit integer
8-9	Pass Count	32-bit integer
10-11	Fail Count	32-bit integer
12-13	Missed Triggers	32-bit integer
14-15	Current Inspection Time	Float
16	Sensor Pass/Fail Coil	16-bit integer
17-29	*reserved*	16-bit integer
30-52	Inspection Name	2-Word length + 20 Unicode characters
53-54	Frame Number	32-bit integer
55	Sensor Type ID	16-bit integer
56	Barcode Count	16-bit integer
57	Barcode-1 Type	16-bit integer
58	Barcode-1 Actual Decoded Data Length	16-bit integer
59-60	Barcode-1 Data Array Length	32-bit integer
61-162	Barcode-1 Data Array	100 Byte Array
163-170	*reserved*	16-bit integer
171	Command Status	16-bit integer
172	Command Response Int16	16-bit integer
173-174	Command Response Int32	32-bit integer
175-176	Comand Response	Float
177-178	Command Response Length	32-bit integer
179-228	Command Response Data	100 Byte Array
229-239	*reserved*	16-bit integer
240	Barcode Count	16-bit integer
241	Barcode-1 Type	16-bit integer
242	Barcode-1 Length	16-bit integer
243-260	Barcode-1 Data	32-bit length + 32-byte array
261	Barcode-2 Type	16-bit integer
262	Barcode-2 Length	16-bit integer
263-280	Barcode-2 Data	32-bit length + 32-byte array
281	Barcode-3 Type	16-bit integer
282	Barcode-3 Length	16-bit integer
283-300	Barcode-3 Data	32-bit length + 32-byte array
301	Barcode-4 Type	16-bit integer
302	Barcode-4 Length	16-bit integer

WORD #	WORD NAME	DATA TYPE
303-320	Barcode-4 Data	32-bit length + 32-byte array
321	Barcode-5 Type	16-bit integer
322	Barcode-5 Length	16-bit integer
323-340	Barcode-5 Data	32-bit length + 32-byte array
341	Barcode-6 Type	16-bit integer
342	Barcode-6 Length	16-bit integer
343-360	Barcode-6 Data	32-bit length + 32-byte array
361	Barcode-7 Type	16-bit integer
362	Barcode-7 Length	16-bit integer
363-380	Barcode-7 Data	32-bit length + 32-byte array
381	Barcode-8 Type	16-bit integer
382	Barcode-8 Length	16-bit integer
383-400	Barcode-8 Data	32-bit length + 32-byte array
401	Barcode-9 Type	16-bit integer
402	Barcode-9 Length	16-bit integer
403-420	Barcode-9 Data	32-bit length + 32-byte array
421	Barcode-10 Type	16-bit integer
422	Barcode-10 Length	16-bit integer
423-440	Barcode-10 Data	32-bit length + 32-byte array

14.6.4 Input and Output Flags

The Input Bits are used to command execution of basic functions. The Output Bits are used to push single bit outputs from the iVu BCR device to the PLC. The 32 bits of iVu BCR output can also be accessed using the bits of the first two Output Registers (Input Bits ACK Register(word 0) and Output Bits Register (word1)).

Table 23: Inputs Bits Register

Bit Position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Command									Set BCR Mask	Set BCR String		Gated Trigger	Trigger	Teach Latch	Product Change

Table 24: Bit Position

Bit Position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Command ACK									Set BCR Mask ACK	Set BCR String ACK		Gated Trigger ACK	Trigger ACK	Teach Latch ACK	Product Change ACK

Table 25: Output Bits Register

Bit Position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Execution Error	System Error	Teach Error	Missed Trigger					Output 3	Output 2	Output 1		Ready Latch	Read/No Read	Pass/Fail	Ready

14.7 PROFINET®

PROFINET® [22] is a data communication protocol for industrial automation and processes. PROFINET IO defines how controllers (IO controllers) and peripheral devices (IO devices) exchange data in real time.

The iVu Plus Barcode Reader (BCR) Gen2 Series Sensor supports PROFINET IO. The data communication protocol is TCP/IP; the data transmission medium is copper wire; the PROFINET conformance class is CC-A. [23]

Note: In this document, outputs from the iVu BCR device are referred to as "inputs" to the controller (PLC). Outputs from the controller (PLC) are referred to as "inputs" to the iVu BCR device.

14.7.1 General Station Description (GSD) File

The General Station Description (GSD) file contains module information, such as:

- Configuration data
- Data information (pass count, inspection status, etc.)
- Diagnostics

Note: A single iVu Plus GSD file describes iVu Plus TG, iVu Plus BCR, and iVu Color models.

14.7.2 PROFINET IO Data Model

The PROFINET IO data model is based on the typical, expandable field device that has a backplane with slots. Modules and submodules have different functionalities.

Modules are plugged into slots; submodules are plugged into subslots. In the PROFINET IO data model, Slot 0 Subslot 1 is reserved for the Device Access Point (DAP) or network interface.

Both modules and submodules are used to control the type and volume of data that is sent to the controller (PLC).

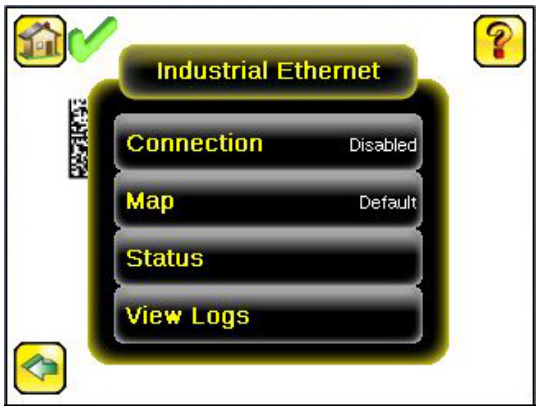
- A submodule is typically designated as input type, output type, or combined input/output type
- An input submodule is used to send data to the controller (PLC)
- An output submodule is used to receive data from the controller (PLC)
- The combined input/output submodule simultaneously receives and sends data in both directions

Configuring the iVu BCR for a PROFINET IO Connection

The iVu BCR device and the controller (PLC) must be configured for PROFINET® .

1. Go to **Main Menu** > **System** > **Communications** > **Industrial Ethernet** > **Connection**.

*Figure 119. **Industrial Ethernet** Menu*

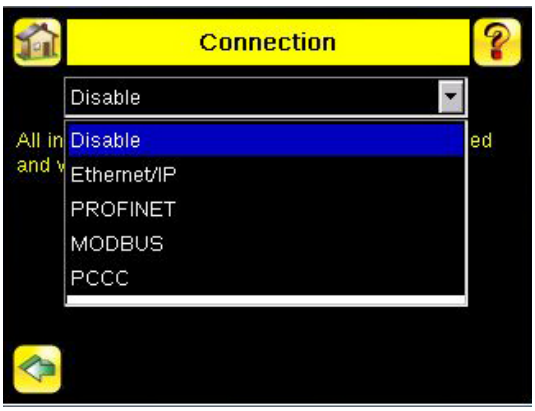


Note: The default Industrial Ethernet Connection setting is Disabled.

2. Click **PROFINET** in the drop-down menu.

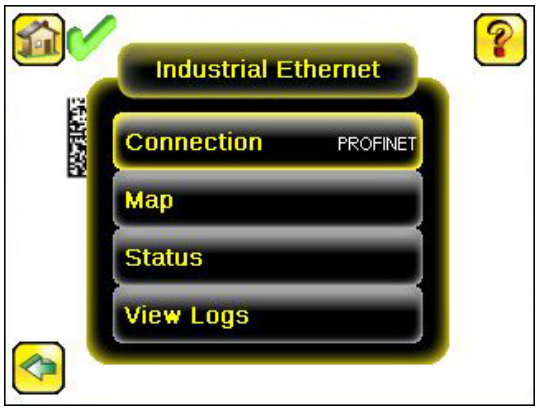
[22] PROFINET® is a registered trademark of PROFIBUS Nutzerorganisation e.V.
[23] CC-A ensures that the device has the minimum properties regarding functionality and interoperability.

*Figure 120. **Connection** Screen*



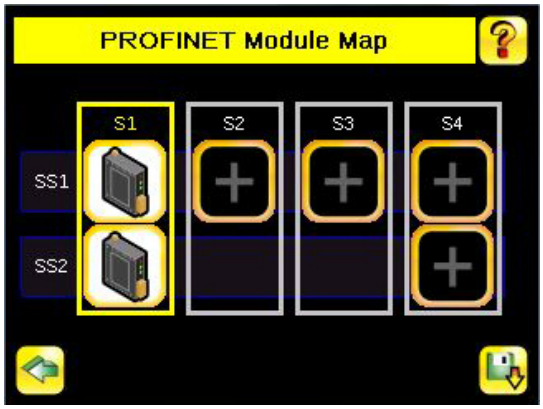
3. Click (only one time) on the **Arrow** button on the bottom left to return to the **Industrial Ethernet** window.

*Figure 121. **Industrial Ethernet** Menu*



4. Click **Map** to configure the PROFINET module map.

*Figure 122. **PROFINET Module Map** Screen*



Note: The PROFINET module map displays S1 SS1 and S1 SS2 by default. S1 represents Slot 1, SS1 represents SubSlot 1; S2 represents Slot 2, SS2 represents SubSlot 2. The other slots are not configured by default.

The default PROFINET configuration consists of a single module plugged into Slot 1. This module, called the Device Control and Status Module, accepts two submodules: the Inspection Result Submodule, plugged into Subslot 1, and the Device Control Submodule, plugged into Subslot 2.

The Inspection Result Submodule provides the inspection results from the iVu BCR, including Pass Count, Fail Count, and Current Inspection Time. See Table 32 on p. 132.

Note: The Inspection Result Submodule does not provide any barcode output data.

The Device Control Submodule allows you to issue commands to the iVu BCR, such as Trigger, TEACH, and Product Change. This submodule also provides command feedback. See Table 33 on p. 132.

Adding sensor-specific output information, including data from decoded barcode symbols, requires the use of a BCR sensor output submodule, plugged into Slot 2 Subslot 1. The iiVu BCR provides different options for configuring this submodule, based on the space required by the decoded barcode data. The selection of sensor output submodules is based on size, allowing the user to control network bandwidth use.

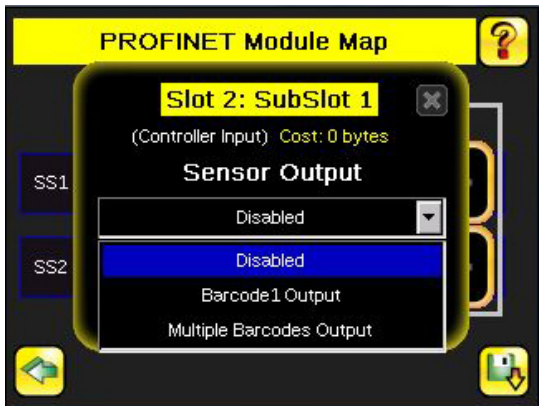
Another optional addition to the configuration is called the Compare String Submodule, plugged into Slot 3 Subslot 1. This submodule allows the controller (PLC) to send new ASCII compare strings or string masks to the iVu BCR. The selection of compare string submodules is based on the desired length of the compare string data used.

The iVu BCR Command Channel Module can be plugged into Slot 4. The selection of Command Channel Submodules is based on the required length of the data output string.

Follow Step 5 and Step 6 to add a submodule to the configuration (optional).

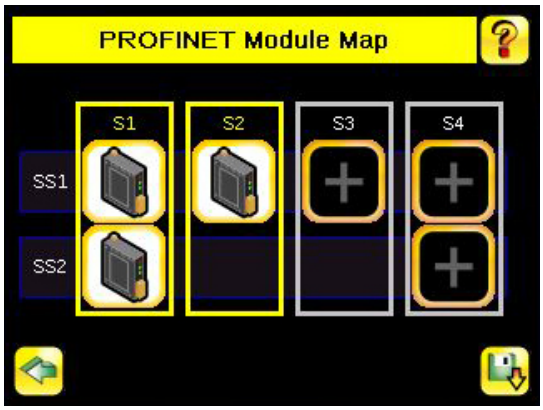
5. Click **S2** to go to the configuration window and add a submodule.

*Figure 123. **PROFINET Module Map** Screen—Add Submodule*



6. Click the **Drop-Down Arrow** next to Disabled to open the list of submodule slots.
7. Select a submodule and hit enter.
   The submodule slot now shows an icon, which means that it has been configured.
8. Set up all submodules for your application.

*Figure 124. **PROFINET Module Map** Screen—With a Submodule Added*



The iVu BCR PROFINET configuration is complete. The PLC can now be configured to complete the PROFINET connection.

Description of Modules

Table 26: Assignment of Slots and Subslots

	Slot 1 - BCR Control and Status Module	Slot 2 - BCR Sensor Output Module	Slot 3 - BCR Control Module	Slot 4 - Command Channel Module
Subslot 1	BCR Inspection Result Submodule	sensor output submodules	Compare String Submodule	Command Channel Command submodules

	Slot 1 - BCR Control and Status Module	Slot 2 - BCR Sensor Output Module	Slot 3 - BCR Control Module	Slot 4 - Command Channel Module
Subslot 2	BCR Device Control Submodule	—	—	Command Channel Response submodules

Table 27: BCR Control and Status Module (Ident 0x00000011)

Number of Physical Subslots	Subslot Label	Subslot Number
1	1.1 BCR Inspection Result Submodule	1 (0x1)
1	1.2 BCR Device Control Submodule	2 (0x2)

Table 28: BCR Sensor Output Module (Ident 0x00000041)

Number of Physical Subslots	Subslot Label	Subslot Number
1	2.1 sensor output submodules	1 (0x1)

Table 29: BCR Control Module (Ident 0x00000020)

Number of Physical Subslots	Subslot Label	Subslot Number
1	Compare String submodules	1 (0x1)

Table 30: Command Channel Module (Ident 0x00000030)

Number of Physical Subslots	Subslot Label	Subslot Number
1	4.1 Command Channel Command submodules	1 (0x1)
1	4.2 Command Channel Response submodules	2 (0x2)

Description of Submodules

Table 31: Supported Submodules and Locations

Submodules	Location	Notes
BCR Inspection Result Submodule	Slot 1,Subslot 1	Always present.
BCR Device Control Submodule	Slot 1, Subslot 2	Present by default, but can be removed.
Sensor Output – First Barcode Submodule	Slot 2, Subslot 1	There are six versions of this submodule supporting command strings of 16, 32, 64, 128, 256, and 512 bytes.
Sensor Output – Multiple Barcodes Submodule	Slot 2, Subslot 1	Predefined with space for 10 barcodes.
Compare String Submodule	Slot 3, Subslot 1	There are six versions of this submodule supporting command strings of 16, 32, 64, 128, 256, and 512 bytes.
Command Channel Command Submodule	Slot 4, subslot 1	There are four versions of this submodule supporting command strings of 0, 32, 64, and 128 bytes.
Command Channel Response Submodule	Slot 4, subslot 2	There are four versions of this submodule supporting command strings of 0, 32, 64, and 128 bytes.

Inspection Result Submodule

The Inspection Result Submodule contains inspection results and sends input data to the controller (PLC). This submodule is plugged into Slot 1 Subslot 2 and cannot be removed.

Table 32: BCR Inspection Result Submodule (Ident 0x0102)

PLC Input Data Name	Input Data Type
Inspection Status Word	Unsigned16
Inspection Number	Unsigned32
Sensor Pass/Fail Status	Unsigned32
Iteration Count	Unsigned32
Pass Count	Unsigned32
Fail Count	Unsigned32
Missed Trigger Count	Unsigned32
Current Inspection Time	Float 32

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Inspection Status Word	
Bit Position for Cyclic Input Data	**Function**
Bit 0	System Ready
Bit 1	Inspection Pass/Fail
Bit 2	Barcode Read/No Read
Bit 3	Ready Signal Latch
Bit 4	Output 1 ON/OFF
Bit 5	Output 2 ON/OFF
Bit 6	Output 3 ON/OFF
Bit 7	Missed Trigger Occurrence

Device Control Submodule

The Device Control Submodule contains controller (PLC) input and output data, including device controls for the iVu BCR. The user-enabled Device Control Submodule is optional and plugged into Slot 1 Subslot 2 by default. The user can remove it.

Table 33: BCR Device Control Submodule (Ident 0x0002)

PLC Input Data Name	Input Data Type
Device Control ACK Word	Unsigned16
Return Error Code	Unsigned32

PLC Output Data Name	Output Data Type
Device Control Command Word	Unsigned16
Product Change Number	Unsigned32

Device Control ACK Word	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Product Change Acknowledgement
Bit 1	Teach Latch Acknowledgement
Bit 2	Trigger Acknowledgement
Bit 3	Gated Trigger Acknowledgement
Bit 13	Teach Error
Bit 14	System Error
Bit 15	Command Execution Error

Device Control Command Word	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Product Change Request
Bit 1	Teach Latch Request
Bit 2	Trigger Request
Bit 3	Start of Gated Trigger Request

Sensor Output Submodules

The First Barcode Submodule contains barcode output data. This user-enabled submodule is optional and plugged into Slot 2 Subslot 1. The First Barcode Submodule has six versions with 16, 32, 64, 128, 256, and 512 bytes, depending on the length of the output string.

Table 34: 16-Byte First Barcode Submodule (Ident 0x00019)

PLC Input Data Name	Input Data Type
Frame Number	Unsigned32
Sensor type	Unsigned16
Total number of barcodes found	Unsigned16
Barcode 1 type	Unsigned16
Actual length of barcode 1 data	Unsigned16
Output length of barcode 1 data	Unsigned32
16-character barcode output string	16-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Table 35: 32-Byte First Barcode Submodule (Ident 0x00020)

PLC Input Data Name	Input Data Type
Frame number	Unsigned32
Sensor type	Unsigned16
Total number of barcodes found	Unsigned16
Barcode 1 type	Unsigned16
Actual length of barcode 1 data	Unsigned16
Output length of barcode 1 data	Unsigned32
32-character barcode output string	32-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Table 36: 64-Byte First Barcode Submodule (Ident 0x00021)

PLC Input Data Name	Input Data Type
Frame number	Unsigned32
Sensor type	Unsigned16
Total number of barcodes found	Unsigned16
Barcode 1 type	Unsigned16
Actual length of barcode 1 data	Unsigned16
Output length of barcode 1 data	Unsigned32
64-character barcode output string	64-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Table 37: 128-Byte First Barcode Submodule (Ident 0x00022)

PLC Input Data Name	Input Data Type
Frame number	Unsigned32
Sensor type	Unsigned16
Total number of barcodes found	Unsigned16
Barcode 1 type	Unsigned16
Actual length of barcode 1 data	Unsigned16
Output length of barcode 1 data	Unsigned32
128-character barcode output string	128-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Table 38: 256-Byte First Barcode Submodule (Ident 0x00023)

PLC Input Data Name	Input Data Type
Frame number	Unsigned32
Sensor type	Unsigned16
Total number of barcodes found	Unsigned16
Barcode 1 type	Unsigned16
Actual length of barcode 1 data	Unsigned16
Output length of barcode 1 data	Unsigned32
256-character barcode output string	256-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Table 39: 512-Byte First Barcode Submodule (Ident 0x00024)

PLC Input Data Name	Input Data Type
Frame number	Unsigned32
Sensor type	Unsigned16
Total number of barcodes found	Unsigned16
Barcode 1 type	Unsigned16
Actual length of barcode 1 data	Unsigned16
Output length of barcode 1 data	Unsigned32
512-character barcode output string	512-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

The Multiple Barcodes Submodule is predefined and contains barcode output data. This submodule has space for ten individual barcodes.

Table 40: Multiple Barcodes Submodule (Ident 0x00026)

PLC Input Data Name	Input Data Type
Frame number	Unsigned32
Sensor type	Unsigned16
Total number of barcodes found	Unsigned16
Barcode 1 type	Unsigned16
Actual length of barcode 1 data	Unsigned16
Output length of barcode 1 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 2 type	Unsigned16
Actual length of barcode 2 data	Unsigned16
Output length of barcode 2 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 3 type	Unsigned16
Actual length of barcode 3 data	Unsigned16
Output length of barcode 3 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 4 type	Unsigned16
Acutal length of barcode 4 data	Unsigned16
Output length of barcode 4 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 5 type	Unsigned16
Actual length of barcode 5 data	Unsigned16
Output length of barcode 5 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 6 type	Unsigned16
Actual length of barcode 6 data	Unsigned16
Output length of barcode 6 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 7 type	Unsigned16
Actual length of barcode 7 data	Unsigned16
Output length of barcode 7 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 8 type	Unsigned16
Actual length of barcode 8 data	Unsigned16
Output length of barcode 8 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 9 type	Unsigned16
Actual length of barcode 9 data	Unsigned16
Output length of barcode 9 data	Unsigned32
32-character barcode output string	32-byte OctetString
Barcode 10 type	Unsigned16
Actual length of barcode 10 data	Unsigned16
Output length of barcode 10 data	Unsigned32
32-character barcode output string	32-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Compare String Submodules

The Compare String Submodules contain controller input and controller output data, as well as BCR controls. This user-enabled submodule is optional and plugged into Slot 3 Subslot 1. The Compare String Submodule has six versions, depending on the length of the compare string.

Table 41: 16-Byte Compare String Submodule (Ident 0x0004)

PLC Input Data Name	Input Data Type
Return status code of the string or mask-set operation	Unsigned16
String or mask-set operation error code	Unsigned32

PLC Output Data Name	Output Data Type
BCR control word	Unsigned16
Reserved	Unsigned16
Length-of-barcode compare string or mask, up to 16 characters	Unsigned32
Maximum 16-character barcode compare string or mask	16-byte OctetString

Return Status Code of the String or Mask-Set Operation	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Set Barcode Compare String Acknowledgement
Bit 1	Set Barcode Compare Mask Acknowledgement

BCR Control Word	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Set Barcode Compare String Request
Bit 1	Set Barcode Compare Mask Request

Table 42: 32-Byte Compare String Submodule (0x0005)

PLC Input Data Name	Input Data Type
Return status code of the string or mask-set operation	Unsigned16
String or mask-set operation error code	Unsigned32

PLC Output Data Name	Output Data Type
BCR control word	Unsigned16
Reserved	Unsigned16
Length-of-barcode compare string or mask, up to 32 characters	Unsigned32
Maximum 32-character barcode compare string or mask	64-byte OctetString

Return Status Code of the String or Mask-Set Operation	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Set Barcode Compare String Acknowledgement
Bit 1	Set Barcode Compare Mask Acknowledgement

BCR Control Word	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Set Barcode Compare String Request
Bit 1	Set Barcode Compare Mask Request

Table 43: 64-Byte Compare String Submodule (Ident 0x0006)

PLC Input Data Name	Input Data Type
Return status code of the string or mask-set operation	Unsigned16
String or mask-set operation error code	Unsigned32

PLC Output Data Name	Output Data Type
BCR control word	Unsigned16
Reserved	Unsigned16
Length-of-barcode compare string or mask, up to 64 characters	Unsigned32
Maximum 64-character barcode compare string or mask	64-byte OctetString

Return Status Code of the String or Mask-Set Operation	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Set Barcode Compare String Acknowledgement
Bit 1	Set Barcode Compare Mask Acknowledgement

BCR Control Word	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Set Barcode Compare String Request
Bit 1	Set Barcode Compare Mask Request

Table 44: 128-Byte Compare String Submodule (Ident 0x0007)

PLC Input Data Name	Input Data Type
Return status code of the string or mask-set operation	Unsigned16
String or mask-set operation error code	Unsigned32

PLC Output Data Name	Output Data Type
BCR control word	Unsigned16
Reserved	Unsigned16
Length-of-barcode compare string or mask, up to 128 characters	Unsigned32
Maximum 128-character barcode compare string or mask	128-byte OctetString

Return Status Code of the String or Mask-Set Operation	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Set Barcode Compare String Acknowledgement
Bit 1	Set Barcode Compare Mask Acknowledgement

BCR Control Word	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Set Barcode Compare String Request
Bit 1	Set Barcode Compare Mask Request

Table 45: 256-Byte Compare String Submodule (Ident 0x0008)

PLC Input Data Name	Input Data Type
Return status code of the string or mask-set operation	Unsigned16
String or mask-set operation error code	Unsigned32

PLC Output Data Name	Output Data Type
BCR control word	Unsigned16
Reserved	Unsigned16
Length-of-barcode compare string or mask, up to 256 characters	Unsigned32
Maximum 256-character barcode compare string or mask	256-byte OctetString

Return Status Code of the String or Mask-Set Operation	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Set Barcode Compare String Acknowledgement
Bit 1	Set Barcode Compare Mask Acknowledgement

BCR Control Word	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Set Barcode Compare String Request
Bit 1	Set Barcode Compare Mask Request

Table 46: 512-Byte Compare String Submodule (Ident 0x0009)

PLC Input Data Name	Input Data Type
Return status code of the string or mask-set operation	Unsigned16
String or mask-set operation error code	Unsigned32

PLC Output Data Name	Output Data Type
BCR control word	Unsigned16
Reserved	Unsigned16
Length-of-barcode compare string or mask, up to 512 characters	Unsigned32
Maximum 512-character barcode compare string or mask	512-byte OctetString

Return Status Code of the String or Mask-Set Operation	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Set Barcode Compare String Acknowledgement
Bit 1	Set Barcode Compare Mask Acknowledgement

BCR Control Word	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Set Barcode Compare String Request
Bit 1	Set Barcode Compare Mask Request

Command Channel Command Submodules

The Command Channel Command Submodules contain controller (PLC) output data and command channel request data. The user-enabled submodules are optional. On the **iVu Plus BCR Gen2** device the submodule is plugged into Slot 4 Subslot 1.

The Command Channel Command Submodule has four versions, depending on the required length of the input string.

Table 47: Numeric Command Submodule (Ident 0x00012)

PLC Output Data Name	Output Data Type
Flag indicates when to apply the command	Unsigned16
Numeric ID of the command	Unsigned16
16-bit integer command argument	Unsigned16
32-bit integer command argument	Unsigned32
Floating-point command argument	Float32

PLC Input Data Name	Input Data Type
Not applicable	Not applicable

Flag indicates when to apply the command	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Command Channel Command Request

Table 48: Text Command 32-byte Submodule (Ident 0x00013)

PLC Output Data Name	Output Data Type
Flag indicates when to apply the command	Unsigned16
Numeric ID of the command	Unsigned16
16-bit integer command argument	Unsigned16
32-bit integer command argument	Unsigned32
Floating-point command argument	Float32
Length-of-Command/Response string	Unsigned32
32-character command string	32-byte OctetString

PLC Input Data Name	Input Data Type
Not applicable	Not applicable

Flag indicates when to apply the command	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Command Channel Command Request

Table 49: Text Command 64-byte Submodule (Ident 0x00014)

PLC Output Data Name	Output Data Type
Flag indicates when to apply the command	Unsigned16
Numeric ID of the command	Unsigned16
16-bit integer command argument	Unsigned16
32-bit integer command argument	Unsigned32
Floating-point command argument	Float32
Length-of-Command/Response string	Unsigned32
64-character command string	64-byte OctetString

PLC Input Data Name	Input Data Type
Not applicable	Not applicable

Flag indicates when to apply the command	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Command Channel Command Request

Table 50: Text Command 128-byte Submodule (Ident 0x00015)

PLC Output Data Name	Output Data Type
Flag indicates when to apply the command	Unsigned16
Numeric ID of the command	Unsigned16
16-bit integer command argument	Unsigned16
32-bit integer command argument	Unsigned32
Floating-point command argument	Float32
Length-of-Command/Response string	Unsigned32
128-character command string	128-byte OctetString

PLC Input Data Name	Input Data Type
Not applicable	Not applicable

Flag indicates when to apply the command	
Bit Position for Cyclic Output Data	**Function**
Bit 0	Command Channel Command Request

Command Channel Response Submodules

The Command Channel Response Submodules contain only controller (PLC) input data and command channel response data. The user-enabled submodules are optional. On the iVu BCR model the submodule is plugged into Slot 4 Subslot 2.

The Command Channel Response Submodule has four versions, depending on the required length of the data output string.

Table 51: Numeric Response Submodule (Ident 0x00050)

PLC Input Data Name	Input Data Type
Flag indicating when to Command ACK	Unsigned16
Numeric Command Status	Unsigned16
16-bit integer command response	Unsigned16
32-bit integer command response	Unsigned32
Floating-point command argument	Float32

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Flag Indicating When to Command ACK	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Command Channel Command Acceptance Acknowledgement
Bit 15	Command Execution Error

Table 52: Text Response 32-byte Submodule (Ident 0x00051)

PLC Input Data Name	Input Data Type
Flag indicating when to Command ACK	Unsigned16
Numeric Command Status	Unsigned16
16-bit integer command response	Unsigned16
32-bit integer command response	Unsigned32
Floating-point command argument	Float32
Length-of-Command/Response string	Unsigned32
32-character command response string	32-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Flag Indicating When to Command ACK	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Command Channel Command Acceptance Acknowledgement
Bit 15	Command Execution Error

Table 53: Text Response 64-byte Submodule (Ident 0x00052)

PLC Input Data Name	Input Data Type
Flag indicating when to Command ACK	Unsigned16
Numeric Command Status	Unsigned16
16-bit integer command response	Unsigned16
32-bit integer command response	Unsigned32
Floating-point command argument	Float32
Length-of-Command/Response string	Unsigned32
64-character command response string	64-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Flag Indicating When to Command ACK	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Command Channel Command Acceptance Acknowledgement
Bit 15	Command Execution Error

Table 54: Text Response 128-byte Submodule (Ident 0x00053)

PLC Input Data Name	Input Data Type
Flag indicating when to Command ACK	Unsigned16
Numeric Command Status	Unsigned16
16-bit integer command response	Unsigned16
32-bit integer command response	Unsigned32
Floating-point command argument	Float32
Length-of-Command/Response string	Unsigned32
128-character command response string	128-byte OctetString

PLC Output Data Name	Output Data Type
Not applicable	Not applicable

Flag Indicating When to Command ACK	
Bit Position for Cyclic Input Data	**Function**
Bit 0	Command Channel Command Acceptance Acknowledgement
Bit 15	Command Execution Error

14.7.3 Configuration Instructions

Using Siemens TIA Portal (v13) Software

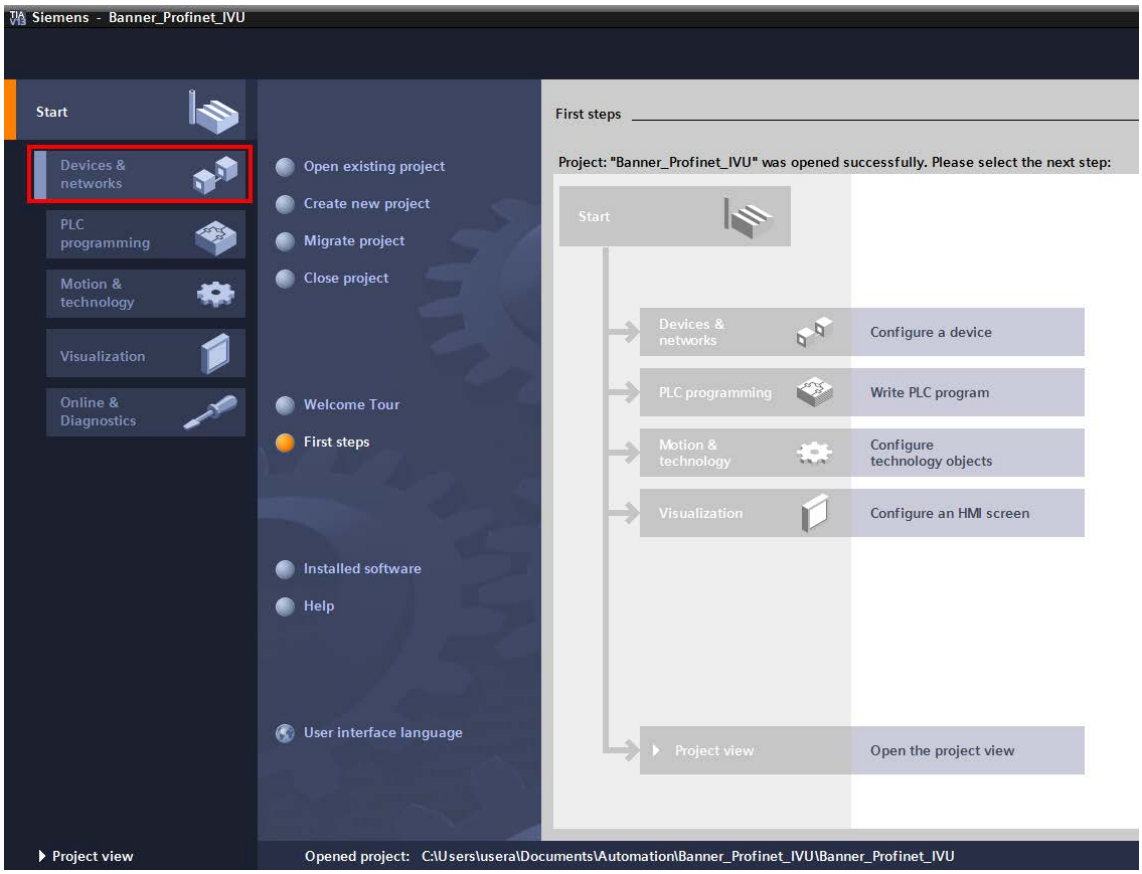
Installing the GSD File

Use these instructions to install the GSD file in the Siemens TIA Portal (v13) software. Use these instructions as a basis for installing the GSD file in another controller (PLC).

1. Download the GSD file from www.bannerengineering.com.
2. Start the Siemens TIA Portal (v13) software.

3. Click **Open existing project**.
4. Select a project and open it.
5. Click **Devices & networks** after the project has been uploaded.

Figure 125. Devices and Networks



6. Click **Configure networks**.

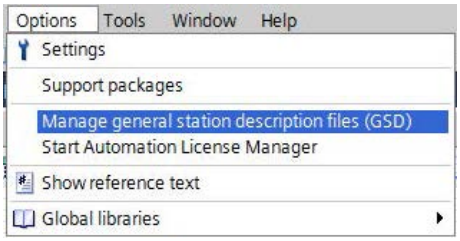
Figure 126. Configure Networks



Network view displays.

7. Click **Options** and select **Manage general station description file (GSD)**.

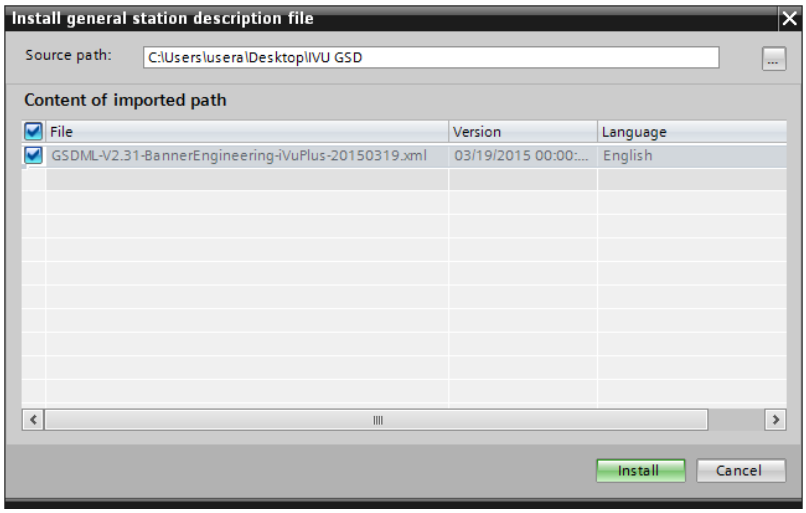
Figure 127. Options—Install the GSD



The **Install general station description file** window opens.

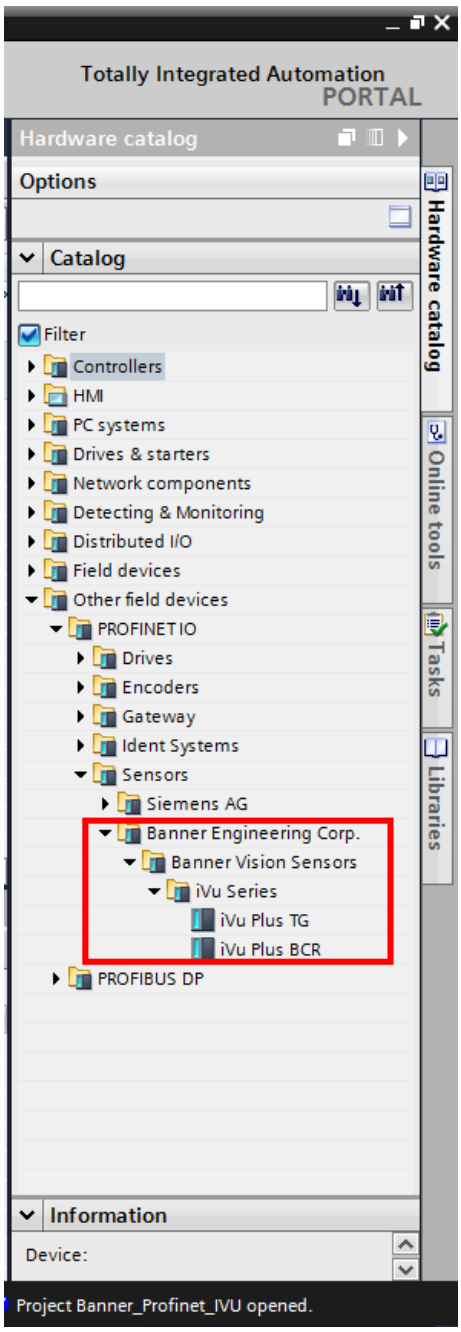
8. Click the browse button **(...)** to the right of the **Source path** field.

Figure 128. Manage GSD Files



9. Navigate to the location the iVu BCR GSD file was downloaded to.
10. Select the iVu BCR GSD file.
11. Click **Install**.

Figure 129. Hardware Catalog



The system installs the iVu BCR GSD file and places it in the **Hardware catalog**. In the above example, the iVu BCR GSD file is located under **Other field devices** > **PROFINET IO** > **Sensors** > **Banner Engineering Corp.** > **Banner Vision Sensors** > **iVu Series** .

Note: If the iVu BCR GSD file does not install properly, save the log and contact Banner Engineering Corp.

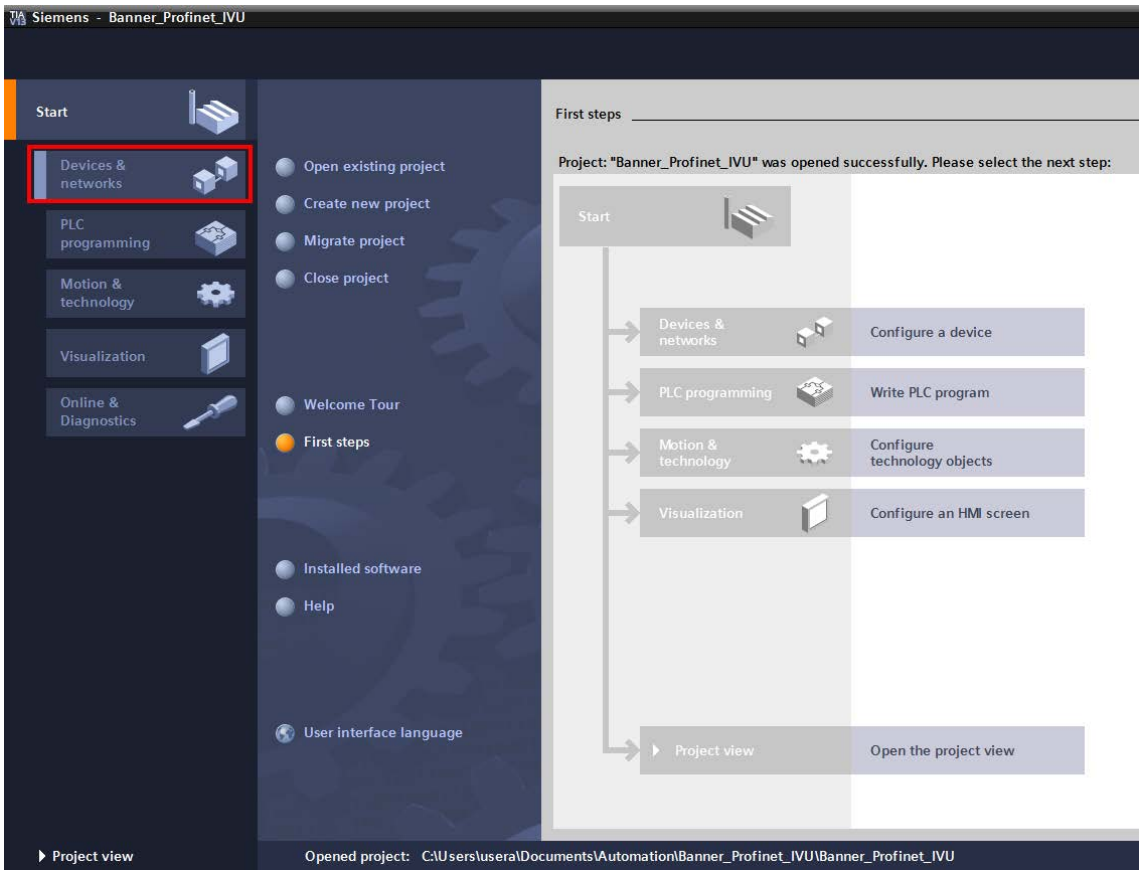
Adding a Device to a Project

Use these instructions to add a iVu BCR device to a Siemens TIA Portal (v13) project, and to configure the device. Use these instructions as a basis for adding a iVu BCR device to another controller (PLC).

1. Start the Siemens TIA Portal (v13) software.
2. Click **Open existing project**.
3. Select a project and open it.

4. Click **Devices & networks** after the project has been uploaded.

Figure 130. Devices and Networks



5. Click **Configure networks**.

Figure 131. Configure Networks

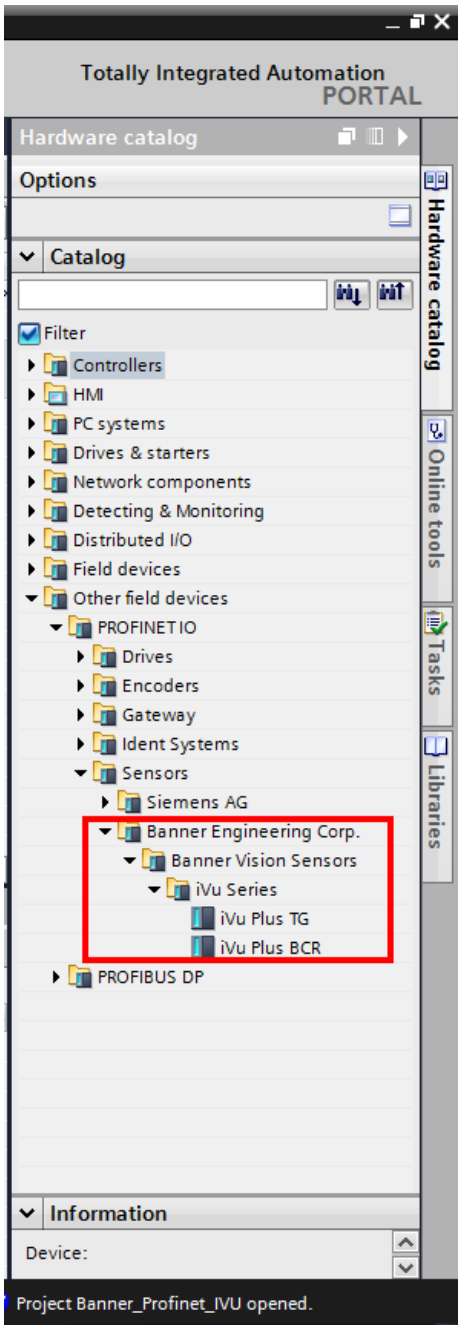


Network view displays.

Note: For Step 6 through Step 10, **Network view** must be open.

6. Locate the iVu BCR in the **Hardware catalog**.

Figure 132. Hardware Catalog



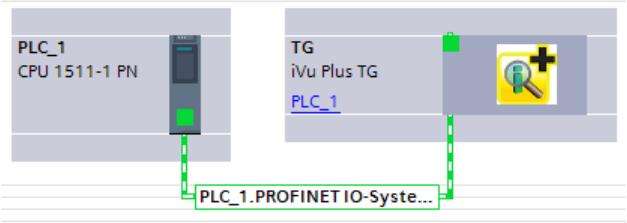
In the above example, the iVu BCR device is located under **Other field devices** > **PROFINET IO** > **Sensors** > **Banner Engineering Corp** > **Banner Vision Sensors** > **iVu Series**.

7. Select the device and add it to the configuration.

Selection Option	Description
Drag	Drag the iVu BCR from the **Hardware catalog** directly into the configuration.
Double-click	Double-click on the iVu BCR and add it to the configuration.

8. Click the green square on the iVu BCR icon. Drag the pointer to the green square on the PLC_1 icon to connect the device to the controller (PLC).

Figure 133. Drag to Connect



The connection is made.

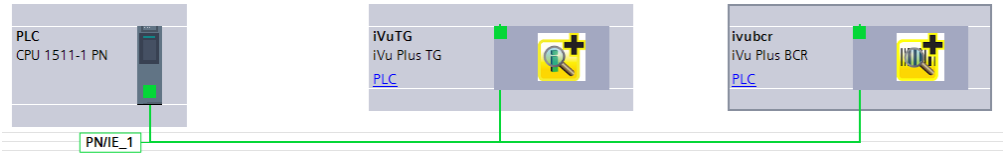
9. Double-click the iVu BCR icon to open the **Device** window.
10. Select the desired modules or submodules from the **Hardware catalog** and drag them onto the **Device overview** tab on the **Device view** tab.
    The iVu BCR device is configured.

Changing the Device IP Address

Use these instructions to change the IP address of the iVu BCR device, using the Siemens TIA Portal (v13) software. Use these instructions as a basis if you are using another controller (PLC).

1. Start the Siemens TIA Portal (v13) software.
2. Click **Open existing project.**
3. Select a project an open it.
4. Click **Devices & networks** after the project has been uploaded to go to **Network view**.

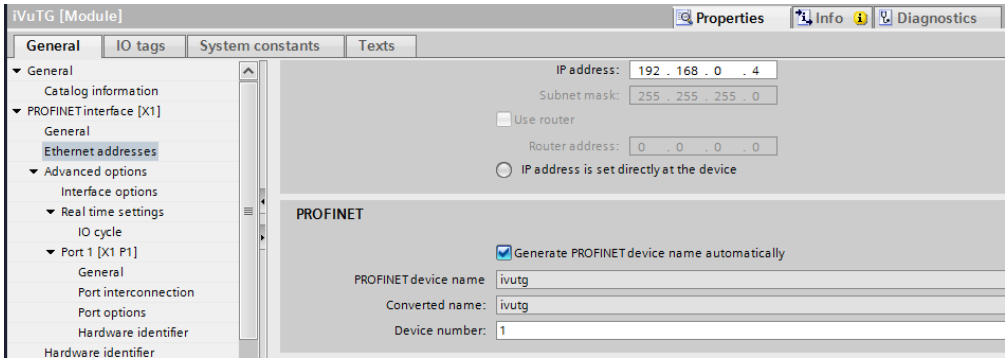
Figure 134. Network View



Network View displays.

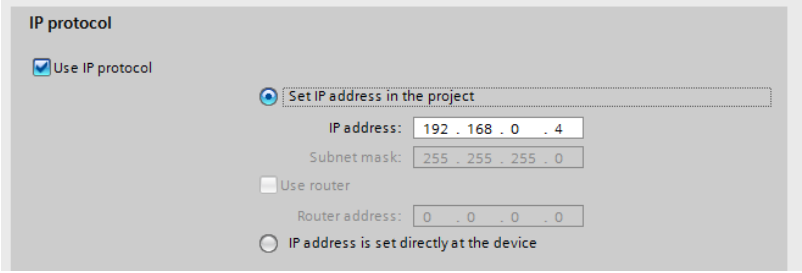
5. Double-click on the iVu BCR icon to open the **Device view**.
6. Click on the iVu BCR icon in the graphic area of the **Device view** to open the **Module properties** window.
   The module can now be configured.
7. Click **Properties**.
8. Click **General**.
9. Select **PROFINET interface** > **Ethernet addresses**.

Figure 135. Ethernet Addresses



10. Select **Set IP address in the project**.

Figure 136. Set IP Address



The project sets the IP address of the device.

11. Enter the IP address.
12. Right-click on the device icon and select **Online & diagnostics**.

Figure 137. Select Online & Diagnostics

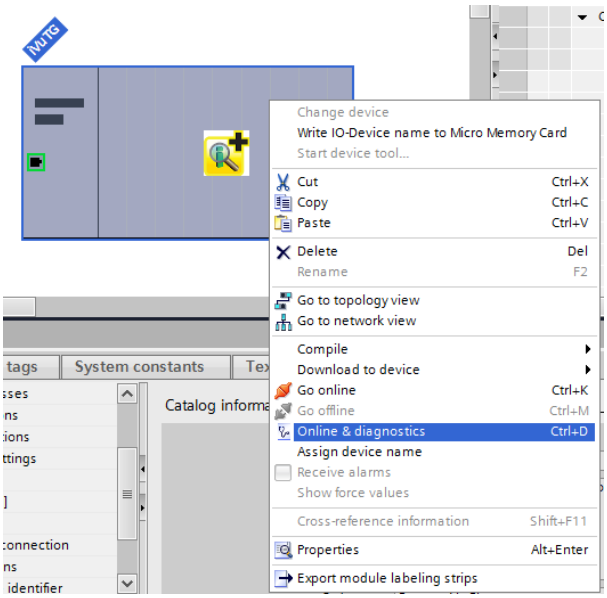
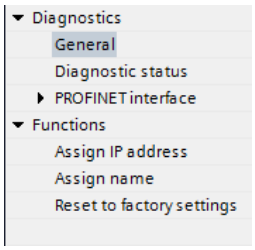


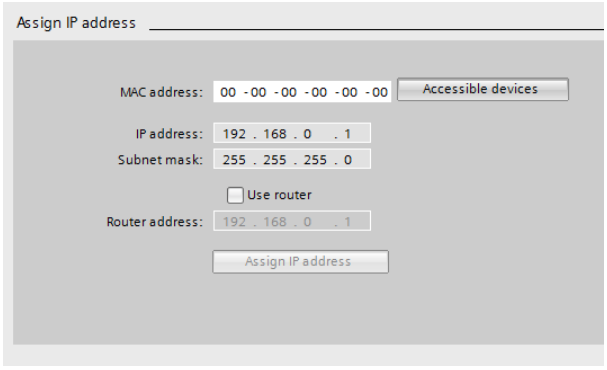
Figure 138. Online & Diagnostics



The **Online & diagnostics** window displays.

13. Select **Assign IP address** under **Functions**.
14. Click **Accessible devices**.

Figure 139. Assign IP Address—Accessible Devices



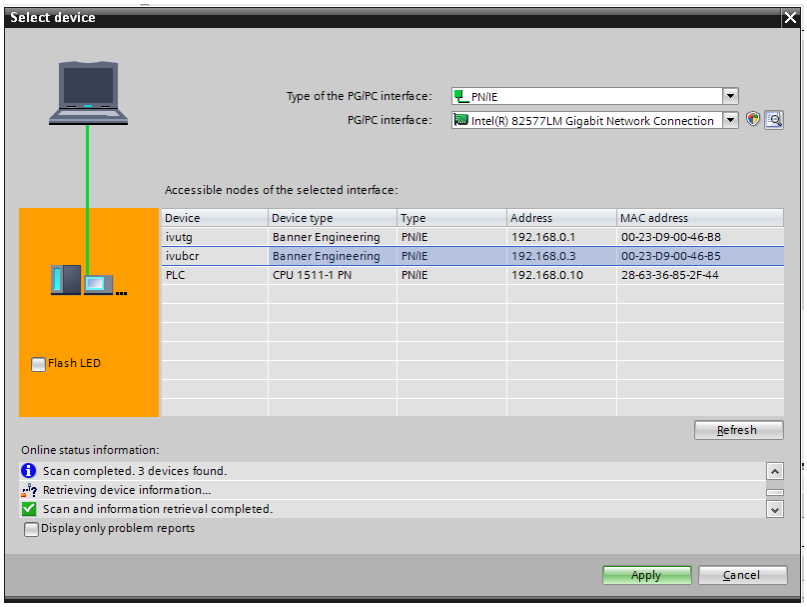
The **Select device** window searches the network for available devices.

15. Determine the device to be adjusted via the MAC address and select it.

Note: Use the display to find the MAC address. **Main Menu** > **System** > **Communications** > **Ethernet IO** > **Status**

16. Click **Apply**.

Figure 140. Select the Device and Apply Changes



The IP address for the device is updated.

17. Click **Assign IP address** to complete the step.

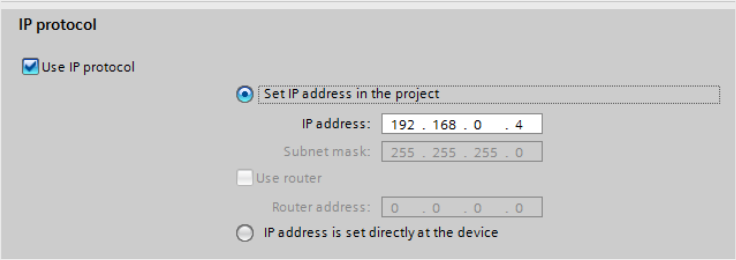
    This step is completed for every device.

Note: PROFINET devices commonly lack an IP address on startup (IP address = all zeros). However, iVu BCR devices require an IP address to connect to Vision Manager to set the device configuration.

By default, each camera shipped from the factory is assigned the IP address 192.168.0.1. The default address can be changed using Vision Manager.

Immediately after the PROFINET protocol has been enabled in the camera, but before the PLC discovers and connects to the camera, the camera will retain its IP address. After the PLC discovers and connects to the camera, the behavior of the IP address depends on how the PLC was configured to assign the camera IP address. Two configuration options are available.

Figure 141. Siemens TIA Portal (v13): IP Protocol Options



- The IP address is set in the project: If the PLC is told to assign the camera IP address (for example, using the **Set IP address in the project** option in Siemens TIA Portal), the camera receives the specified address, but only after the program has been loaded into the PLC and is running.

  If the camera is restarted after it was discovered and configured by the PLC, the camera has an IP address of 0.0.0.0 until the PLC discovers it and assigns it the specified address again.

  When the camera has no IP address assigned, it is still possible to assign an IP address to the camera using Vision Manager. However, if this address is different than what is specified in the PLC, the camera reverts to the address specified in the PLC when the PLC becomes active again.
- The IP address is set at the device: If the PLC is told that the camera IP address is configured at the device (for example, using the **IP address is set directly at the device** option in Siemens TIA Portal), the camera always retains the IP address that was assigned to through Vision Manager.

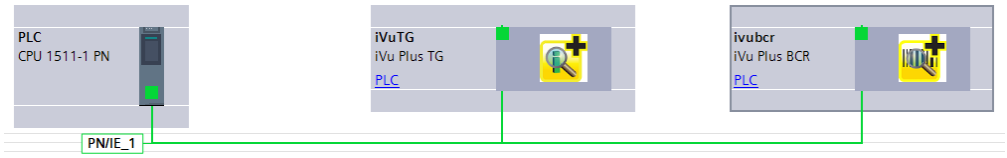
These configuration options conform to the PROFINET standard.

Changing the Device Name

Use these instructions to change the name of the iVu BCR device, using the Siemens TIA Portal (v13) software. Use these instructions as a basis if you are using another controller (PLC).

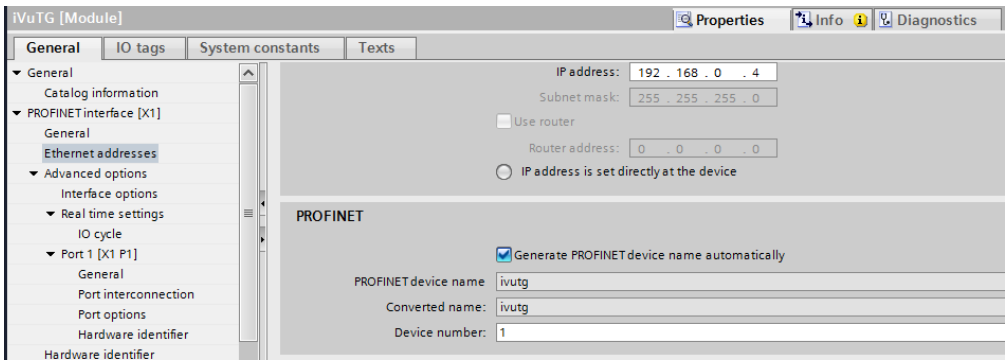
1. Open a project and click on **Devices & networks** to go to the **Network view**.

Figure 142. Network View



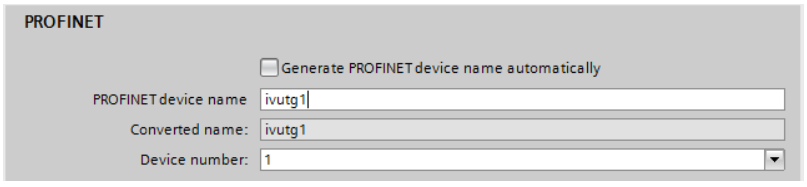
   Network view displays.
2. Double-click on the iVu BCR icon to open **Device view**.
3. Click on the iVu BCR icon in the graphic area of **Device view** to open the **Module properties** window.
4. Click **General**.
5. Select **PROFINET interface [X1]** > **Ethernet addresses**.

Figure 143. Ethernet Addresses



6. Deselect **Generate PROFINET device name automatically**.

Figure 144. PROFINET Device Name



7. Enter a unique name in the **PROFINET device name** field.
8. Enter a unique device number in the **Device number** field.

Note: Each device number is used only once.

9. Right-click on the device icon and select **Online & diagnostics**.

Figure 145. Select Online & Diagnostics

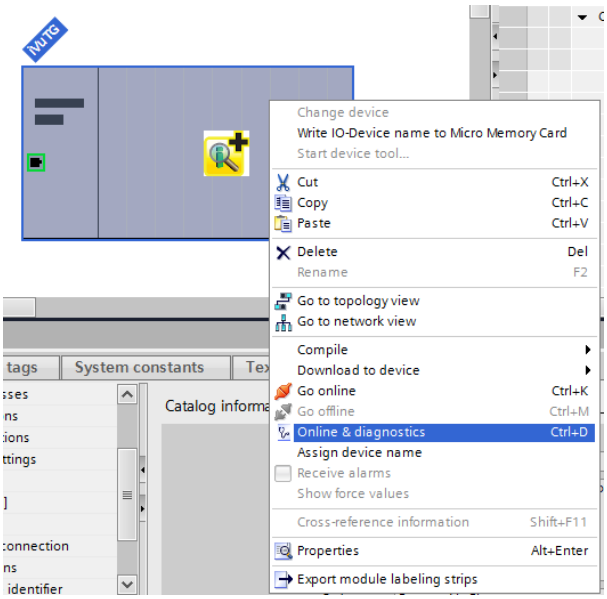
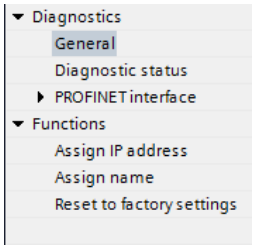


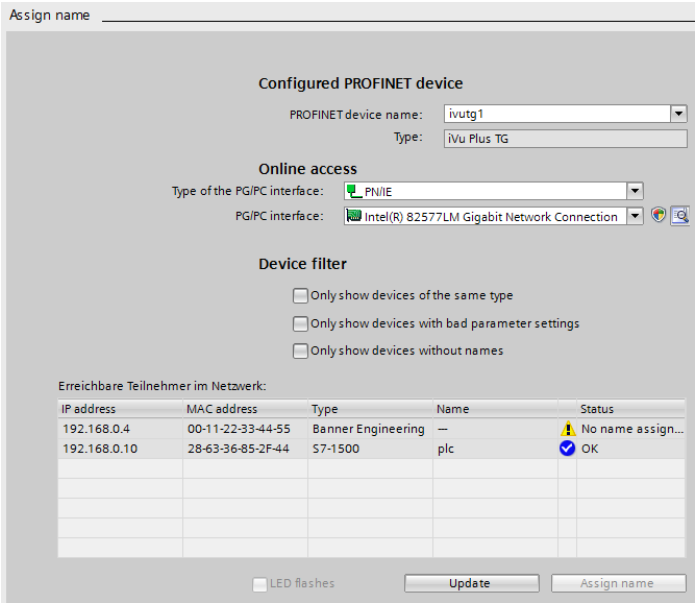
Figure 146. Online & Diagnostics



The **Online & diagnostics** window displays.

10. Select **Assign name** under **Functions**.

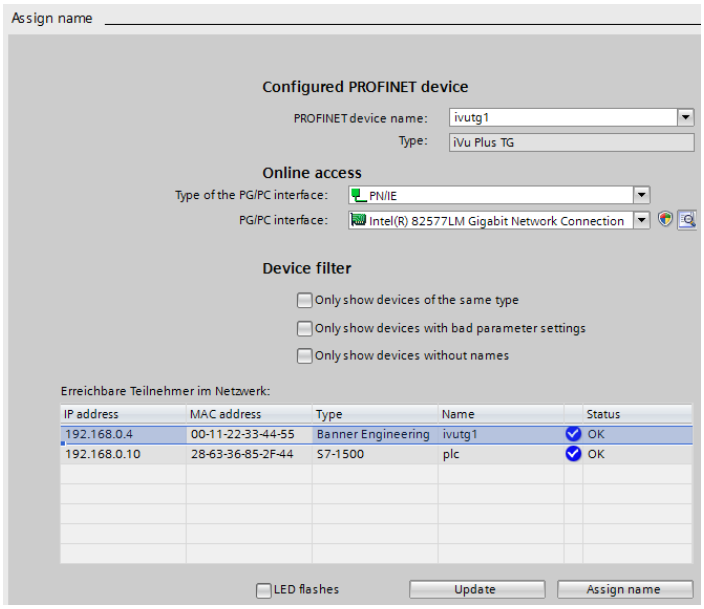
Figure 147. Assign Name



The **Assign name** window displays. The devices in the network are discovered. The **Name** column is blank.

11. Select the device that will have a name assigned to it.
12. Click **Assign name** to start the process.
    The name is assigned.

Figure 148. Assign Name



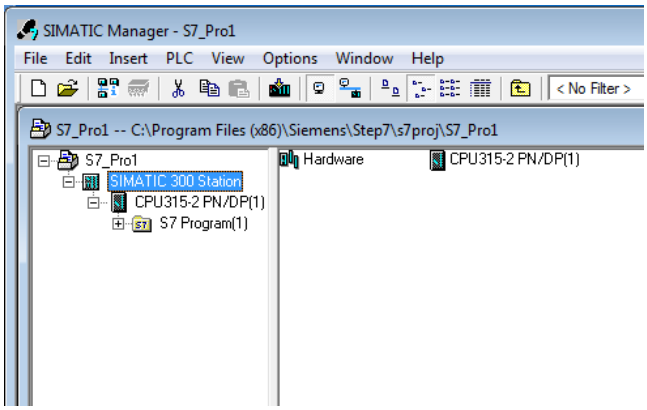
Using Siemens SIMATIC STEP 7 (v5.5) Software

Installing the Banner iVu BCR GSD File

Use these instructions to install the Banner iVu BCR GSD file in the Siemens SIMATIC STEP 7 (v5.5) software.

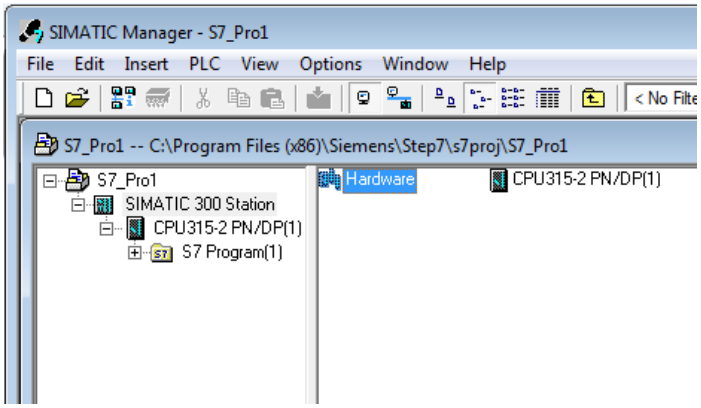
1. Start Siemens SIMATIC Manager.
2. Select an existing project and open it.
3. Select the Station (PLC) from the **Object Hierarchy** list.

*Figure 149. **Object Hierarchy** List*



4. Double-click the **Hardware** icon in the **Station level** window.

*Figure 150. Double-Click the **Hardware** Icon*



The **Hardware configuration** window opens.

5. In the **Hardware configuration** window, click **Options** > **Install GSD File...**.

*Figure 151. **Options** Menu—Select **Install GSD File...***

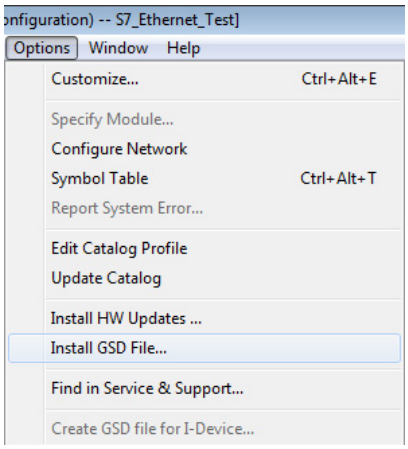
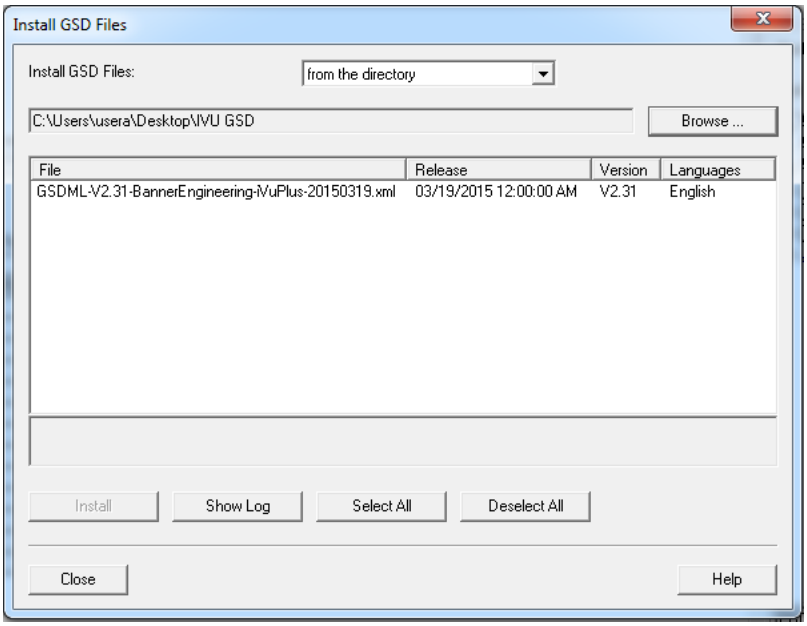


*Figure 152. **Install GSD Files** Screen*

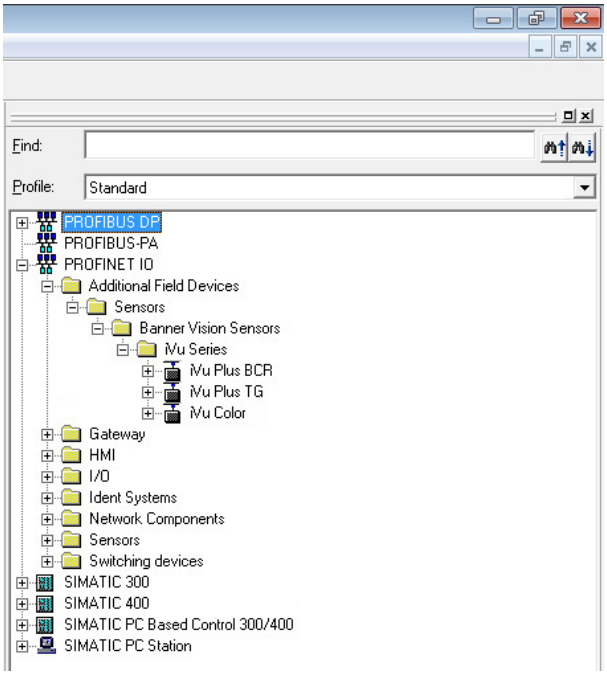


The **Install GSD Files** window displays.

6. Browse to the location of the saved Banner iVu BCR GSD file.
7. Select the version of the file you want to add and click **Install** to add the GSD file to the **Hardware catalog**.
8. Go to the **View** menu in the **Hardware configuration** window.
9. Check the **Catalog** option.

   The **Hardware catalog** appears on the right side of the **Hardware configuration** window.

Figure 153. Hardware Catalog



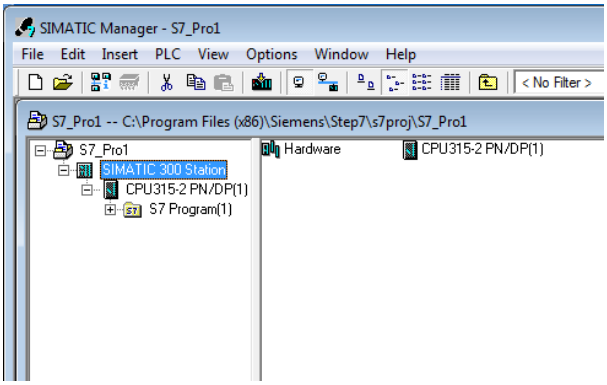
The location in the **Hardware catalog** is **PROFINET IO** > **Additional Field Devices** > **Sensors** > **Banner Vision Sensors** > **iVu Series**

Creating a PROFINET® Connection

Use these instructions to create a PROFINET Connection in **Hardware configuration** with the Siemens SIMATIC STEP 7 (v5.5) software.

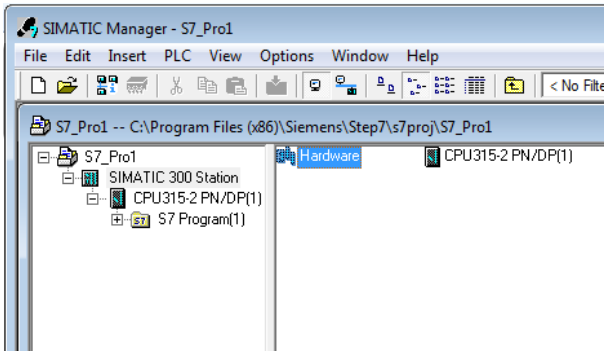
1. Start Siemens SIMATIC Manager.
2. Select an existing project and open it.
3. Select the Station (PLC) from the **Object Hierarchy** list.

*Figure 154. **Object Hierarchy** List*



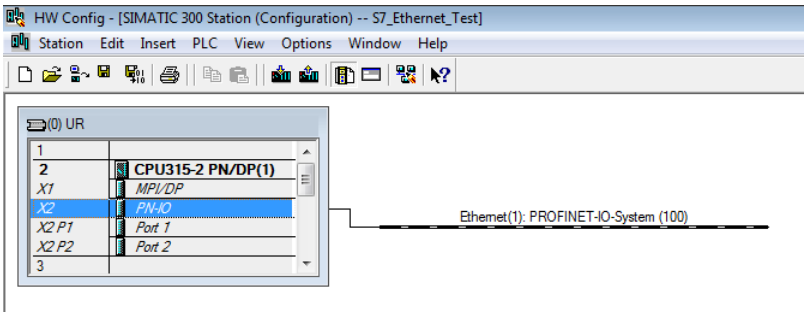
4. Double-click the **Hardware** icon in the **Station level** window to open the **Hardware configuration** window.

*Figure 155. Double-click the **Hardware** Icon*



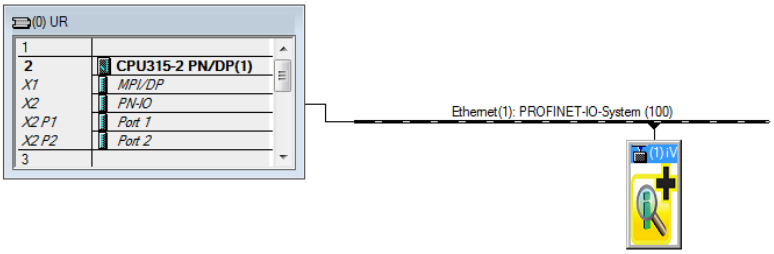
5. Right-click on the PN-IO line in the CPU module of the **Station** window and select *Insert PROFINET IO System*.
6. In the **Parameters** tab of the **Ethernet interface properties** window type in the IP Address and Subnet Mask of the PLC.
7. Select the Ethernet subnetwork from the box at the bottom of the **Ethernet interface properties** window. If no suitable network is shown, click the **New** button to add one, then click **OK**.

Figure 156. Add New Network



8. Click iVu BCR in the **Hardware catalog** and drag and drop onto the PROFINET IO system connection.

Figure 157. Add iVu BCR to the PROFINET IO System Connection



The device is connected to the system.

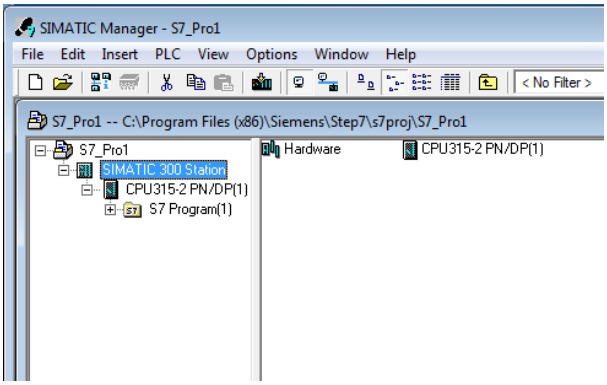
9. Add modules and submodules.

Changing the Device IP Address

Use these instructions for the Siemens SIMATIC STEP 7 (v5.5) software.

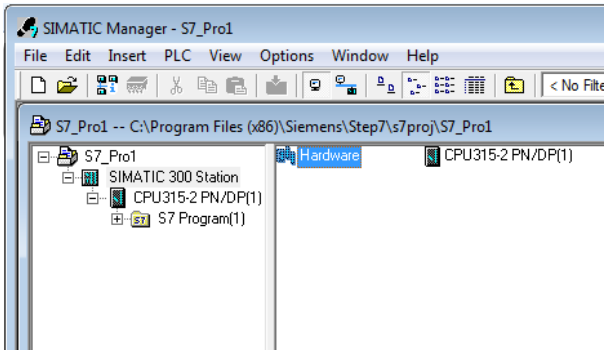
1. Start Siemens SIMATIC Manager.
2. Select an existing project and open it.
3. Select the Station (PLC) from the **Object Hierarchy** list.

*Figure 158. **Object Hierarchy** List*



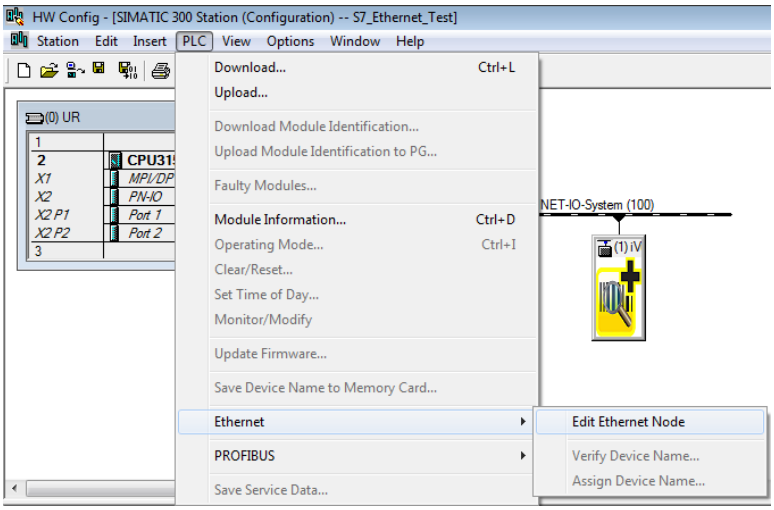
4. Double-click the **Hardware** icon in the **Station level** window to open the **Hardware configuration** window.

*Figure 159. Double-click the **Hardware** Icon*



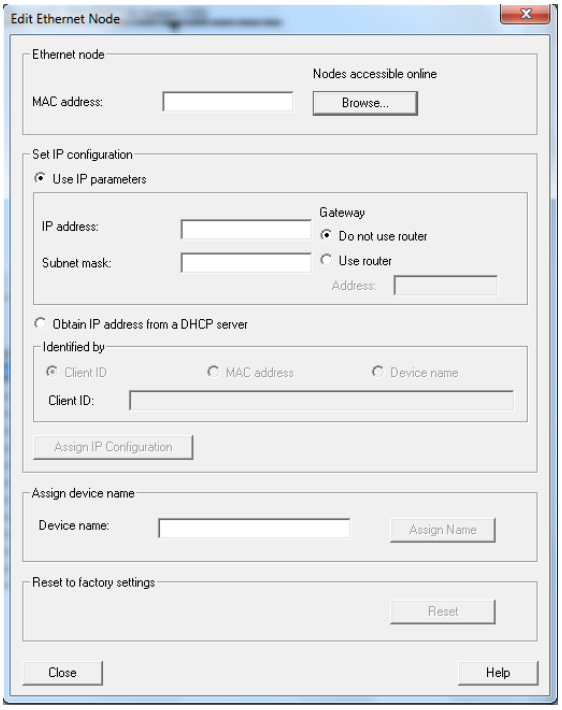
5. Select **PLC** > **Ethernet** > **Edit Ethernet Node**.

*Figure 160. Select **Edit Ethernet Note***



6. Click **Browse...** under **Nodes accessible online** in the **Edit Ethernet Node** window.

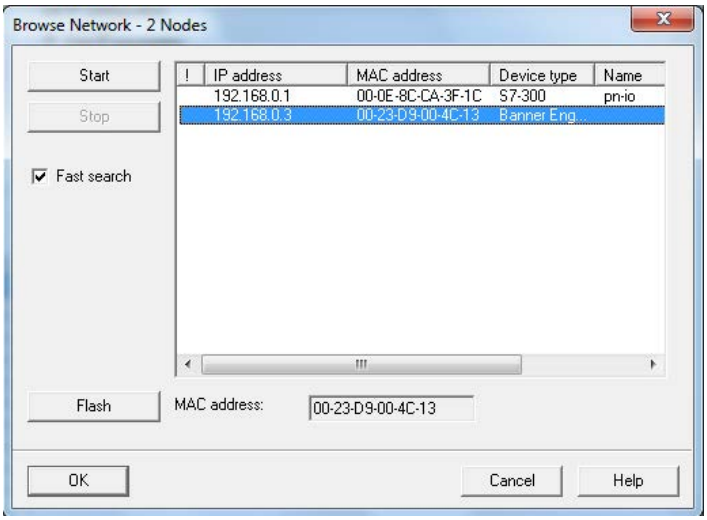
*Figure 161. **Edit Ethernet Node** Screen*



This starts a search for all PROFINET devices on the network and shows the found devices.

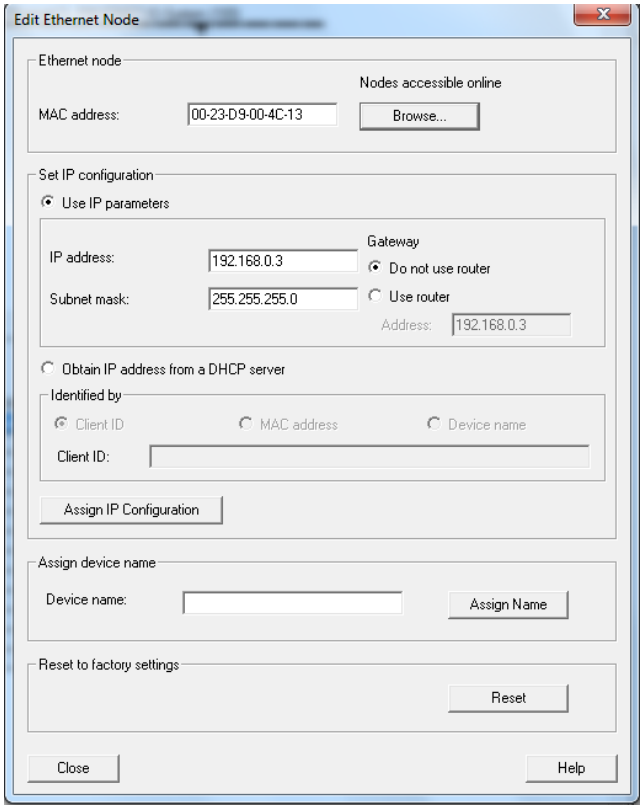
7. Select the device to be modified.

*Figure 162. **Browse Network** Screen*



8. Click **OK**.

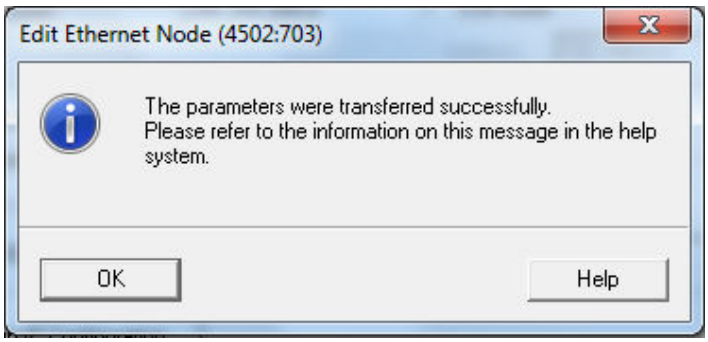
*Figure 163. **Edit Ethernet Note** Screen*



The **Edit Ethernet Node** window is updated.

9. Set the IP address to the desired value.
10. Click **Assign IP Configuration** at the bottom left of the **Set IP configuration** section. The parameters are transferred.
11. Click **OK** to acknowledge the message of a successful transfer.

*Figure 164. **Edit Ethernet Node** Message*



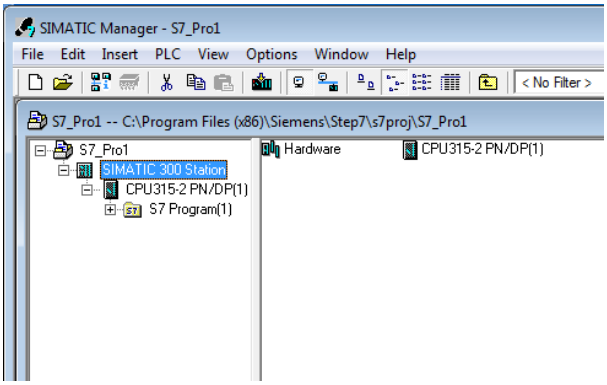
The IP address adjustment is complete.

Changing the Device Name

Use these instructions for the Siemens SIMATIC STEP 7 (v5.5) software.

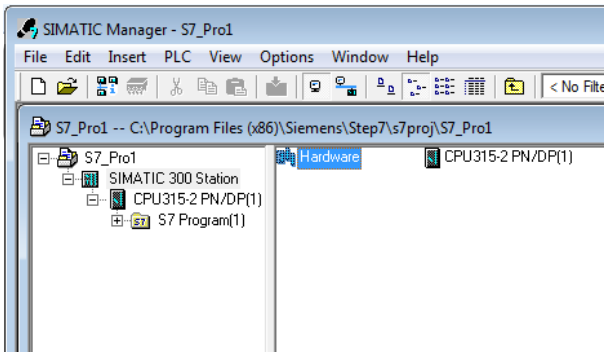
1. Start Siemens SIMATIC Manager.
2. Select an existing project and open it.
3. Select a Station (PLC) from the **Object Hierarchy** list.

*Figure 165. **Object Hierarchy** List*



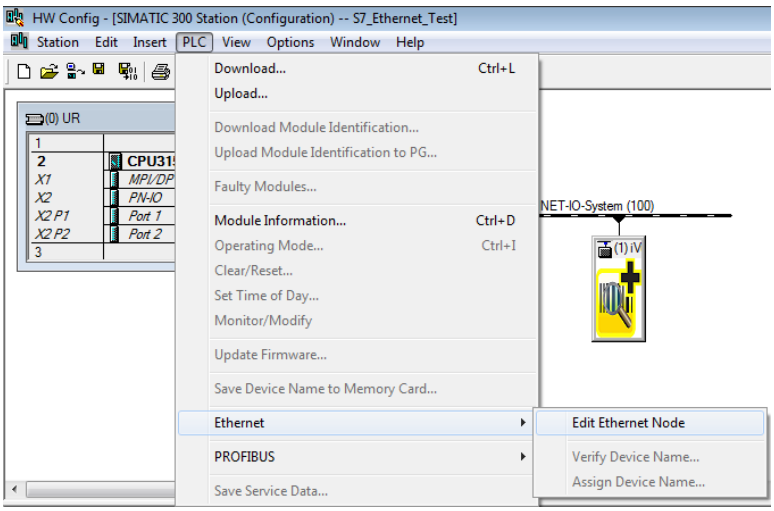
4. Double-click the **Hardware** icon in the **Station level** window to open the **Hardware configuration** window.

*Figure 166. Double-click the **Hardware** Icon*



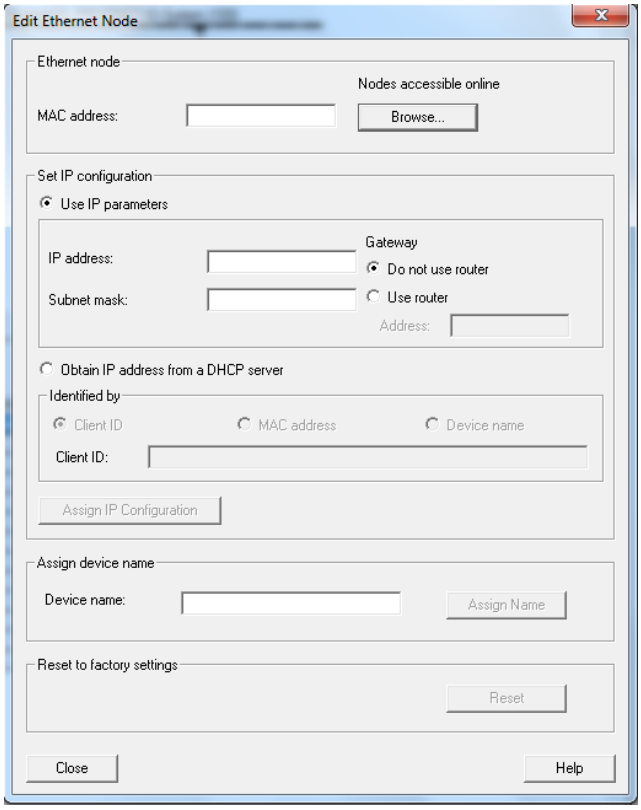
5. Select **PLC** > **Ethernet** > **Edit Ethernet Node**.

*Figure 167. Select **Edit Ethernet Node***



6. Click **Browse...** under **Nodes accessible online** in the **Edit Ethernet Node** window.

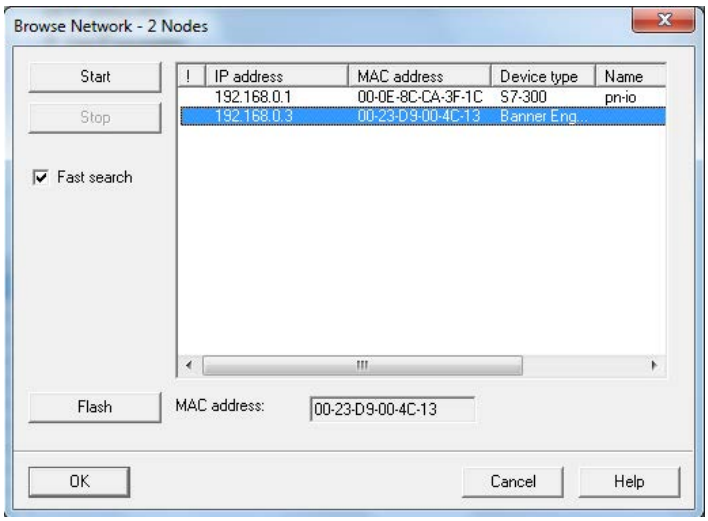
*Figure 168. **Edit Ethernet Node** Screen*



This starts a search for all PROFINET® devices on the network and shows the found devices.

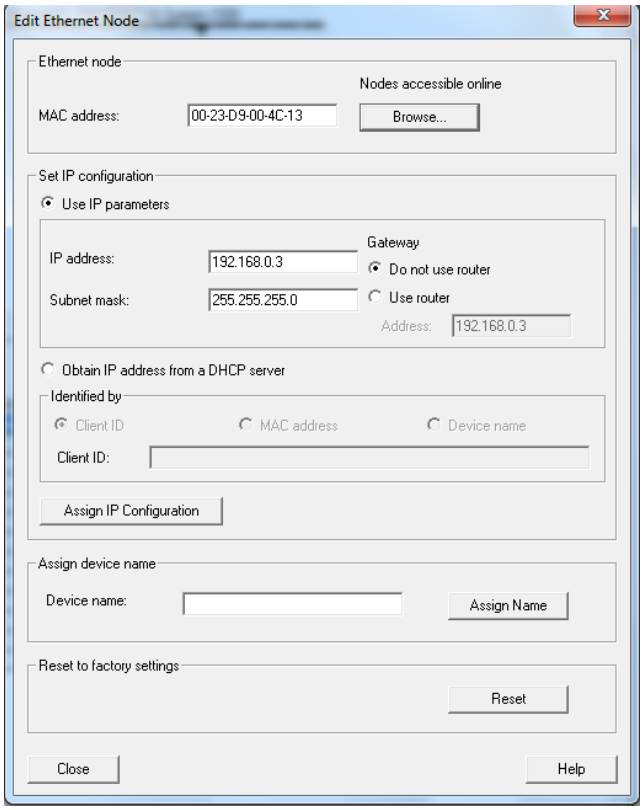
7. Select the device to be modified.

*Figure 169. **Browse Network** Screen*



8. Click **OK**.

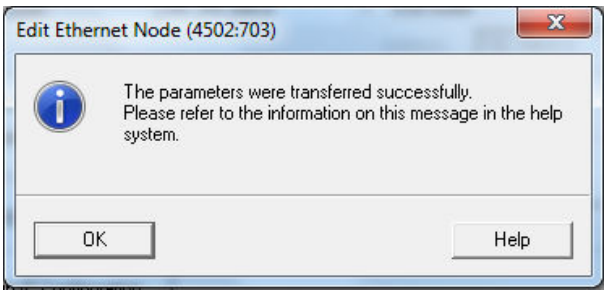
*Figure 170. **Edit Ethernet Node** Screen*



The **Edit Ethernet Node** window is updated.

9. Enter a name with lower case letters in the **Device name** field.
10. Click **Assign Name**.

*Figure 171. **Edit Ethernet Node** Message*



The Device name is updated. If a failed update message is returned, the new name did not meet the naming requirements. Reference the Siemens PLC naming convention.

14.8 Sample Timing Diagrams

X, Y, Z: Represent snapshot in time

Figure 172. Product Change Timing Diagram

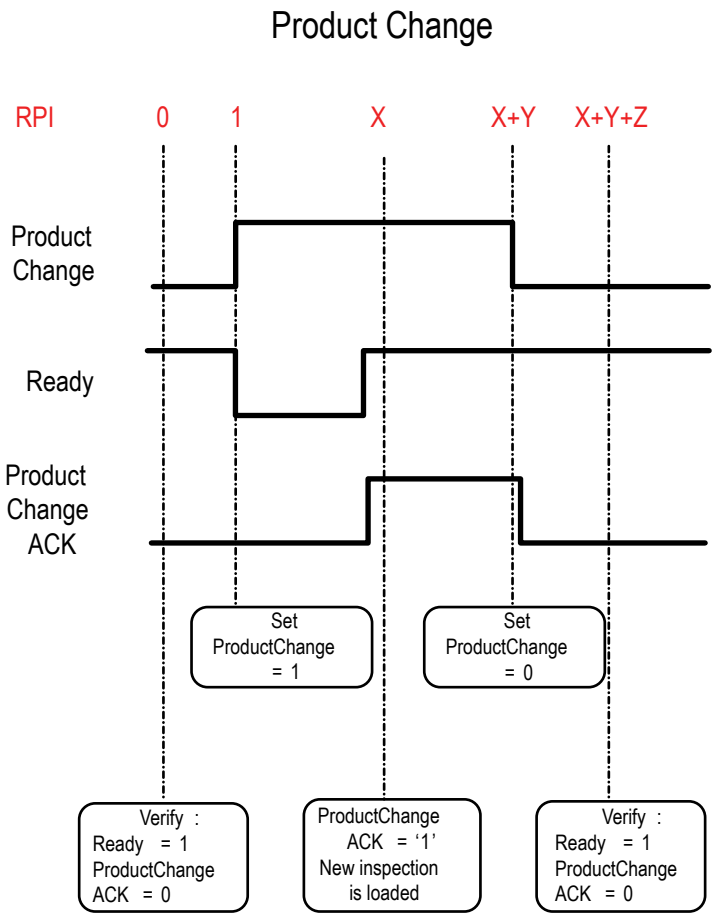


Figure 173. Teach Latch Timing Diagram

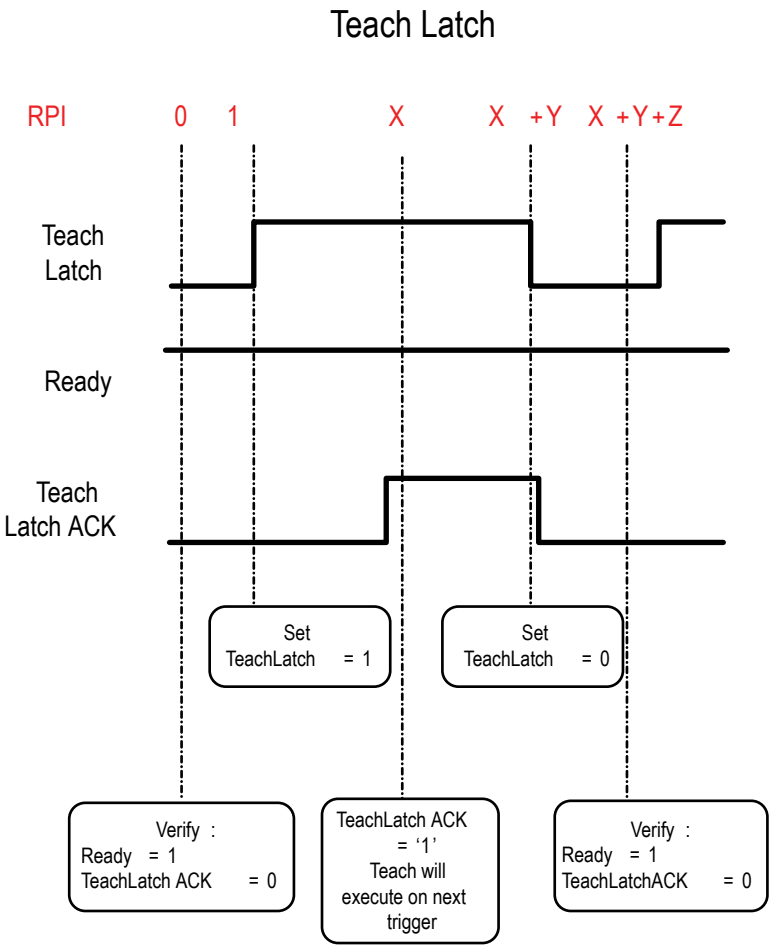


Figure 174. Trigger Timing Diagram

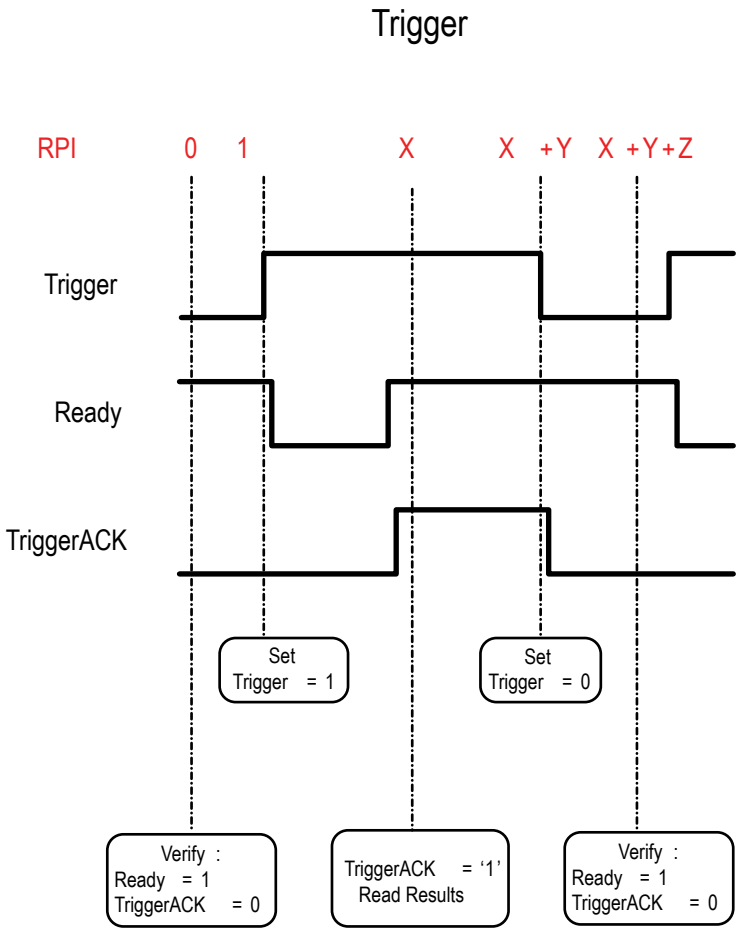
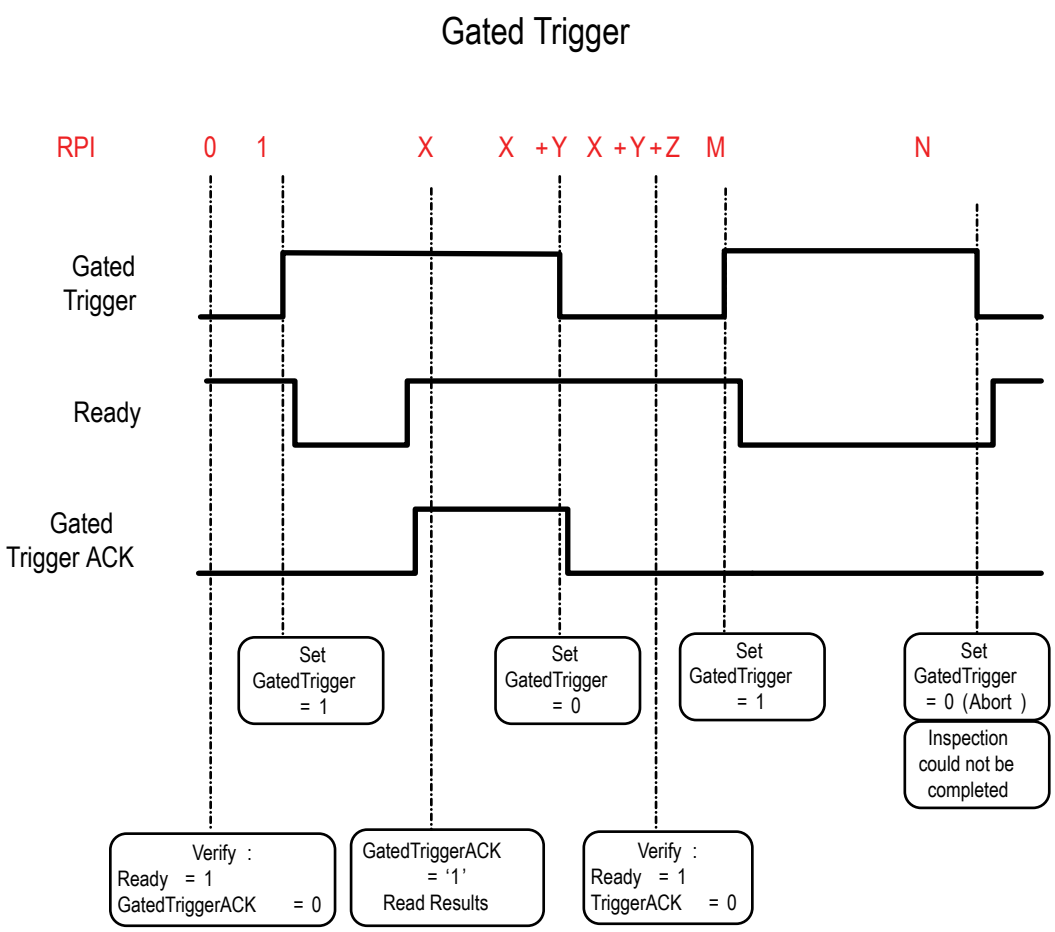


Figure 175. Gated Trigger Timing Diagram



14.9 Command Channel Command Status Register

The command status register will confirm receipt of a command by reflecting the exact command ID received, regardless of whether the command was valid or not.

14.10 Diagnostic Guide

iVu BCR devices provide several methods to help diagnose communication issues when using Ethernet communications.

14.10.1 Ethernet Diagnostics

To verify Ethernet connectivity, follow these steps:

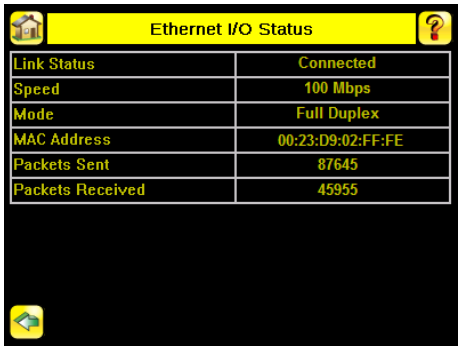
1. Verify that all of the cables are connected and properly seated.
2. Examine the Ethernet I/O LED located on the top of the iVu BCR, between the Pass/Fail and System Status LEDs. The light should be either on or blinking.
3. Go to **System** > **Logs** > **System Log**.
4. Verify that the log entry indicates that the Ethernet link is up:

*Figure 176. **System Log** Screen—Ethernet Link*



5. Go to **System** > **Communications** > **Ethernet I/O**, and click **Status**.
6. Verify that the Link Status is Connected, and that the link parameters, such as speed and duplex settings are as expected. For example:

*Figure 177. **Ethernet I/O Status** Screen*



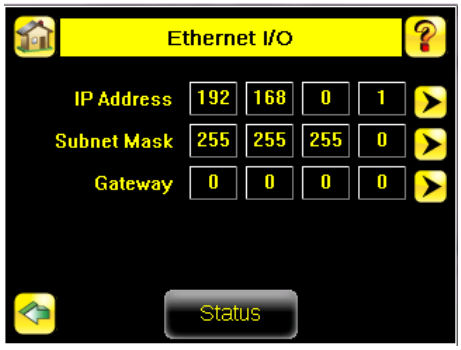
7. If the Link Status indicates that there is no link, inspect the wiring and verify that the Ethernet switch is powered up.
8. If the link parameters are not as expected (wrong baud rate or duplex setting) try the following:
    a. Log in to your managed switch and verify that the port to which the iVu BCR device is connected is correctly configured, or, consult with your IT department to perform this verification.
    b. Verify that your cable is the correct type, and is properly connected to the switch and to the camera.

14.10.2 Networking and TCP/IP Diagnostics

To verify networking and TCP/IP connectivity, follow these steps:

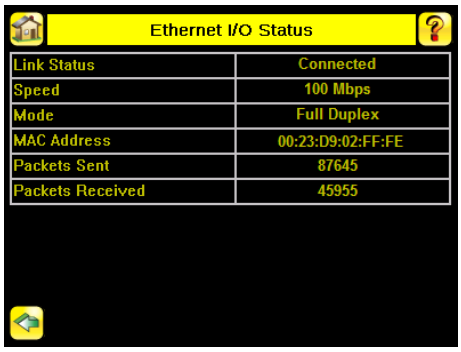
1. Verify that the Ethernet link has been established.
2. Go to **System** > **Communications** > **Ethernet I/O** , and check the iVu BCR IP address, subnet mask, and the Gateway address.

*Figure 178. **Ethernet I/O** Screen*



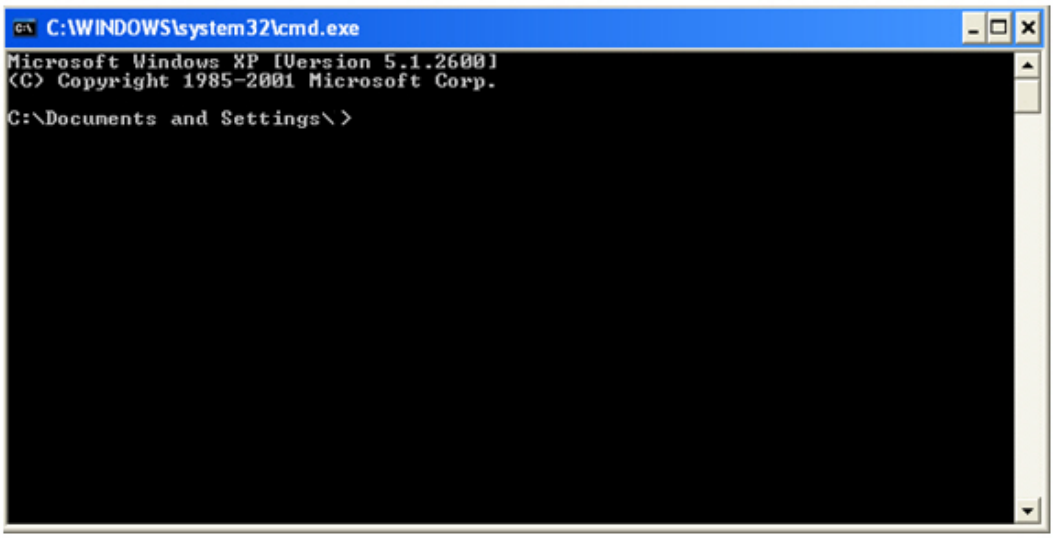
3. Verify with your IT department that these settings are correct. If necessary, make the required modifications and restart the iVu BCR.
4. Click **Status** on the **Ethernet I/O** screen to open the **Ethernet I/O Status** screen.

*Figure 179. **Ethernet I/O Status** Screen*



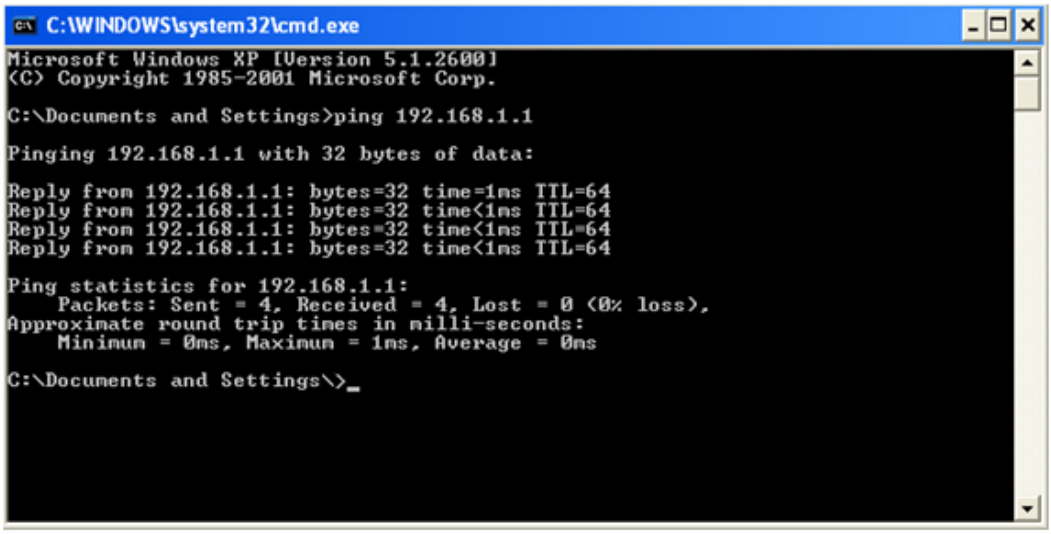
5. On the PC attached to your LAN, open the **Command** window. To do this, click **Start** > **Run**, enter `cmd`, and click **OK**. A command window displays.

Figure 180. Command Window



6. Enter a ping command specifying the iVu BCR IP address as an argument. You should see a series of responses from the iVu BCR.

Figure 181. Command Window with Responses from the iVu BCR



You should also see the Packets Received and Packets Sent count on the **Ethernet I/O Status** screen in the camera increment by at least 4.

7. If the output of the ping command shows request timeouts, try the following:

- Verify that the camera is located on the correct subnet, has the correct IP address, and is connected to the correct switch or router
- If you are running several overlapping subnets, you may want to consult your IT department to ensure that the routing for the network is configured correctly
- If you are trying to access the camera through a gateway or a VPN router, verify that these devices are configured such that they allow traffic from the iVu BCR device to reach the destination device

14.10.3 Industrial Protocols Troubleshooting

Modbus/TCP Protocol

Modbus/TCP protocol relies on the fundamental TCP/IP connectivity to establish connections and transport data. After you have verified Networking and TCP/IP connectivity, you should have little or no problems establishing a Modbus/TCP connection.

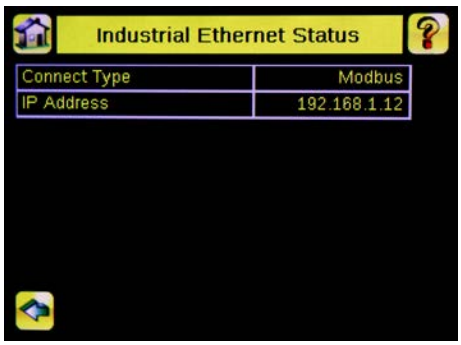
iVu BCR supports one Modbus/TCP connection from a single client, and will reject additional connection requests.

Prior to attempting to establish the Modbus/TCP connection, configure your device and teach it about the iVu BCR device. Tell the device the IP address of the iVu BCR device that you have previously configured. Configuration steps vary for each device. Consult the appropriate device manual for these steps.

The iVu BCR Modbus/TCP port is fixed at port number **502**.

After you have established a Modbus/TCP connection, verify that the iVu BCR has accepted. Go to **System** > **Communications** > **Industrial Ethernet** > **Status** , and view the connection status.

*Figure 182. **Industrial Ethernet Status** Screen*



If you experience issues accessing data, see Modbus/TCP on p. 116 for the Modbus/TCP register maps supported by the iVu BCR, and consult the Industrial Protocols Log. The log, when configured to **Detailed Logging** mode, provides a record of the individual register access sequences and records any errors.

*Figure 183. **Industrial Ethernet** Screen*



EtherNet/IP™ and PCCC Protocols

EtherNet/IP and PCCC protocols rely on Common Industrial Protocol (CIP™) [24] protocol to establish communications and exchange data. CIP protocol, in turn, utilizes TCP/IP.

EtherNet/IP implements Input/Output (I/O) messaging. I/O messaging allows two devices, the iVu BCR and the PLC, to continuously synchronize data sets between each other. These data sets are called Input and Output Assemblies. The iVu BCR device consumes PLC output assemblies, and produces PLC input assemblies. This exchange occurs continuously, at the rate specified by the RPI (Requested Packet Interval) value.

[24] EtherNet/IP™ and CIP™ are trademarks of ODVA, Inc.

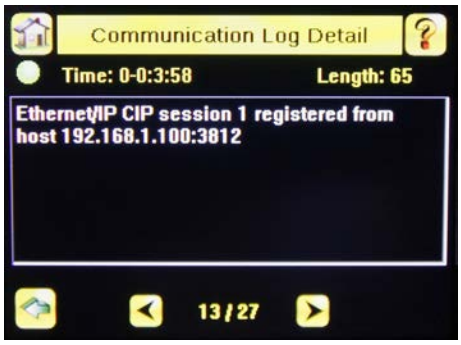
I/O messaging is based on UDP/IP, and utilizes Multicast addressing when sending PLC input assemblies. It is the default mode of operation for I/O messages in PLCs. Many PLCs also support Unicast (direct) addressing for PLC input assemblies, but need to be specially configured.

Because I/O messaging uses UDP/IP and Multicast, it requires special, managed switches, and customized switch configuration. Managed switches, when properly configured, prevent multicast devices from flooding the network with data. Consult with your IT department to make sure that you have the correct switch type, and that these switches have Internet Group Management Protocol (IGMP) snooping enabled to allow them to manage multicast groups.

Some switches with built-in firewalls block UDP traffic by default. If this is the case, and if the path between your devices involves several switches or routers, it is possible that some of them might block the UDP traffic necessary for I/O messages. Consult with your IT department to verify that your network is configured correctly.

Establishing CIP and EtherNet/IP I/O communications is a complicated process. There are several steps during which an error can occur. Industrial Protocols log contains a detail description of the communications process, and should be consulted if any errors are suspected.

*Figure 184. **Communication Log Detail** Screen*



A great level of detail is also provided in the log when the I/O connection is established.

*Figure 185. **Industrial Ethernet** Screen*

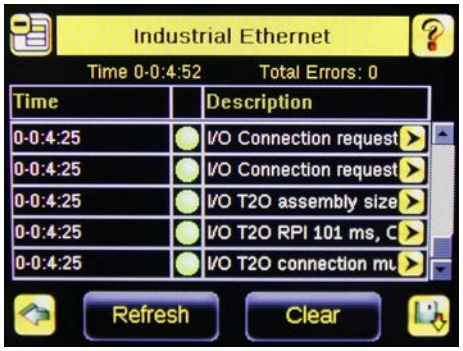
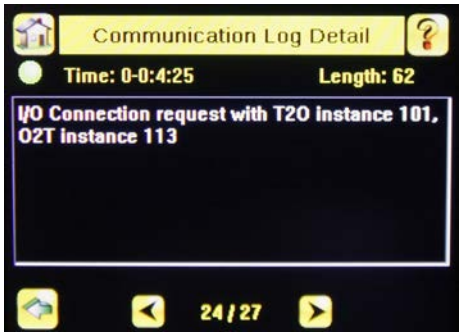
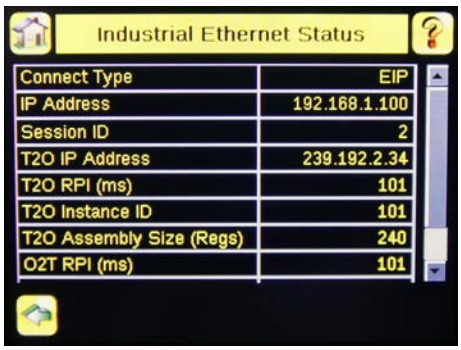


*Figure 186. **Communication Log Detail** Screen*



After the CIP and I/O connections are established, the **Industrial Protocols Status** screen shows the details of the connection.

*Figure 187. **Industrial Ethernet Status** Screen*



Most of the errors in establishing the CIP and I/O connections have to do with specifying the proper Input and Output Assembly Instance IDs and sizes. Refer to the appropriate sections of this manual for this information.

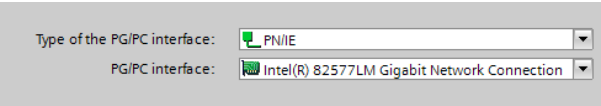
PROFINET

Discovering iVu BCR Devices

The Siemens TIA Portal (v13) software discovery and configuration protocols are used to discover iVu BCR devices on a network.

1. Start the Siemens TIA Portal (v13) software.
2. Click **Open an existing project**.
3. Select a project and open it.
4. Click **Devices & networks** after the project has been uploaded.
5. Click **Configure networks**.
6. Click the **Accessible devices** icon.
   The **Accessible devices** window opens.
7. Select an interface connection in the **Type of the PG/PC interface** list.
8. Select an interface connection in the **PG/PC interface** list.

Figure 188. PG/PC Interface

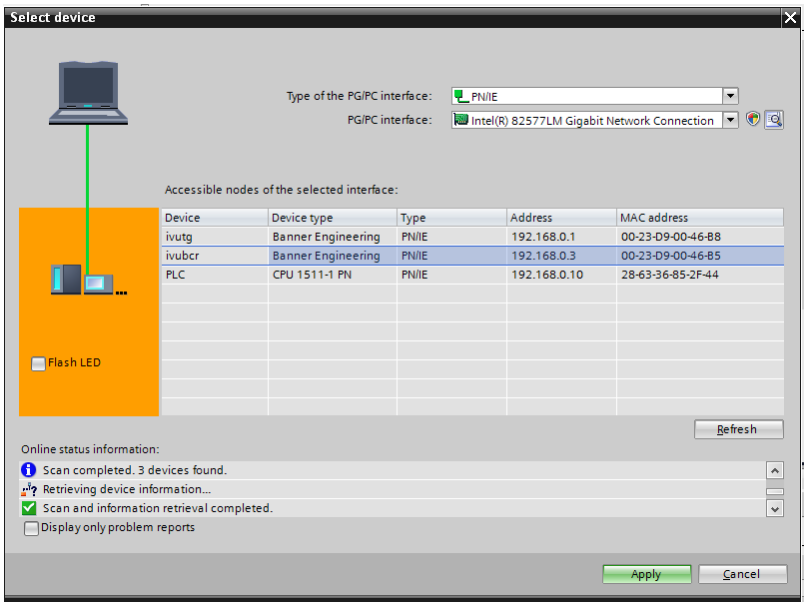


The PC scans the network for PROFINET® devices. If the device you are looking for is not present, check the cabling.

Example of Scanning Results

Under **Online status information**, the scan shows that three devices were found.

Figure 189. Select Device—Online Status Information

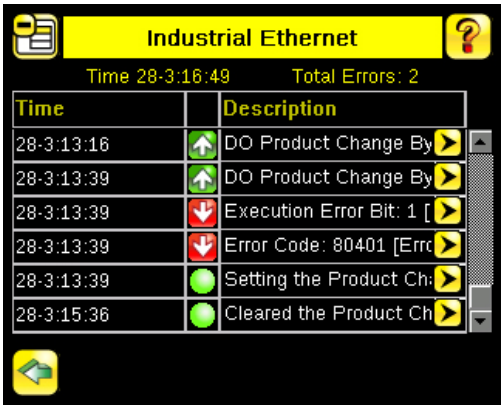


Accessing the iVu BCR Device's Communication Logs

PROFINET® communication activity is recorded in the iVu BCR device's communication logs. Use these instructions to access the iVu BCR device's communication logs via the display.

1. Go to **Main Menu** > **Logs** > **Communication Logs** > **Industrial Ethernet** > **View Logs**.

*Figure 190. **Industrial Ethernet** Screen*

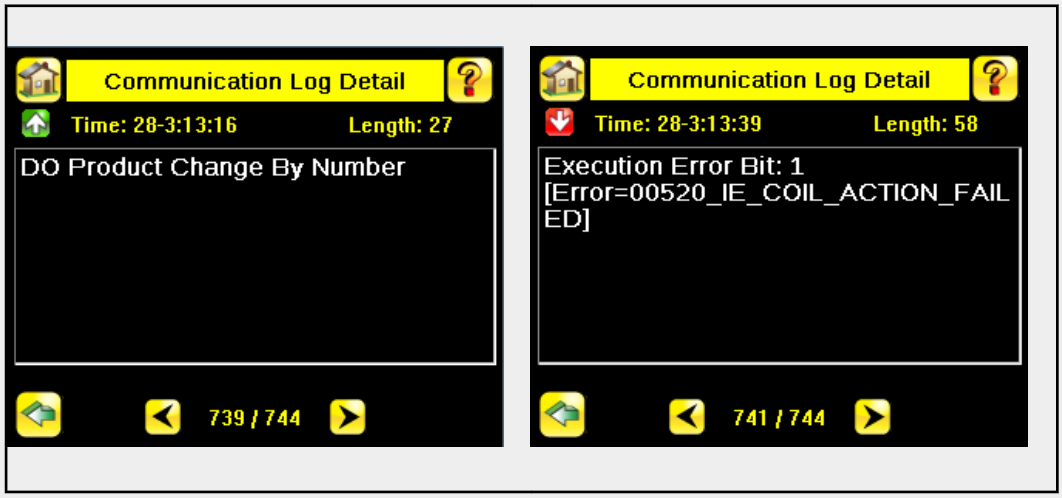


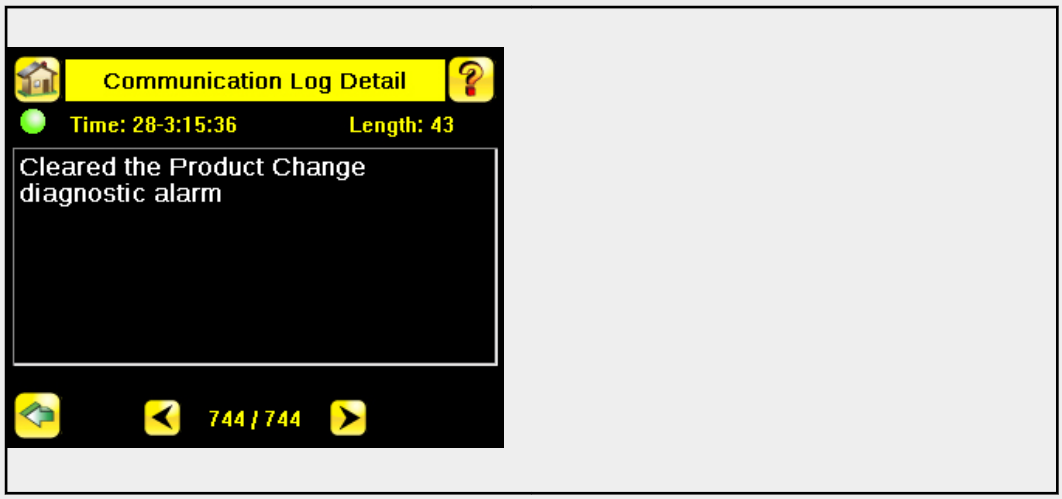
Note: Green communication log icons mean flawless communication. Red communication icons mean communication errors.

2. Click the **Arrow** button on any log entry in the communication log to access the **Communication Log Detail** window.

Note: An expanded description of the communication supports better diagnostics.





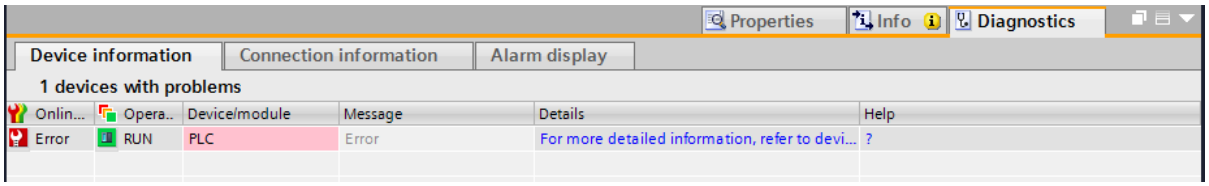


Diagnosing Errors

The Siemens TIA Portal (v13) software includes numerous diagnostic tools. When a computer is connected to the controller (PLC), diagnostic information is available. The controller (PLC) generates a message that displays in the **Diagnostics** window. A flashing red light on the CPU module of the controller (PLC) indicates an error.

1. Click on the text in the **Details** column to request detailed information about the device that caused the error.

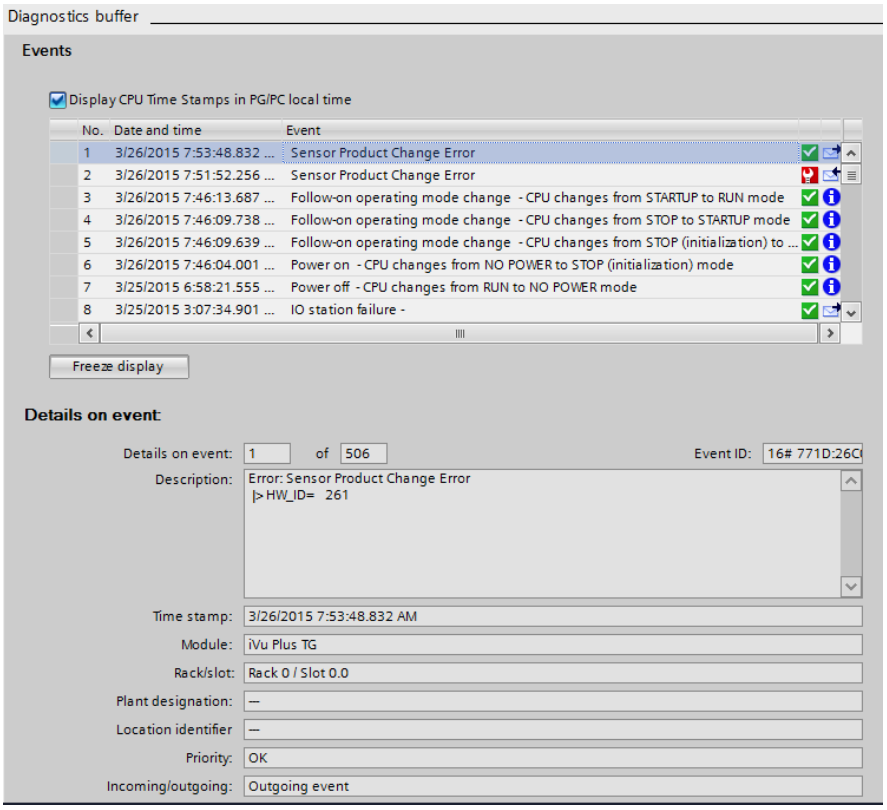
Figure 191. Diagnostics



All system and device messages are displayed in the **Diagnostics buffer** window under **Events** and **Details on event**.

2. Select a message in the table, **Display CPU Time Stamps in PG/PC local time**.

Figure 192. Diagnostics Buffer



The respective information displays in the **Description** field under **Details on event**.

3. Read the message to learn about the error and resolve it. When the error is resolved, the icon that corresponds to the displayed message is green.

14.11 Additional Information

14.11.1 iVu BCR Command Channel Commands (iVu BCR Command Channel over Industrial Ethernet)

This section describes how to use the iVu BCR Command Channel over Industrial Ethernet. See for more information on the iVu BCR Command Channel protocol. The following commands are executed using the Command ID register and the Command Input bit/Input Coil bit.

Command Channel Primer on p. 81

Command	Command ID			Description	Data Type
	Do	Set	Get		
Trigger					
Trigger Mode		1	10001	The iVu BCR triggering mode. This value must match the modes supported by the iVu BCR.	Int16
Product Change					
Product Change By Name	21			This command forces the iVu BCR to switch to the specified inspection. The iVu BCR does not transmit a response until the iVu BCR has completed the action. Inspection results immediately after a product change are invalid until a new trigger is received.	Byte Array
Imager					
Gain		51	10051	The iVu BCR value used to electronically brighten all image pixels.	Int32
Exposure		52	10052	The iVu BCR value used to control the amount of time the imager is allowed to gather light for the image.	Int32
Status					
Clear System Error	81			This command clears the system error LED and resets the internal system error flag to false.	N/A
System					
Reboot Sensor	101			This command restarts the iVu BCR. If the iVu BCR configuration data is currently being saved, this command is blocked until the save operation completes.	N/A
Save Configuration	102			This command saves all modified inspection and configuration parameters. This command blocks all other commands until all values have been persisted.	N/A
Info					
Sensor Name			10151	User-assigned device name.	Byte Array
Model Number			10152	Device model number.	Byte Array
Serial Number			10153	Device serial number.	Byte Array
Firmware Version			10154	Device firmware (software) version.	Byte Array
Hour Counter			10155	The total number of hours the device has been energized.	Byte Array
History					
Clear History	301			This command clears all history fields for the active inspection. History values include pass count, fail count, execution times and sensor-specific history values.	N/A
Inspection					
Inspection Name			10501	The name of the active inspection.	Byte Array
BCR inputs					
Compare String			11001	The Barcode inspection compare data string. This string must start and end with the double quote character.	Byte Array
Compare Mask			11002	The Barcode inspection compare string mask in binary format, that is, masked characters are indicated by a "1" and unmasked characters are "0." Note that the mask character string must match the length of the compare string.	Byte Array

Trigger Mode	1000	Description
External	1	Inspections are initiated via the electrical trigger wire.
Internal	2	Inspections run continuously at the specified period (electrical trigger inputs are ignored).
External Gated	4	Gated barcode inspections are started and/or aborted via the electrical trigger wire.
Continuous Scan	5	Inspections run continuously (electrical trigger inputs are ignored).
Industrial Ethernet	10	Inspections are only trigged by Industrial Ethernet coils and commands.
Command	20	Inspections are only trigged by the Command Channel trigger commands.

Error Codes

The iVu BCR device provides error codes in cases when commands failed to execute successfully. If such an error occurs, the Execution Error flag is set in the Output Bits/Status Register. When this bit is set, read the Error Code register to know the reason for the failure. The following table lists the error codes:

Numeric ID	Text ID	Description
0	SUCCESS	Command processed successfully.
500	IE_TRIGGER_MODE_EXPECTED	The Trigger Mode must be set to **Industrial Ethernet** to perform this operation.
510	IE_COMMAND_NOT_FOUND	The numeric Command ID specified was not found.
520	IE_COIL_ACTION_FAILED	The coil action resulted in a failure.
521	IE_COIL_ALREADY_BUSY	The coil was asserted before the previous execution completed.
522	IE_COIL_NOT_FINISHED	The coil was de-asserted prior to the execution completing.
523	IE_COIL_ANOTHER_ACTION_PENDING	The coil was asserted prior to another coil execution completing.
524	IE_COIL_MULTIPLES_DETECTED	Multiple coils were asserted simultaneously.
525	IE_COIL_ACK_INHIBITED	The coil action's output ACK was inhibited because the input coil was no longer set.
10000	EMPTY_FRAME_RECEIVED	Indicates that the request was empty. The command channel requires a command, any arguments, and an end-of-frame delimiter.
10001	COMMAND_NOT_RECOGNIZED	The command specified is not recognized
10100	GROUP_MISSING	A Group ID must be specified immediately after the command
10101	GROUP_NOT_FOUND	The specified Group ID is invalid / unknown
10102	GROUP_ITEM_MISSING	A Group Item ID must be specified immediately after the Group ID
10103	GROUP_ITEM_NOT_FOUND	The specified Group Item ID is invalid / unknown
10152	NOT_READABLE	Attempt to get a value that is not readable
10153	NOT_WRITEABLE	Attempt to set a value that is not writeable
10250	NOT_A_METHOD	Method ID specified is not a method
10251	WRONG_ARGUMENT_COUNT	Total method arguments specified do not match method
10252	COMMAND_NOT_FINISHED	Attempt to issue command when a previous command has not finished
10300	INVALID_ARGUMENT_TYPE	Item ID specified must be an item (not a group or method)
10301	DATA_VALUE_MISSING	Command missing item's data value
10340	MINIMUM_VALUE_EXCEEDED	New item value is below the minimum
10341	MAXIMUM_VALUE_EXCEEDED	New items value is above the maximum

Numeric ID	Text ID	Description
10350	ARGUMENTS_DETECTED	Get command received with unneeded arguments
10351	INVALID_ARGUMENT_TYPE	Item ID specified must be an item (not a group or method)
10500	DATA_SET_EMPTY	Data export operation returned no results.
10900	SENSOR_NOT_READY	Command specified requires iVu BCR to be in the READY state.
10920	SENSOR_TYPE_NOT_ACTIVE	Command specified belongs to a different sensor type.
10950	DEVICE_TYPE_INVALID	Command not supported on this device type.
15000	VALUE_INVALID	Text value is invalid / unknown
15050	VALUE_INVALID	Text value is invalid - expecting True or False
15100	STRING_TOO_LONG	String value specified exceeds maximum allowable length
20002	COMPARE_DATA_DISABLED	Operation requires Barcode compare to be enabled
20003	COMPARE_MASK_INVALID	Compare mask invalid. Expecting string of 1's and 0's with length equal to compare data string
20004	NUMBER_TO_FIND_NOT_ONE	Barcode number to find must be set to one for this operation.
20005	COMPARE_MASK_DISABLED	Operation requires Barcode compare mask to be enabled.
80000	REMOTE_DISPLAY_NOT_CONNECTED	Remote Display must be connected to obtain this value
80001	REMOTE_DISPLAY_NOT_SUPPORTED	This device does not have Remote Display capability
80100	COMMAND_MODE_EXPECTED	The Trigger Mode must be set to "Command" perform this operation
80101	COMMAND_TIMED_OUT	The command timed out before finishing
80102	TRIGGER_REQUIRED	Access to the specified data requires a triggered inspection
80150	COMMAND_TIMED_OUT	The command timed out before finishing
80200	SYSTEM_ERROR_NOT_ACTIVE	The System Error must be active to execute this command
80350	MULTIPLE_INSPECTIONS_DISABLED	Requires multiple inspections to be enabled
80351	MULTIPLE_INSPECTIONS_EMPTY	No inspections are available in multiple inspection mode.
80400	PRODUCT_CHANGE_WHEN_NOT_READY	Sensor must be in the READY state to perform a product change.
80401	PRODUCT_CHANGE_INVALID_INSPECTION	Attempt to product change to an unknown or invalid inspection.
80402	PRODUCT_CHANGE_TIMEOUT	The Product Change operation timed out.
80403	PRODUCT_CHANGE_TO_SAME_INSPECTION	Attempt to product change to the same inspection.
80404	SENSOR_NAME_NOT_FOUND	Attempt to use a command without a sensor name in a multi-sensor inspection

Examples of Operation

The following examples show how to utilize the iVu BCR Command Channel via the Industrial Ethernet connection.

Clear System Error

1. Write the number `81` as a 16-bit integer into the Command ID register.
2. Toggle the Command bit from 0 to 1 (bit 15 in the Input Bits/Input Coil Bits register).
3. Wait for the Command ACK flag to go from 0 to 1 (bit 15 in the Input Bits ACK/Input Coil Bits ACK register).
4. Verify that the Execution Error flag is not set (that is, the value should be 0). This is bit 15 in the Output Bits/Status Coil Bits register. If the value is 1, read the Error Code register for more information.
5. Task Complete. Toggle the Command bit back to 0 (bit 15 in the Input Bits/Input Coil Bits register).

Get/Set Trigger Mode

Get the current Trigger Mode from the iVu BCR.

1. Write the number `10001` as a 16-bit integer into the Command ID register.
2. Toggle the Command bit from 0 to 1 (bit 15 in the Input Bits/Input Coil Bits register).
3. Wait for the Command ACK flag to go from 0 to 1 (bit 15 in the Input Bits ACK/Input Coil Bits ACK register).
4. Verify that the Execution Error flag is not set (that is, the value should be 0). This is bit 15 in the Output Bits/Status Coil Bits register. If the value is 1, read the Error Code register for more information.
5. Task Complete. Toggle the Command bit back to 0 (bit 15 in the Input Bits/Input Coil Bits register). Read the current Trigger Mode value in the Command Response Int16 register.

iVu BCR model	Trigger Mode	Int16 value
TG/Color/Color, BCR	External	1
TG/Color	Internal	2
TG/Color	Free Run	3
TG/Color, BCR	Industrial Ethernet Only	10
TG/Color, BCR	Command	20
BCR	Continuous Scan	5
BCR	External Gated	4

Set the desired Trigger Mode for the iVu BCR.

1. Write the number **1** as a 16-bit integer into the Command ID register.
2. Write the desired Trigger Mode's Int16 value from the table above into the Command Parameter Int16 register.
3. Toggle the Command bit from 0 to 1 (bit 15 in the Input Bits/Input Coil Bits register).
4. Wait for the Command ACK flag to go from 0 to 1 (bit 15 in the Input Bits ACK/Input Coil Bits ACK register).
5. Verify that the Execution Error flag is not set (that is, the value should be 0). This is bit 15 in the Output Bits/Status Coil Bits register. If the value is 1, read the Error Code register for more information.
6. Task Complete. Toggle the Command bit back to 0 (bit 15 in the Input Bits/Input Coil Bits register).

Set New Barcode Compare String

This procedure assumes that the Data Compare feature is enabled (found in the Inspection menu for the iVu Plus BCR).

1. Write the number `11001` as a 16-bit integer into the Command ID register.
2. Fill in the Command Parameters String registers with the ASCII data to be used as the new barcode compare string.
3. Write a 32-bit integer value equal to the number of ASCII characters present in the new barcode compare string data into the Command Parameter String Length register.
4. Toggle the Command bit from 0 to 1 (bit 15 in the Input Bits/Input Coil Bits register).
5. Wait for the Command ACK flag to go from 0 to 1 (bit 15 in the Input Bits ACK/Input Coil Bits ACK register).
6. Verify that the Execution Error flag is not set (that is, the value should be 0). This is bit 15 in the Output Bits/Status Coil Bits register. If the value is 1, read the Error Code register for more information.
7. Task Complete. Toggle the Command bit back to 0 (bit 15 in the Input Bits/Input Coil Bits register). The new barcode compare string will be utilized for the next inspection.

Get/Set Exposure Time

Get the current Exposure Time from the iVu BCR.

1. Write the number `10052` as a 16-bit integer into the Command ID register.
2. Toggle the Command bit from 0 to 1 (bit 15 in the Input Bits/Input Coil Bits register).
3. Wait for the Command ACK flag to go from 0 to 1 (bit 15 in the Input Bits ACK/Input Coil Bits ACK register).
4. Verify that the Execution Error flag is not set (that is, the value should be 0). This is bit 15 in the Output Bits/Status Coil Bits register. If the value is 1, read the Error Code register for more information.
5. Task Complete. Toggle the Command bit back to 0 (bit 15 in the Input Bits/Input Coil Bits register). Read the current Exposure Time value (in microseconds) in the Command Response Int32 register.

Set the desired Exposure Time for the iVu BCR.

1. Write the number `52` as a 16-bit integer into the Command ID register.
2. Write the desired Exposure Time (in microseconds) as a 32-bit integer value into the Command Parameter Int32 register. The minimum acceptable value is 117 µsec and the maximum value is 1,000,000 µsec.
3. Toggle the Command bit from 0 to 1 (bit 15 in the Input Bits/Input Coil Bits register).
4. Wait for the Command ACK flag to go from 0 to 1 (bit 15 in the Input Bits ACK/Input Coil Bits ACK register).
5. Verify that the Execution Error flag is not set (that is, the value should be 0). This is bit 15 in the Output Bits/Status Coil Bits register. If the value is 1, read the Error Code register for more information.

6. Task Complete. Toggle the Command bit back to 0 (bit 15 in the Input Bits/Input Coil Bits register). The new exposure time will be used for the next inspection. Note that this value is not saved to the iVu BCR device's permanent memory unless the Save Configuration task is completed.

Save iVu BCR Configuration

This command saves all modified inspection and configuration parameters to the iVu BCR, including Command Channel changes to exposure time and gain, trigger mode, barcode compare string and/or mask, and Remote Teach sessions.

1. Write the number `102` as a 16-bit integer into the Command ID register.
2. Toggle the Command bit from 0 to 1 (bit 15 in the Input Bits/Input Coil Bits register).
3. Wait for the Command ACK flag to go from 0 to 1 (bit 15 in the Input Bits ACK/Input Coil Bits ACK register).
4. Verify that the Execution Error flag is not set (that is, the value should be 0). This is bit 15 in the Output Bits/Status Coil Bits register. If the value is 1, read the Error Code register for more information.
5. Task Complete. Toggle the Command bit back to 0 (bit 15 in the Input Bits/Input Coil Bits register).

15 Troubleshooting

15.1 LED Indicator Troubleshooting

In normal operation, the Power LED is green, and the Pass/Fail is green or red depending on the triggered inspection. The Ethernet I/O LED is on or off depending on connection status.

Figure 193. iVu BCR LEDs



1. Power LED
   Green: Ready/Power
   Red (blinking or steady): Error
2. Pass/Fail LED
   Green (steady): Pass
   Green (blinking): Error
   Red: Fail
3. Ethernet I/O LED
   Green: Connected
   Off: Disconnected

The iVu BCR LEDs also indicate abnormal conditions as described in Errors on p. 179.

15.1.1 Errors

Indicator	Solution
The Pass/Fail LED blinks green deveral times, separated by an LED red blink, and the iVu BCR repeats this pattern over and over. This indicates that no inspections are occurring.	Reboot the iVu BCR device.
The Power LED is on steady red. Errors indicated by the Power LED are reported in the System log and appear highlighted in red.	1. Look at the System Log to see the error. 2. Clear the LED. a. Go to **Main Menu** > **Logs** > **System Logs** . b. Click **Clear System Error**. A device reboot is not required. 3. If the error occurs again, try rebooting the iVu BCR to see if that fixes the problem. If the problem persists, contact Banner Engineering.

15.1.2 Warnings

Warnings are atypical conditions that the iVu BCR detects and fixes. Warnings are highlighted in yellow in the **System Log**, and can typically be ignored.

15.2 How to Round-Trip Debug Using the Emulator

This section describes the procedures for performing round-trip debugging using the iVu BCR Emulator in Vision Manager.

Note: This section refers to saving configuration and inspection logs in folders based on the device name. If the device is not named, folders are named using the first eight characters of the device serial number.

Two options are available:

- How to Debug Using Inspection Logs on p. 180
- How to Debug Using Bitmap Files on p. 180

15.2.1 How to Debug Using Inspection Logs

Use this procedure to debug using the inspection logs and the configuration from the iVu BCR. Using the inspection logs and configuration file is helpful when evaluating intermittent failures.

This procedure requires a USB flash drive and a USB cable, PSG-4M-4xx-USB (see Accessories on p. 190).

1. Connect a USB cable to the iVu BCR device.
2. Connect a USB flash drive to the USB cable.
3. Save the Inspection Logs to the USB flash drive.
   a) Go to **Main Menu** > **Inspection Logs** > **View Logs**, and click the **Save** button to save the inspection logs.
   b) When prompted, click **Yes** to save device configuration along with the Inspection Logs.
   The location of these files on the USB flash drive displays after the operation is completed. The Inspection Logs are saved in `[USB:]\BANNER\[SENSOR_NAME]\InspLog` and the device configuration is saved in `[USB:]\BANNER\[SENSOR_NAME]`. For example, if the device name is *myName*:
   - Configuration File (CONFIG.CFG) path: `[USB:]\BANNER\myName`
   - Inspection Logs path: `[USB:]\BANNER\myName\InspLog`

   Note: If the device name is longer than eight characters, only the first eight characters are used in the folder name. If the device has no name, the folder name is the first eight characters of the device serial number.
4. Disconnect the USB flash drive from the iVu BCR device.
5. Connect the USB flash drive to a Windows PC that has Vision Manager installed.
6. If desired, Inspection Log files or bitmap files previously stored on the PC can be copied to the InspLog folder on the USB flash drive.
7. Start Vision Manager and click **Emulators**.
8. For the desired Emulator, click and select the path on USB flash drive to which the device configuration was saved. For example, `[USB:]\BANNER\myName`.
9. Click to connect to the Emulator.
   The Emulator runs with the configuration on the USB flash drive using the saved Inspection Logs in the InspLog folder. Inspections occur depending the Trigger Mode settings.
10. Make the desired adjustments to the inspection or inspections.
11. On the **Home** screen, click to disconnect the Emulator.
    All configuration changes are automatically saved to the CONFIG.CFG file on the USB flash drive.
12. Disconnect the USB flash drive from the PC.
13. Connect the USB flash drive to the iVu BCR device.
14. Restore the configuration to the iVu BCR device.
    a) Go to **Main Menu** > **System** > **Sensor Configuration** > **Load Configuration**.
    b) Select the configuration to restore.
    c) Click **Load** to start the restore device configuration.
    d) Restart the device when the restore is complete.

15.2.2 How to Debug Using Bitmap Files

Use this procedure to debug using bitmap (.bmp) files stored on a PC. The .bmp files are commonly saved to a PC through the **Image Export** function over Ethernet I/O.

This procedure requires a USB flash drive and a USB cable, PSG-4M-4xx-USB (see Accessories on p. 190).

To use .bmp images with this procedure, see How to Use Bitmap Image Files with the iVu BCR Emulator on p. 24.

1. Connect a USB cable to the iVu BCR device.
2. Connect a USB flash drive to the USB cable.
3. Go to **Main Menu** > **System** > **Configuration** > **Save to USB** and click the **Save** button
   The device configuration is saved to the USB flash drive. The location of these files on the USB flash drive displays after the operation is completed. The configuration file is saved in the `[USB:]\BANNER\[SENSOR_NAME]` folder. For example, if the device name is myName, the configuration file (CONFIG.CFG) path is `[USB:]\BANNER\myName`

   Note: If the device name is longer than eight characters, only the first eight characters are used in the folder name. If the device has no name, the folder name is the first eight characters of the device serial number.

4. Disconnect the USB flash drive from the iVu BCR device.
5. Connect the USB flash drive to a Windows PC that has Vision Manager installed.
6. Copy the device configuration file from USB flash drive to desired location on the PC.
   For example, when debugging inspections for an iVu Color device, the image files can be located at: `C:\Users\Public\Documents\Banner Vision Manager\iVu Series\iVu Color`.
7. Make sure the bitmap (.bmp) files to be used for debugging are located in "InspLog" subfolder at that location. For example, C:\Users\Public\Documents\Banner Vision Manager\iVu Series\iVu Color\InspLog. To avoid confusion, remove the bitmap (.bmp) or Inspection Log files (.log) files in the InspLog folder so that those files will not be used for debugging. The iVu BCR Emulator automatically uses all .bmp and .log files sequentially according to filename.
8. Start Vision Manager and click **Emulators**.
9. For the desired Emulator, click and select the path on USB flash drive to which the device configuration was saved. For example, `[USB:]\BANNER\myName`.
10. Click to connect to the Emulator.
    The Emulator runs with the configuration on the USB flash drive using .bmp files in the InspLog folder. Inspections occur depending the Trigger Mode settings.
11. Make the desired adjustments to the inspection or inspections.
12. On the **Home** screen, click to disconnect the Emulator.
    All configuration changes are automatically saved to the CONFIG.CFG file on the PC.
13. Copy the modified device configuration file from the PC to the USB flash drive (`[USB:]\BANNER\myName`).
14. Disconnect the USB flash drive from the PC.
15. Connect the USB flash drive to the iVu BCR device.
16. Restore the configuration to the iVu BCR device.
    a) Go to **Main Menu** > **System** > **Sensor Configuration** > **Load Configuration**.
    b) Select the configuration to restore.
    c) Click **Load** to start the restore device configuration.
    d) Restart the device when the restore is complete.

15.3 Vision Manager Error Codes

Error Code	Description	Recommended Solution
10000	The sensor's feature set is too old to work with this version of Vision Manager.	• Update the sensor firmware to a version compatible with this application • Install an older version of this application
10001	The sensor's feature set is too new to work with this version of Vision Manager.	• Install an newer version of this application • Downgrade the sensor firmware to a version compatible with this application
10005	The sensor was not found at the specified IP address. Network PING results indicate no device present at the specified IP address.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify the sensor subnet is valid
10010	A connection to the sensor could not be established. One or more required channels failed to connect.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor

Error Code	Description	Recommended Solution
10011	A connection to the sensor could not be established. One or more required channels failed to connect	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10012	A connection to the sensor could not be established. A timeout occurred connecting required channels.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10020	A connection to the sensor could not be established. One or more required channels failed to connect.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10021	A connection to the sensor could not be established. One or more required channels failed to connect.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor

Error Code	Description	Recommended Solution
10022	The connection to the sensor was lost while sending data.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10023	The connection to the sensor was lost while receiving data.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10024	The connection to the sensor was lost while receiving data.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10025	The connection to the sensor was lost while receiving data.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor

Error Code	Description	Recommended Solution
10026	The connection to the sensor was lost while receiving data.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10027	The connection to the sensor was lost.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10040	The device at the specified IP address is already connected to another application. This can happen when another Vision Manager is already connected to the sensor.	• Disconnect the other application and try again • Verify there are no other devices using the same IP address
10041	The device at the specified IP address rejected the connection attempt. This can happen when the network device does not support the Vision Manager protocol.	• Verify the sensor's firmware version is compatible with this application • Verify the device at the specified IP address is a Banner Vision sensor
10050	The connection to the sensor was lost.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10051	The connection to the sensor was lost.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor

Error Code	Description	Recommended Solution
10053	The connection to the sensor was lost while receiving data.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10054	The Connection to the sensor was lost while receiving data.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10055	The Connection to the sensor was lost due to network keep alive expiration.	• Verify the network adaptor link speed and duplex settings • Verify the is sensor not stalled, or in shutdown mode
10070	The Connection to sensor was lost due to a receive state machine error.	• Verify the is sensor not stalled, or in shutdown mode • Verify the sensor is supported by this version
10071	The Connection to sensor was lost due to a receive state machine error.	• Verify the is sensor not stalled, or in shutdown mode • Verify the sensor is supported by this version
10080	The Connection to sensor was lost.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10085	A connection to the sensor could not be established. One or more required channels failed to connect.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor

Error Code	Description	Recommended Solution
10086	The connection to the sensor was lost while receiving data.	• Verify the sensor is energized • Verify the sensor communication cable is connected • Verify all inline network equipment is energized, properly configured and connected • Verify all required network equipment cables are connected • Verify the network adaptor is properly configured • Verify the sensor IP address is valid • Verify there are no other devices using the same IP address • Verify the sensor subnet is valid • Verify the sensor can be successfully pinged • Verify the network firewall settings support connection to the sensor
10091	Receiving data from the sensor timed out (no data was received). The connection to the sensor was aborted by this application.	• Verify the network adaptor link speed and duplex settings • Verify the is sensor not stalled, or in shutdown mode
10092	Receiving data from the sensor timed out (partial data was received). The connection to the sensor was aborted by this application.	• Verify the network adaptor link speed and duplex settings • Verify the is sensor not stalled, or in shutdown mode
10093	A parsing error was detected while receiving data from the sensor. The connection to the sensor was aborted by this application.	• Verify the network adaptor link speed and duplex settings • Verify the is sensor not stalled, or in shutdown mode
10094	A receive overrun was detected while receiving data from the sensor. The connection to the sensor was aborted by this application.	• Verify the network adaptor link speed and duplex settings • Verify the is sensor not stalled, or in shutdown mode
10095	Receiving data from the sensor timed out (internal error). The connection to the sensor was aborted by this application.	• Verify the network adaptor link speed and duplex settings • Verify the is sensor not stalled, or in shutdown mode
10096	A transmit timeout occurred while sending data to the sensor (no data was sent). The connection to the sensor was aborted by this application.	• Verify the network adaptor link speed and duplex settings • Verify the is sensor not stalled, or in shutdown mode
10097	A transmit timeout occurred while sending data to the sensor (partial data was sent). The connection to the sensor was aborted by this application.	• Verify the network adaptor link speed and duplex settings • Verify the is sensor not stalled, or in shutdown mode
10100	The connection to the sensor was lost while sending data.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor
10101	The connection to the sensor was lost while sending data.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor

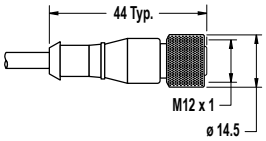
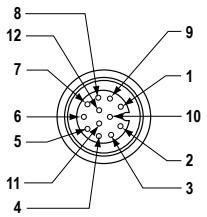
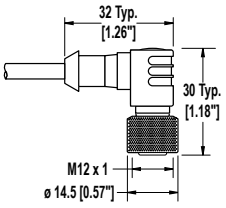
Error Code	Description	Recommended Solution
10110	The connection to the sensor was aborted by this application due to an internal processing error.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor
10111	The connection to the sensor was aborted by this application due to an internal processing error.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor
10120	The connection to the sensor was aborted by this application due to an internal processing error.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor
10125	The connection to the sensor was aborted by this application due to an internal processing error.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor
10126	The connection to the sensor was aborted by this application due to an internal processing error.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor
10140	The Connection to the sensor was lost due to network keep alive expiration.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor
10150	The connection to the sensor was aborted by this application due to an internal processing error.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor
10190	The connection to the sensor was aborted by this application due to an internal threading error.	• Install an newer version of this application • Verify the device at the specified IP address is a Banner Vision sensor • Verify the sensor's firmware version is compatible with this application • Check the firewall setup on computer • Go to Sensor Neighborhood and reconnect to the sensor

Error Code	Description	Recommended Solution
20000	An application error occurred while refreshing the display. An unhandled exception was detected.	• Go to Sensor Neighborhood and reconnect to the sensor
20001	An application error occurred while refreshing the display. There was a problem parsing data from the sensor.	• Go to Sensor Neighborhood and reconnect to the sensor
20010	An application error occurred while refreshing the display. There was a problem creating screen elements.	• Go to Sensor Neighborhood and reconnect to the sensor
20011	An application error occurred while refreshing the display. There was a problem releasing screen elements.	• Go to Sensor Neighborhood and reconnect to the sensor
20020	An application error occurred while refreshing the display. There was a problem synchronizing data.	• Go to Sensor Neighborhood and reconnect to the sensor
20021	An application error occurred while refreshing the display. There was a problem releasing data resources.	• Go to Sensor Neighborhood and reconnect to the sensor
20030	An application error occurred while refreshing the display. There was a problem synchronizing with the inspection.	• Go to Sensor Neighborhood and reconnect to the sensor
20040	An application error occurred while refreshing the display. There was a problem updating input data.	• Go to Sensor Neighborhood and reconnect to the sensor
20041	An application error occurred while refreshing the display. There was a problem updating result data.	• Go to Sensor Neighborhood and reconnect to the sensor
20050	This application detected an error while refreshing the display. There was a problem rendering the image.	• Go to Sensor Neighborhood and reconnect to the sensor
20060	An application error occurred while refreshing the display. There was a problem updating pixel annotations.	• Go to Sensor Neighborhood and reconnect to the sensor
20061	An application error occurred while refreshing the display. There was a problem updating pixel annotations.	• Go to Sensor Neighborhood and reconnect to the sensor
20070	An application error occurred while refreshing the display. There was a problem updating vector annotations.	• Go to Sensor Neighborhood and reconnect to the sensor
20071	An application error occurred while refreshing the display. There was a problem updating vector annotations.	• Go to Sensor Neighborhood and reconnect to the sensor
20072	An application error occurred while refreshing the display. There was a problem releasing vector annotations.	• Go to Sensor Neighborhood and reconnect to the sensor
20150	Connection to the emulator failed.	• Call Banner Customer Support
20151	There was an error starting the emulator.	• Reinstall this application • Check the firewall setup on computer

Error Code	Description	Recommended Solution
20152	The selected emulator could not be found.	• Reinstall this application • Check the firewall setup on computer
20153	There was a problem closing the previous emulator session.	• Reboot the computer to end any processes which did not shut down properly
20154	There was a problem closing the previous emulator session.	• Reboot the computer to end any processes which did not shut down properly
20155	There was a problem closing the previous emulator session.	• Reboot the computer to end any processes which did not shut down properly
20156	There was a problem closing the previous emulator session.	• Reboot the computer to end any processes which did not shut down properly
20157	There was an error starting the emulator.	• Reinstall this application • Check the firewall setup on computer
20158	There was an error starting the emulator.	• Reinstall this application • Check the firewall setup on computer
20159	There was an error starting the emulator.	• Reinstall this application • Check the firewall setup on computer
20160	Another emulator session is currently running. Only one emulator session can be run at a time.	• Close the other Vision Manager currently connected to the emulator • Reboot the computer to end any processes which did not shut down properly
20233	A maintenance service internal error was detected.	• Go to Sensor Neighborhood and reconnect to the sensor • Reboot the sensor • Update the sensor firmware to the latest version • Update the Vision Manager Application to the latest version

16 Accessories

16.1 Power Cable — Required

12-Pin M12/Euro-Style Cordsets with Open Shield				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
MQDC2S-1206	2 m (6.56 ft)	Straight		 1 = White 2 = Brown 3 = Green 4 = Yellow 5 = Gray 6 = Pink 7 = Blue 8 = Red 9 = Orange 10 = Light Blue 11 = Black 12 = Violet
MQDC2S-1215	5 m (16.40 ft)			
MQDC2S-1230	9 m (29.53 ft)			
MQDC2S-1250	16 m (52.49 ft)			
MQDC2S-1275	23 m (75.46 ft)			
MQDC2S-1206RA	2 m (6.56 ft)	Right Angle		
MQDC2S-1215RA	5 m (16.40 ft)			
MQDC2S-1230RA	9 m (29.53 ft)			
MQDC2S-1250RA	16 m (52.49 ft)			

16.2 Remote Display—Required for Setup (Remote Display Models Only)

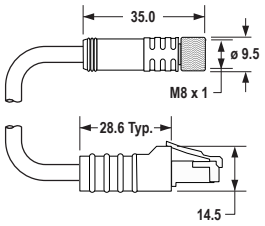
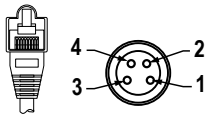
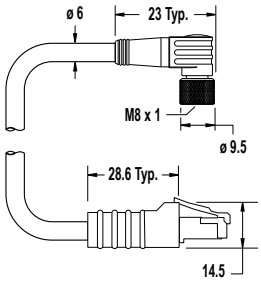
Model	Description	Data Sheet
RDM35	89 mm (3.5 in) Diagonal Machine-Mountable Remote Touchscreen Display	p/n 166096

16.2.1 RDM35 Remote Display Accessory Kit

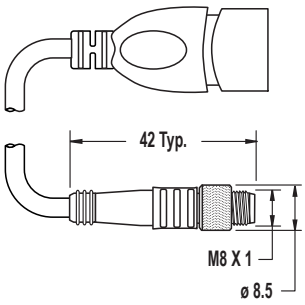
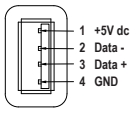
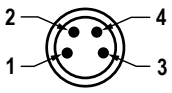
Table 55: ***Cordset Kits***

Model	Length	Description
IVURDM-QDK-803	0.91 m (3 ft)	8-pin cable, straight, M12-M12 Mounting bracket (SMBRDM35) Stylus
IVURDM-QDK-806	1.83 m (6 ft)	
IVURDM-QDK-815	4.57 m (15 ft)	
IVURDM-QDK-830	9.14 m (30 ft)	
IVURDM-QDK-850	15.2 m (50 ft)	
IVURDM-QDK-803RA	0.91 m (3 ft)	8-pin cable, right-angle, M12-M12 Mounting bracket (SMBRDM35) Stylus
IVURDM-QDK-806RA	1.83 m (6 ft)	
IVURDM-QDK-815RA	4.57 m (15 ft)	
IVURDM-QDK-830RA	9.14 m (30 ft)	
IVURDM-QDK-850RA	15.2 m (50 ft)	

16.3 Ethernet Cable Options

RJ45 Ethernet to 4-Pin Threaded M8/Pico-Style Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
IVUC-E-406	1.83 m (6 ft)	Straight Cat5e Shielded		 1 = Blue 2 = White/Blue 3 = White/Orange 4 = Orange
IVUC-E-415	4.57 m (15 ft)			
IVUC-E-430	9.14 m (30 ft)			
IVUC-E-450	15.2 m (50 ft)			
IVUC-E-475	22.9 m (75 ft)			
IVUC-E-406R	1.83 m (6 ft)	Right Angle Cat5e Shielded		
IVUC-E-415R	4.57 m (15 ft)			
IVUC-E-430R	9.14 m (30 ft)			
IVUC-E-450R	15.2 m (50 ft)			

16.4 USB Cable — Optional

4-Pin Threaded M8/Pico-Style to USB Cordsets with Shield—Double Ended				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
PSG-4M-4005-USB	0.15 m (0.5 ft)	Straight Pico QD/ USB		 Male  1 = Red 2 = White 3 = Black 4 = Green
PSG-4M-401-USB	0.31 m (1 ft)			
PSG-4M-403-USB	0.91 m (3 ft)			
PSG-4M-410-USB	3 m (10 ft)			

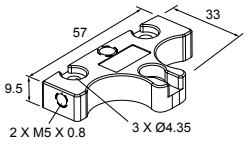
16.5 USB Flash Drive — Optional

Model	Description
IVU-USBFD2	USB Flash Drive 2 GB

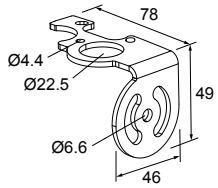
16.6 Brackets

For Use with Integrated Display Models

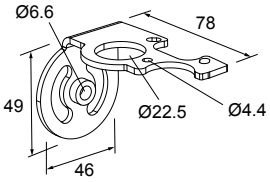
SMBIVUB
- Bottom mounting bracket
- Black anodized aluminum
- Hardware included



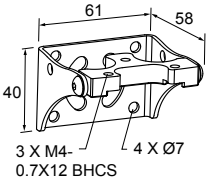
SMBIVURAL
- Right-angle bracket for mounting the device from the left
- 12-ga. stainless steel
- Hardware included



SMBIVURAR
- Right-angle bracket for mounting the device from the right
- 12-ga. stainless steel
- Hardware included



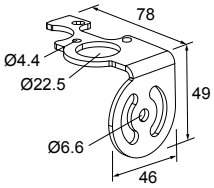
SMBIVUU
- U-shaped swivel bracket kit
- 14-ga. stainless steel
- Hardware included
- Bottom mounting bracket, SMBIVUBP, can be ordered separately



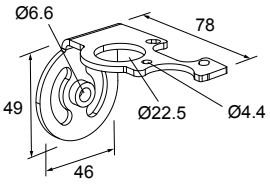
Note: Use cables with right-angle connectors with this bracket kit.

For Use with Remote Display Models

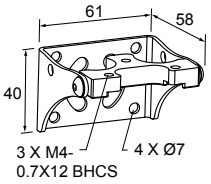
SMBIVURAL
- Right-angle bracket for mounting the device from the left
- 12-ga. stainless steel
- Hardware included



SMBIVURAR
- Right-angle bracket for mounting the device from the right
- 12-ga. stainless steel
- Hardware included



SMBIVUU
- U-shaped swivel bracket kit
- 14-ga. stainless steel
- Hardware included
- Bottom mounting bracket, SMBIVUBP, can be ordered separately



Note: Use cables with right-angle connectors with this bracket kit.

16.7 Micro Video Lens Accessories

16.7.1 Micro Video Lens Models

Model	Lens Description
LMF04 [25]	4.3 mm lens
LMF06	6 mm lens
LMF08	8 mm lens
LMF12	12 mm lens
LMF16	16 mm lens
LMF25	25 mm lens

16.7.2 Micro Video Lens Filters — Optional

Model	Description
FLTMR2	Red and dark red filter kit
FLTMI	Infrared filter kit
FLTMB	Blue filter kit
FLTMG	Green filter kit

16.8 C-Mount Lens Accessories

16.8.1 C-Mount Lens Models

Model	Lens Description
LCF04	4 mm Lens - no threads for filter
LCF08	8 mm Lens - no threads for filter
LCF12	12 mm Lens - no threads for filter
LCF16	16 mm Lens, aperture lock - no threads for filter
LCF25R	25mm lens
LCF25LR	25mm lens with focus locking
LCF50L1R	50mm lens with focus locking, plastic
LCF50L2R	50mm lens with focus locking, metal (will not fit ring)
LCF75LR	75mm lens with focus locking, metal (will not fit ring)

[25] Due to the flexibility of the replaceable lenses, focus mechanism, and imager field-of-view settings, it is possible with the 4.3 mm lens to experience reflections from the internal strobe on the inspection image. To eliminate this effect, the field-of-view can be limited to the system default of 320×240 (or 640×480 for fine), the working distance to the object should be no more than about 8 inches, or an external strobe should be used instead of the internal ring light.

16.8.2 C-Mount Lens Enclosure Models

Model	Description
IVUSLC50-P	Sealed C-mount lens enclosure
IVUSLC75-P	

16.8.3 C-Mount Lens Filters — Optional

Model	Description
FLTR	Red filter kit
FLTB	Blue filter kit
FLTG	Green filter kit
FLTI	IR Filter kit

17 Product Support and Maintenance

This section provides general Banner resources and specific documentation for installers and operators of this iVu BCR.

17.1 Product Support

Banner provides the following resources for quickly setting up and operating the device.

Online Help

When setting up or monitoring inspections using the iVu BCR device's display, view online help on any screen by clicking the **Help** icon in the upper-right corner of the display.

PDF Documentation

The product documentation is available in a convenient printable format (PDF) in the iVu BCR installation package or at www.bannerengineering.com.

Banner Website

The most current product information, documentation, and software updates are available on the Banner website: www.bannerengineering.com.

Warranty Service

Contact Banner Engineering for troubleshooting of this device. **Do not attempt any repairs to this Banner device; it contains no field-replaceable parts or components.** If the device, device part, or device component is determined to be defective by a Banner Applications Engineer, they will advise you of Banner's RMA (Return Merchandise Authorization) procedure.

Important: If instructed to return the device, pack it with care. Damage that occurs in return shipping is not covered by warranty.

Factory Support

To help Banner better assist you, be ready to provide the following information:

- iVu BCR firmware version (to find the version number, go to **Main Menu** > **System** > **Sensor Information**)
- Device model number and date code, which are found on the bottom of the device.
- Exact wording of any messages that appeared on your screen
- A description of what you were doing and what happened
- A description of how you tried to solve the problem
- Error Codes (see LED Indicator Troubleshooting on p. 179)

17.2 Maintenance

Maintenance tasks include keeping the hardware free of dust and dirt and updating the iVu firmware as needed.

17.2.1 Clean the iVu BCR

Regularly remove any dust or dirt from the sensor using a soft cloth.

If needed, slightly dampen the cloth with a weak solution of neutral detergent. Avoid getting dirt on the imager (the area behind the lens). If the imager is dirty, use anti-static compressed air to blow off the dust.

17.2.2 Update the iVu BCR Firmware

Use the following steps to update the iVu firmware.

The current version of iVu firmware is available through Vision Manager. Download the latest version of Vision Manager from www.bannerengineering.com.

Note: iVu firmware is packaged with Vision Manager version 1.5.0 and later.

This procedure requires a USB flash drive and a USB cable, PSG-4M-4xx-USB (see Accessories on p. 190).

1. Connect a USB flash drive to a Windows PC that has Vision Manager installed.
2. In Vision Manager, go to **Sensor Maintenance** and click for the sensor to be updated.

   Note: Vision Manager cannot be connected to the sensor to be updated.

   The folder `C:\Users\Public\Documents\Banner Vision Manager\Firmware\[Vision sensor model]` opens.
3. Copy the folder called "BANNER" to the root of the USB flash drive.
4. Disconnect the USB flash drive from the PC.
5. Connect the USB cable to the iVu BCR.
6. Connect the USB flash drive to the USB cable.
7. On the iVu BCR, go to **Main Menu** > **System** > **Firmware Update**.
   The name of the firmware file you copied to the USB flash drive displays.
8. Select the correct iVu firmware file and click **Load**.
9. Follow the on-screen instructions to update the firmware.

17.2.3 How to Set or Modify a Device Name using the Emulator

You can set a device name for your iVu BCR device or modify an existing name on the device using the keypad. You can also change the device name this using the iVu BCR Emulator as described below.

Note: If you are in a language other than English, you cannot modify the device name using the keypad. Use the procedure described below.

Note: If you have not set the device name previously, folders are named using the first 8-characters of the device serial number.

This procedure requires a USB flash drive and a USB cable, PSG-4M-4xx-USB (see Accessories on p. 190).

1. Connect a USB cable to the device.
2. Connect a USB flash drive to the USB cable.
3. Save the Device Configuration to the USB flash drive. Go to **Main Menu** > **System** > **Configuration** > **Save to USB**.

   The location of these files on the USB flash drive displays after the operation is complete. The device configuration is saved in `[USB:]\BANNER\[DEVICE_NAME]`. For example, if the device name is *myName*, the path is `[USB:]\BANNER\myName`.
4. Disconnect the USB flash drive from the device.
5. Connect the USB flash drive to a Windows PC.
6. If you are running the Emulator installed on a PC, make sure the Emulator is **not** running, and copy the Device Configuration from the USB flash drive to the folder where the Emulator is installed on the PC.

   For example, if the device name is myName and the iVu BCR Emulator is installed in the default location on the PC, copy the file `[USB:]\BANNER\myName\CONFIG.CFG` to `C:\Program Files\Banner Engineering\iVu Series`.
7. Launch the iVuEmulator.exe program (either from the USB flash drive or from the Windows PC, depending on which one you are using).
8. Go to **Main Menu** > **System** > **Information**.
9. Click inside the **Device Name** field, and enter the desired `name`.
10. Click the **Back** button on the lower-left corner of the display to save the device name.
11. Close the Emulator program. The device name is automatically saved to the CONFIG.CFG file.
12. If you are running the Emulator on the PC, copy the CONFIG.CFG file back to the original folder on the USB flash drive, `[USB:]\BANNER\[DEVICE_NAME]`. For example `[USB:]\BANNER\myName`.

    Note: The device looks in the original folder (for example, myName) for the CONFIG.CFG file.
13. Remove the USB flash drive from the PC, and connect it to the device.
14. Restore the configuration to the device.
    a. Go to **Main Menu** > **System** > **Configuration** > **Load from USB**.
    b. Select the configuration to restore.
    c. Click **Load** to start the restore device configuration.

Note: After the new device name is restored in the device, all files saved to USB flash drive will now reside in the folder corresponding to the new device name.

d. Restart the device when the restore is complete.

Note: If a device configuration from one device is loaded onto another device, the device name from the device configuration is not be stored in the device.

17.2.4 How to Reset the Device Password

If you forget the password for your device, contact Banner Engineering for assistance.

17.3 Contact Us

Banner Engineering Corp. headquarters is located at:

9714 Tenth Avenue North
Minneapolis, MN 55441, USA
Phone: + 1 888 373 6767

For worldwide locations and local representatives, visit www.bannerengineering.com.

17.4 Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.

This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

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For patent information, see www.bannerengineering.com/patents.

17.5 FCC Part 15 and CAN ICES-3 (A)/NMB-3(A)

This device complies with part 15 of the FCC Rules and CAN ICES-3 (A)/NMB-3(A). Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules and CAN ICES-3 (A)/NMB-3(A). These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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