iVu Plus BCR Gen2 Series Sensor

more sensors, more solutions

Quick Start Guide

Introduction

This guide is designed to help you set up and install the iVu Plus Barcode Reader (BCR) Gen2 Series Sensor. For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the Instruction Manual at *www.bannerengineering.com*. Search for p/n 179047 to view the Instruction Manual. Use of this document assumes familiarity with pertinent industry standards and practices.

The iVu BCR includes integrated Help.

Program, modify and view inspections through the integrated touch screen, remote touch screen or Vision Manager PC software. Vision Manager is not required to configure or run the iVu BCR.

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.

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.

Features and Indicators



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)

Figure 1. Features

Note: 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.

Installation Instructions

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.

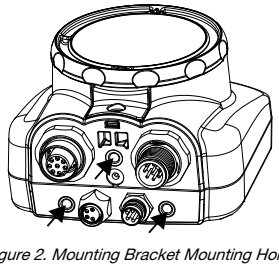

Figure 2. Mounting Bracket Mounting Holes

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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.

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.

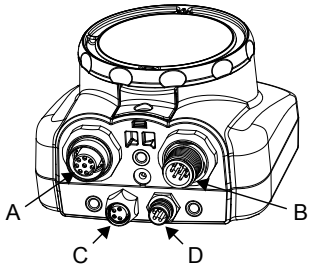


Figure 3. iVu BCR Cable Connections—Micro Video Lens Model

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 1: 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
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

Install the Software

PC Requirements

Operating System
Microsoft® Windows® operating system version 7, 8, or 10[1]
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.

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.

Connect to the Sensor

These instructions use Windows® operating system version 7, 8, or 10.[2]

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

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**.
   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.

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.

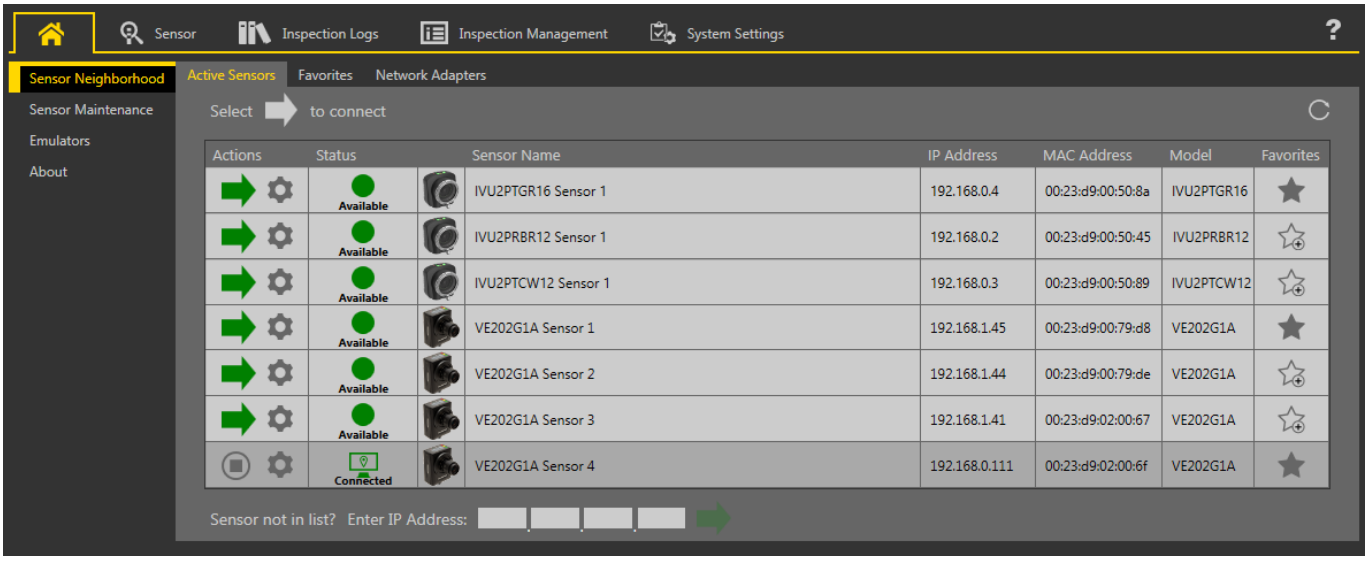


Figure 4. Active Sensors Tab

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 .

Sensor Modes

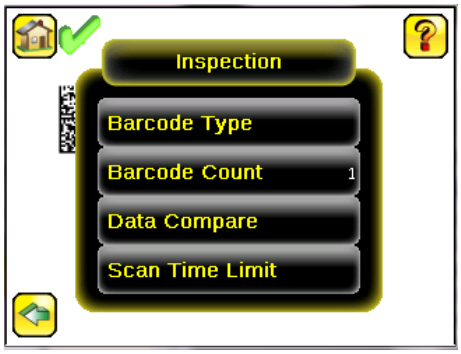
Demo Mode

The first time you power up the iVu BCR sensor, it starts in Demo Mode and allows you to 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, you can learn how to make adjustments while observing how the adjustments affect the sensor results. When you exit Demo Mode, the sensor reboots into its normal operating mode with default settings.

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

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**.



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.

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.

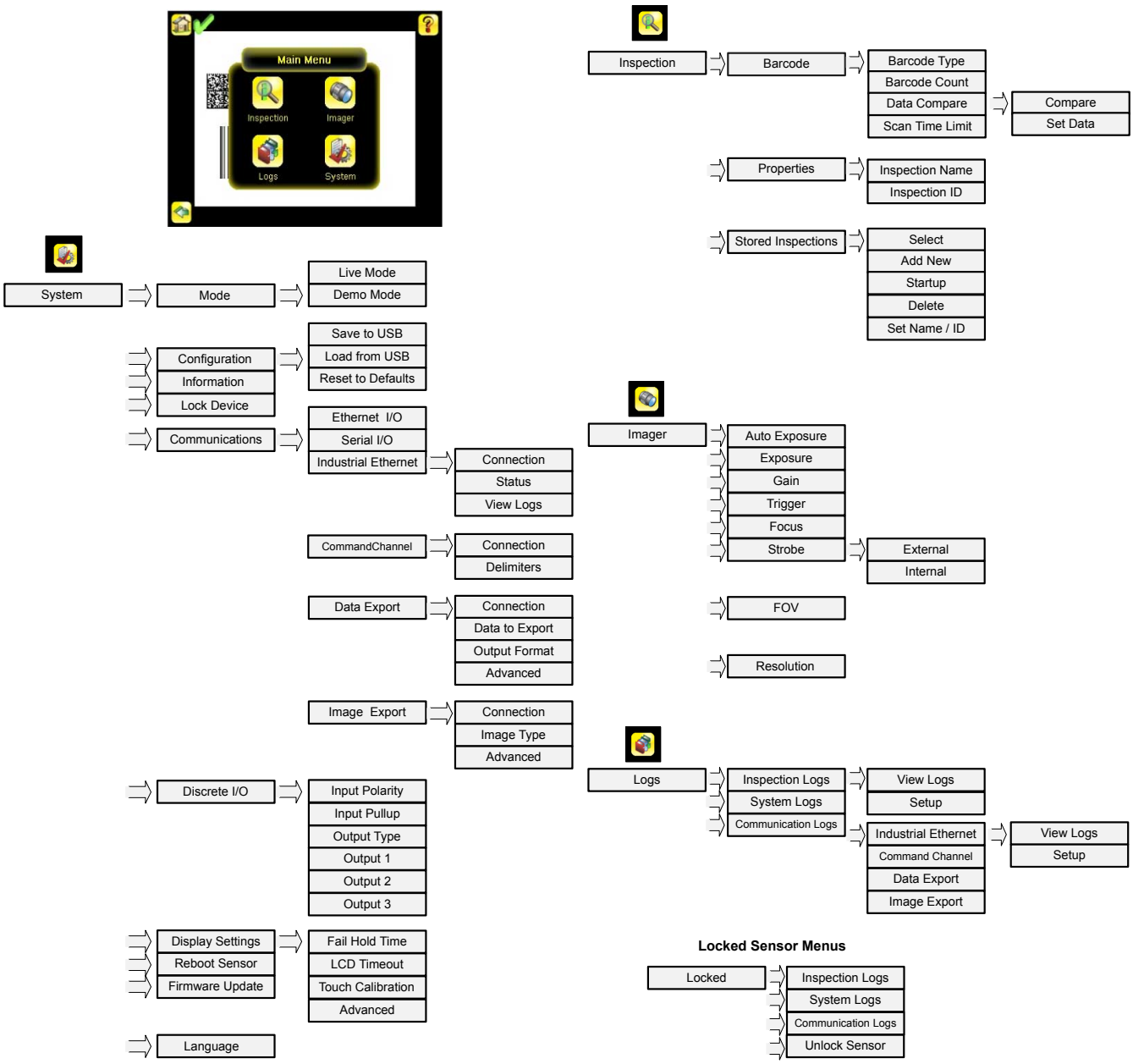
Device Home Screen

Use the **Home** screen on the iVu BCR display to monitor inspections and to configure the iVu BCR. Typically, the part being inspected is centered on the screen with the feature of interest bounded by the Region of Interest (ROI), a rectangle as shown below. The ROI can be rotated and resized, and is highlighted when selected for adjustment.

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



Icon Reference

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.

Icon	Description
	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 **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 **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.

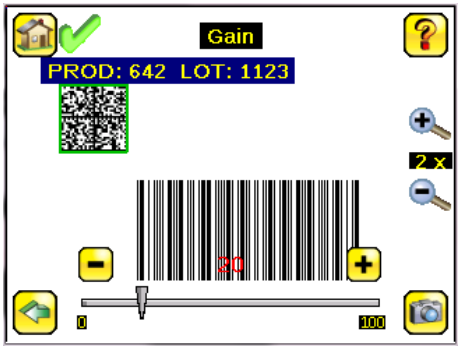
Display Icons

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 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 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.

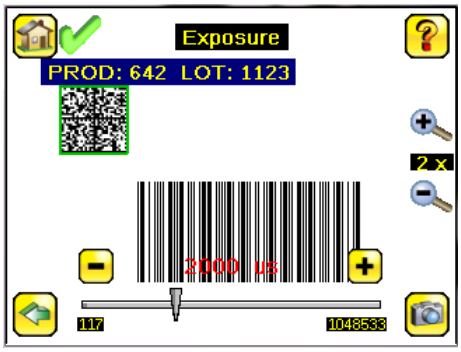
Acquiring a Good Image

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

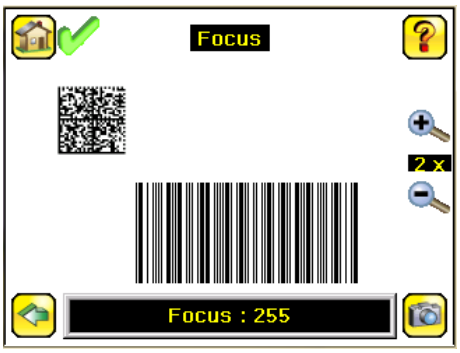
1. Go to **Main Menu** > **Imager** > **Auto Exposure** to run the **Auto Exposure** routine.
2. Check the lighting.
   - Make sure that the lighting is constant and consistent (unchanging over time, no shadows or hot spots).
   - Capture the barcode with lighting that optimizes its contrast and separates 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.

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



Figure 5. Adjust the Focus

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



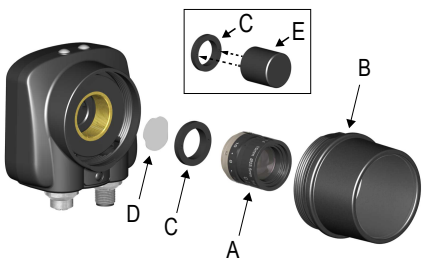
A	Lens
B	Focusing Window
C	Locking Clip
D	Locking Screw
E	Filter Cap
F	Filter

Figure 6. Micro Video Lens Model Components

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.



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

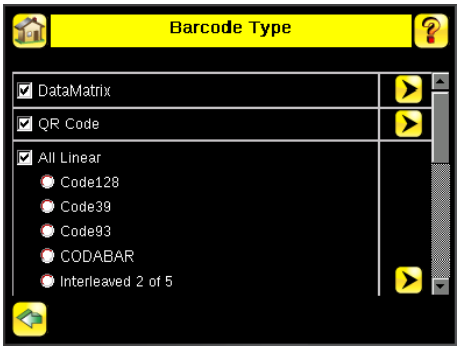
Figure 7. C-Mount Lens Model Components

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

Setting Up a Barcode Application

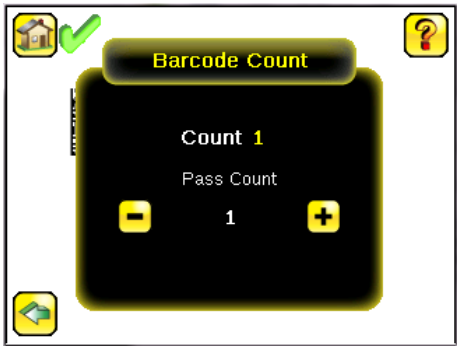
This section describes how to set up the iVu BCR sensor.

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.

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.

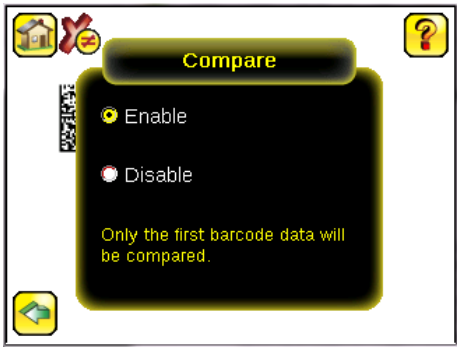
The sensor tries to compare the full length of this string with the data read from the barcode. If it is not equal, the inspection is marked as Fail.

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.

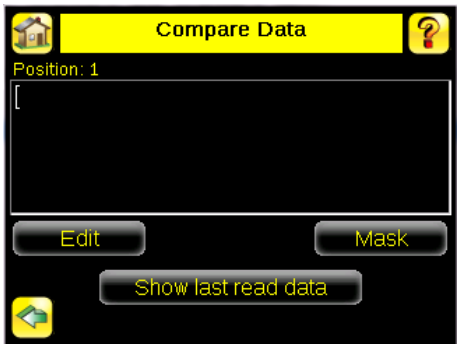
Setting up for Data Compare

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

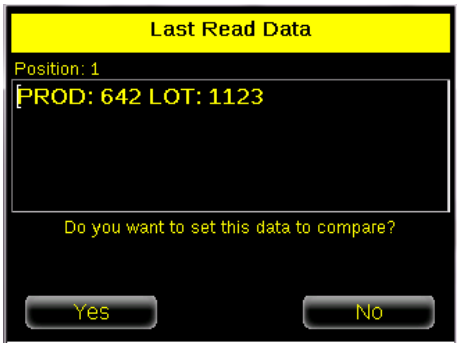
1. Go to **Main Menu** > **Inspection** > **Barcode** > **Data Compare** > **Compare** and enable data compare.



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.

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** .

iVu Plus Communications Overview

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)

Output Format:

- Start String
- Delimiter
- End String

Serial Port Settings:

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

Communication Channels

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

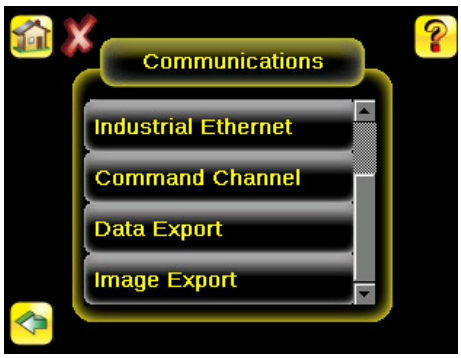


*Figure 8. **Communications** Menu*

- 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™[3], Modbus/TCP, PCCC, or PROFINET®[4] 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.

[3] EtherNet/IP™ is a trademark of ODVA, Inc.
[4] PROFINET® is a registered trademark of PROFIBUS Nutzerorganisation e.V.

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

Multiple Inspections

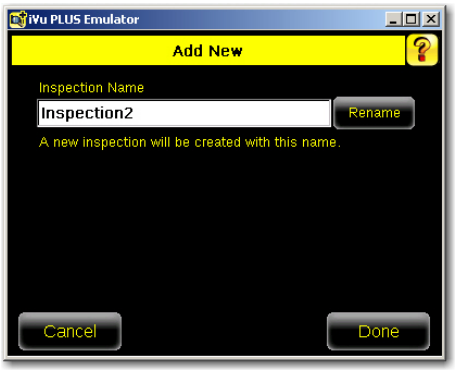
The iVu BCR supports multiple inspections that facilitate storing and controlling up to 30 inspections of different types of barcodes.

By default, Inspection 1 is crated with Data Matrix and Linear Barcodes enabled.

Adding a New Inspection

To add a new stored inspection:

1. Go to **Main Menu** > **Inspection** > **Stored Inspections** and click **Add New**.
2. Select **Rename** to type a new name for the new inspection.

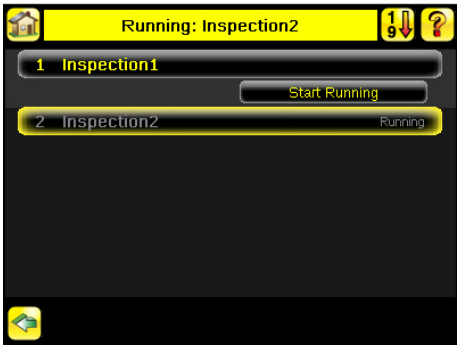


3. Click **Done**. The new inspection with automatically begin running.

Changing Running Inspections

To change the running inspection:

1. From the Home screen, click the yellow button in the top center of the screen that displays the currently running inspection. This will display all the stored inspections.
2. Select the inspection to start and click the **Start Running** button that appears below it.



Changing Inspection Name or ID

To change the name or ID of an inspection go to **Main Menu** > **Inspection** > **Stored Inspections** > **Set Name/ID**. Select the inspection from the list.

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)[5]

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

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[5] This value can vary based on inspection settings.

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the manufacturer.

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