

iVu BCR^{Gen2} Series Sensor

Instruction Manual

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1 Overview of the Sensor

The iVu BCR sensor reads a wide variety of barcodes. The package consists of sensor, 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 without requiring a PC.

- No PC required to configure the sensor
- USB port for uploading and downloading of inspections and log files for easy updating and diagnostics
- Image processing expertise is not required
- Integrated or remote color touch screen display
- High speed processing

The iVu BCR reads the following barcode types:

- DataMatrix (ECC 200) barcodes
- QR Code (QR and Micro QR)
- Linear barcodes: Code128, Code39, CODABAR, Interleaved 2 of 5, EAN13, EAN8, UPCE, Postnet, IMB, and Pharmacode

1.1 Imager Resolution

The iVu Barcode Reader (BCR) Gen2 Series includes an adjustable resolution up to 752×480 pixels.

1.2 Installation

1.2.1 Components

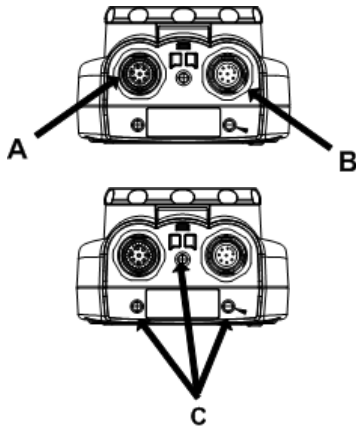
iVu with Integrated Display

The iVu Series sensor comes fully assembled with the lens and an integrated ring light if so ordered. The integrated touchscreen display has a plastic cover to protect the display. Remove this cover when setting up the sensor. When the display is not in use be sure to keep the display covered to protect it.

If an integrated ring light is not used, another light source is needed. Various lights are available from Banner. Operating in external trigger mode requires a triggering source (for example, the Banner WORLD-BEAM® QS18VN6D sensor).



- 1 Focusing Window
- 2 Focusing Window Locking Clip
- 3 LED - Green: Ready; Red: Error
- 4 LED - Green: Pass; Red: Fail
- 5 Integrated Display



- A 8-pin Euro-style (M12) female USB Cable Connector
- B 12-pin Euro-style (M12) male Power and I/O Cable Connector
- C Mounting Bracket Mounting Holes (uses supplied three M4 x 4 mm screws)

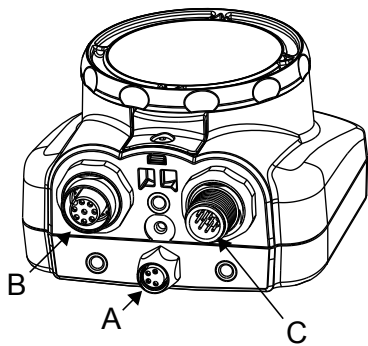
iVu with Remote Display

The iVu sensor for use with a Remote Display comes fully assembled with the lens and an integrated ring light if so ordered. Although the Remote Display is not required for normal sensor operation, it is needed to set up the sensor and to monitor inspections.

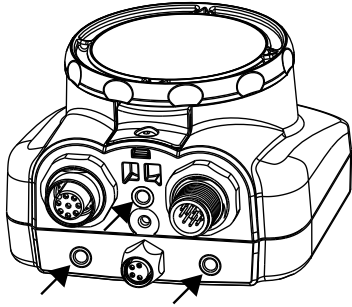
If an integrated ring light is not used, another light source is needed. Various lights are available from Banner. Operating in external trigger mode requires a triggering source (for example, the Banner WORLD-BEAM® QS18VN6D sensor).



- 1 Focusing Window
- 2 Focusing Window Locking Clip
- 3 LED - Green: Ready; Red: Error
- 4 LED - Green: Pass; Red: Fail



- A USB Connector
- B Remote Display Connector
- C Power I/O Connector



Mounting Bracket Mounting Holes (uses supplied three M4 x 4 mm screws)

1.2.2 Cable Connections

Cable Connections for iVu BCR with Integrated Display

The cable connections on the iVu BCR sensor are shown below, and the power I/O connections (B) are defined in [Table 1](#) on page 6.



- A USB Connector
- B Power I/O Connector



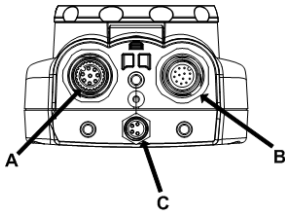
NOTE: Micro video lens model shown. C-Mount model connections are identical.

Table 1: Power I/O Connections

Pin #	Wire Color	Description	Direction
1	White	Output 1	Output
2	Brown	10-30V dc	Input
3	Green	Output 2	Output
4	Yellow	Strobe Out (5V 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	Not used	N/A
10	Light Blue	RS-232 TX	Output
11	Black	RS-232 Signal Ground	Output
12	Violet	RS-232 Rx	Input

Cable Connections for the iVu BCR with a Remote Display

The cable connections on the iVu BCR sensor are shown below, and power I/O connections (B) are defined in [Table 2](#) on page 7.



- A Remote Display Connector
- B Power I/O Connector
- C USB Connector



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

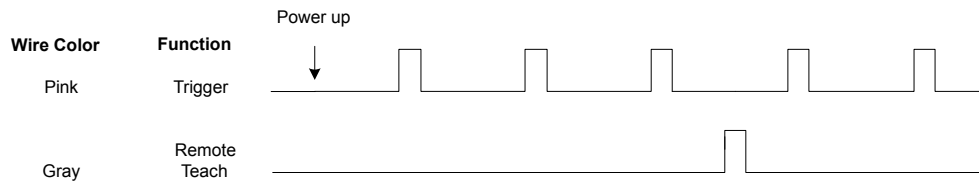
Table 2: Power I/O Connections

Pin #	Wire Color	Description	Direction
1	White	Output 1	Output
2	Brown	10-30V dc	Input
3	Green	Output 2	Output
4	Yellow	Strobe Out (5V 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	Not used	N/A
10	Light Blue	RS-232 TX	Output
11	Black	RS-232 Signal Ground	Output
12	Violet	RS-232 Rx	Input

iVu Trigger, Remote Teach, and I/O Waveforms

The iVu has two input signals—Trigger and Remote Teach. The default setting is to detect the low to high transition. This setting can be changed in the Main Menu > System > Discrete I/O > Input Polarity screen on the sensor.

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



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

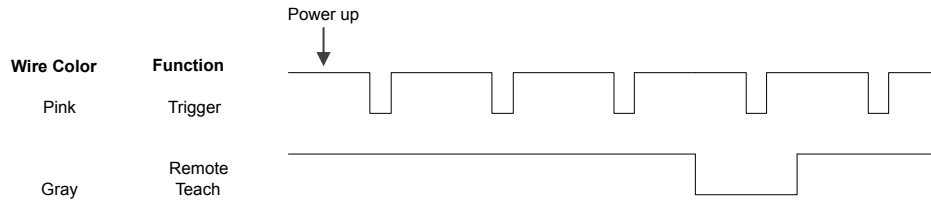


NOTE:

Table 3: Required iVu Input Signal Voltage

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

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



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



NOTE:

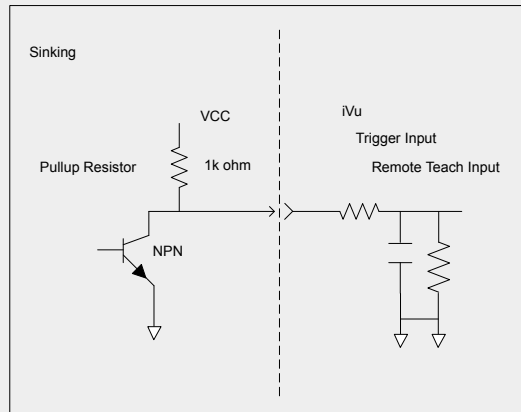
Table 4: Required iVu Input Signal Voltage

	ON	OFF
NPN	< 2 V dc	+10 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 1k ohm, between the sensor's positive (+) voltage and the sensor's input as shown below.



Option 2: Enable the Input Pullup in the iVu BCR software (Main Menu > System > Discrete I/O > Input Pullup).

iVu Output Waveforms

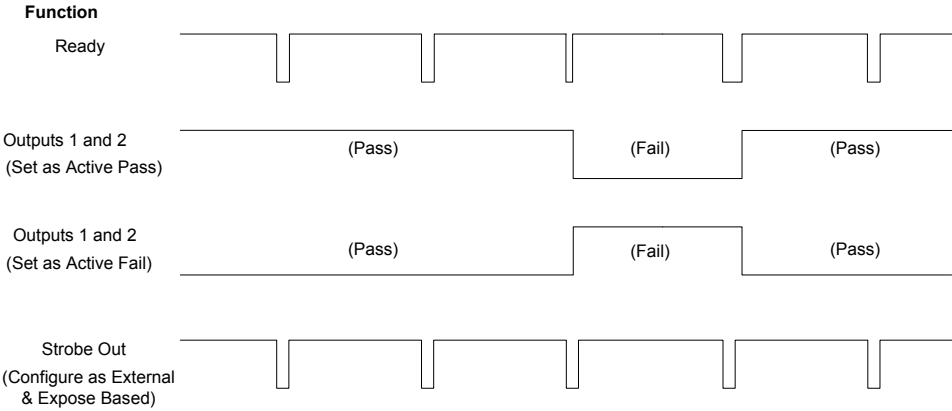


Figure 1. PNP Outputs

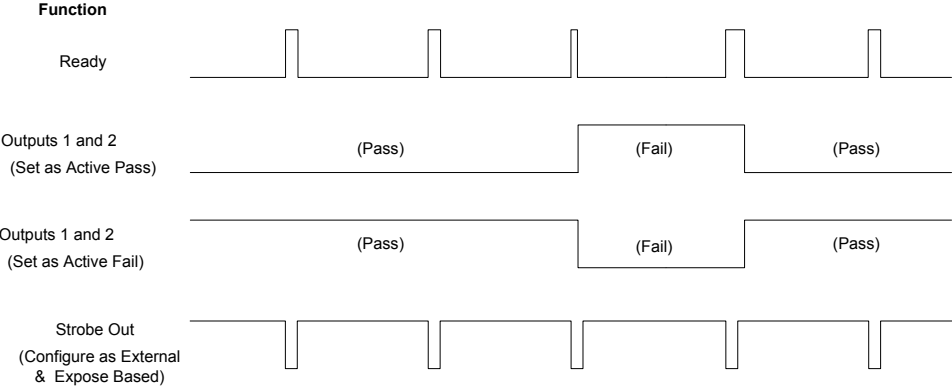


Figure 2. NPN Outputs



NOTE:

Table 5: Expected iVu Output Signal Voltage

	ON	OFF
PNP	+V	< 2 V dc
NPN	< 2 V dc	+V

1.2.3 Installing and Connecting the Sensor

The iVu BCR sensor requires a bracket for mounting. Three brackets are available from Banner. The brackets allow the sensor to be mounted either perpendicular to the part or at an adjustable angle.

Thread three M4 x 4mm screws through the bracket into the mounting holes in the bottom of the sensor. Tighten all three screws.

Table 6: iVu Brackets

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Installing a Filter on iVu Series Sensors

Installing a Filter on the Micro Video Lens Model

To install a filter on the iVu Series sensor 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 Series sensor.

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

1. Remove the Focusing Window locking screw (D) using the 1/16 in. hex key.



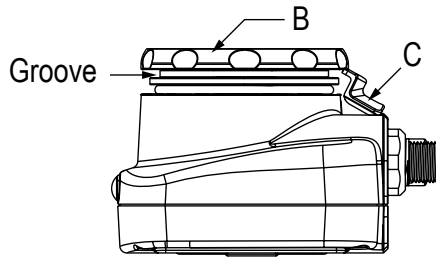
NOTE: The Locking Clip (C) inserts in a groove near the top of the Focusing Window (B). When removing the window, the Locking Clip will be loose. Be careful not to lose the clip while removing the window.

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. Give a slight tug on the Focusing Window when you think you've unscrewed it far enough. 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. Be careful 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.



7. Press the Focusing Window onto the housing to make sure that it seats correctly (no gap between the window and housing). Rotate the window counter-clockwise at least two turns.
8. Replace the locking tab screw but do not tighten until you have set up and focused the sensor again.

Installing a Filter on the C-Mount Lens Model

To install a filter on the iVu Series sensor 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 Series sensor.

C-Mount Lens Models	
	A C-Mount Lens
	B Lens Enclosure
	C Retainer Ring (optional)
	D Filter (optional)
	E Filter Retainer Ring Tool
NOTE: Filter Kits are available separately.	

1. Remove the Lens Enclosure and 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 sensor until it firmly seats the filter.
4. Replace the Lens and Lens Enclosure on the camera.



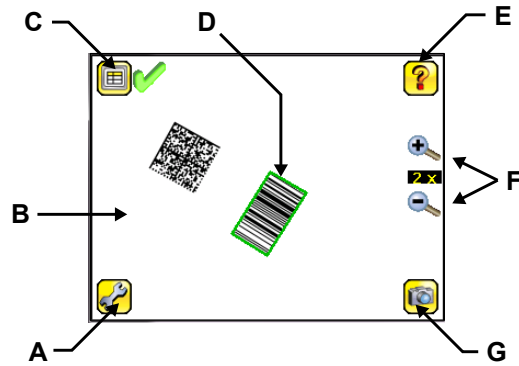
CAUTION: Electrostatic Discharge

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.

1.3 Home Screen

The Home screen on the iVu Series sensor display is used to monitor inspections and to configure the sensor. Normally, the part being inspected is centered on the screen.



A	Main Menu
B	Field of View
C	Display Modes
D	Decoded Barcode
E	Help Button
F	Zoom In (+) Zoom Out (-)
G	Manual Trigger

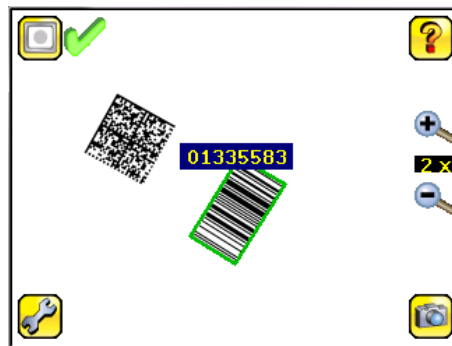
1.4 Display Modes

In the upper left of the screen is an icon for accessing different Display Modes:

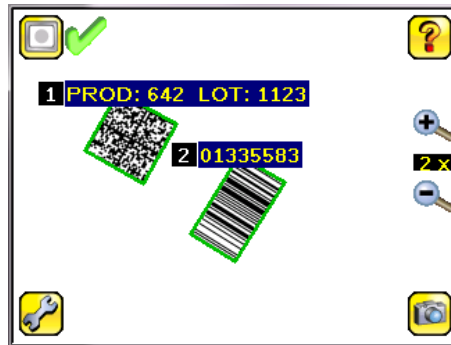
- Display Annotations
- Hide Annotations
- Display Statistics.

1.4.1 Display/Hide Annotations

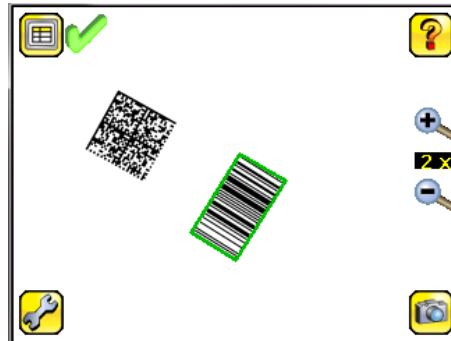
Click the icon in the upper-left of the screen to display annotations. When annotations are on, the display shows the data the sensor has read.




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 screen to hide annotations.



Inspection Statistics

To access the Inspection Statistics, click the Display mode icon .

Click the arrow to access the other page.

The Inspection Statistic mode has three pages:

- History
- Inspection Result
- Inspection Inputs

Click the arrows to access the other pages.

History

The History screen shows inspection history from sensor reboot, or the last time the statistics were reset, including:

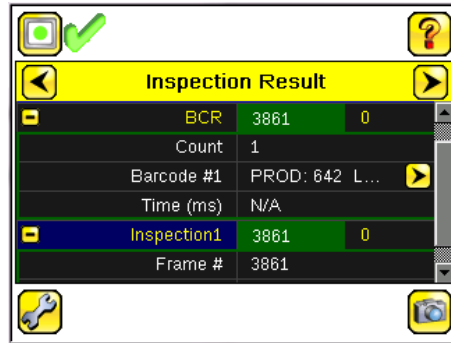
- Count Range—minimum and maximum number of objects observed
- Passed—running total of parts that passed inspection
- Failed—running total of parts that failed inspection
- Missed triggers—running total of missed triggers
- Time Range—minimum and maximum inspection times observed

Click the Reset button to reset statistics.

Inspection Results

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

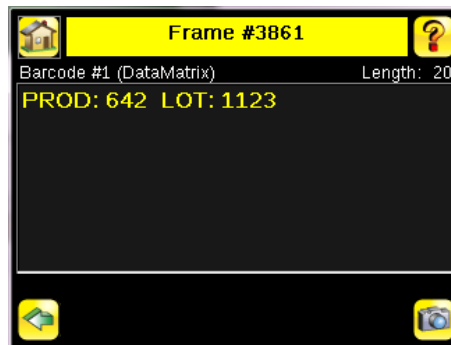
- last Frame number
- Barcode Count
- Inspection Time
- read Barcode Data



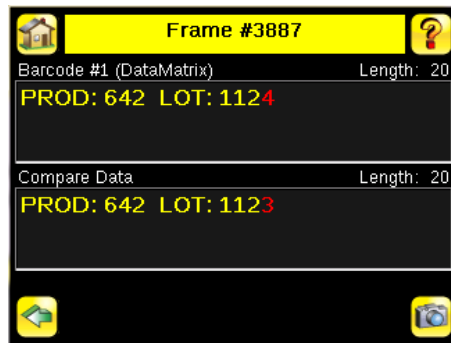
Barcode Viewer

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 is displayed in yellow.

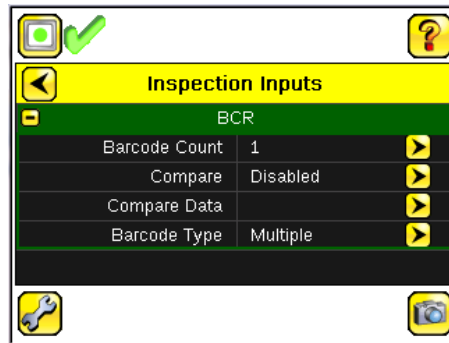


If Data Compare is enabled and the barcode is the first one, there are two text boxes. The upper one displays the data read from the barcode, and the lower text box shows the data from the Data Compare screen. The sensor does a position-by-position match and the characters that match are in yellow and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



Inspection Inputs

The Inspection Input page has the sensor settings. Use this page 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.



1.5 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. The barcode types are selected on the integrated touch screen by accessing Main Menu > Inspection > Barcode Type. The barcode count is selected on the touch screen by going to Main Menu > Inspection > Barcode Count.

1.5.1 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 sensor is configured where Data Compare is disabled, Pass and Fail are the same as Read and No Read.
- If the sensor is using the Data Compare feature, Pass indicates that a good barcode was found and the data compared.
- If the sensor 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.

1.5.2 Trigger Modes

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

- External-Single
- Continuous
- External-Gated
- Command

1.5.3 Compare Data

The iVu BCR has a data compare feature for comparing read barcode data against reference data. Data can be manually entered by navigating to the Main Menu > Inspection > Data Compare > Set Data screen. Data of up to 3200 characters can be entered. Additionally, the data compare feature provides for masking characters within the data.

There are two other ways to enter compare data:

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

The sensor tries to compare full length of this string with the data read from the barcode. If 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.

1.5.4 Output 1 and Output 2

The sensor has two output signals that you can configure 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.



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.

1.5.5 Remote Teach

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

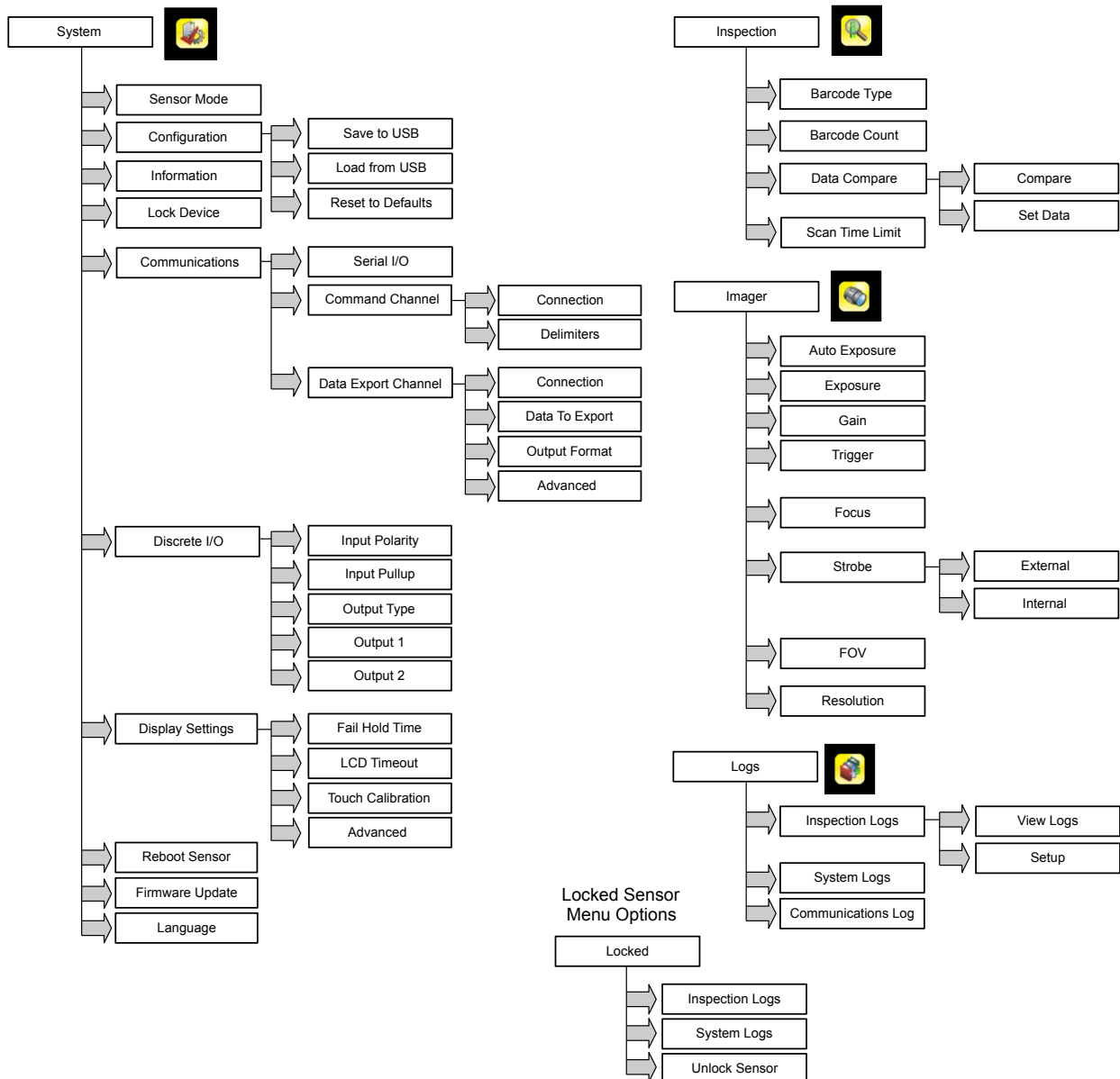
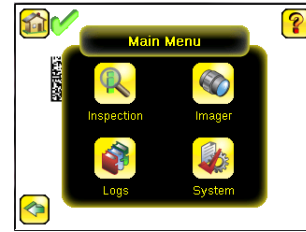
1. With the sensor Ready (see [Installation](#) on page 4), pulse the Remote Teach line.
2. The sensor recognizes that the Remote Teach line has been pulsed and waits for the next valid trigger.
3. At the next valid trigger, Ready goes inactive (the Green Ready LED shuts OFF), and the sensor acquires a new image.

2 Main Menu Reference

2.1 Main Menu





















The Main Menu has four sections:

- Inspection—to modify inspection settings
- Imager—to run the Auto Exposure routine and to make adjustments to functions like exposure, gain, and strobe
- System—to set output signals, communication channel parameters and to manage the device
- Logs—to configure and view System and Inspection Logs












2.1.1 Icon Reference







Action Icons

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

Display Icons

Icon	Description
	The Inspection Passed icon is located in the upper-left of the screen, and indicates that the last inspection passed its test conditions.
	One of the possible Inspection Failed icons located in the upper-left of the screen, it indicates that the last inspection failed.
	In either External - Single or External Gated trigger mode this is one of the possible Inspection Failed icons located in the upper-left of the screen. It indicates that the inspection failed because there were fewer barcodes than specified by the Barcode Count.
	In Continuous Scan mode this icon appears in the upper-left of the screen, and 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 located in the upper-left of the screen, it 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 appears in the upper-left of the screen, and 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 located in the upper-left of the screen, it indicates that the sensor is in fail hold mode.
	One of the possible Inspection Failed icons located in the upper-left of the screen, it indicates that the data compare has failed for the barcode that the sensor read.
	The Sensor Locked icon is located in the upper-left of the screen, and indicates that the sensor is in a locked state. If no icon is displayed, the sensor is unlocked.

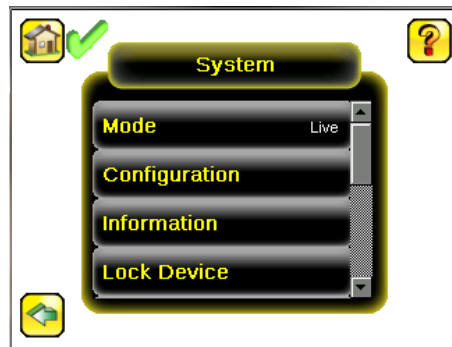
Communications Log Icons

Icon	Description
	Port opened.
	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.
	If the response frame contains an error or is dropped, the log entry icons for the request and the response frames will be colored red, and the displayed error count will increment by one.
	If the command takes a long time to process, the last long entry will change to an hourglass (for example, during trigger of long inspections).

2.2 System Menu

Main Menu > System

The System menu icon is on the Main Menu, and is used to manage the sensor. The System menu provides for selecting Sensor Mode, updating sensor firmware, backing up and restoring sensor Configuration, and other general system-level operations.



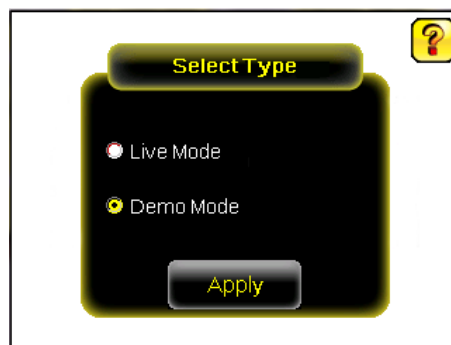
2.2.1 Mode

Main Menu > System > Mode

The sensor 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 device is powered up it starts in Demo Mode and allows you to choose whether to stay in Demo Mode or exit to Live Mode.



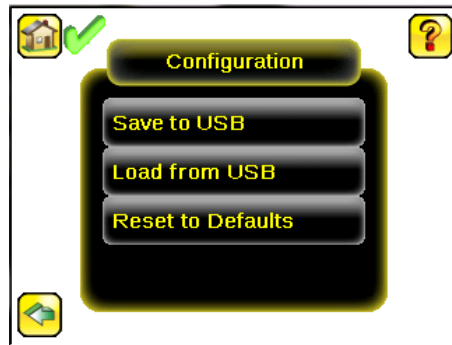
Demo Mode uses stored images and inspection parameters that demonstrate how the sensor is set up without having to worry about focus, lighting, or triggers. In this mode, practice making adjustments while observing how the adjustments affect the results. To exit Demo Mode go to Main Menu > System > Mode and select Exit Demo Mode. Upon exit, the sensor reboots into its normal operating mode with default settings.

2.2.2 System Configuration

Main Menu > System > Configuration

The Configuration menu options are:

- Save sensor Configuration to the USB flash drive
- Load sensor Configuration from the USB flash drive
- Reset the sensor Configuration to defaults
- Update sensor firmware



Save to USB

Main Menu > System > Sensor Configuration > Save to USB

The Save to USB screen allows the sensor Configuration to be saved to a USB flash drive. The saved configuration information can be used as a backup or as a way to clone configuration information for other sensors.



NOTE: On the Emulator, this option is Save Configuration.

Load from USB

Main Menu > System > Sensor Configuration > Load from USB

The Load from USB screen allows the sensor 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.

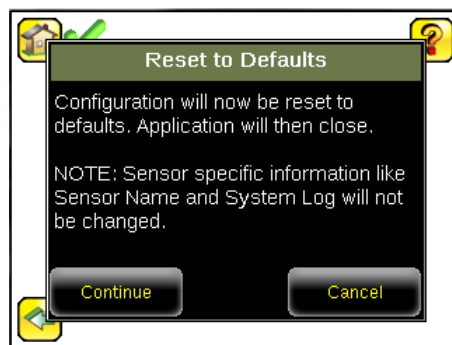


NOTE: On the Emulator, this option is Load Configuration.

Reset to Defaults

Main Menu > System > Sensor Configuration > Reset to Defaults

Resets all sensor configurations to the factory defaults. This operation will remove all existing inspections and replace them with factory default settings.



2.2.3 System Information

Main Menu > System > Information

The Information screen displays the following sensor information:

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

- Model Number
- Device Name

Click the right-arrow next to the Sensor Name field to display a software keyboard that allows you to change the Sensor Name.

2.2.4 Lock device

Main Menu > System > Lock device

This option provides for locking the sensor to prevent accidental modification of settings. When locked, the sensor 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 sensor display indicates that the sensor is locked. Note that the sensor can be locked with or without a password. If a password is not used, unlock the sensor by clicking on the Unlock device menu. When a password is used, it must be 4 digits entered using the software keypad. If the password is lost, use the Password Reset Utility software provided on the CD to obtain a Reset Key.



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

2.2.5 Communications

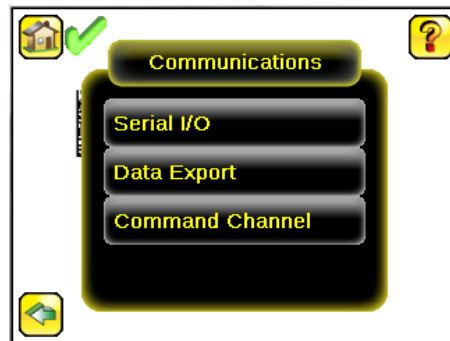
Main Menu > System > Communications

The Communications menu is used to configure the serial I/O channel. There are three menu options:

- Serial I/O for configuring the Serial port
- 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



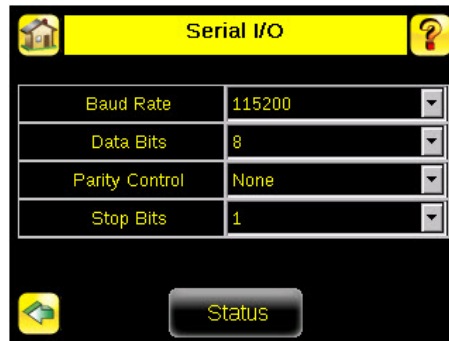
NOTE: Either Data Export Channel OR Command Channel can be enabled at a time.



Serial I/O

Main Menu > System > Communications > Serial I/O

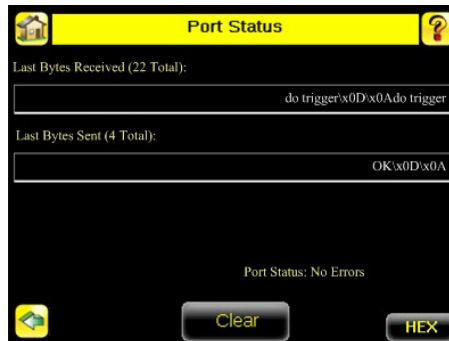
Set Serial I/O settings for Baud Rate, Data Bits, Parity Control and Stop Bits on this screen. Clicking Status displays recent bytes transmitted through this channel.



Port Status

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

The Port Status screen can be used to ensure data is entering and exiting the sensor. This can be useful for debugging issues such as improper wiring, mismatched baud rates, or other serial I/O issues.



Data Export

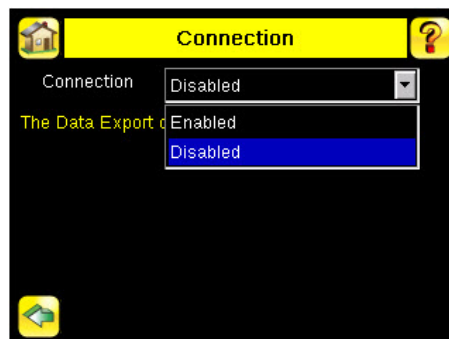
Main Menu > System > Communications > Data Export

When the Data Export is enabled, the sensor will transmit selected inspection data when triggered.

Connection

Main Menu > System > Communications > Data Export > Connection

The Connection screen is used to enable or disable the Data Export.



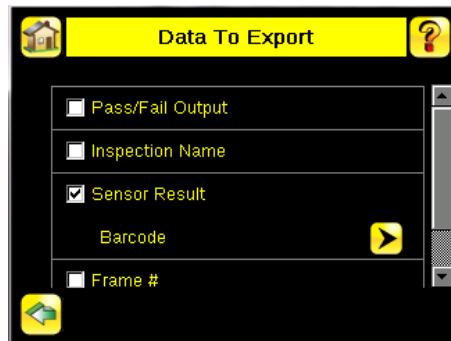
Data To Export

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

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



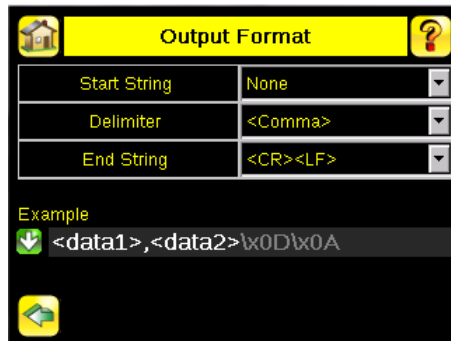
NOTE: Grab the edge of the Data to Export menu and pull down to allow all information to show.



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 a Delimiter. In the field at the bottom of the screen is an example of how the data will look when it is output.



Command Channel

Main Menu > System > Communications > Command Channel

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

Connection

Main Menu > System > Communications > Command Channel > Connection

The Connection screen is used to enable or disable the Command Channel.

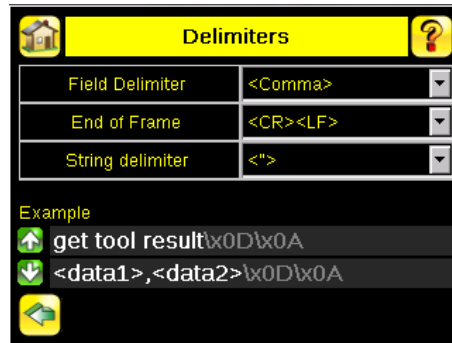
Delimiters

Main Menu > System > Communications > Command Channel > Delimiters

In the Delimiters screen, there are three delimiter options that you can set:

- Field Delimiter, which determines what is used to separate data that the sensor is sending out to a remote device.
- End of Frame, which determines the delimiter used to indicate the end of a frame.
- String Delimiter, which determines what is used to enclose a string field during both input and output operations.

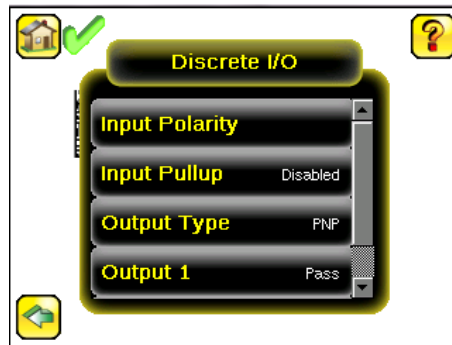
Use the drop-down lists to select the appropriate delimiter. The example at the lower part of the screen displays how the data will look in the output or input streams.



2.2.6 Discrete I/O

Main Menu > System > Discrete I/O

The Discrete I/O options are used to adjust iVu input and output settings.



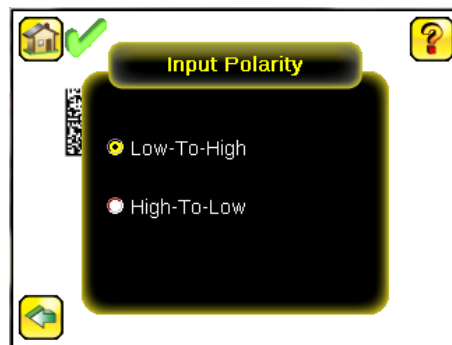
Input Polarity

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

The iVu has two input signals—Trigger and Remote Teach. 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 sensor is Low To High, and for an NPN sensor it is High To Low. The user can change the setting on the Input Polarity screen.

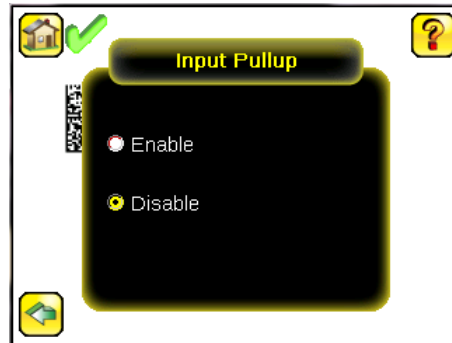


Input Pullup

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

The NPN version of the iVu sensor triggers from high to low, and Remote Teach behaves electrically like trigger. If using the NPN version of the sensor, select Enable.

The PNP version of the iVu sensor triggers from low to high, and Remote Teach behaves electrically like trigger. If using the PNP version of the sensor, select Disable.



Output Type

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

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

Output 1

Main Menu > System > Sensor Configuration > Discrete I/O > Output 1

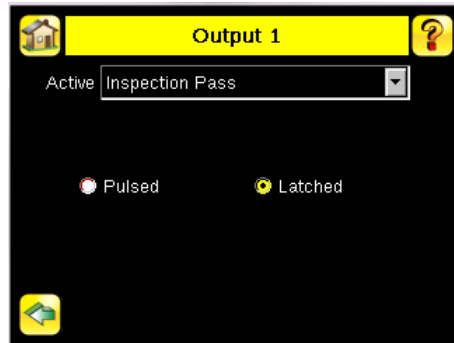
Output 1 can be configured for Inspection Pass, Inspection Fail, Read, No Read, Match, No Match, Missed Trigger, or System Error.

- 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 sensor is busy inspecting the previous image. This output signal will be set to active state. This signal will be 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 will be set to 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.

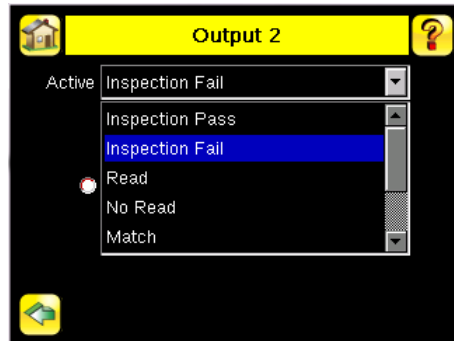


Output2

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

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

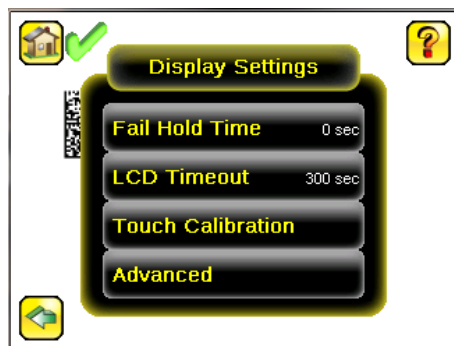
The default setting for Output 2 is Inspection Fail and Latched.



2.2.7 Display Settings

Main Menu > System > Display Settings

The Display Settings menu is for setting the Fail Hold Time, LCD Timeout, and doing a Touch Screen Calibration. Display optimization can be enabled in the Advanced menu.



Fail Hold Time

Main Menu > System > Display Settings > Fail Hold Time

The Fail Hold Time determines how long a failed image is displayed on the LCD so that you can see what failed. The sensor will continue to process any triggers and the inspection will continue normally. This time delay is just for the screen. You can set this parameter from 0 to 3600 seconds using the slider at the bottom of the screen.



LCD Timeout

Main Menu > System > Display Settings > LCD Timeout

The LCD screen dims after a user-selectable period when the device is not being used. Use the arrow keys or slide the bar at the bottom of the screen to set the LCD screen time out.



NOTE: This screen is not available in the Emulator.

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 touch screen's coordinates to the display behind it. Be sure to follow the prompts on the screen when executing the Touchscreen Calibration function.



NOTE: This screen is not available in the Emulator.

Advanced

Main Menu > System > Display Settings > Advanced

The Advanced Display screen allows you to enable the Optimize Display Response option. This feature helps to make the display more responsive when the sensor 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 sensor is busy.

2.2.8 Reboot Sensor

Main Menu > System > Reboot Sensor

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



NOTE: This option is not available on the Emulator.

2.2.9 Firmware Update

Main Menu > System > Firmware Update

The Firmware Update screen is used to load the latest sensor 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.

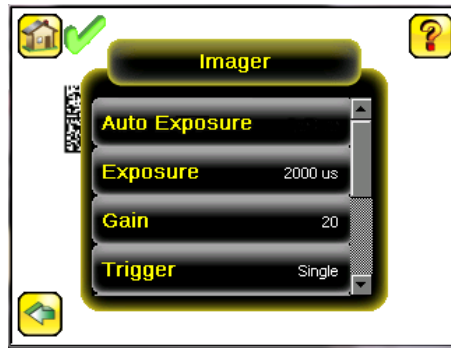


NOTE: The Firmware Update menu is not available in the Emulator.

2.3 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. The Imager menu is used to access the Auto Exposure routine, manually adjust Exposure and Gain, set Trigger and Strobe options as well as the size of the field of view (FOV).



2.3.1 Auto Exposure

Main Menu > Imager > Auto Exposure

Auto Exposure optimizes the exposure time and gain for the current lighting conditions.

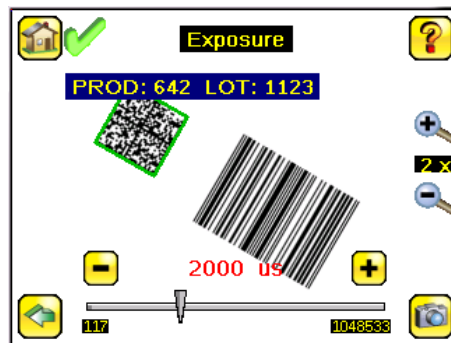


NOTE: The Auto Exposure option is not available on the Emulator.

2.3.2 Exposure

Main Menu > Imager > Exposure

Exposure is the amount of time the sensor 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.

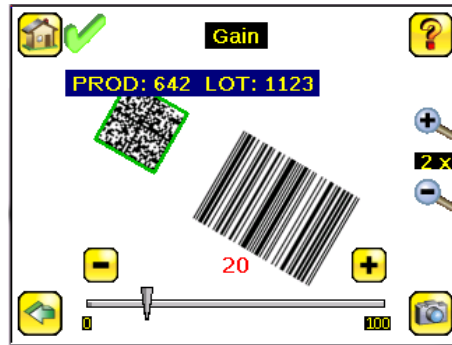



NOTE: This feature is not effective on the emulator.

2.3.3 Gain

Main Menu > Imager > Gain

Gain is an electronic boost to the image signal. Increasing Gain by using the right arrow key 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.

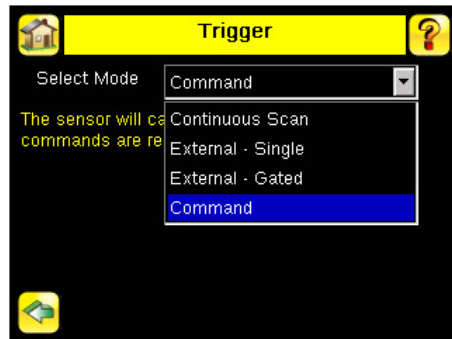


 NOTE: This feature is not effective on the emulator.

2.3.4 Trigger

Main Menu > Imager > Trigger


A Trigger is a signal that makes the sensor capture a barcode image and decode it. From the drop-down list, select Continuous Scan, External - Single, External - Gated, or Command.



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. There are two parameters that are used to fine-tune how Continuous Scan mode operates:

- Same Code Reject Time (set at the bottom of Main Menu > Imager > Trigger)—time in seconds that must elapse before the scanner will report a previously scanned symbol again. A different symbol will be read immediately.
- Scan Time Limit (Main Menu > Inspection > Scan Time Limit)—limits the amount of time the sensor will attempt 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.

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 > Scan Time Limit) to limit the amount of time the sensor will attempt to scan for barcodes on an image.

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 the External Trigger input signal becomes inactive. The External - Gated mode uses the Scan Time Limit parameter (Main Menu > Inspection > Scan Time Limit) to limit the amount of time the sensor will attempt to decode barcodes on an image.



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

Command Mode

In Command mode, the sensor captures images when Trigger commands are received. The sensor will be receiving trigger commands through the command channel.

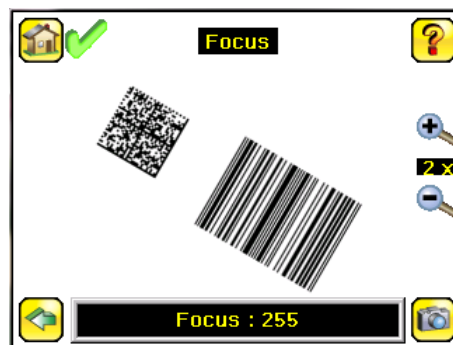
2.3.5 Focus

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 sensor until the Focus Number peaks (or the image appears sharp), then lock the focus ring.



NOTE: For the Focus Number to work, the sensor must be triggering and the images must be similar over time.



2.3.6 Strobe

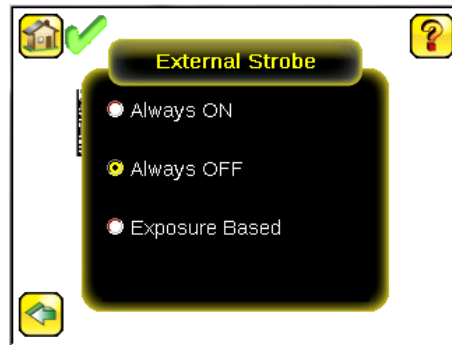
Main Menu > Imager > Strobe

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

External

Main Menu > Imager > Strobe > External

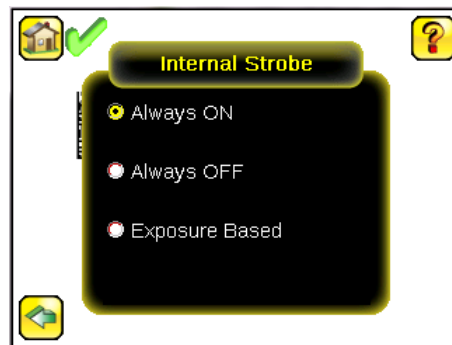
The External Strobe is a 5V output that can be used for an external light. Setting options are Always ON, Always OFF, or Exposure Based. If Exposure Based is selected, then the external light is on during the time the sensor is capturing an image.



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, then the ring light is on during the time the sensor is capturing an image. For UV models, the Always ON option is not available.



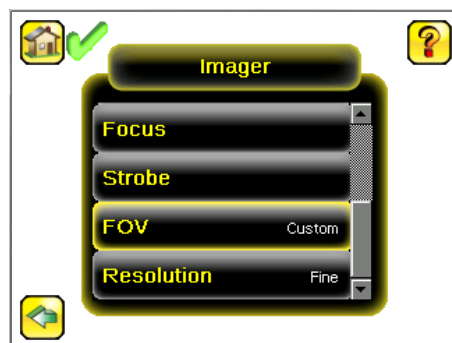
2.3.7 FOV (Field of View)

Main Menu > Imager > FOV

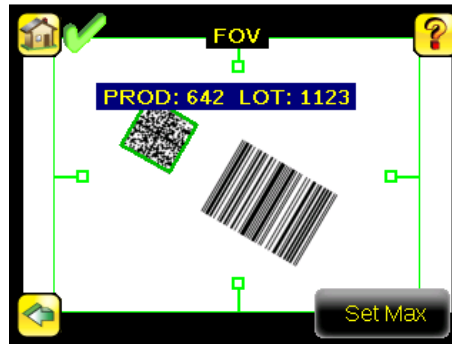
The field of view (FOV) is the area that the sensor can see at a given working distance. The working distance is the distance from the sensor's lens cover to the part being inspected. The effective FOV can be reduced in order to speed up the processing time of an inspection or to decrease background noise.

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.



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



2.3.8 Resolution

System > Imager > Resolution

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



Coarse resolution has a maximum FOV of 376×240 pixels, and Fine resolution has a maximum FOV of 752×480 pixels. Fine resolution has 4 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.

2.4 Inspection Menu

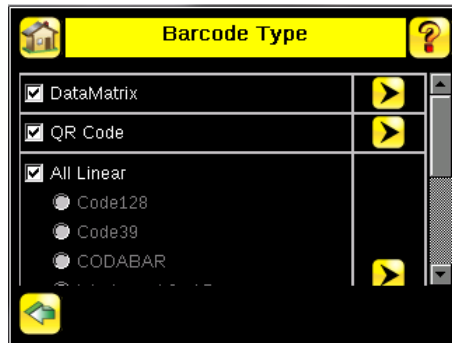
Main Menu > Inspection

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

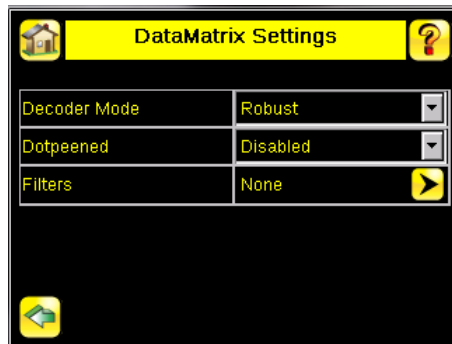
2.4.1 Barcode Type

Main Menu > Inspection > Barcode Type

The first time the sensor is powered up, the selection checkboxes for DataMatrix and All Linear barcode types are checked. The best practice is to check only the barcode type(s) applicable for your particular application. Note that, if All Linear is unchecked, a single linear barcode type can be selected instead.



DataMatrix Settings



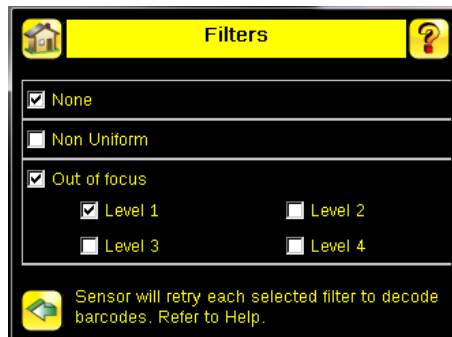
Decoder Mode

The Decoder Mode determines which decode algorithm to use and how imperfections in barcode images are handled. When you select Fast from the drop-down list, 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. When you select Robust, the sensor uses an algorithm that performs routines to correct for imperfections of the barcode image. When Equalization is selected, the sensor tries to improve the contrast within the symbol to improve readability.

Dotpeened

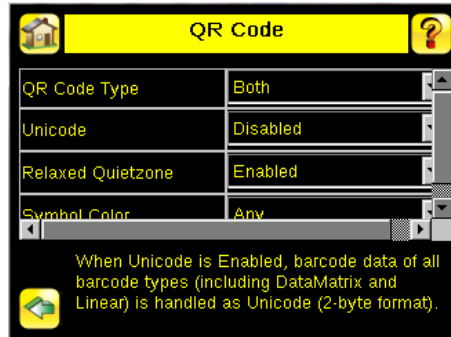
Enabling Dotpeened causes the decoder to be run in a method that is optimized for dot peened data matrix barcodes.

Filters



Use filters to improve decode rates in conditions in which the barcodes are blurred or have nonuniform module sizes. Select one or more Out-of-focus filters to improve the decode rate of out-of-focus barcodes. Select the Non Uniform filter to improve 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. Select None to force the sensor to first try to decode barcodes without applying any filters.

QR Code Settings



QR Code Type

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

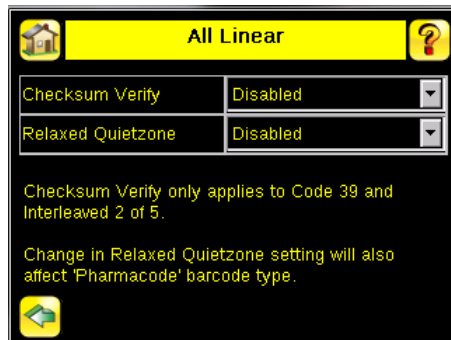
Unicode

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.

All Linear Settings

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

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



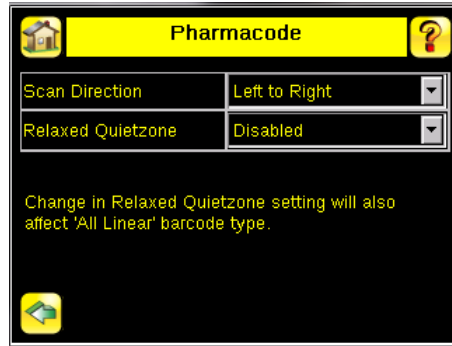
Checksum Verify

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

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.

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 barcode can appear inverted on part being inspected. If 'Compare' is enabled, the sensor attempts to compare that string to decoded data in both scan directions. Inspection is marked as PASS if at least one string matches. The data that successfully matched is displayed on the screen and is exported 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. Enabling Relaxed Quietzone creates a greater tolerance with respect to the quiet zone required before and after the barcode.

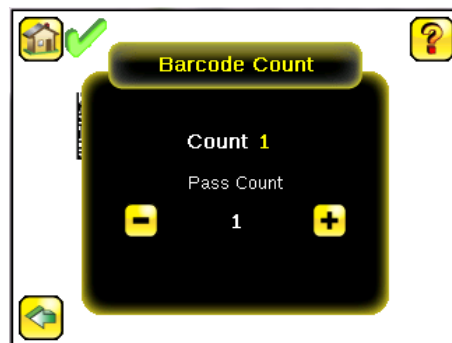
2.4.2 Barcode Count

Main Menu > Inspection > Barcode Count

In the Barcode Count screen, select the number of barcodes you want to decode. You can select from 1 to 10.



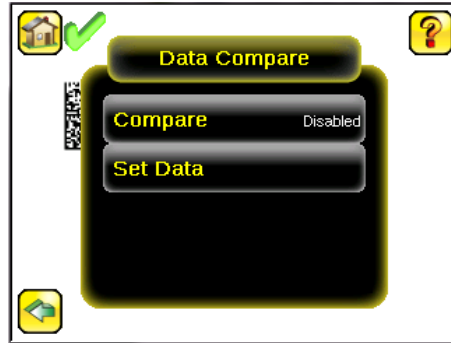
NOTE: For IMB, Postnet and Pharmacode barcode types, the sensor will decode only one barcode for each of these types regardless of the Barcode Count setting. This means that if there is one of each of these types in an image, and the Barcode Count is set to 3, the sensor will decode all three; however,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



2.4.3 Data Compare

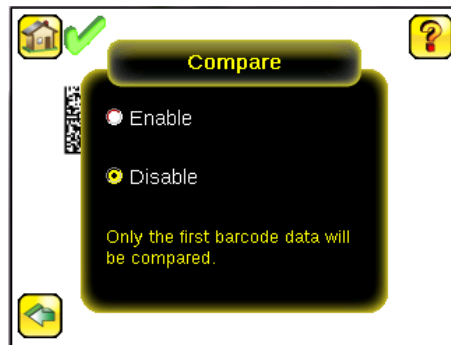
Main Menu > Inspection > Data Compare

The menu options here are used 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

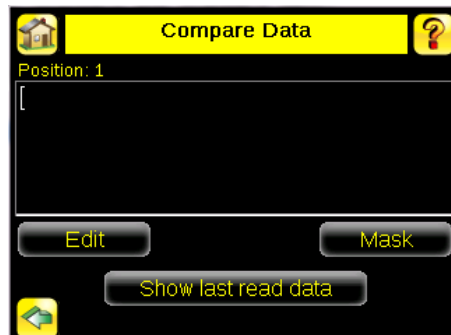
Use this menu to enable or disable Data Compare. If Data Compare is enabled, data can be defined in the Compare Data screen. The data can be retrieved from a previously scanned barcode, or it can be entered using the software keyboard on the touch screen, and insignificant characters can be masked within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



Compare Data

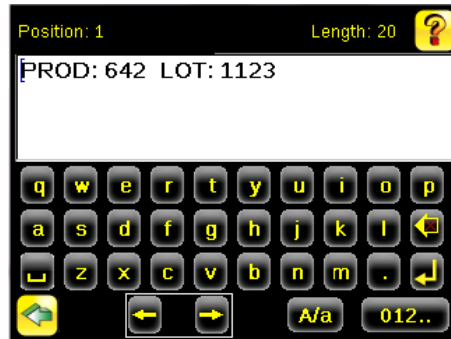
The Compare Data screen allows you to specify data against which you can compare a read barcode. Note that, if the Barcode Count is greater than 1, only the first barcode data can be compared or used in a remote teach operation. To see which barcode is the first one, turn on annotations.

- Click the Show last read data button to use the last read barcode data for the data compare.
- Click the Edit button to enter data using a software keyboard on the touch screen.
- Click the Mask button to select characters in the data to mask from the data compare. To mask a character, use the arrows at the bottom of the screen to move the cursor (I). When the cursor is to the left of a character you want to mask, click the Mask button. The character will change to green with a slash through it. If you want to unmask a character, make sure that the cursor is to the left of the masked character, and click the Unmask button.



Edit Compare Data

The Edit screen displays data that was previously read or entered in the text field. The Position of the cursor within the characters displayed (|) in the text field is indicated at the top of the screen. Additionally, the number of characters is indicated by Length. 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 at the top of the screen to 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.

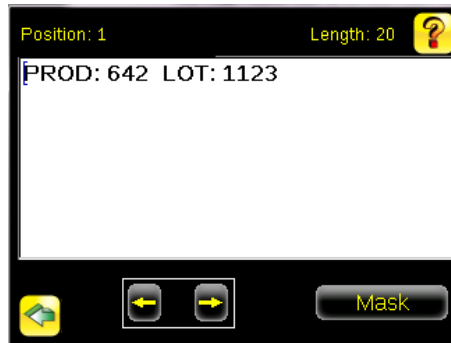


Last Read Data

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

Mask Data

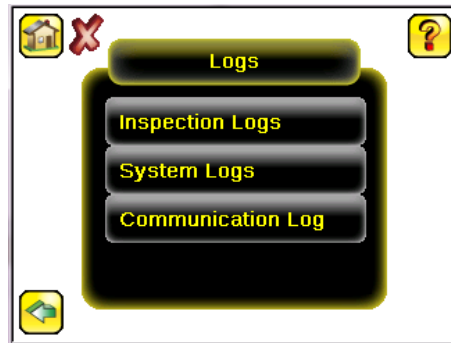
To mask characters in the data, move the cursor to the left of the character(s) to be masked, and click the Mask button. A masked character will appear gray with a strikethrough (\) indicator. To unmask a previously masked character, click the UnMask button. Note that, when using Remote Teach to set new barcode data, if the previous input data contained any masked characters, Remote Teach will retain 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.



2.5 Logs Menu

Main Menu > Logs

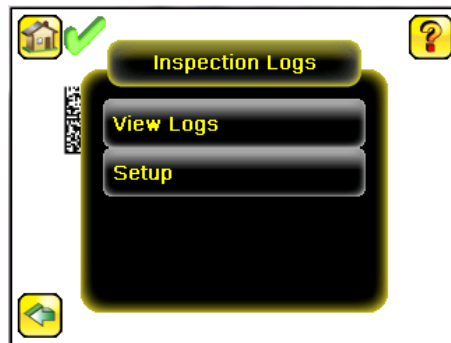
The Logs menu icon is on the Main Menu, and is used to set up, view, and save Inspection and System Logs.



2.5.1 Inspection Logs

Main Menu > Logs > Inspection Logs

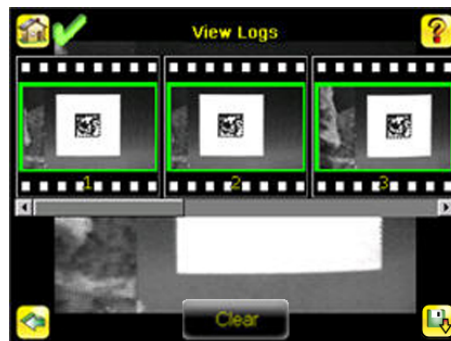
This menu provides for configuring and viewing Inspection Logs. Inspection Logs are stored inspection records that include a captured image, the parameters used to inspect it, and the results of that inspection. Up to ten Inspection Logs can be held in memory on the sensor. The next ten overwrite the previous. Inspection Logs can be saved to the USB flash drive so that the logs can be imported to the emulator.



View Logs

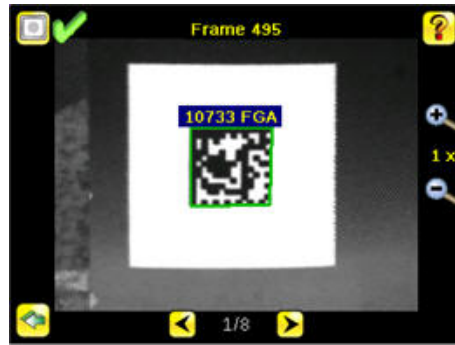
Main Menu > Logs > Inspection Logs > View Logs

Inspection Logs appear as a strip of film. You can select a frame to view a specific image. Use the icon in the lower right of the screen to save the logs to the USB flash drive. Logs saved to the USB flash drive can be imported into the emulator. Click the Clear button to clear Inspection Logs.



The View Inspection Log screen is used to debug an inspection, and shows one inspection in read-only mode. Click the upper-left icon to cycle through views. When in Statistics view, the table title has arrows to switch between Inputs and Results of the Inspection.

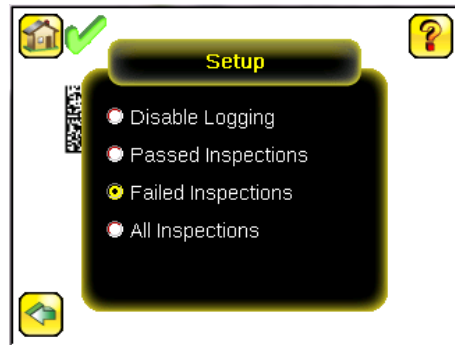
Use the left and right arrow keys at the bottom of the screen to navigate through the all stored Inspection Logs.



Setup

Main Menu > Logs > Inspection Logs > Setup

Use the radio buttons to Disable Logging, to log Passed Inspections, Failed Inspections, or All Inspections.



2.5.2 System Logs

Main Menu > Logs > System Logs

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

- Click the icon in the upper left corner of the screen to show/hide the time column
- Click Clear Log button at the bottom of the screen to clear the System Log
- Click the icon at the lower-right of the screen 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.

2.5.3 Communication Logs

Main Menu > Logs > Communication Logs

The Communication Log contains logs for the two communications channels; Command Channel Data Export. The features below 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 button at the bottom of the screen to clear the log.
- Click the icon at the lower-right of the screen to save the Log to the USB flash drive.



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

3 Setting up an Inspection

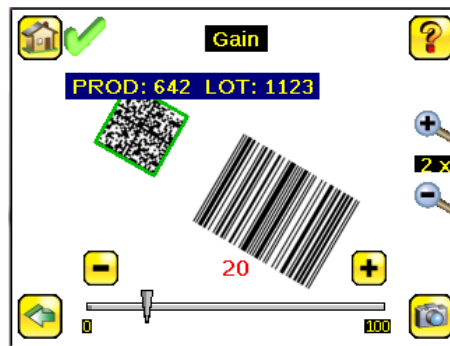
To set up for an inspection:

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

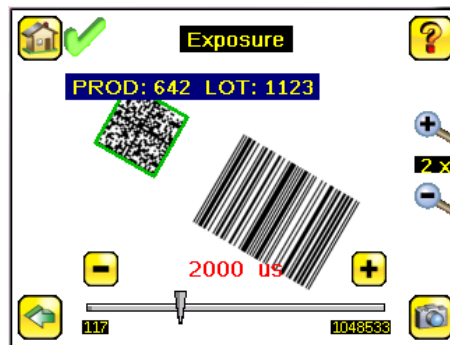
3.1 Acquiring a Good Image

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

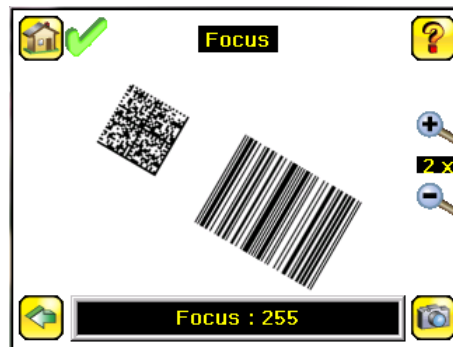
1. Go to Main Menu > Imager > Auto Exposure to run the Auto Exposure routine.
2. Check the lighting.
 - Make sure that the lighting is constant and consistent (unchanging over time, no shadows or hot spots).
 - Capture the barcode with lighting that optimizes its contrast and separates it from the background. 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 sensor on your line. Typically, a slight angle will help 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:



3.1.1 Adjust the Focus on a Micro Video Lens Model

1. Use the supplied 1/16 in. hex key to loosen the Focusing Window locking screw (D), then adjust focus on the iVu Series sensor 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.

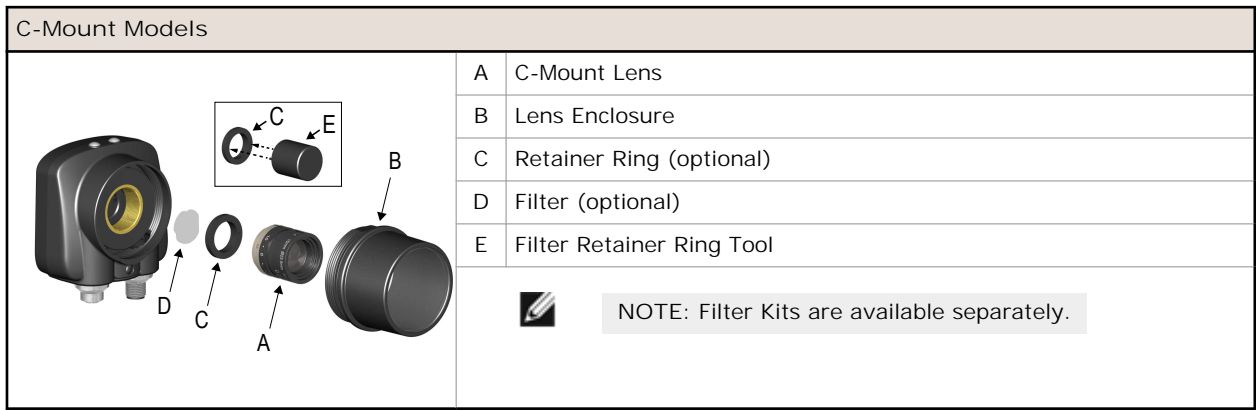


3. After the best image has been acquired, lock the focusing window.

Micro Video Lens Models	
	A Lens
	B Focusing Window
	C Locking Clip
	D Locking Screw
	E Filter Cap (optional)
	F Filter (optional)
	NOTE: Filter Kits are available separately.

3.1.2 Adjust the Focus on a C-Mount Lens Model

1. Remove the Lens Enclosure.
2. Adjust 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.



3.2 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.

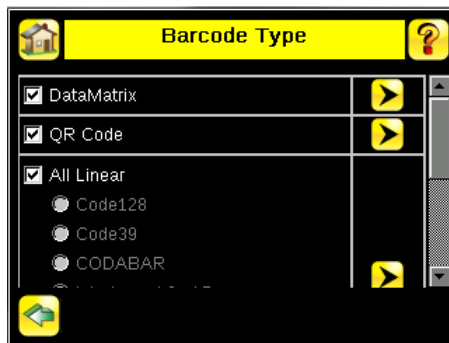


NOTE: New features available on Gen2 devices will not be available when creating the inspection on Gen1 software.

3.3 Setting Up a Barcode Application

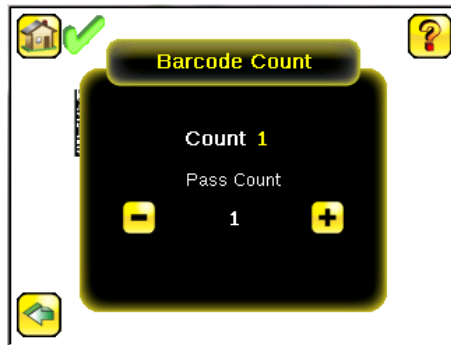
This section describes how to set up the iVu BCR sensor.

1. Go to Main Menu > Inspection > Barcode Type to 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 a radio button next to the desired linear barcode type. If you use only DataMatrix, uncheck all the boxes except the one next to DataMatrix.

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



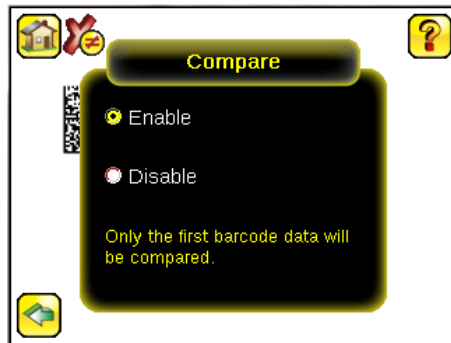
After the sensor has been set up as described:

- 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.

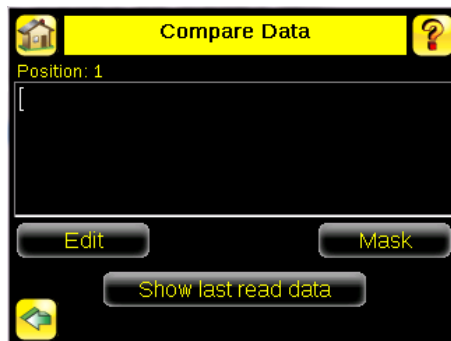
3.4 Setting up for Data Compare

This section describes how to set up the iVu BCR sensor to compare decoded barcode data against some reference. For this example, the reference data will be from a previously decoded barcode.

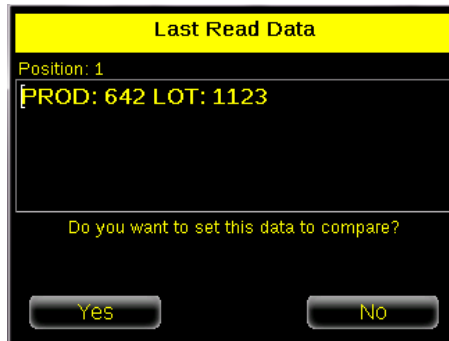
1. Go to the Main Menu > Inspection > Data Compare > Compare to Enable data compare.



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



3. Click Yes.



4. Click the Home icon to return to the main screen.

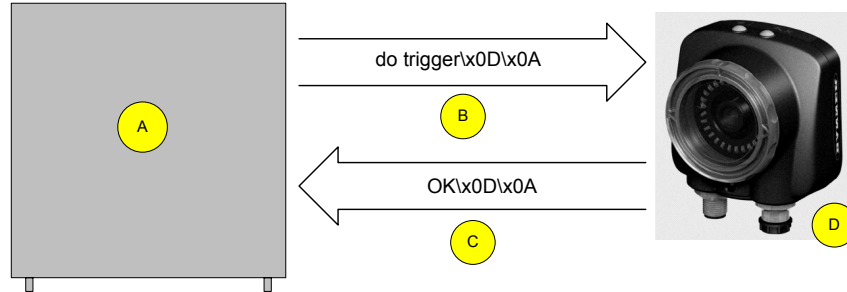


For all subsequent triggers, when the sensor reads the barcode data, it will compare it against this reference data.

4 Communications Guide

4.1 Command Channel

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



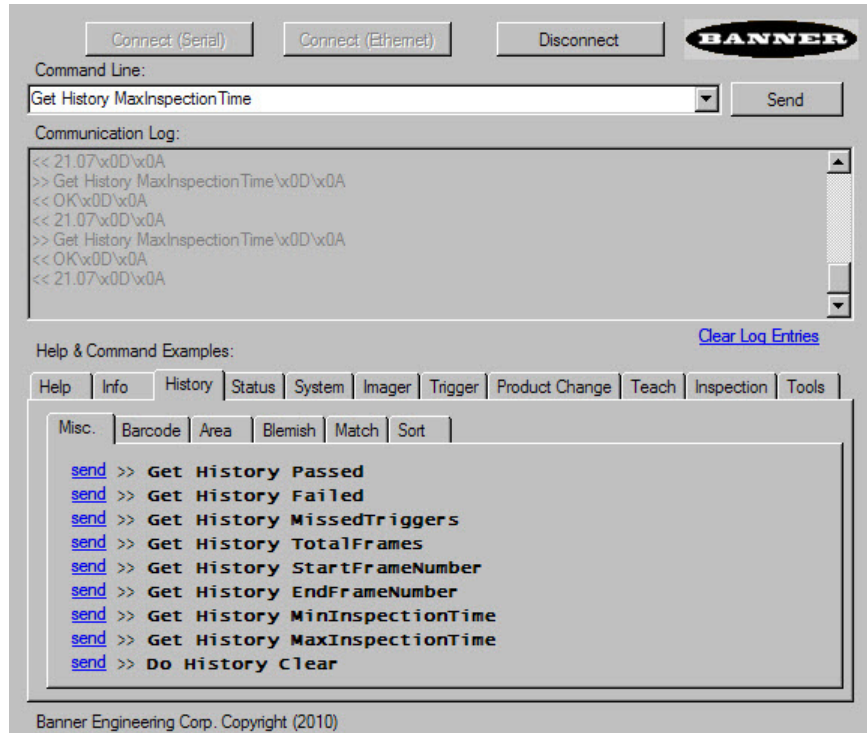
- A Control Device, which can be a PLC, PC program, or a terminal
- B Request Frame
- C Response Frame
- D iVu BCR Sensor

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

- Get sensor information (such as version and sensor name)
- Control "discrete" I/O (such as trigger and teach)
- Get sensor results (such as sensor status)
- Set and get BCR compare strings

Command Channel Sample Application

The iVu BCR installation CD 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 sensor.



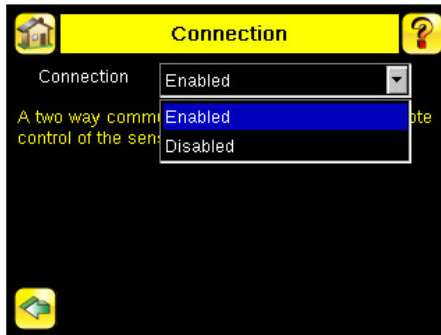
4.2 Setting Up Serial Communications

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

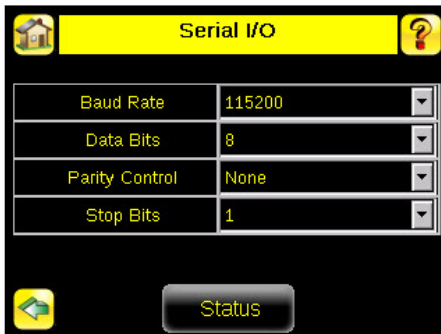
Table 7: iVu RS-232 Connections

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

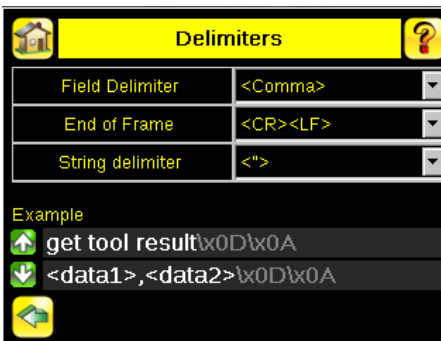
2. Enable the command channel. Go to Main Menu > System > Communications > Command Channel > Connection.



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

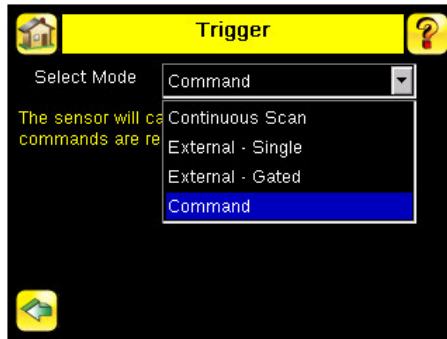


4. Configure end-of-frame delimiters. Go to Main Menu > System > Communications > Command Channel > Delimiters.



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

- Optionally, if you want to trigger the iVu from the control device, set the trigger mode to Command (go to Main Menu > Imager > Trigger and select Command from the drop-down).



- Verify that the iVu receives and transmits data correctly.

4.3 Testing and Troubleshooting iVu Command Channel Communications

4.3.1 Using the Port Status Screen for Testing RS-232 Communications

The Port Status screen can be used to ensure data is entering and exiting the sensor. 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 on the Status button.

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



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.

4.3.2 Understanding the Communication Log

The Communication Log can be used to ensure commands are properly formed (syntax is correct), and provides a history of commands issued along with responses to these commands. To access the Communication log, go to Main Menu > Logs > Communication Log .



Some notes about the logs:

- To see an expanded view of each entry, click on 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 table below describes the icons used in the Communication Log, the up-arrow indicates an incoming request to the iVu from the control device; the down-arrow indicates an outgoing response from the iVu to the control device.

Icon	Description
	Port opened.
	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.
	If the response frame contains an error or is dropped, the log entry icons for the request and the response frames will be colored red, and the displayed error count will increment by one.
	If the command takes a long time to process, the last long entry will change to an hourglass (for example, during trigger of long inspections).

4.3.3 Using the iVu 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 Command Channel Sample App (available on the installation CD) or to use a terminal program running on a PC:

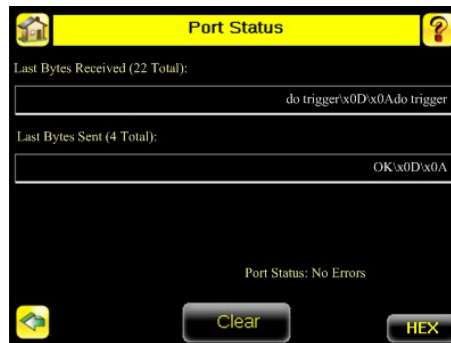
If using a terminal program, in the terminal program's configuration:

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

4.3.4 Verifying Basic Receive Functionality

To verify the iVu can receive request frames from the requesting device:

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



2. On the requesting device, transmit one or more bytes to the iVu sensor.
 - If the data byte values appear correct and the number sent by the requesting device matches the number received by the iVu sensor, 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 sensor 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.

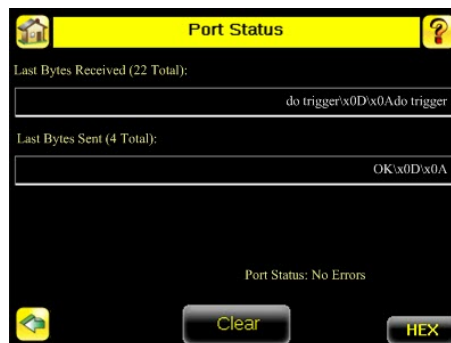
4.3.5 Verifying Basic Transmit Functionality

The iVu command channel will only send 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 sensor. For example, in a terminal program, simply hit Enter.

If a valid end-of-frame delimiter is received, the iVu sensor will immediately transmit 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 sensor. Go to the Main Menu > System > Communications > Serial I/O > 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.

4.4 Command Channel Commands

All iVu 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 a particular iVu group; for example, get, set, do, login, or logout.

group

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

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



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

4.4.1 Command Flow

The command flow should be such that a new command request should not be issued until the iVu 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 sensor 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
```

4.4.2 String Delimiters and Escaping

By default setting, 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 escaped 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.

4.4.3 Command Channel Command Synopsis

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

Do Commands

Do commands are actions (methods) to perform on the sensor, such as trigger, reboot, and the like.

Command	Group	Description
Reboot	System	Reboots the sensor. Pre-empts other commands except Save.

Command	Group	Description
Save	System	Saves inspection and configuration parameters. Blocks until finished. Should be used sparingly.
ClearSystemError	Status	Clears the system error LED and sets the internal flag to false.
Immediate	Trigger	Initiates a single trigger. The sensor does not transmit a response until the sensor has completed the action.
Gated	Trigger	Initiates gated triggering. The sensor does not transmit a response until the sensor has completed the action.
AbortGated	Trigger	Aborts gated triggering. The sensor does not transmit a response until the sensor has completed the action, then it will respond with two responses.
NextTrigger	Teach	Sets the sensor to teach on the next trigger
Clear	History	Clears all history fields (for example pass, fail, etc.).

Get Commands

Get commands are used to retrieve information from the sensor (for example, get the status of the sensor).

Command	Group	Description
CompanyName	Info	The company name as a string.
ModelNumber	Info	The sensor model number as a string.
FirmwareVersion	Info	The sensor firmware version as a string.
SerialNumber	Info	The sensor serial number as a string.
Name	Info	The sensor name as a string.
BootNumber	Info	The number of sensor bootups
UpTimer	Info	The elapsed time the sensor has been running in the format hh:mm:ss:msec.
HourCount	Info	The number of hours the sensor has been running.
RemoteConnected	Info	The remote display connected status as a boolean value (true or false)
RemoteModelNumber	Info	The model number of the remote display as a string.
RemoteSerialNumber	Info	The serial number of the remote display as a string.
Ready	Status	Flag indicating whether the system is ready to trigger (true) or busy (false)
SystemError	Status	Flag indicating whether a system error is active (true) or cleared (false)
Mode	Trigger	Sets trigger mode to one of the valid trigger modes for the sensor.
Passed	History	The number of passed inspections.
Failed	History	The number of failed inspections.

Command	Group	Description
MissedTriggers	History	The number of missed triggers.
StartFrameNumber	History	The starting frame number.
EndFrameNumber	History	The ending frame number.
MinInspectionTime	History	The minimum elapsed time (msec) of the inspection.
MaxInspectionTime	History	The maximum elapsed time (msec) of the inspection.
MinBarcodeCount	History	The minimum number of barcodes read.
MaxBarcodeCount	History	The maximum number of barcodes read.
Status	Inspection	This status of the most recent inspection either Pass, Fail, or Idle (no triggers).
FrameNumber	Inspection	The most recent inspection frame number
ExecutionTime	Inspection	The most recent inspection execution time in msec.
ReadNoRead	Inspection	The barcode decoder status either read or barcode not found.
CompareData	BCR_INPUT	The compare data string. This string must start and end with the double quote character.
CompareMask	BCR_INPUT	The 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.
Count	BCR_RESULT	The total number of barcodes found in the last inspection.
Data	BCR_RESULT	The barcode data strings that were read in the last inspection. Each string starts and ends with the double quote character. Multiple strings are separated by the field delimiter
Type	BCR_RESULT	The type(s) of barcodes read in the last inspection. Multiple values are separated by the field delimiter.

Set Commands

Set commands set some group item on the sensor (for example, set compare data for the BCR).

Command	Group	Item	Value
Set	BCR_INPUT	CompareData	<VALUE>
Set	BCR_INPUT	CompareMask	<MASK >
Set	Trigger	Mode	ContinuousScan
Set	Trigger	Mode	ExternalSingle
Set	Trigger	Mode	ExternalGated
Set	Trigger	Mode	Command

Command Channel Response Frames

The iVu 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 bcr_input comparedata\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 bcr_input comparedata "012345ABCDEF"\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 page 60 for a list of errors.

4.5 Examples

4.5.1 Conventions Used for Examples

There are a number of command channel examples included here, and the following are the conventions used in the examples:

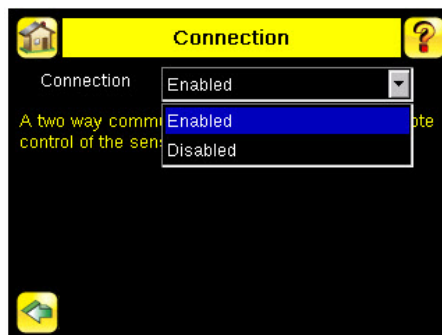
- All examples use <CR><LF> for the end-of-frame delimiter, and this delimiter is always denoted in hex (\x0D\x0A) since that is what is displayed in the iVu logs and, for example, the Port Status screen.
- All commands are in bold text.
- For each example, a command request to the iVu sensor is prefaced with a >>, and a command response frame from the iVu sensor 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
```

4.5.2 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. Main Menu > System > Communications > Command Channel > Connection and select Enabled.



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

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

- Check that the inspection passed.

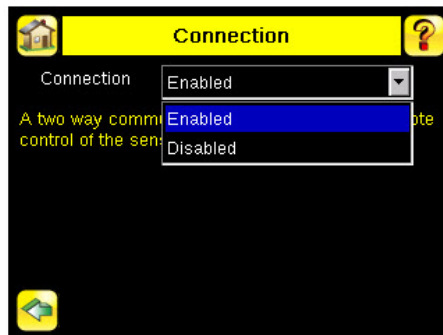
```
>> get inspection status\x0D\x0A
<< OK\x0D\x0A
<< Pass\x0D\x0A
```

- Get the barcode data read by the iVu sensor.

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

4.5.3 How to Modify Barcode Compare Data Using the Command Channel

- Main Menu > System > Communications > Command Channel > Connection and select Enabled.



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

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

- Trigger the sensor.

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

- Check that the inspection passed.

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

- Get the barcode data read by the iVu sensor.

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

4.6 Command Channel Reference

4.6.1 BCR_INPUT Command Group

Command	Group	Item	Description
get	bcr_input	comparedata	Returns the compare string.
get	bcr_input	comparemask	Returns the compare string mask. 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.
set	bcr_input	comparedata	Sets the compare string.
set	bcr_input	comparemask	Sets the compare string mask. Masked characters need indicated by a "1" and unmasked characters are "0, " and the mask character string must match the length of the compare string.

Examples:

```
>> get bcr_input comparedata\x0D\x0A
<< OK\x0D\x0A
<< "0043000111201"\x0D\x0A
```

```
>> get bcr_input comparemask\x0D\x0A
<< OK\x0D\x0A
<< "111100000000"\x0D\x0A
```

```
>> set bcr_input comparedata "0043000111201"\x0D\x0A
<< OK\x0D\x0A
```

```
>> set bcr_input comparemask "111100000000"\x0D\x0A
<< OK\x0D\x0A
```

4.6.2 BCR_RESULT Command Group

Command	Group	Item	Description
get	bcr_result	count	Returns the number of barcodes found
get	bcr_result	data	Returns the barcode data that the iVu sensor read.
get	bcr_result	type	Returns the type of the barcode read. Multiple items are separated by a field delimiter.

Examples:

```
>> get bcr_result count\x0D\x0A
<< OK\x0D\x0A
<< 1\x0D\x0A
```

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

```
>> get bcr_result type\x0D\x0A
<< OK\x0D\x0A
<< EAN13\x0D\x0A
```

4.6.3 History Command Group

Command	Group	Item	Description
get	history	passed	Returns the number of passed inspections.
get	history	failed	Returns the number of failed inspections.
get	history	missedtriggers	Returns the number of missed triggers.
get	history	startframenum	Returns the start frame number.
get	history	endframenum	Returns the end frame number.
get	history	mininspectiontime	Returns the minimum elapsed time of the inspection.
get	history	maxinspectiontime	Returns the maximum elapsed time of the inspection.
get	history	minbarcodecount	Returns the minimum number of barcodes read.
get	history	maxbarcodecount	Returns the maximum number of barcodes read.
do	history	clear	Clears all history fields (for example pass, fail, etc.).

Examples:

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

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

```
>> get minbarcodecount\x0D\x0A
<< OK\x0D\x0A
<< 1\x0D\x0A
```

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

4.6.4 Info Command Group

Command	Group	Item	Description
get	info	companyname	Returns the company name.
get	info	modelnumber	Returns the sensor model number.

Command	Group	Item	Description
get	info	firmwareversion	Returns the sensor firmware version.
get	info	serialnumber	Returns the sensor serial number.
get	info	bootnumber	Returns the number of sensor bootups.
get	info	name	Returns the sensor name.
get	info	uptimer	Returns the elapsed time the sensor has been running in the format hh:mm:ss.ms.
get	info	hourcount	Returns the number of hours the sensor has been running.
get	info	remoteconnected	Returns the whether a remote display is connected as a boolean value (true or false).
get	info	remoteserialnumber	Returns the the serial number of the remote display.
get	info	remotemodelnumber	Returns the model number of the remote display.

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
```

4.6.5 Inspection Command Group

Command	Group	Item	Description
get	inspection	status	Returns either Pass, Fail, or Idle.
get	inspection	readnread	Returns either Read (found) or NoRead (not found).
get	inspection	framenummer	Returns the frame number.
get	inspection	executiontime	Returns the inspection execution time.

Examples:

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

```
>> get inspection readnread\x0D\x0A
<< OK\x0D\x0A
<< Read\x0D\x0A
```

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

4.6.6 Status Command Group

Command	Group	Item	Description
get	status	ready	Returns either True (ready for trigger) or False.
get	status	systemerror	Returns either True or False.
do	status	clearsystemerror	Resets SystemError 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
```

4.6.7 System Command Group

Command	Group	Item	Description
do	system	save	Saves inspection and configuration parameters. Blocks until finished. Should be used sparingly.
do	system	reboot	Reboots the sensor. Pre-empts all commands except save.

```
>> do system save\x0D\x0A
<< OK\x0D\x0A
```

4.6.8 Teach Command

Sets the sensor to teach on the next trigger

Example:

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

4.6.9 Trigger Command Group

Command	Group	Item	Description
set	trigger	mode	Sets trigger mode to one of the valid trigger modes for the sensor: ContinuousScan, External, ExternalGated, or Command.
get	trigger	mode	Returns the trigger mode.
do	trigger		Initiates a single trigger. The sensor does not transmit a response until the sensor has completed the action.

Command	Group	Item	Description
do	trigger	gated	Initiates gated triggering. The sensor does not transmit a response until the sensor has completed the action.
do	trigger	abortgated	Aborts gated triggering. The sensor does not transmit a response until the sensor has completed the action, then it will respond with two responses (one from the previous gated trigger and one for the abort).

Examples:

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

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

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

The following example shows a gated trigger that is taking too long so an do trigger abortgated command is executed.

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

4.6.10 Command Channel Error Codes

Table 8: 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
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 a item (not a group or method)
10301	DATA_VALUE_MISSING	Command missing item's data value
10350	ARGUMENTS_DETECTED	Get command received with unneeded arguments
10351	INVALID_ARGUMENT_TYPE	Item ID specified must be a item (not a group or method)
10340	MINIMUM_VALUE_EXCEEDED	New item value is below the minimum

Numeric ID	Text ID	Description
10341	MAXIMUM_VALUE_EXCEEDED	New items value is above the maximum
10500	DATA_SET_EMPTY	Data export operation returned no results.
10900	SENSOR_NOT_READY	Command specified requires sensor 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 sensor 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	The System Error must be active to execute this command

5 Debugging Inspections

5.1 iVu Emulator

The iVu Emulator is a Windows application that allows you to operate in a Windows environment exactly as you would on the iVu Series sensor itself. In general, the Emulator is an inspection debugging tool where you can:

- Import stored inspections and configuration from an iVu BCR sensor.
- Modify inspection parameters on the emulator.
- Restore the updated configuration back to the sensor.

5.2 How to Round-Trip Debug Using the Emulator

The iVu Emulator is a Windows application that allows you to operate in a Windows environment exactly as you would on the sensor itself. In general, the Emulator is an inspection debugging tool: you can import stored inspections and a configuration from an iVu sensor, then modify its parameters on the emulator, and restore the updated configuration back to the sensor. When you install the iVu Emulator, by default, it is installed in the following folder:

C:\Program Files\Banner Engineering\iVu Series

You can run the Emulator from this folder, but you will need to move files between the USB flash drive and PC. To avoid moving files, copy the Emulator executable to the USB flash drive, and run the Emulator directly from the USB flash drive.

This "how-to" describes the procedures for doing round-trip debugging either using the iVu Emulator installed on a PC or using it directly from the USB flash drive.



NOTE: This document refers to saving configuration and inspection logs in folders based on the sensor name. If you have not yet named the sensor, then folders will be named using the first 8-characters of the sensor serial number.

5.2.1 How to Debug Using the Emulator from a PC

1. Plug a USB flash drive into the sensor.
2. Save the Inspection Logs to the USB flash drive.
 - a. On the Main Menu > Inspection Logs > View Logs screen, click the Save icon to save the inspection logs.
 - b. When prompted, select Yes to save sensor 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 sensor configuration is saved in <USB>:\BANNER\<SENSOR_NAME>. For example, if the sensor name is myName:
 - Configuration File (CONFIG.CFG) path: <USB>:\BANNER\myName
 - Inspection Logs path: <USB>:\BANNER\myName\InspLog



NOTE: If the sensor has no name, then the folder name is the first 8-characters of the serial number.

3. Remove the USB flash drive from the sensor and insert it into an available USB port on a Windows PC that has the iVu Emulator installed.



Important: Make sure the iVu Emulator is NOT running before proceeding to the next step.

4. Copy the Sensor Configuration from the USB flash drive to the folder where the Emulator is installed on the PC. For example, if the sensor name is myName and the iVu 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.
5. Copy the Inspection Logs from the USB flash drive (for example, <USB>:\BANNER\myName\InspLog) to the InspLog folder on the PC (for example, C:\Program Files\Banner Engineering\iVu Series\InspLogs).
6. Start the Emulator.
7. Set the Trigger option to Internal—
 - a. Go to Main Menu > Imager > Trigger, and select Internal.
 - b. Set the Trigger Interval as desired.

The iVu Emulator runs with the saved configuration from Step 6 using the saved Inspection Logs from Step 7 as images.

8. Make the desired adjustments.
9. Close the iVu Emulator program. All configuration changes are saved to the CONFIG.CFG file.

10. Copy the sensor configuration (that is, CONFIG.CFG) from the PC working directory to the USB flash drive (for example <USB>:\BANNER\myName\CONFIG.CFG).
11. Remove the USB flash drive from the PC, and connect it to the sensor.
12. Restore the configuration to the sensor.
 - a. Go to Main Menu > System > Sensor Configuration > Load Configuration.
 - b. Select the Configuration to restore.
 - c. Click the Load button to start the restore sensor configuration.
 - d. Reboot the sensor when the restore is complete.

5.2.2 How to Debug Using the Emulator from the USB Flash Drive

1. Plug a USB flash drive into the sensor.
2. Save the Inspection Logs to the sensor.
 - a. On the Main Menu > Inspection Logs > View Logs screen, click the Save icon to save the inspection logs.
 - b. When prompted, select Yes to save sensor 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 sensor configuration is saved in <USB>:\BANNER\<SENSOR_NAME>. For example, if the sensor name is myName:
 - Configuration File (CONFIG.CFG) path: <USB>:\BANNER\myName
 - Inspection Logs path: <USB>:\BANNER\myName\InspLog



NOTE: If the sensor has no name, the folder name is the first 8-characters of the serial number.

3. Remove the USB flash drive from the sensor and insert it into an available USB port on a Windows PC that has the iVu Emulator installed.
4. Copy the iVuEmulator.exe program file to the USB flash drive in the same location as the CONFIG.CFG file (for example, <USB>:\BANNER\myName).
5. Launch the <USB>:\BANNER\myName\iVuEmulator.exe program.
6. Set the Trigger option to Internal—
 - a. Go to Main Menu > Imager > Trigger, and select Internal.
 - b. Set the Trigger Interval as desired.

The iVu Emulator runs with the saved configuration using the saved Inspection Logs as images.

7. Make the desired adjustments.
8. Close the iVu Emulator program. All configuration changes are saved to the CONFIG.CFG file.
9. Remove the USB flash drive from the PC, and connect it to the sensor.
10. Restore the configuration to the sensor.
 - a. Go to Main Menu > System > Sensor Configuration > Load Configuration.
 - b. Select the Configuration to restore.
 - c. Click the Load button to start the restore sensor configuration.
 - d. Reboot the sensor when the restore is complete.

6 Updating the Sensor

6.1 Update Process

Banner Engineering may release new versions of the sensor firmware in the future. New firmware releases can be downloaded from Banner's website or can be obtained by ordering the latest Product CD. The following steps will guide you through the process of updating the iVu firmware.

Step 1: Copy firmware of the desired product to USB flash drive.

1. Launch the iVu Series software.

From the Product CD:

- Place the latest Product CD into your CD ROM drive. The iVu Series Software automatically starts.
- If your computer is not set for Auto-Play, start the iVu Series Software by browsing to the CD drive from the My Computer screen and double-clicking on 'iVuSeries.exe'.

From the Banner Website:

1. Visit Banner's Website: <http://www.bannerengineering.com>.
 2. Browse to the Vision Products page and select the iVu product you are using.
 3. Click on the Software tab to view software releases.
 4. Determine which version you want to download (the Current Version is recommended, for example "iVu Series Software Version 2010R4").
 5. Click on the circular Download button. This initiates the download process. Depending on your browser settings, you may be asked to confirm or provide a location to save the file. Choose to download on your desktop. Note the file name.
 6. Double-click the file to start extracting the files and run the iVu Series Software.
2. Select the product you are using and browse to the Firmware Update page.
 3. Click on the 'Run Firmware Update Wizard' and the program starts.
 4. Follow the on-screen instructions. Clicking on 'Copy firmware to USB' copies the selected firmware to the USB flash drive.

Step 2: Install the firmware on the iVu.

1. Remove the USB flash drive from the PC, and plug it into the sensor.
2. On the sensor, select System > Firmware Update. The name of the firmware file you copied on the USB flash drive displays.
3. Choose the correct file and click on the Load button.
4. Follow the on-screen instructions to update the firmware.

6.2 How to Set or Modify a Device Name using the Emulator

You can set a Device Name for your iVu Series sensor or modify an existing name on the sensor using the software keypad. You can also change the device name this using the iVu Emulator as described below.



NOTE: If you are in a language other than English, you cannot modify the device name using the software keypad. Use the procedure described below.



NOTE: If you have not set the device name previously, then folders will be named using the first 8-characters of the device serial number.

1. Plug a USB flash drive into the device.
2. Save the Device Configuration to the USB flash drive (Main Menu > System > Sensor 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 will be <USB>:\BANNER\myName).
3. Remove the USB flash drive from the device and insert it into an available USB port on a Windows PC.
4. If you are running the Emulator from the USB flash drive, launch the iVuEmulator.exe program. 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 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.

5. Launch the iVuEmulator.exe program.
6. Go to the Information screen (Main Menu > System > Sensor Information).
7. Click the white box next to the Device Name label, and enter the desired Device Name.
8. Click the Back button on the lower-left corner of the screen to save the Device Name.
9. Close the Emulator program and the Device Name is saved to the CONFIG.CFG file.
10. 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.

11. Remove the USB flash drive from the PC, and connect it to the device.
12. Restore the configuration to the device.
 - a. Go to Main Menu > System > Sensor Configuration > Load from USB.
 - b. Select the Configuration to restore.
 - c. Click the Load button 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. Reboot 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 will not be stored in the device.

6.3 How to Reset the Sensor Password

If you forget the password for your sensor, you can remove the current password using a reset key that is generated by the Password Reset Utility, which is located on the Product CD. The following steps will guide you through the specific steps to reset the password:

1. On your iVu Series sensor, click the Forgot? button located on the bottom of the Enter Current Password screen.
2. Write down the 6-digit Device Key.
3. On a Windows PC, insert the iVu product CD into the CD ROM drive.
4. From the product CD menu (started upon inserting the CD), launch the Password Reset Utility.
5. Enter the Device Key into the text box in the Utility—identified as Step 1 in the Password Reset Utility.
6. Click the Generate Reset Key button.
7. Write down the four-digit Password Reset Key—identified as Step 2 in the Password Reset Utility.
8. On the iVu Series sensor, check the Next button on the Password Reset screen.
9. Enter the 4-digit reset key on the Enter Reset Key screen.
10. Click Apply.

The password is now cleared.

6.4 How to Use Bitmap Image Files with the iVu Emulator

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



NOTE: Images smaller than 640 × 480 are black-filled starting in the upper-right. Images larger than 640 × 480 are cropped starting in the upper-left.

1. Copy the .bmp files into the InspLog folder in the iVu Emulator install folder.

For example, copy .bmp files into the C:\Program Files\Banner Engineering\iVu Series\InspLog folder.



NOTE: Remove any existing .bmp or Log files in that folder to avoid confusion because the iVu Emulator automatically runs all .bmp/Log files sequentially according to filename.

2. Launch the iVu Emulator program.

iVu BCR Gen2 Series Sensor

3. Select Internal Trigger on the Trigger Selection screen (Main Menu > Image > Trigger).
4. Set the Trigger Interval as desired.

The iVu 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 always end up modifying the configuration after loading it on the sensor on the line. A better choice is to set up the inspection on the iVu Emulator using the Inspection Logs from the sensor.

7 LED Indicator Troubleshooting

In normal operation, the Power LED is steady green, and the Pass/Fail is green or red depending on the triggered inspection.



- | | | |
|---|---------------|----------------------------|
| 1 | Power LED | Green: Power
Red: Error |
| 2 | Pass/Fail LED | Green: Pass
Red: Fail |

The iVu also indicates abnormal conditions as described below.

7.1 Errors

Problem Indicator	Solution
The Pass/Fail LED is blinking green a number of times, separated by an LED red blink, and the sensor repeats this pattern over and over. This indicates that no inspections are occurring.	Reboot the sensor.
The Power LED is lit steady red. These type of errors are reported in the System log and appear highlighted in red.	Do the following: <ol style="list-style-type: none"> 1. Look in the System Log to see the error. 2. Clear the LED; that is, go to the Main Menu > Logs > System Logs and press the Clear System Error button at the bottom of the screen (a sensor reboot is not required). 3. If the error occurs again, you can try rebooting the sensor to see if that fixes the problem. If the problem persists, contact Banner customer support.

7.2 Warnings

Warnings are atypical conditions that the sensor detects and fixes. Warning are highlighted in yellow in the System Log, and can typically be ignored.

8 Product Support and Maintenance

This section provides general Banner resources and specific documentation for installers and operators of this iVu BCR Vision Sensor.



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.

8.1 Product Support

Banner provides the following resources for quickly setting up and operating the device.

Documentation

Online Help

When setting up or monitoring inspections using the iVu sensor's integrated display, you can get online help on any screen by clicking the Help icon in the upper-right of the screen.

PDF Documentation

The product documentation is available in a convenient printable format (PDF) on the installation CD 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 firmware version (to find the version number, click 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 page 67)

8.2 Maintenance

Maintenance tasks include keeping the hardware free of dust and dirt and possibly updating the iVu firmware as new versions become available.

Cleaning the Sensor

Regularly remove any dust or dirt from the device 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.

Updating the iVu firmware

The current version of iVu firmware is available for download from the Banner website. See the Banner Website for the firmware download link.

8.3 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.

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Banner Engineering Corp. reserves the right to change, modify or improve the design of the product without assuming any obligations or liabilities relating to any product previously manufactured by Banner Engineering Corp.

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