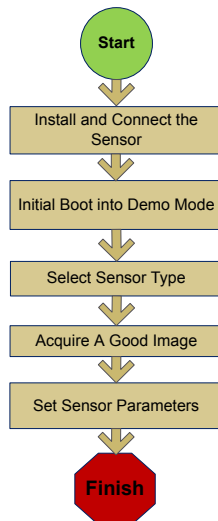


## Quick Start Guide

### Introduction

The iVu Plus TG Gen2 Series Sensor is used to monitor labels, parts, and packaging for type, size, orientation, shape, and location. The sensor has an integrated or remote color touch screen display making installation, setup and configuration easy without requiring a PC.



#### Quick Start Overview

This guide is designed to help you set up and install the iVu Plus TG. It provides an overview of the sensor and illustrates how to set up the sensor to inspect a label, part, or packaging. The flow chart to the left provides an overview of the process.

Use of this document assumes familiarity with pertinent industry standards and practices.

For complete information on programming, performance, troubleshooting, dimensions, and accessories, please refer to the documentation listed below. This documentation is available on the Product CD or at [www.bannerengineering.com](http://www.bannerengineering.com). Search for the part number to view the documentation.

- *iVu Plus TG Gen2 with Integrated Display (datasheet; P/N 179044)*
- *iVu Plus TG Gen2 with Remote Display (datasheet; P/N 179045)*
- *iVu Plus TG Gen2 Instruction Manual (P/N 179042)*
- *iVu Plus Industrial Ethernet User's Guide (P/N B\_3095133)*

In addition, the sensor includes integrated Help.



#### WARNING: Not To Be Used for Personnel Protection

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



#### CAUTION: Electrostatic Discharge

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

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

## Installing and Connecting the Sensor

The iVu Plus TG 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.

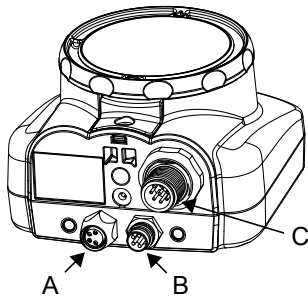


Table 1: iVu Brackets

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### Cable Connections for Integrated Display

The cable connections on the iVu Plus with integrated display are shown below, and power I/O connections (C) are defined in the Power I/O Connections table below.



- A USB Connector
- B Ethernet Connector
- C Power I/O Connector

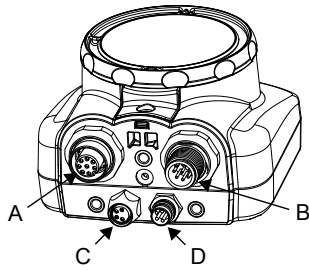


NOTE: Micro video lens model shown, C-Mount model connections are identical.

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	Output 3	Output
10	Light Blue	RS-232 TX	Output
11	Black	RS-232 Signal Ground	Output
12	Violet	RS-232 Rx	Input

## Cable Connections for Remote Display

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



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

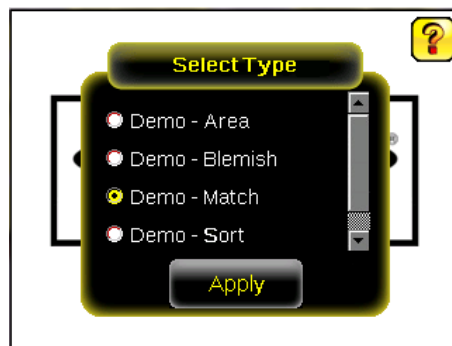


NOTE: Micro video lens model shown, C-Mount model connections are identical.

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	Output 3	Output
10	Light Blue	RS-232 TX	Output
11	Black	RS-232 Signal Ground	Output
12	Violet	RS-232 Rx	Input

## Demo Mode

The first time you power up the iVu Plus TG sensor, it starts in Demo Mode and allows you to choose whether to stay in Demo Mode or exit to Live Mode. Demo Mode uses stored images and inspection parameters that demonstrate how the sensor is set up without having to worry about focus, lighting, or triggers. In this mode, you can learn how to make adjustments while working with the different sensor types and observing how the adjustments affect the sensor results. When you exit Demo Mode, the sensor reboots into its normal operating mode with default settings.





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

## Sensor Types

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### Area Sensor

An Area type sensor is used to ensure that a feature, or multiple features, are present on a part. When setting up the sensor for an Area inspection, a feature, such as a drilled hole, is identified as well as the size (area) expected. If there is more than one of the identified features on a part, the number expected can be set as well. During the inspection, the sensor verifies that each part or package includes the specified number of features. Some example applications include:

- Inspections that check for drilled holes on a part
- Inspections that check for correctly stamped parts
- Inspections that ensure proper packaging (for example, check that a packing slip exists in or on a box; test whether a vial is properly capped)
- Inspections of blister packs

### Blemish Sensor

A Blemish type sensor can be used to find flaws on a part (for example, scratches on a disc), or it can be used to make sure a feature exists on a part. Although verifying a feature is present on a part is more commonly an Area sensor application, a Blemish sensor may be a better option when dealing with variable materials or uneven lighting. Some example applications include:

- Inspections that check for scratches on a part, and reject parts where the scratches are too numerous or larger than acceptable
- Inspections that check for the presence of some label or marking on a part that may vary in color

### Match Sensor

A Match type sensor is used to verify that a pattern, shape, or part in any orientation matches a reference pattern. The reference pattern is taught during setup. A reference pattern might include alphanumeric characters, logos, or any other shapes. During an inspection, the sensor checks that each part or package being inspected matches the reference pattern. Additionally, if there is more than one of the identified pattern, the number expected can be set.

Some example applications include:

- Date/Lot code inspections
- Label inspections
- Part etching inspections
- Part orientation inspections
- Part shape inspections

### Sort Sensor

A Sort sensor type that can recognize and sort up to ten different patterns within the same inspection. Each reference pattern is taught during setup and stored in one of ten pattern memory locations. A reference pattern might include alphanumeric characters, logos, or any other shapes, and the pass criteria can be set for any or all of the patterns.

Some example application include:

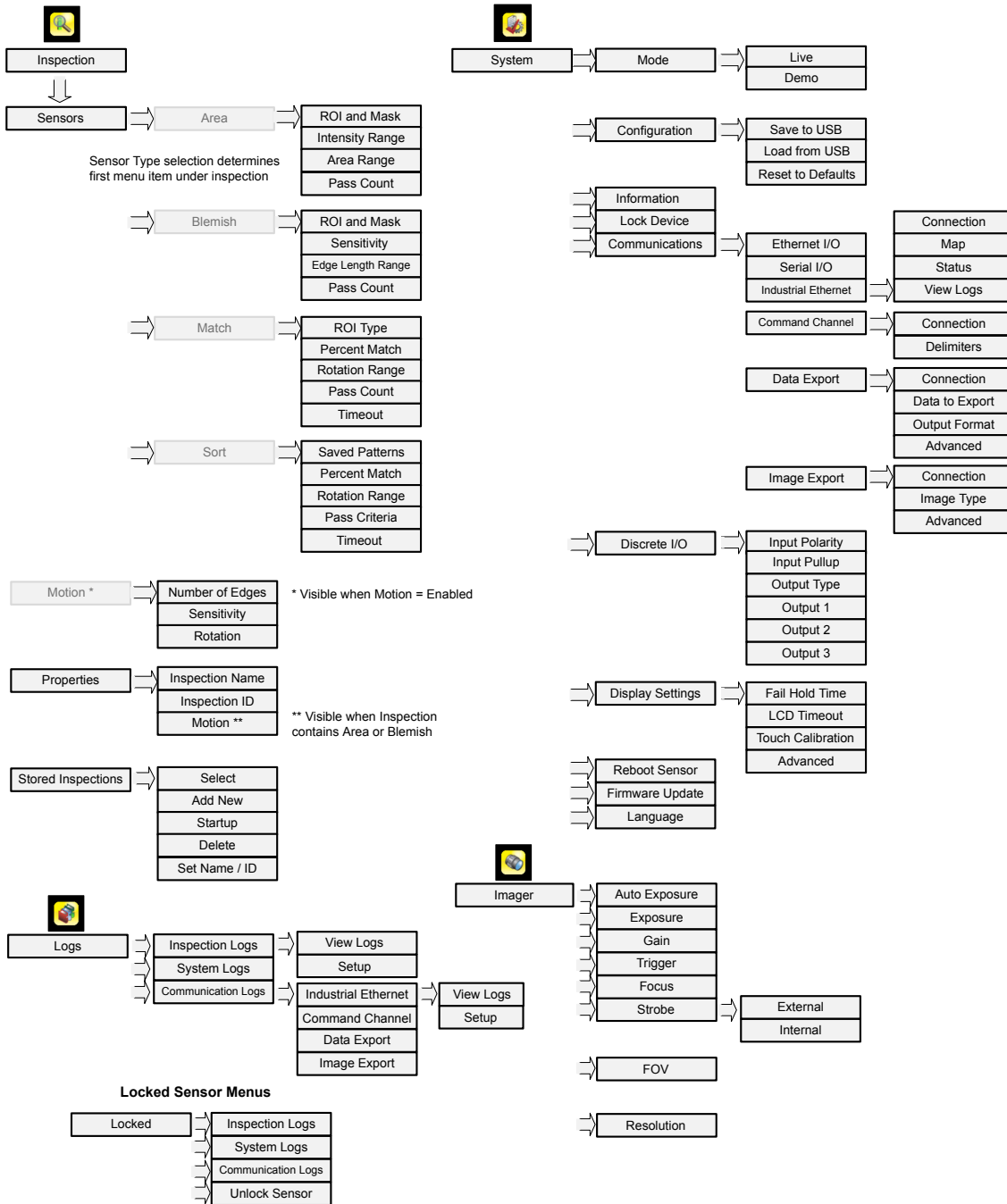
- Identify and sort parts on a production line
- Ensure that several different parts are present in a package

## Main Menu

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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 select the sensor Type and to manage the device
- Logs—to configure and view System and Inspection Logs




## 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 the current and all stored inspections.







Icon	Description
	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, Communications, 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 Log Timestamps icon is one of the icons displayed in the upper-left corner of the Logs screen. Click this icon to hide the time stamp for the Logs.
	The Show Log Timestamps icon is one of the icons displayed in the upper-left corner of the Logs screen. Click this icon to show the time stamp for the 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 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 Intensity Selector is located on the left of the of the Intensity Range screen and is used to select the shade of one of the objects of interest.
	The Decrement icon decreases the currently displayed parameter value by one interval. To quickly decrement the value, press and hold the icon.
	The Increment icon increases the currently displayed parameter value by one interval. To quickly increment the value, press and hold the icon. In the Sort tool, this icon is used to indicate one of the ten storage locations for patterns.
	The Add Mask icon displays on the left side of the screen when masking is enabled. Press to add a mask to the currently selected sensor.
	The Delete Mask icon displays on the left side of the screen when a mask is selected. Press to delete a mask from the currently selected sensor.
	The Circular Mask icon displays on the left side of the screen when a mask is selected. Press to cycle through and select a Circular, Elliptical, or Rectangular-shaped mask.
	The Elliptical Mask icon displays on the left side of the screen when a mask is selected. Press to cycle through and select a Circular, Elliptical, or Rectangular-shaped mask.

Icon	Description
	The Rectangular Mask icon displays on the left side of the screen when a mask is selected. Press to cycle through and select a Circular, Elliptical, or Rectangular-shaped mask.

## 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.
	One of the possible Sensor Failed icons located in the Inspection Statistic table, it indicates that the sensor failed because the number of objects exceeded the test count.
	One of the possible Sensor Failed icons located in the Inspection Statistic table, it indicates that the sensor failed because there were fewer objects than specified by the test count.
	One of the possible Sensor Failed icons located in the Inspection Statistic table, it indicates that the sensor failed because the inspection timed out.
	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.
	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.

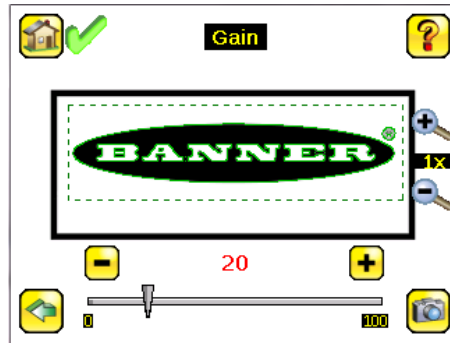
## Communications Log Icons

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, or client is not reading data on ethernet.
	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).

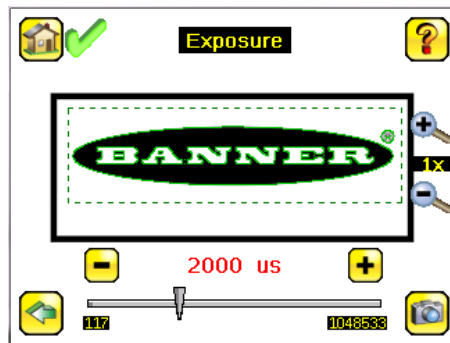
## Acquiring a Good Image

The iVu Series sensor needs to capture a good image of each part to ensure that it correctly passes good parts and fails bad parts.

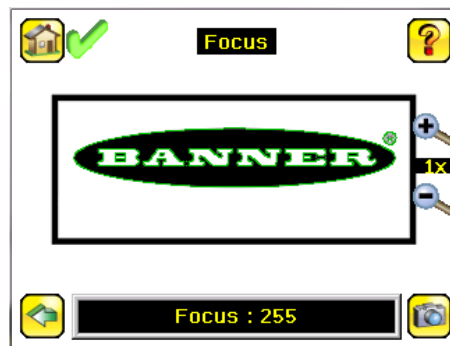
1. Go to Main Menu > Imager > Auto Exposure to run the Auto Exposure routine.
2. Check the lighting.
  - Make sure that the lighting is constant and consistent (unchanging over time, no shadows or hot spots).
  - Capture the shape and form of the target object with lighting that optimizes its contrast 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 part features you are monitoring. The mounting bracket lets you easily position and adjust the sensor on your line.
3. If needed, go to Main Menu > Imager > Auto Exposure to run the Auto Exposure routine a second time or adjust Gain and Exposure manually:
  - Main Menu > Imager > Gain



- Main Menu > Imager > Exposure



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



## Adjust the Focus on a Micro Video Lens Model

1. Use the supplied 1/16 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.



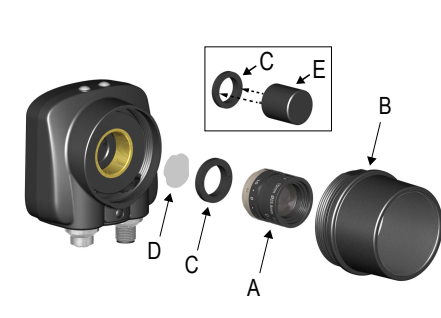

3. After the best image has been acquired, lock the focusing window.



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.	

### 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.

C-Mount 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.	

### Trigger

Main Menu > Imager > Trigger

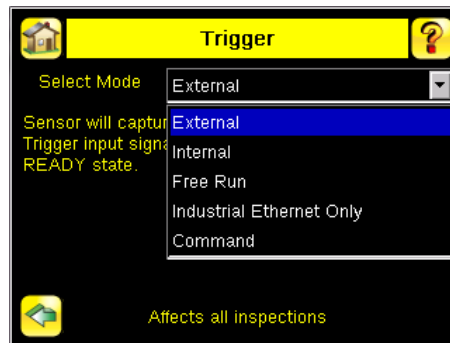
A Trigger is a signal that makes the sensor capture an image and inspect it. Use the dropdown list to select External Trigger, Internal Trigger (default), Free Run, Industrial Ethernet Only, or Command.

- If Internal Trigger is selected, triggers are based on timed intervals, and you need to select a trigger interval between 10 and 10000 milliseconds.



NOTE: If the interval is less than the inspection time, then missed triggers will occur.

- If External Trigger is selected, inspections are triggered in response to an electrical signal on the Trigger input line.
- If Free Run is selected, the sensor automatically runs continuous inspections.
- If Command is selected, the command channel is used to trigger the sensor from a remote device.
- If Industrial Ethernet Only is selected, trigger commands from the Industrial Ethernet communications channel only are accepted.



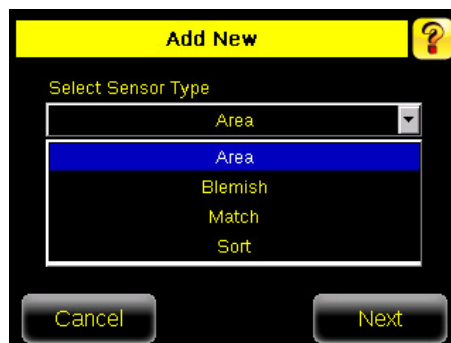
## Multiple Inspections

The iVu Plus supports multiple inspections that facilitate storing and controlling up to 30 inspections of different Sensor Types.

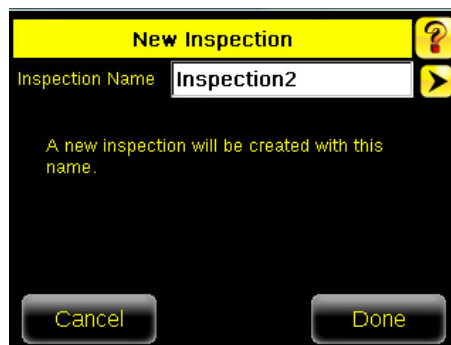
### Adding a New Inspection

To Add a new stored inspection:

1. Go to Main Menu > Inspection > Stored Inspections and click Add New.



2. Select the Sensor Type for the new inspection, and click Next.



3. Click Done. The newly created inspection will now be the current inspection.

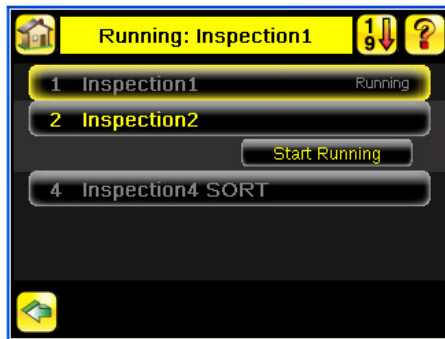
### Changing Running Inspections

To change the running inspection:

1. From the Home screen, click the Yellow button in the top center of the screen that displays the currently running inspection to display all the stored inspections.



2. Select the inspection to start and click the Start Running button that appears below it.

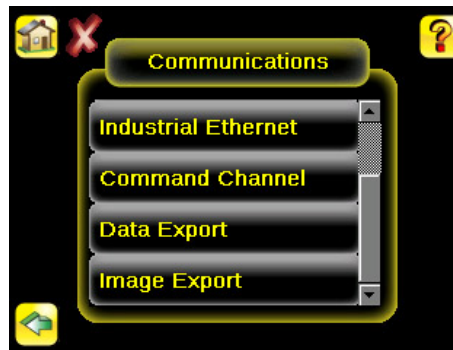


## iVu Plus Communication Summary of Ethernet and Serial

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

### Communication Channels

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



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

Data export and command channel can be configured for either Ethernet or Serial I/O (but not both); image export is only available over Ethernet. The table below briefly summarizes valid communication channel configuration options.

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

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