

# FS10/xS20 Smart Camera



## Product Reference Guide



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# About This Guide

## Introduction

The FS/VS Smart Camera Series Product Reference Guide provides general instructions for integrating, setting up, and programming the device.



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- Industrial Ethernet User Guide

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# Getting Started

This section outlines the configurations, accessories, and specifications of the FS/VS Smart Camera Series.

## Configurations

Fixed Industrial Scanning (FS) devices come equipped with a USB or PoE scanner with auto focus, while Vision System (VS) devices come equipped with a smart PoE Sensor with adjustable focus.

**Table 1** FS10/xS20 Configurations

Device	Description
FS10	Fixed Industrial USB Scanner, Auto Focus, Standard Range, 1.0MP, Fast 2D Barcode Decoder, Red and White illumination
FS20	Fixed Industrial PoE Scanner, Auto Focus, Standard Range, 1.0MP, Ethernet with PoE, Serial and Industrial Protocols, Red or White Illumination
VS20	Smart PoE Sensor, Adjustable Focus, Standard Range, 1.0MP, Sensor Toolset with Fast 2D Decode, Ethernet with PoE, Serial and Industrial Protocols, Red or White Illumination

## Accessories

Supported cables and power supplies for FS10 and xS20 devices are listed below.

### Cables

FS10 devices utilize USB-C to C or USB-C to A cables, while xS20 devices utilize X-coded Ethernet and power, serial, and GPIO cables.

**Table 2** Cables

Device	Part Number	Description
FS10	CBL-USB03000-USC00	Cable, USB 2M, locking USB-C to USB C
	CBL-USB04000-USC00	Cable, USB 4M, locking USB-C to USB C
	CBL-USB02000-USA00	Cable, USB 2M, locking USB-C to USB A
	CBL-USB04000-USA00	Cable, USB 4M, locking USB-C to USB A

**Table 2** Cables

Device	Part Number	Description
xS20	CBL-ENT00500-M1200	Cable, Ethernet 5M, X-Coded M12 to RJ45, standard flex
	CBL-ENT01500-M1200	Cable, Ethernet 15M, X-Coded M12 to RJ45, standard flex
	CBL-PWR00500-M1200	Cable, power 5M, 12 Pin M12 to flying leads, standard flex
	CBL-PWR01500-M1200	Cable, power 15M, 12 Pin M12 to flying leads, standard flex

## Power Supplies (xS20 Only)

The xS20 device supports the use of 24 V power supplies.

**Table 3** Power Supply

Part Number	Description
PWR-24V03A-0000	Power supply, 24VDC 3AMP, DIN rail mount
PWR-24V05A-0000	Power supply, 24VDC 5AMP, DIN rail mount
PWR-POE30W-0000	Power over Ethernet injector, 30W POE+, AC input

## FS10 and xS20 Smart Camera Specifications

The following table outlines the physical characteristics, performance characteristics, user environment, and regulatory approvals of FS10 and xS20 devices.

### FS10 Specifications

**Table 4** FS10 Specifications

Item	Description
<b>Physical Characteristics</b>	
Dimensions	1.0 in. H x 2.0 in. W x 1.92" D 25.4 mm H x 50.8 mm W x 48.9mm D
Weight	110 g/3.9 oz
Power	USB Type-C, 1A max
Interface Ports	(1) USB Type C supports USB 2.0 high speed only
Communication Protocols	USB RNDIS, HID, CDC
<b>Performance Characteristics</b>	
Image Sensor	Monochrome: 1.0 MP (1280x800 pixels) CMOS Sensor with Global Shutter and 3.0 um pixel size
Acquisition Rate	60 frames/second
Aimer	617nm Red LED aim dot
Illumination	(1) 2700K (Color Temperature) White LED (1) 660nm Red LED
Imager Field of View	35°(H) x 26°(V)
<b>User Environment</b>	
Operating Temperature	0°C - 45°C (32°F to 113°F) (duty cycle-dependent)
Storage Temperature	-40° to 70°C (-40°F to 158°F)
Humidity	5 % to 90 % RH (Non Condensing)
Vibration Resistance	EN 60068-2-6, 14 mm @ 2 to 10 Hz, 1.5 mm @ 13 to 55 Hz; 2 g @ 70 to 500 Hz; 2 hours on each axis
Shock Resistance	EN 60068-2-27, 30g; 11 ms; 3 shocks on each axis
Sealing	IP65 and IP67
Light Immunity	Product operates in: Incandescent 450 ft candles, Sunlight <6000 ft candles, Florescent 450 ft candles, Mercury Vapor 450 ft candles, Sodium Vapor 450 ft candles, LED 450 ft candles
Electrostatic Discharge	±15kV Air, ±8kV Contact

**Table 4** FS10 Specifications

Item	Description
Trigger Durability	Withstand 1,000 cycles of operation with no degradation in functionality
<b>Regulatory Approvals</b>	
Environmental	EN 50581:2012 EN IEC 63000:2018
Electrical Safety	IEC 62368-1 (Ed.2) EN 62368-1:2014/A11:2017
LED Safety	IEC 62471: 2006 (Ed.1) EN 62471: 2008
EMI/EMS	EN 55032:2015/A11: 2020 EN 55035:2017/A11: 2020 EN 61000-3-2: 2014 EN 61000-3-3: 2013 EN 61000-6-2: 2005 & 2019 FCC 47 CFR Part 15, Subpart B Canada ICES-003, Issue 7
EU Declaration of Conformity	2014/30/EU; 2014/35/EU; 2011/65/EU Refer to the Declaration of Conformity (DoC) for details of compliance to the current standards. The DoC is available at: <a href="http://zebra.com/doc">zebra.com/doc</a>

## xS20 Specifications

**Table 5** xS20 Specifications

Item	Description
<b>Physical Characteristics</b>	
Dimensions	1.1 in. H x 2.15 in. W x 3.71 in D 28.3 mm H x 54.6 mm W x 94.3 mm D
Weight	200 g/7.1 oz
Power	10 to 30 VDC external power supply, 7W max at 24V Class 2 PoE, 7W
Configurable IO	(4) Four opto-isolated GPIO: 2 dedicated inputs(IN0/IN1), 2 dedicated outputs (OUT0/OUT1)
Interface Ports	(1) M12 X-Coded 1000/100/10 Mbps Ethernet (1) M12 12-pin Power/GPIO/Serial
Communication Protocols	Ethernet/IP, PROFINET, CC-Link, Modbus TCP, TCP/IP
<b>Performance Characteristics</b>	
Image Sensor	Monochrome: 1.0 MP (1280x800 pixels) CMOS Sensor with Global Shutter and 3.0 um pixel size
Acquisition Rate	Up to 60 frames/second
Aimer	617nm Red LED aim dot
Illumination	(2) 2700K (Color Temperature) White LEDs or (depending on model) (2) 660nm Red LEDs
Imager Field of View	35°(H) x 26°(V)
<b>User Environment</b>	
Operating Temperature	0°C - 45°C (32°F to 113°F) (duty cycle-dependent)
Storage Temperature	-40° to 70°C (-40°F to 158°F)
Humidity	5 % to 90 % RH (Non Condensing)
Vibration Resistance	EN 60068-2-6, 14 mm @ 2 to 10 Hz, 1.5 mm @ 13 to 55 Hz; 2 g @ 70 to 500 Hz; 2 hours on each axis
Shock Resistance	EN 60068-2-27, 30g; 11 ms; 3 shocks on each axis
Sealing	IP65 and IP67
Light Immunity	Product operates in: Incandescent 450 ft candles, Sunlight <6000 ft candles, Florescent 450 ft candles, Mercury Vapor 450 ft candles, Sodium Vapor 450 ft candles, LED 450 ft candles
Electrostatic Discharge	±15kV Air, ±8kV Contact

**Table 5** xS20 Specifications

Item	Description
Trigger Durability	Withstand 1,000 cycles of operation with no degradation in functionality
<b>Regulatory Approvals</b>	
Environmental	EN 50581:2012 EN IEC 63000:2018
Electrical Safety	IEC 62368-1 (Ed.2) EN 62368-1:2014/A11:2017
LED Safety	IEC 62471: 2006 (Ed.1) EN 62471: 2008
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EU Declaration of Conformity	2014/30/EU; 2014/35/EU; 2011/65/EU Refer to the Declaration of Conformity (DoC) for details of compliance to the current standards. The DoC is available at: <a href="http://zebra.com/doc">zebra.com/doc</a>

# Installation

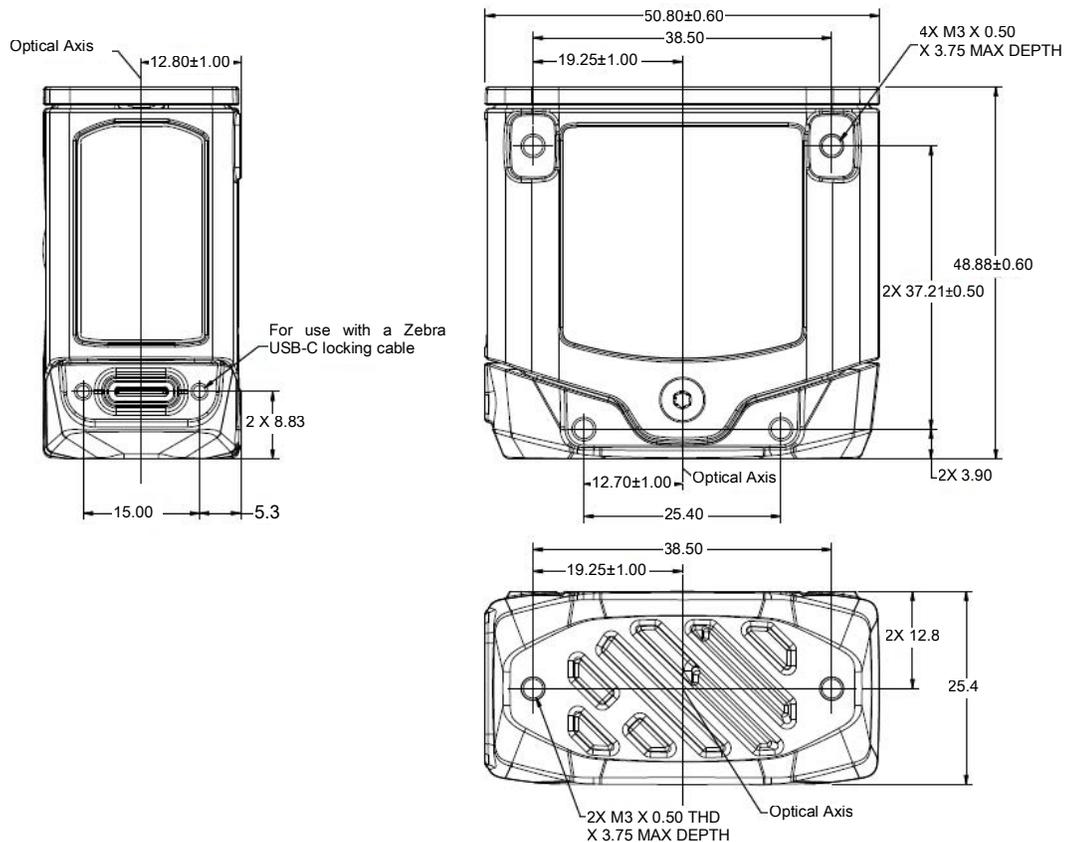
This section describes the mounting procedure for the FS10/xS20 series.

## Dimensional Drawings

The following illustrations display the dimensions and mounting orientation for FS10 and xS20 devices. Use the guidance provided to mount the device to an L-bracket as shown in [Mounting Instructions](#).

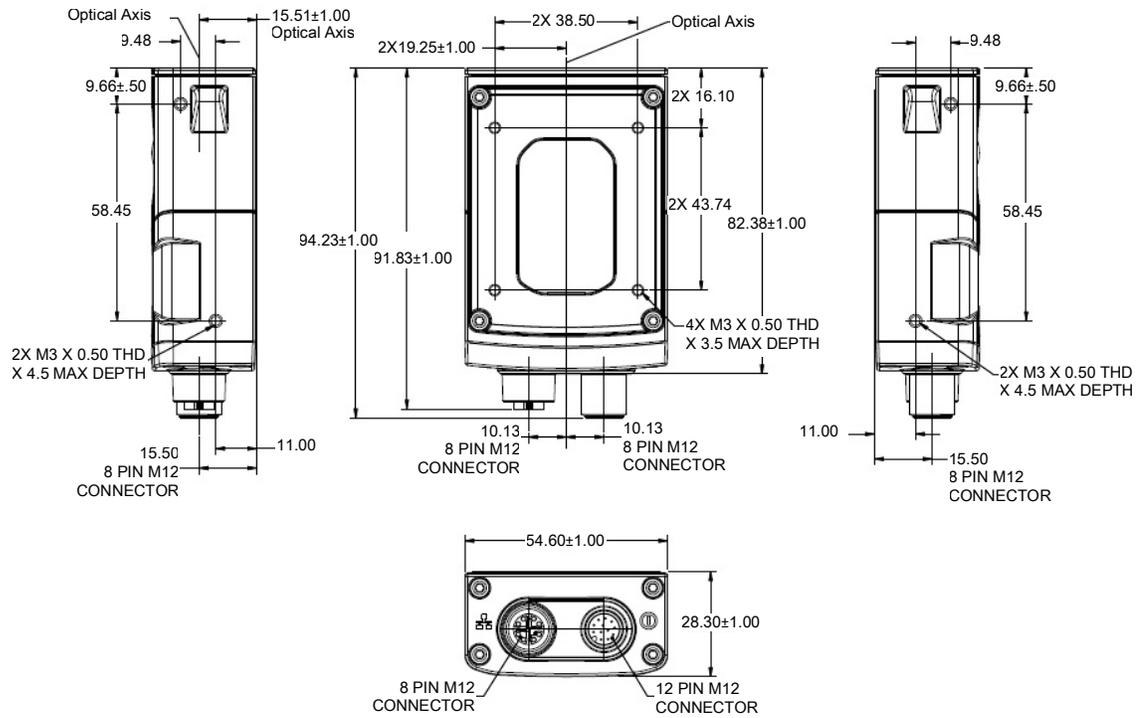
### FS10 Dimensional Drawings

Figure 1 FS10 Dimensional Drawings



## xS20 Dimensional Drawings

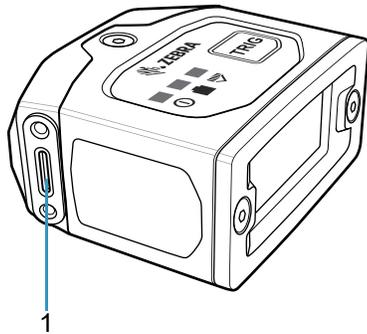
Figure 2 xS20 Side Dimensional Drawings



## FS10 Connection

The FS10 supports USB-C connections (USB 2.0 high speed only).

**Figure 3** FS10 Connection

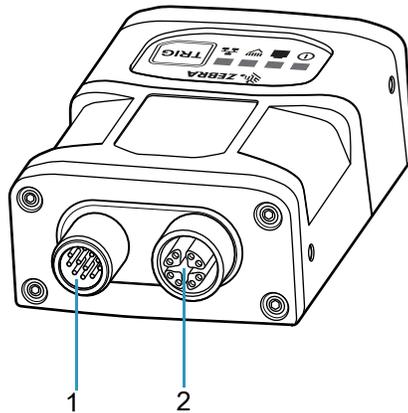


1	USB-C
---	-------

## xS20 Connections

The xS20 supports power, serial, GPIO, and Ethernet.

**Figure 4** xS20 Connections



1	Power, Serial, and GPIO
2	X-Coded Ethernet

## Torque Specification

To guarantee an IP65 or IP67 product specification, Zebra cables and/or connector covers must be torqued to the following specification:

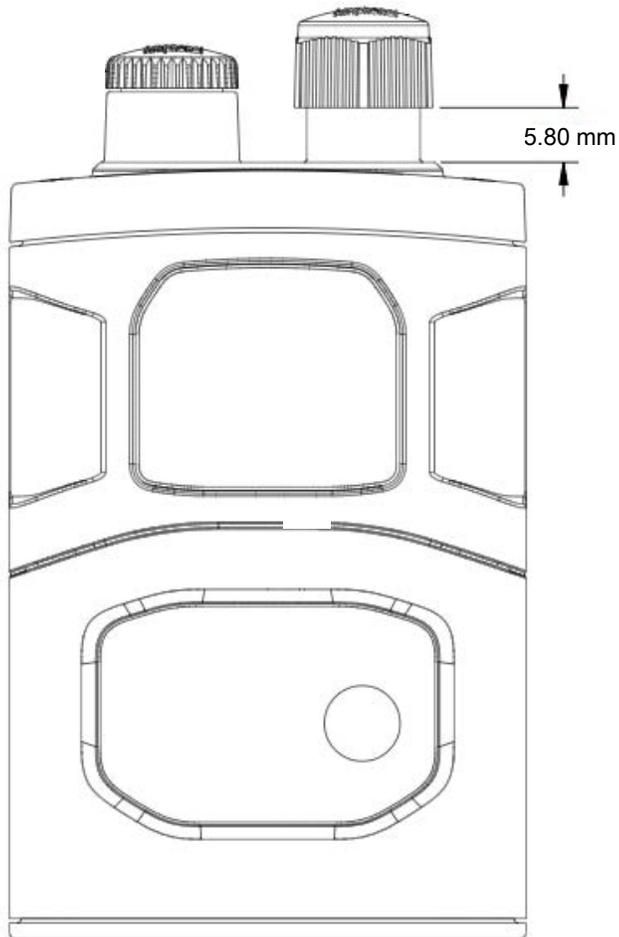
- Torque for M12 Zebra cables (xS20 only): 24.0 in-lbs
- Torque for USB-C cables (FS10 only): 1 in-lb
- Torque for connector covers (xS20 only): 10.0 in-lbs



**NOTE:** Connector covers are hand tightened from the factory to allow for easy hand removal. The covers must be torqued at installation to guarantee an IP65 or IP67 specification if cables are not used.

To ensure proper connector cover seating, see the figure below for the reference dimension (5.80 mm) of the connector covers.

**Figure 5** Connector Covers Reference Dimension



For additional information on Zebra cables, see [Cables](#).

## Power Sources

FS/VS Smart Camera devices can be powered through an external power supply, Power over Ethernet (PoE) (xS20 only), or USB Type C (FS10 only) for maximum flexibility. A power priority scheme selects power from the external power supply over PoE (xS20 only) to ensure the least restrictive power source is utilized. Changes to the power source trigger a reboot.

### 12 Pin M12 Power Input (xS20 only)

This power source input powers the xS20 only. There are no external peripherals are powered through the xS20. As a result, as long as the voltage and currents are met in the specifications table, the xS20 will operate as expected. A self-resettable fuse prevents the physical overload of the M12 connector and provides protection from reverse voltage and prevents the voltage from exceeding or falling below the input specifications.

### Power Over Ethernet (xS20 Only)

FS/VS Smart Camera devices support operation from power sourcing equipment meeting the 802.3at class 4 (30 W) or 802.3af class 3 (15.4W) or 802.3af Class 2 (7W) IEEE Power Over Ethernet (PoE) standards. These are commonly referred to as PoE+ and PoE respectively by equipment providers.

### USB Type C (xS10 Only)

USB Type C allows for novel and cost-effective installations provided the following constraints are acceptable:

- Optocoupled GPIO is still functional provided the COMMON\_IN and COMMON\_OUT are properly terminated when using the appropriate cable.



**CAUTION:** For optimal performance, use USB BC1.2 or USB charging ports that can supply up to 1.5A only.

## Grounding for Electro-Magnetic Compliance and ESD Safe

The vision system is designed with a rugged metal chassis connected internally to ground for robust Electro-Magnetic Compliance (EMC) and ESD Safe operation. Do not mount to any conductive object, body, structure, or mechanism that may become connected to line voltage or a voltage potential other than Protected Earth Ground. Chassis grounding via cable shield, mounting screws, or low inductance ground strap to a local Protected Earth Ground is acceptable.



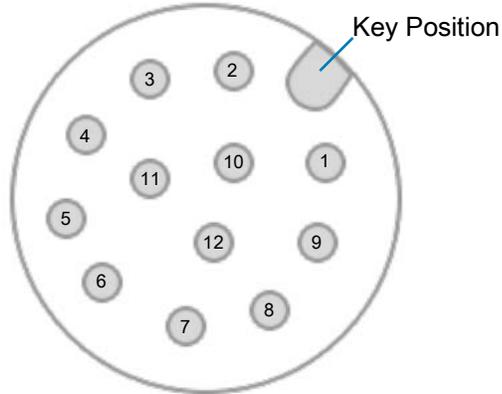
**NOTE:** There is no galvanic connection to Earth Ground when the device is powered over an unshielded Ethernet cable. In this scenario, grounding to local Earth Ground through another cable shield, mounting screw, or ground strap is required for ESD Safe compliance and best practice for EMC.

## Cable Pin Outs

The following sections outline the pin outs for the 12 pin Power and I/O connector and the Ethernet connector for xS20 devices.

### Power and I/O Connector (xS20 Only)

**Figure 6** Power and I/O Connector - 12 Pin Diagram

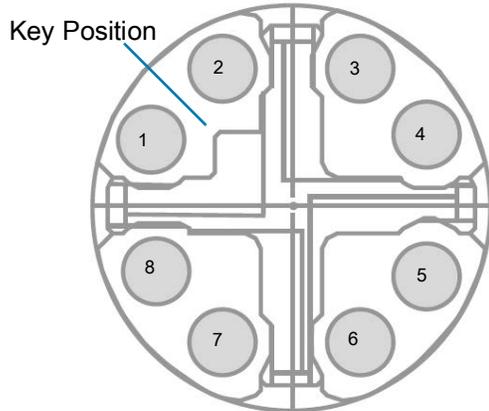


**Table 6** Power and I/O Connector - 12 Pin Listing

Pin	Color	Description
1	Yellow	OUT1
2	White / Yellow	TXD
3	Brown	RXD
4	White / Brown	IN1
5	Violet	RTS
6	White / Violet	COMMON_IN
7	Red	DC_IN
8	Black	GND
9	Green	COMMON_OUT
10	Orange	IN0
11	Blue	OUT0
12	Grey	CTS
SHELL	Bare	SHIELD

## Ethernet Connector (xS20 Only)

**Figure 7** Ethernet Connector - 8 Pin Diagram



**Table 7** Ethernet Connector - 8 Pin Listing

Pin	Description
1	ENET_MX1P
2	ENET_MX1N
3	ENET_MX2P
4	ENET_MX2N
5	ENET_MX4P
6	ENET_MX4N
7	ENET_MX3N
8	ENET_MX3P
SHELL	SHIELD

## Setting up an FS/VS Smart Camera

This section provides mounting instructions for both FS10 and xS20 devices using an L-bracket.

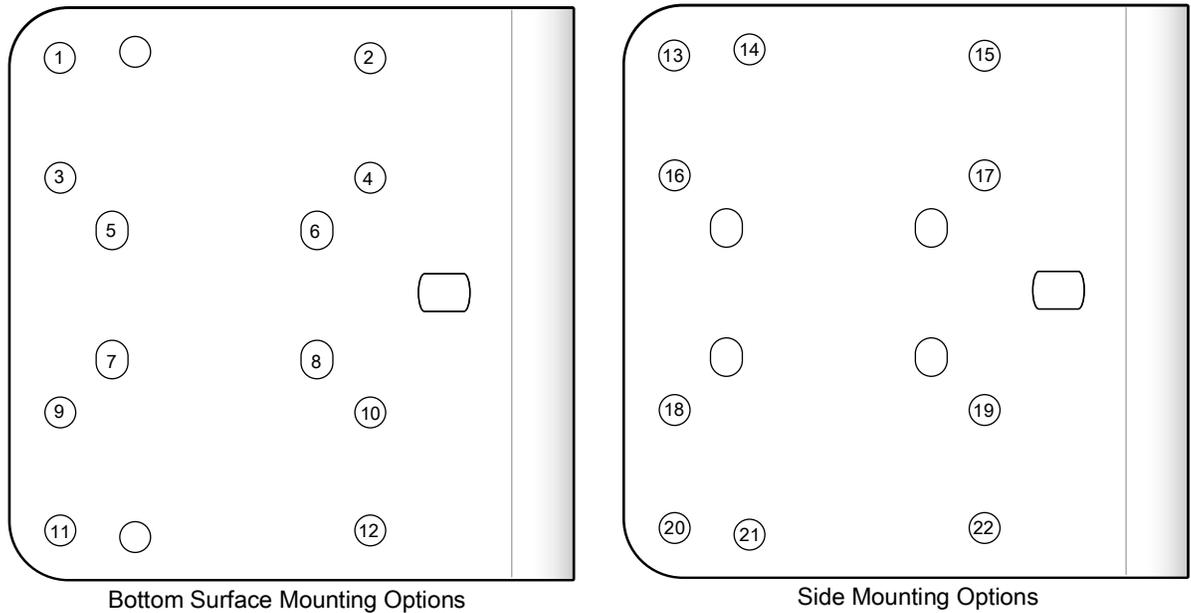
### Mounting Instructions

1. Refer to [Dimensional Drawings](#) for mounting hole placements on the devices.
2. Align the holes on the mounting surface with the mounting holes on the device.
3. Insert screws into the mounting holes and tighten. The recommended torque is 6.0 in-lbs.

### Mounting the Device Using the L-Bracket Accessory (BRKT-LMNT-U000)

1. Use the mounting screws provided with the kit to attach the camera to the bracket. The recommended Torque is 6.0 in-lbs.
2. Refer to the L-bracket mounting options outlined below.

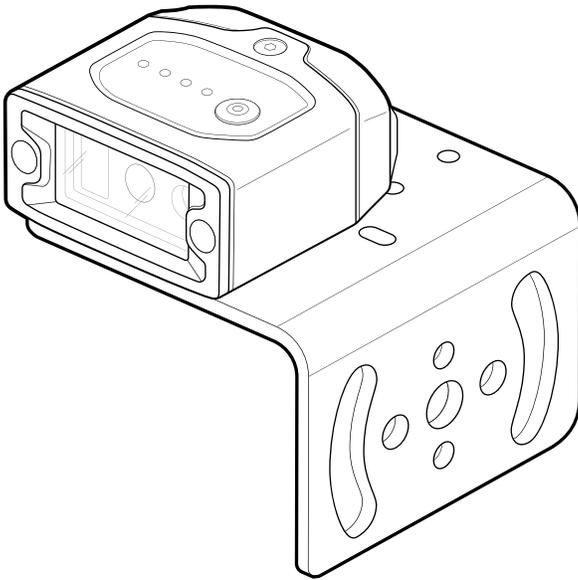
**Figure 8** Bottom and Side Mounting Hole Patterns



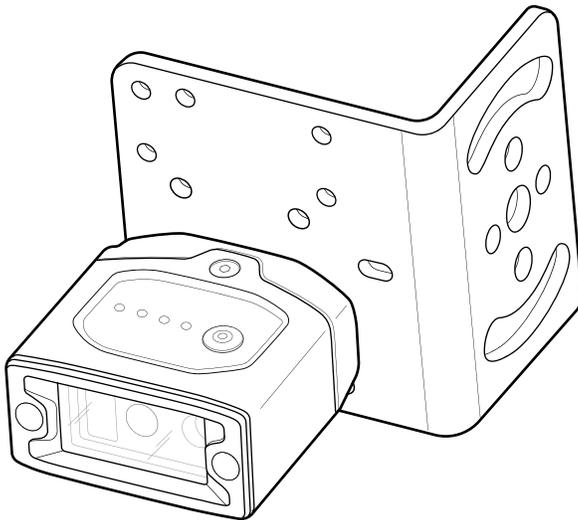
1,2,7,8 or 5,6,11,12	Bottom Mounting Holes for the FS10 (two options)
13,15 16,17 18,19 20, 22	Back Mounting Holes for the FS10 (four options)
1,2,9,10 or 3,4,11,12	Bottom Mounting Holes for the xS20 (two options)
13, 21 or 14,20	Side Mounting Holes for the xS20 (two options)

## FS10 Mounting Options

**Figure 9** Bottom and Side Mounting Hole Patterns



**Figure 10** Bottom and Side Mounting Hole Patterns



## xS20 Mounting Options

Figure 11 xS20 Bottom Mounting Orientation

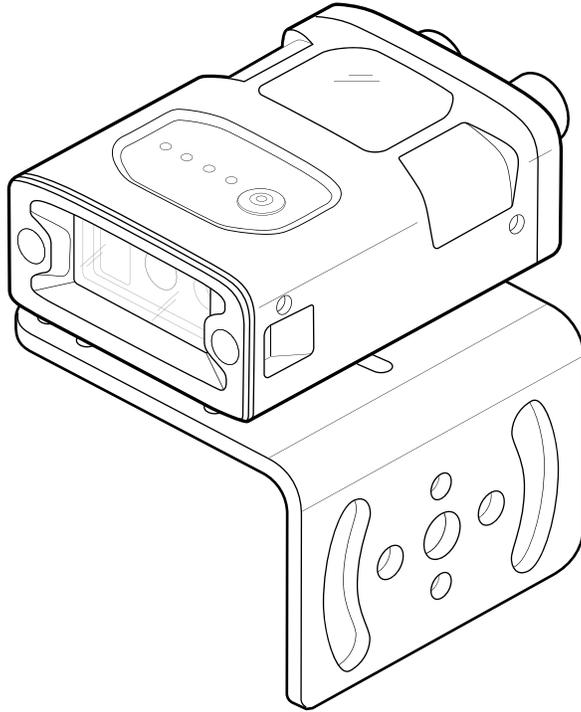
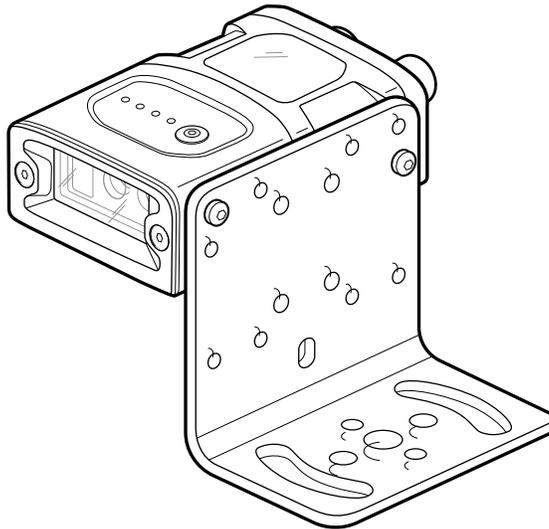
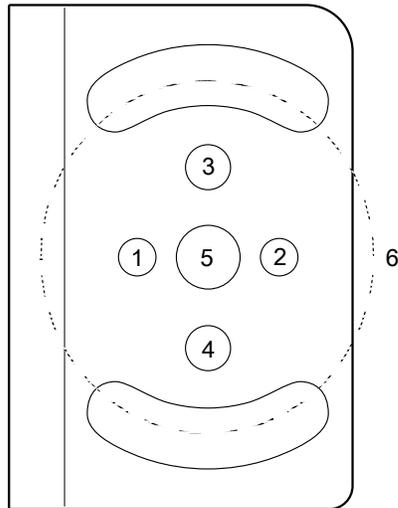


Figure 12 xS20 Side Mounting Orientation



**Figure 13** Mounting to the Structure Hole Pattern



1-2	M5 Clearance
3-4	1/4-20 Clearance
5	M8 Clearance
6	M8 Clearance Slots

# Using the Smart Camera

This section describes using the FS/VS Smart Camera and optimizing the device's utility by leveraging its connection interfaces and understanding the feedback the device is able to provide through its user interface.

## USB Type C (FS10 Only)

The FS10 utilizes a USB type C connection that supports USB 2.0 high speed communication only. The sealed port implements a standard USB Type C dual screw lock mechanism for secure connections. When paired with the IP67 series of Zebra screw locking cables, the interface maintains a full IP67 seal.



**CAUTION:** The sealing gasket on IP67 series Zebra USB Type C cables require adequate pressure for proper seal and connector engagement. Always tighten the locking screws when using these cables, even if IP67 sealing is not required.

When connected as a peripheral to a USB host, the devices can be configured to support the following functionality:

- RNDIS Ethernet over USB
- HID keyboard

## User Interface

The FS/VS Smart Camera provides various forms of feedback in the form of beeper indications and LEDs that keep the user aware of specific device states.

## Data Capture

The FS10/xS20 Smart Cameras have an amber LED aiming dot.

**Figure 14** FS10/xS20 Aiming Dot



## User Interface Label

Figure 15 FS/VS Smart Camera Series UI Labels



Number	FS10 Indicator	Number	xS20 Indicator
1	Power	1	Power
2	Device Status	2	Device Status
3	Decode	3	Decode
4	Trigger	4	Ethernet
		5	Trigger

## LED and Beeper Indicators

The table below describes the LED and beeper indications of the FS/VS Smart Camera upon device events such as power up, maintenance operations, and decoding

**Table 8** Beeper and LED Indicators

Event	Beeper	Power LED	Device Status LED	Error Decode LED Status	Description
<b>Power Up</b>					
Bootup In Progress	None	Solid Red	Off	Off	Bootloader or Linux Bootleg
Bootup Complete	None	Solid Green	Off	Off	Unit is fully powered up.
<b>Maintenance Operations</b>					
Firmware Update Start	Off	LED state does not change	Red Blinking	Off/Red Blinking	Firmware Update in progress
Firmware Update Success	LED state does not change	LED state does not change	LED state does not change	LED state does not change	Firmware Update completed successfully. No success indication, boot normally.
Firmware Update Fail	One medium volume, low tone, long duration beep	LED state does not change	Red Blinking	Red Blinking	Firmware Update has failed
Factory Reset	Two medium volume, medium tone, short duration beeps	LED state does not change	LED state does not change	Red Blinking	Factory defaults
AutoTune Start	One medium volume, medium tone, short duration beep	LED state does not change	LED state does not change	Off	AutoTune in progress
AutoTune Success	One high volume, high tone, short duration beep	LED state does not change	LED state does not change	Off	AutoTune completed successfully
AutoTune Fail	One low volume, low tone, short duration beep	LED state does not change	LED state does not change	Off	AutoTune has failed

**Table 8** Beeper and LED Indicators (Continued)

Event	Beeper	Power LED	Device Status LED	Error Decode LED Status	Description
<b>Decode</b>					
Barcode Decode Start	Off	LED state does not change	Solid Amber	Off	Barcode decode in progress
Barcode Decode Success	Configurable. Default: One high volume, medium tone, short duration beep	-	Green (Single Blink)/Off	Configurable Default: One Green Blink	Barcode decode successful
Barcode Decode Fail	Off	-	Off	Configurable Default: One Red Blink	Barcode decode error

## FS10/xS20 Decode Ranges

Figure 16 FS10/xS20 Reading Diagram (FS10 Pictured)

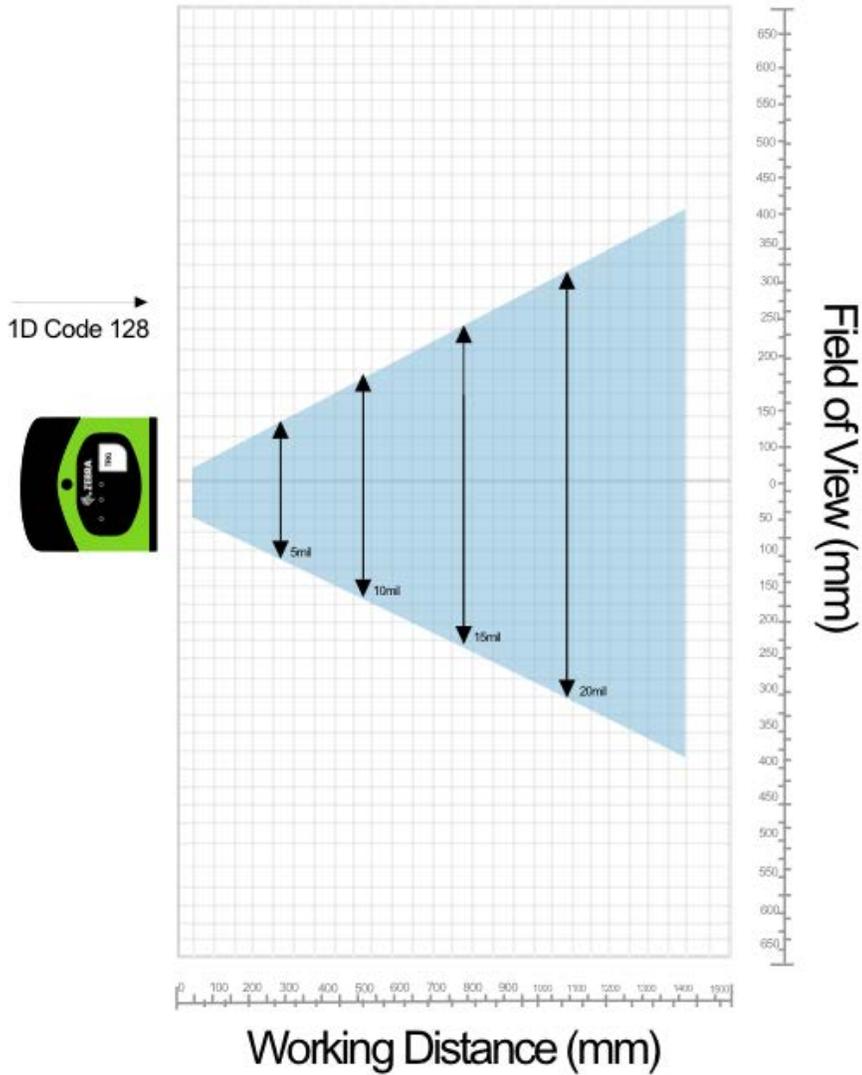


Table 9 FS10 and xS20 Decode Ranges

Symbology	Typical Near	Typical Far
5 mil Code 128	51 mm (2 in.)	330 mm (13 in.)
10 mil Code 128	51 mm (2 in.)	656 mm (25 in.)
15 mil Code 128	51 mm (2 in.)	940 mm (37 in.)
20 mil Code 128	51 mm (2 in.)	1219 mm (48 in.)
5 mil Data Matrix	51 mm (2 in.)	203 mm (8 in.)
10 mil Data Matrix	51 mm (2 in.)	381 mm (15 in.)
15 mil Data Matrix	51 mm (2 in.)	610 mm (24 in.)
30 mil Data Matrix	51 mm (2 in.)	1143 mm (45 in.)
<b>NOTE:</b> Near distance is limited by barcode width and near distance focuses no closer than 3".		
*May be limited by illumination output.		

## General Purpose Input and Outputs

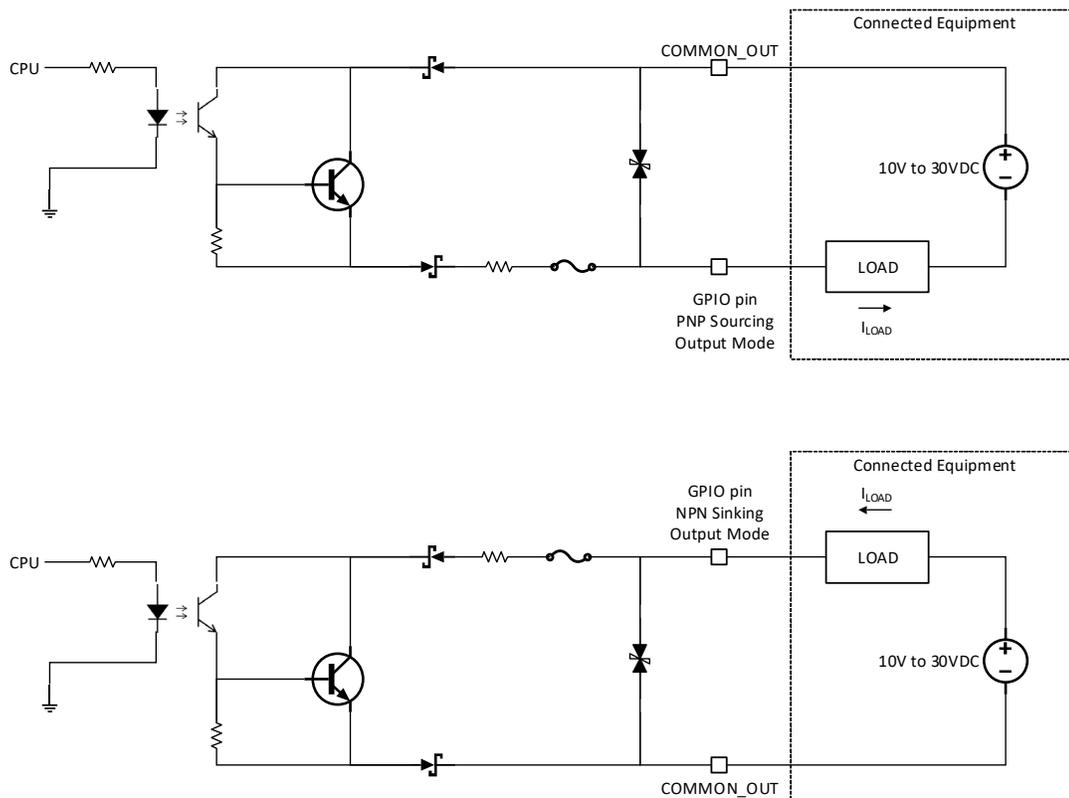
The FS10 (with appropriate cable) and xS20 devices have two dedicated input and two dedicated output general purpose IO. They are all optically coupled to provide electrical isolation and wiring flexibility

### Optically Coupled GPIO

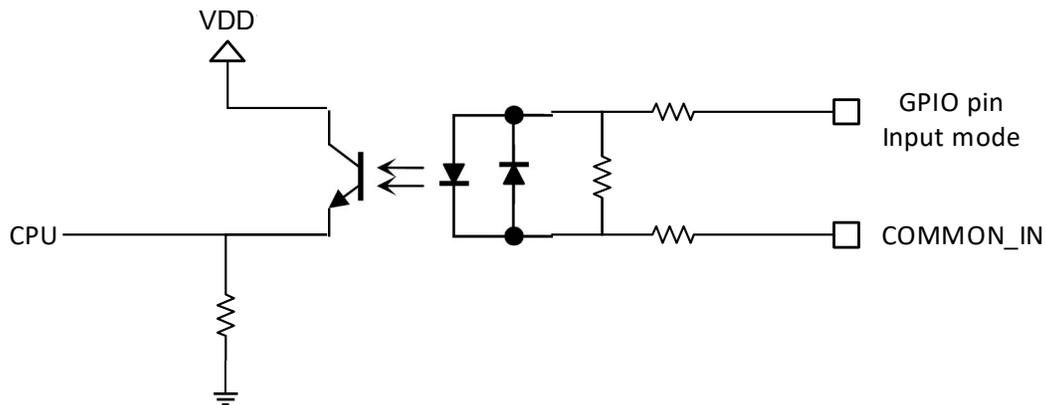
Optocoupled GPIO have the advantage of being electrically isolated from the rest of the vision system and require external reference through the COMMON\_IN and COMMON\_OUT wires. The termination of COMMON\_IN and COMMON\_OUT to an external voltage or ground determines if the input or output is Sinking (also known as NPN) type or Sourcing (also known as PNP) type.

The output GPIO performs similarly to switches connecting the GPIO pin to COMMON\_OUT. When disabled, the GPIO pin is disconnected from COMMON\_OUT and allowed to float. As a result, optocoupled outputs turn on relatively quickly, while the turn off time is dependent upon how quickly the connected load dissipates charge.

**Figure 17** Output Mode Equivalent Circuit Diagram for NPN and PNP Mode



Optocoupled inputs are enabled when voltage is applied across the GPIO pin and COMMON\_IN.

**Figure 18** Input Mode Equivalent Circuit Diagram for NPN and PNP Mode

Optocoupled GPIO can be operated in a non-isolated fashion by terminating COMMON\_IN and COMMON\_OUT to the DC\_IN or GND wires used to power the device.

The following table provides a useful reference for such connections.

**Table 10** Connection References

Wire	Termination	Configuration
COMMON_IN	GND	Sinking Input (NPN)
COMMON_IN	DC_IN	Sourcing Input (PNP)
COMMON_OUT	GND	Sinking Output (NPN)
COMMON_OUT	DC_IN	Sourcing Output (PNP)

While it is possible to configure inputs and outputs as the same type, this is not recommended as inputs and outputs must be of opposite type on the device and auxiliary equipment to be compatible. All optocoupled GPIO share the COMMON\_IN for inputs and COMMON\_OUT for outputs. Therefore, all inputs must be of the same type and all outputs must be of the same type. For example, it is not possible to simultaneously configure sinking output on OUT0 and sourcing output on OUT1.



**NOTE:** Refer to the documentation of the connected auxiliary equipment to ensure a compatible configuration, and remember to leave unused GPIO in a disabled state.

Optocoupled outputs are individually fused to protect against damage from short circuit or overload events. Since no power is consumed from the vision system, optocoupled GPIO are always available regardless of power source and have no impact on power budgeting.

## Thermal Management

Sophisticated algorithms keep operation of the system within acceptable thermal parameters to ensure reliable operation over the product lifetime.

Temperature is actively monitored at critical points within the system. Whenever a safe limit is exceeded the system response may include stopping active jobs. When this condition occurs, the user must take steps to mitigate the overheating condition. Following these steps, a power cycle of the unit is necessary to resume normal operation.

If overheating is a problem, effective mitigation strategies include:

- Avoiding continuous trigger mode
- Lowering trigger rate
- Using external illumination
- Operating in a cooler environment
- Actively cooling with a fan
- Heatsinking the chassis to a large thermally conductive mounting surface through a thermally conductive mounting system

For optimal performance, ensure that the device does not exceed the recommended operating ranges listed below:

**Table 11** Operating Temperature

Temperature	Operating Range
Ambient Temperature	0°C - 45°C (duty cycle-dependent)



**IMPORTANT:** If temperatures exceed the operating range, additional heat sinking strategies may be necessary, i.e. mounting to a metal infrastructure or forced convection via an external fan. Use of the Zebra Universal Mounting Bracket (BRKT-LMNT-U000) provides multiple options to mount to a metal infrastructure.

# Zebra Aurora Software Overview

The Zebra Aurora application provides a unified platform with an intuitive interface for setting up, deploying, and running Fixed Industrial Scanning or Vision System jobs to control enterprise-wide manufacturing and logistics automation solutions. This tool has the capacity to scale in support of new codes and increase scanning speed with the potential to upgrade to machine vision functionality via software license upgrade.

## Human-Machine Interface (HMI)

Using the Web Human-Machine Interface (HMI), operators can view and interact with the Zebra Aurora application Human Machine Interface (HMI) dashboard via web browser or by connecting a monitor directly to the device.

## Industrial Ethernet Information

For information regarding built-in EtherNet/IP, PROFINET or other network protocols to integrate with any common PLC or host system, refer to the FS/VS Smart Camera Industrial Ethernet User Guide.

## Zebra Aurora Features

The Zebra Aurora application provides several differentiating features to rapidly process, evaluate and compare multiple images in various lighting conditions without altering any hardware configurations.



**NOTE:** Only VS20 devices can perform jobs that require machine vision, such as golden image compare described below.

Some notable features include:

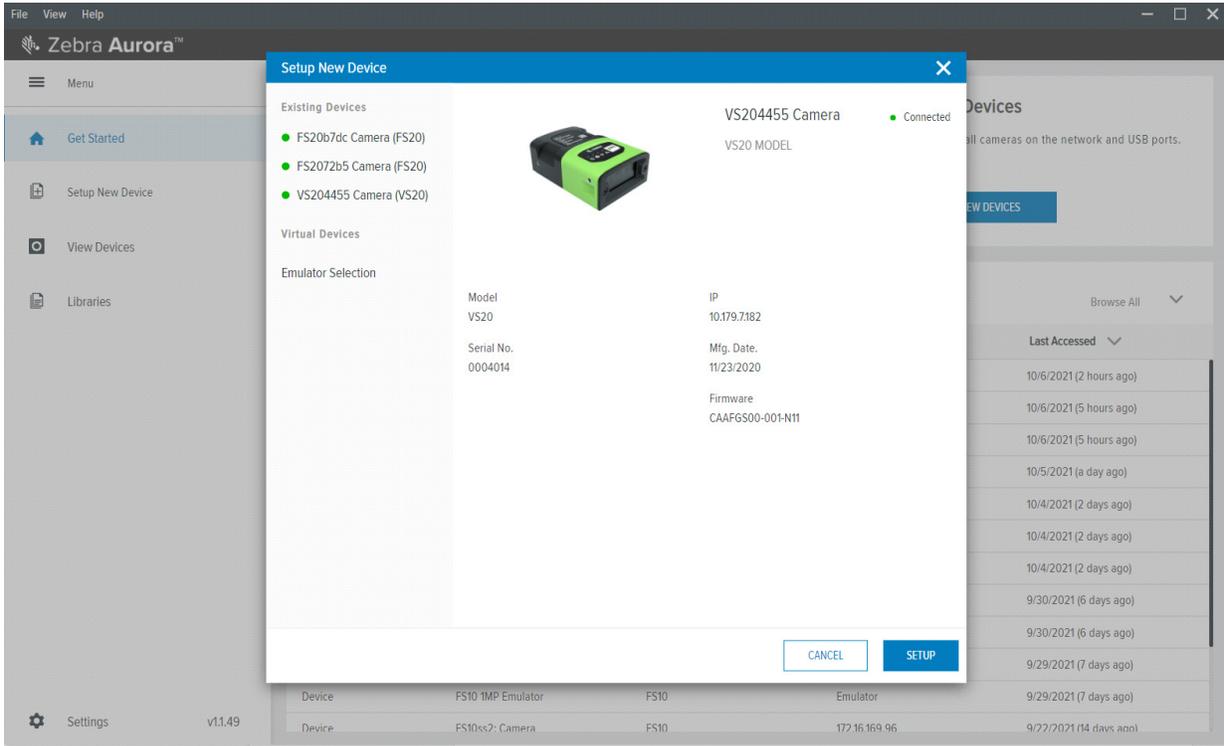
- Golden Image Compare – allows users to efficiently identify and resolve issues by comparing any image to an ideal image created at setup. This tool has the capacity to significantly expedite troubleshooting activities by immediately diagnosing and correcting the source of degradation.
- QuickDraw – enables the user to draw right on an image to create a tool with minimum steps.
- Object Locate and Pattern Matching – Zebra’s algorithms and intuitively crafted default settings enable users to consistently create and deploy efficient tools with less trial and error involved.
- Image Perfect - captures up to 16 different images, each with its own unique setting for focus, exposure, gain, and illumination control in one capture event.

For additional information on leveraging these features toward a specific use case, refer to the built-in tutorials, videos and walk-throughs available within the Zebra Aurora application.

## Device Discovery

Emulated devices are listed under **Virtual Devices** on the **Setup New Device** screen. Devices that are physically connected to the system and are available to connect and setup are listed under **Existing Devices**.

Figure 19 Setup a Device

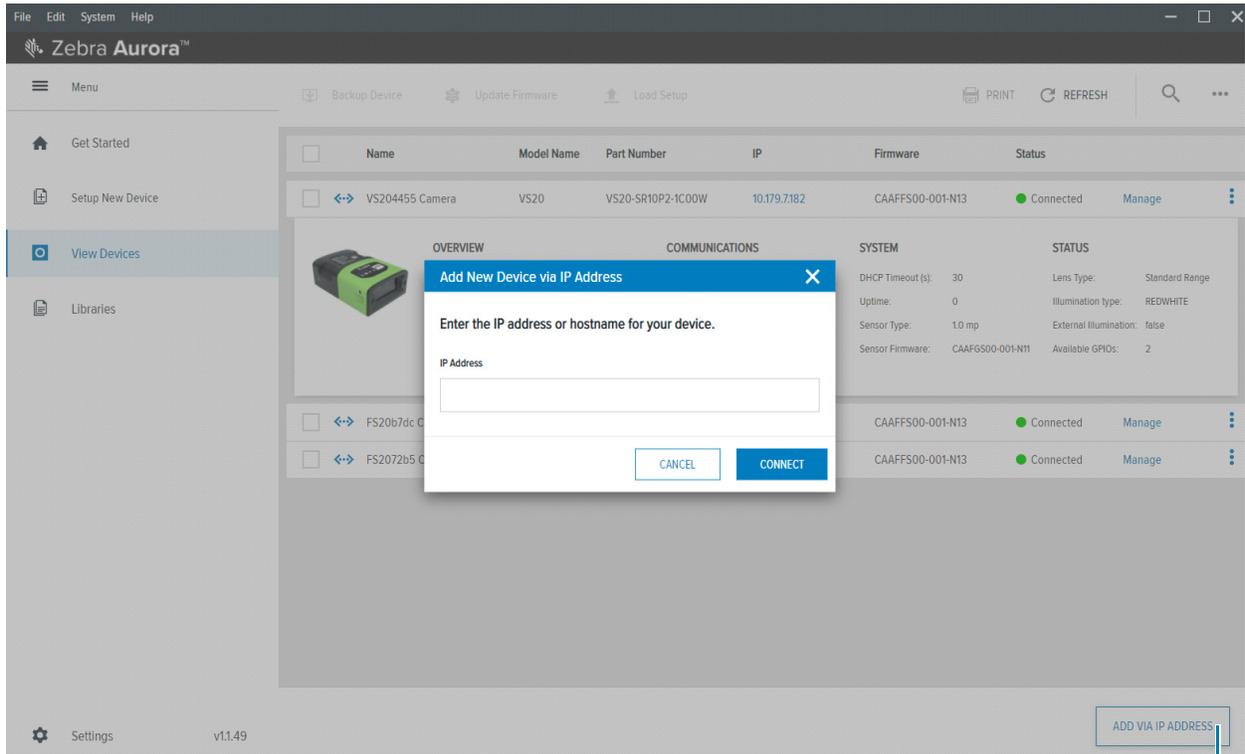


**NOTE:** If you are experiencing issues using Device Discovery, see the [Troubleshooting](#) and [Security Settings](#) sections for potential solutions.

## Setting an IP Address

Users can manually set up an IP address by clicking on the **Add Via IP Address** button in the bottom left corner of the **View Devices** screen. To connect via IP address, enter the IP address into the **Add New Device via IP Address** form field and click **Connect**.

**Figure 20** Add a New Device via Static IP Address



Add Via IP Address Button

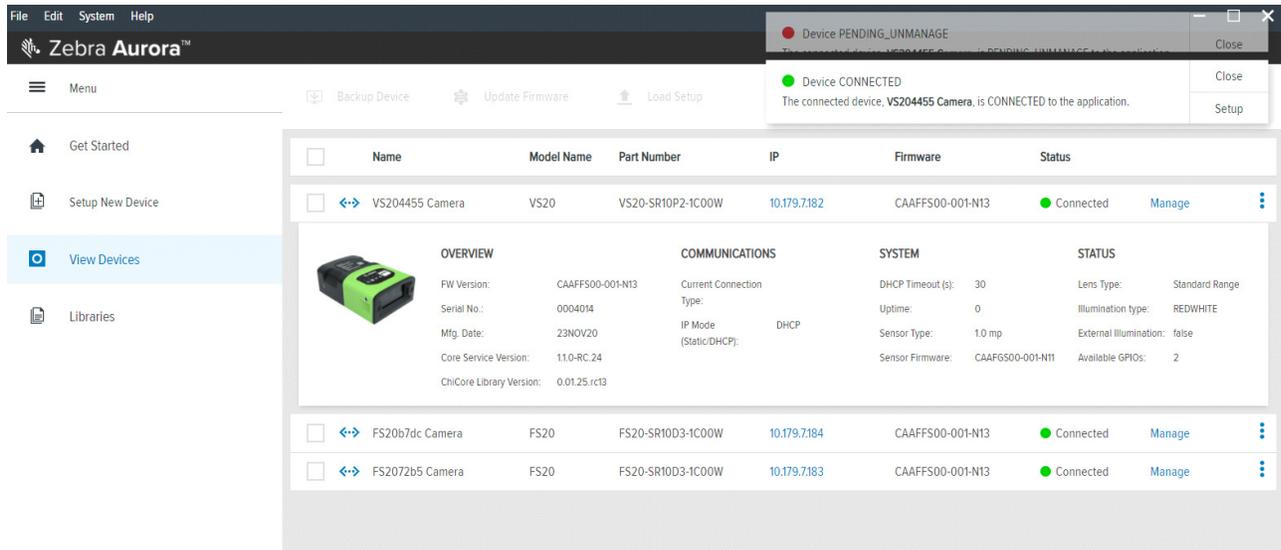
## Network Setup (xS20 only)

To connect the device to a network:

1. Physically connect the FS20 or VS20 to a Network Switch, Power over Ethernet Injector, or directly to the host PC using Ethernet.
2. Next, Connect the FS10 to the host PC using a USB-A to USB-C cable.

Once connected, navigate to the **View Devices** screen to view all connected devices and their properties such as name, model name, IP address and the last time the device was accessed.

**Figure 21** Main Screen



## Configuring Device Settings

Configurable device settings within the Zebra Aurora application include device details, communication, general settings, and GPIO mapping (xS20 only). Users can add a description to a specific set up, proceed to configure additional settings, or open the Job workflow to open an existing Job by importing a zjob file or creating a new one.



**NOTE:** Emulated device settings are read-only and cannot be edited by users.

Figure 22 Device Settings

The screenshot shows the 'VS20 - Device Settings' window in the Zebra Aurora application. The window title bar includes 'File', 'Edit', 'View', 'System', and 'Help' menus. Below the title bar, there are tabs for 'Setup Device' and 'VS20 - Device Settings'. The main content area is divided into several sections:

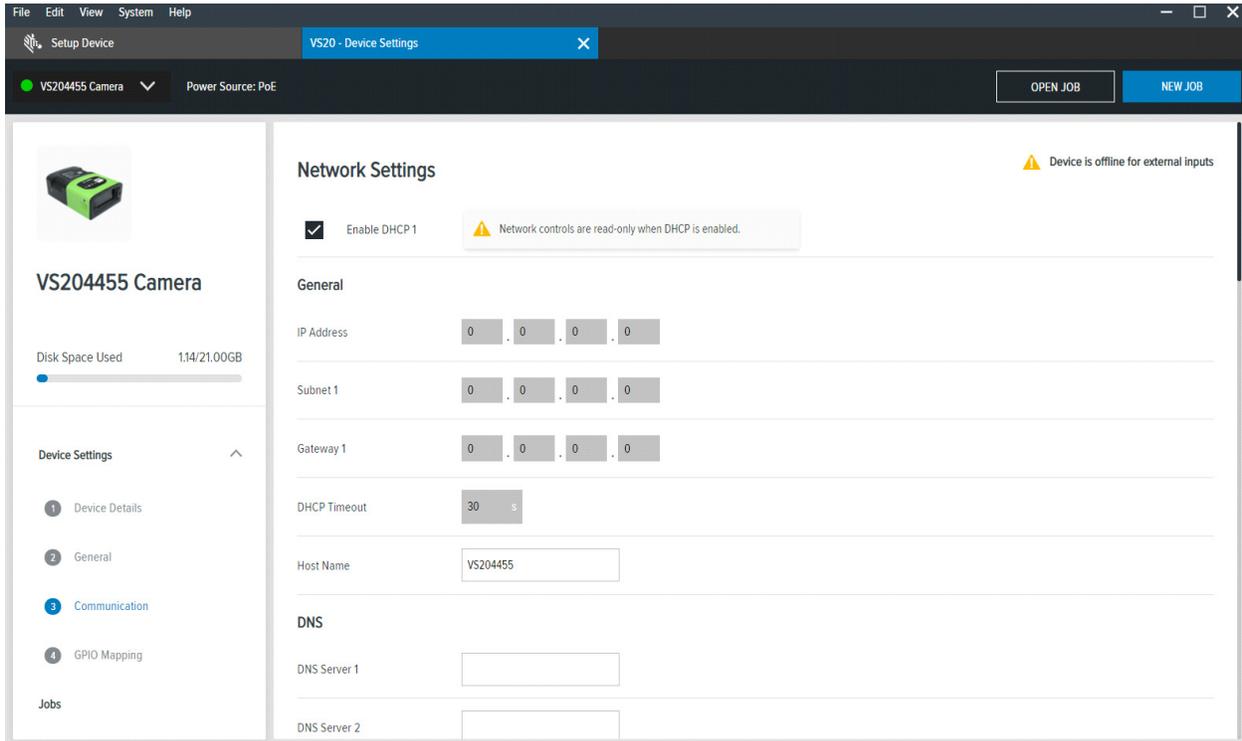
- Header:** Shows 'VS204455 Camera' with a dropdown arrow and 'Power Source: PoE'. There are 'OPEN JOB' and 'NEW JOB' buttons.
- Device Image:** A small image of the VS204455 Camera.
- VS204455 Camera:** The device name.
- Disk Space Used:** A progress bar showing 1.14/21.00GB used.
- Device Settings:** A list of settings categories:
  - 1 Device Details
  - 2 General
  - 3 Communication
  - 4 GPIO Mapping
- Jobs:** A section for job management.
- Setup Description / Notes:** A large text area for entering a description or notes, with a '500/500 characters remaining' indicator.
- Device Info:** A table of device attributes:
 

Model	VS20
IP	10.179.7.182
Part Number	VS20-SR10P2-1C00W
Serial Number	0004014
Mfg. Date	23NOV20
Manufacturer	Zebra Technologies Corp
Manufacturer Uri	http://www.zebra.com
Model Uri	http://www.zebra.com
Presentation Uri	/
UUID	VS20-0004014
Number Of GPIOs	2

## Communication Settings

Configurable communication settings include network settings, DNS, date/time, PLC protocol (xS20 only) and USB settings (FS10 only). For additional information on PLC protocol and Industrial Ethernet, refer to the Smart Camera Industrial Ethernet User Guide.

Figure 23 Communication

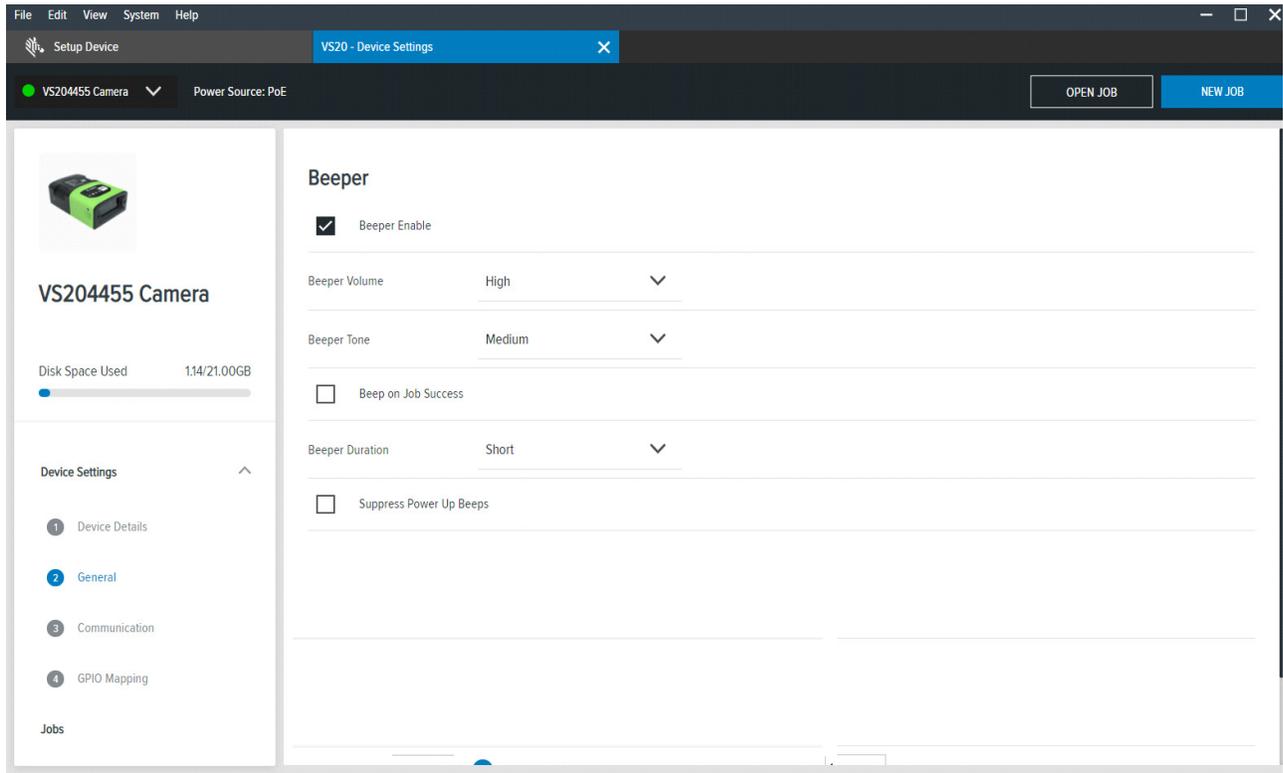


## General Settings

Under general settings, configure the beeper and LED settings. Beeper settings can be set to enable or disable and the volume, tone, and duration of the beep can be configured to fit the needs of a specific use case.

For additional information on the FS/VS Smart Camera user interface, see [LED and Beeper Indicators](#).

**Figure 24** General Settings

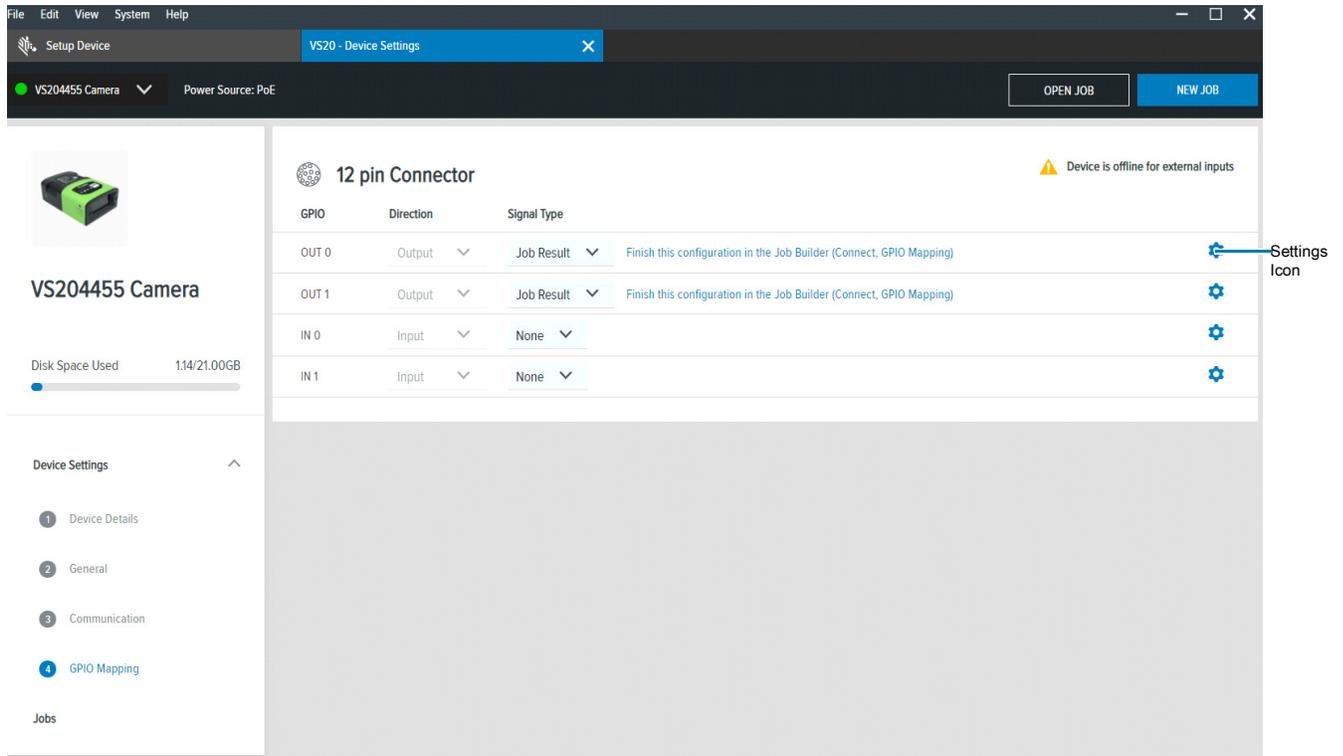


## GPIO Mapping (xS20 only)

Configure GPIO settings such as the direction and signal type for the 12 pin connector by accessing the GPIO mapping tool. The xS20 devices have hardcoded input and out GPIOs. therefore, direction cannot be configured. OUT0 and OUT1 can be configured to signal job result or none. For IN0 and IN1, the signal type can be changed to trigger or none. Input debounce on IN0 and IN1 can be also be increased by clicking the **Settings** icon.

For more information on the GPIO operation, see [General Purpose Input and Outputs](#).

**Figure 25** GPIO Mapping Configuration



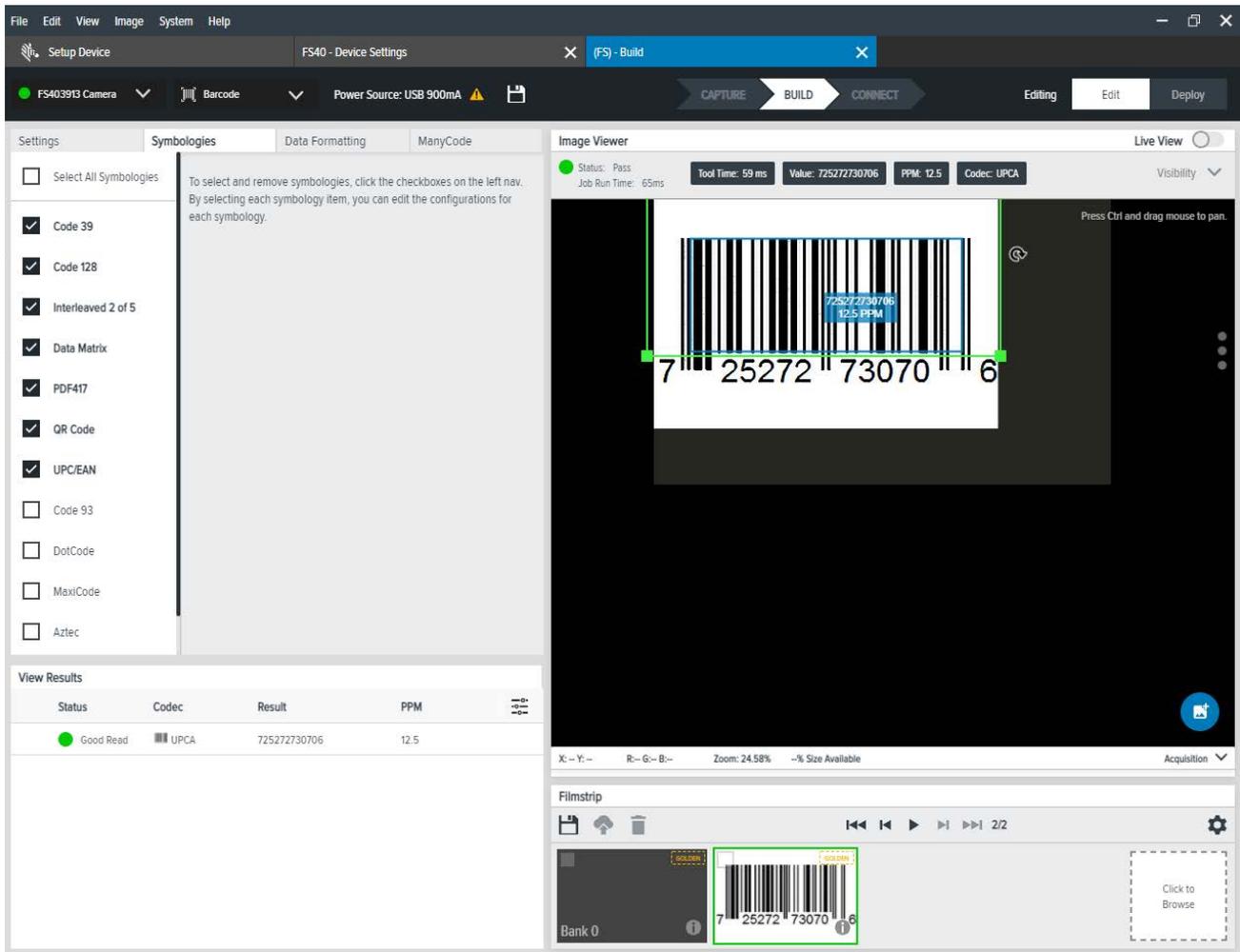
## Building and Deploying Fixed Scanning (FS) Jobs

To set up a FS Job, set decoder parameters, symbologies, OCR settings, code quality metrics, and data formatting rules. Begin by configuring the decode parameters and selecting the appropriate set of symbologies. A symbology is chosen by clicking **Symbologies Tab**. Next, select specific symbologies to be deployed by clicking the corresponding checkboxes.

Once the Job is in progress, monitor the **Image Viewer** and **Filmstrip** controls to view the Jobs progress. The **Image Viewer** contains a status bar that displays the Job result and run time. In FS editor, the status bar will show the decode time, decoded value, PPM and the type of symbology decoded.

**View Results** provides additional data on the decode, and displays the results for each Job instance.

**Figure 26** FS Job Builder



## Building and Deploying Vision System (VS) Jobs (xS20 only)

To build and deploy a VS Job, start by selecting a machine vision tool and dragging it onto the **FlowBuilder**. Using **Flowbuilder**, stack additional tools onto the workflow or configure the intended results to deploy the Job. To streamline the creation of a specific toolset, use the QuickDraw tool.

### Using the QuickDraw Tool

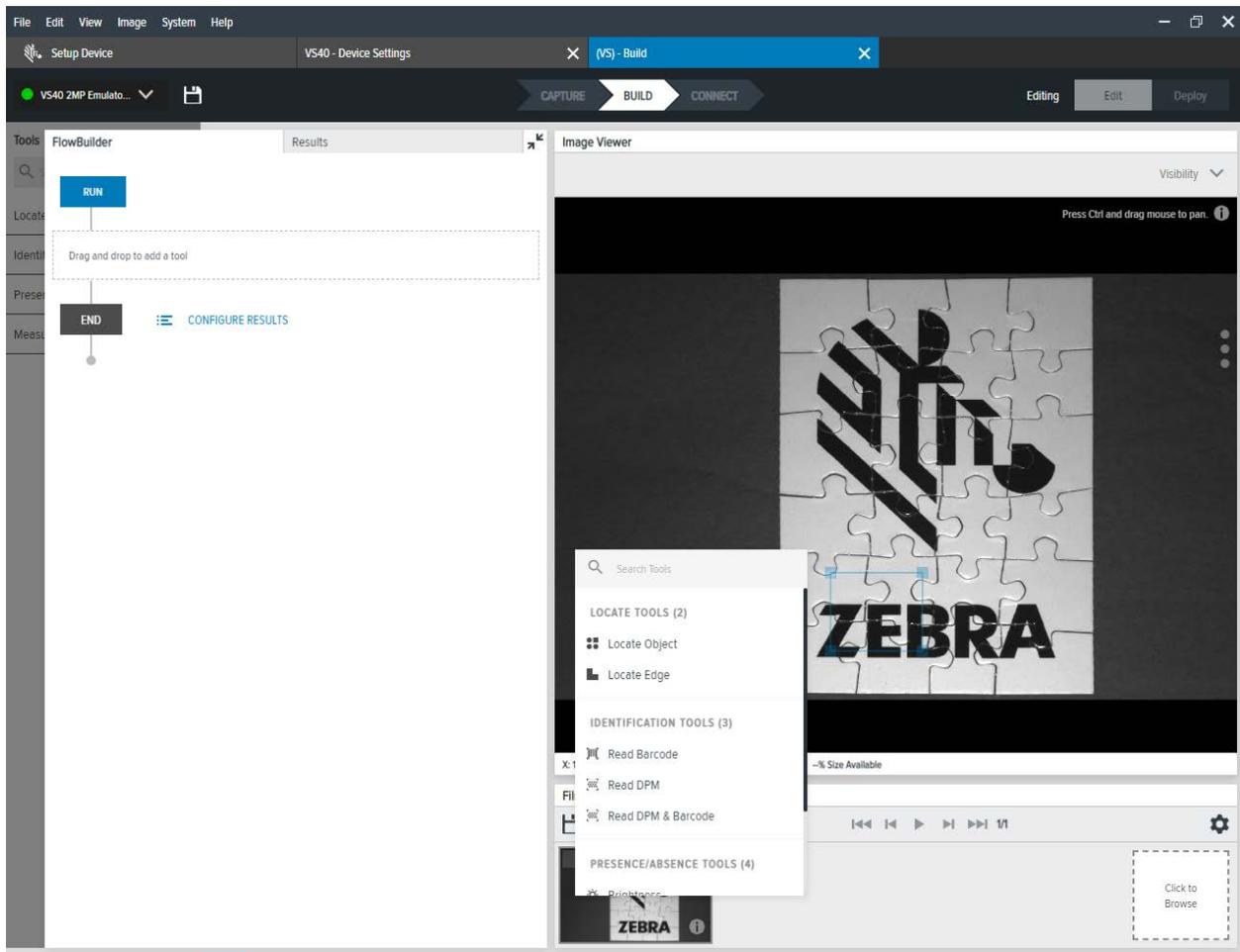
The QuickDraw tool provides an efficient way for users to rapidly select a region of interest on an image and deploy a Job based on that region.

To use the QuickDraw tool:

1. Hold shift and click to create a region of interest by dragging the mouse on the ImageViewer.
2. From the QuickDraw menu, select a tool.

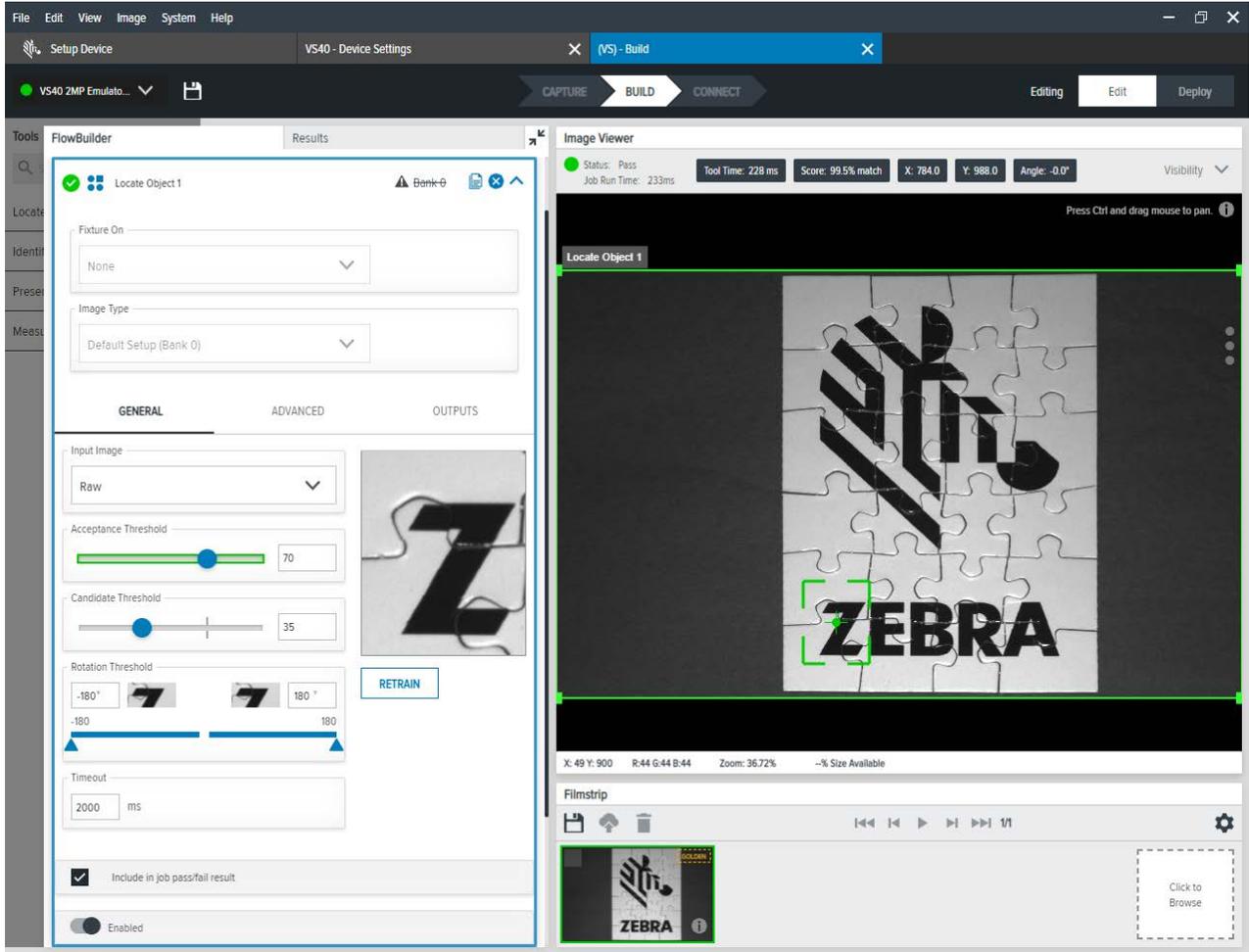
The selected tool then gets added to the FlowBuilder. From here, follow the Flowbuilder workflow to deploy the Job.

**Figure 27** QuickDraw Tool



Users can view the results of the Job in progress by monitoring the **Image Viewer** as it cycles through the images on the **Filmstrip** in the lower left corner of the application

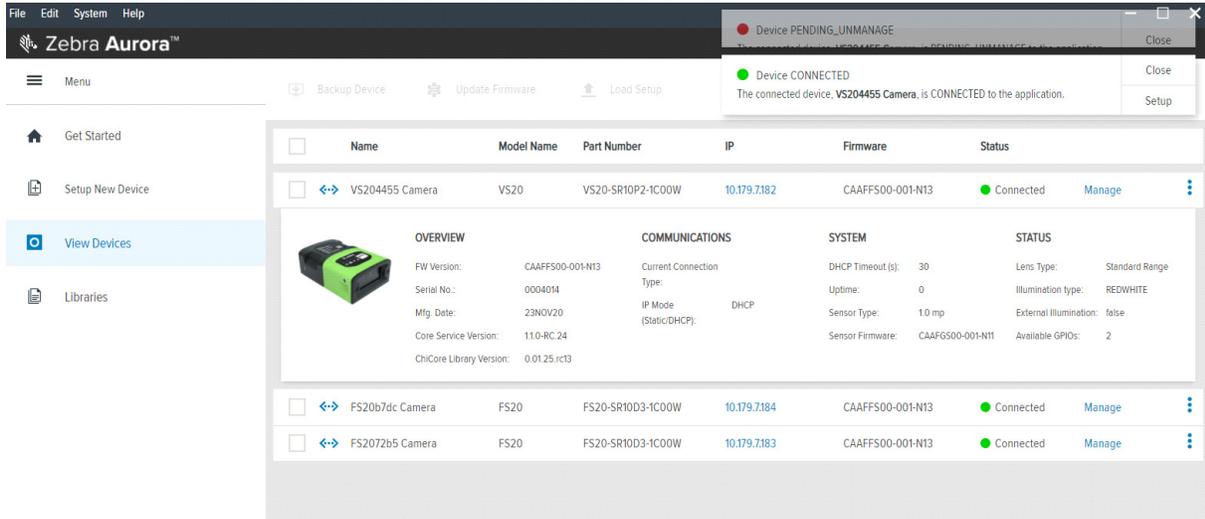
Figure 28 FlowBuilder



## Accessing the Web Human-Machine Interface (HMI)

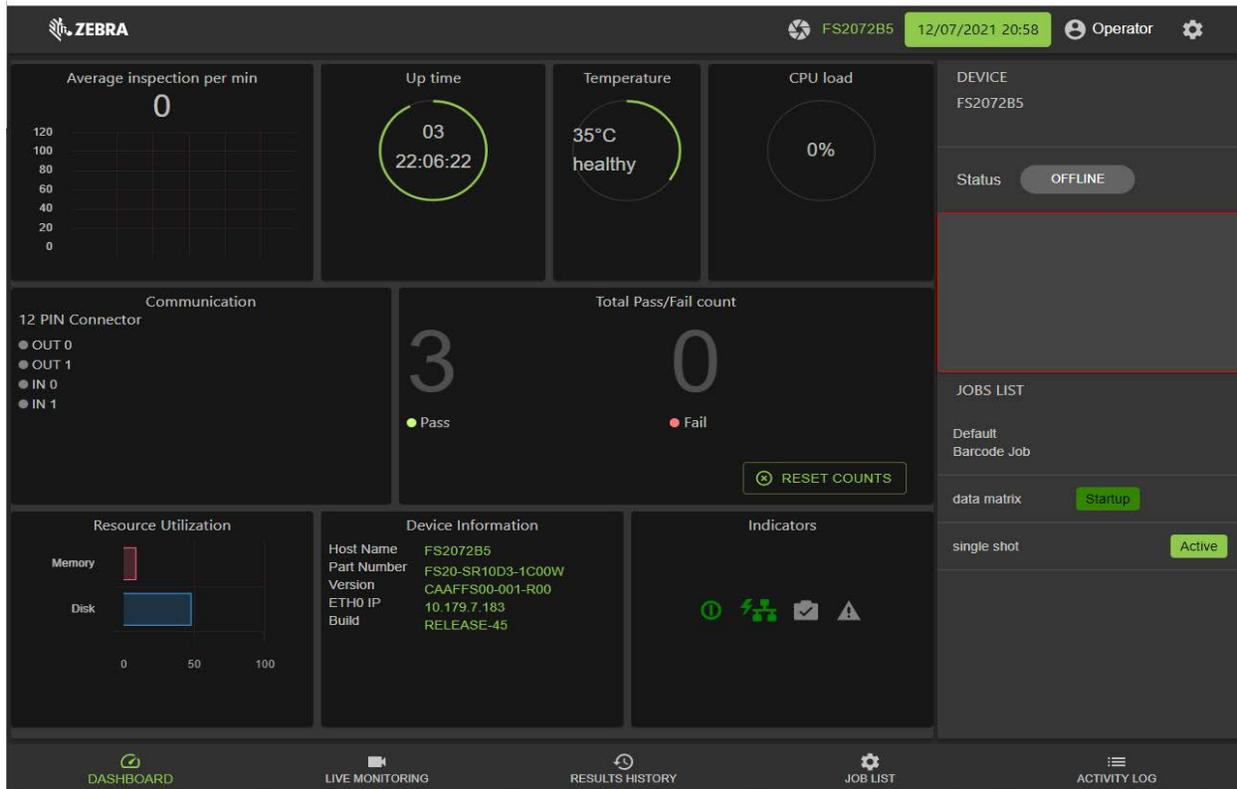
Access the Web HMI by entering the device IP address into a web browser. To obtain the device IP address, select **View Devices** from the menu on the left of the Zebra Aurora application.

Figure 29 View Devices Screen



Once logged in to the Web HMI, the application presents a dashboard that provides key hardware metrics such as average inspection per minute, total up time, temperature, CPU load, communication status, average pass fail, and resource utilization.

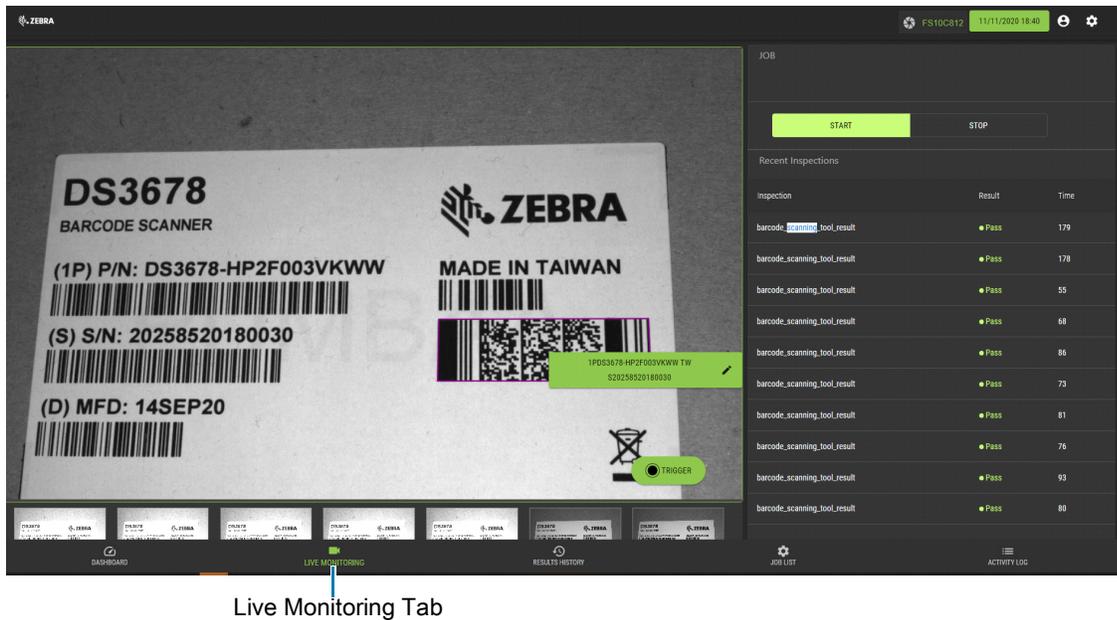
Figure 30 Web HMI



## Live Monitoring with the Web HMI

The **Live Monitoring** feature allows users to view decode results as they occur in real-time by clicking the **Live Monitoring** tab on the bottom of the interface.

Figure 31 HMI Live Monitoring



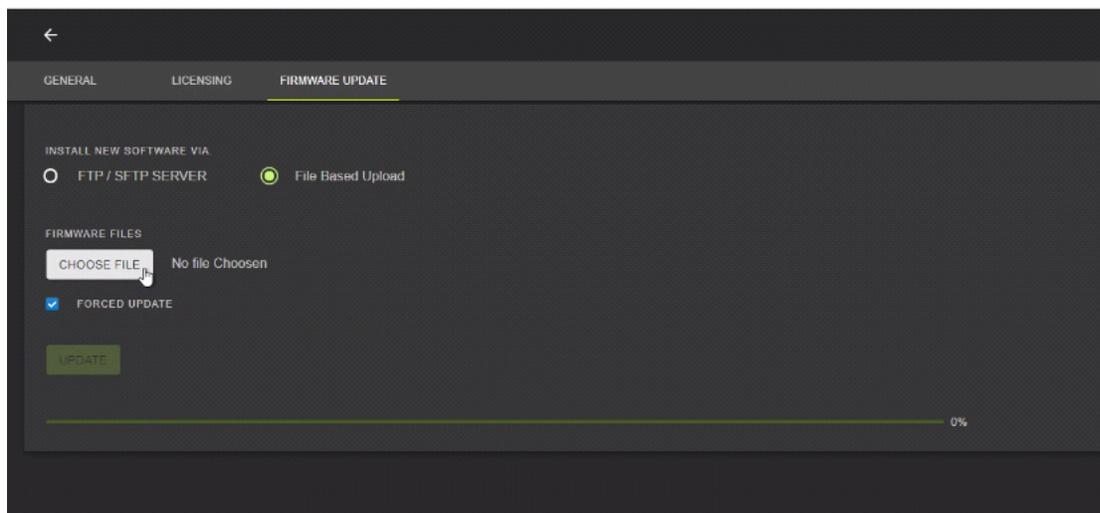
Live Monitoring Tab

The Web HMI also provides the capability to update the device firmware by selecting the settings icon in the top right corner of the application.

## Updating Firmware Using the Web HMI

On the settings screen, click the **Firmware Update** tab and click **Choose File** to select the file from the directory and click the **Update** button.

Figure 32 Web HMI Settings



Below the **Update** button, the progress bar shows the completion percentage of the firmware update in progress. Once complete, a success or failure message appears to indicate the outcome of the update. On the device, the LEDs flash red to indicate success. The device then automatically reboots and beeps.

To confirm that the firmware update was successfully completed, check the firmware version on the device in the Device Information section of the Web HMI dashboard.



**NOTE:** A factory reset may be required to clear out old XML and zjob files and replace them with newer files.

## Accessing the Device Using the Web HMI

To access the device via the Web HMI, open a browser and enter the known IP address of the reader.

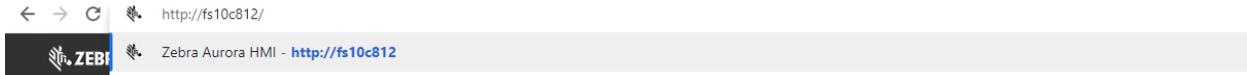
1. If connected via USB:
  - View the device label and note the hostname field.

**Figure 33** Obtain Hostname from Label

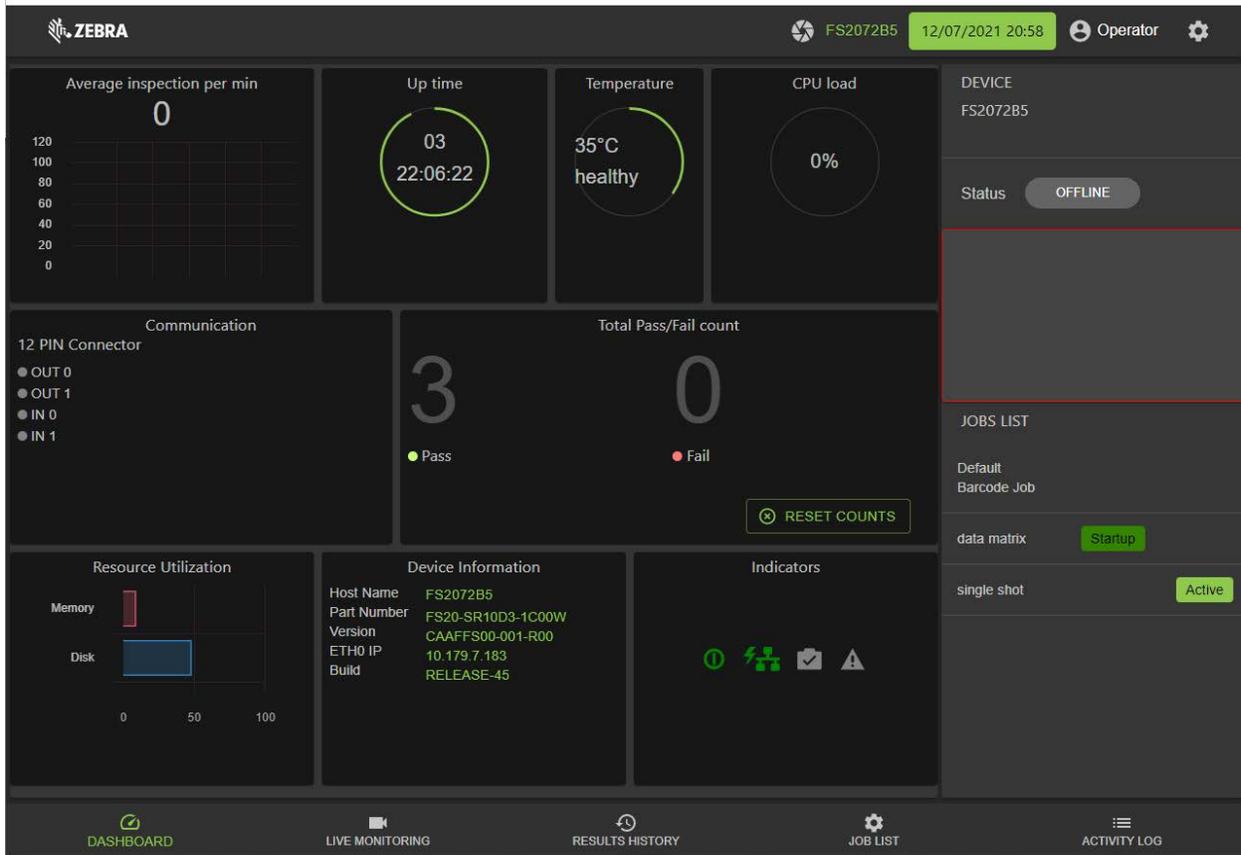


- Open a web browser and enter `http://<HOSTNAME>` and press enter.

**Figure 34** Enter the Device Hostname into a Web Browser



**Figure 35** Access Web HMI



Alternatively, the device's IP can be accessed directly by using six digits (shown below as X and Y) included in the serial number.

- Example:
  - 12XXX345678YYY - where the values for XXX and YYY form the third and fourth octet of the device's USB IP address:
  - The USB IP address is in the format: 172.16.XXX.YYY
    - If XXX is less than 256; XXX; otherwise XXX = XXX Modulo 256
    - If YYY is less than 256, YYY; otherwise YYY = YYY Modulo 256.

The two examples below show how to calculate the USB IP address:

- Example 1: Both XXX and YYY are less than 256

SN:21097520180161

XXX = 097

YYY = 161

USB IP Address = 172.16.97.161

- Example 2: XXX is greater than 256 and YYY is greater than 256:

SN:21364520180597

XXX = 364 (Since this value is greater than 256, perform a Modulo operation)

XXX =  $364\%256 = 108$

YYY = 597 (Since this value is greater than 256, perform a Modulo operation)

YYY =  $597\%256 = 85$

USB IP Address = 172.16.108.85

2. If connected via Ethernet directly to the PC:

- The IP address should fit the format 169.254.x.y., where x and y are the last four characters of the MAC address converted from hex to decimal.

- Example:

- MAC Address: 78:b:d6:5c:6d:f2

- 6D (hex) - 109 (decimal)

- F2 (hex) - 242 (decimal)

- IP = 169.254.109.242

3. If connected via Ethernet to a network via switch or hub, use the DHCP address from the network/router configuration.

For all connection methods, users are also able to access the device via hostname instead of IP address. The hostname consists of the device part number and the last four characters of the MAC address:

- Example:

- Part Number - VS20

- MAC Address - 78:b:d6:5c:6d:f2

- Hostname = VS206df2

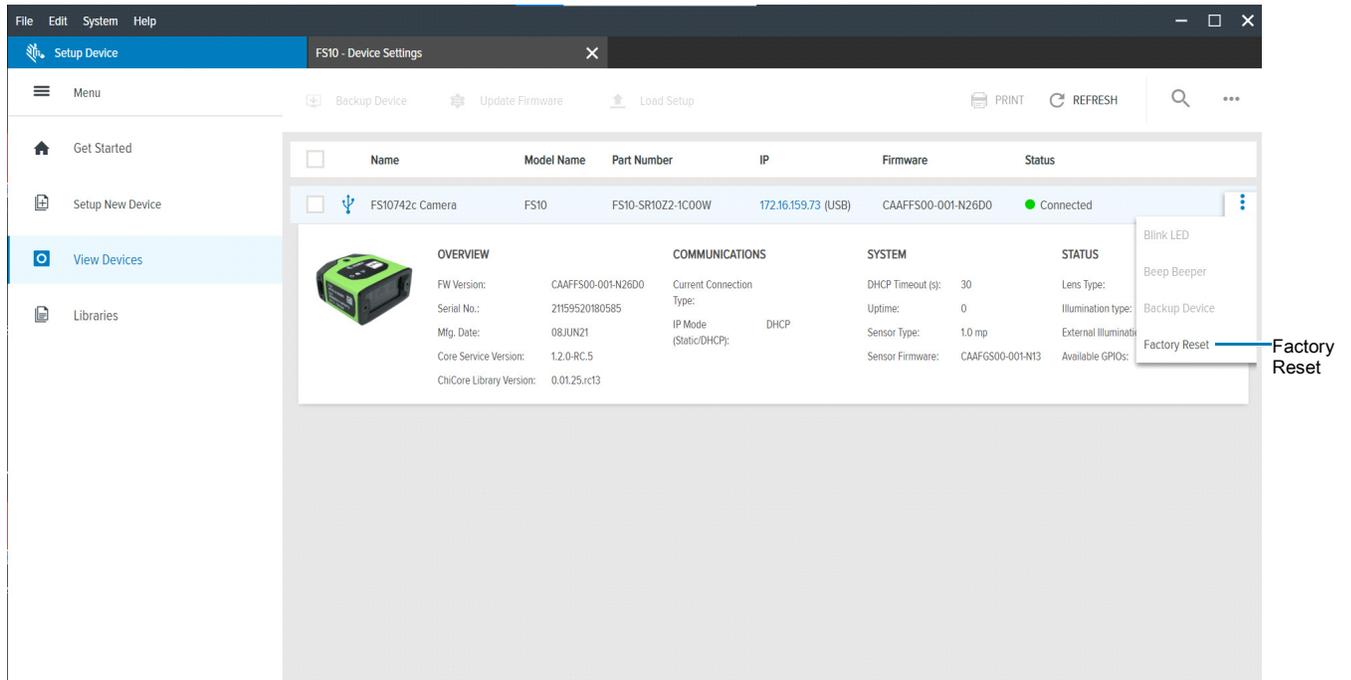
For the latest information on performing a firmware update, refer to [zebra.com/support](https://zebra.com/support)

## Factory Reset

To restore the factory settings on the device:

1. Use the Zebra Aurora application to navigate to the **View Devices** tab from the menu.
2. Select the device to be reset.
3. Click on the dropdown to select **Factory Reset** to restore factory settings on the device.

**Figure 36** Factory Reset on the Aurora Application



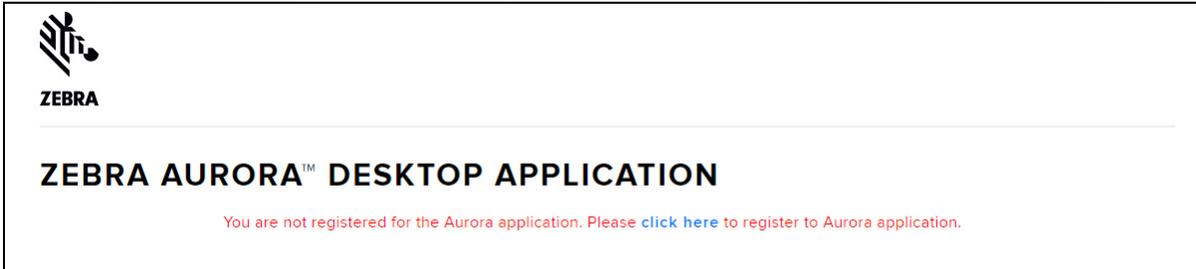
## Software License Activation Methods

To obtain a license key by registering with the Zebra Aurora application and activate their license within the application by following the steps in this section.

### Obtaining a License Key

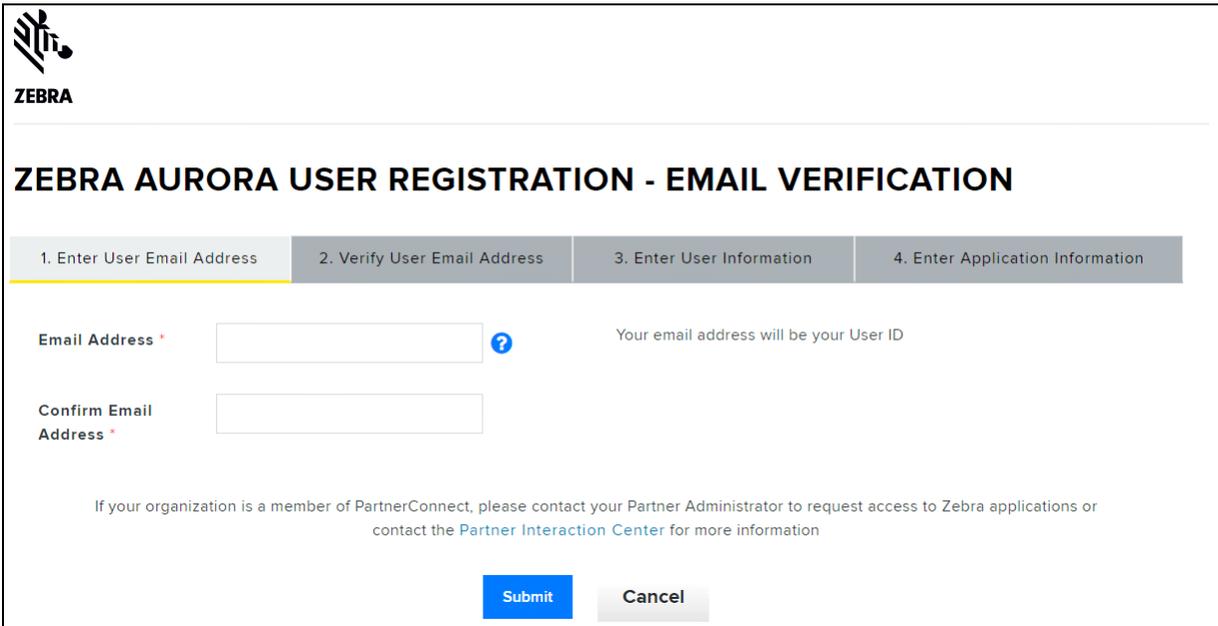
To obtain a Zebra Aurora license key, visit [register-aurora.zebra.com](https://register-aurora.zebra.com)

Figure 37 Registering with Zebra Aurora



Follow the link to create an account and register for the Zebra Aurora application.

Figure 38 Account Creation Workflow



Once the account has been successfully created, a confirmation email is sent with the Activation IDs for the licenses as well as account details such as the start and expiration date of the license.



**NOTE:** After activating the desktop emulator license, the host/PC is locked with the associated registered account on the licensing server.



**NOTE:** The confirmation email stores important information that is used to verify the account and renew an expired license.

## Activating a License with Zebra Aurora

To connect to a device from the Zebra Aurora application when it is online, launch the browser from within the application to connect to the Web HMI and enter the Activation ID.

To activate a license if the device is offline (intranet) or USB-only:

1. Connect the device to the desktop application.
2. From the License Manager screen, navigate to the license file.

Download the license file to the device.

## Supported Symbologies

The following table lists the supported symbologies for the FS/VS Smart Camera Series.

**Table 12** Supported Symbologies

Type	Symbology
1D	Base 32 (Italian Pharma), Codabar/NW7, Code 11, Code 39, Code 128, GS1 Databar, I 2 of 5, UPC/EAN, DPM
2D	Aztec, Composite Codes, DataMatrix, Dotted DataMatrix, DotCode, MaxiCode, PDF417, Micro PDF417, QR Code, Micro QR, DPM
OCR	OCR-A, OCR-B, MICR, US Currency, Trainable OCR (available on select models or via OCR license)

# Troubleshooting

This section describes potential issues that could arise while using the device and solutions that could correct the problem such as power cycling and pinging the device. Ensure that you are familiar with the recommended security settings to use the device and the communication ports that the Zebra Aurora application utilizes by referring to [Security Settings](#) and [Zebra Aurora Communication Port Usage](#).

**Table 13** Troubleshooting the Device

Problem	Cause	Solution
Device is not connecting to network when using Device Discovery.	Specific ports that are utilized by the application are blocked by Windows Defender Firewall.	Ensure that Zebra Aurora has access to Domain, Public and Private networks. See <a href="#">Security Settings</a> for additional information.
	Ensure that the device is visible in the Windows Network by viewing the File Explorer and selecting Network.	If the device is not viewable under the Network dropdown or listed under Other Devices, it is not connected.
	There is no RNDIS driver available to the device when connected vis USB.	To verify that there is a RNDIS driver, go to the Windows Device Manager and search under the Network Adapters dropdown.
Device is cycling power or data connection on USB port.	USB cable may be loose or intermittent.	Reseat the USB cable and tighten locking screws firmly. See <a href="#">Power Cycling the Device</a> for additional information.
	USB port does not source enough power.	Use another USB port that is BC1.2, USB charging, USB-C or has enough power. Use an appropriate cable that utilizes an external power supply.

## Communicating with the Device

Two common strategies used to communicate with the device are pinging via IP and pinging via hostname.

### Pinging the Device via IP

To ping the device via IP address:

1. Open a command prompt or powershell.
2. Enter the following command:  
`i.ping<ip address>`
3. Check to see if the device responds or fails to respond.

- Example:

Pinging 192.168.4.100 with 32 bytes of data:

Reply from 192.168.4.100: bytes= 32 time=1ms TTL=64

Reply from 192.168.4.100: bytes= 32 time=1ms TTL=64

Reply from 192.168.4.100: bytes= 32 time=1ms TTL=64

### Pinging the Device via Hostname

To ping the device via hostname:

1. Open a command prompt or powershell.
2. Enter the following command (assuming the Hostname is FS20b1cc)  
`i.ping FS20b1cc.local`



**NOTE:** The above hostname example uses the Avahi service running in the device.

3. Check to see if the device responds or fails to respond.

- Example:

Pinging 192.168.4.100 with 32 bytes of data:

Reply from 192.168.4.100: bytes= 32 time=1ms TTL=64

Reply from 192.168.4.100: bytes= 32 time=1ms TTL=64

Reply from 192.168.4.100: bytes= 32 time=1ms TTL=64

## Device Discovery Troubleshooting Methods

Two common solutions to enable the device to re-connect via device discovery are performing a factory reset on the device and power cycling the device.

### Factory Reset the Device

To factory reset the device using the hardware buttons:

1. Disconnect all power sources.
2. Press and hold the TRIG button on the camera.
3. Connect to a power source.
4. Continue to hold the TRIG button. After 20 seconds, the LEDs on the device turn amber.
5. Immediately release the TRIG button once the LED turns amber and release within five seconds.

For information on how to perform a factory reset using the Web HMI, see [Factory Reset](#).

### Power Cycling the Device

To power cycle the device:

1. Remove all cables to ensure that no power is being directed to the device.
2. Reinsert a power source and allow the device approximately one minute to boot up.
3. Re-attempt to:
  - Discover a device in Aurora by restarting the application and clicking View Devices.
  - View a device in the Windows Network
  - Access a device using the Web HMI

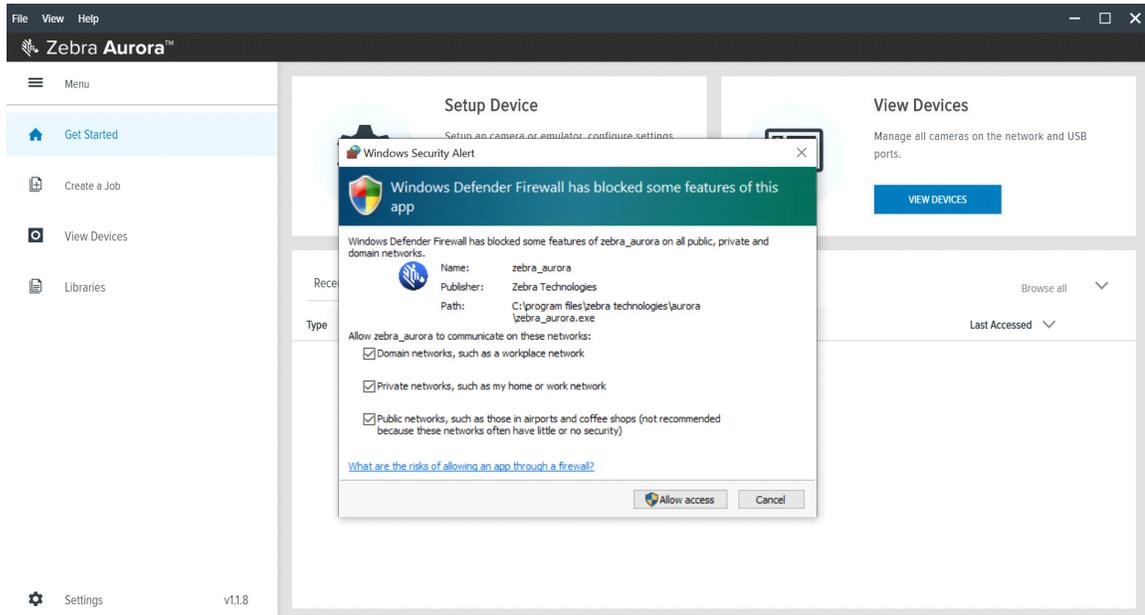
If failure persists, repeat the steps above for all of the connection types being used with the device, including:

- USB-to-PC (FS10 only)
- Ethernet directly to the PC (this requires a 24 V connection for power, xS20 only)
- Ethernet connected to a network via switch or hub (this requires a 24 V connection to a power source if not using Power over Ethernet, xS20 only)

## Security Settings

To ensure that all available application functionalities are enabled, select all three checkboxes in the Windows Defender Firewall settings window as shown in the figure below and click **Allow Access**.

**Figure 39** Windows Defender Firewall Settings



These settings can be configured by clicking Change Settings and enabling the domain, private and public network settings for Zebra Aurora and Network Discovery applications. For specific information on the communication ports utilized by the Zebra Aurora application, see [Zebra Aurora Communication Port Usage](#).

## Zebra Aurora Communication Port Usage

The table below displays the ports utilized by the Zebra Aurora application.

**Table 14** Communication Port Usage

Item	TCP	UDP
FTP - Data	20	
FTP - Communication	21	
DHCP Server		67
DHCP Client		68
Web HMI	80	443
NTP		123
Modbus	502	502
EtherNet/IP		2222
Discovery Port	3702	3702
TCP Port <sup>1</sup>	4444	
mDNS		5353
mDNS Responder		5354
Listening Port	5555	5555
Communication Port	5556	5556
Output Image	7722	7722
Image Live View	7777	7777
Discovery Port (2)	8889	
Discovery Port (3)	9876	
Raw TCP Data <sup>1</sup>	25250	
Profinet RT Unicast	34962	34962
Profinet RT Multicast	34963	34963
Profinet RT CM	34964	34964
EtherNet/IP	44818	44818
Profinet		49152
<b>NOTE<sup>1</sup> : User Configurable</b>		

# Maintenance

This section describes the maintenance procedures that must be followed to maintain the FS/VS Smart Camera's performance.

## Maintenance

### Known Harmful Ingredients

The following chemicals are known to damage the plastics on Zebra scanners and should not come in contact with the device:

- Acetone
- Ammonia solutions
- Aqueous or alcoholic alkaline solutions
- Aromatic and chlorinated hydrocarbons
- Benzene
- Bleach
- Carboic acid
- Compounds of amines or ammonia
- Ethanolamine
- Ethers
- Ketones
- TB-lysoform
- Toluene
- Trichloroethylene

### Approved Cleaning Agents

The following cleaning agents are approved for cleaning the plastics on Zebra scanners:

- Pre-moistened wipes
- Isopropyl alcohol 70%

## Tolerable Industrial Fluids and Chemicals



**NOTE:** Not all fluid variants and brands have been tested.

The following industrial fluids and chemicals were evaluated and deemed tolerable for the FS/VS Smart Camera series.

- Motor/Engine Oil
- Automatic Transmission Fluid (ATF)
- Continuously Variable Transmission Fluid (CVT)
- Industrial De-Greaser (Engine Brite Heavy Duty)

## Cleaning the Device

Routinely cleaning the exit window is required. A dirty window may affect scanning accuracy. Do not allow any abrasive material to touch the window.

To clean the device:

1. Dampen a soft cloth with one of the approved cleaning agents listed above or use pre-moistened wipes.
2. Gently wipe all surfaces, including the front, back, sides, top and bottom. Never apply liquid directly to the scanner. Be careful not to let liquid pool around the scanner window, trigger, cable connector or any other area on the device.
3. Be sure to clean the trigger area by wiping the surface with careful attention to avoid lifting the label from the device.
4. Do not spray water or other cleaning liquids directly into the exit window.
5. Wipe the scanner exit window with a lens tissue or other material suitable for cleaning optical material such as eyeglasses.
6. Immediately dry the scanner window after cleaning with a soft non-abrasive cloth to prevent streaking.
7. Allow the unit to air dry before use.
8. Scanner connectors:
  - a. Dip the cotton portion of a cotton-tipped applicator in isopropyl alcohol.
  - b. Rub the cotton portion of the cotton-tipped applicator back-and-forth across the connector on the Zebra scanner at least 3 times. Do not leave any cotton residue on the connector.
  - c. Use the cotton-tipped applicator dipped in alcohol to remove any grease and dirt near the connector area.

Use a dry cotton tipped applicator and rub the cotton portion of the cotton-tipped applicator back-and-forth across the connectors at least three times. Do not leave any cotton residue on the connectors.

