GS20 Connectivity Gateway

Leader Module

User Guide

ZEBRA

MN-004570-04EN Rev A

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About this Guide

This guide provides information on installing the device and configuring the GS20 Connectivity Gateway Leader Module for use with multiple follower devices using the Web HMI.

Notational Conventions

The following notational conventions make the content of this document easy to navigate.

- **Bold** text is used to highlight the following:
  - Dialog box, window, and screen names
  - Dropdown list and list box names
  - Checkbox and radio button names
  - Icons on a screen
  - Key names on a keypad
  - Button names on a screen
- Bullets (•) indicate:
  - Action items
  - List of alternatives
  - Lists of required steps that are not necessarily sequential.
- Sequential lists (for example, those that describe step-by-step procedures) appear as numbered lists.

Icon Conventions

The documentation set is designed to give the reader more visual clues. The following visual indicators are used throughout the documentation set.

NOTE: The text here indicates information that is supplemental for the user to know and that is not required to complete a task.

IMPORTANT: The text here indicates information that is important for the user to know.

CAUTION: If the precaution is not heeded, the user could receive a minor or moderate injury.

WARNING: If danger is not avoided, the user CAN be seriously injured or killed.

DANGER: If danger is not avoided, the user WILL be seriously injured or killed.

Service Information

If you have a problem with your equipment, contact Zebra Global Customer Support for your region. Contact information is available at: zebra.com/support.

When contacting support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number

Zebra responds to calls by email, telephone, or fax within the time limits set forth in support agreements.

If your problem cannot be solved by Zebra Customer Support, you may need to return your equipment for servicing and will be given specific directions. Zebra is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

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Telit End User Agreement: docs.devicewise.com/Content/LegalNotice/Gateway-Software-License.htm

Getting Started

This section outlines the specifications and accessories for the GS20 Connectivity Gateway Leader Module.

Specifications

The following table outlines the physical characteristics, user environmental, and regulatory specifications of the GS20 Connectivity Gateway Leader Module.

Specification	Description
Physical Characteristics	
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
Power	10 to 30 VDC external power supply, 7W max at 24V Class 2 PoE, 7W
Configurable IO	(4) Four optoisolated 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	
Host to Leader	PLC (Siemens, Rockwell, Omron, Mitsubishi models), TCP/IP, Serial, GPIO
Leader to Followers	TCP/IP, GPIO
Follower	Maximum Forward Continuous Current (IFM=70mA @ TA). The GS20 Connectivity Gateway supports up to 16 XS40 and XS70 Fixed Industrial Scanners in a scanning solution connected via TCP/IP and GPIO. Integrators should consult the FS/VS Fixed Industrial Scanner specification sheets available on zebra.com/support for information on the follower devices that can be connected to the GS20 Leader Module as part of a Connectivity Gateway.
User Environment	

Specification	Description
Operating Temperature	0°C to 45°C (non-POE, duty cycle-dependent) 0°C to 40°C (POE, duty cycle-dependent)
Storage Temperature	-40° to 70°C
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
Electrostatic Discharge	±15KV Air, ±8KV Direct/Indirect Contact
Regulatory Approvals	
Environmental	EN 50581:2012 EN IEC 63000:2018
Electric Safety	IEC 62368-1 (Ed.2) EN 62368-1:2014/A11:2017
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 with the current standards. The DoC is available at: zebra.com/doc

Accessories

The Connectivity Gateway is compatible with Zebra FS40 and FS70 Fixed Industrial scanners.

Table 1 Supported Accessories

Description	Requirement	Zebra Part Number	Description
Power Supply, 24V DC	A power supply or combination of power supplies with the total current/power rating to power a GS20 device plus connected follower devices is required to power GS20 and follower devices via 24V. You do not need this accessory if you choose to use a PoE switch.	PWR-24V03A-0000	Allen Bradley 1606-XLE80E Power Supply, 24V DC, 3.3A, 80 W
		PWR-24V05A-0000	Allen Bradley 1606-XLE120E Power Supply, 24V DC, 5A, 120
PoE Injector		PWR-POE30W-0000	Power over Ethernet Injector, 30W POE+, AC Input

Table 1 Supported Accessories (Continued)

Description	Requirement	Zebra Part Number	Description
Power Cable	An A-Coded 12-pin female M12 connector to flying leads is necessary for the GS20 Leader Module and each follower device.	CBL-PWR00500-M1200	Power Cable, 5m (16 ft.)
		CBL-PWR01500-M1200	Power Cable, 15m (49 ft.)
Ethernet Switch	A compatible Ethernet switch must have a total number of ports equal to the following: The number of ports (1 for GS20) + number of followers + (1 for an external host) + (1 for the PLC device) + (1 for PC to set up). The number of ports = (1 for GS20) + the number of followers + (1 for an external host) + (1 for the PLC device) + (1 for PC to setup) The GS20, follower devices, PC, external host (optional), and PLC (optional) must be connected to the same network. If you are using Power over Ethernet to power the GS20 and follower devices, ensure that your Ethernet switch is compatible with their specifications. A Class 4 PoE+ source is recommended.	-	-

Table 1 Supported Accessories (Continued)

Description	Requirement	Zebra Part Number	Description
Leader and Followers Ethernet Cables	An X-Coded male M12 connector to a standard male RJ45 connector Ethernet cable is required for the GS20 and each follower device. These connect the GS20 and follower devices to the Ethernet switch.	CBL-ENT00100-M120	Ethernet Cable 1M, X-Coded M12 to RJ45, Standard Flex
		CBL-ENT00300-M1200	Ethernet Cable 3M, X-Coded M12 to RJ45, Standard Flex
		CBL-ENT00500-M1200	Ethernet Cable 5M, X-Coded M12 to RJ45, Standard Flex
		CBL-ENT01500-M1200	Ethernet Cable 15M, X-Coded M12 to RJ45, Standard Flex
Standard Ethernet Cable	A standard male RJ45 to male RJ45 Ethernet cable is required to connect an Ethernet Switch to the PC. A cable is necessary for the external host and the PLC.	-	-
Terminal blocks	Terminal blocks are required for GS20 and follower devices. Additional terminal blocks are necessary if the Connectivity Gateway uses GPIO triggering between the leader and follower devices. Refer to the pin-out diagram of the 12-pin M12 of the GS20 device and follower devices in the GS20 Connectivity Gateway Leader Module User Guide.	-	-
PLC (if used)	Use a supported PLC device with the Connectivity Gateway. An RJ45 male Ethernet cable is required to connect the PLC to the Ethernet switch.	-	-

Table 1 Supported Accessories (Continued)

Description	Requirement	Zebra Part Number	Description
Serial (if used)	Use a DB9 RS232 breakout connector or a supported equivalent to establish serial communication from the GS20 device. Refer to the pin-out diagram of the 12-pin M12 of the GS20 device in the GS20 Connectivity Gateway Leader Module User Guide to ensure proper installation.	-	-
GPIO input trigger device (if used)	A compatible cable ending in flying leads is required (CBL-SNS0500F-M1200) for sending an input trigger via GPIO to an external device (for example, a break beam sensor).	-	-

GS20 devices utilize X-coded Ethernet and power, serial, and GPIO cables.

Table 2 Cables

Part Number	Description
CBL-ENT00100-M1200	Cable, Ethernet 1M, X-Coded M12 to RJ45, standard flex
CBL-ENT00300-M1200	Cable, Ethernet 3M, X-Coded M12 to RJ45, standard flex
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

Compatible PLC Devices

The GS20 Connectvitiy Gateway Leader Module supports communication with the following PLC models.

Table 3 Supported PLC Models

Manufacturer	Models
Siemens	Logo!

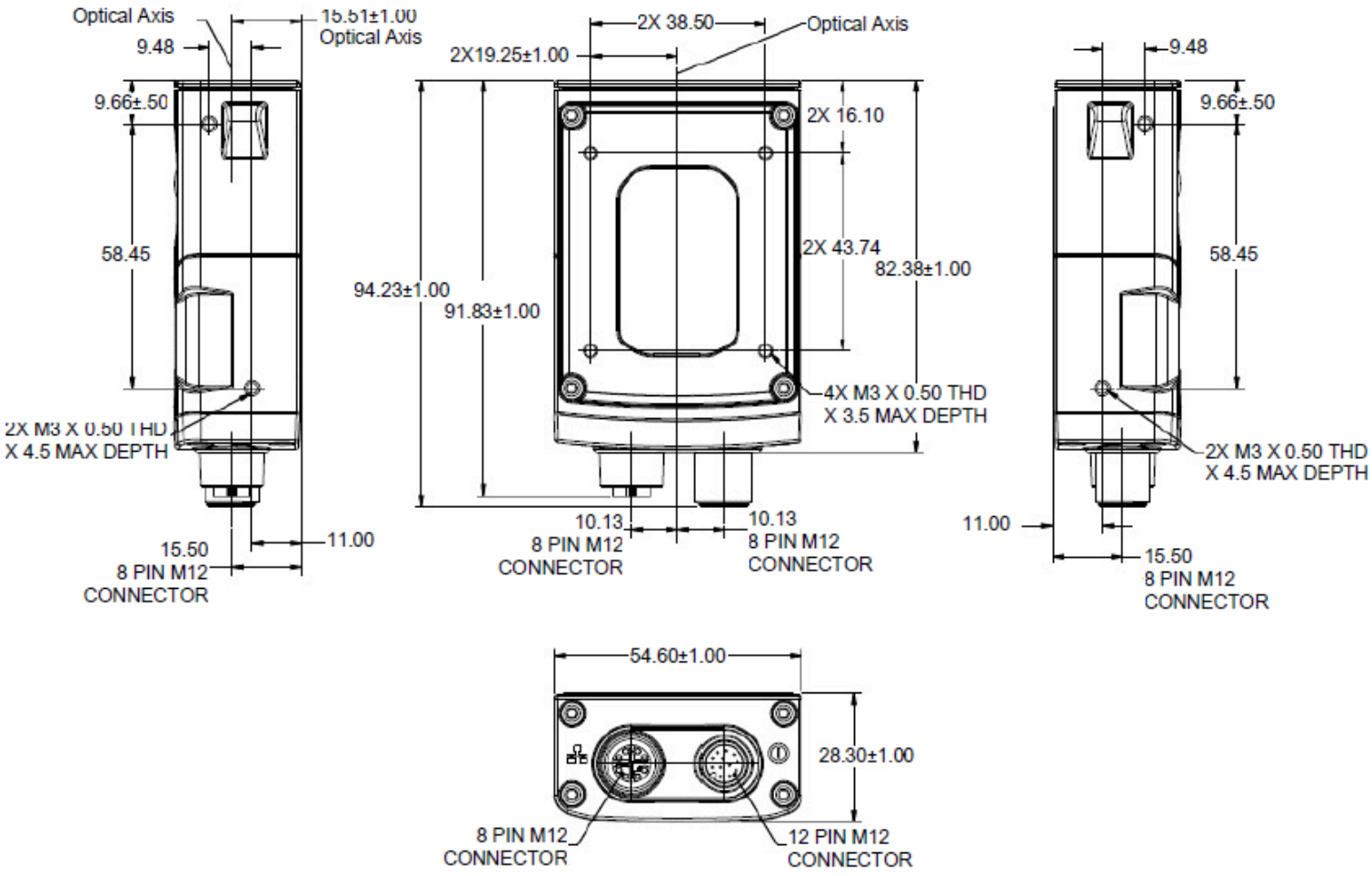
Table 3 Supported PLC Models (Continued)

Manufacturer	Models
	S7-200
	S7-300
	S7-400
	S7-1200
	S7-300 (ERPC)
	ET 200 Pro
	S7-1500
	SINUMERIK 840D
	PCS 7
Rockwell	ControlLogix CPU
	CompactLogix CPU
	Micro800 CPU
Mitsubishi	QCPU (Built-in Ethernet)
	LCPU (Built-in Ethernet)
	RCPU (Built-in Ethernet)
	FX3CPU
	FX5CPU
	GOT
	ACPU
Omron	CS1 CPU
	CJ1 CPU
	CV1 CPU
	NJ CPU
	CP1 CPU
	NX CPU
	CJ2 CPU
	NE1S CPU

Installation

GS20 Dimensional Drawings

Figure 1 GS20 Dimensional Drawings



Torque Specification

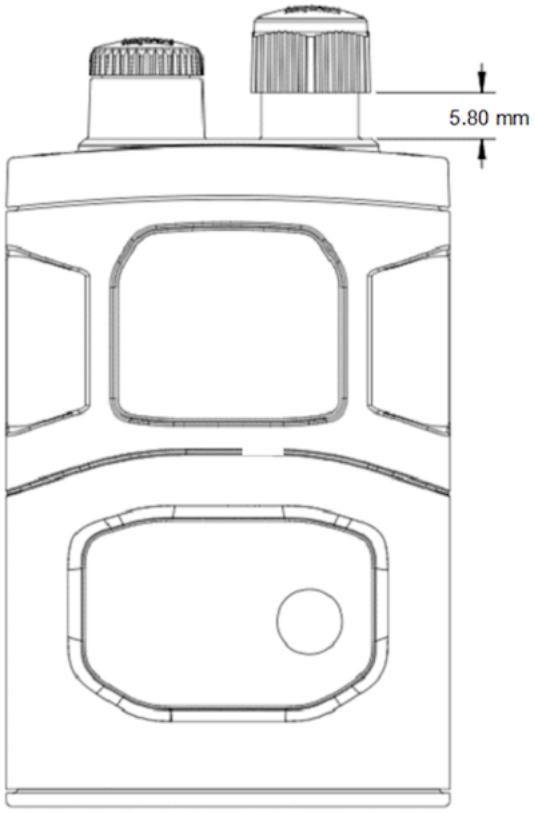
Each connector requires a specific torque value.

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

- Torque for M12 Zebra cables: 24.0 in-lbs
- Torque for connector covers: 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, refer to the following diagram for the reference dimension (5.80 mm) of the connector covers.



Power Sources

FS/VS Smart Camera devices are powered through an external power supply or Power over Ethernet (PoE). A power priority scheme selects power from the external power supply over PoE to ensure the least restrictive power source is utilized. Changes to the power source may trigger a reboot.

12 Pin M12 Power Input

No external peripherals are powered through the device. As a result, as long as the voltage and current listed in the specification table are met, the device operates as expected. Circuitry in the device prevents input current overload of the M12 connector and protects from reverse voltage and over and under voltage exceeding the input specifications.

Power Over Ethernet

The GS20 requires a minimum 802.3af Class 2 (7W) PoE power source to operate properly.

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 pinouts for the 12-pin Power and I/O connector and the Ethernet connector for GS20 devices.

Power and IO Connector

Figure 2 Power and I/O Connector - 12 Pin Listing

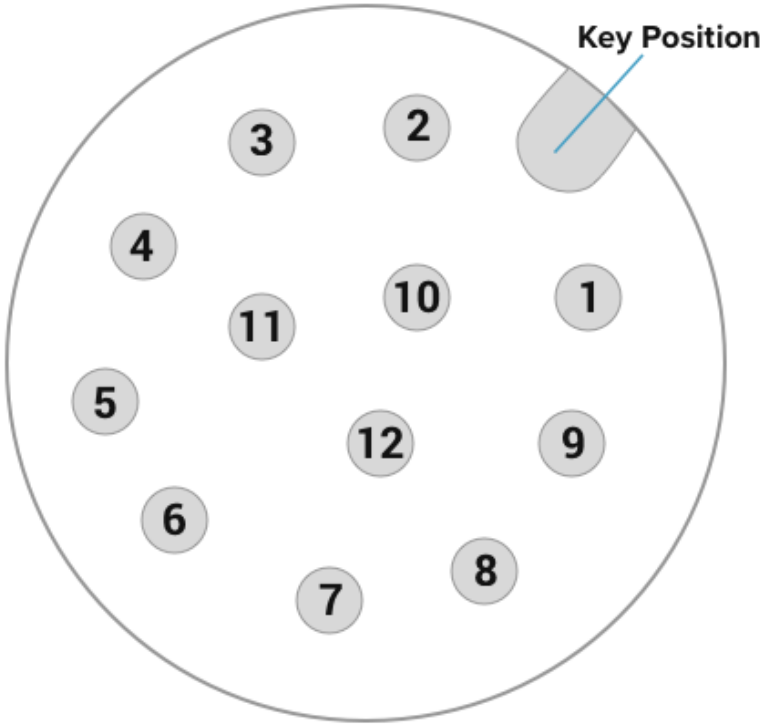


Table 4 Power and I/O Connector - 12 Pin Listing

Pin	Color	Description
1	Yellow	OUT0
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

Figure 3 8 Pin Ethernet Connector Diagram

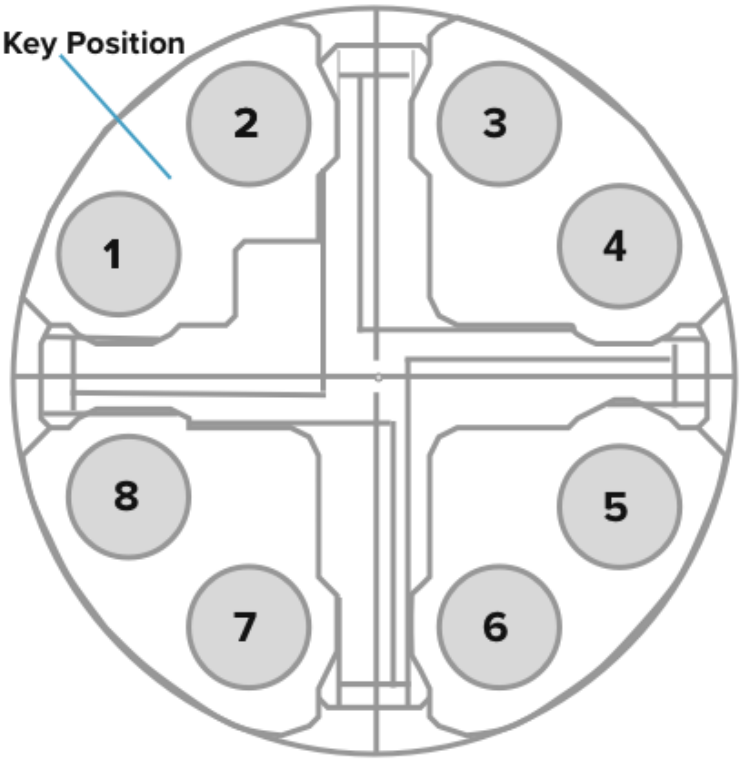


Table 5 8-Pin Ethernet Connector Pin Out Description

Pin	
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

Power Requirements

The GS20 Connectivity Gateway supports 24V power supplies and PoE switches.

Selecting a 24V Power Supply

Zebra's Fixed Industrial Scanner (FIS) and Machine Vision (MV) devices support a variety of input power sources. Designed to provide the integrator with flexibility, each connected Follower's power specifications must be considered when selecting a 24V DC power supply or combination of supplies for the Connectivity Gateway.

The input power required to support the devices should be determined in terms of a budget, with a fixed electrical current required for each supported device. Integrators should consult the scanner specification sheets available on zebra.com/support, for all follower devices connected as part of the Connectivity Gateway. Select a 24V DC Power Supply to provide sufficient current to handle all connected follower devices.

Below is a sample configuration for reference to understand how to size out a 24V DC Power Supply depending on the size of the Connectivity Gateway, the number of follower devices, and the follower type. The integrator should select two 24V DC power supplies to power the devices in the Connectivity Gateway, a supply capable of providing 5A and a supply capable of supplying 3.3A.

Selecting a PoE Switch

To integrate the Connectivity Gateway using Power over Ethernet (PoE), a wide variety of commercially available switches provide Zebra devices with the requisite power for operation in a gateway. Select a switch that complies with the 802.3at Type 2 PoE+ standard (Class 4).

Ethernet Switch Requirements

To configure the Connectivity Gateway using PoE, a wide variety of commercially available switches provide Zebra FIS and MV devices with the requisite power for operation in a Connectivity Gateway configuration. Select a switch that complies with the 802.3at Type 2 PoE+ standard (Class 4).

There are no additional requirements to integrate an Ethernet Switch into a Connectivity Gateway. Many commercially available Ethernet Switches allow the user to connect leader and follower devices to facilitate network communication between the devices.

Setting Up the Device

This section provides mounting instructions using an L-bracket

Mounting Instructions

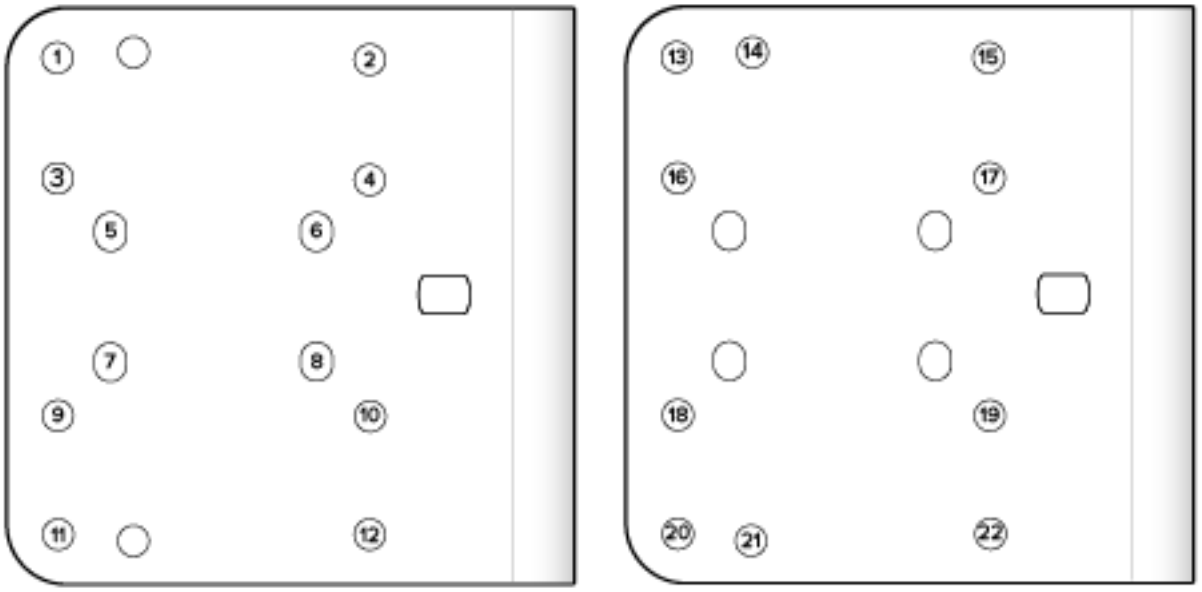
1. Refer to the dimensional drawings for mounting hole placements on the device.
2. Align the holes on the mounting surface with the mounting holes on the device.
3. Insert screws into the mounting holes and tighten. The recommended torque is 6.0 in-lbs.

Mounting the Device Using the L-Bracket Accessory

This section illustrates the mounting orientations for the device using the L-bracket accessory (BRKT-LMNT-U000).

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

Figure 4 Mounting Orientations



Bottom Mounting Options	Back/Side Mounting Options
1,2,9,10 or 3,4,11,12 for the GS20 (two options)	13 and 21 or 14 and 20 Side Mounting Holes for the GS20 (two options)

Mounting Bracket Dimensions

he following diagrams provide dimensions for the mounting bracket.

Figure 5 L Bracket Dimensions

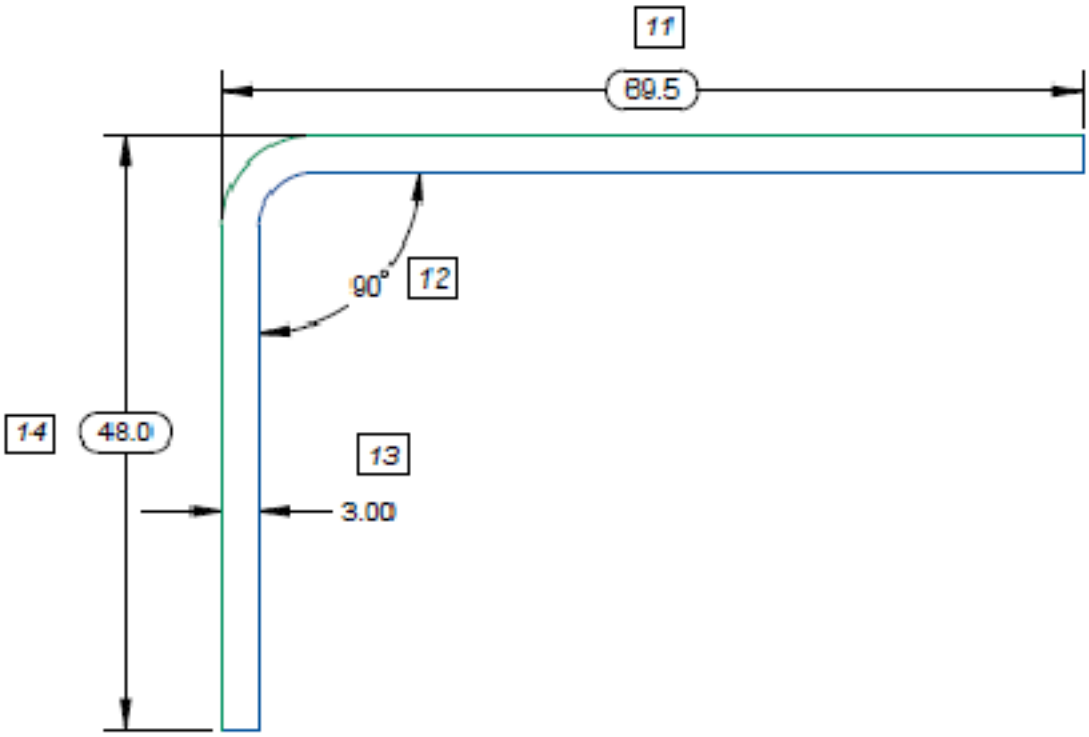


Figure 6 L Bracket Bottom Dimensions

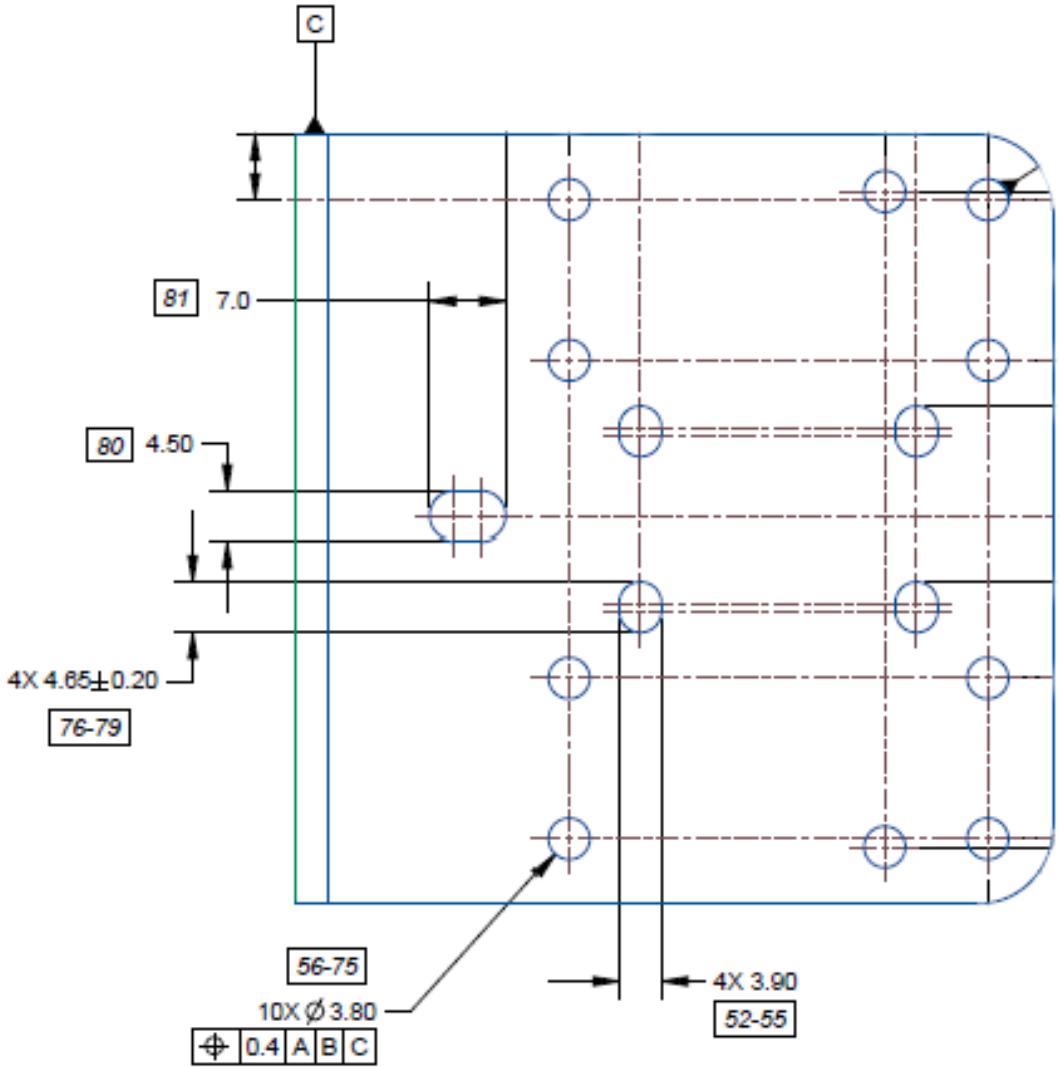
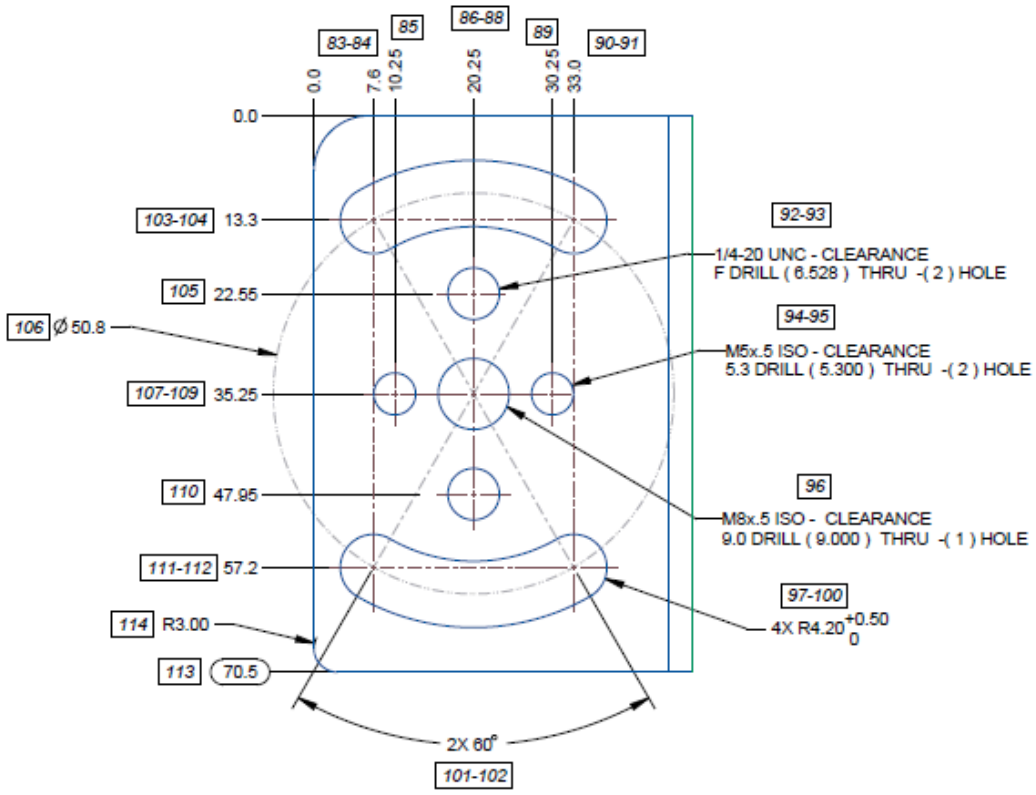


Figure 7 L Bracket Side Dimensions



Connecting Follower Devices

The GS20 works as a leader module in a Connectivity Gateway configuration by filtering the results it receives from follower devices before sending them to the host. Follower devices are triggered through GPIO or TCP/IP. The device supports continuous mode for follower devices connected via TCP/IP.

Connecting Follower Devices using TCP/IP

GS20 devices must be connected to follower devices via Ethernet to receive the scanning results. The GS20 sends a trigger over TCP/IP to initiate scanning on the follower devices.

In this case, an Ethernet Switch with a minimum number of ports equal to one (GS20) plus the number of followers to the PC and the host PLC is required. The GS20 Leader Module supports trigger and continuous modes when follower devices are triggered via TCP/IP.

Connecting Follower Devices Using GPIO

The GS20 Connectivity Gateway Leader Module has two dedicated output GPIO that trigger follower devices or send Pass/Fail results to the host.

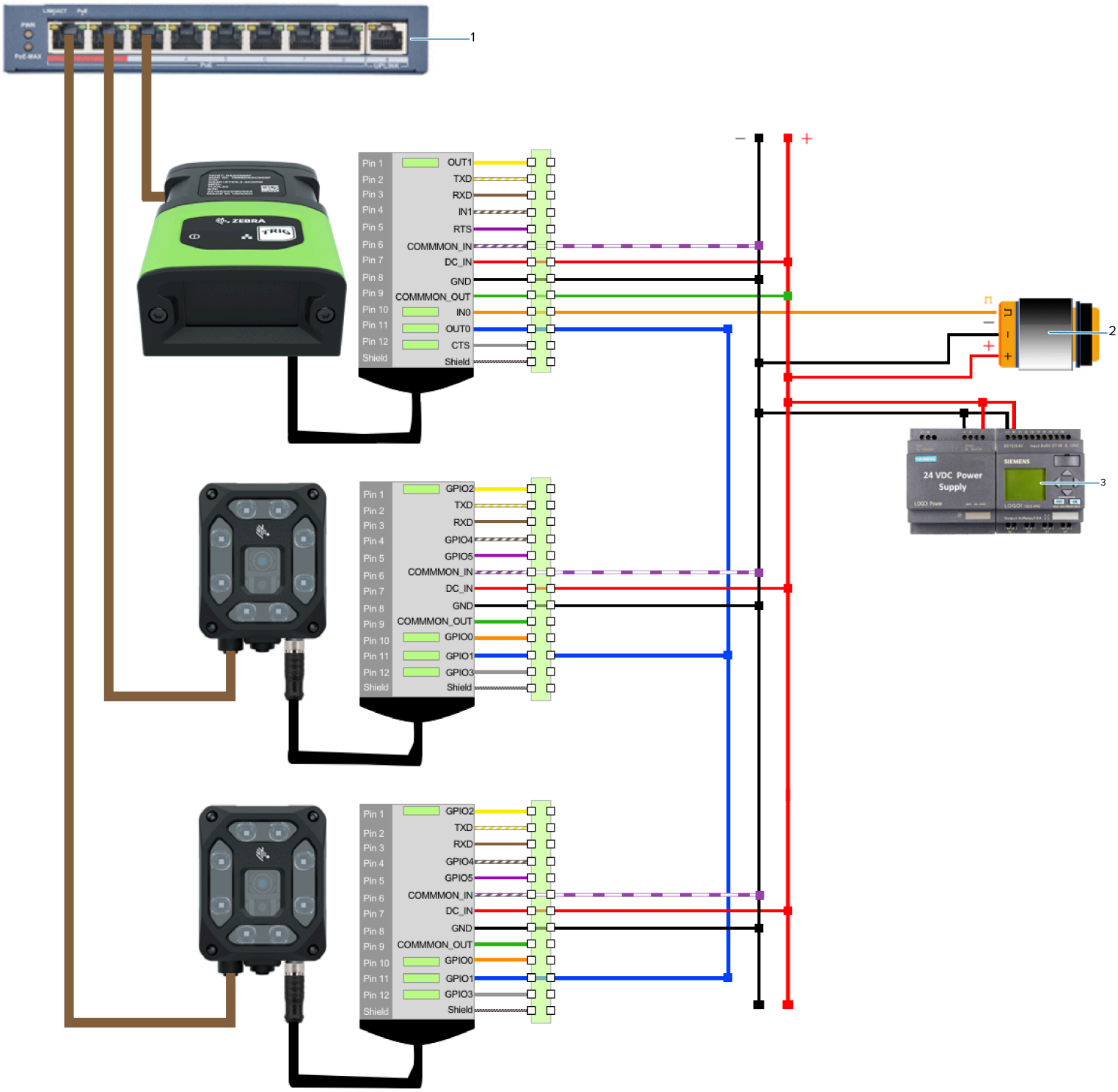
NOTE: The number of Zebra Barcode Scanners connected to one output pin should not exceed 16 devices or the Maximum Forward Continuous Current (IFM=70mA @ TA).

NOTE: While the follower devices are connected to the leader through IO, it is still necessary to connect followers and the GS20 to the Ethernet switch to ensure that the results from the followers are sent to the leader device.

The following diagram shows a GS20 Leader Module with two followers on outputs (FS40 and FS70). Terminal blocks are used to connect the output pin on the GS20 to the inputs on the FS40 and FS70. Follower inputs can connect to one GS20 output or split between two outputs. Follower devices are powered via a PoE switch. The GS20, follower devices, and the host PC are connected to the Ethernet switch via Ethernet cables. In this case, the GS20 is powered by a 24V DC power supply or PoE switch.

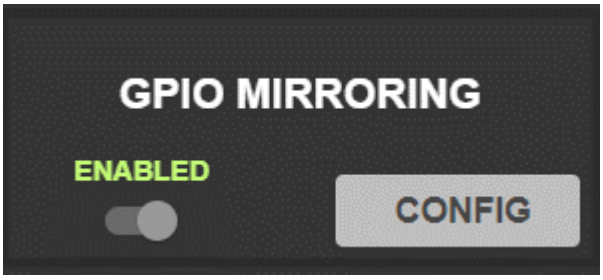
In this configuration, follower devices receive a trigger through TCP/IP from the host PC, triggering the follower devices through GPIO or TCP/IP (depending on configuration) and sending the result back to the host PC.

Figure 8 GPIO Connection Diagram

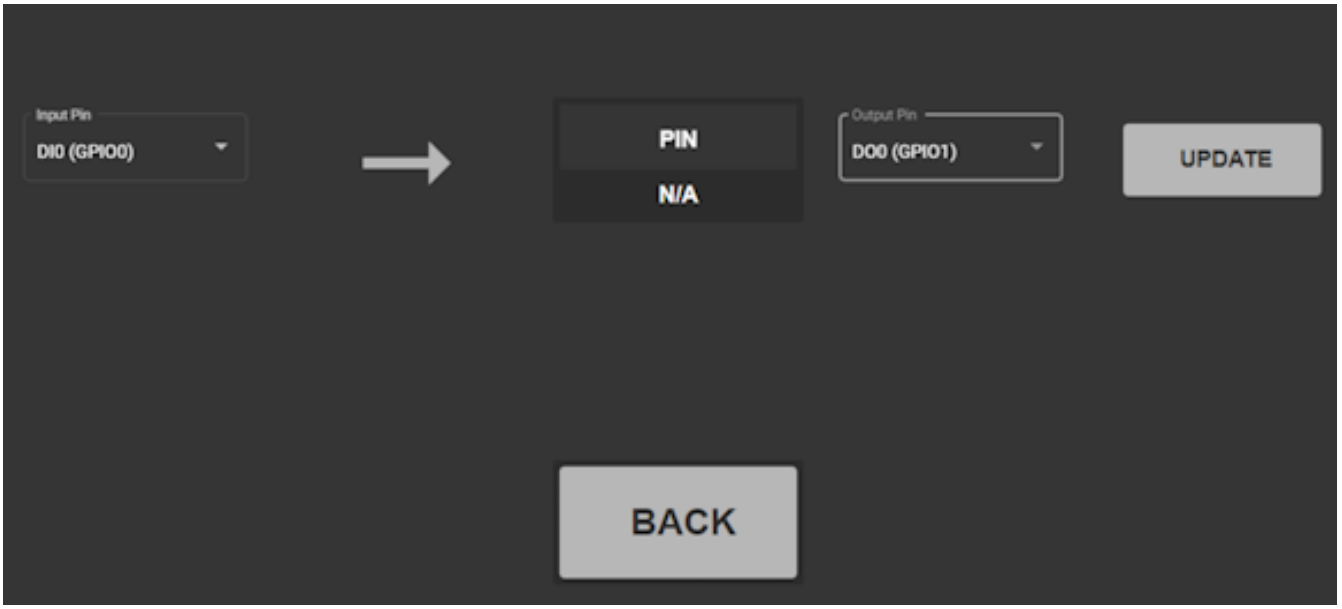


1	Ethernet Switch
2	Proximity Sensor
3	Power Supply

NOTE: Ensure that GPIO Mirroring is enabled on the Configuration screen.



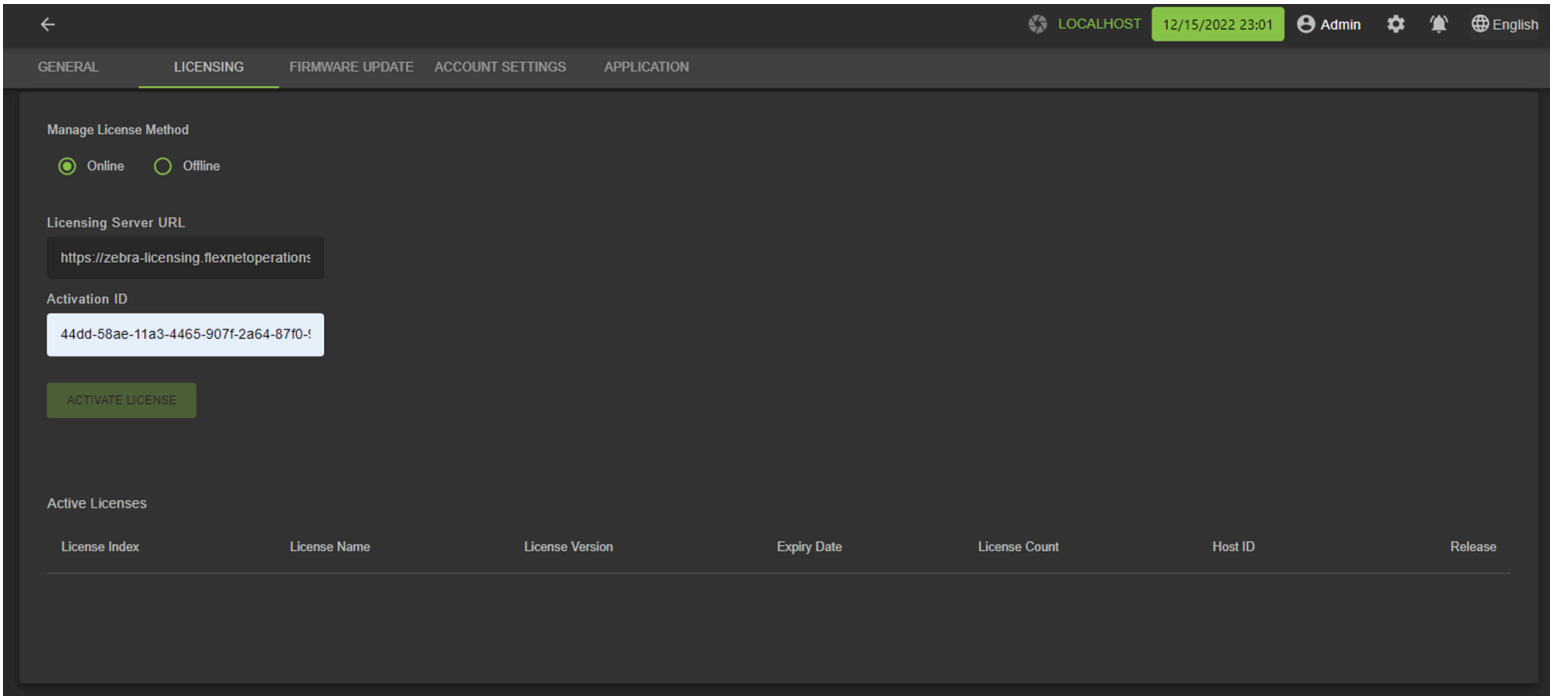
Click Config to set the Input and Output pins on the devices.



Gateway Licensing

Leader-follower licensing for the Connectivity Gateway solution is available for xS40/70 devices using the Zebra Web HMI when logged in with administrator credentials.

Click the Licensing tab to activate a new license and view active licenses,



NOTE: GS20 devices include a license by default.

For additional details on license acquisition and activation, refer to the Aurora Focus User Guide at zebra.com/support

Using the Device

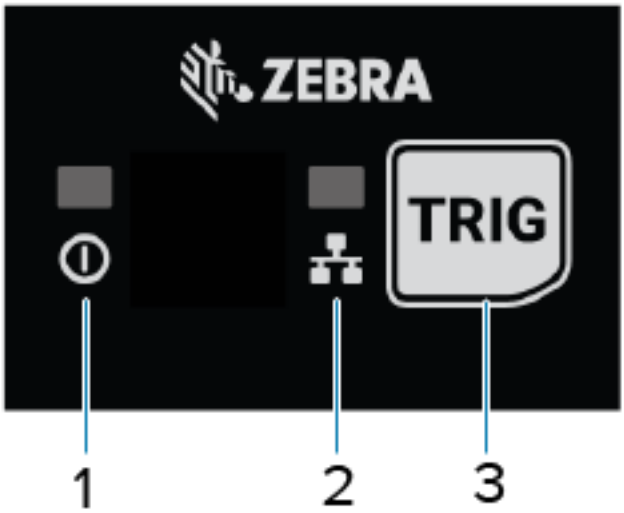
This section describes using the FS/VS Smart Camera and optimizing the device's utility for its use case by leveraging its connection interfaces.

User Interface

The GS20 Leader Module provides various forms of feedback in the form of beeper indications and LEDs that keep the user aware of specific device states.

User Interface Label

Each device has a label that indicates various states such as power, Ethernet, and trigger.



Item	Indicator
1	Power
2	Ethernet
3	Trigger

LED and Beeper Indications

The table below describes the LED and beeper indications of the device during events such as power-up, job deployment, maintenance operations, and parameter programming.

Table 6 LED and Beeper Indications

Event	Beeper	Power LED
Power Up		
Power up with Low Power	Low, Medium, High Tone	Solid Red
Power up with Limited Power (USB or 15W PoE)	Low, Medium, High Tone	Green (Slow Blink)
Power up with Full Power (24V or 30W PoE)	Low, Medium, High Tone	Solid Green
Job Error	Low, Low Tone	Solid Green
Device Maintenance		
Factory Reset	Medium, Medium Tone	Solid Green
Firmware Operations		
Firmware Update Start	-	Solid Green

Table 6 LED and Beeper Indications (Continued)

Event	Beeper	Power LED
Firmware Update Success	-	Solid Green
Firmware Update Fail	Low Tone	Solid Green
Autotune Operations		
AutoTune Start	Medium Tone	Solid Green
AutoTune Success	High Tone	Solid Green
AutoTune Fail	Low Tone	Solid Green
Decode		
Barcode Decode Start	-	Solid Green
Barcode Decode Success	Medium Tone	Solid Green

Table 6 LED and Beeper Indications (Continued)

Event	Beeper	Power LED
Barcode Decode Failure	-	Solid Green
Parameter Programming		
Parameter Entry Accepted	High, Low, High, Low Tone	-
Parameter Number Entry Expecting Barcodes	High, Low Tone	-
Parameter Entry Error	Low, High Tone	-

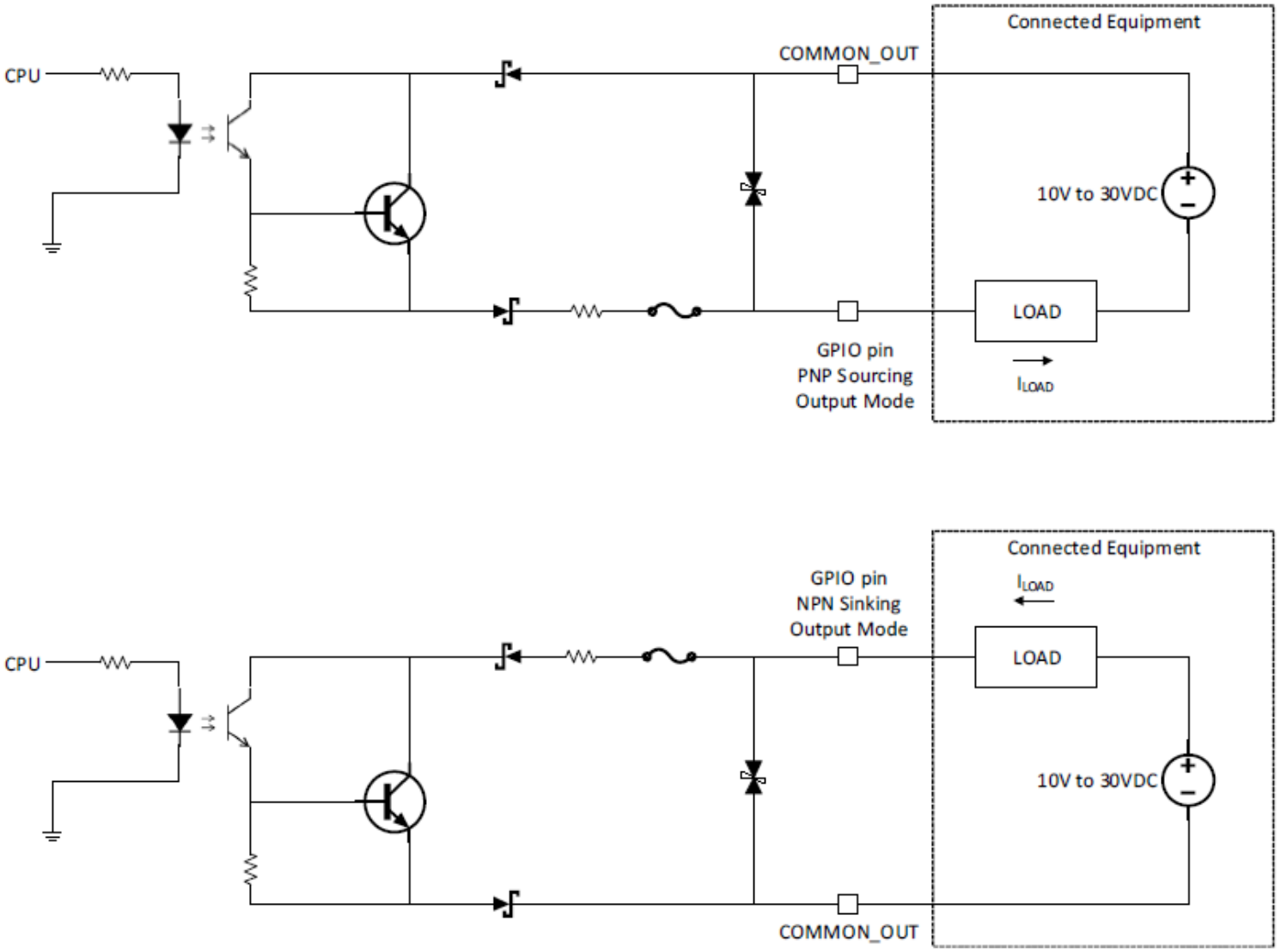
GPIO and Opto-Coupled GPIO

The GS20 devices have two dedicated input and two dedicated output general purpose IO that are optically coupled to provide electrical isolation and wiring flexibility.

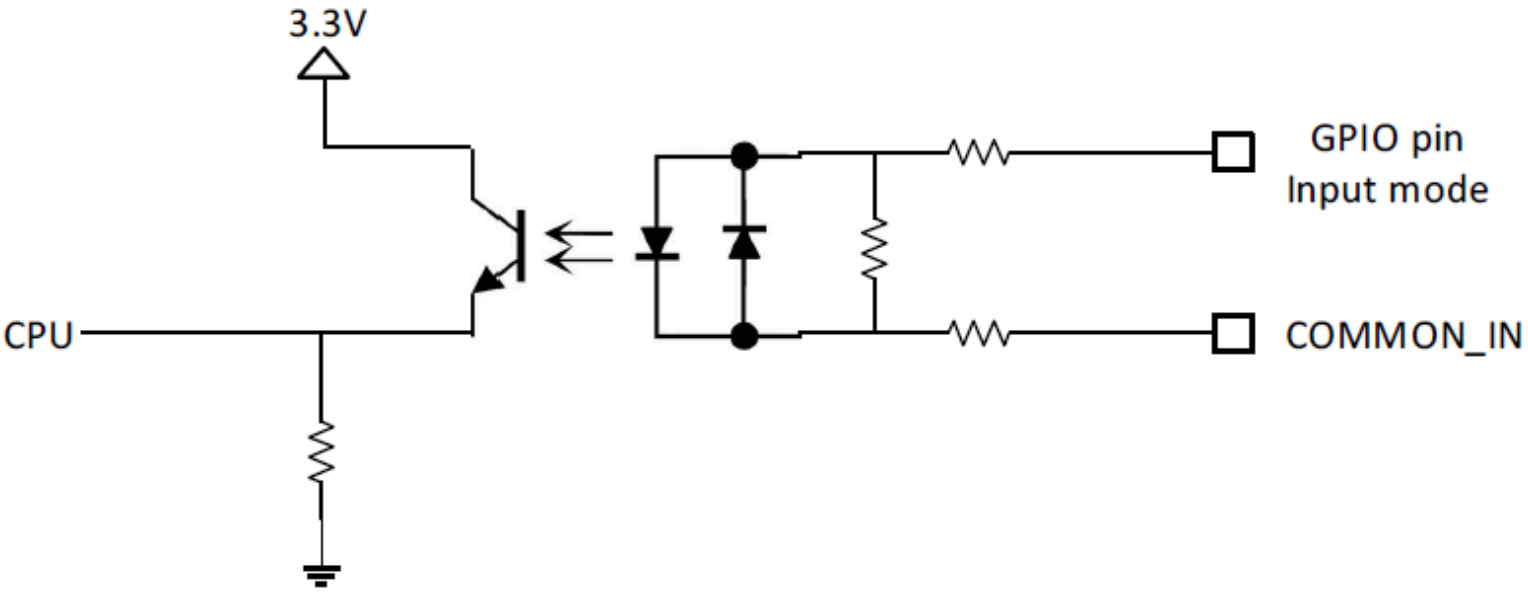
Optically Coupled GPIO

Optocoupled GPIO has the advantage of being electrically isolated from the rest of the system and requires 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.



Optocoupled inputs are enabled when voltage is applied across the GPIO pin and COMMON_IN.



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.

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 an 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.

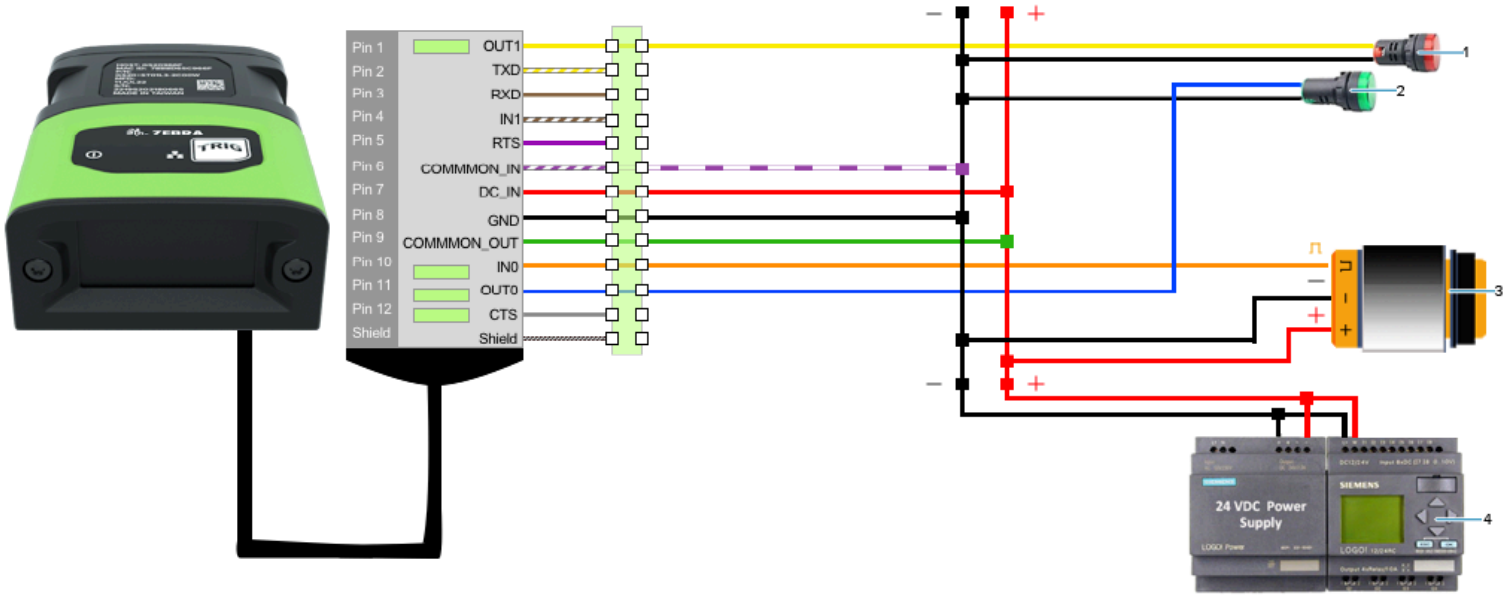
NOTE: Refer to the documentation of the connected auxiliary equipment to ensure a compatible configuration, and remember to leave unused GPIO in a disabled state.

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

GPIO Wire Diagrams

The following diagram shows a GS20 device with two LEDs on outputs indicating job outcome and input trigger from a proximity sensor. The GPIO input is a current sink. The outputs are set as a current source. The power source is a PLC 24VDC PSU, and the GPIO functions are optoisolated.

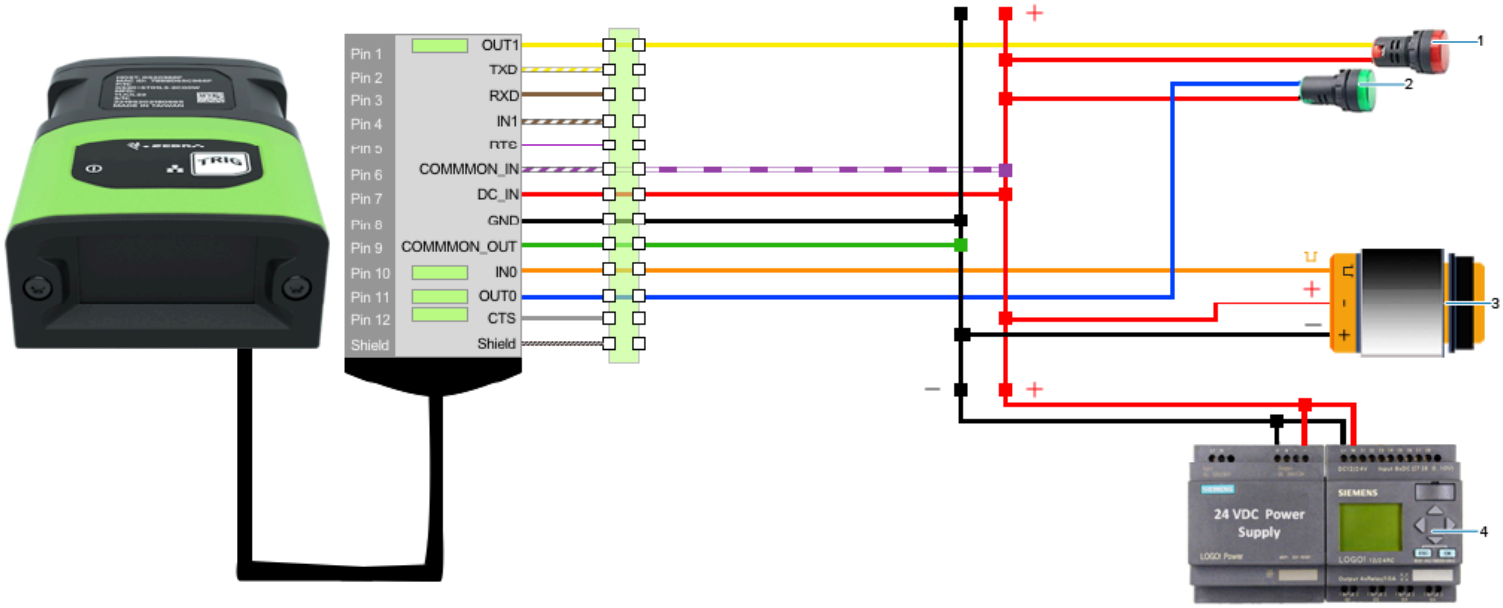
Figure 9 Output as Current Source / Input as Current Sink



1	Job Fail
2	Job Pass
3	PNP Proximity Sensor
4	Power Supply

The following diagram shows a GS20 device with two LEDs on outputs indicating job outcome and input trigger from a proximity sensor. The GPIO input is a current source and the outputs are set as a current sink. The power source is a PLC 24VDC PSU, and the GPIO functions are optoisolated.

Figure 10 Output as Current Sink / Input as Current Source



1	Job Fail
2	Job Pass
3	NPN Proximity Sensor
4	Power Supply

Thermal Management

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.

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 the mitigation steps, a power cycle of the unit is necessary to resume normal operation.

If overheating is a problem, effective mitigation strategies include:

- Using external illumination
- Actively cooling with a fan or a panel AC unit
- 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 7 Operating Temperature

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

NOTE: If temperatures exceed the operating range, additional heat-sinking strategies may be necessary. For example, 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.

Updating Device Firmware

To prepare for the firmware update procedure, the device must be connected to a PC using a USB or Ethernet cable or from Ethernet to a router (common network with a host PC). The USB connection provides power and communications to the device.

NOTE: A Factory Reset is required after applying a firmware update to a Connectivity Gateway license-enabled device.

For additional details on setting up the device, refer to the FS/VS Smart Camera Product Reference Guide.

Software Needed:

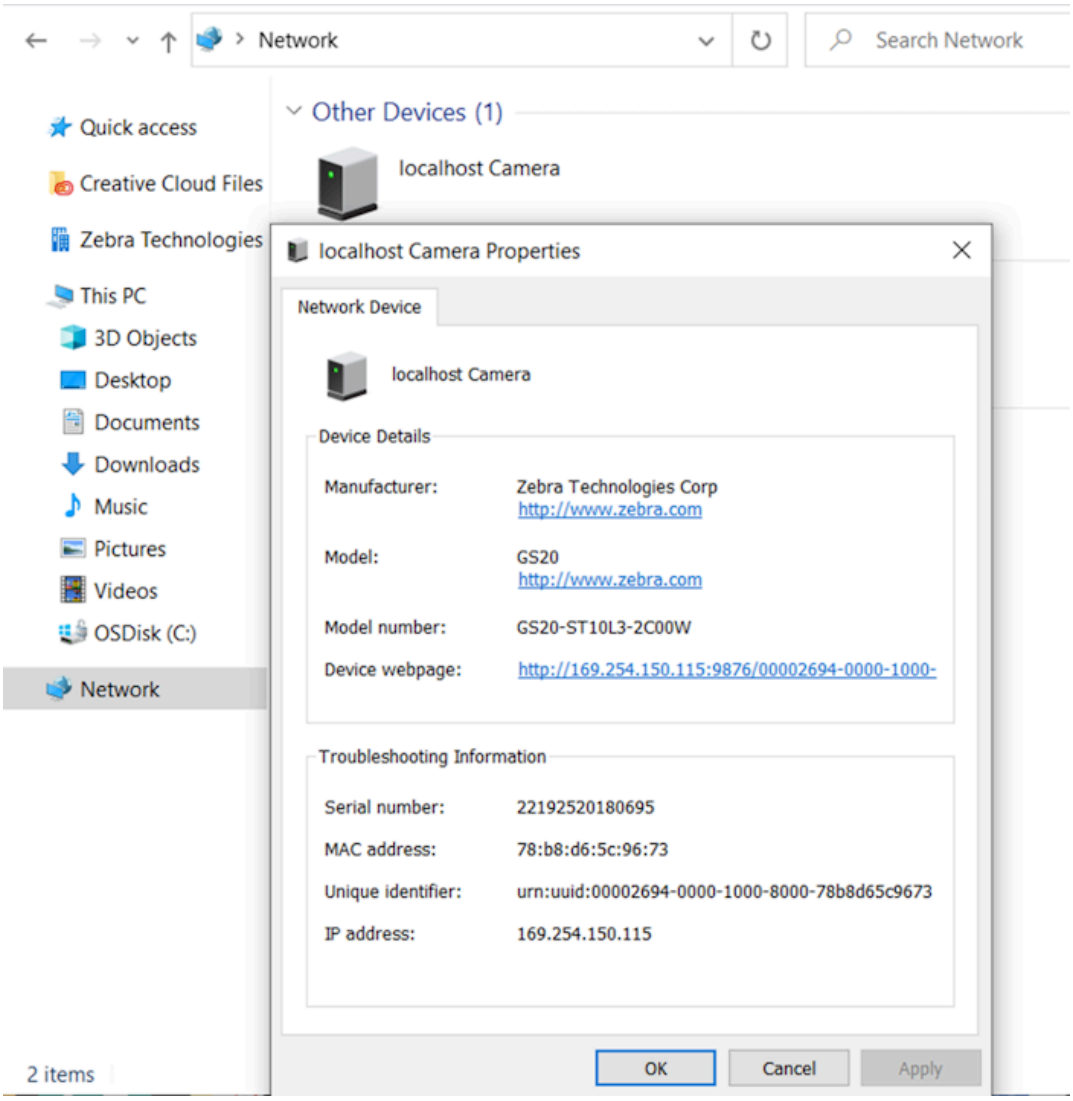
- Web Browser (Google Chrome, Mozilla Firefox, or equivalent)
- Firmware file on the local PC

Firmware Update

To perform a firmware update on the device, follow the steps below:

1. Open **File Explorer** on your host Windows desktop PC.
2. On the left window pane, scroll down and select **Network** to view devices on your network and identify a device.

3. Right-click on the device and select properties to obtain the device's IP address information.

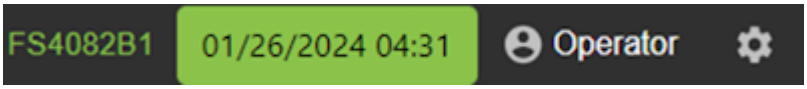


4. Enter the IP address (or Hostname) into your browser.

NOTE: This example refers to the hostname as localhost in the top left corner of the Properties window.

5. View the Zebra Web HMI and observe the build number RELEASE-xx (where xx is the build number) in the **Device Information** section of the dashboard.

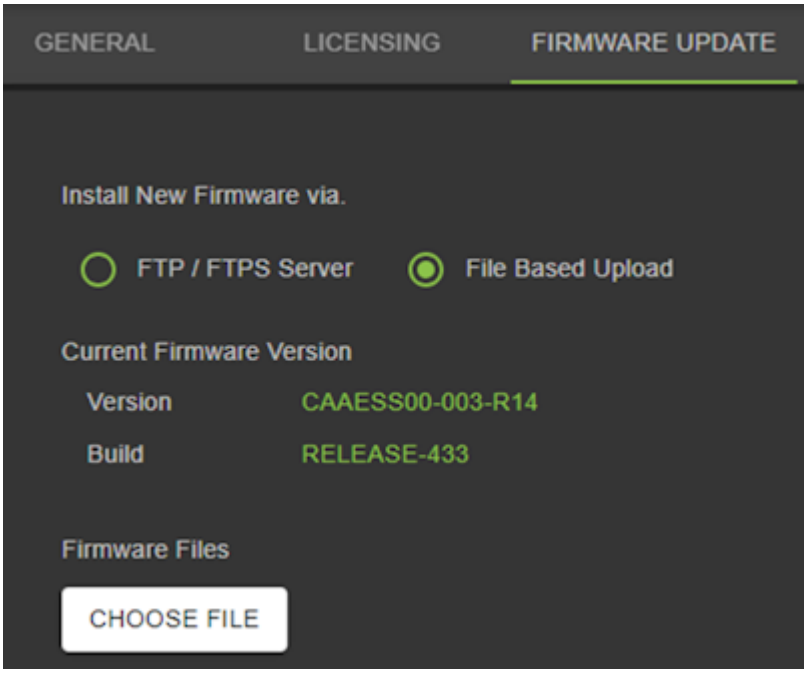
6. Click **Operator** to launch the login window.



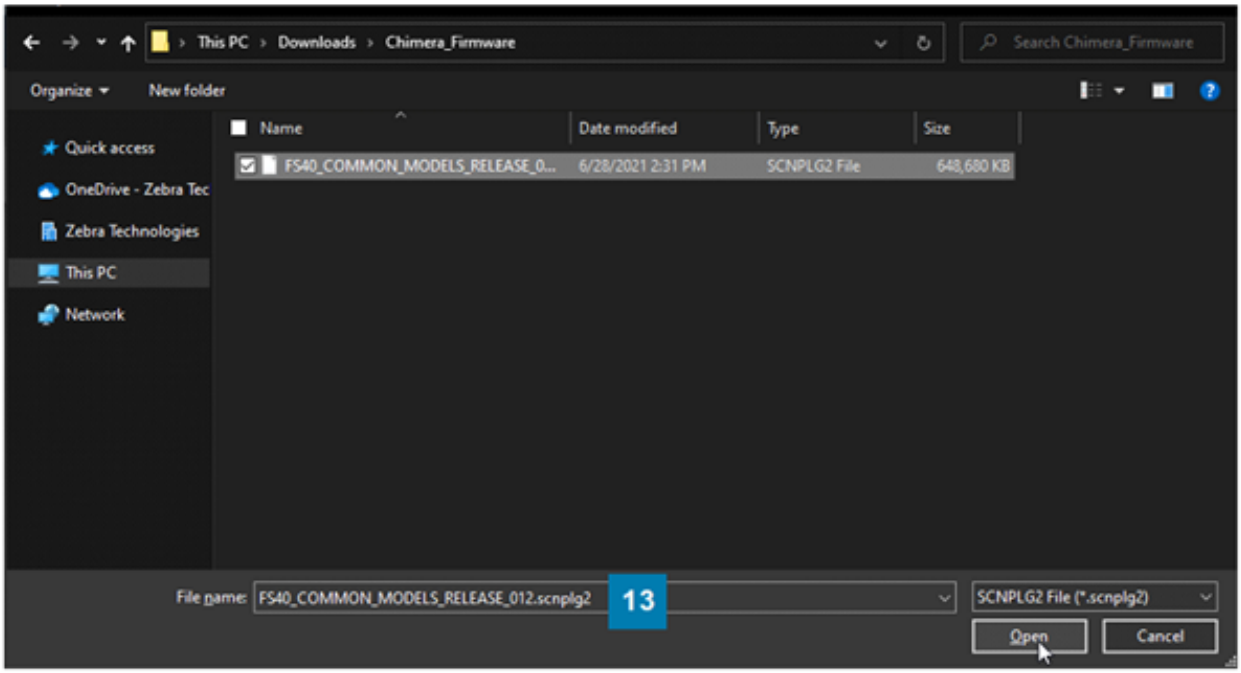
7. Enter the following login credentials:
   a) User ID: admin
   b) Password: admin
8. Click **Login**.
9. Observe that **Operator** now displays as **Admin**.

10. Click the Gear icon .
11. Click the **Firmware Update** tab.

12. Click **Choose File**, navigate to the location of the file stored on the Local PC, and select the latest firmware file.



13. Click **Open**.



14. Select either **Forced Update** or **Dual Update**.

NOTE: Forced Update loads the device in cases where it is identical to the current firmware on the device.

NOTE: Dual Update loads the device firmware and updates the backup partition. This option typically takes longer (twice as long) than a forced update.

15. Click **Update**.

NOTE: The device LED blinks red and the upload progress displays on the screen. The device reboots after the upload is complete.

16. Refresh the browser window and view the build number in the device information field to confirm that it has been updated from the previous version.

Updating Firmware Using 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.

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.

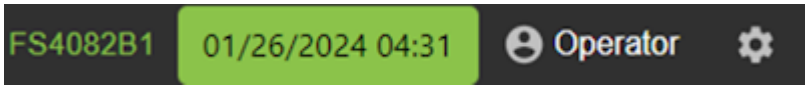
To confirm that the firmware update is complete, check the firmware version on the device in the Device Information section of the Web HMI dashboard.

NOTE: A factory reset may is highly recommended to clear out old XML and zjob files and replace them with newer files. This is necessary for GS20 and other leader devices such as the FS40 with a Gateway license upgrade.

Performing a Factory Reset

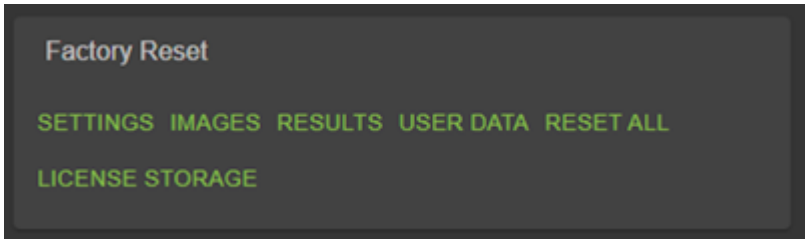
NOTE: A factory reset deletes all created Jobs on the camera. It is critical to save all Jobs and user-specific information before performing the factory reset.

1. Click the **Operator** icon to launch the login window.



2. Type the user ID (admin) in the **User ID** field
3. Type the password (admin) in the **Password** field.
4. Click **Login**.

5. Click the Gear icon .
6. On the General Tab, click the **Reset All** button in the **Factory Reset** field and wait for the device to reboot (approximately 45-60 seconds).



Software Overview

GS20 Web HMI Features

The GS20 Connectivity Gateway Web HMI provides a unified platform with an intuitive interface for setting up, deploying, and running a scanning solution for barcode jobs.

NOTE: The GS20 Web HMI supports up to 16 XS40, or XS70 Fixed Industrial Scanners in a Connectivity Gateway configuration connected via TCP/IP and GPIO. The Maximum Forward Continuous Current is (IFM=70mA @ TA).

Notable features include:

- Continuous and Trigger Modes (TCP/IP, Serial, GPIO, PLC)
- Result output to (TCP/IP, Serial, GPIO, PLC)
- GPIO mirroring
- Common PLC model support
- String matching and filtering on barcode results
- Split code functionality

Device Compatability with Zebra Aurora Focus

Follower devices are accessed and configured using Zebra Aurora Focus before adding them to the Connectivity Gateway solution and connecting them to the GS20 Leader Module.

Network Setup

NOTE: DHCP is enabled by default. Networking parameters are not saved after power cycling and reconnecting the device while DHCP is enabled.

NOTE: Disabling DHCP clears subnet settings.

To connect the device to a network:

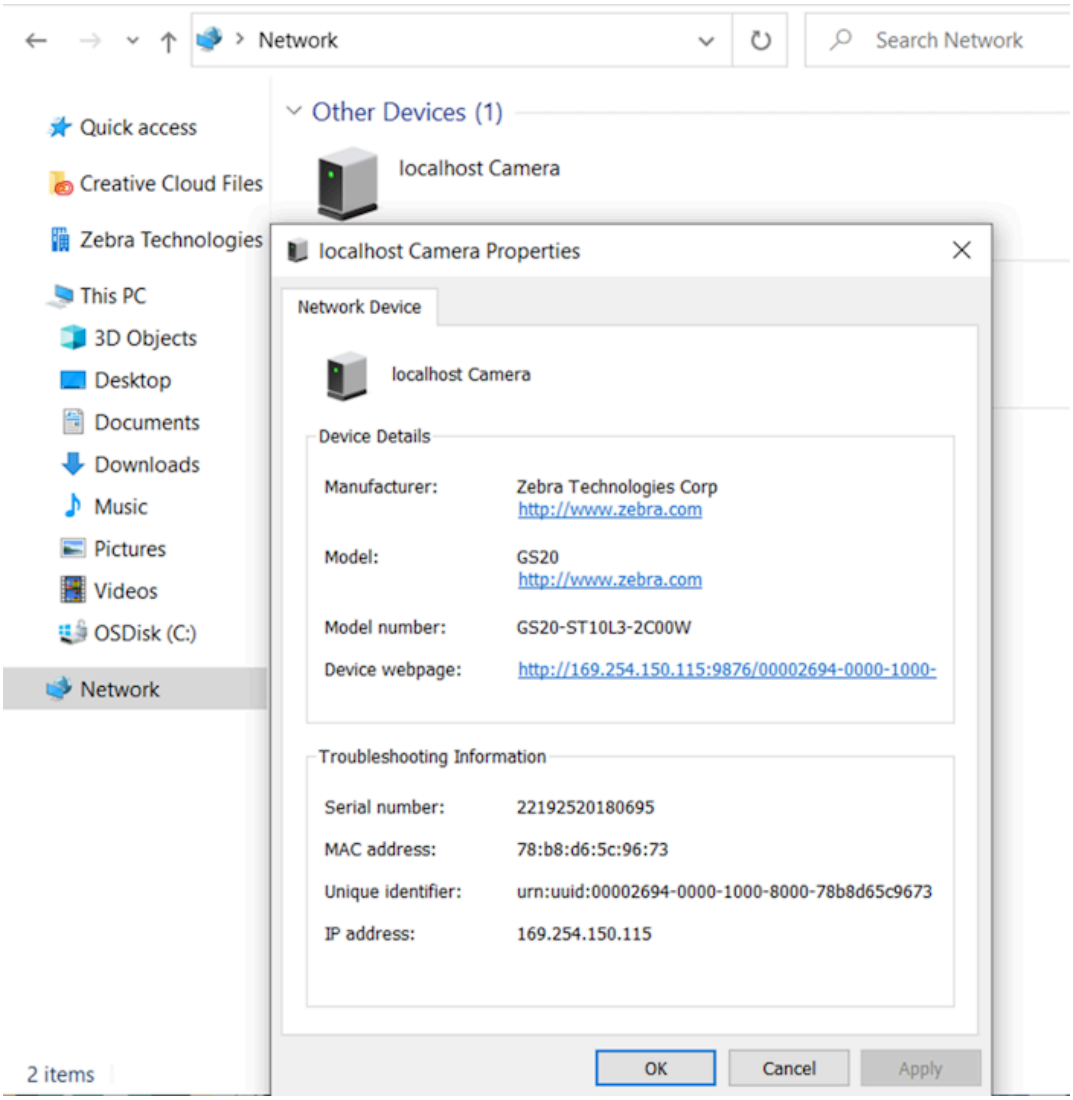
1. Ensure your device is powered using a supported power supply if you are not using a Power over Ethernet (PoE) Injector/Switch.
2. Connect the GS20 to a Network Switch, PoE Injector, or directly to the host PC using Ethernet. When using follower devices, ensure your GS20 device is connected to the same Ethernet Switch as the follower devices and the PC.

Accessing the GS20 Web HMI

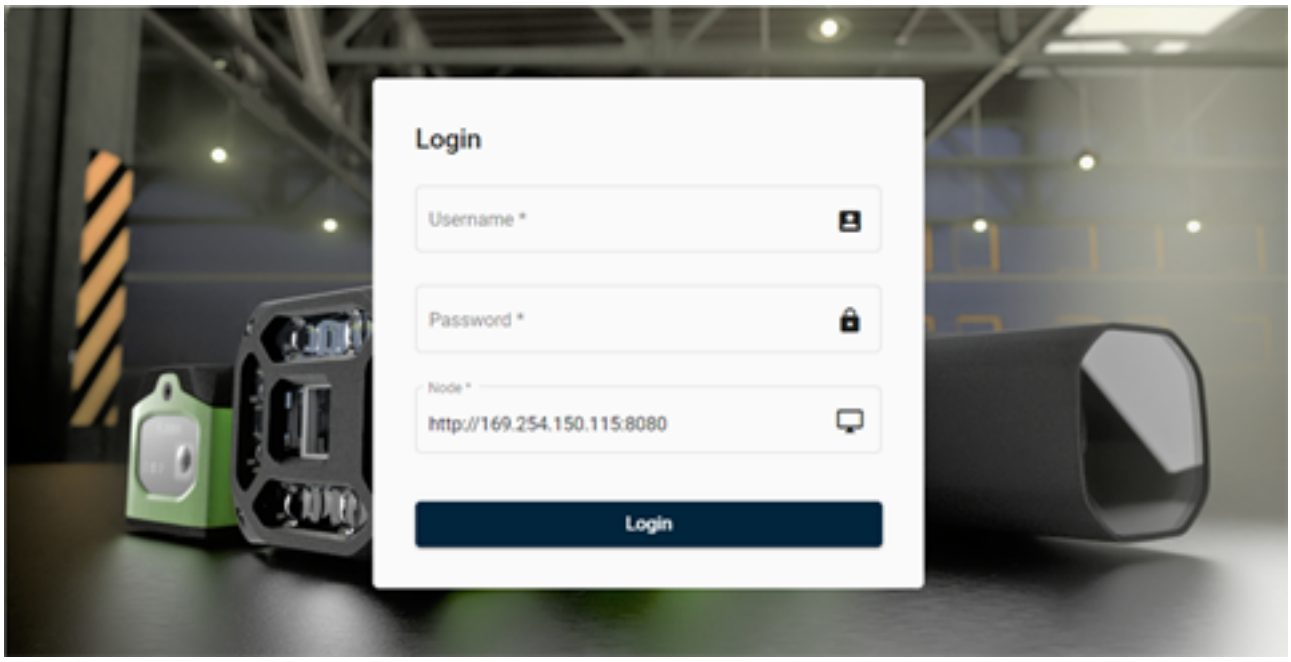
The GS20 Connectivity Gateway Leader Module is accessed using a Web Human-Machine Interface (HMI).

To access the device using the GS20 Web HMI:

1. Open File Explorer and navigate to **Network** on your PC.
2. Right-click on the GS20 device to open the menu and click Visit device webpage.

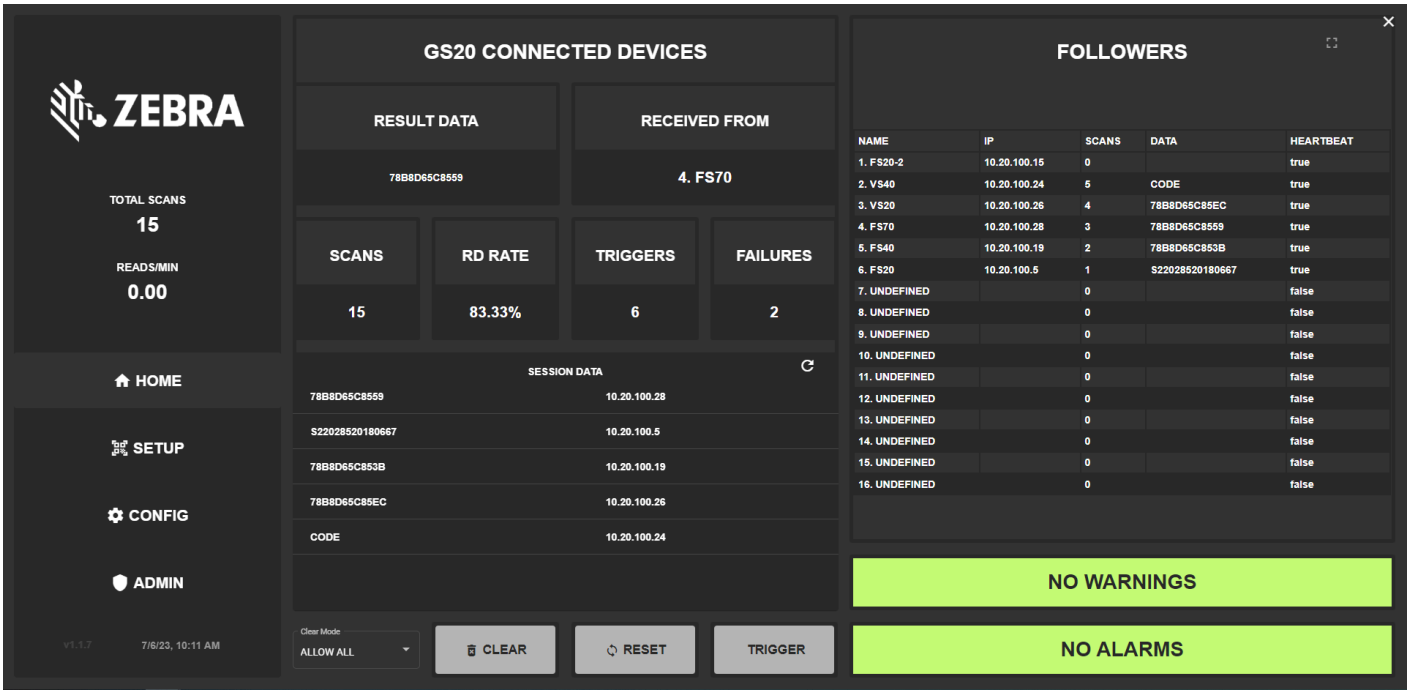


3. Enter the following credentials to log in to the GS20 Web HMI:
   - Username: user
   - Password: user



NOTE: If you do not see the **Login** screen, exit out of the browser window, and select the device from Network Discovery again.

4. Observe the GS20 Web HMI Home screen.



UI Overview

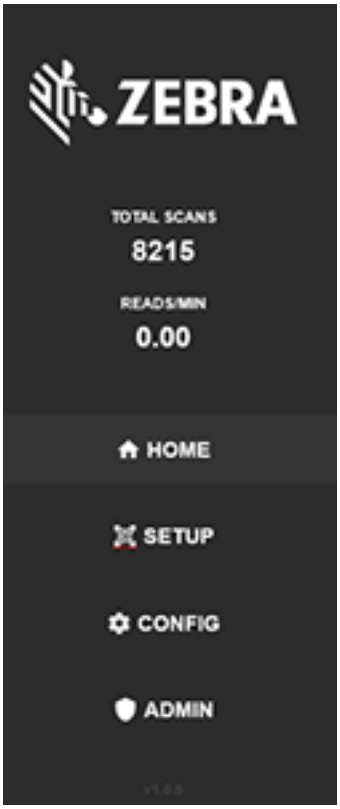
The GS20 Connectivity Gateway Home screen provides a quick overview of key scan metrics and status information about the follower devices.

The GS20 Connected Devices section of the Home screen reports Output Data and where the data is received from, in addition to the total number of scans, read rate, number of triggers, and number of failures. Session Data can be filtered by items per page, cleared, reset, or triggered to generate new scan data.

The Followers section of the Home screen provides information on the xS20, xS40, or xS70 devices that can be added to the Connectivity Gateway. Device data such as IP, scans, data, and heartbeat are tracked in real-time and reported in this section.

Navigation

The menu displays the total number of scans and reads per minute and provides access to device setup, configuration, and administrator settings.



- Home - provides an overview of the configuration.
- Setup - determine Follower name, IP, trigger delay, and trigger input for Follower devices, as well as input and output settings for the GS20 Leader Module.
- Config - configure GPIO, GPIO mirroring, GPIO pass/fail, string filtering, serial, trigger strings, no read string, failure timeout, leader to host delay, leader to host interface and run mode.
- Admin - view log, Leader device information, gateway health, network configuration, PLC configuration, access TCP and GPIO debugger, enable a read rate alarm, access split code functionality, ping a

device, access the Web HMIs for both Leader and Follower devices, restart runtime, or reboot the device.

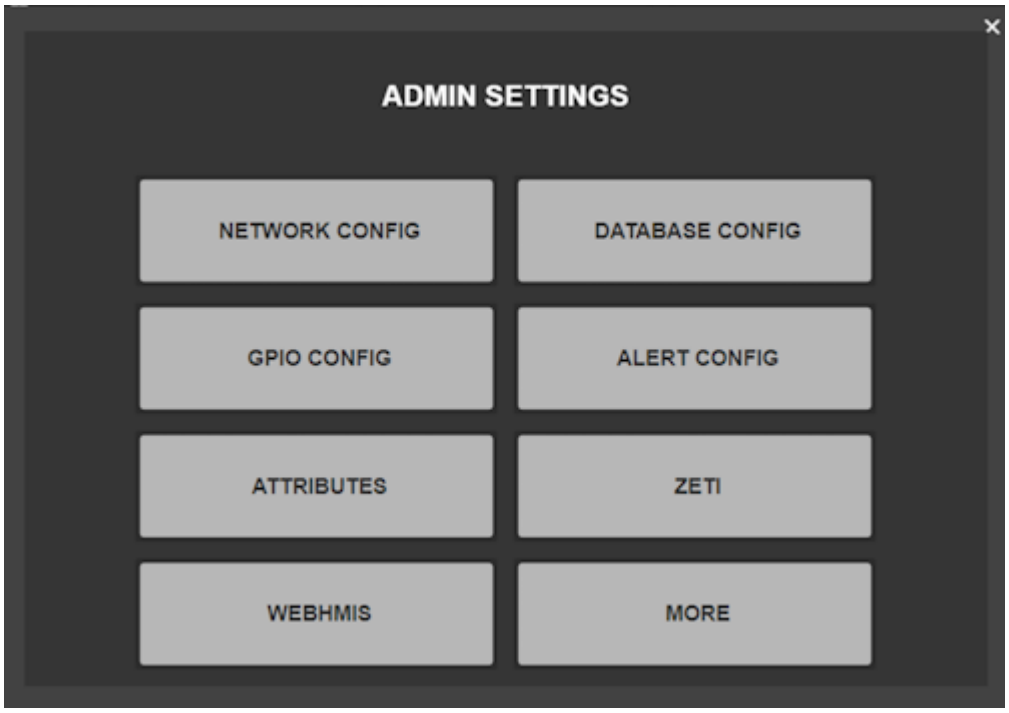
Configuring Network Settings

Configurable communication settings include hostname, IP address, subnet, gateway, DHCP, DNS, and date/time setting NTP servers.

NOTE: Network configuration is unnecessary if DHCP or the default DHCP fallback addresses are in use.

To configure network settings:

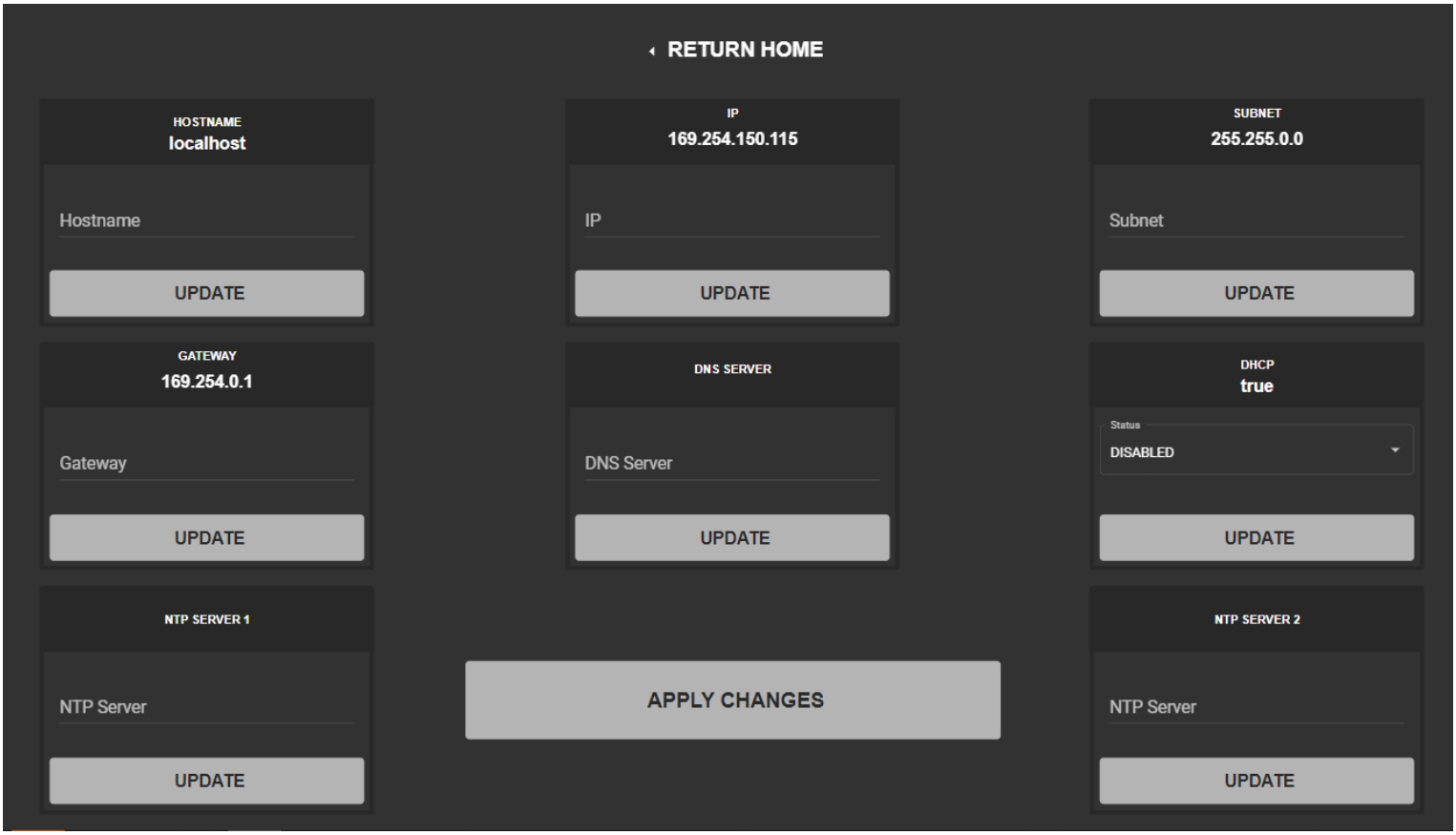
1. Access **Admin Settings** from the left menu on the **Home** screen.
2. Navigate to **Network Config** from **Admin Settings**.



3. On the **Network Configuration** screen, change the desired fields by entering the field value and clicking **Update** next to the corresponding field.

NOTE: Ensure that DHCP is disabled when assigning a static IP address value.

4. After the settings are updated, click **Apply Changes** for the new configuration to take effect.



NOTE: Applying network changes restarts and logs you out of your session.

NOTE: When assigning a static IP address value, specify the Gateway and Subnet. If you do not properly set the static settings before attempting to disable DHCP, the Apply Changes button is unavailable.

5. Observe the warning message indicating that applying the network changes results in a reboot of the device.
6. Click Return Home at the top of the page to access the Network Configuration screen.

Configuring Follower Devices

The GS20 Connectivity Gateway Leader Module is compatible with XS20, XS40, and XS70 Zebra Fixed Industrial and Vision Scanners.

If the follower devices are triggered via TCP/IP or GPIO, ensure they are connected to the same Ethernet switch as the GS20 device and the PC.

NOTE: It is required to configure follower settings in both the GS20 Web HMI and Zebra Aurora.

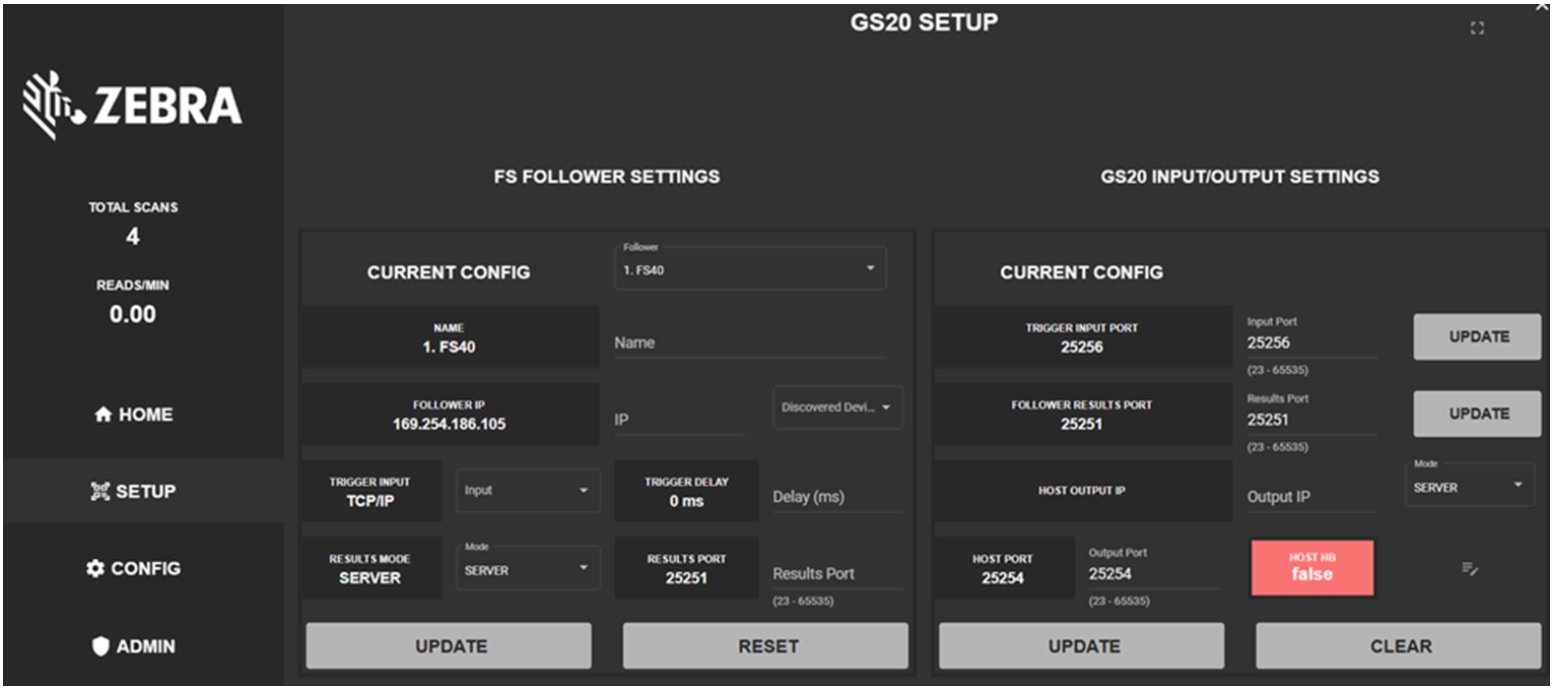
Adding Follower Devices in the Web HMI

To configure the Connectivity Gateway, add each follower device in the scanning solution using the Leader/Follwer Web HMI.

NOTE: The host Heartbeat indicator only applies in Client Mode when the Host IP is specified.

To add a new follower device:

1. Click **Setup** on the left menu of the **Home** screen.



2. Select the follower device you intend to configure from the menu (set to **UNDEFINED** by default), enter the device name, IP address, optional trigger delay, and trigger input into form fields.
   - Leader to Follower TCP/IP Trigger mode: when using TCP/IP to trigger follower devices from the leader, select **TCP/IP** in the Trigger Input field.
   - Leader to Follower GPIO Trigger mode: when using GPIO to trigger follower devices from the leader, select either **OUT0** or **OUT1** in the Trigger Input field. Ensure that this matches the hardware setup of the GPIO connection pins.
   - Leader to follower TCP/IP Continuous mode: when using follower devices in continuous mode, select **None** in the Trigger Input field.

NOTE: When multiple followers connect to the same GS20 GPIO output pin, all followers trigger with the lowest trigger delay specified. If you intend to use different GPIO input trigger delays for each follower, configure the GPIO settings for the follower devices in Zebra Aurora.

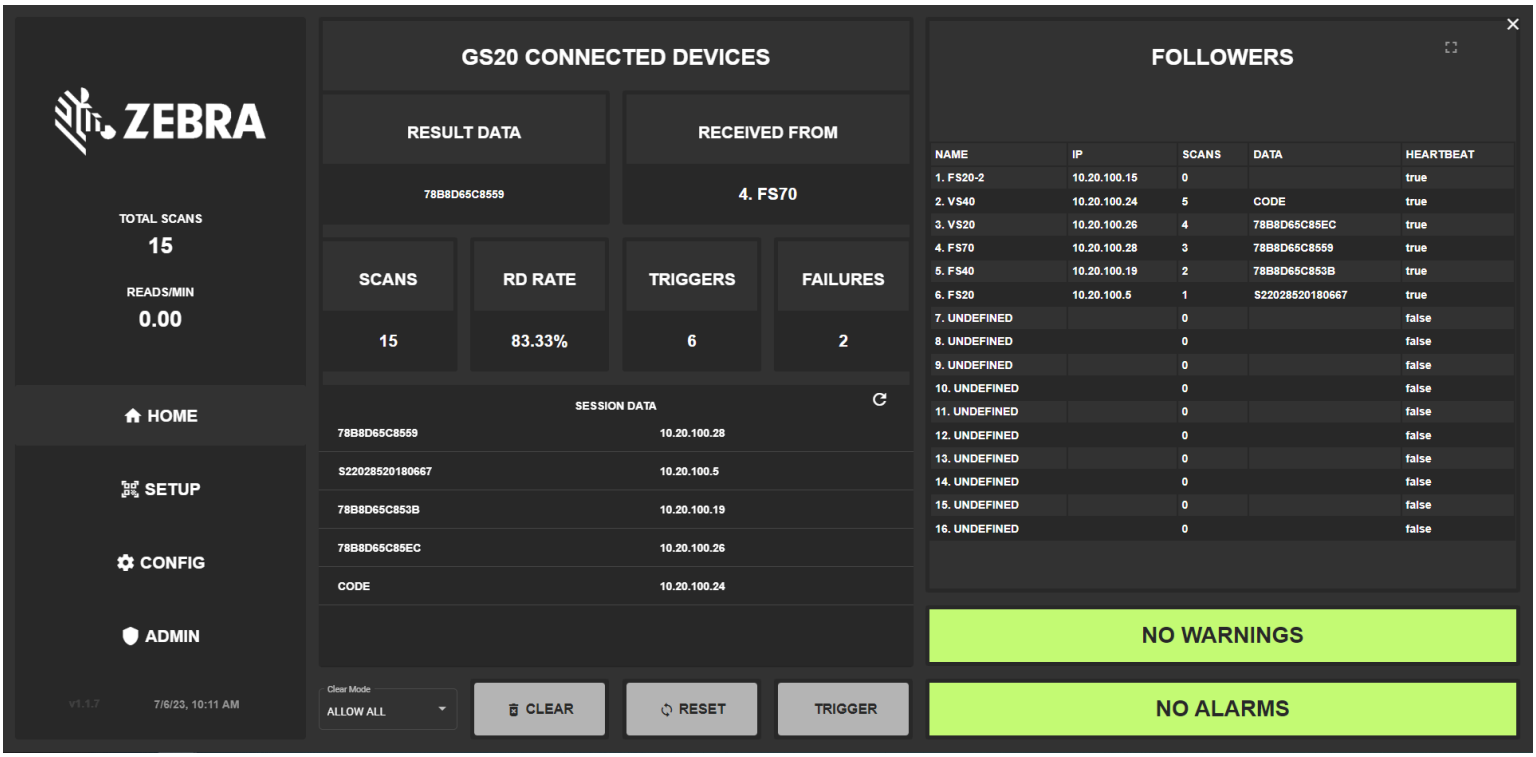
NOTE: Clear the IP address from a specific follower.

3. Continue adding follower devices by overwriting **UNDEFINED** followers.

4. Once the configuration for each follower is complete, click **UPDATE**.

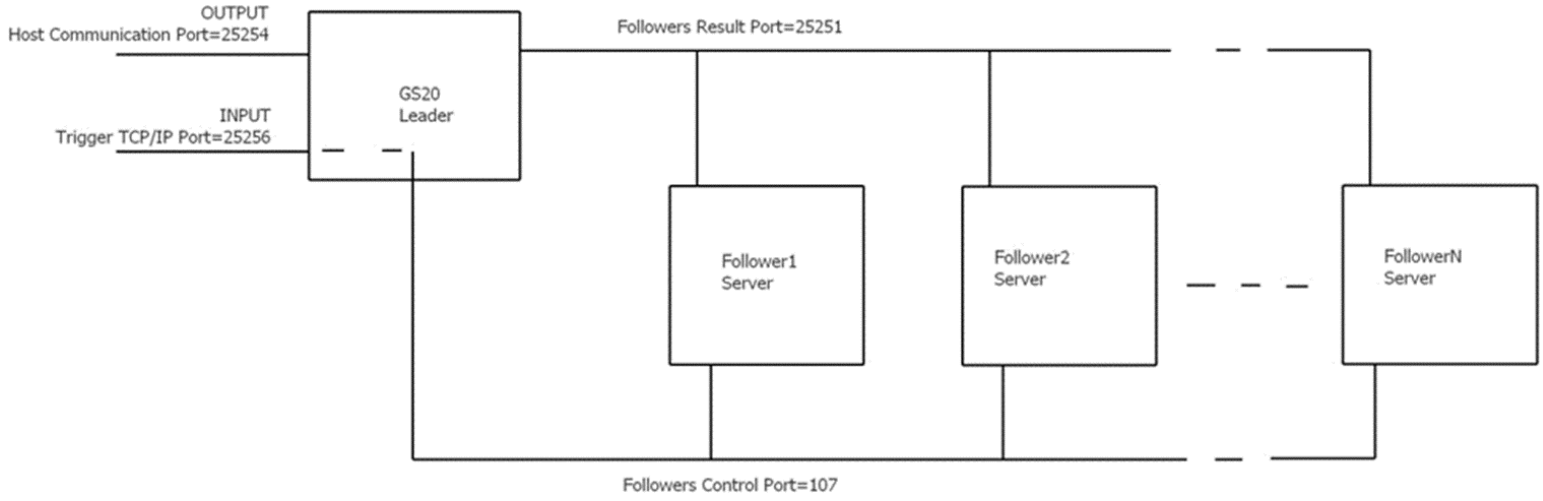
NOTE: Observe the message requesting the user to wait for at least two minutes before sending the next trigger to the gateway.

After committing changes, the newly added follower devices can be viewed by navigating to the Home Screen. The table on the right lists all follower devices and updates as new device data is entered.



Configuration Overview

The following diagram provides a reference for port configuration in a Connectivity Gateway solution.



Setting Up the Result Output

Configure the results port on each follower device regardless of the trigger mode to ensure that results from follower devices send to the GS20 Leader Module.

1. In Zebra Aurora Focus, navigate to the **Communication** pane and configure the **Results** section as follows:
   - Connection Type: client
   - IP Address: enter the IP address of the GS20 (optional)
   - Results Port Number: must match the GS20 follower setup
   - Results Terminator: CR+LF
   - Timeout: set the desired timeout.

NOTE: This timeout determines the delay of the results sent to the GS20 Leader Module. Calibrate the timeout setting as needed based on the use case. Do not implement long timeouts.

2. Click **Apply** in TCP/IP settings to ensure that the changes are applied.

Using a Manual Trigger

When in triggered mode, use the manual trigger feature to test the Connectivity Gateway setup.

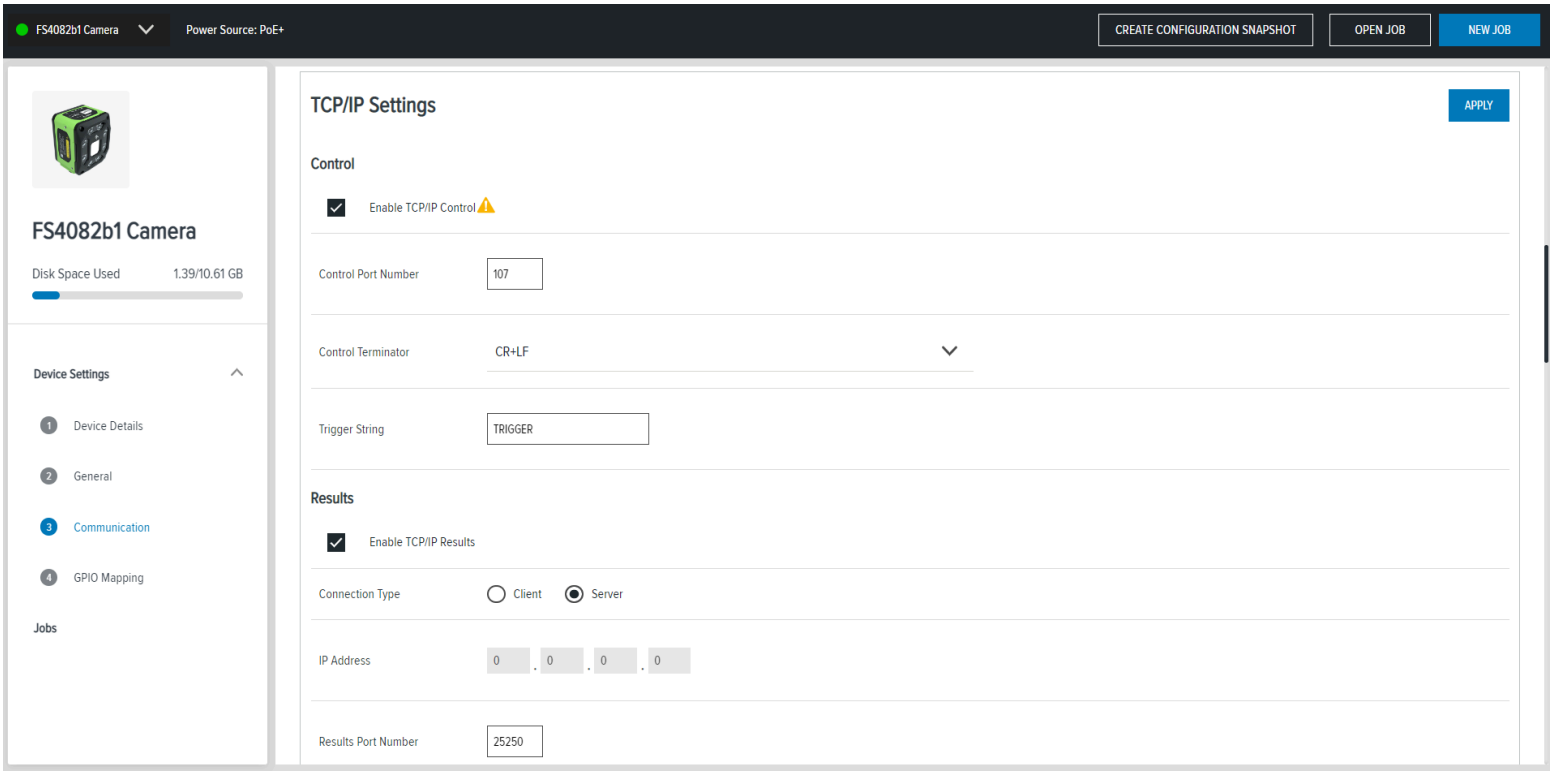
Click **Trigger** at the bottom of the **Home** screen to trigger the device manually.

Setting Up TCP/IP Trigger Settings for TCP/IP Triggered Mode

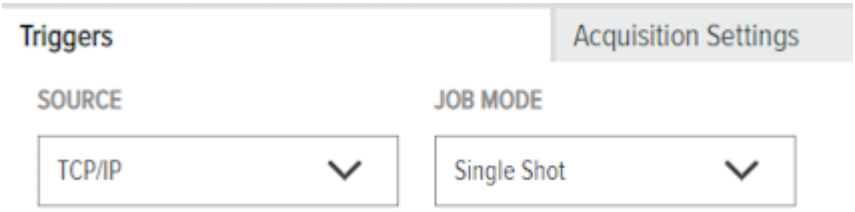
Configure the control port on each of the follower devices accordingly to ensure that the TCP/IP trigger propagates from the GS20 Leader Module to the follower devices.

1. Using Zebra Aurora Focus, navigate to the **Communication** pane and change the Control section as follows:
   - Control Port Number: 107
   - Control Terminator: CR+LF
   - Trigger String: TRIGGER

2. Click **Apply** in **TCP/IP Settings** to ensure that the changes are applied.



3. Ensure that the Trigger Settings for **Source** is set to **TCP/IP** and **Job Mode** is set to **Single Shot** in Capture mode.

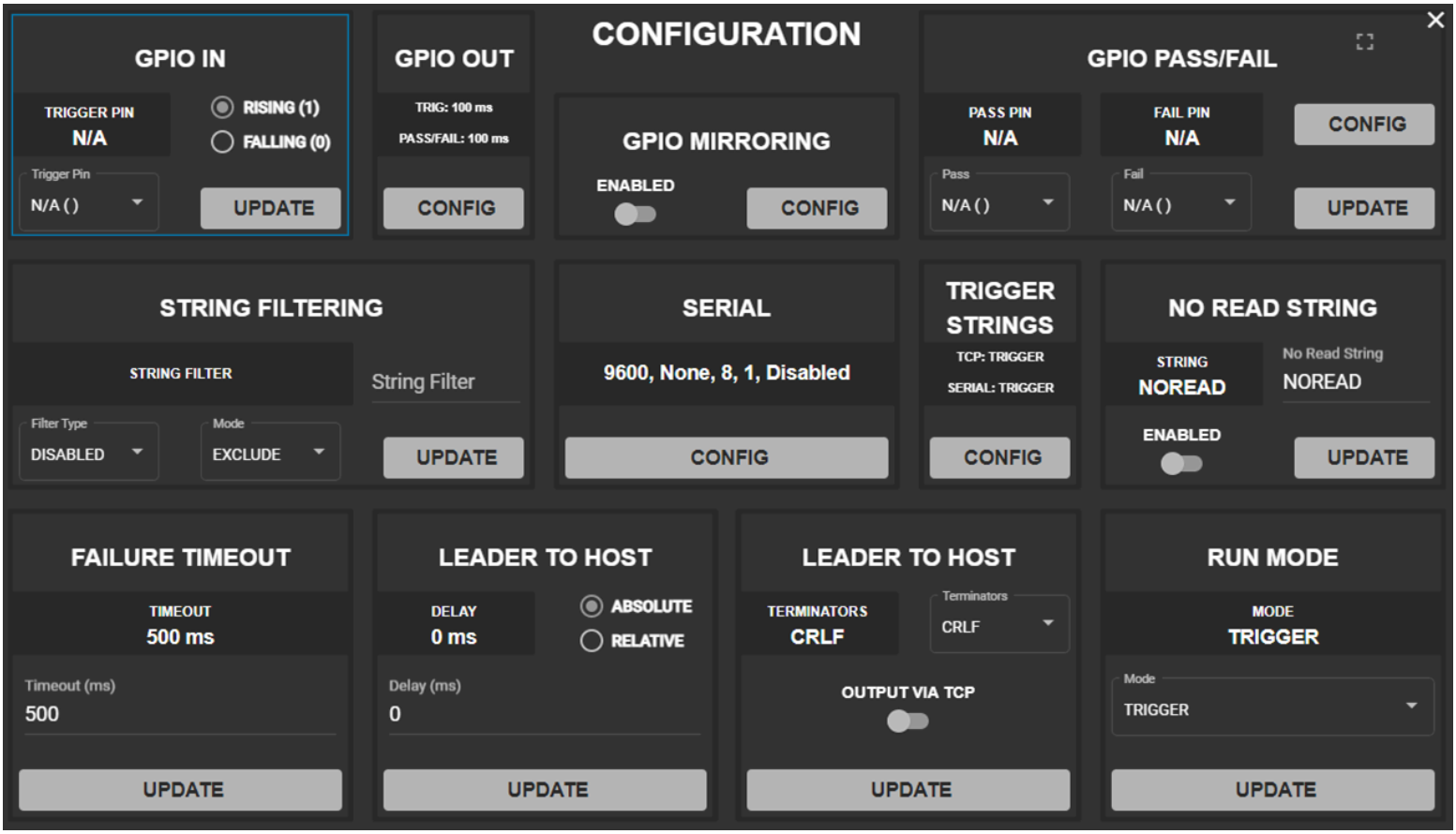


Setting Up GPIO Triggering

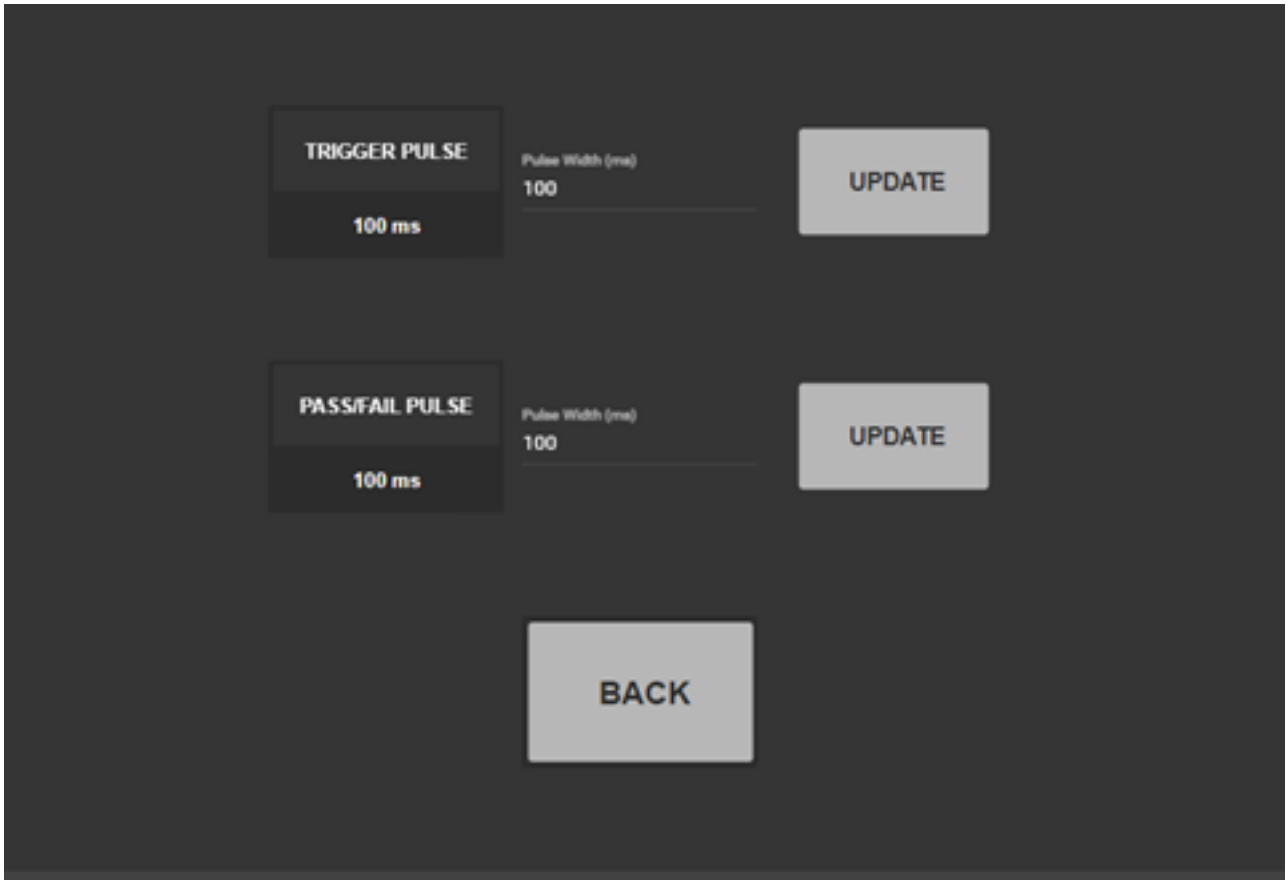
To define a pulse width of the signal to trigger a GS20 Leader Module over the input of your choice:

1. Navigate to the **Configuration** screen using the left menu on the **Home** screen.

2. In the top left **GPIO** section, select the desired trigger pin (either In 0 or In 1), and click **Update**.



3. Click **Config** to edit the **Trigger Pulse** and **Pass/Fail Pulse** fields.



4. Enter the desired values and click **Update**.
   - Trigger Pulse: specifies the pulse width for the signal that triggers the follower devices.
   - Pass/Fail Pulse: specifies the pulse width for the pass/fail result signal.

NOTE: If you configure the same output for GPIO Pass/Fail and as an input for the follower device (for example, trigger input), the trigger input for the follower device takes precedence.

When configuring followers to receive triggers on either Out0 or Out1, updating the trigger input for each follower in the Connectivity Gateway is required. Check your wiring to ensure it matches the GS20 pinout, and determine which pin the follower devices should connect to.

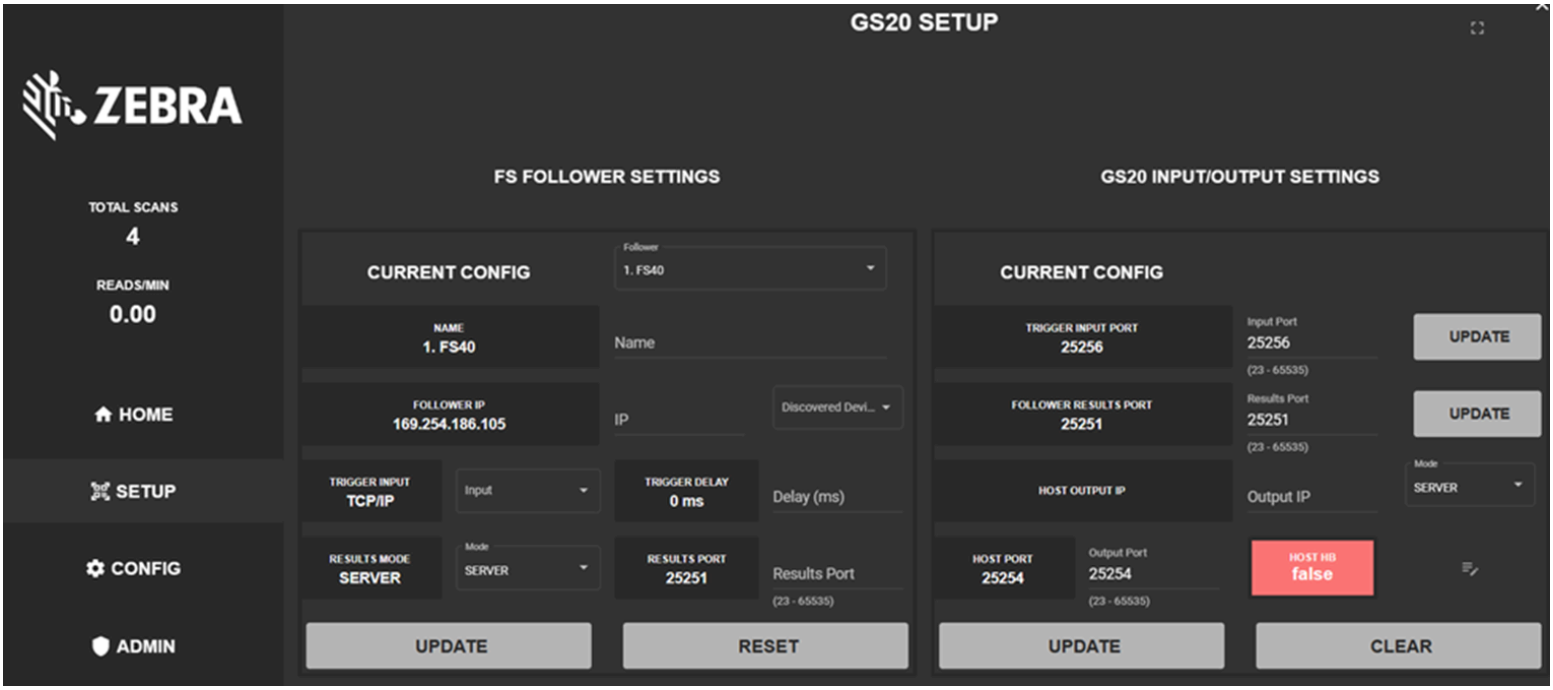
NOTE: The GS20 Web HMI supports the connection of all followers to one Out pin (up to 16 devices) or split between Out0 and Out1. If you decide to split the followers between outputs, you cannot output the GPIO Pass/Fail result.

Changing Ports Between the Remote Host and the Leader Device

Use the GS20 Web HMI to configure a Host to Leader port that receives triggers on the GS20 Leader Module with a Leader to Host port and IP address for sending results to the external host.

NOTE: It is unnecessary to configure the Host to Leader port while in continuous mode.

1. Navigate to the **Setup** screen using the left menu on the **Home** screen.



2. Select a **Follower** device from the dropdown menu or select a device from the **Discovered Devices** dropdown menu.

- If you are in triggered mode and intend to update the port that the GS20 Leader Module is monitoring for an incoming trigger string, enter the desired port into the **Trigger Input** field (0 to 65535) and click **Update**.
- To set up the GS20 TCP port to act as a **Server**, select this option from the **Mode** dropdown menu and click the icon above the menu to edit the server settings.
- To configure a trigger delay, enter a time interval in the **Trigger Delay** field.
- Select port to send results to from the **Results Port** dropdown menu.

3. Click **Update** to enable the changes and update the field values. Select **Server** to use the GS20 TCP port as a server.

NOTE: When the Leader to Host port acts as a Server, a timeout occurs after 5 seconds of inactivity. In some cases, you may need to set up a heartbeat to keep the connection alive by sending a string (for example, HB) from the host machine to the GS20 device IP address and the specified server port with a frequency higher than every 5 seconds.

4. Once the form fields are populated, click **Update**.

NOTE: Inactivity Timeout is the time the device waits for the next TCP message before the connection is lost. This setting is only applicable when the leader device operates in Server mode. The default setting of one day is helpful for stable network connections. However, lower timeout options should be used along with a heartbeat from the host to recognize dropped connections quicker on unstable networks. If your network is unstable, set up a heartbeat to maintain the connection by sending a string (for example, HB) from the host machine to the leader's device IP address and specify the server port with a frequency higher than the inactivity timeout.

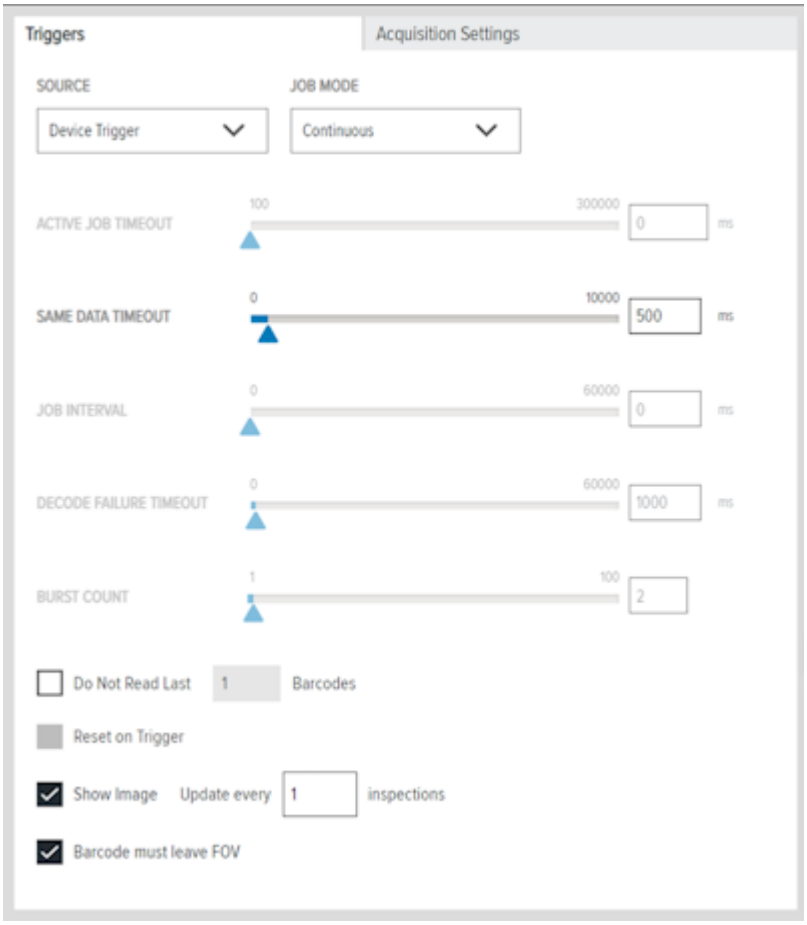
Configuring Communication Settings for Follower Devices

Specific settings must be configured for each follower device in Zebra Aurora Focus to trigger them from the GS20 leader device successfully, including editing the Communication Settings and GPIO mapping when triggered via GPIO from the GS20 to the follower devices.

For additional information, refer to the FS10/xS20 Product Reference Guide available on zebra.com/support.

Setting Up Continuous Mode

Follower devices that are in Continuous Mode do not require configuration of TCP/IP control settings. However, you must configure the Results port and update the Job Mode to Continuous and Source to Auto(Self).



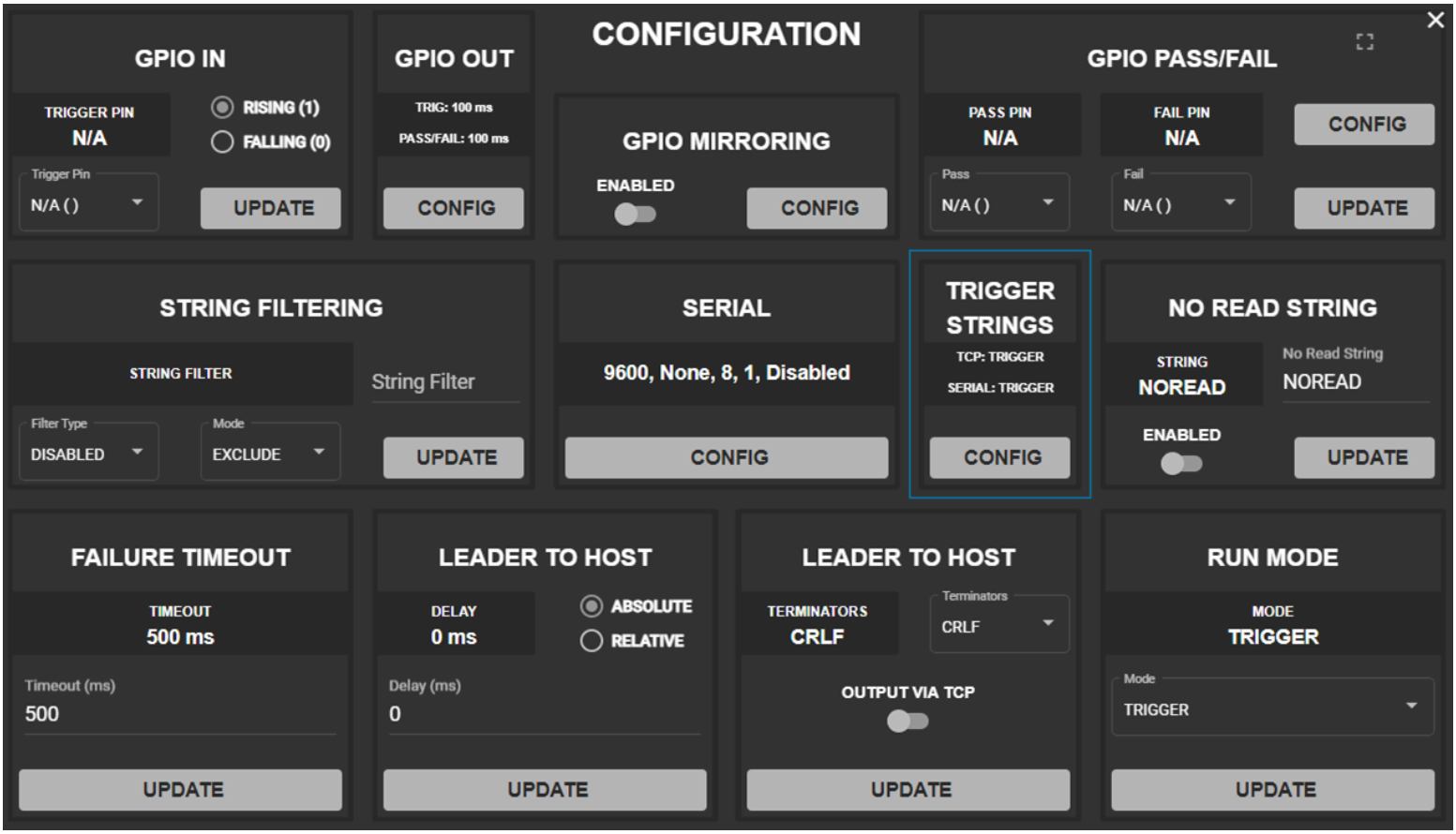
Setting Up TCP/IP Triggering

NOTE: Before setting up TCP/IP triggering on the GS20 Leader Module, configure the Host to Leader port and follower devices.

To set up TCP/IP triggering:

1. Navigate to the **Configuration** screen using the left menu on the **Home** screen.

2. Locate the **Trigger Strings** section and click **Config**.



3. On the **Configuration** screen, select the terminator for each trigger from the menu, and click **Update** to apply the changes.

NOTE: Serial Interface does not support a null terminator.

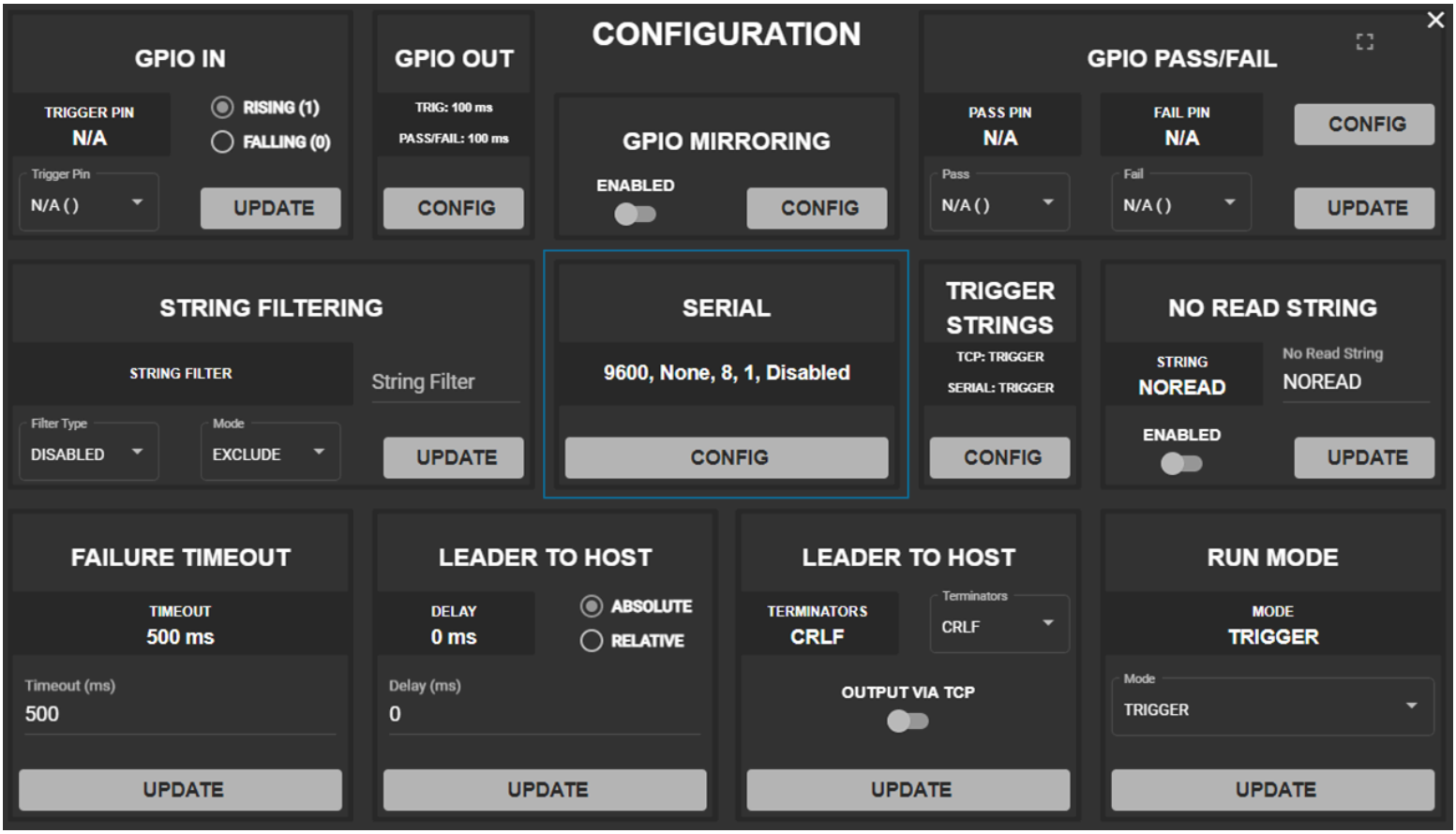
Setting Up Serial Triggering

NOTE: There is no serial connection between the leader and the follower devices; triggering between the devices occurs over TCP/IP.

To set up a Serial Trigger from the host to the Connectivity Gateway:

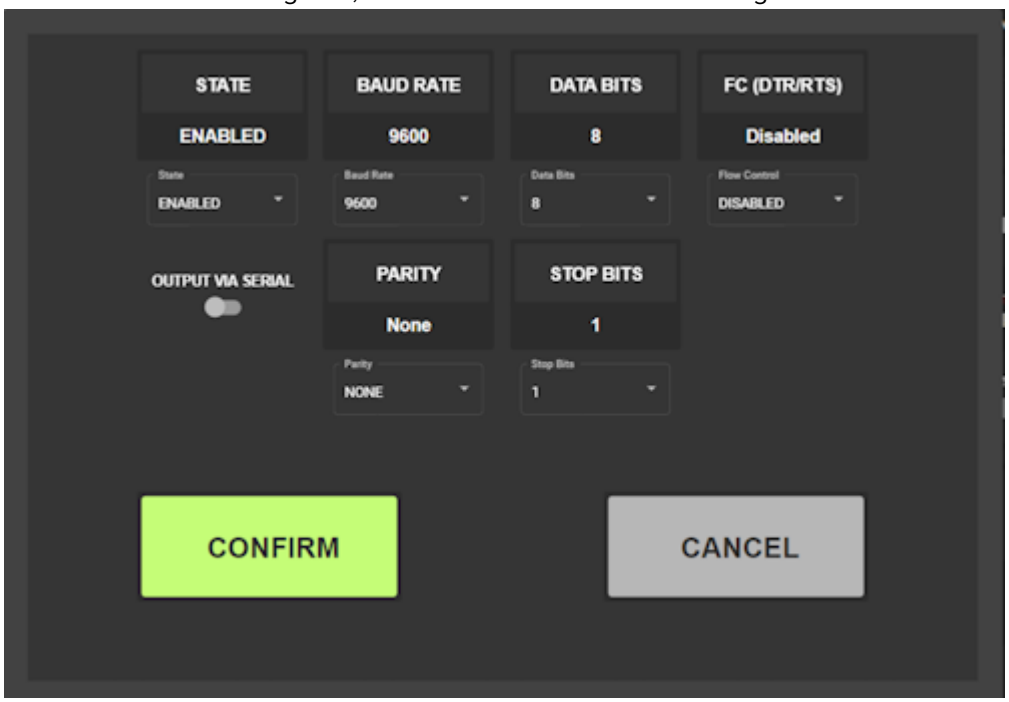
1. Navigate to the **Configuration** screen using the left menu on the Home screen.

2. Locate the **Serial** section and click **Config** to set the serial settings for the device.



3. Toggle the **Output via Serial** button to output results via serial.

4. After the fields are configured, click **Confirm** to enable the settings on the device.



NOTE: By default, Parity is set to None, Data Bits is set to 8, and Stop bits is set to 1. The maximum message length is 512 characters.

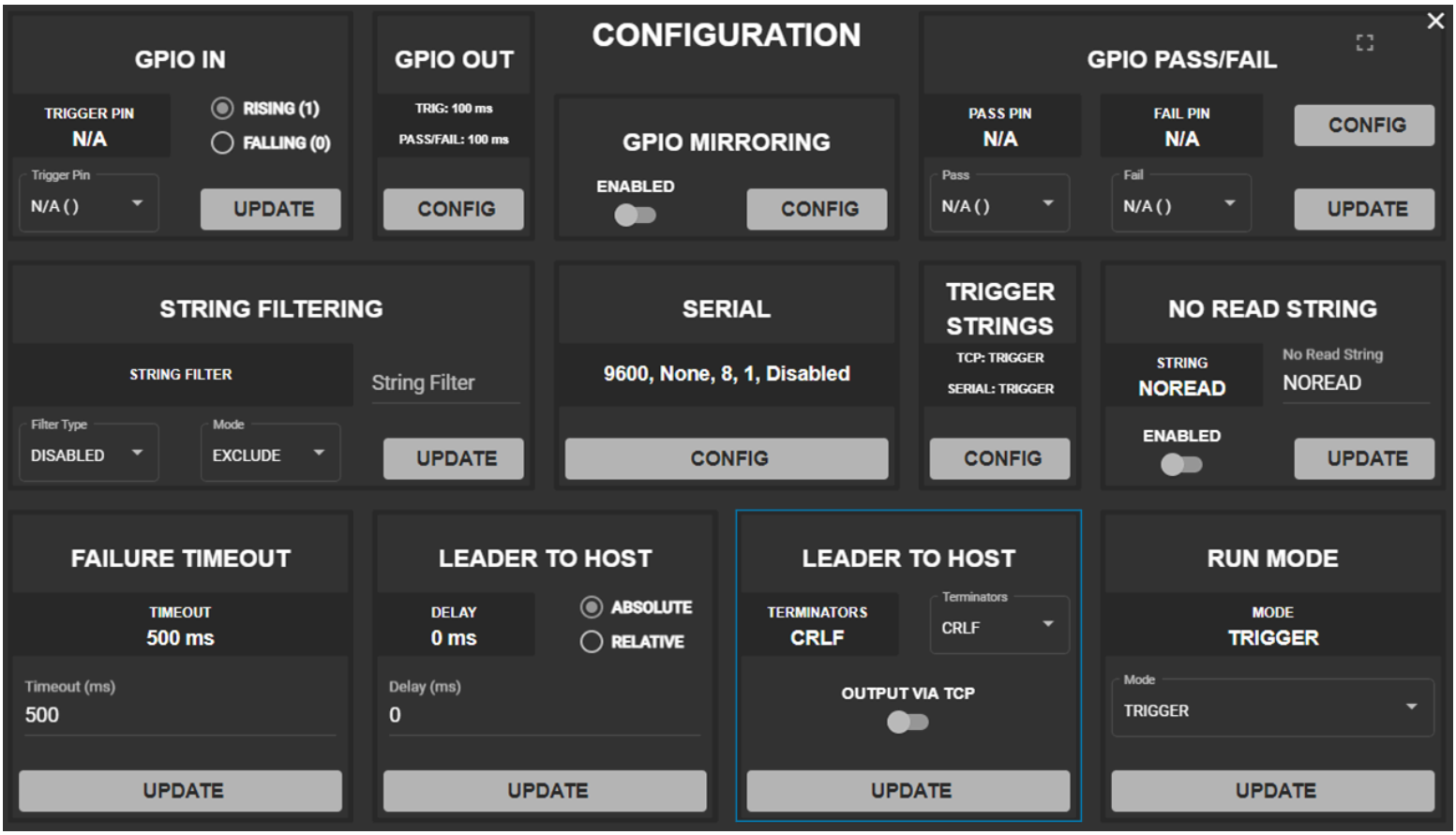
Sending Results to the Host Over Serial and TCP/IP

Results can be sent over TCP/IP, serial, or both.

To determine a location where results are sent:

1. Navigate to the **Configuration** screen using the left menu on the **Home** screen.

2. Locate the **Leader to Host** section of the **Configuration** screen and select the desired terminators from the dropdown menu: None, CR, LF, CRLF TCP/IP, or Null.



NOTE: The GS20 is unable to set None as a terminator. When Serial is None in the GS20 Web HMI, the default is to output CR+LF instead. When TCP is Null, the output appends no terminator. To set a terminator using TCP, select a Null terminator in the advanced formatting options in Zebra Aurora on the follower side, followed by standard CR+LF. In this case, the GS20 removes CR+LF and keeps the Null terminator.

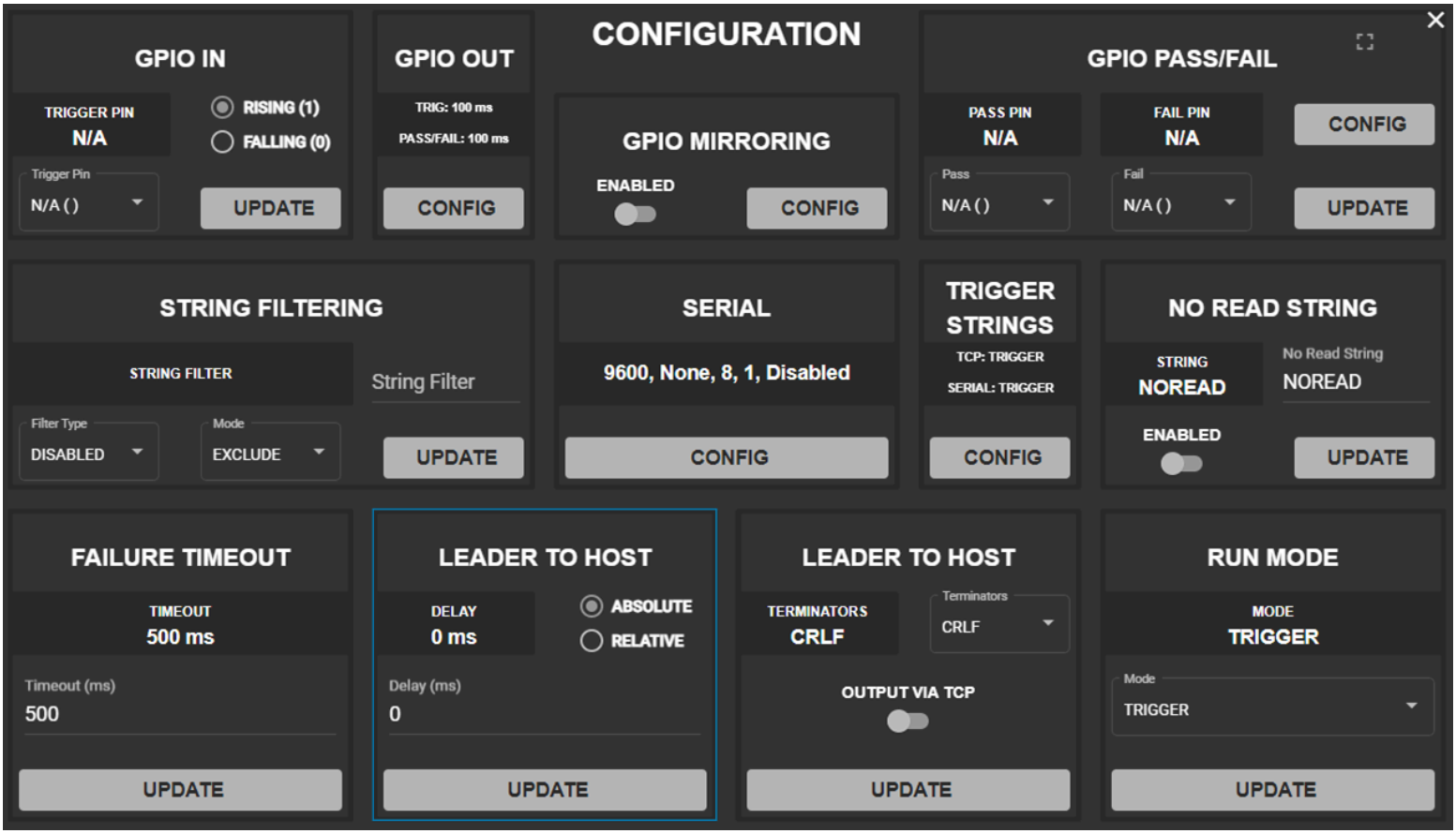
3. Toggle the Output via TCP to send results via TCP.
4. Click Update to apply the changes.

Setting Leader to Host Delay

To configure a delay for sending results to the host:

1. Navigate to the **Configuration** screen using the left menu on the **Home** screen.

2. Locate the **Leader to Host** section in the bottom middle of the **Configuration** screen.



3. Input the desired delay in ms and select **Absolute** or **Relative**.

NOTE: Absolute delay is a standalone measure of time, while relative delay is a comparative measure.

4. Click **Update**.

Setting Up a PLC Device

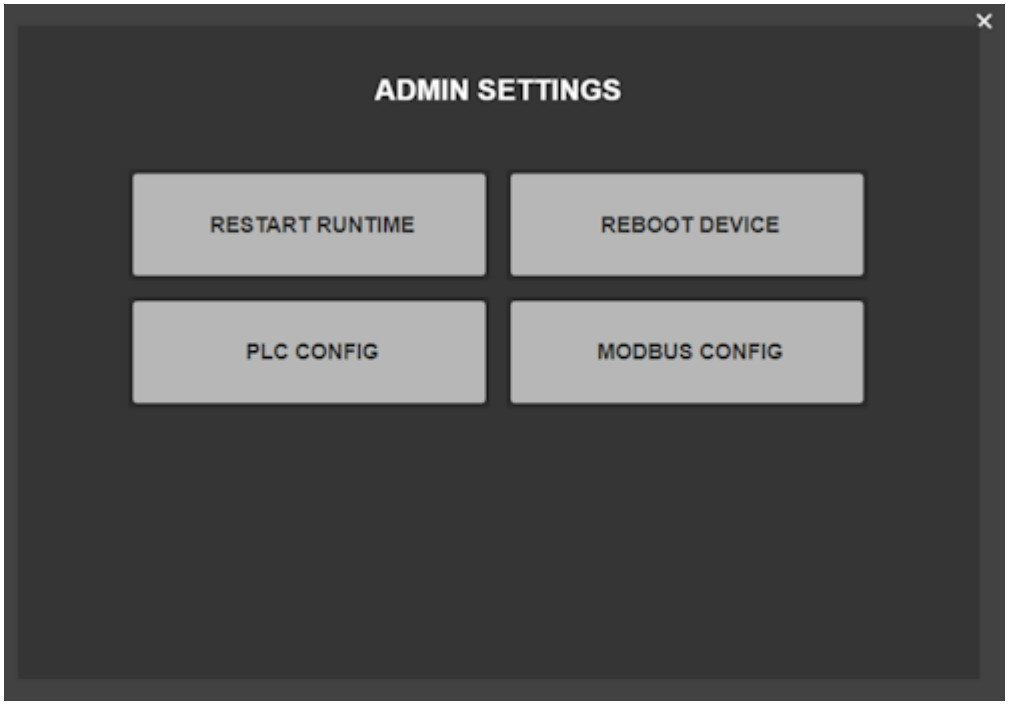
Use the GS20 Leader Module with supported PLC models to receive triggers from PLC devices and send results back. Connect the PLC device to the same switch as the GS20 and the follower devices to use this functionality.

Creating a PLC Device

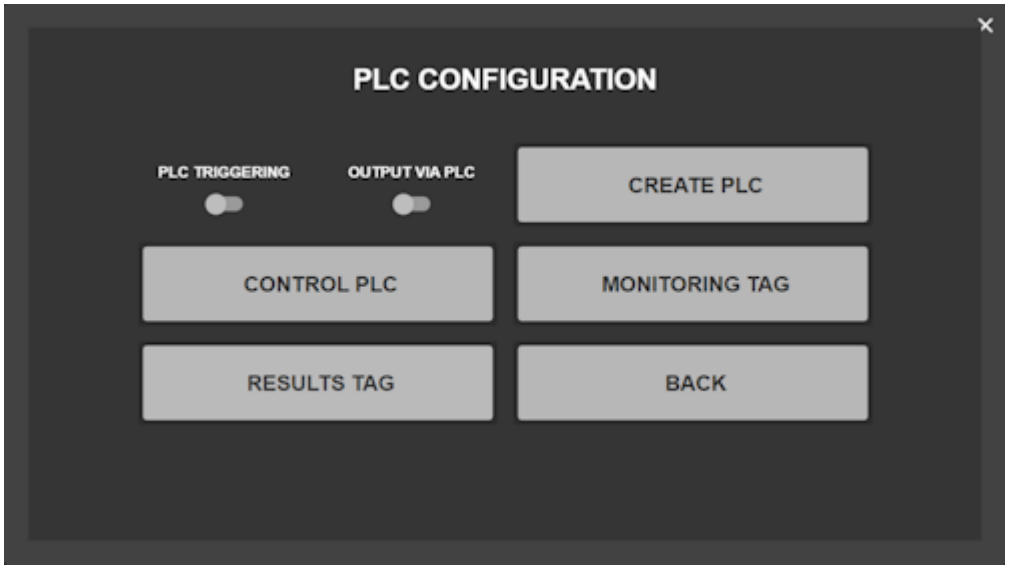
To connect a PLC to the GS20 Leader Module, create the PLC device in the GS20 Web HMI.

1. Navigate to **Admin Settings** from the left menu on the **Home** screen.

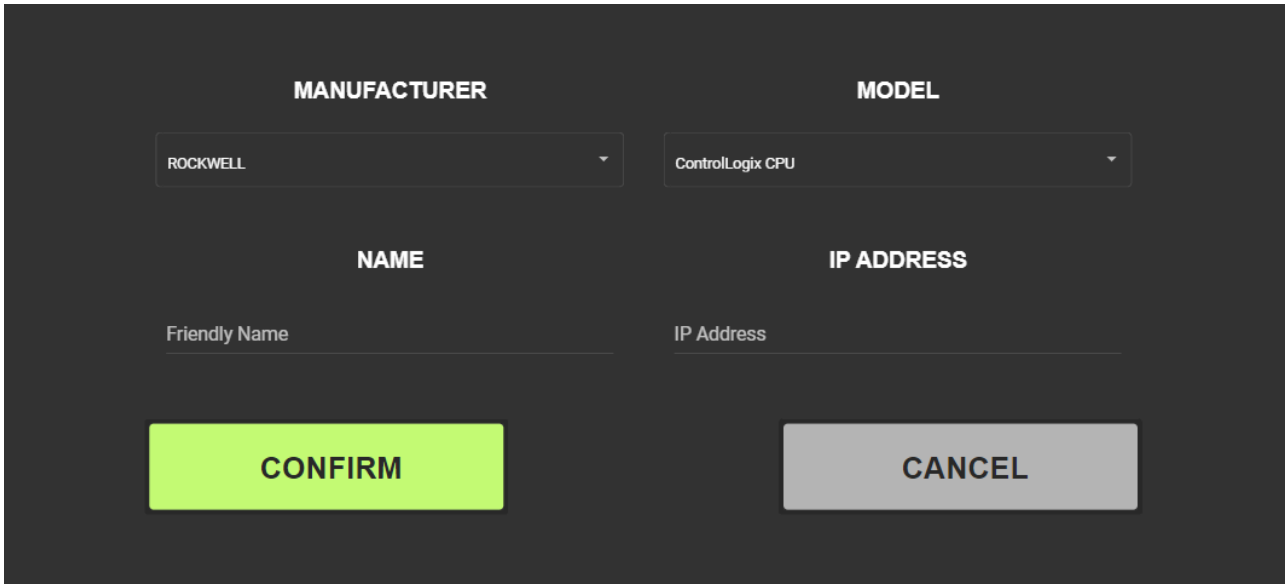
2. Select **PLC Config** from the **Admin Settings** menu.



3. Select **Create PLC** from the **PLC Configuration** menu.



4. On the **Create PLC** screen, select the **Manufacturer** and **Model** of the PLC, specify a **Friendly Name** for the PLC, and enter the **IP Address** where the device is reached.



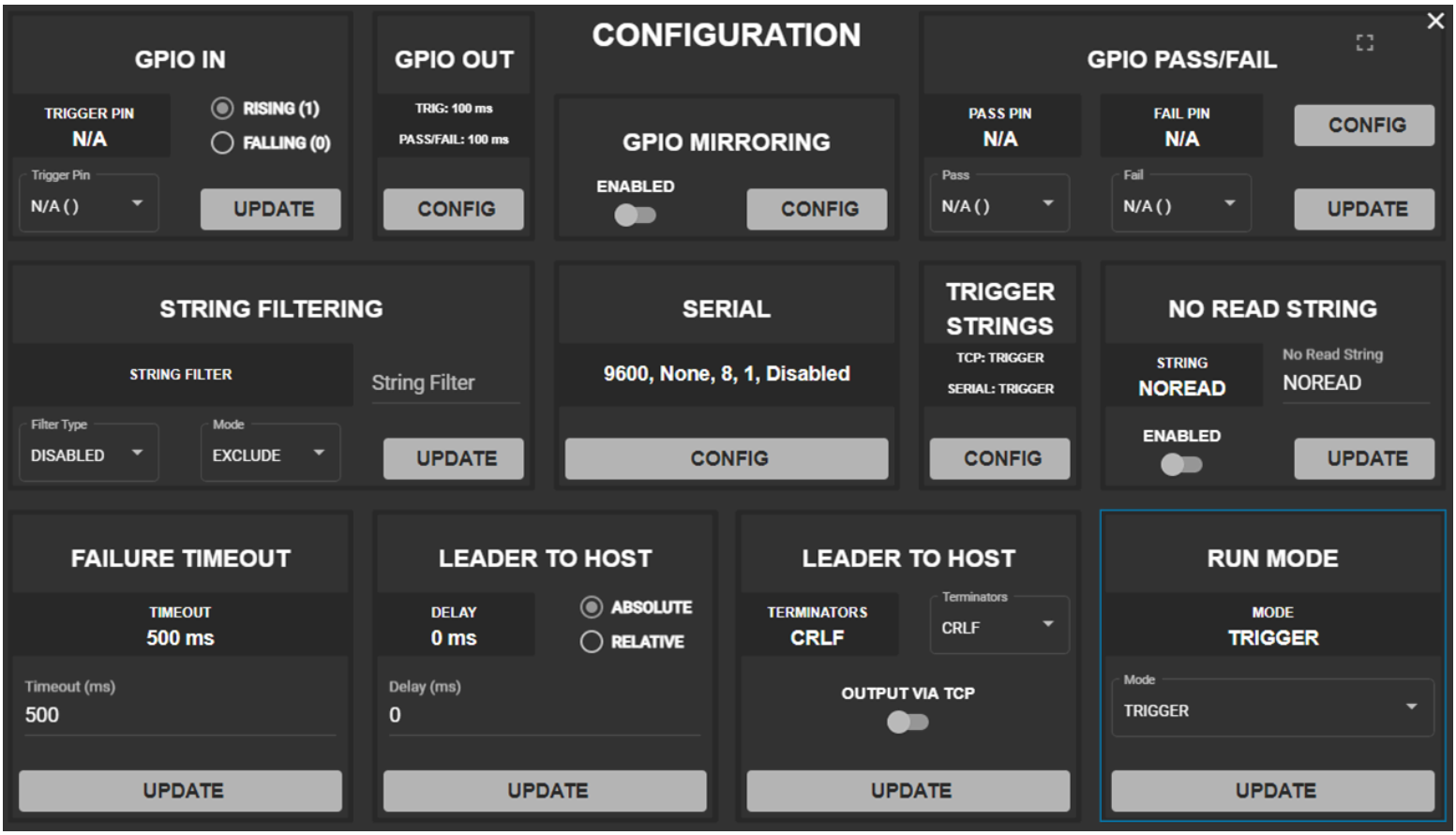
5. Click **Confirm** and observe the confirmation message.

Triggering with the PLC Device

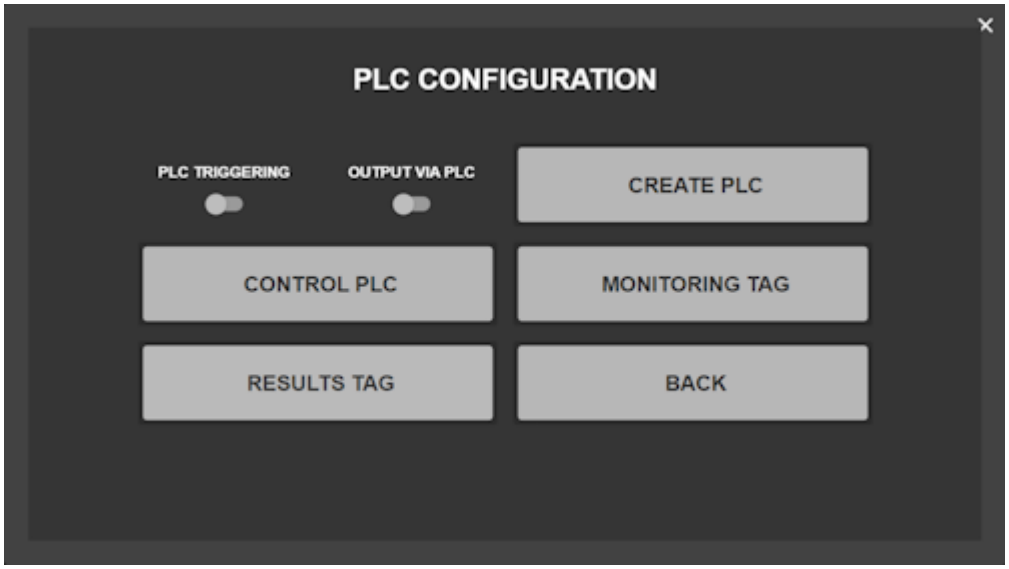
1. Navigate to the **Configuration** screen using the left menu on the **Home** page.

2. Ensure that **Run Mode** is set to **Trigger**. Select **Trigger Mode** and click **Update**.

NOTE: Switching run mode erases the scan data.

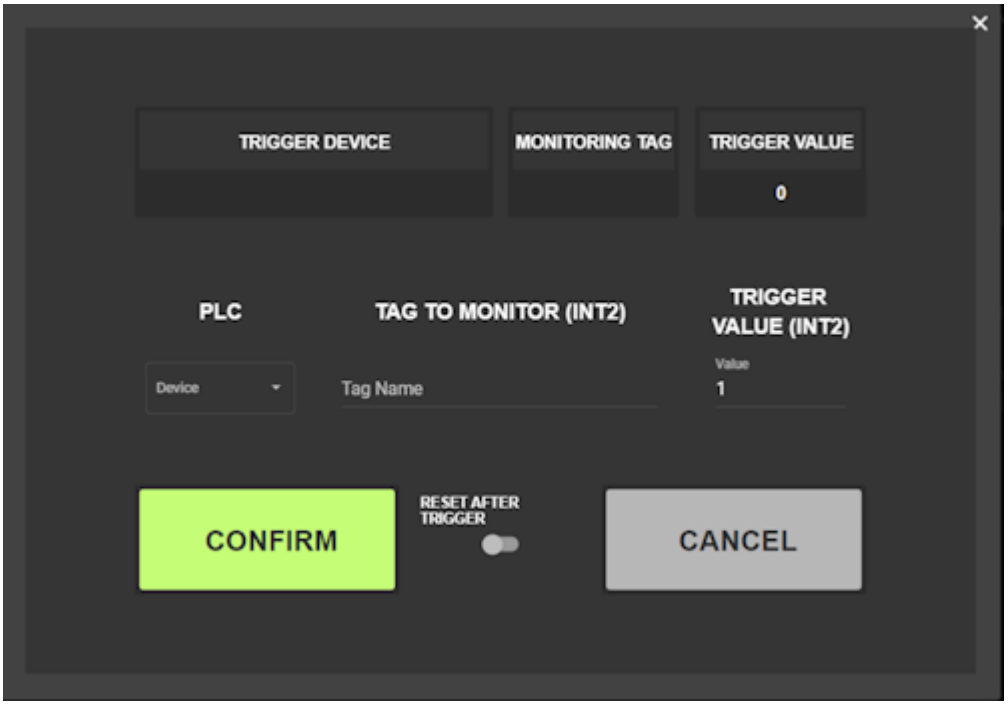


3. After you have created your PLC device, navigate to the **PLC Configuration** screen from the **Admin Settings** menu and click **Monitoring Tag**.



4. Select the PLC device from the menu and enter the tag's name to monitor and the value for the trigger.

   The PLC triggers the Connectivity Gateway when a tag matches the specified value in the TRIGGER WHEN EQUAL TO (INT2) field and when the PLC tag value changes back to the specified trigger value from another value. Program the PLC to keep the tag total low as a part of its results handling procedure or enable Reset after Trigger to reset the trigger tag to 0 when enabled.

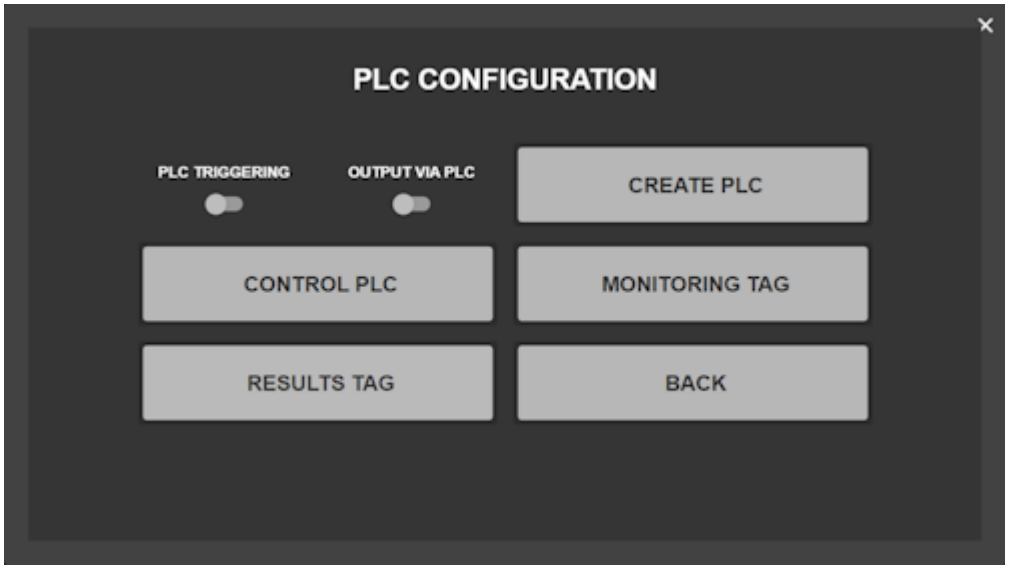


Sending Results to the PLC Device

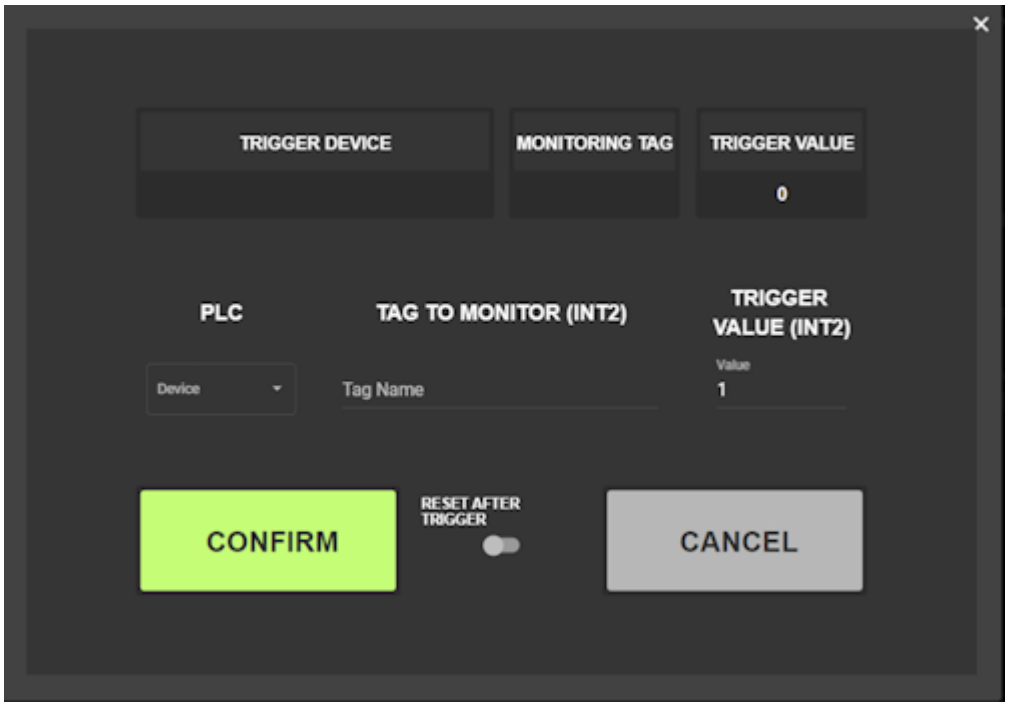
To configure a GS20 Leader Module to send scanning results to a PLC.

1. Navigate to the **Admin Settings** screen from the left menu on the **Home** screen and click **PLC Config**.

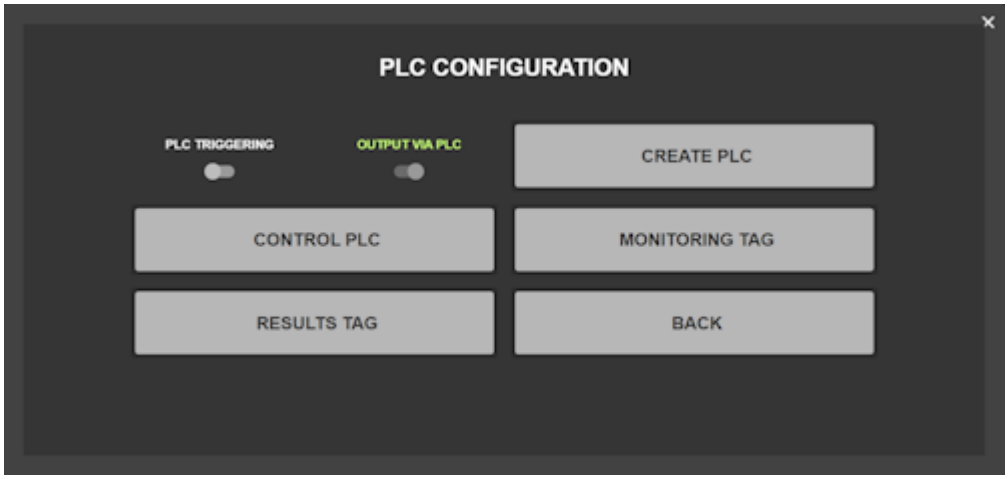
2. Click **Results Tag** on the **PLC Configuration** screen.



3. Toggle **Reset After Trigger** to the right to reset the results after a trigger event.
4. Select the **PLC** device from the menu, enter a **Tag to Monitor**, and enter a **Trigger Value**.



5. On the **PLC Configuration** screen, toggle **Output Via PLC** to the right to output results to the PLC.



NOTE: The results tag supports a string of up to 4096 characters, including the CR+LF terminator.

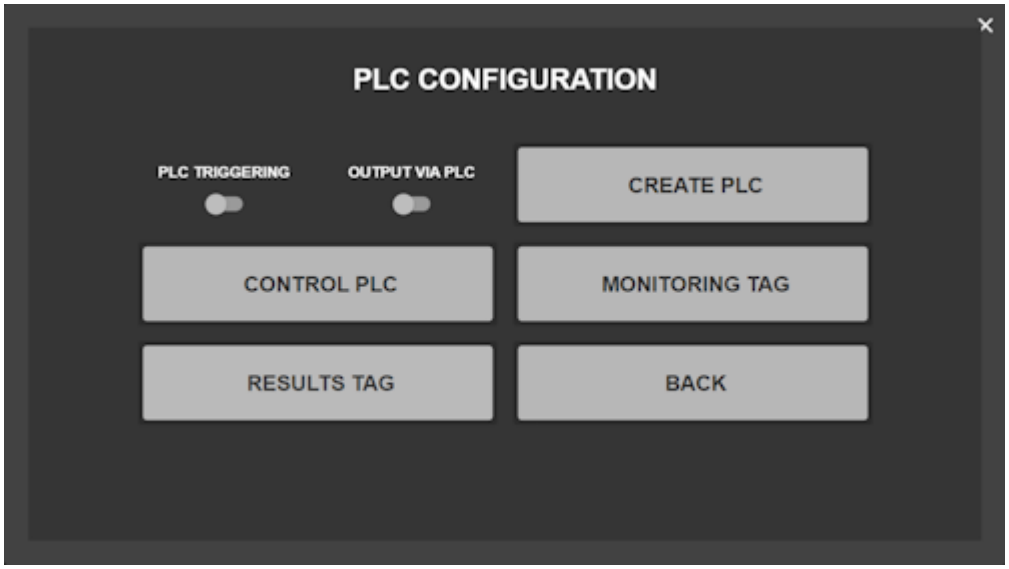
6. Once the configuration is complete, return to the **Control PLC** screen, select the PLC device from the menu, and click **Start** to begin sending results.

Stopping and Deleting a PLC Device

To stop the GS20 Leader Module from monitoring PLC triggers and results or delete the PLC device:

1. Access **Admin Settings** from the left menu on the **Home** screen.
2. Click **PLC Config** from the **Admin Settings** menu.

3. Select **Control PLC** from the **PLC Configuration** screen.

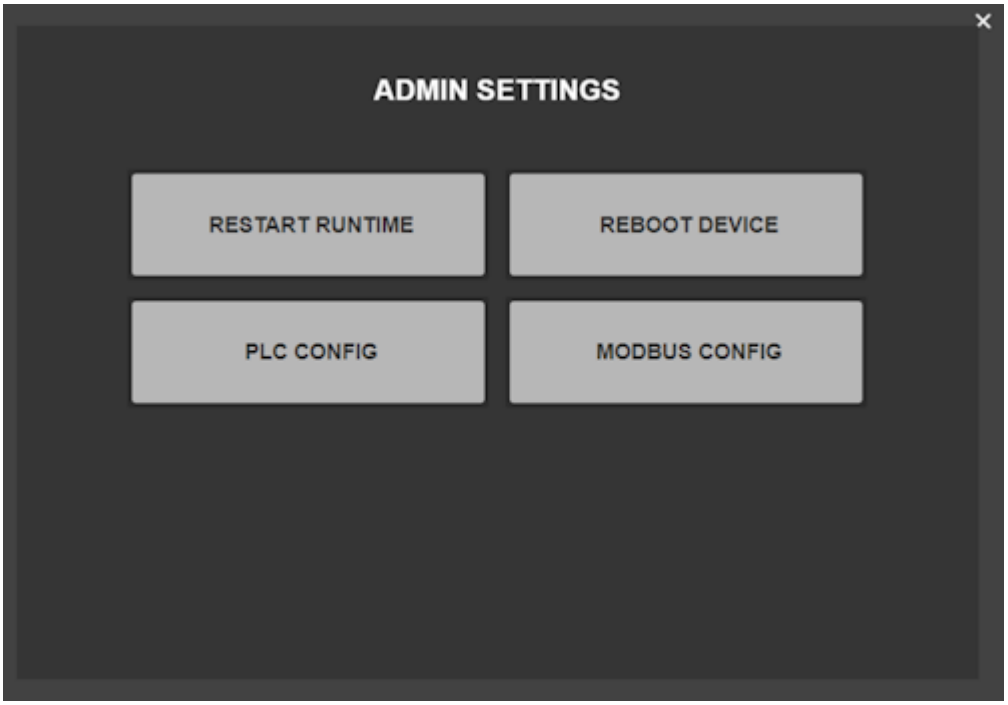


4. Select the configured PLC device.

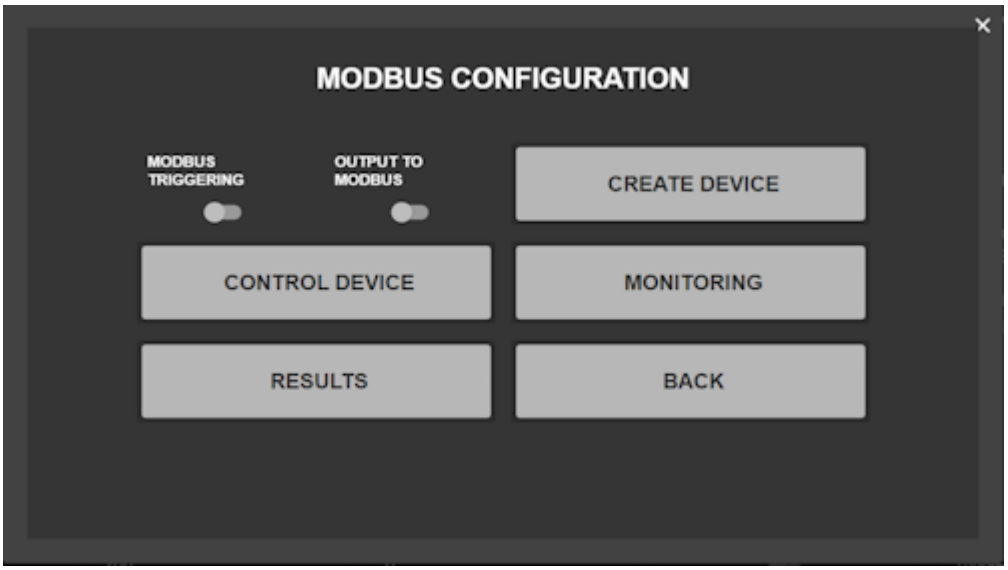
5. Click **Stop** to disable PLC functionality or click **Delete** to delete the specified PLC device.

Setting Up a Modbus Device

1. Navigate to the **Admin Settings** menu from the **Home** screen.



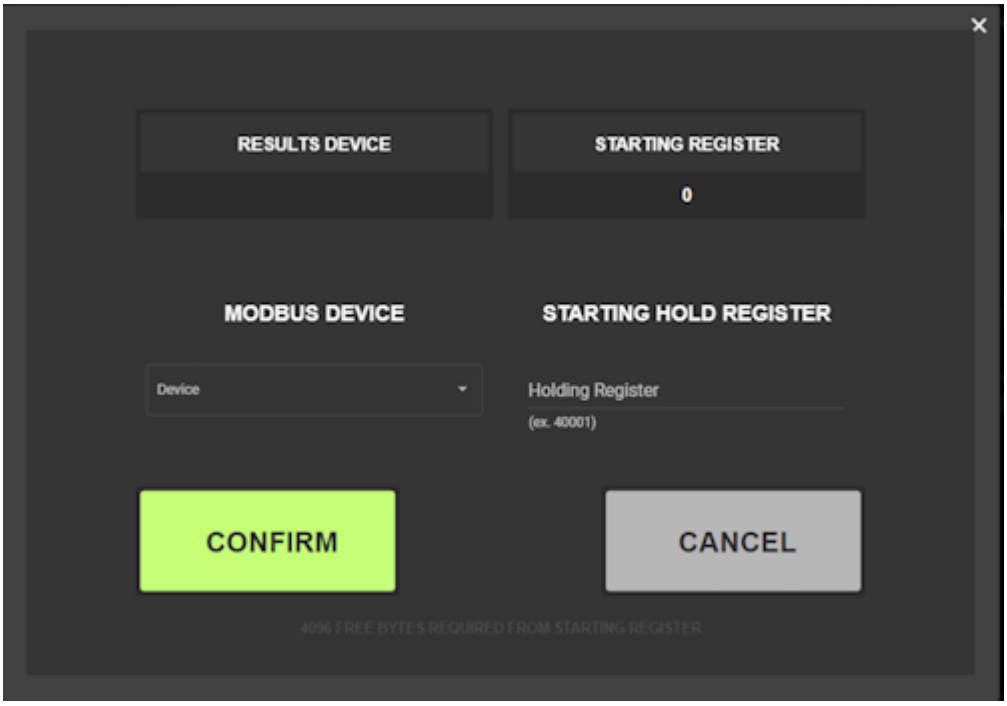
2. Access **Modbus Config** from the **Admin Settings** Menu.



3. Slide the toggle to the right to enable **Modbus Triggering** or **Output to Modbus.**

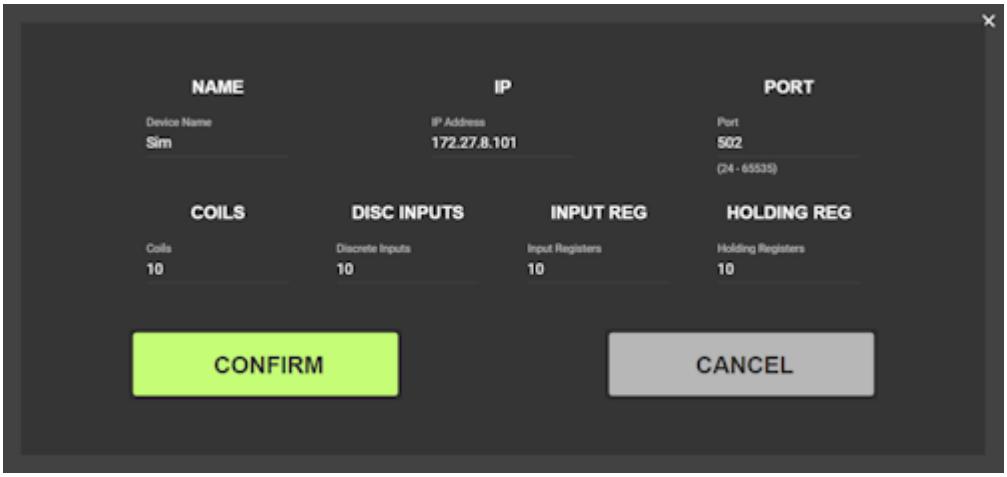
4. Click **Control Device** to access controls to the Modbus device.

5. Select the Modbus device from the menu and click **Start** to begin controlling the device. Click **Stop** to end the session or **Delete** to remove the device. When you are finished controlling the device, click **Back** to return to the **Admin Settings** menu.
6. Click **Results** to access Modbus results and configure where results are sent to.
7. Select the Modbus device from the menu and define a **Holding Register**.

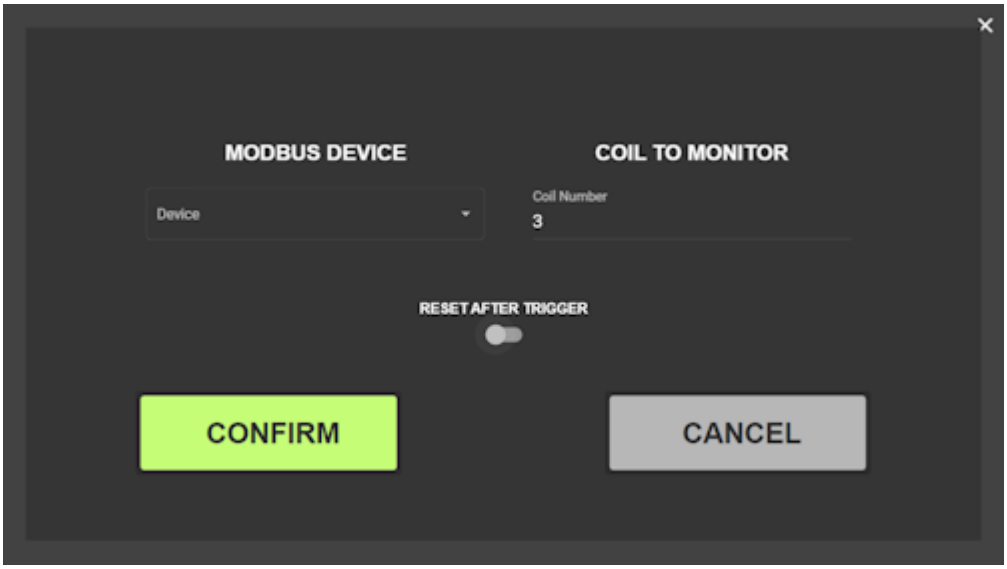


8. Click **Confirm** to save changes and return to the **Admin Settings** menu.

9. Click **Create Device** to configure the device information.
10. Provide the required device information and click **Confirm** to return to the **Admin Settings** menu.



11. Click **Monitoring** to monitor a specific coil on the Modbus device
12. Select a Modbus device from the menu and determine a coil number to monitor.



Configuring GPIO on the Device

The GS20 Leader Module supports the following GPIO capabilities:

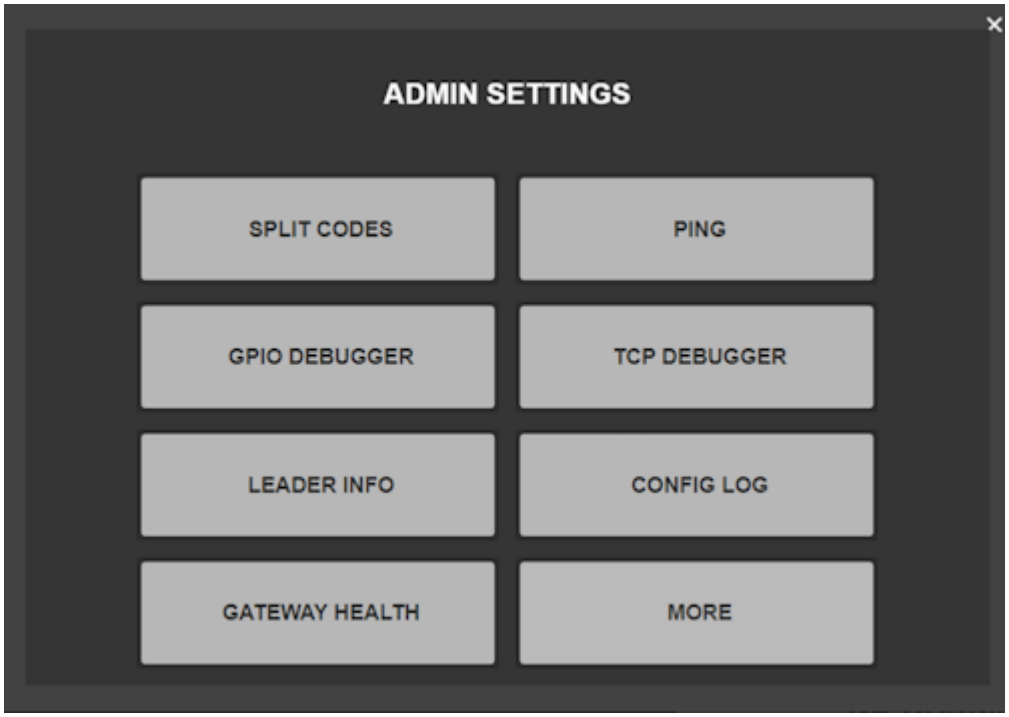
- Triggering from Host to Leader
- Triggering from Leader to Follower Devices
- Sending Pass/Fail Results
- GPIO Mirroring from Input to Output

There are two inputs and two outputs on the GS20 Leader Module. Either input can trigger the gateway, and both outputs trigger follower devices or output a Pass/Fail result.

GPIO Debugging

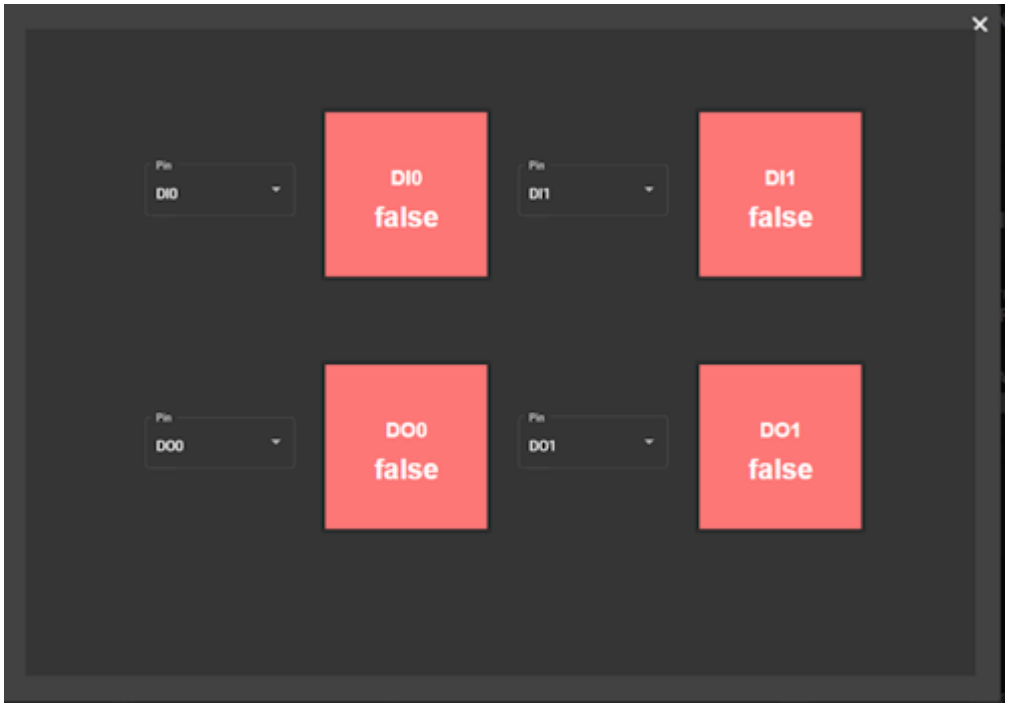
To debug the GPIO connection in real-time using the GPIO debugger:

1. Access **Admin Settings** from the left menu on the **Home** screen.
2. Navigate to the **GPIO Debugger** screen.



3. Observe the input and output pins. If the pin receives the signal, the value updates to True.

NOTE: You may also manually toggle the Out0 and Out1 pins.

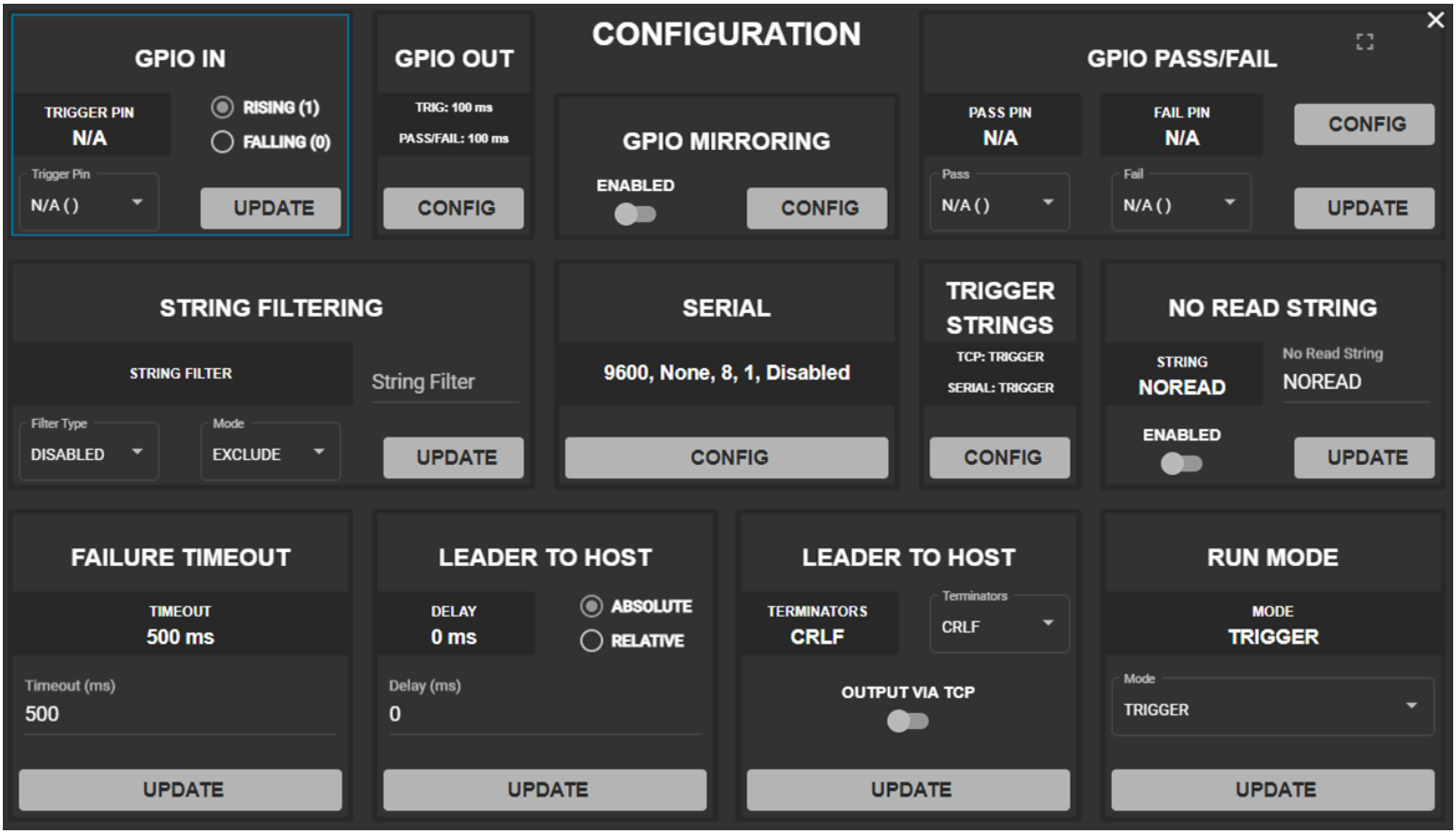


Setting Up GPIO Triggering

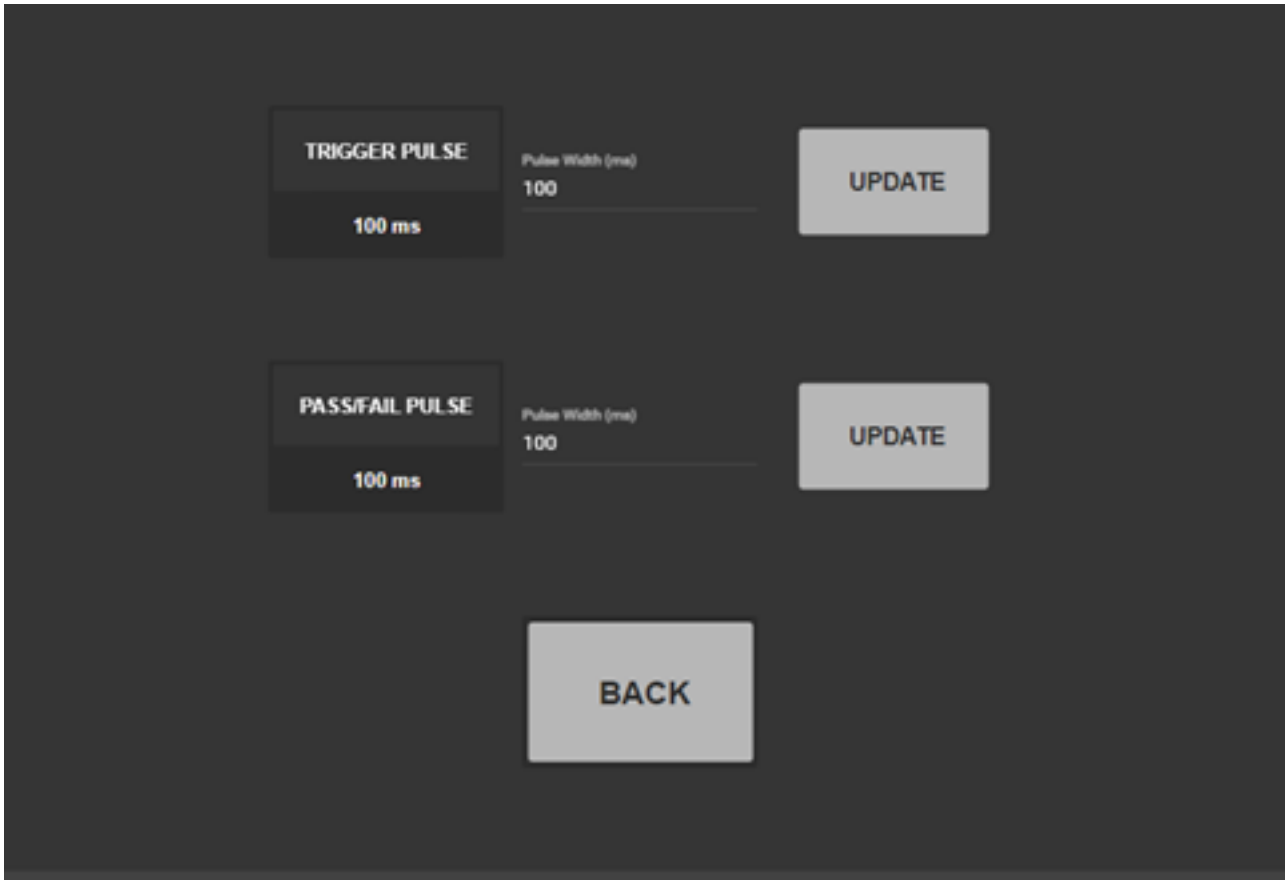
To define a pulse width of the signal to trigger a GS20 Leader Module over the input of your choice:

1. Navigate to the **Configuration** screen using the left menu on the **Home** screen.

2. In the top left **GPIO** section, select the desired trigger pin (either In 0 or In 1), and click **Update**.



3. Click **Config** to edit the **Trigger Pulse** and **Pass/Fail Pulse** fields.



4. Enter the desired values and click **Update**.
   - Trigger Pulse: specifies the pulse width for the signal that triggers the follower devices.
   - Pass/Fail Pulse: specifies the pulse width for the pass/fail result signal.

NOTE: If you configure the same output for GPIO Pass/Fail and as an input for the follower device (for example, trigger input), the trigger input for the follower device takes precedence.

When configuring followers to receive triggers on either Out0 or Out1, updating the trigger input for each follower in the Connectivity Gateway is required. Check your wiring to ensure it matches the GS20 pinout, and determine which pin the follower devices should connect to.

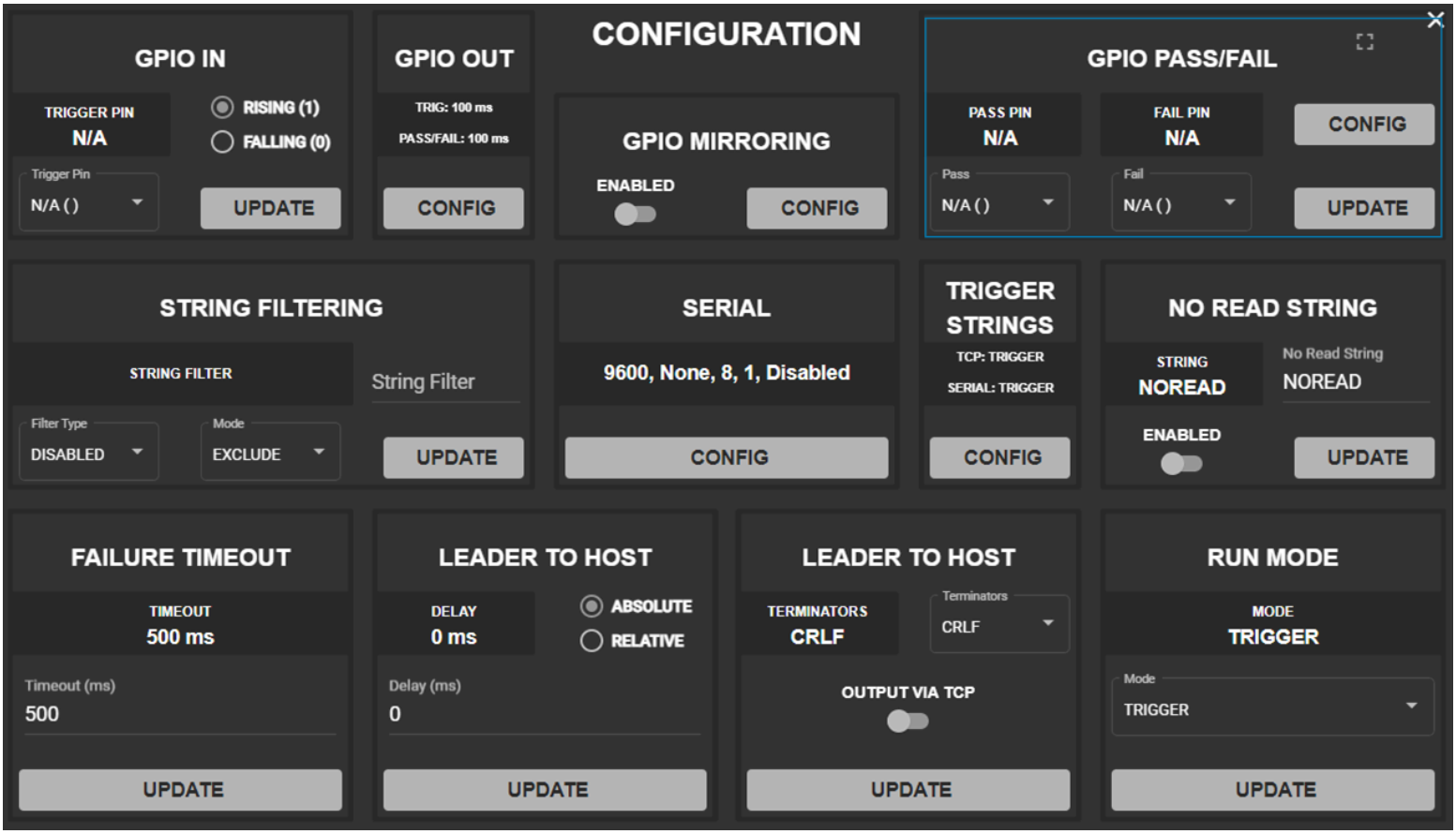
NOTE: The GS20 Web HMI supports the connection of all followers to one Out pin (up to 16 devices) or split between Out0 and Out1. If you decide to split the followers between outputs, you cannot output the GPIO Pass/Fail result.

Setting Up GPIO Pass/Fail

To configure GPIO Pass/Fail on an Out pin of your choice:

1. Determine which Out to use for Pass/Fail. There are only two outputs on the GS20. The output is used to trigger followers and cannot be used to output scanning results.
2. Navigate to the **Configuration** screen using the left menu on the **Home** screen.

3. Use the top-right **GPIO Pass/Fail** section to select Pass and Fail pins.



4. Click **Config** to configure an SD timeout in ms when enabled and click **Update**.
5. Set the toggle to **Enabled** and click **Update**.

GPIO Mirroring

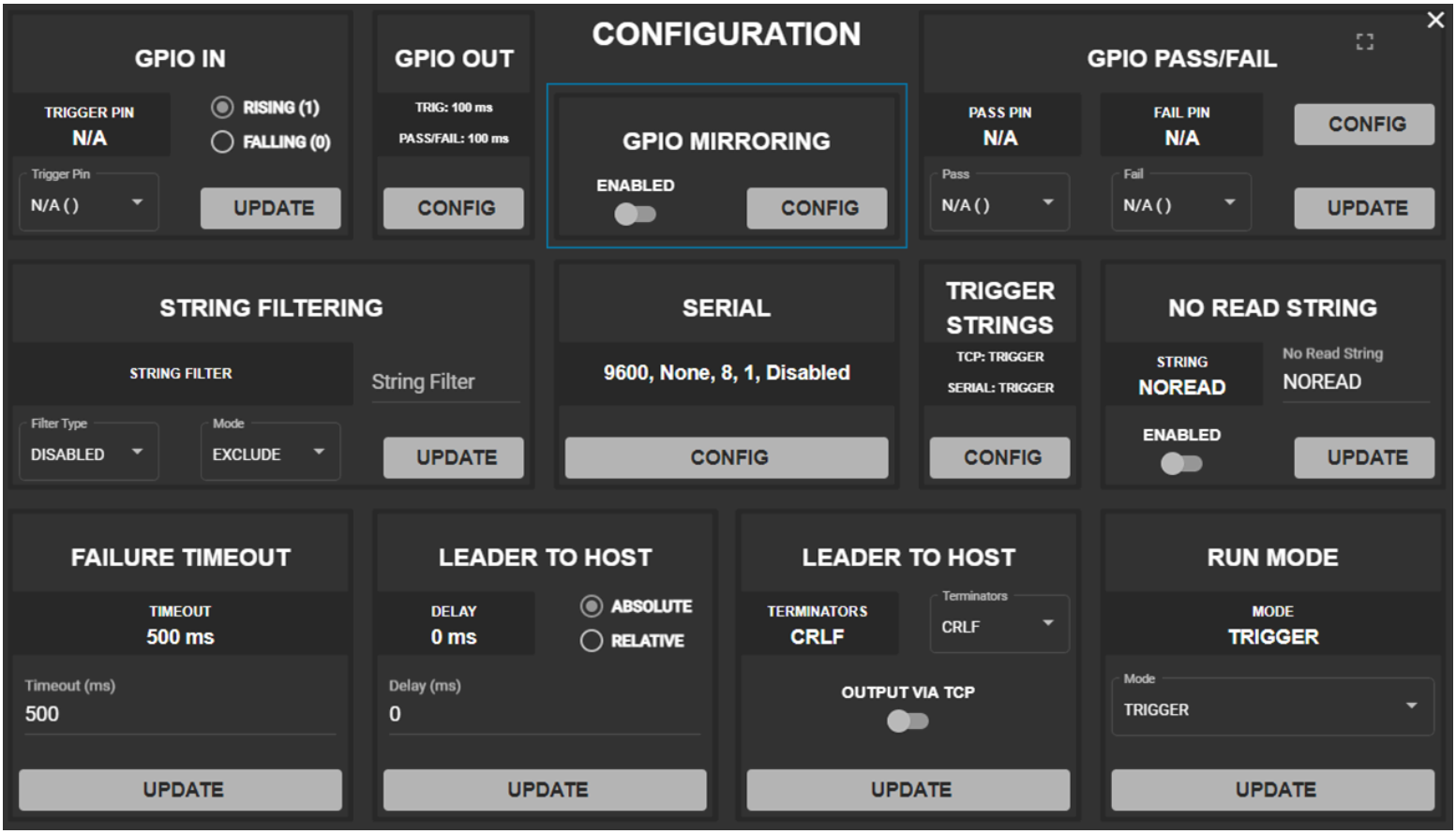
The GS20 Web HMI provides the option to enable or disable GPIO Mirroring and inverse the mirroring to allow Input 0 and Input 1 to mirror to Out1 and Out0.

- Enabled GPIO Mirroring: the output signal goes high whenever the input pin that it is mirroring goes high.
- Disabled GPIO Mirroring: the output signal goes high for its predefined pulse width and then goes low immediately after.
- Enabling Opposite pins: input 0 mirrors Out0, and Input1 is mirrored to Out1 by default. Enabling opposite inverses the mirroring to allow Input0 and Input1 to mirror Out1 and Out0, respectively.

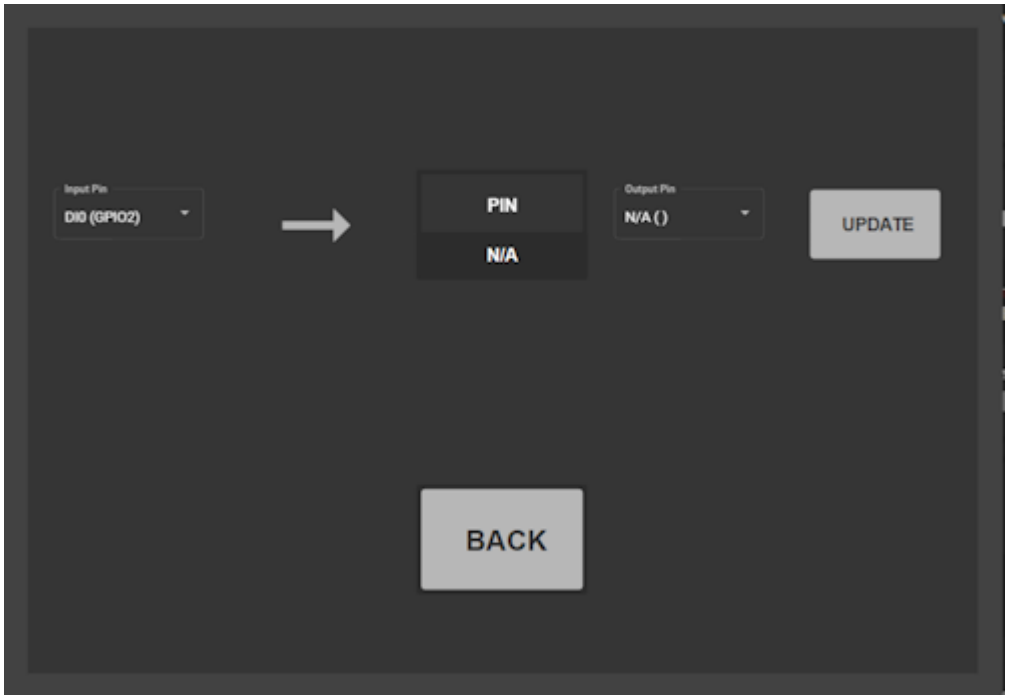
To change the GPIO Mirroring configuration:

1. Navigate to the **Configuration** screen using the left menu on the **Home** screen.

2. Locate the **GPIO Mirroring** section and toggle **GPIO Mirroring** to the right to enable or disable.



3. Click **Config** to toggle the Opposite pins to the On or Off position.



4. Click **Confirm** to apply the changes.

String Filtering

The GS20 Connectivity Gateway supports string filtering modes such as exclude and include and string filters such as exact match, start with, ends with, contains, and regex.

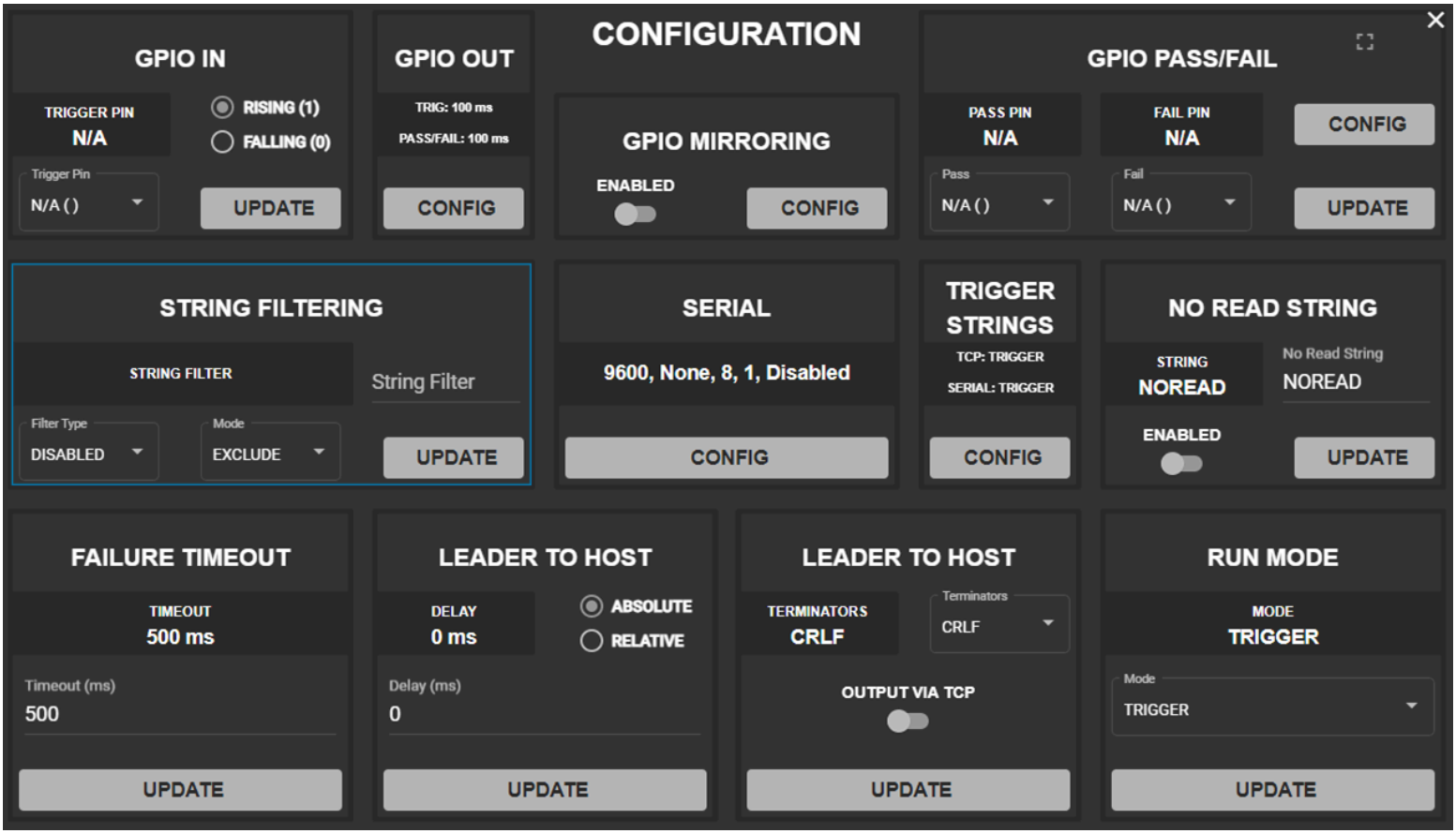
- Exclude: the device excludes barcode results matching the specified string filter.
- Include: the device only includes barcode results matching the specified string filter.

Supported string filters include:

- Disabled: disables string filtering.
- Exact Match: filters strings that exactly match the input string.
- Start With: filters string matches at the beginning of the string.
- Ends With: filters string matches at the end of the string.
- Contains: filters string matches anywhere in the string.
- RegEx: uses a regular expression to define string filtering.

To set up string filtering:

1. Navigate to the **Configuration** screen using the left menu on the **Home** screen.
2. Use the **String Filtering** section to select the desired **Mode**, **Input**, **String Filter**, and **Filter Type**.

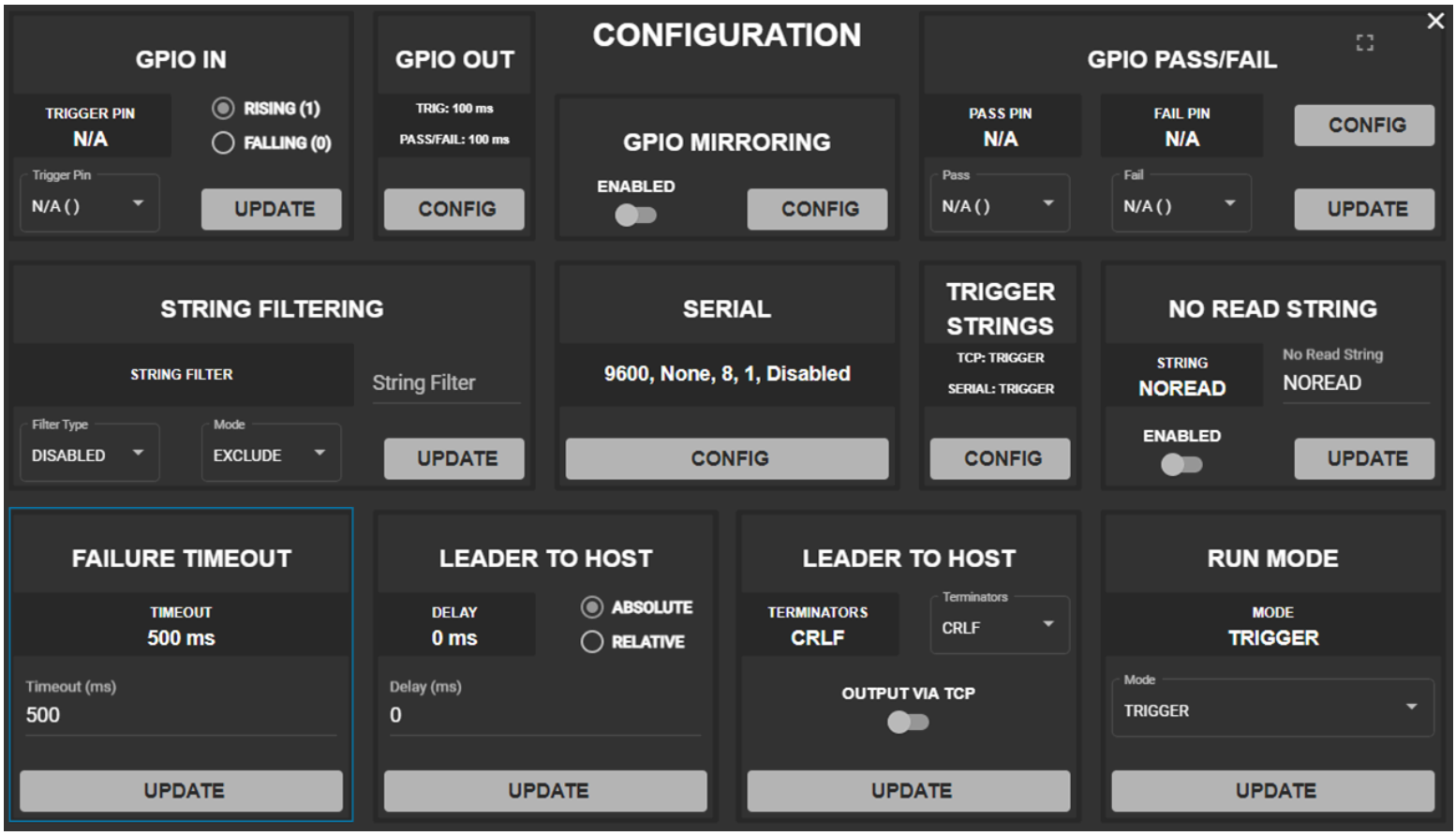


3. Click **Update** to apply the changes.

Failure Timeout

To set the failure timeout:

1. Navigate to the **Configuration** screen using the left menu on the **Home** screen.
2. Use the bottom left **Failure Timeout** section to specify a timeout.



3. Click **Update** for the changes to take effect.

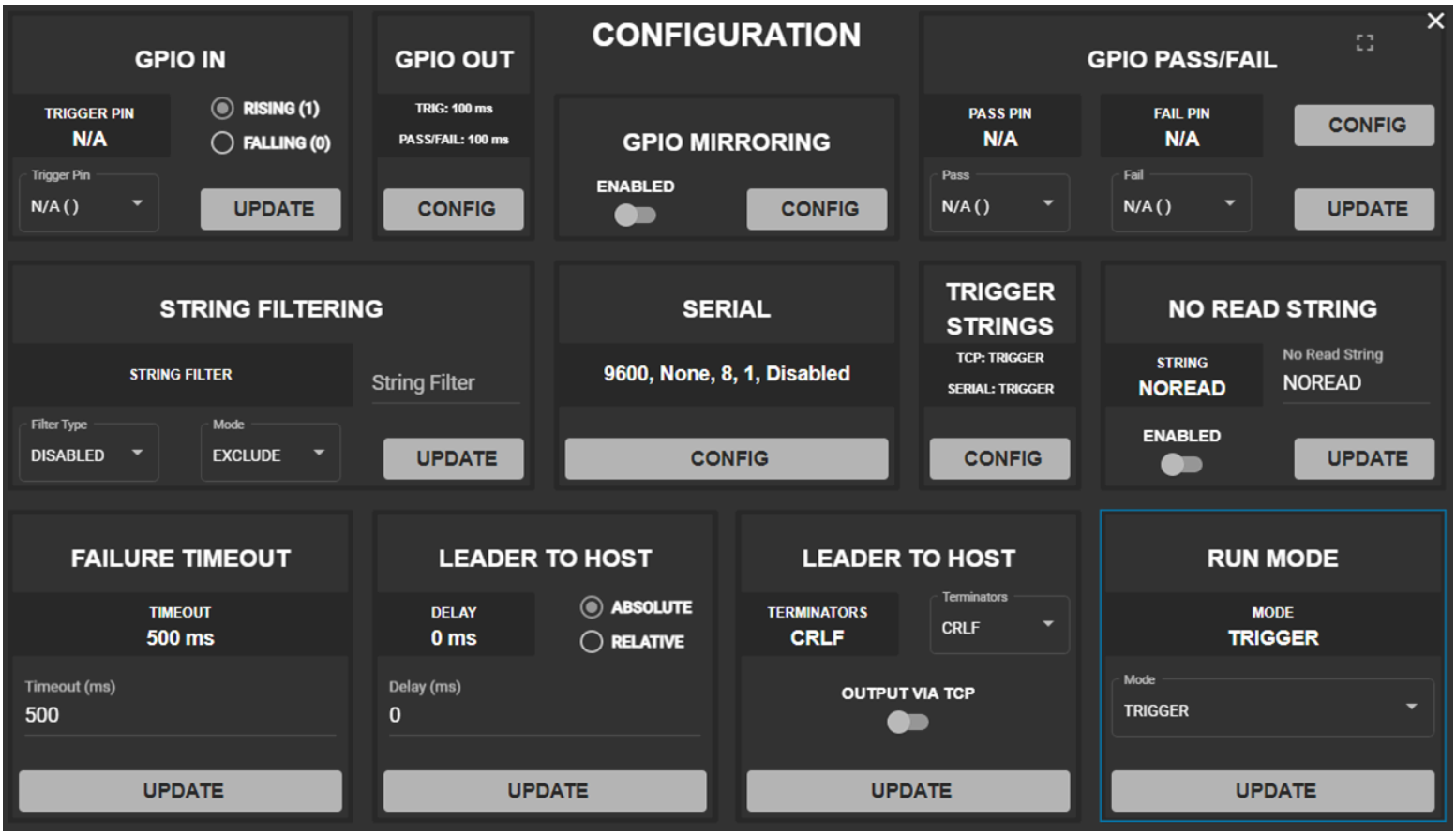
NOTE: Ensure that your failure timeout accounts for any trigger input delays specified on the follower side.

Run Mode

The GS20 Leader Module can run in continuous or triggered mode.

1. Ensure that you set up continuous mode between leader and followers before selecting an operating mode.
2. From the Home screen, navigate to the Configuration screen using the left navigation menu.

3. On the Configuration screen, use the bottom right Run Mode section to change between Trigger and Continuous modes.

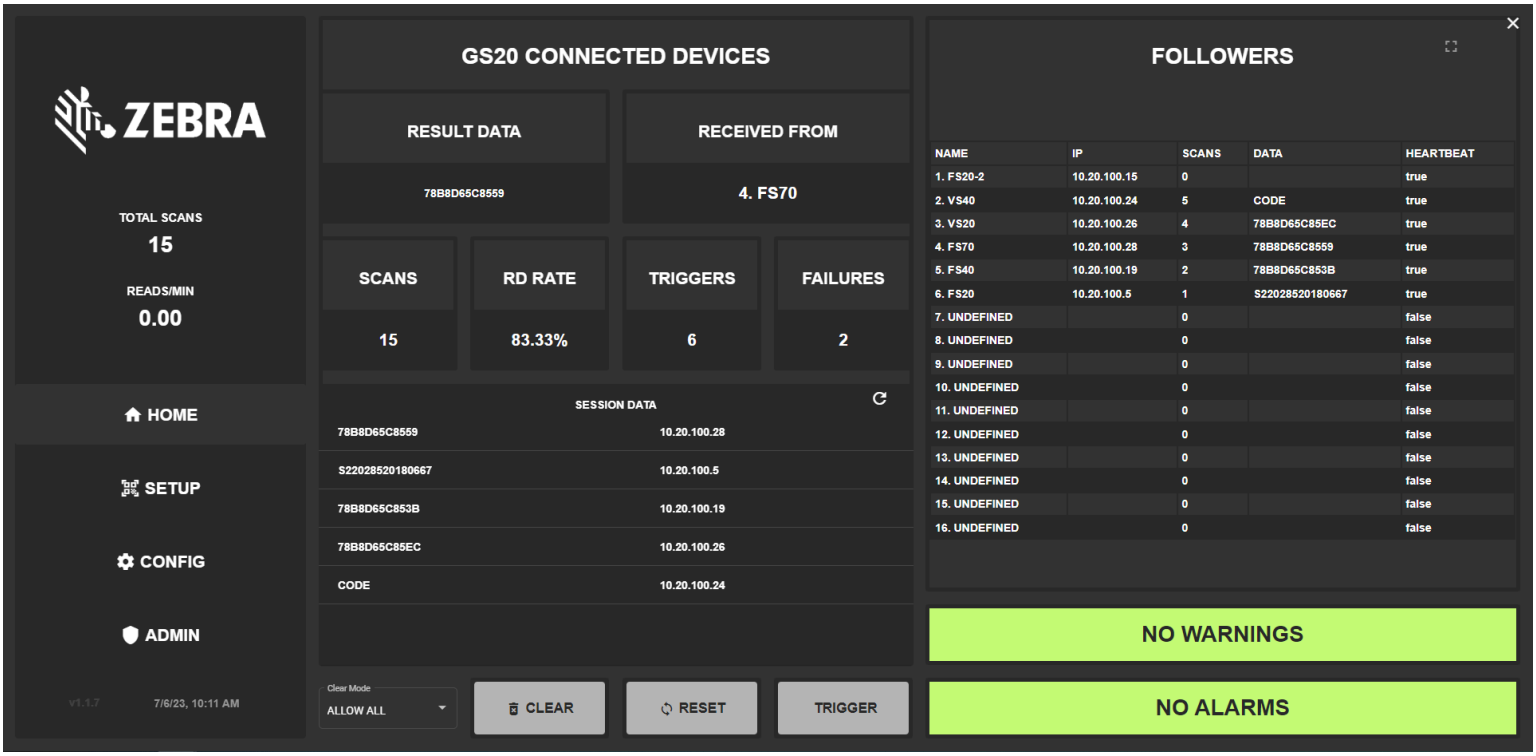


4. Click Update for the changes to take effect.

5. Observe the warning screen indicating that scan data is erased once the changes are implemented. Acknowledge the warning to proceed with your changes.

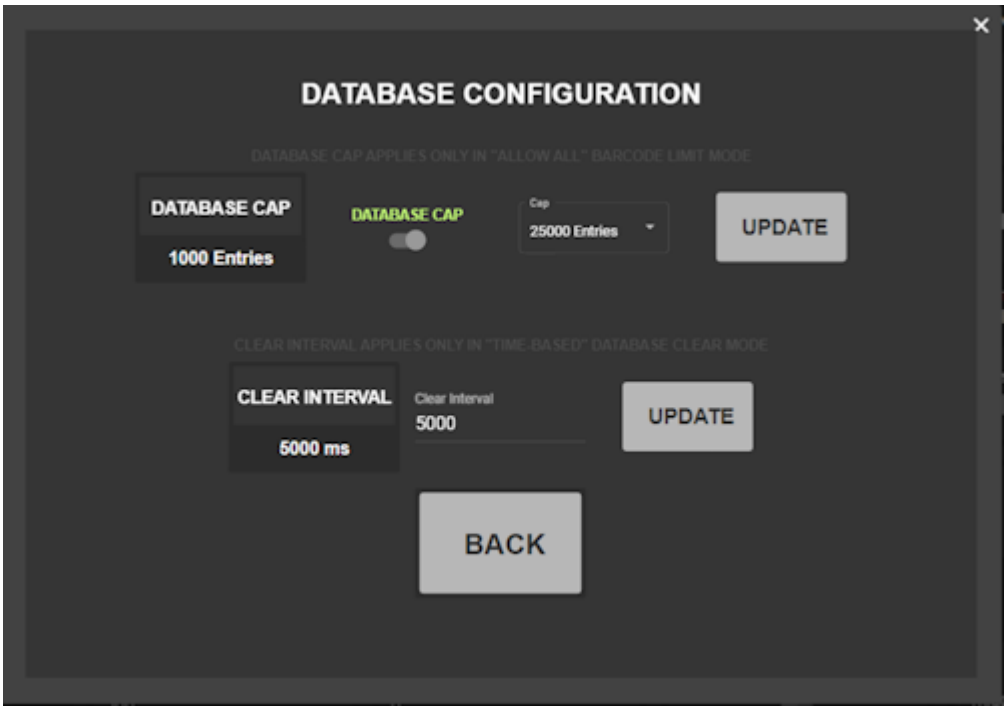
Configuring the Number of Entries in the Database

The number of barcode entries in the database optimizes the device performance when removing duplicate barcodes from the results sent to the Host. It is the maximum number of barcodes you expect in the gateway field of view simultaneously and by the number of follower devices.



Database Configuration

Configure a database capacity or a clear interval to determine how long to save data before it is cleared.



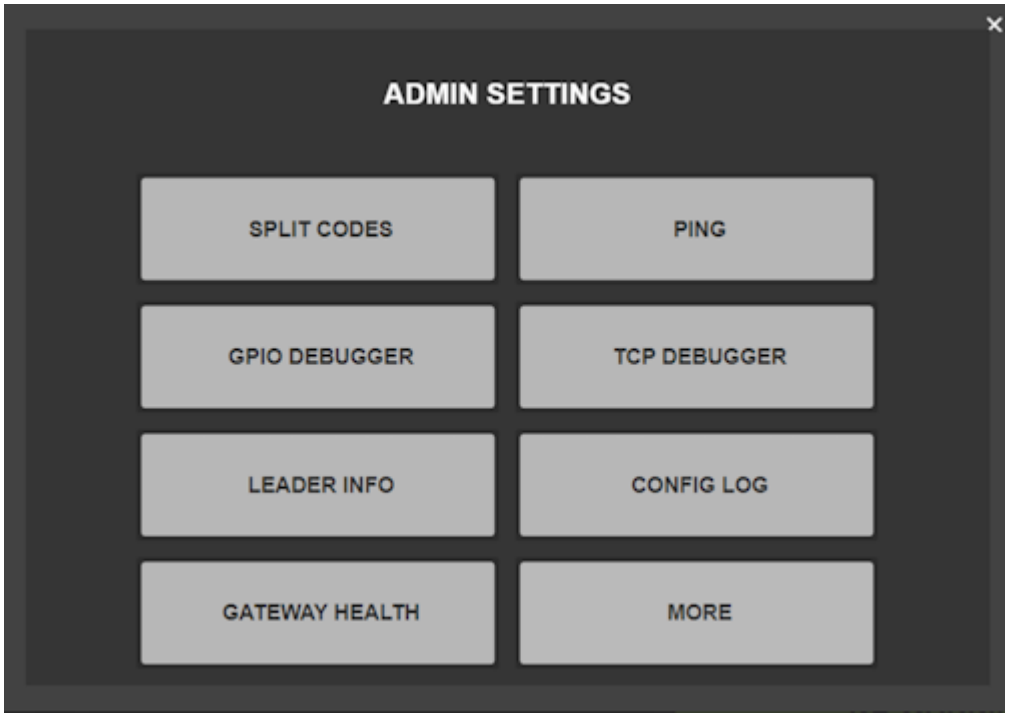
Debugging Follower Connectivity

The GS20 Web HMI provides a heartbeat capability to determine the status of a follower device's connection. If a response from the follower device misses three times, the Heartbeat column in the follower's section on the Home screen changes from True to False.

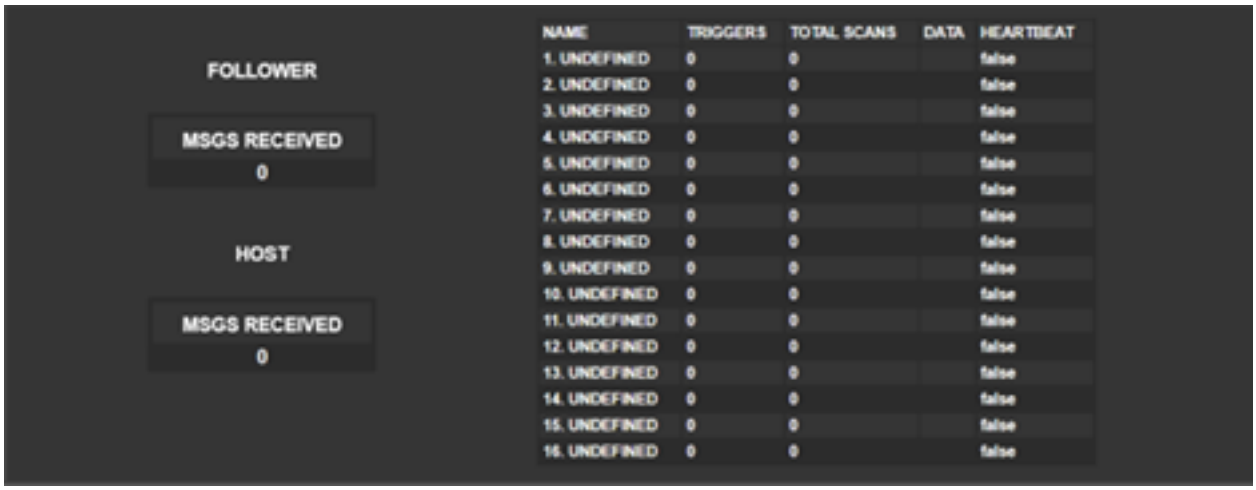
TCP Debugger

Use TCP debugger to view messages received from the host and follower devices.

1. Access **TCP Debugger** from the **Admin Settings** menu.

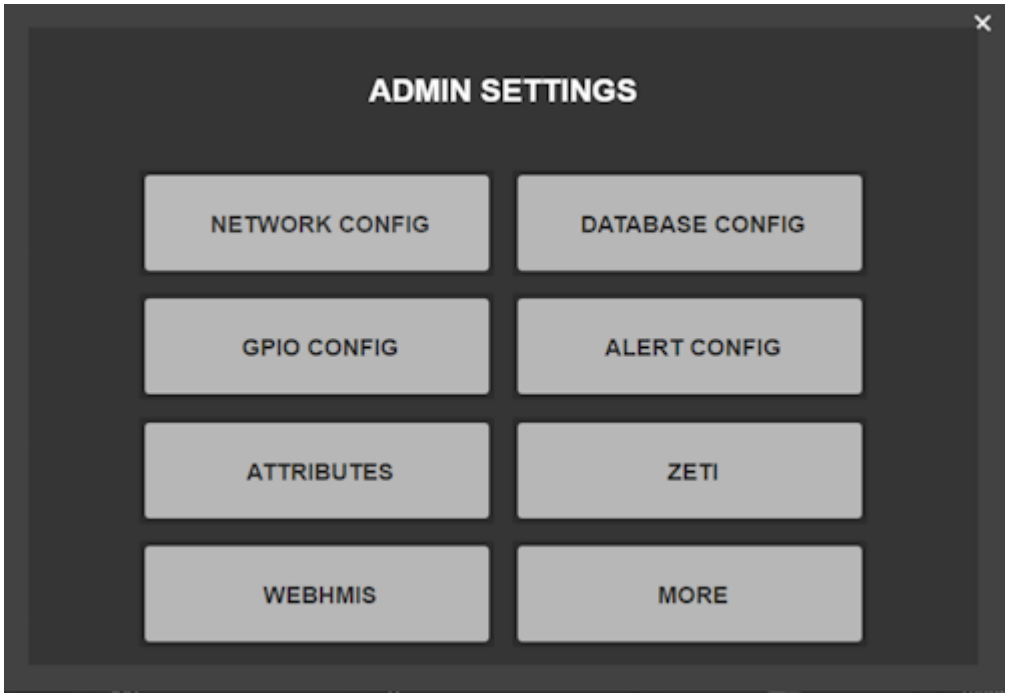


2. View all connected follower devices, total triggers, scans, and most recent heartbeat data.



Setting Attributes

1. Access **Attributes** from the **Admin Settings** screen.



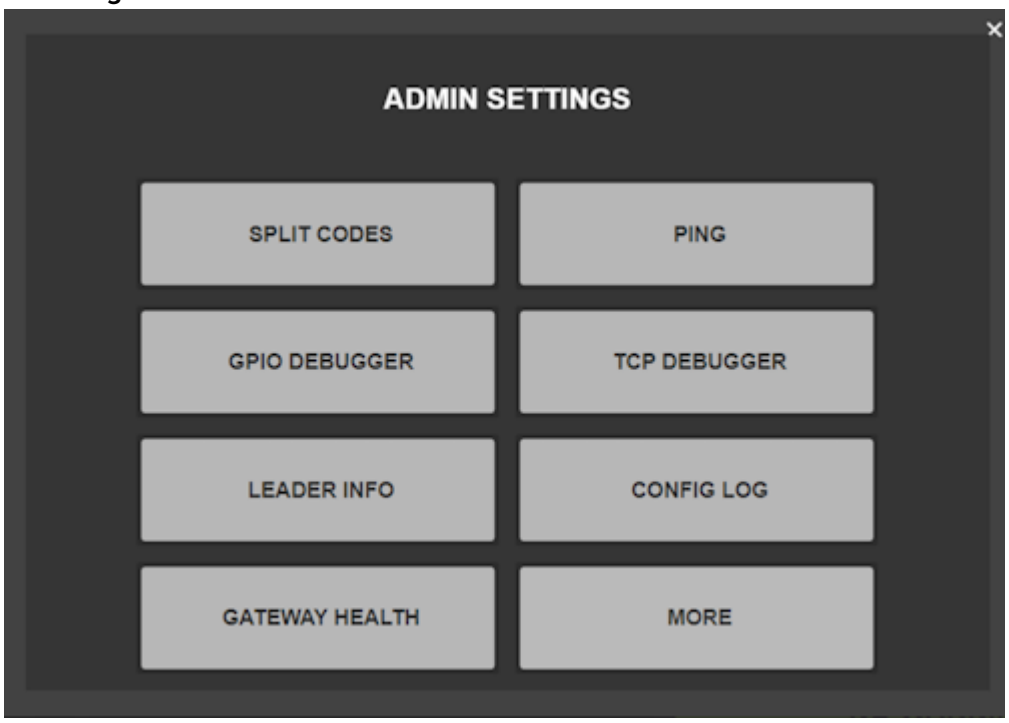
2. Enter the **Attribute ID** and **Attribute Value** and click **Get** or **Set** to retrieve the response.

Pinging Devices

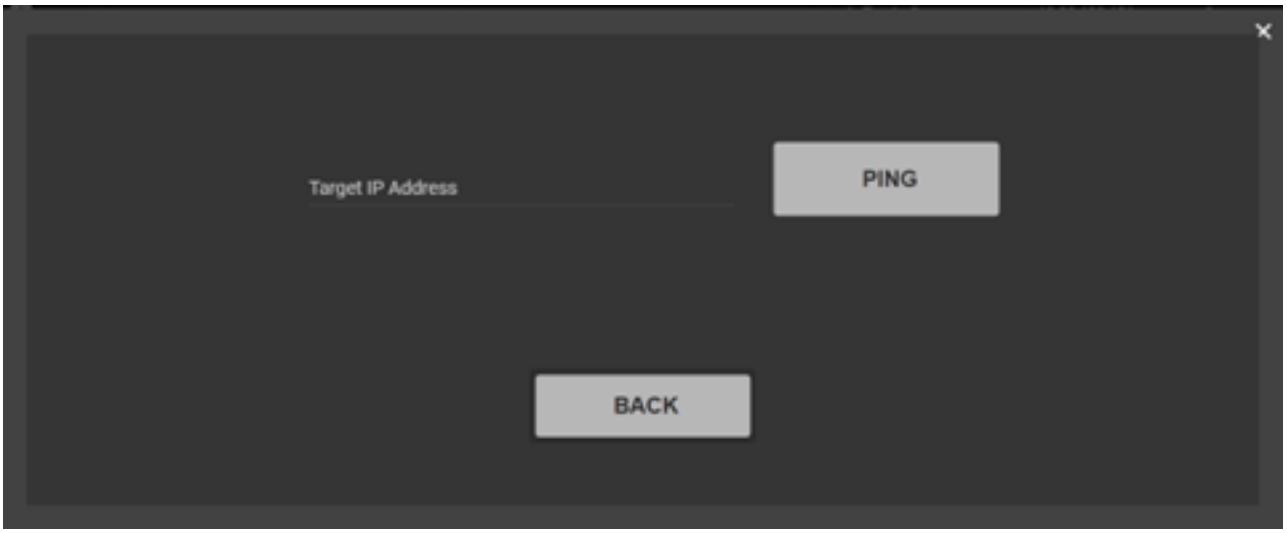
To ping your device from the GS20 Web HMI using the device IP address:

1. Access **Admin Settings** from the left menu on the **Home** screen and click **More** to access additional Admin Settings.

2. Click **Ping**.



3. Enter the IP address of your external device and click **Ping**. The screen updates after the return packet is received or not received.

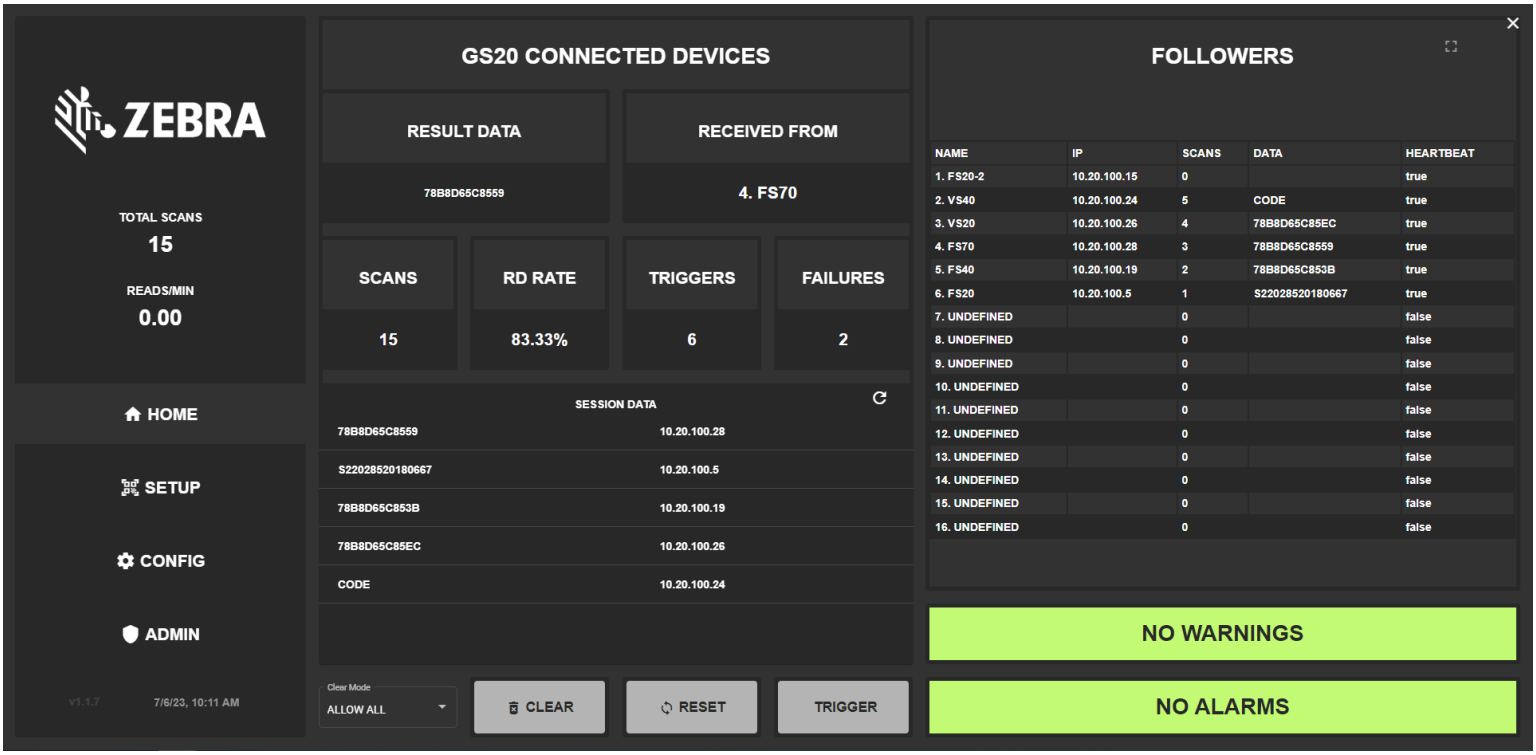


Viewing Output Data and Interpreting Stats

The Home screen displays the number of scans, the data received from the follower devices, and the resultant output data.

- Output Data: Indicates the most recent barcode result written into the database and sent to the host.
- Received From: indicates where the output data was received.
- Scans: the total number of barcode results received from all follower devices.

- Reads/m: indicates the average number of reads per minute in Continuous Mode.
- Read Rate: the ratio of successful reads per number of triggers. If multiple followers send a read result for the same trigger, only one read result counts towards the read rate in Triggered Mode.
- Triggers: the number of triggers sent in Triggered Mode.
- Failures: the number of failed read results received or no result received within the specified timeout interval.

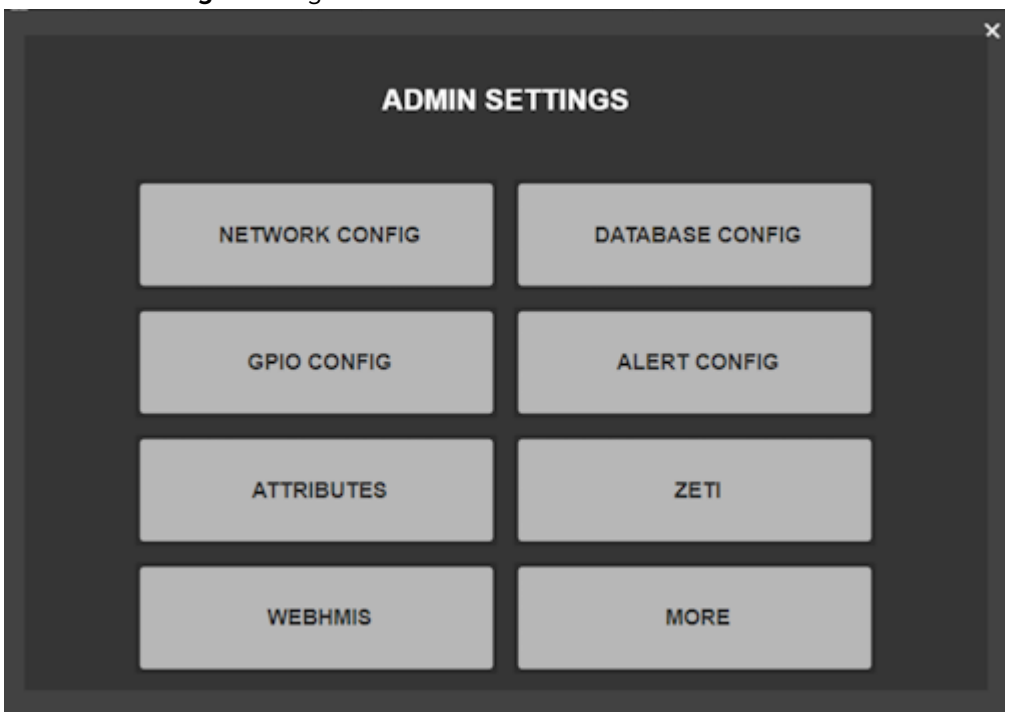


Setting Alerts

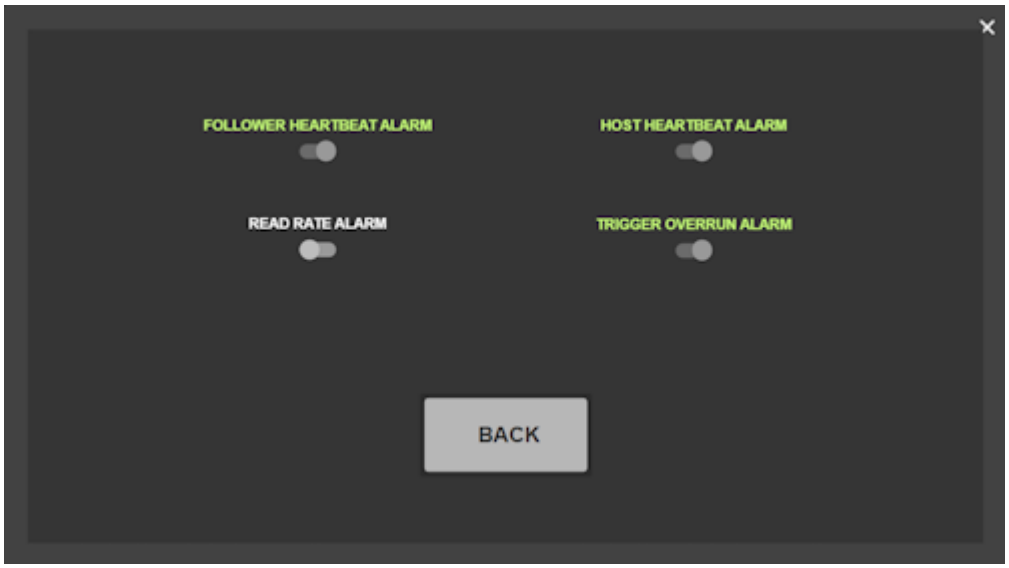
To set an alert for Follower Heartbeat, Host Heartbeat, Read Rate, and Trigger Overrun:

1. Access **Admin Settings** from the left menu on the **Home** screen.

2. Click **Alert Config** to configure alerts.

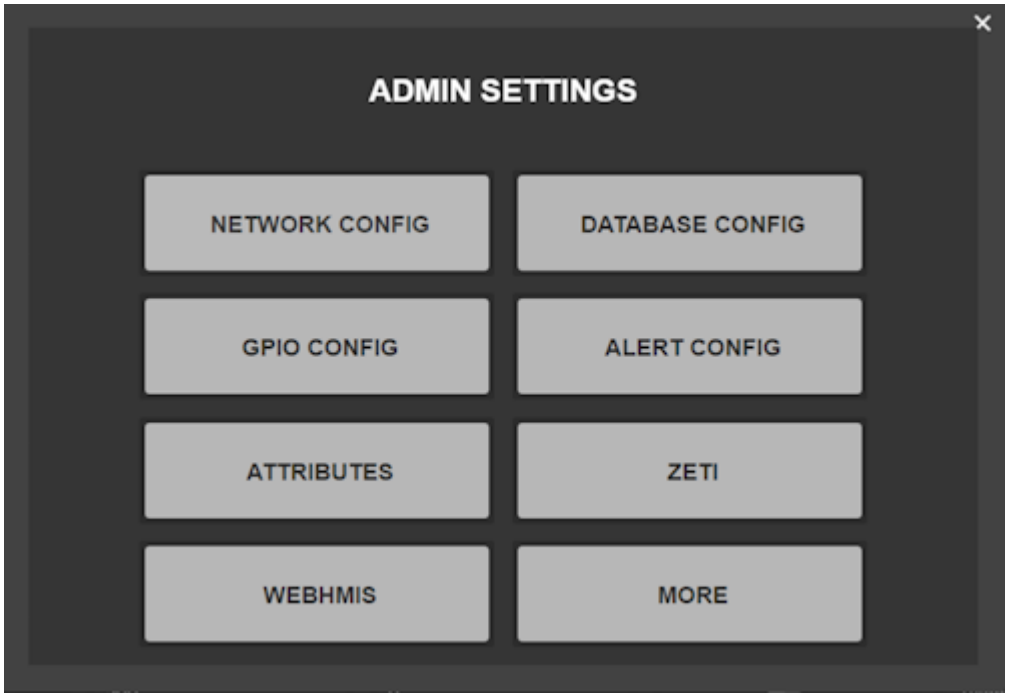


3. Enable an alarm for Follower Heartbeat, Host Heartbeat, Read Rate, and Trigger Overrun by sliding the corresponding toggle button to the right.
   - Follower Heartbeat: enables a heartbeat (timeout interval) for follower devices.
   - Host Heartbeat: enables a heartbeat (timeout interval) for the host device.
   - Read Rate: enables a notification on the Home screen if the read rate drops below 95% over 1000 scans.
   - Trigger Overrun: enables a notification on the Home screen when triggering occurs faster than the result is received from the follower or when a failure timeout occurs.

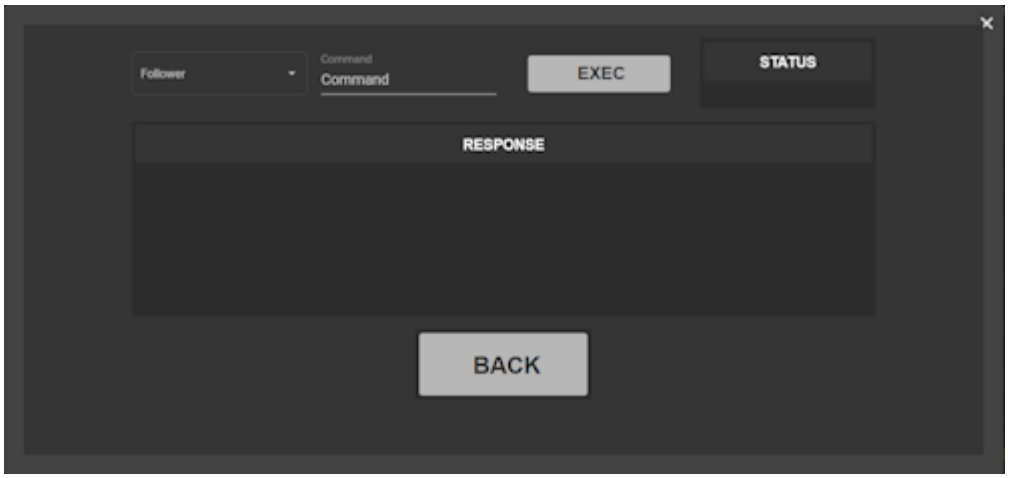


Using Zebra Easy Text Interface

1. Access **ZETI** from the **Admin Settings** menu.



2. Select a follower from the menu and enter a command.
3. Click **Exec** to execute the command and observe the **Status** and response.



Split Code

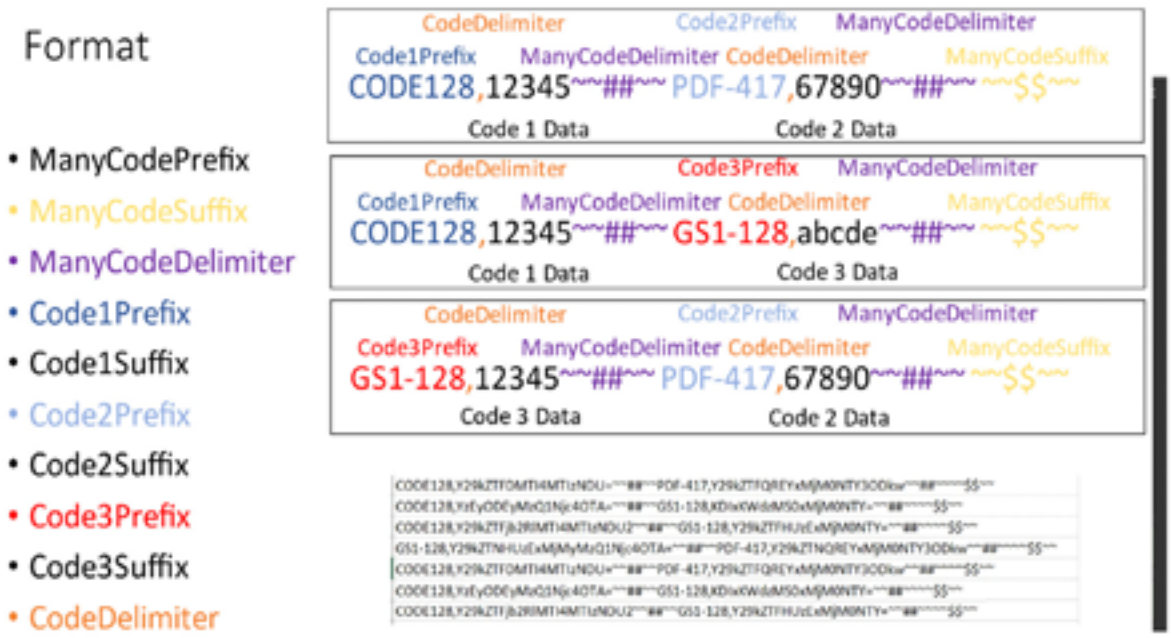
The primary use case for split code functionality is the presence of ManyCode jobs containing labels with two codes. In this case, the GS20 leader device combines barcodes from multiple decode results (from the same follower or from a different follower) into one final output with set formatting.

The advantage of this feature is that a single follower device is no longer required to decode both codes in the field of view, allowing the user to solve this issue with fewer follower devices covering the gateway field of view and less field of view overlap.

There are 9 Split Code modes that determine the result that is sent to the host:

- Disabled: split code functionality is disabled
- Mode 1: the output result is equal to code 1 and code 2 and combines the decodes of code 1 and code 2.
- Mode 2: the output result is equal to code 1 equals (code 2 or code 3). The output result combines code 1 with either code 2 or code 3, depending on which code is received first.
- Mode 3: the output result = code 1 + code 2 + code 3. The output result combines code 1, code 2, and code 3.
- Mode 4: the output result = (code 1 + code 2) OR (code 2 + code 3) OR (code 1 + code 3). The Output result consists of a combination of either 2 of the available three codes (whichever is received first).
- Mode 5: code 1 + code 2 (if code 2 contains code 1)
- Mode 6: (code 1 + code 2 (if code 2 contains code 1)) or (code 3 + code 2) or (code 3 + code 1)
- Mode 7: (code 1 + code 2 (if code 2 contains code 1)) or code 1
- Mode 8: (code 1 + code 2 (if code 2 contains code 1)) or (code 3 + code 2 (if code 2 contains code 3 [starting at position 7]))
- Mode 9: (code 1 + code 2 (if code 2 contains code 1)) or (code 3 + code 2 (if code 2 contains code 3 [starting at position 7])) or code 3

View the description below for information on the formatting of the ManyCode and codes 1-3:



Example combination for Mode 1:

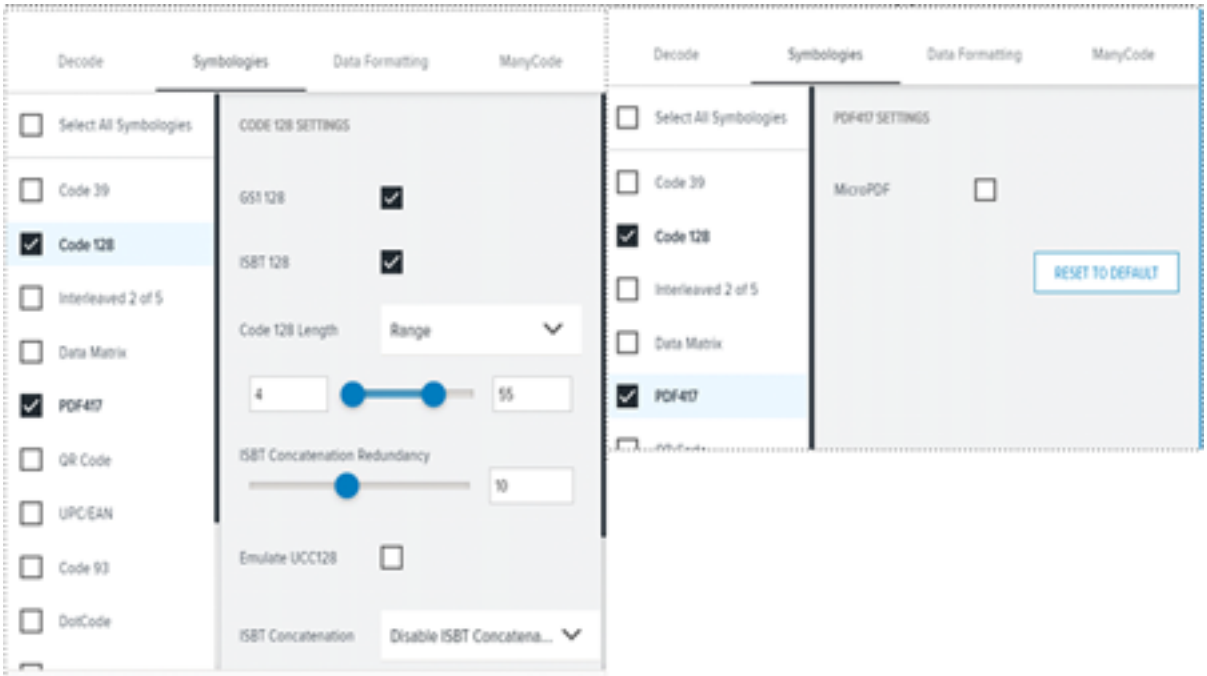
- Follower 1 Data: – CODE128,Y29kZTFDMTI4MTIzNDU=~~##~~~~$$~~
- Follower 2 Data: – PDF-417,Y29kZTFQREYxMjM0NTY3ODkw~~##~~~~$$~~
- GS20 Result Output - CODE128,Y29kZTFDMTI4MTIzNDU=~~##~~PDF-417,Y29kZTFQREYxMjM0NTY3ODkw~~##~~~~$$~~

Configuring Follower Settings for Split Code

NOTE: Configuring follower devices for Split Code functionality is done using Zebra Aurora Focus.

1. Create a new job for the follower device and navigate to the **Build** tab in Zebra Aurora Focus.

2. Navigate to the **Symbologies** section. Ensure that only the symbologies necessary for the application are enabled.



3. Navigate to the **ManyCode** tab. Configure the total number of Barcodes to Decode (3 max). Sort by symbology and enable partial results.

4. Navigate to the **Data Formatting** tab and select **Advanced Formatting**.

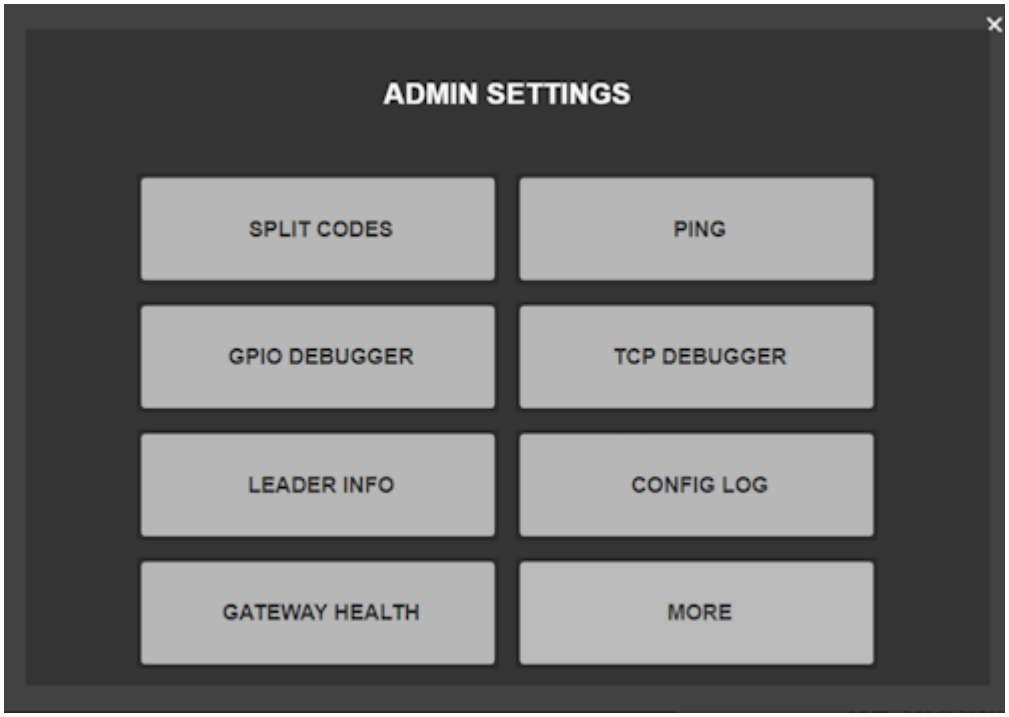
5. Select **ManyCode** and input the following:
   - Prefix: None
   - Data
     - Many Code String
     - Custom String "~~$$~~"
   - Suffix: None
   - Delimiter
     - Data Type: None
     - End: None
     - ManyCode String: None

6. Select All Symbologies
    - Prefix: None
    - Data
        - Symbology
        - Custom String ","
        - Full String: Base 64
        - Custom String: "~~##~~"
    - Suffix: None
    - Delimiter
        - Data Type: None
        - End: None

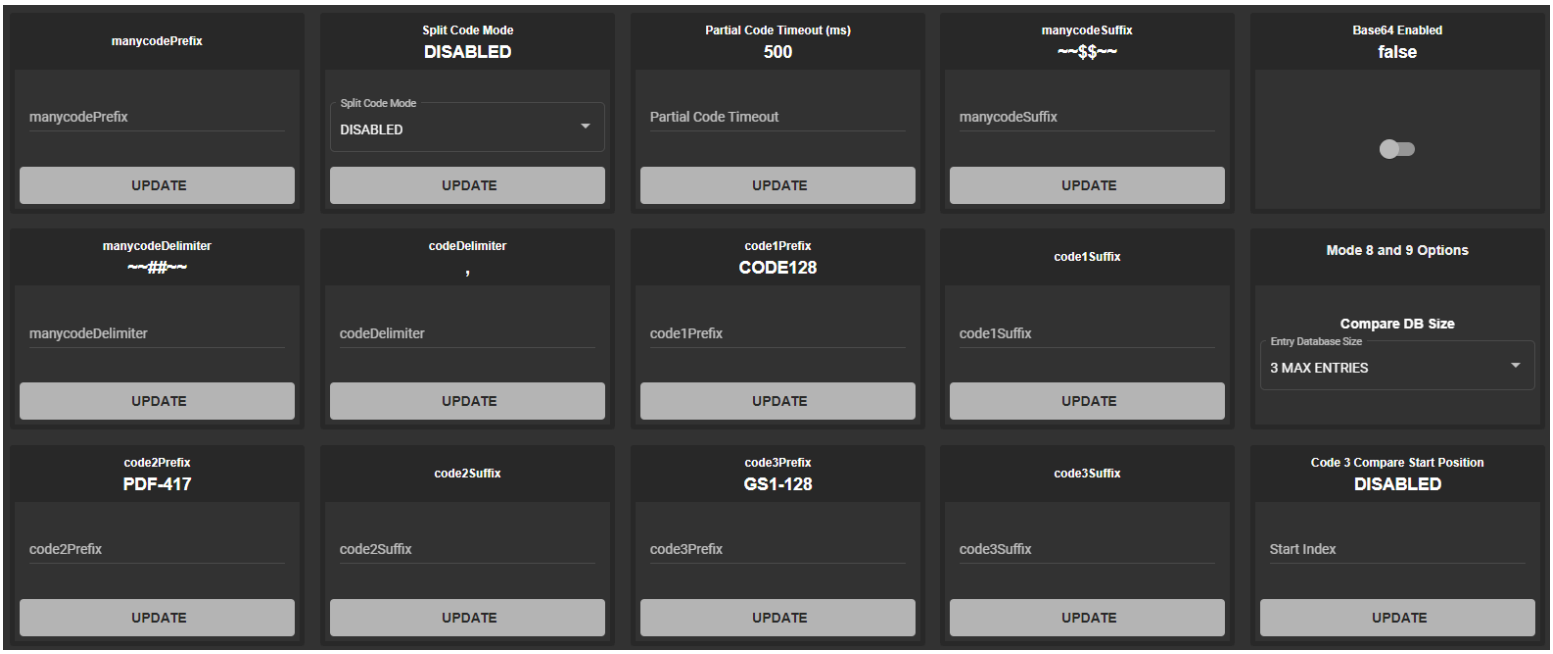
Configuring Split Code

To configure Split Code functionality on GS20 Leader Module:

1. Ensure that the follower devices are configured to support Split Code functionality.
2. From the **Home** screen, on the left panel select **Admin.**
3. Click **More**, then Split Codes option.



4. On the setup screen, input your code formatting values, select **Split Code** mode from the dropdown and define a Partial Code timeout value.



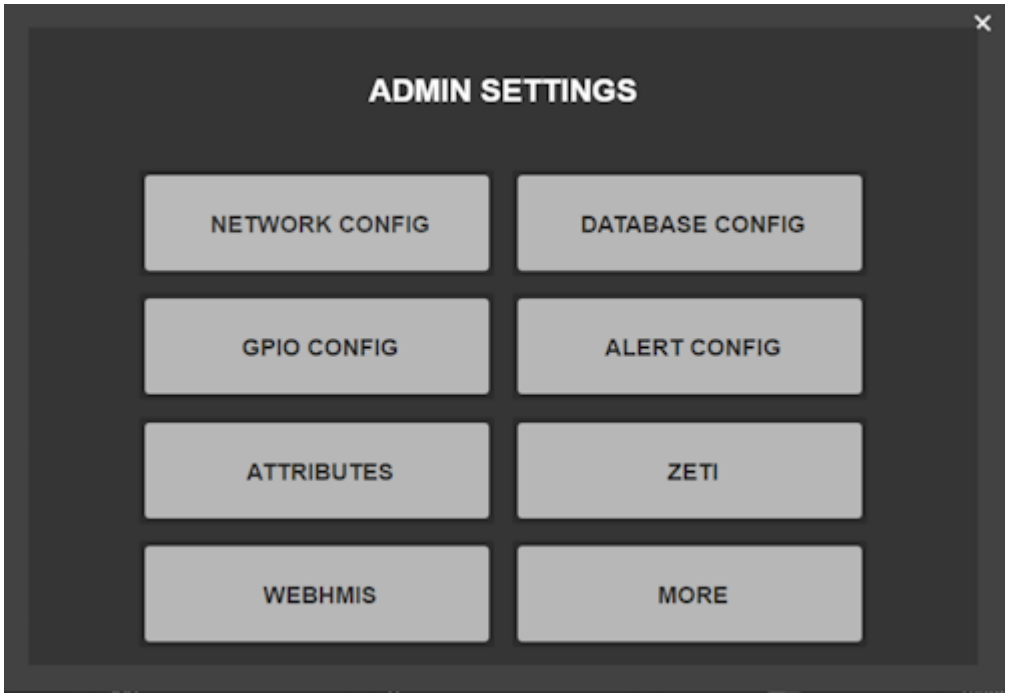
5. Click **Update** to apply changes.

Accessing Leader and Follower Zebra HMI

Access leader and follower Zebra web HMIs from the GS20 web HMI.

1. Select **Admin** from the left panel on the **Home** screen to access **Admin Settings**.

2. Click **WebHMIs**.



3. Select an HMI:

   a) For Leader devices: click **Leader web HMI** to visit the Zebra Web HMI.

   b) For the Follower devices: select the desired follower from the menu to visit the Connectivity Gateway Web HMI.

Connectivity Gateway Solutions

The Zebra Connectivity Gateway provides asynchronous passthrough and synchronized leader-follower solutions for use cases requiring high-speed scan tunnels, sorting facilities, and multi-point or multi-side barcode scanning for parcels and boxes.

When assembling the Connectivity Gateway with the Gateway License, take into account the following device characteristics before determining which will act as a leader or follower.

- Fixed Scanning and Gateway devices can enable USB HID mode as output. However, GS20 devices do not natively support a USB port.
- Fixed Scanning and Gateway devices can support up to 9 total GPIO. GS20 devices have 4 total GPIO.
- It is recommended to implement no more than four followers in a given Connectivity Gateway solution. This implies that the Fixed Scanning and Gateway devices may act as a follower and a leader device simultaneously. If this is implemented in your system, expect a slight degradation in read rate performance in the device acting in both modes.

Asynchronous Passthrough

In asynchronous leader-follower use cases, multiple devices send result data to a single leader device. The leader passes the data through as a single point of contact to the host.

Examples:

- High-speed scan tunnels.
- Humans present barcodes for scanning in a sorting facility.

Fixed Scanner Input:

- Generic
- TCPIP (Followers)

Fixed Scanner Output to Host:

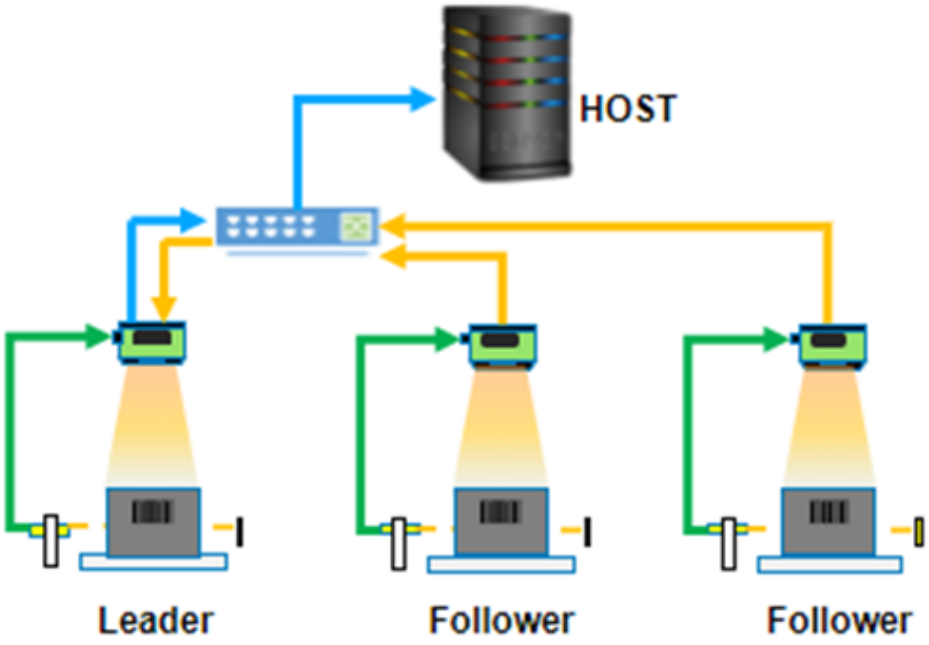
- TCPIP
- Industrial Communication
- Serial
- USB HID

Functionalities:

- Enable simple passthrough to send result data without changes.

- Enable advanced passthrough to change or add input text before the output.

Figure 11 Asynchronous Passthrough



Synchronized Leader Follower

In synchronized leader-follower use cases, the leader receives a trigger, activates the follower devices, receives the data from the followers, and sends the results to the host.

Examples:

- Multi-sided reading of parcels.
- Multi-point reading of barcodes on a tire rim (overhead view only).

Leader Input:

- Generic:
  - GPIO Trigger
- From Follower:
  - Results:

Leader Output:

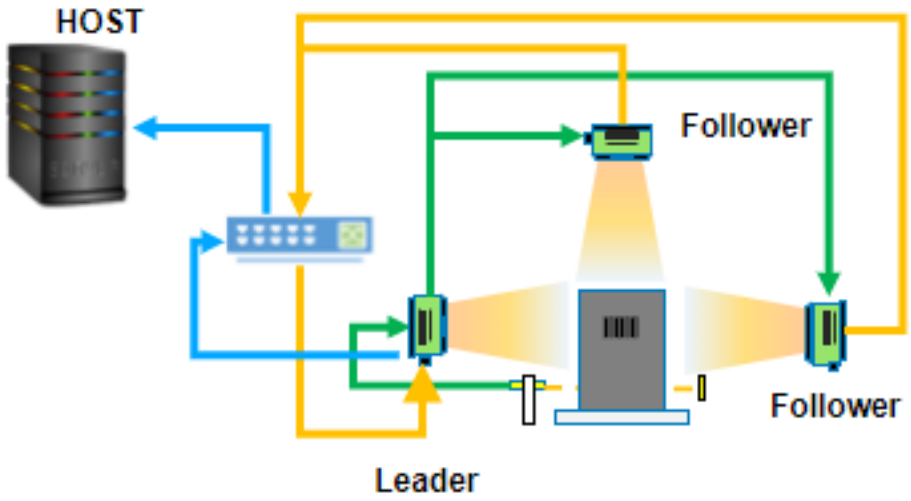
- To Host:
  - TCPIP
  - Industrial Communication
  - Serial
  - USB HID

- To Follower:
  - Trigger
- To Machine/PLC:
  - Total Result String
  - Total Pass/Fail GPIO

Functionalities:

- Enable synchronous triggers from leader to follower devices.
- Recieve results from follower devices and apply pass/fail criteria.
- Send result data to the host, GPIO, or PLC.

Figure 12 Synchronized Leader-Follower



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.

Table 8 Troubleshooting

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.
	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 NDIS 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.
	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

Pinging via IP and pinging via hostname are two common strategies that you can use to communicate with the device.

Pinging the Device via IP

Users can ping the device by providing the IP address via command prompt or powershell to communicate with the device.

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

1. Open a command prompt or PowerShell.
2. Enter the following command (assuming the Hostname is GS20b1cc:

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

3. Check whether the device responds or fails to respond to the command.

   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 device.
3. Connect to a power source.
4. Continue to hold the TRIG button. After 20 seconds, the Power LED on the device turns from yellow to green, and the Ethernet LED turns from orange to amber. Release the TRIG within 5 seconds after the Ethernet LED changes to amber.

Power Cycling the Device

To power cycle the device:

1. Remove all cables to ensure 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 Zebra Aurora Focus 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:

- Ethernet directly to the PC.
- Ethernet connection to a network via switch or hub.

Communication Port Usage

The table below displays the ports utilized by the GS20 Connectivity Gateway Leader Module Web HMI.

Table 9 GS20 Web HMI Communication Port Usage

Port	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	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	25250	
Profinet RT Unicast	34962	34962
Profinet RT Multicast	34963	34963
Profinet RT CM	34964	34964

Table 9 GS20 Web HMI Communication Port Usage (Continued)

Port	TCP	UDP
EtherNet/IP	44818	44818
Profinet		49152
Reserved for Gateway Functionality	4012	4012
Reserved for Gateway Functionality	4009	4009
Reserved for Gateway Functionality	8080	8080
Listening to Raw TCP Data from Follower Devices	25250	25250
TCP Port (Host to Leader)	25256	25256
MQTT	8883	8883
Reserved for Gateway Functionality	25170	25170

NOTE: TCP Port and Raw TCP Data are user-configurable ports.

Obtaining the Device's IP Address

Access the device's IP directly by using six digits (shown in the following example 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 following examples explain 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

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

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

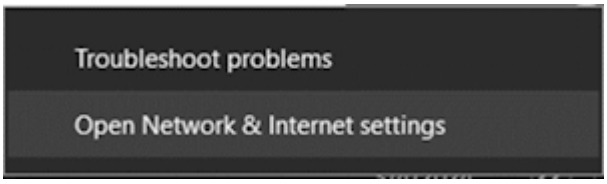
For all connection methods, users are also able to access the device via hostname instead of IP address. The hostname consists of the device part number and the last four characters of the MAC address:

- Example:
- Part Number - GS20
- MAC Address - 78:b:d6:5c:6d:f2
- Hostname = GS206df2

Go to zebra.com/support for the latest device firmware.

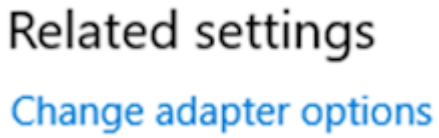
Editing Ethernet Port Adapter Options

1. Right click on the WLAN/internet connection icon in the status icons taskbar in the lower right corner of a Windows PC and select **Open Network & Internet Settings**.

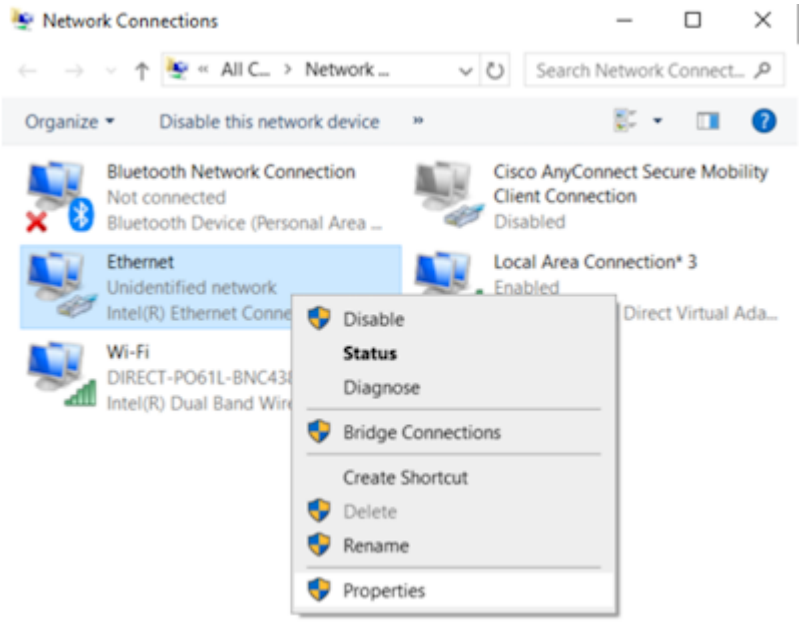


2. Click **Ethernet**

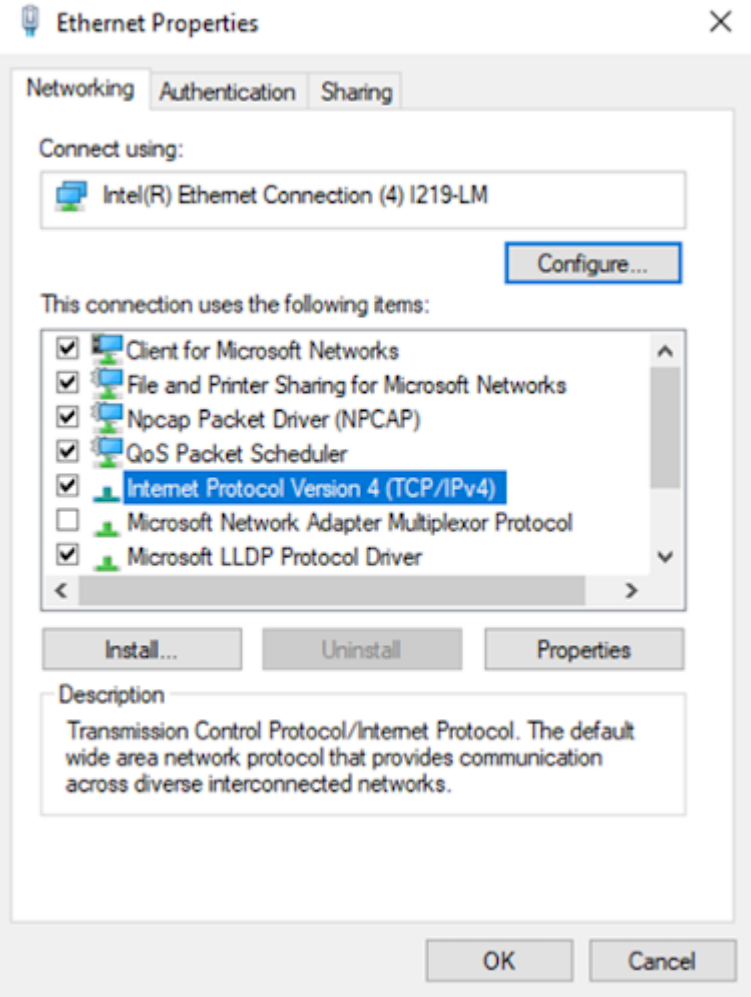
3. Select **Change Adapter Options**



4. Right-click on the Ethernet adapter in use and click **Properties**



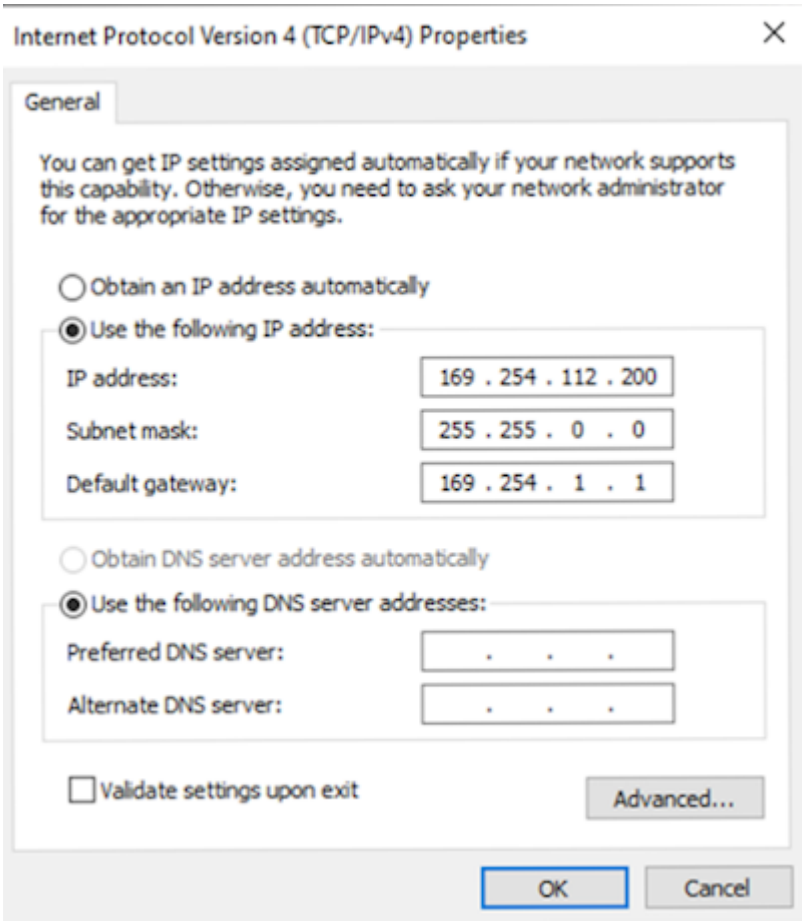
5. Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**



6. Click **Use the Following IP Address** and set the IP.

NOTE: Use any number between 1 and 255 for the last two blocks of the IP address. Ensure that the chosen IP address is not already in use on the local network. Ping the address

before assigning the IP via a command prompt to confirm that the address is available for use.



7. Click **OK** twice to implement the new settings and wait 1-5 minutes.
8. Open **File Explorer** on the host PC.
9. Scroll to the bottom of the left panel and click **Network.**
10. Right click on the device and select **Properties** to view the IP address and confirm the change was implemented.