



USER MANUAL

GoMax Smart Vision Accelerator

Firmware version: 5.1.x.xx

Document revision: D

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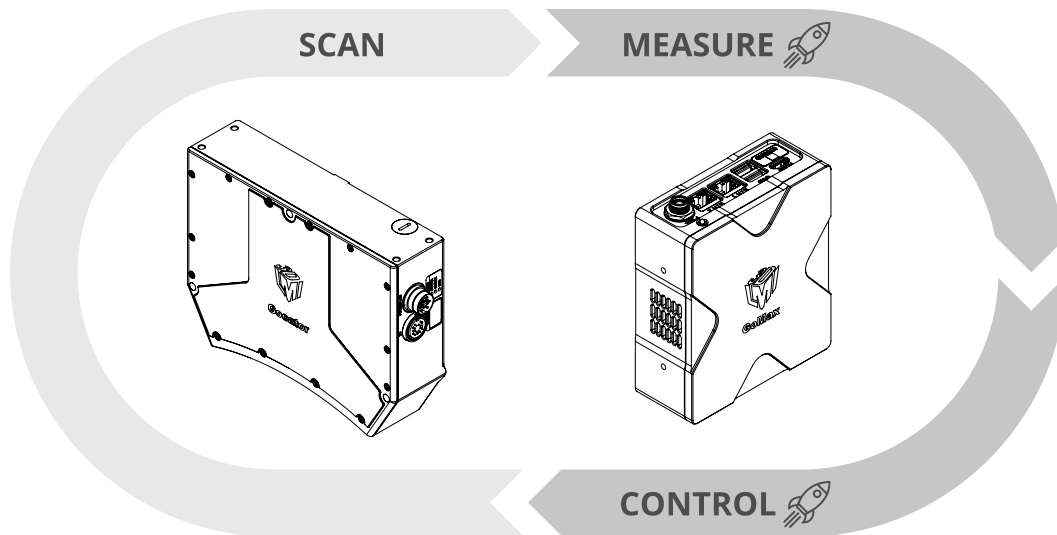
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Introduction

The GoMax Smart Vision Accelerator is a hardware solution that accelerates any Gocator sensor to meet inline production speeds, without the need for a PC. The plug and play functionality of GoMax lets you quickly and easily add powerful data processing to a Gocator system, achieving faster cycle times and enhancing overall inspection performance.

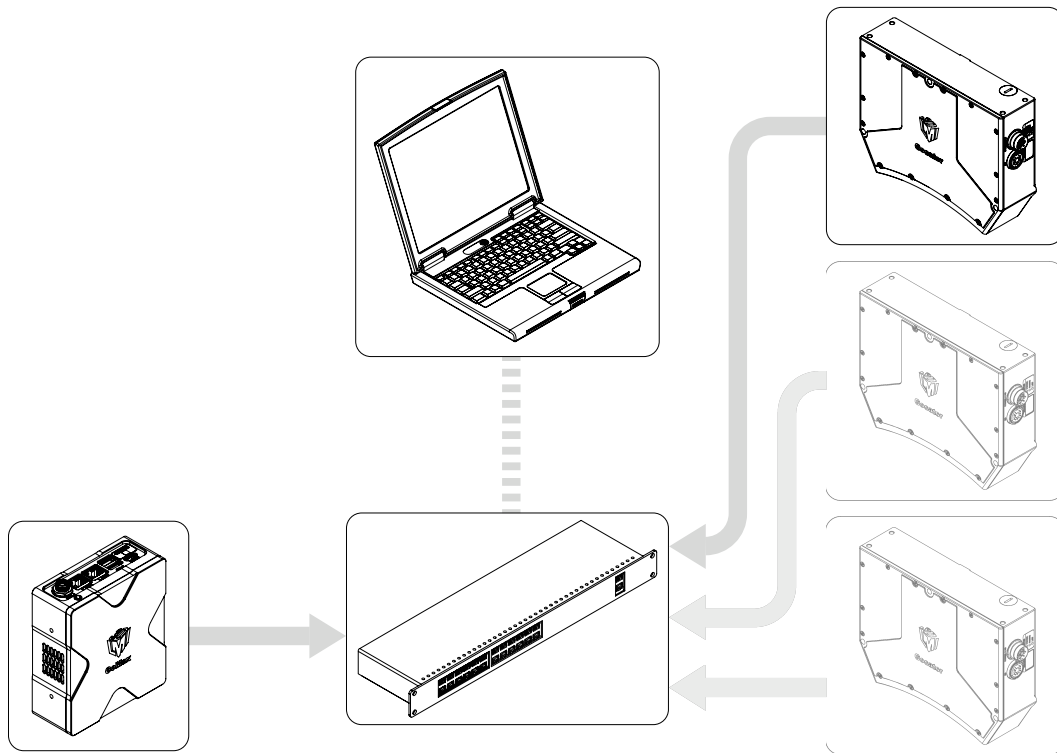
GoMax provides this compute power thanks to its NVIDIA Jetson TX2's 256-core GPU and 64-bit quad-core ARM processor—all in a compact, rugged case.

GoMax does this by taking over a portion of the sensor's data processing (data generation, 3D measurement, and control).



Relationship between GoMax (right) and a sensor (left)

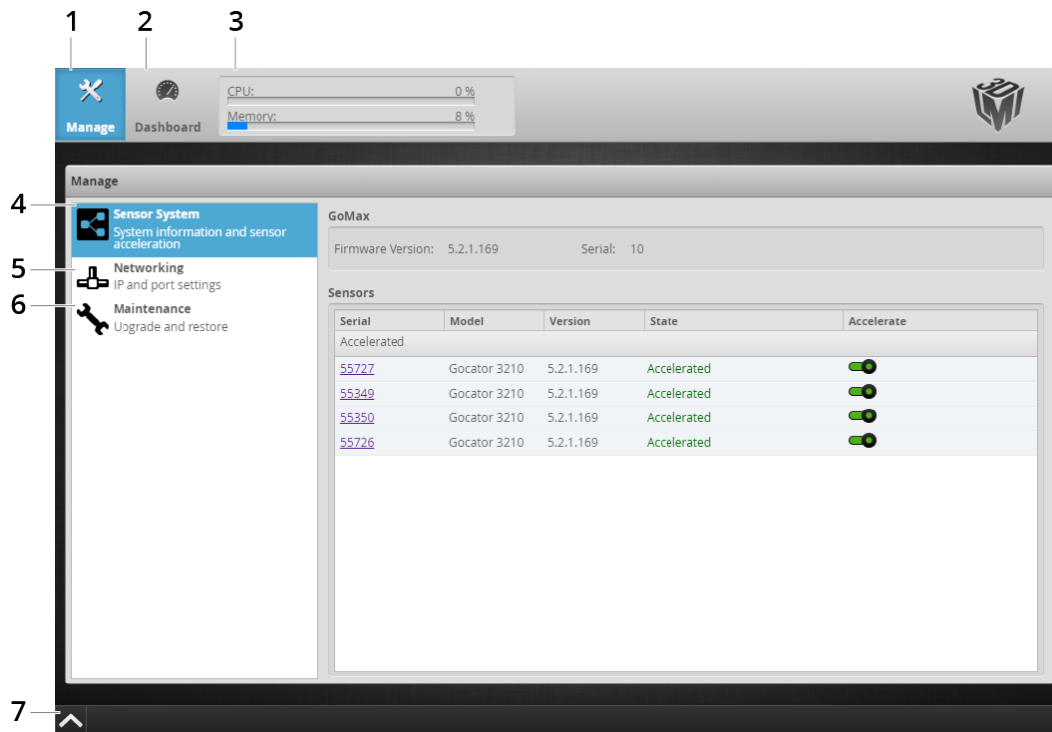
GoMax is ideal for accelerating one or more Gocator snapshot sensors such as Gocator 3506, or multi-sensor, buddied Gocator laser line profile sensor systems. A single GoMax unit can accelerate one or more sensors.



GoMax accelerating one or more Gocator sensors

You can also add multiple GoMax units to a system, each unit accelerating one or more sensors, to scale up to faster speeds. Note however that you can't use multiple GoMax units to accelerate a single sensor.

As with Gocator sensors, you configure GoMax using an intuitive web interface.



The GoMax interface, listing four accelerated sensors

Click the icons at the top of the web interface to switch between pages, which contain a high level grouping of settings and functionalities. In panels such as the **Manage** panel shown above, click the categories to the left to switch between lower level groupings of settings.

Element	Description
1 Manage page	Contains settings and controls (in the Manage panel) to start and stop acceleration, change network settings, and perform maintenance on the GoMax unit. For more information, see the Manage panel categories listed below.
2 Dashboard page	Provides monitoring of the GoMax unit's health. For more information, see <i>Monitoring GoMax Health Status</i> on page 28.
3 CPU Load and Speed	Provides important GoMax metrics.
4 Sensor System category	Lets you start and stop acceleration of sensors. For more information, see <i>Starting and Stopping Acceleration</i> on page 22.
5 Networking category	Contains settings for configuring the network. For more information, see <i>Configuring Network Settings</i> on page 29.
6 Maintenance category	Lets you upgrade firmware and perform a factory reset of the GoMax unit. For more information, see <i>Upgrading and Restoring GoMax</i> on page 26.
7 Status bar	Displays log messages from the GoMax unit.

The web interface on an accelerated sensor is identical to the interface on an unaccelerated sensor. The Ethernet-based output protocols (Gocator, EtherNet/IP, ASCII, and Modbus) are also identical to those found on an unaccelerated sensor, and are fully supported.

	GoMax supports digital, analog, and serial output from sensors. However, because output must be passed to the GoMax unit and then back to the sensor, network latency will have an impact on performance.
---	---

GoMax can accelerate GDK tools in custom firmware, with some limitations (for details, see *Understanding How GDK Tools Work with GoMax* on page 32).

For information on developing GDK tools, see the reference documentation and samples provided with the library.

This documentation describes how to connect and use a GoMax unit. For information on using Gocator sensors, see the user manuals of those devices.

Notational Conventions

This documentation uses the following notational conventions:

	Follow these safety guidelines to avoid potential injury or property damage.
---	--

	Consider this information in order to make best use of the product.
---	---

Safety and Maintenance

The following sections describe the safe use and maintenance of GoMax vision accelerators.

Electrical Safety



Failure to follow the guidelines described in this section may result in electrical shock or equipment damage.

Sensor systems GoMax are connected to should be connected to earth ground

All sensors in the system should be connected to earth ground through their housing. All sensors should be mounted on an earth grounded frame using electrically conductive hardware to ensure the housing of the sensor is connected to earth ground. Use a multi-meter to check the continuity between the sensor connector and earth ground to ensure a proper connection.

Minimize voltage potential between system ground and sensor ground

Care should be taken to minimize the voltage potential between system ground (ground reference for I/O signals) and sensor ground. This voltage potential can be determined by measuring the voltage between Analog_out- and system ground. The maximum permissible voltage potential is 12 V but should be kept below 10 V to avoid damage to the serial and encoder connections.

Use the power supply provided with the unit

If the power supply or cords get damaged, contact LMI Technologies for a replacement.

Use care when handling powered devices

Wires connecting to the GoMax unit should not be handled while the unit is powered. Doing so may cause electrical shock to the user or damage to the equipment.

Cleaning and Maintenance

Keep vents clean

To avoid overheating of the GoMax unit, make sure the unit's vents are clean.

Environment

Avoid installing the GoMax unit in hazardous environments

To ensure reliable operation and to prevent damage to the GoMax unit, avoid installing the unit in locations

- that are humid, dusty, or poorly ventilated;
- with a high temperature, such as places exposed to direct sunlight;
- where there are flammable or corrosive gases;
- where the unit may be directly subjected to harsh vibration or impact;

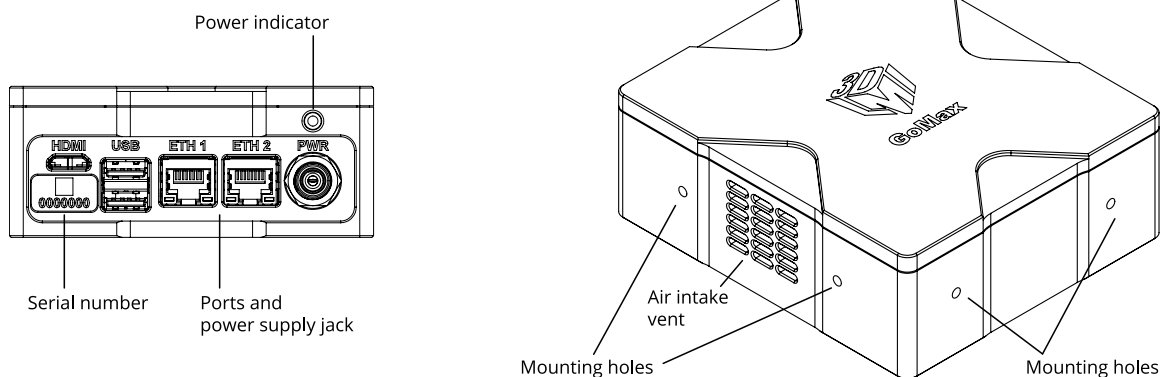
- where water, oil, or chemicals may splash onto the unit;
- where static electricity is easily generated.

Ensure that ambient conditions are within specifications

GoMax units are suitable for operation between 0–45° C.

Hardware Overview

The following illustrates the physical features of a GoMax unit.



Item	Description
Power Indicator	Illuminates when power is applied (blue).
USB ports	USB 2.0 and 3.0 ports. Reserved for future use.
ETH 1	Gigabit Ethernet port. For direct connection to PC at initial configuration and to connect the GoMax unit to the sensor system via a hub.
ETH 2	Gigabit Ethernet port. Reserved for future use.
HDMI	Mini HDMI port. Reserved for future use.
Power Jack	Accepts screw-on connector from supplied power supply.
Air Intake Vent	Intake for air flow.
Air Outlet Vent	Outlet for air flow. (Opposite the intake vent; not shown.)
Serial Number	Unique sensor serial number.
Mounting Holes	Holes for mounting the GoMax unit (using the provided DIN rail clips or mounted directly to a frame). Four additional holes area available on the back of the unit (not shown). For important information on mounting orientation and the choice of mounting points, see <i>Mounting</i> on page 17. For information on mounting hole specifications, see <i>GoMax</i> on page 35.

Adding GoMax to a Sensor System

LMI recommends adding GoMax to a sensor system that is already fully set up and configured. For information on setting up a sensor system, see the user manual of the sensors used in the system.

Follow the instructions in the following sections to install and perform the initial configuration of a GoMax unit.



Sensors you intend to accelerate using GoMax must be running firmware version 5.1 or higher.

Connecting Power

Power is provided by the included power supply. The plug type depends on the region in which you are using the unit.

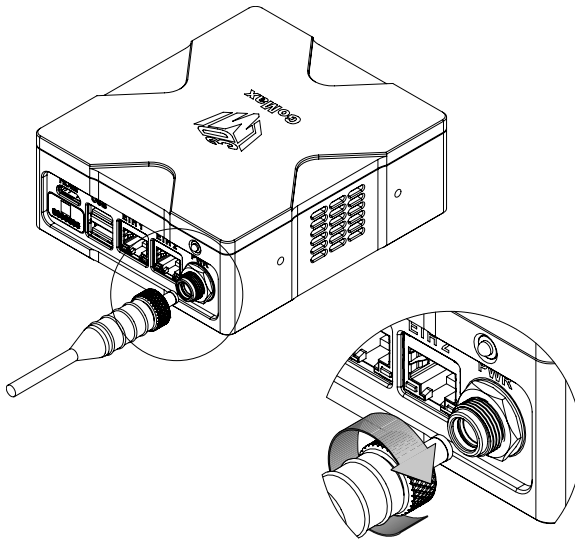


Use *only* the supplied power supply with the GoMax unit. Using a higher voltage power supply will damage the unit. Take particular care not to use a Master 100 power supply with GoMax, as the barrel connector is identical.

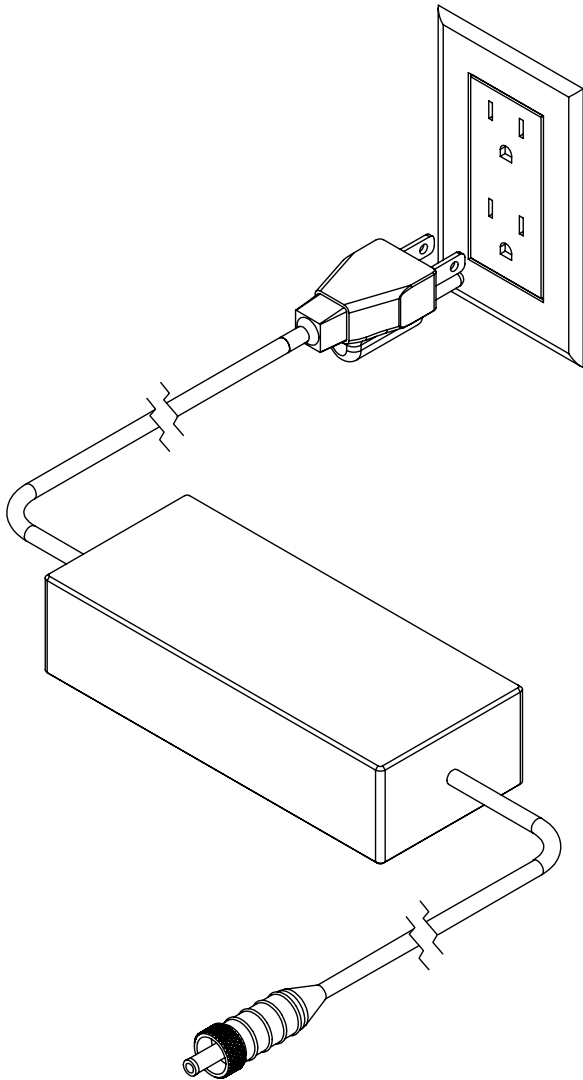
LMI recommends powering up the GoMax unit and performing the initial configuration of the GoMax unit before physically connecting the unit to the sensor system.

To connect power:

1. Connect the power supply connector to the unit and hand-tighten.



2. Plug the power adapter into an available electrical outlet.



An LED indicator on the unit lights when power is applied.
The unit is ready for initial configuration (setting an IP address).

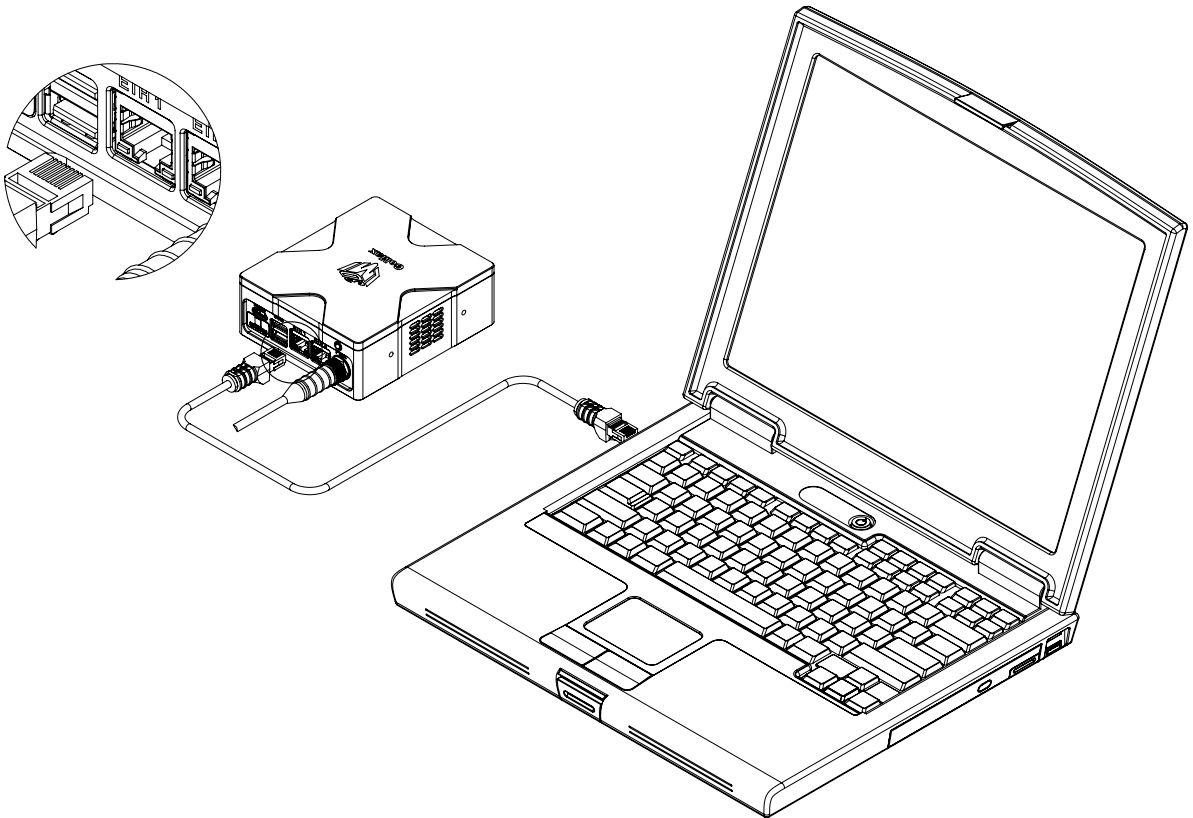
Setting the IP Address

Each GoMax unit and Gocator sensor on the sensor system network must have a unique IP address. By default, GoMax units are set to an IP address of 192.168.1.6. If this address does not conflict with other GoMax units or Gocator sensors on the network, you can leave its IP address as its default, and use that address to connect to the GoMax unit later on.

If this address conflicts with sensors in your sensor system, or if your system will contain multiple GoMax units, you will have to set the IP address of each GoMax unit to avoid conflicts. Follow the steps described in *Setting the IP Address* above

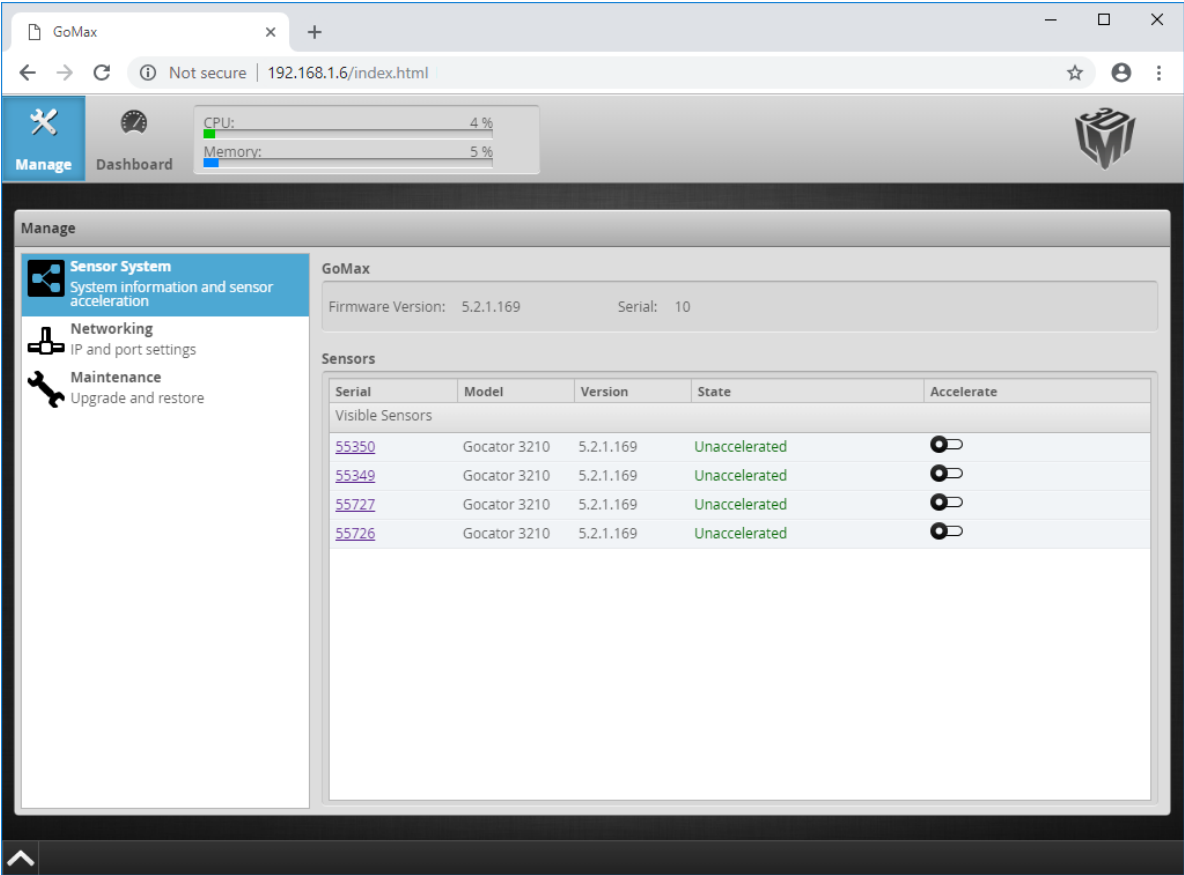
To set the IP address of a GoMax unit:

1. Using an Ethernet cable, connect a computer to the ETH 1 port on the GoMax unit.



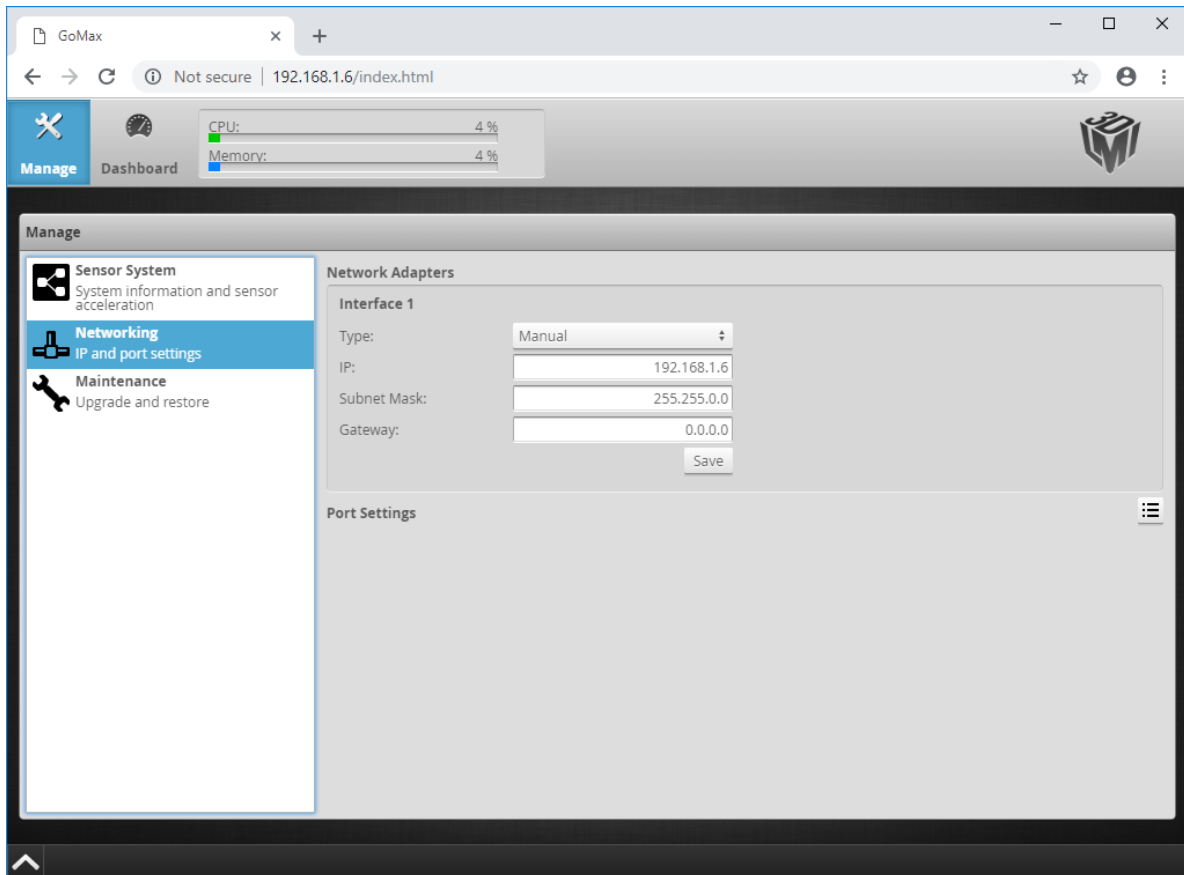
2. On the computer, launch an Internet browser and navigate to 192.168.1.6.

The GoMax web interface is displayed.

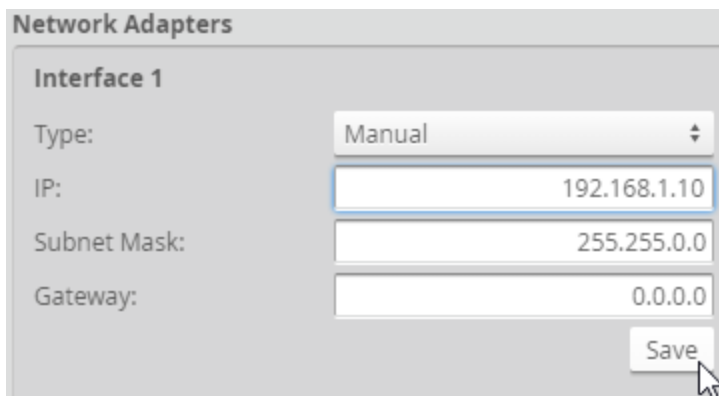


3. In the **Manage** panel, click the **Networking** category.

The **Networking** category settings are displayed.



- Under **Interface 1**, set the IP address and click **Save**.



The GoMax unit power cycles after you confirm you want to do this. Changing network settings stops the acceleration of any accelerated sensors.

After the GoMax unit restarts, its IP address is changed to the specified address. Use this address to access the unit.

- Disconnect the laptop from the GoMax unit.

Mounting

GoMax provides mounting holes on the back and on three sides of the unit. Although you can mount GoMax using any of these holes and in any orientation, to avoid overheating, LMI recommends the following:

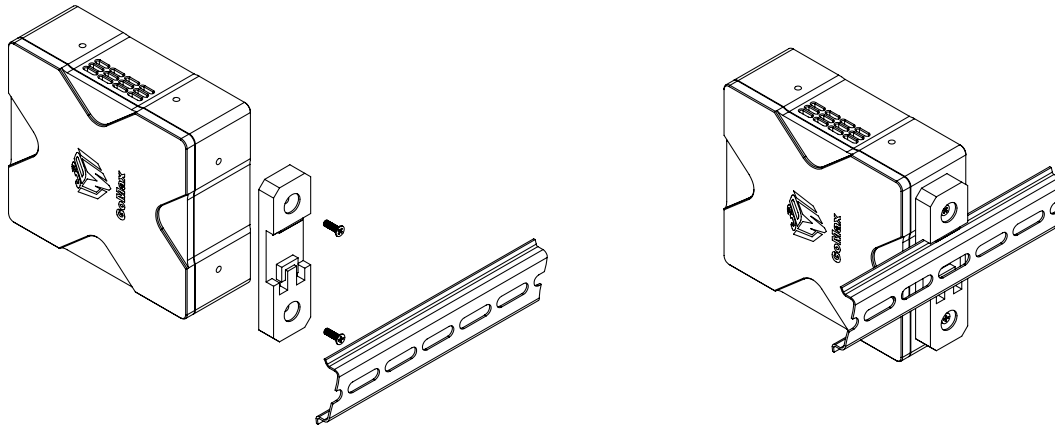
- The ventilation holes should be kept free of obstructions. (There are two vents on opposite sides of the unit.)
- The larger vent (18 holes with anti-dust mesh) should be at the bottom.

You can mount GoMax units to a DIN rail or directly to a frame.

For details on GoMax's mounting holes, see *GoMax* on page 35.

Using DIN Rail Clips

LMI provides two DIN rail clips to mount GoMax on a DIN rail. Note the recommended orientation (smaller vent at the top) in the following illustration:

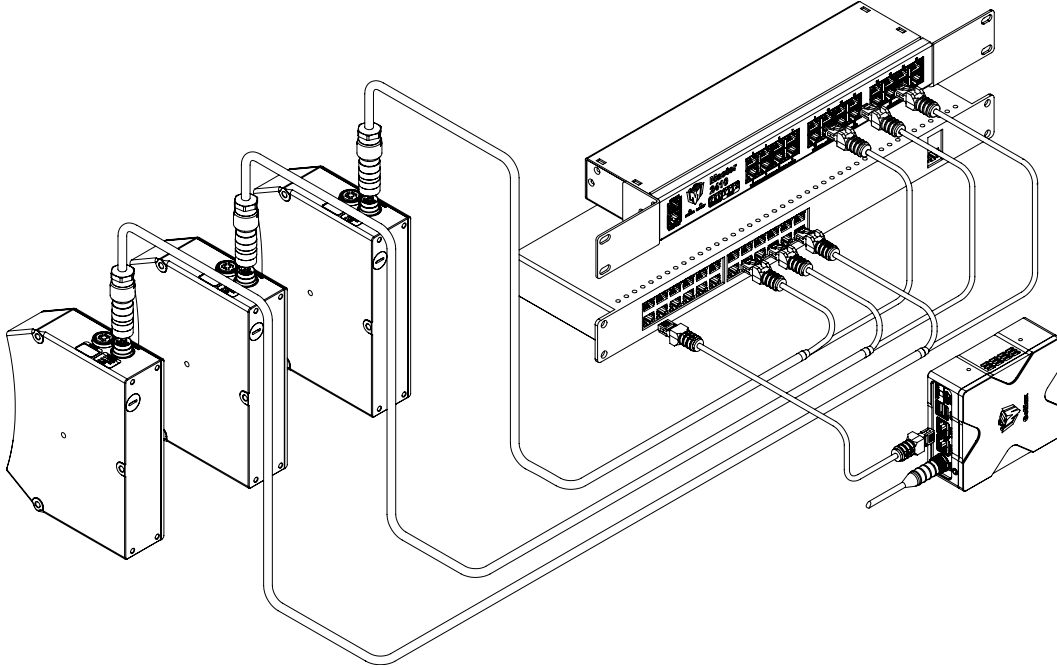


Mounting Directly to a Frame

You can also mount the GoMax unit directly to a frame. All mounting holes are specified as M4X0.7 - 6H, with a thread depth of 3.65 mm. The same recommendations for orientation and mounting points (see above) still apply if you mount GoMax directly to a frame.

Connecting GoMax to a Sensor System

You must connect GoMax to a sensor system through the Gigabit switch the sensors are connected to. Connect GoMax to the switch using an Ethernet cable and the ETH 1 port on the GoMax unit.



Using GoMax

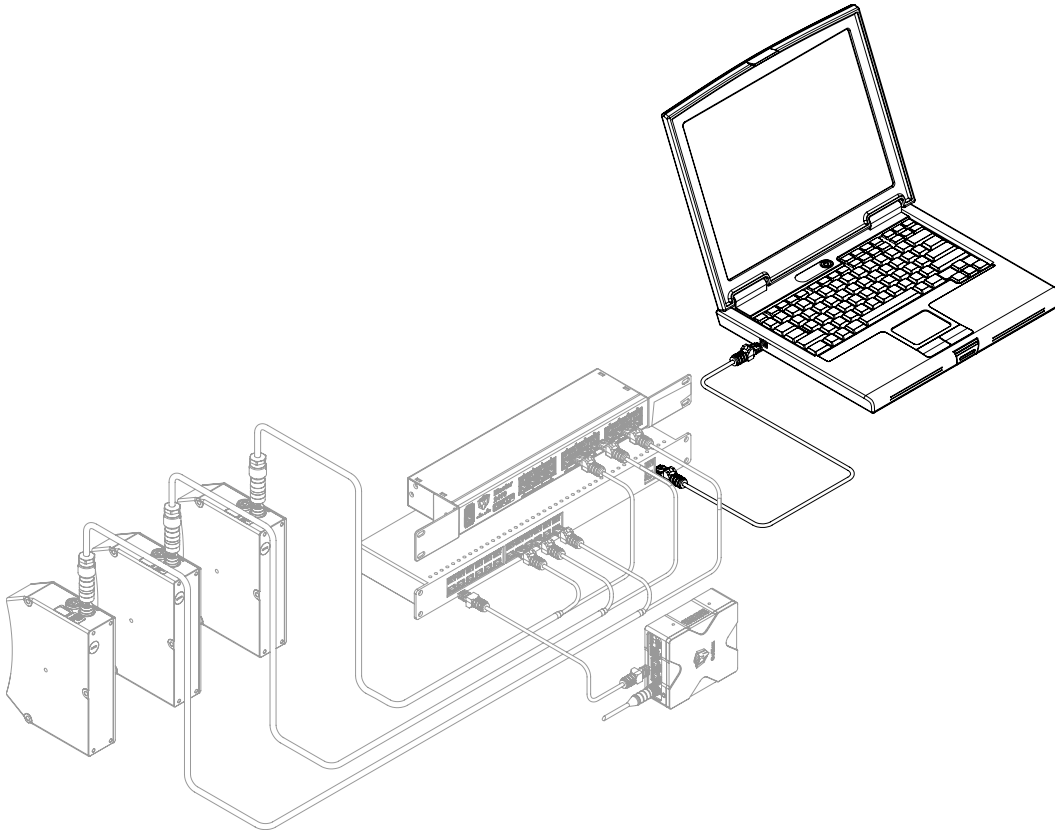
The following sections describe how to access and configure GoMax via its web interface, how to start and stop sensor acceleration, and more.

Accessing GoMax

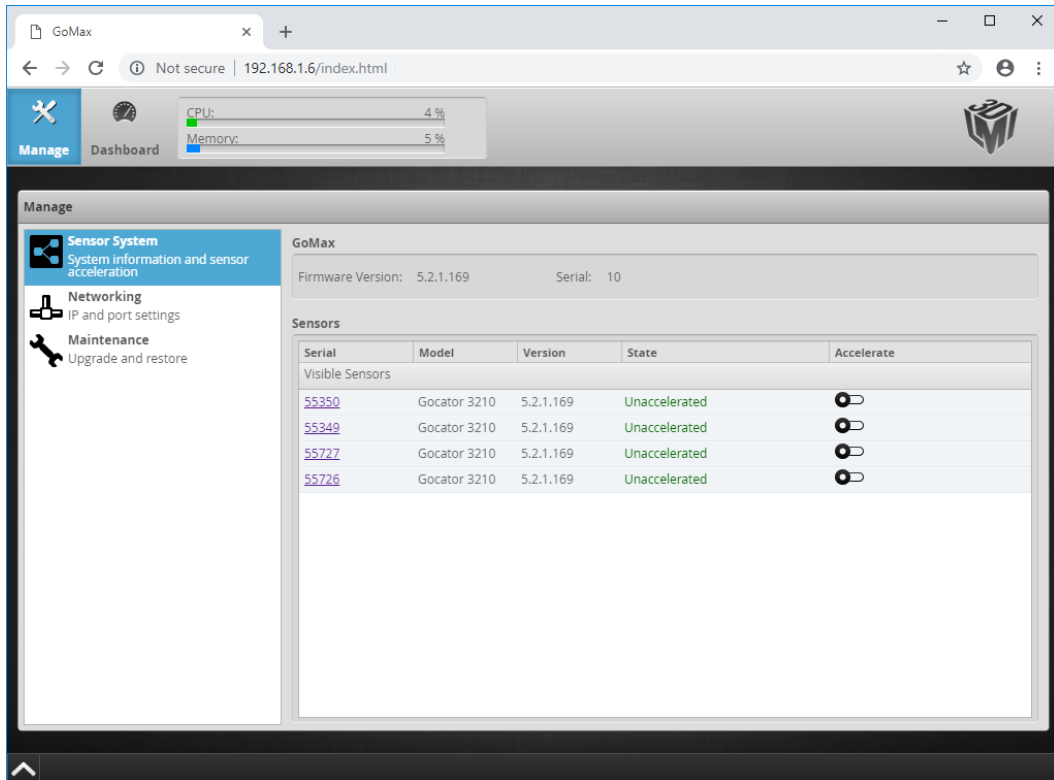
To access the GoMax vision accelerator's web interface, you can use any web browser. However, because there are currently some limitations when using the Microsoft Edge browser with the Gocator sensor web interface, you may wish to avoid this browser, to avoid inadvertently using it when configuring Gocator sensors.

To access a GoMax unit:

1. Connect the power supply to the GoMax unit. For more information, see *Connecting Power* on page 12.
2. Connect a computer to the switch to which the sensors and GoMax are connected using an Ethernet cable.



3. On the computer, using a web browser, connect to the GoMax web interface using the unit's IP address.
The GoMax web interface is displayed. The **Sensor System** category is preselected in the **Manage** panel.



If necessary, you can set the ports GoMax uses for the accelerated sensors; for more information, see *Configuring Network Settings* on page 29.

You are now ready to start accelerating sensors; for more information, see *Starting and Stopping Acceleration* on the next page.

Starting and Stopping Acceleration

After you have installed and set up a GoMax unit, it is ready to start accelerating one or more sensors with it.

The firmware version of the GoMax unit and the sensors you want to accelerate must match. Sensors whose firmware doesn't match the GoMax firmware are indicated by "Firmware Mismatch" in the GoMax interface (in the **Sensor System** category on the **Manage** page).

For information on upgrading or changing the firmware of the GoMax unit, see *Upgrading and Restoring GoMax* on page 26.

For information on upgrading or changing the firmware of a Gocator sensor, see the user manual of that sensor.

GoMax can accelerate multi-sensor (buddied) systems. However, only the Main sensor is displayed in the list of sensors that you can accelerate.

To accelerate a sensor:

1. Using a web browser, connect to the GoMax unit using its IP address.
2. In the **Manage** page, under **Sensors**, in the **Visible Sensors** list, click the toggle to the right of the sensor you want to accelerate.

Sensors				
Serial	Model	Version	State	Accelerate
Visible Sensors				
55726	Gocator 3210	5.2.1.169	Unaccelerated	☐
55727	Gocator 3210	5.2.1.169	Unaccelerated	☐
55349	Gocator 3210	5.2.1.169	Unaccelerated	☐
55350	Gocator 3210	5.2.1.169	Unaccelerated	☐

The sensor is now accelerated and appears in the **Accelerated** list.

Sensors				
Serial	Model	Version	State	Accelerate
Accelerated				
55726	Gocator 3210	5.2.1.169	Accelerated	☒
Visible Sensors				
55727	Gocator 3210	5.2.1.169	Unaccelerated	☐
55349	Gocator 3210	5.2.1.169	Unaccelerated	☐
55350	Gocator 3210	5.2.1.169	Unaccelerated	☐

For information on accessing the accelerated sensor, see *Accessing Accelerated Sensors* on page 24.

To stop the acceleration of a sensor:

- In the **Manage** page, under **Sensors**, in the **Accelerated** list, click the toggle to the right of the sensor for which you want to stop acceleration.

Sensors				
Serial	Model	Version	State	Accelerate
Accelerated				
55727	Gocator 3210	5.2.1.169	Accelerated	
55349	Gocator 3210	5.2.1.169	Accelerated	
55350	Gocator 3210	5.2.1.169	Accelerated	
55726	Gocator 3210	5.2.1.169	Accelerated	 

The sensor is no longer accelerated. To access the sensor, use the IP address as defined in the sensor's networking settings.

Accessing Accelerated Sensors

After GoMax starts accelerating a sensor, you can access and configure it in two ways: via web browser and via SDK applications.



GoMax does not support the PROFINET protocol. For more information on PROFINET, see the Gocator user manual of your sensor.

Via a Web Browser

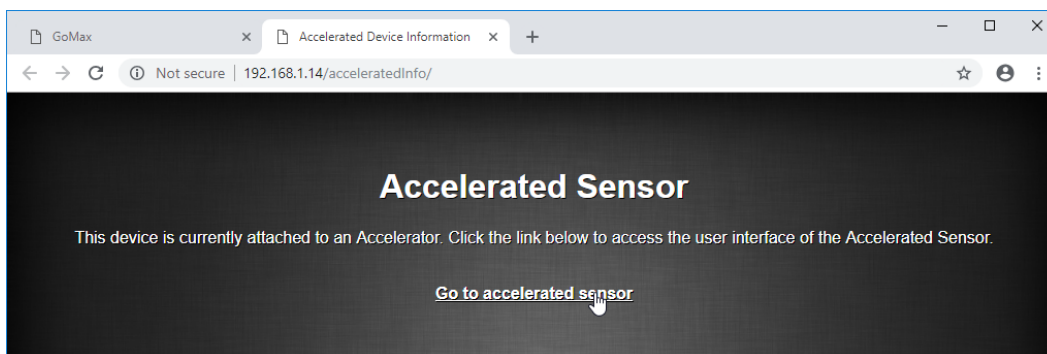
When you access an unaccelerated sensor via a web browser, you use the IP address of the sensor defined in the sensor's networking settings. But after a sensor has been accelerated, you can access it via the IP address of the GoMax unit and a port defined by GoMax, which are listed in the **Port Settings** section in the **Networking** category on the **Manage** page (for more information on this, see *Configuring Network Settings* on page 29). However, the easiest way to access a sensor is via the GoMax interface.

To access a sensor via the GoMax interface:

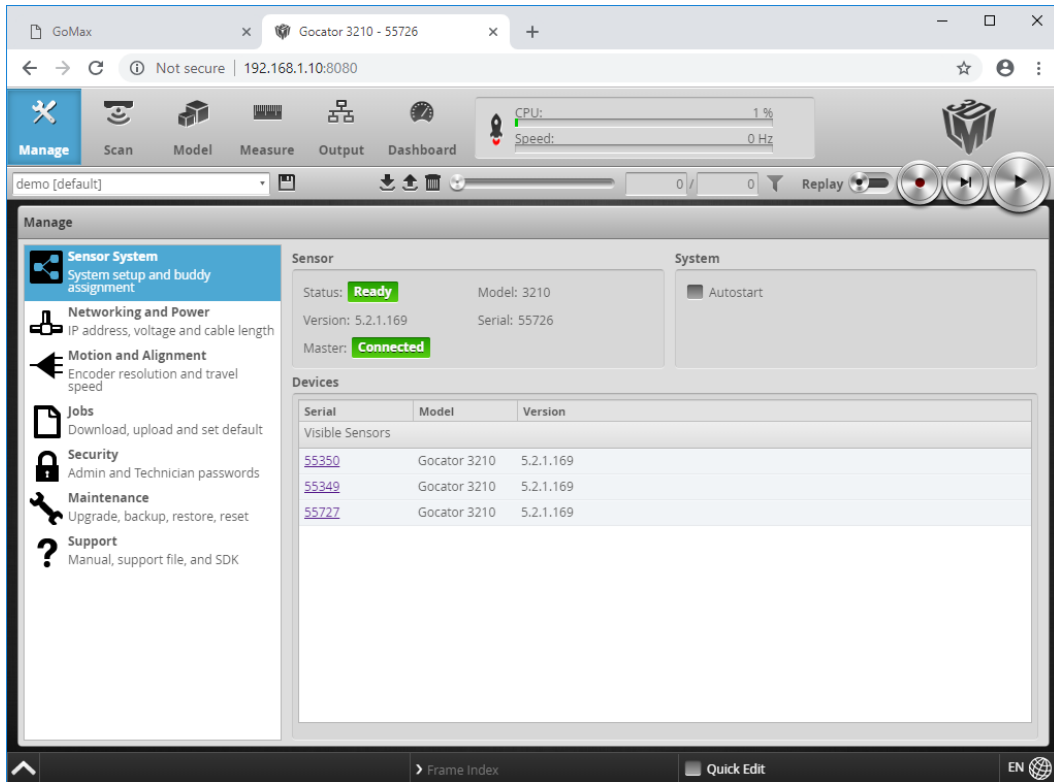
1. Using a web browser, connect to the GoMax unit.
2. On the Manage page, under **Sensors**, in the **Accelerated** list, click the sensor's serial number to the left.

Sensors				
Serial	Model	Version	State	Accelerate
Accelerated				
55726	Gocator 3210	5.2.1.169	Accelerated	
55727	Gocator 3210	5.2.1.169	Accelerated	
55349	Gocator 3210	5.2.1.169	Accelerated	
55350	Gocator 3210	5.2.1.169	Accelerated	

A page providing a link to the accelerated sensor's web interface opens in a new tab.



3. Click the link in the "Accelerated Device Info" page.
The web interface of the accelerated sensor is displayed.



Configure the sensor as you normally would. For information on configuring a sensor, see the sensor's user manual.

Via an SDK Application

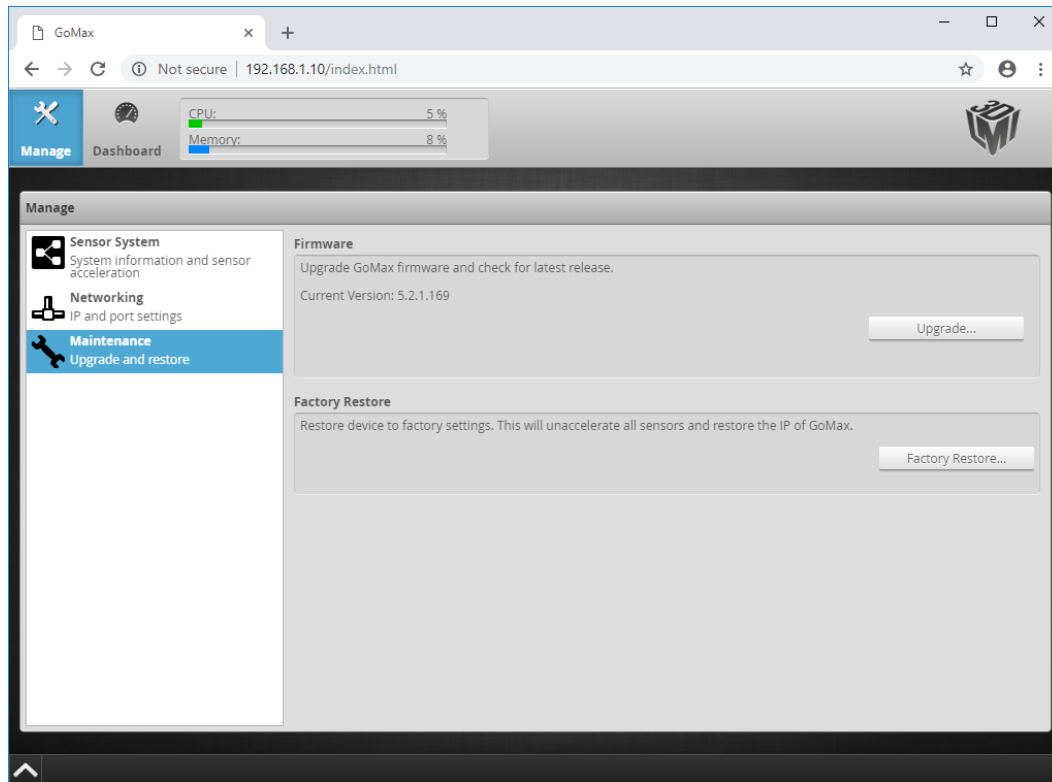
SDK applications can access accelerated sensors in the same way as with physical sensors, controlling them and receiving messages. In SDK applications built using version 5.1 of the SDK or later, you only need the serial number of an accelerated sensor to access it. In SDK applications built using SDK versions before 5.1, you must specify the port used to access the sensor; for information on setting and viewing the port settings in GoMax, see *Configuring Network Settings* on page 29.

For more information on accessing accelerated sensors via the SDK, see the SDK reference documentation.

For general, introductory information on the SDK, see the sensor's user manual.

Upgrading and Restoring GoMax

You can upgrade the GoMax firmware to get the latest features or bug fixes in the **Maintenance** category on the **Manage** page. If you have developed a custom firmware containing GDK tools, you upload the firmware to the GoMax unit from here. You can also perform a factory restore to return the device to factory defaults from the **Maintenance** category.



GoMax firmware is available from the LMI Download Center (<https://downloads.lmi3d.com/>).



The GoMax firmware and the sensor firmware must match in order for you to be able to accelerate a sensor.



Upgrading the GoMax unit or performing a factory restore stops acceleration.



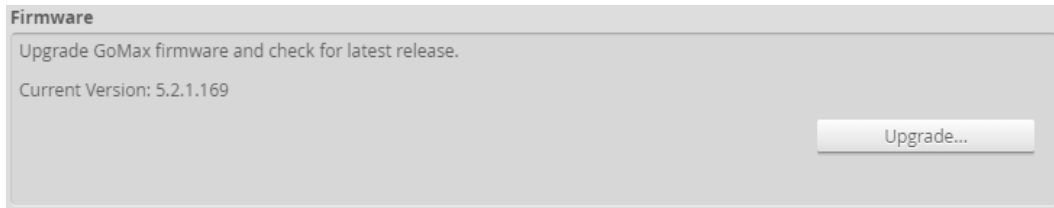
To upgrade sensor firmware, you must do so from the Maintenance category of the *sensor's* web interface.



Do NOT disconnect power or the network connection from the GoMax unit while you are upgrading it.

To upgrade the GoMax firmware:

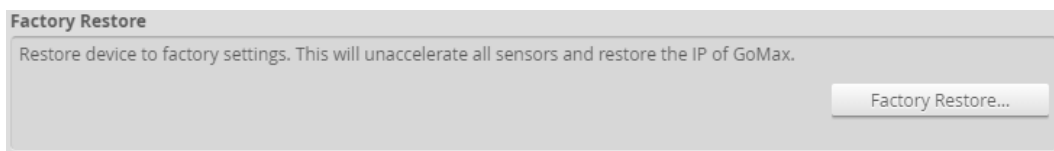
1. Go to the **Manage** page and click the **Maintenance** category.
2. Click **Upgrade...** in the **Firmware** section.



3. Locate the firmware file you downloaded from the website in the **File** dialog and then click open.
4. Wait for the upgrade to complete.
After the firmware upgrade is complete, the GoMax unit will restart.

To restore the GoMax unit:

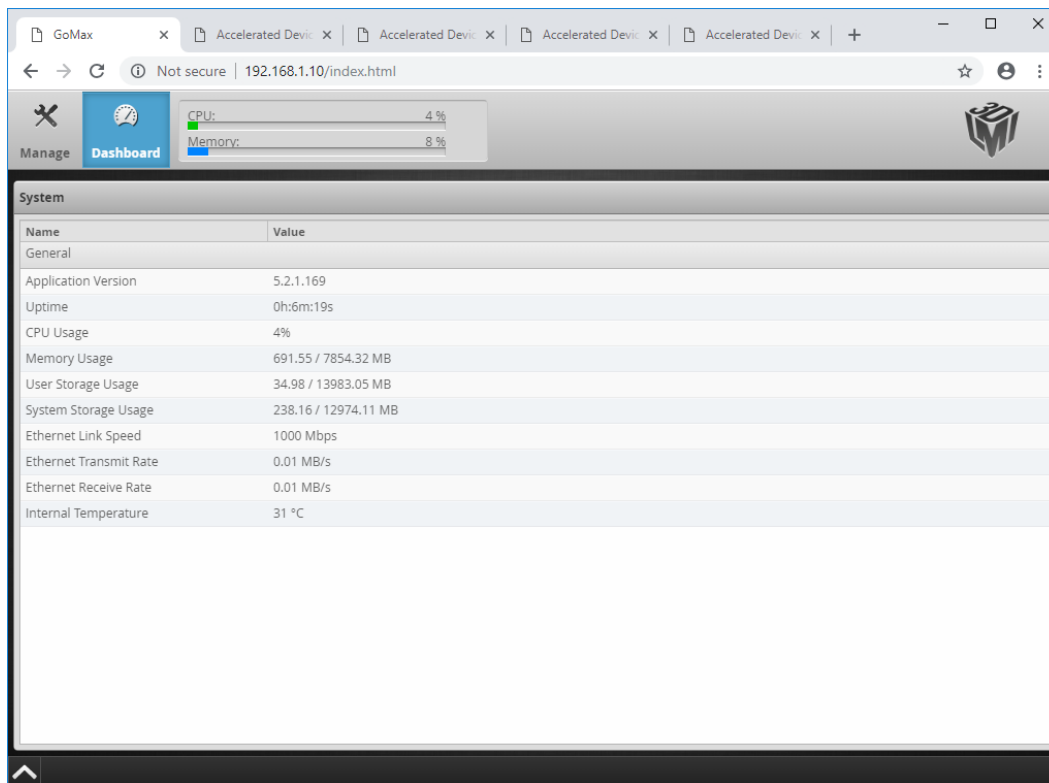
1. Go to the **Manage** page and click the **Maintenance** category.
2. Click **Factory Restore...** in the **Factory Restore** section.



The GoMax unit is restored to factory defaults.

Monitoring GoMax Health Status

The Dashboard page displays information related to the GoMax unit.



The following state and health information is available in the **System** panel on the **Dashboard** page:

Dashboard General System Values

Name	Description
Application Version	The GoMax firmware version.
Uptime	Length of time since the GoMax unit was power-cycled.
CPU Usage	The maximum usage of any of the six individual GoMax CPU cores. For example, this indicator will show 100% when only one of the six cores is at 100% usage.
Memory Usage	The amount of memory used by the GoMax unit (MB used / MB total available).
User Storage Usage	The amount of user storage used on the GoMax unit (MB used / MB total available).
System Storage Usage	The amount of system storage used on the GoMax unit (MB used / MB total available).
Ethernet Link Speed	Speed of the Ethernet link between GoMax and the device it is connected to (sensor or switch).
Ethernet Transmit Rate	The total outgoing data rate between GoMax and the device it is connected to (sensor or hub).
Ethernet Receive Rate	The total incoming data rate between GoMax and the device it is connected to (sensor or hub).
Internal Temperature	Internal temperature of the GoMax unit.

Configuring Network Settings

You configure network settings of GoMax from the **Networking** category in the **Manage** panel, on the **Manage** page. This category lets you do the following:

- Set the GoMax unit's IP address.
- Modify or view the ports that SDK applications should use for communication and control of the accelerated sensors in the system.

Setting the IP Address

Before configuring anything else on the GoMax unit, you should ensure that its IP address does not conflict with any other device (other GoMax units or Gocator sensors) on the sensor system. For more information on this, see *Setting the IP Address* on page 14.

Configuring the GoMax Ports

When a GoMax unit is accelerating a sensor, you access the accelerated sensor not by its internal IP address, but rather by accessing the IP address of the GoMax unit, on a port defined by GoMax. Typically, you can leave the ports at their defaults: you only need to modify the ports if non-default ports have been set.

Furthermore, you can access the web interface of the accelerated sensors via the GoMax web interface, so there is no need to remember the accelerated sensor's IP address.

In some situations, for example, if you need to adapt ports to an existing SDK application, you may need to modify the ports. Otherwise, if you are in the process of developing an SDK application, you can consult the port assignments for each accelerated sensor by clicking the accelerated sensors in the list of accelerated sensors.

The **Port Settings** section only lets you define the port range GoMax can use to assign ports. GoMax automatically assigns the Control, Upgrade, Health, Public, and Web ports for all accelerated sensors in the defined range.

To set the port range:

1. On the **Manage** page, under the **Sensor System** category, make sure that acceleration of all sensors is stopped.

Sensors				
Serial	Model	Version	State	Accelerate
Visible Sensors				
55350	Gocator 3210	5.2.1.169	Unaccelerated	☐
55349	Gocator 3210	5.2.1.169	Unaccelerated	☐
55727	Gocator 3210	5.2.1.169	Unaccelerated	☐
55726	Gocator 3210	5.2.1.169	Unaccelerated	☐

You can't set the port range while GoMax is accelerating any sensor.

2. On the **Manage** page, under the **Networking** category, expand the **Port Settings** section.

The screenshot shows the 'Manage' window of the GoMax Smart Vision Accelerator. On the left is a sidebar with three sections: 'Sensor System' (System information and sensor acceleration), 'Networking' (IP and port settings), and 'Maintenance' (Upgrade and restore). The 'Networking' section is currently selected and highlighted in blue.

The main content area is divided into two sections. The top section, 'Network Adapters', contains a sub-section 'Interface 1' with the following fields:

- Type: A dropdown menu set to 'Manual'.
- IP: A text field containing '192.168.1.10'.
- Subnet Mask: A text field containing '255.255.0.0'.
- Gateway: A text field containing '0.0.0.0'.
- A 'Save' button is located at the bottom right of this section.

The bottom section, 'Port Settings', contains three sub-sections:

- Port Range:** Shows a range of '[3190 - 49151]'. Below this are 'Start' and 'End' fields with values '3190' and '49151' respectively, and a 'Save' button. A note below the fields states: 'Port range cannot be changed while any sensors are accelerated.'
- Accelerated Sensors:** An empty rectangular box.
- Ports Used:** A table with the following data:

Ports Used	
Control:	N/A
Upgrade:	N/A
Health:	N/A
Public:	N/A
Web:	N/A

3. In the **Start** and **End** fields, type the start and end ports of the range.
4. Click **Save**.

GoMax will now assign ports using the defined range. Make sure to leave a range sufficiently large to accommodate all the sensors you intend to accelerate.

Understanding Auto Restart

Once a GoMax unit has started accelerating a sensor, it will try to re-accelerate the sensor in the following situations:

- The GoMax unit is power-cycled or otherwise loses power.
- If an accelerated sensor is disconnected.

If the GoMax unit is accelerating multiple sensors, it will re-accelerate the sensors, one at a time, in the order that they appear in the web interface. For this reason, allow enough time for a sensor in the system to be accelerated before trying to access it.

Understanding How GDK Tools Work with GoMax

GoMax can accelerate custom firmware containing GDK-based tools. Currently however, GDK tool acceleration has the following limitations:

- The GPUs in GoMax are not currently supported. This limits the degree of acceleration available.
- Third-party tools and libraries are not supported unless they compile for ARM8 and can be statically linked into the firmware.

These limitations will be removed soon, in future releases of the GoMax firmware.

Custom firmware is uploaded via the upgrade functionality in the GoMax web interface, in the same way as standard firmware is. For information on upgrading the GoMax firmware, see *Upgrading and Restoring GoMax* on page 26.

For information on building a GoMax target, see the GDK reference documentation and samples.

Troubleshooting

Review the guidance in this chapter if you are experiencing difficulty with a GoMax unit.

Mechanical/Environmental

The unit is warm.

- It is normal for a GoMax unit to be warm when powered on.

Connection

When attempting to connect to the GoMax unit with a web browser, the unit is not found (page does not load).

- Verify that the GoMax unit is powered on and connected to the client computer network. The power indicator LED should illuminate when it is powered.
- Check that the client computer's network settings are properly configured.
- Use IP scanning software to verify the IP address of the GoMax unit.

Performance

The CPU level is near 100%.

- Consider reducing the speed. If you are using a time or encoder trigger source, consider reducing the speed. If you are using an external input or software trigger, consider reducing the rate at which you apply triggers.
- Review the measurements that you have programmed and eliminate any unnecessary measurements.

Specifications

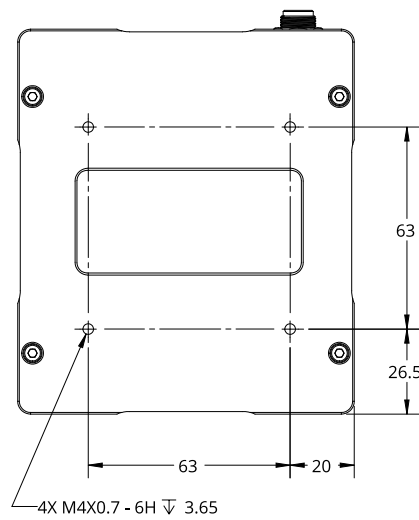
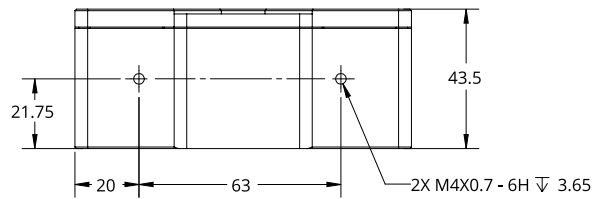
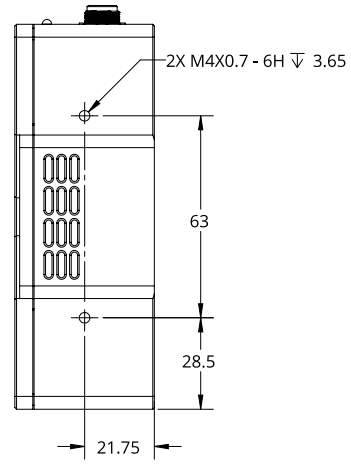
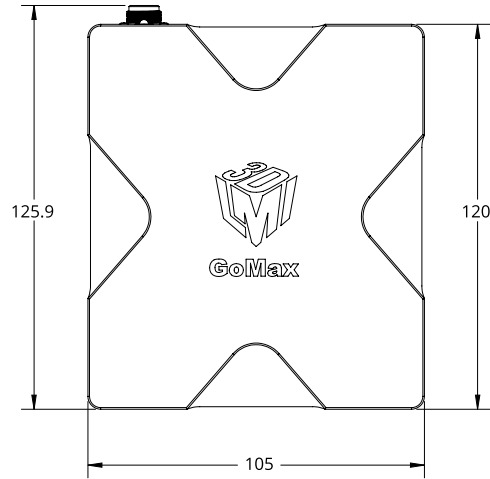
GoMax Specifications

NVidia Module	Jetson TX2
CPU	64-bit Quad ARM A57 @ 2 GHz plus 64-bit Dual Denver 2 @ 2 GHz
GPU	NVIDIA Pascal, 256 CUDA cores
Memory	8 GB 128-bit LPDDR4
IO ports	1x USB3, 1x HDMI, 2x GigE, 1x USB2
Dimensions (mm)	120x105x43.5
Weight (kg)	0.7
Operating Temperature	0 - 45 degrees Celsius



The ETH 2, HDMI, and USB ports are reserved for future use.

GoMax



Return Policy

Return Policy

Before returning the product for repair (warranty or non-warranty) a Return Material Authorization (RMA) number must be obtained from LMI. Please call LMI to obtain this RMA number.

Carefully package the GoMax unit in its original shipping materials (or equivalent) and ship the unit prepaid to your designated LMI location. Please ensure that the RMA number is clearly written on the outside of the package. Inside the return shipment, include the address you wish the shipment returned to, the name, email and telephone number of a technical contact (should we need to discuss this repair), and details of the nature of the malfunction. For non-warranty repairs, a purchase order for the repair charges must accompany the returning unit.

LMI Technologies Inc. is not responsible for damages to a unit that are the result of improper packaging or damage during transit by the courier.

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Modified by Lincoln Cooper to add Safari support and only call the callback once during initialization for msie when no initial hash supplied. API rewrite by Lauris Bukis-Haberkorns

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Support

For help with a component or product, please submit an online support ticket using LMI's [Help Desk](http://support.lmi3d.com/newticket.php) at <http://support.lmi3d.com/newticket.php>.

If you are unable to use the Help Desk or prefer to contact LMI by phone or email, use the contact information below.



Response times for phone or email support requests are longer than requests submitted through the Help Desk.

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