CUBISCAN™ CS 210-L

Operations and technical manual

Version 1.2

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CUBISCAN

Cubiscan™ CUBISCAN 210-L operations and technical manual

⚠ CAUTION	The Cubiscan CS210-L should only be serviced by qualified personnel.
	Observe precautions for handling electrostatic sensitive devices when setting up or operating the Cubiscan CS210-L.
	Disconnect all power to the Cubiscan CS210-L before servicing or making any connections.

Limited warranty
Quantronix new product

<u>Statement of Warranty</u>. Quantronix, Inc.'s, warranty obligations are limited to the terms set forth below: Quantronix (hereinafter referred to as the "<u>Seller</u>") warrants that its new product is in accordance with Seller's published specifications (or those agreed upon with Buyer in writing) at the time of sale or lease and that it is free from non-cosmetic defects in materials and workmanship under normal use for a period of one (1) year from the date of sale or the commencement date under a written equipment lease or rental agreement (the "<u>Warranty Period</u>"). If a hardware defect arises and a valid claim is received within the Warranty Period, at its option, Seller will either (i) repair the hardware defect at no charge, using new or refurbished replacement parts, or (ii) exchange the product or defective part(s) with a product or part(s) that are new or which has been manufactured from new or serviceable used parts and is at least functionally equivalent to the original product or part, or (iii) refund the purchase price of the product after Buyer has returned the product to Seller. For purposes of this warranty agreement, "<u>Buyer</u>" shall mean and refer to (i) the party which originally – whether from Seller directly, or from an authorized distributor, agent or reseller who is authorized by Seller – purchases, or leases under a written equipment lease or rental agreement, the Seller's product which is the subject of this warranty, or (ii) any subsequent purchaser or transferee that acquires valid title to the equipment within the Warranty Period.

In the event of the occurrence of a claim under this warranty, the Buyer shall have thirty (30) days to notify Seller in writing of the nature and specifics of the claimed defect; provided, however, that any and all claims must be received before the expiration of the Warranty Period. Failure to notify Seller within such time period shall void this warranty. Any claim of a warrantied defect is subject to inspection and analysis by Seller, prior to and/or after Buyer ships the product to Seller, to conclusively identify or confirm the nature and cause of failure and application of this warranty. In the event that the defect or damage is excluded from warranty the Seller may at its option either (i) provide Buyer with a quote to make any such repairs or replacements which are not covered under this warranty, or (ii) give Buyer twenty (20) days to pay for return shipping and upon receipt return the product to Buyer. If Buyer fails to pay for return shipping after twenty (20) days' notice and after repairs are made or warranty coverage is determined not applicable, Seller may dispose of or scrap the product.

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This warranty shall not apply to equipment or components which has/have:

1. Been the subject of an accident, or repairs or modifications attempted or made and not authorized by Seller.
2. Been used with incompatible products.
3. Been operated under abnormal conditions, excessive heat or cold, highly corrosive environments, or in an unintended manner.
4. Not been operated or maintained in accordance with Seller's instructions.
5. Been subject to misuse or abuse, negligent handling, improper installation, accident, damage by fire, flood, snow, ice, water or other liquid damage, lightning, abnormal electrical condition and/or power surge, earthquake, or other act of God or events outside of Sellers control.
6. Had serial numbers altered, defaced or removed.
7. Been operated beyond capacity.
8. Not been manufactured by Seller including parts, accessories, or components which have been integrated into, used alongside of, or in conjunction with a product manufactured by Seller.

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SELLER IN ITS SOLE DISCRETION. This statement sets forth the full extent of Seller's liability for breach of any warranty or deficiency in connection with the sale or use of the product. No employee, representative or reseller of Seller is authorized to change this warranty in any way or grant any other warranty.

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CONSUMER PROTECTION LAWS. FOR CONSUMERS WHO ARE COVERED BY CONSUMER PROTECTION LAWS OR REGULATIONS IN THEIR COUNTRY OF PURCHASE OR, IF DIFFERENT, THEIR COUNTRY OF RESIDENCE, THE BENEFITS CONFERRED BY THIS WARRANTY ARE IN ADDITION TO ALL RIGHTS AND REMEDIES CONVEYED BY SUCH CONSUMER PROTECTION LAWS AND REGULATIONS. Some countries, states and provinces do not allow the exclusion or limitation of incidental or consequential damages or exclusions or limitations on the duration of implied warranties or conditions, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary by country, state or province.

This document was created with the purpose of providing the most accurate and complete information. If you have comments or suggestions for improving this manual, contact Quantronix at manual@cubiscan.com.

Manual updated July 24, 2024.

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CHAPTER 1
PRODUCT DESCRIPTION

The CUBISCAN 210-L sensor is designed for 3D measurement and control applications. The sensors is configured using a web browser and can be connected to a variety of input and output devices. The sensor can also be configured using the provided development kits.
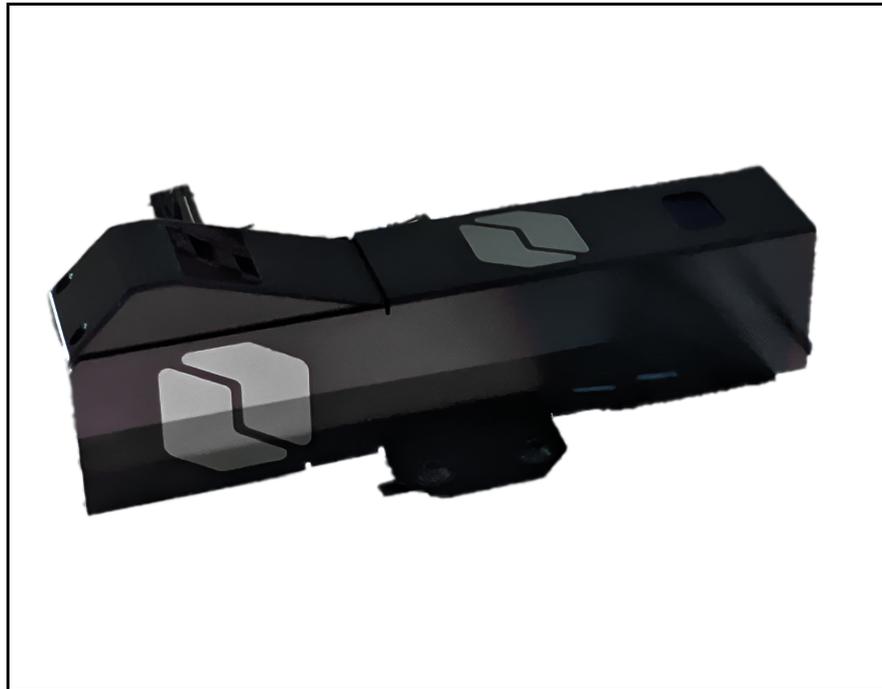
Figure 1
Cubiscan 210-L

Specifications

Power requirements

115 VAC, 47 to 63 Hz

Environmental

Operating temperature: 32° to 122° F (0° to 50° C)

Storage temperature: -22° to 158° F (-30° to 70° C)

Measuring capacities

Scan Rate:	370 Hz (full view) or 800 Hz (configured for 1m x 2m field of view) to 5000 Hz
Clearance Distance:	13.7 in (350 mm)
Measurement Range:	60.0 in (400 mm)
Field of View:	15.4 in to 78.7 in (390 to 2000 mm)
Laser Class:	2, 3R (red, 660 nm)

Physical

Length:	10.7 in (27.2 cm)
Width:	1.9 in (4.9 cm)
Height:	3.34 in (8.5 cm)
Weight:	3.3 lb (1.5 kg)

User interface

Inputs:	Differential Encoder, Laser Safety Enable, Trigger
Outputs:	2x Digital output, RS-485 Serial (115 kBaud), 1x Analog Output (4 - 20 mA)

Part Description

Item	Description
Camera	Observes laser light reflected from target surfaces.
Laser Emitter	Emits structured light for laser profiling.
I/O Connector	Accepts input and output signals.
Power/LAN Connector	Accepts power and laser safety signals and connects to 1000 Mbit/s Ethernet network.
Power Indicator	Illuminates when power is applied (blue).
Range Indicator	Illuminates when camera detects laser light and is within the sensor's measurement range (green).
Laser Indicator	Illuminates when laser safety input is active (amber).
Serial Number	Unique sensor serial number.
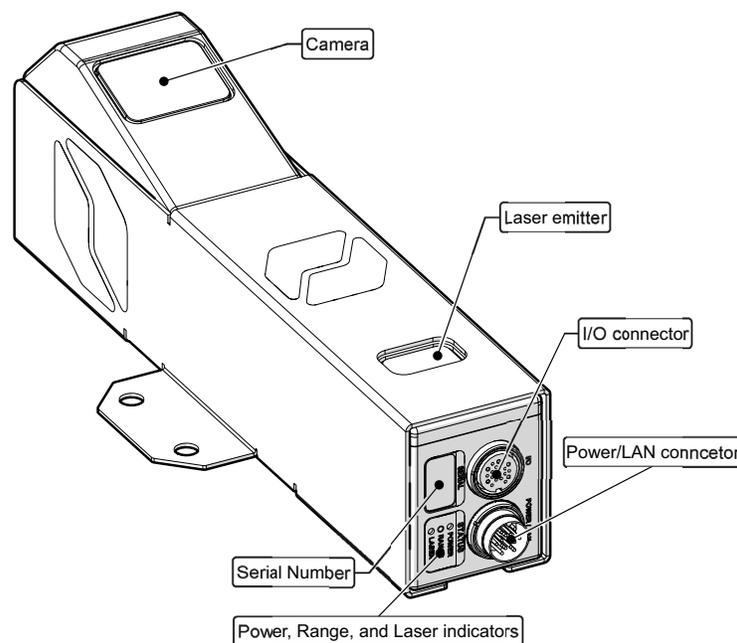
Figure 2
Sensor Details

Safety Precautions

Definitions

Safety definitions are designed in adherence to American National Standards Institute (ANSI) safety sign standards in order to ensure that the Cubiscan is operated and maintained correctly and safely.

DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.

IMPORTANT: Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

Labels

Labels are provided with the Cubiscan to alert operators of potential hazards. Ensure that the labels are properly displayed on the unit and in its vicinity. Do not remove or alter labels for any reason without first consulting a Cubiscan representative.

Danger High Voltage
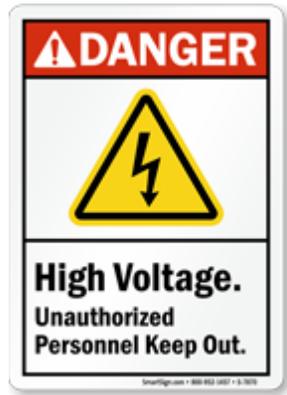
Electric Shock

Caution

Warning

Do not use Cubiscan near electronic devices that handle high-precision control or weak signals as it may affect electronic devices leading to malfunction.

Do not allow foreign matter or liquids to get inside the Machine. Doing so may cause short circuit or smoke, resulting in fire, electric shock, or malfunction. If foreign matter or liquid gets inside the Cubiscan, immediately turn off the machine and unplug it from the outlet.

If the Cubiscan is dropped or suffers a strong impact, immediately turn it off and unplug it from the outlet. Continued use may cause fire, electric shock, injury, or malfunction.

Do not operate the touch panel with sharp objects. Pressing the touch panel strongly with a sharp object may cause damage, leading to malfunction.

Do not climb onto or lean on the Cubiscan. Doing so may cause injury.

Regular cleaning and calibration tests are required to maintain accurate measurements. Run calibration tests after any maintenance work.

Turn off power to the Cubiscan and unplug it immediately if the machine gives off an odd smell, makes unusual sounds, emits smoke, or overheats. Call **Cubiscan Technical Assistance** at **801.451.7000** for assistance. Failure to do so could result in fire, accidental electrocution, and possible machine damage.

Electrical Hazards

Avoid handling electric cables, plugs, and other electrical components when connected to a live power source. Follow these safety standards when working with electrical components of the Cubiscan:

- Turn off the power to the machine before unplugging.
- Be sure to hold the plug, NOT the power cable, when unplugging.
- Whenever handling electrical cables or components, do so with care.
- Never place cables and other electrical components near a heat source.
- Ensure that grounding wires are in place and secure before operating the Cubiscan.
- Avoid stepping on or placing heavy objects on cables.
- Do not modify, bend, or otherwise tamper with cables and other electrical components.

If damage is observed from a cable, plug, or other electrical component, turn off the machine immediately and unplug it from the power source. Consult a Cubiscan trained technician for replacement.

If you do not use the unit for a long time, disconnect the power plug from the outlet to ensure safety. Allowing it to remain plugged in over a long period of time without use may cause fire or electric shock.

Failure to observe safe electrical standards may result in accidental electrocution, damage to the machine, fire, and possible injury or death.

Heat Warning

Motors and other electrical components, especially batteries, heat up during use. If the unit is used extensively, these parts may become overheated causing a potential hazard to the machine and the operator.

To avoid injury, when working around motors and other electrical components, avoid contact with these parts during operation and shortly after. Even with the power off heat may be retained in the part for several minutes after operation.

 If you find certain parts are heating well beyond the temperature threshold, shut down the unit to prevent injury. Ensure that the problem is not a result of the surrounding environment. If it is, move the unit to a more suitable environment. If the problem persists, consult a Cubiscan technician.

Environment

The Cubiscan should not be installed in any environment where excessive heat, humidity, or dust is present. Variations in temperature or direct exposure to sunlight may cause inaccuracies in measurements and could damage sensors. Do not install near fans where temperatures may fluctuate, causing variations in measurements.

Do not install the Cubiscan in a location that is inclined as this will affect the precision of its measurement and may contribute to instability resulting injury if the unit tips over. Install the unit on a flat surface and stable location, where it can easily be leveled.

Some setups will require multiple cables running to the Cubiscan. This may cause a potential tripping hazard that can damage the unit and cause injury. Install the unit in a low traffic area, where wires may be tucked against a wall or some other inconspicuous place. If wire must be run in a traffic area, take precautions to prevent tripping such as taping down the cables or providing a cable ramp or other protective cover.

Accessories

Certain accessories used with the Cubiscan may pose risk outside the scope of the standalone unit. These may include but are not limited to: scales, portable batteries, camera units, shrink wrappers, etc. Please consult additional documentation for the individual units. A collection of this documentation for each accessory sold with the unit may be found on the Cubiscan website: https://cubiscan.com/guides-accessories/

Cubiscan is not responsible for third party accessories used with the unit. Before using third party accessories, consult a Cubiscan sales representative or technician to ensure that the implementation of the accessory will not pose a safety risk, harm the Cubiscan, or potentially void the warranty.

Laser Eye Safety Classification

> "Complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dates May 8, 2019."

Class 2 and 3R

This Cubiscan is a Class 2 and 3R lasers product under IEC 60825-1. According to IEC guidelines, a Class 2 and 3R laser is considered safe in all applications. The levels of optical radiation emitted from a Class 2 and 3R laser are above the exposure limits for the eye under any exposure condition.

CAUTION

> "Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure"
>
> Note: there is no exception for this statement based on Class of radiation or the applicability of actual controls on the product.

For safety reasons, the laser within the Cubiscan is not serviceable. Do not attempt to repair the laser yourself, remove it from its casing, or tamper

with it in any way. Doing so may expose you to harmful radiation and will potentially damage the laser.

If the laser is suspected to be damaged, call **Cubiscan Technical Assistance** at **801.451.0500** for assistance. A Cubiscan certified technician will assist you.

Whenever performing maintenance on the Cubiscan, power it down and unplug it. This will ensure the user is not exposed to harmful radiation during maintenance.

This chapter provides instructions for the unpacking and setting up of the CUBISCAN 210-L sensor. Along with the CS 210-L sensor, the customer assembly kit includes:

– Aluminum extrusion frame customized for the customer's conveyor and control box.

– The CS 210-L Control box.

– The CS 210-L Assembly kit. The kit includes the sensor, cables and hardware, a calibration cube, and encoder.

Mounting

After the extrusion frame is installed in the conveyor system, mount the sensor to the frame. The CS 210-L sensor includes a mounting bracket used to mount the sensor to the extrusion frame. The bracket provides through holes to secure the unit to the frame.
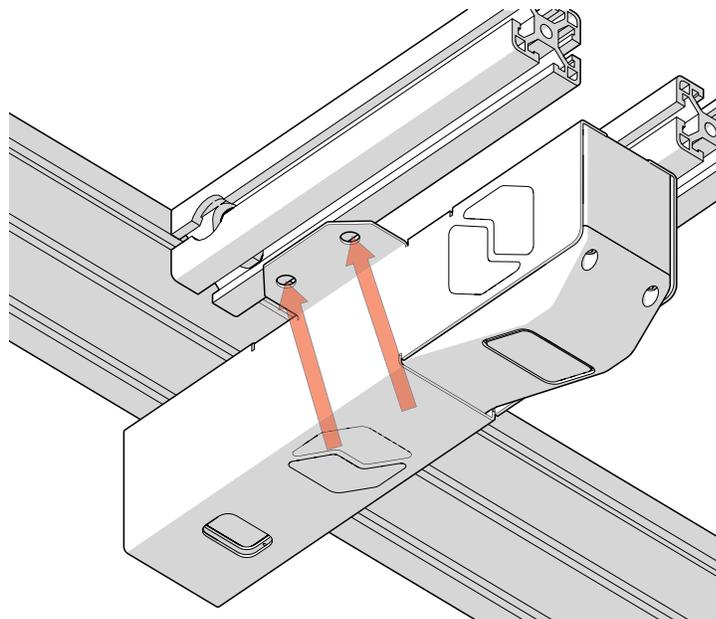

Figure 3
Mounting sensor

Care should be taken not to install sensors near objects that might occlude the camera's view of projected light.

NOTE ❯ *Proper care should be taken in order to ensure that the internal threads are not damaged from cross-threading or improper insertion of screws.*

Measurement Field

In order to install the sensor properly it is helpful to understand three main concepts with regards to the scanning field of the CS 210-L sensor: Clearance distance (CD), field of view (FOV), and measurement range (MR).
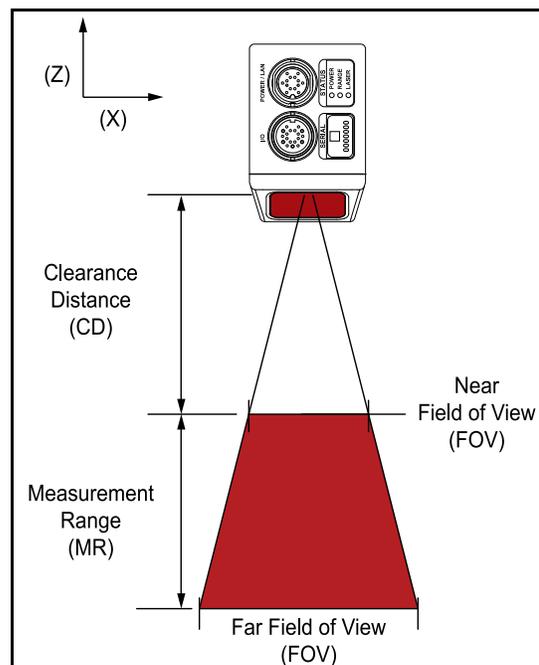

Figure 4
Scanning Field

Clearance distance

This refers to the required minimum distance for the sensor to measure a target. If the target is closer than the clearance distance, the sensor cannot provide reliable measurements resulting in data that is invalid.

Measurement range

This is the distance where the target may be accurately scanned. It begins at the clearance distance and extends vertically to a maximum distance. Due to the scattering of the laser, accurate measurements can only be made within the measurement range. Any measurements taken of a target beyond this range will result in data that is invalid.

Field of view

The measurement area also encompasses the field of view, which is the width of the measurement area along the X axis. The Field of view narrows towards the clearance distance, but the X and Z resolutions are much higher. At the other extreme, the measurement area widens towards the maximum distance of the measurement range, but the resolution is lower.

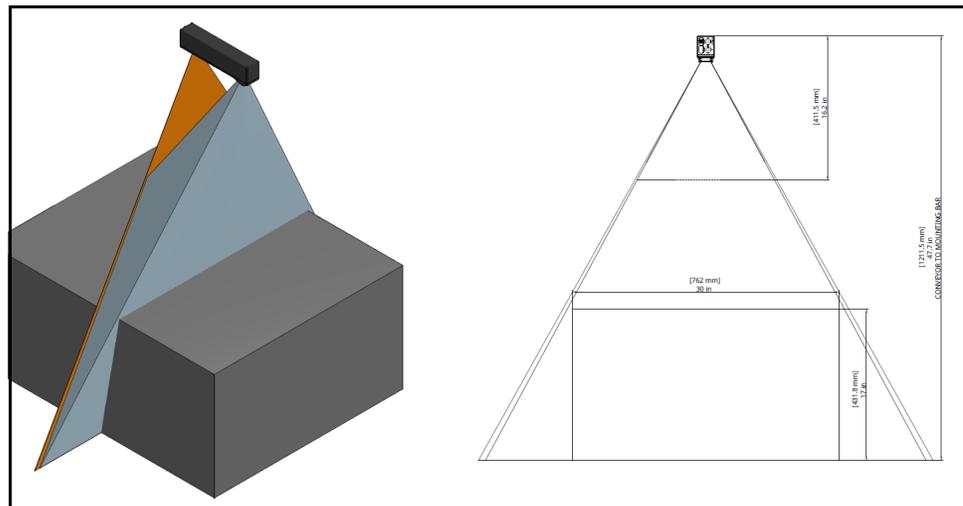Figure 5
Medium Range

For best resolution place the sensor at a height that will allow the target to be closest to the clearance range while still allowing full scanning of the target within the measurement area.
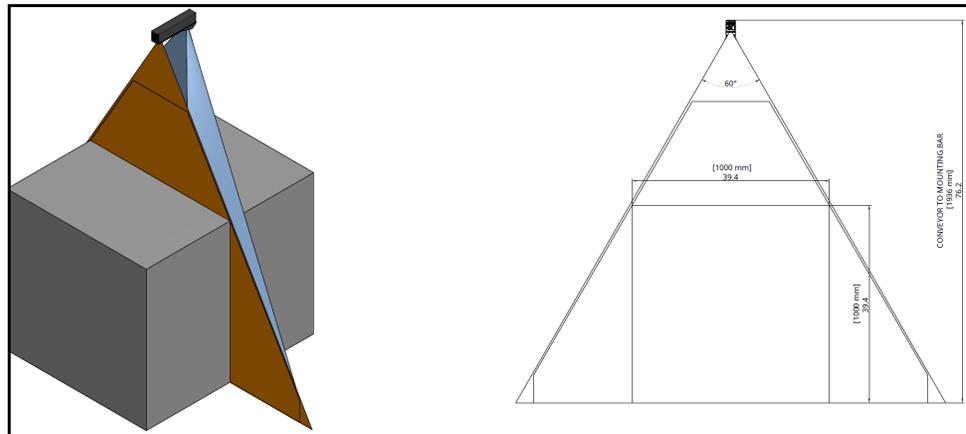
Figure 6
Full Range

Control Box

Once the CS 210-L sensor is mounted for optimal measurement of target, the control box may be mounted to the side of the extrusion frame. Ensure

that the control box is in a location and at a height where it is easily accessible.

Figure 7
Control Box

The controller may be mounted to the frame with four bolts at each of the corners.
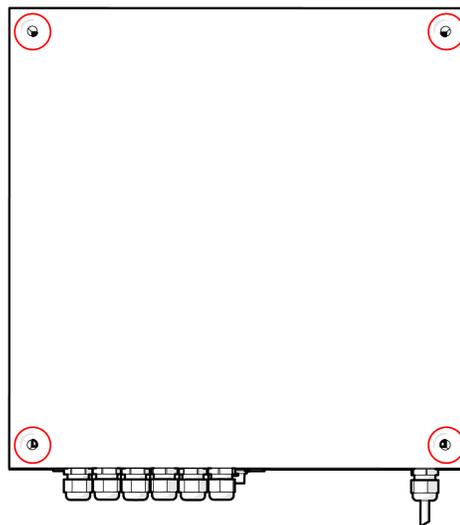
Figure 8
Back panel

At the bottom of the control panel conduit holes are provided to run cord out to a power source and to run connections to the sensor and other

external sources such as a computer terminal. Network connectors are also provided to connect to Ethernet.

Figure 9
Control box

The control box houses the conduit connectors, network connectors, and the junction board.

Figure 10
Junction board

For specifics of setting up sensor systems specific to your needs, please **contact Cubiscan Service and Support at 801.451.0500** or your system integrator for assistance.

CHAPTER 3
CONFIGURATION

This chapter Provides instructions for configuring the Cubiscan 210-L. This chapter also Provides instructions for configuring the units, dimensional weight factor, and other settings.

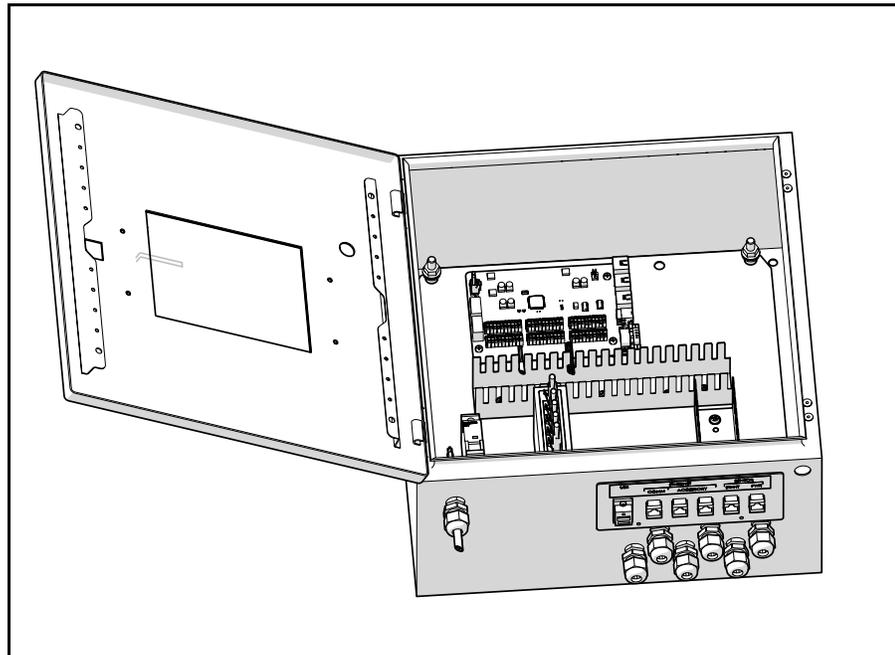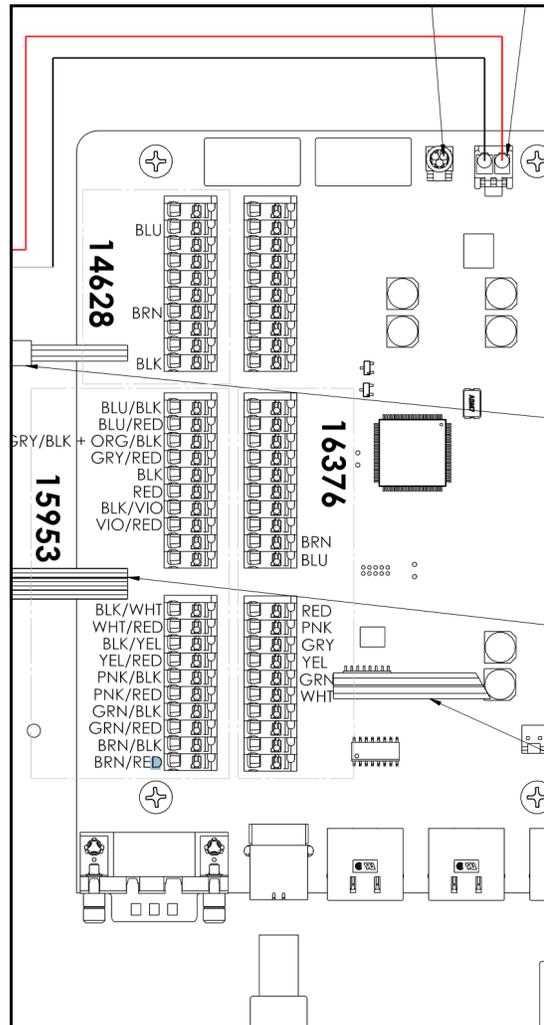If you are using Qbit software, see the *Qbit User Guide* located on your flash drive. The Qbit User Guide can also be downloaded from the Cubiscan website at www.cubiscan.com.

Settings

General settings

The Cubiscan 210-L may be customized to suit your specific dimensioning needs. To access the general settings, complete the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **SETTINGS**.
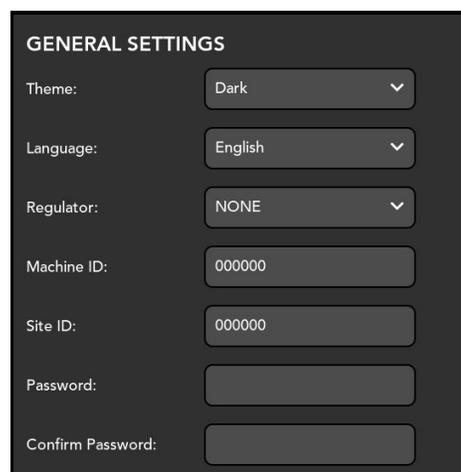
GENERAL SETTINGS

Theme:	Dark
Language:	English
Regulator:	NONE
Machine ID:	000000
Site ID:	000000
Password:	
Confirm Password:	

Figure 11
General settings

Theme   Aside form light and dark themes, a custom theme may be created, see "Create Theme" on page 18.

Language   Select your desired language form the following options: English, French, Spanish, Japanese, and Chinese.

Regulator   Choose the regulator standard form the drop-down menu. Options include: none, Australian, European/Middle Eastern, and United States/Canada. The default is *none*.

Barcode   Select form the drop-down menu to enable up to two barcode scanners. The default is *none*.

Machine ID   Optional Machine ID may be set for the Cubiscan. This may be useful in a facility where data is tracked from more than one Cubiscan.

Site ID   Optional Site ID may be set for the Cubiscan. This is helpful to distinguish tracking data received from multiple Cubiscan machines from different sites.

Password   Optional password Protection for the touchscreen is available. Enter desired password into the text field and reenter it in the field next to **Confirm Password**. This password will also block the web interface administration page.

                When the password is set you will also be prompted to enter the *password* and *user name* to access the web interface administration page. The *user name* will be **cubiscan** and the *password* will be whatever is entered in the settings.

Create Theme

The interface for the Cubiscan 210-L may be customized to suit your preferences and needs. You may select from the preset light or dark themes or create a new custom theme. Complete the following steps to create your own custom theme:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **SETTINGS.**

3. Select *Custom* from the drop-down menu next to **Theme** in the General Settings. A button will appear reading, **Create Theme**.

4. Tap [**Create Theme**].
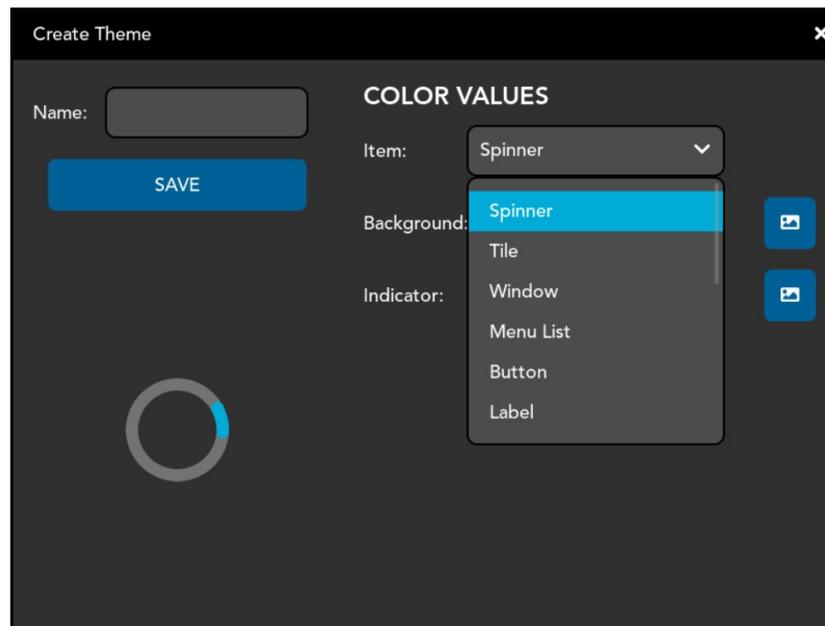
Figure 12
Custom theme

5. Enter a name for the customized theme in the text box next to **Name**.

6. Select an item to customize from the drop-down menu next to **Item**.
    Options include: spinner, tile, window, menu list, button, and label.

7. With the item selected you may make changes to appearance and
    color. When complete select the next item to customize.

8. Before leaving the customization screen, tap [**Save**] to keep changes.

9. You may now select the custom theme from the **Theme** drop-down on
    the General Settings screen.

Date and Time

To set the date and time complete the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **SETTINGS.**

3. Scroll down to the **Date and Time Settings**.
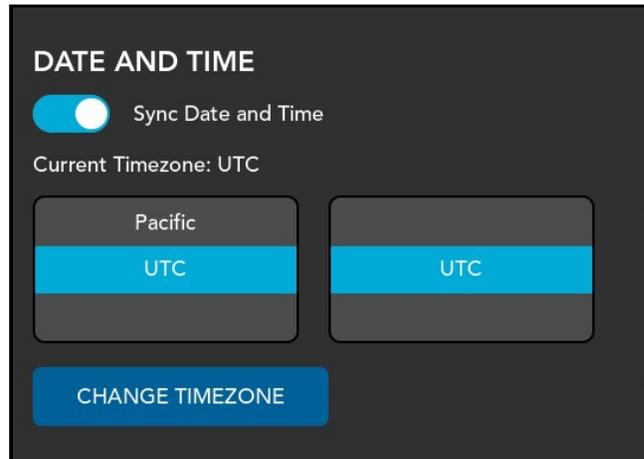
Figure 13
Date and time settings

The following settings are available:

Sync Date &Time
The option is available to set the Cubiscan to sync date and time. In order for the Cubiscan to sync a connection must be set up.

Current Timezone
Set the timezone for the Cubiscan. Be sure to tap **[Change Timezone]** after making any changing the timezone settings.

Date Settings
Set the date for the Cubiscan using the calendar input. Tap **[Change Date]** after making changes to the date to ensure changes are saved.
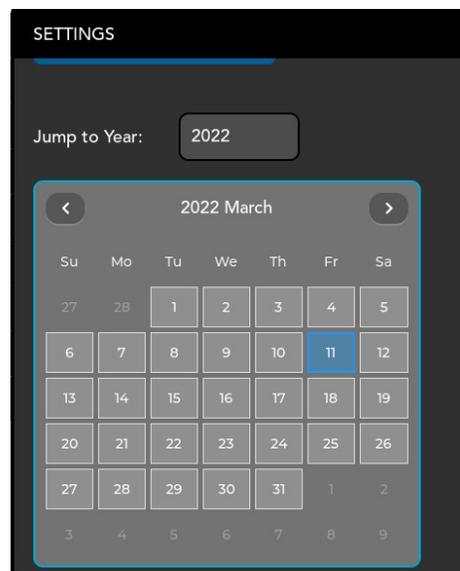
Figure 14
Date settings

Time Settings   Set the time by entering values into the text fields next to **Hour**, **Minute**, and **Second**.
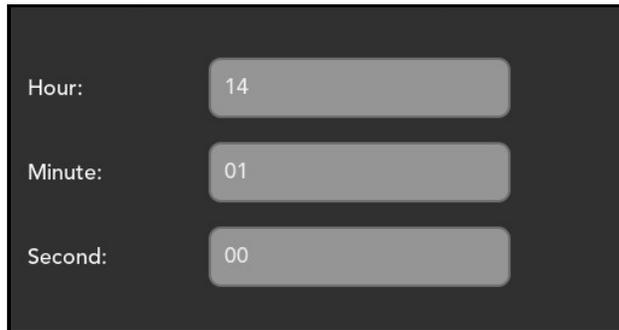
Figure 15
Time settings

System Reset

In the event that settings need to be reset back to factory defaults, the Cubiscan 210-L has a system reset. By initiating system reset, all settings including custom settings will be reset back to their initial presets. Reseting the system back to defaults will result in loss of all custom settings and should be avoided unless absolutely necessary.

Figure 16
System reset

To initiate a system reset complete the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **SETTINGS.**

3. Scroll down to **System Reset.**

4. Tap **[RESET TO FACTORY DEFAULTS]**.

Measure Settings

The following options can be used to configure your Cubiscan 210-L. Settings exist for configuring measurements and the interface, allowing you to setup a measurement system that meets your needs and preferences.

To access the measure settings, perform the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **MEASURE SETTINGS**.
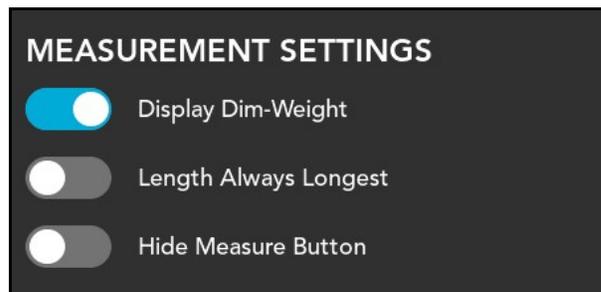
Figure 17
Measure settings

Display Dim Weight	Toggle this switch to display the dim weight and factor on the home screen.
Length Always Longest	When enabled, this option ensures that no matter how an object is oriented, the greatest dimension measurement will be assigned to length.
Hide Measure Button	Toggle this switch, to remove the **[Measure]** button from the home screen. This may be helpful if the Cubiscan is configured for measurement triggers such as *scale stable* or *barcodes filled*.

Units

The Units section, Provides configuration of measuring units. These units will be displayed on the measurement screen and will be posted to data acquired during measurements.

Figure 18
Units

Dim units   In this field you can select **inches**, **centimeters**, or **millimeters** for your dimensional unit.

Weight units   In this field you can select **pounds** or **kilograms** for your weight unit.

Dim-factor   In this field you can select a **domestic** or **international** dim-factor.

Connection

The Connection section Provides information and options for the setup of an Ethernet or other connection, allowing for the transfer of data from the CS 210-L.

To access the connection settings, perform the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **CONNECTIONS**.

Ethernet Settings

The Ethernet Settings field allows you to select the Ethernet settings for the Cubiscan. The following information is displayed to help you connect with the CS 210-L: **MAC Address**, **IP Address**, **Subnet**, and **Gateway**.

ETHERNET SETTINGS

MAC Address:	00:30:D6:30:4E:92
IP:	192.168.1.66
Subnet:	255.255.255.0
Gateway:	0.0.0.0

Enable Ethernet
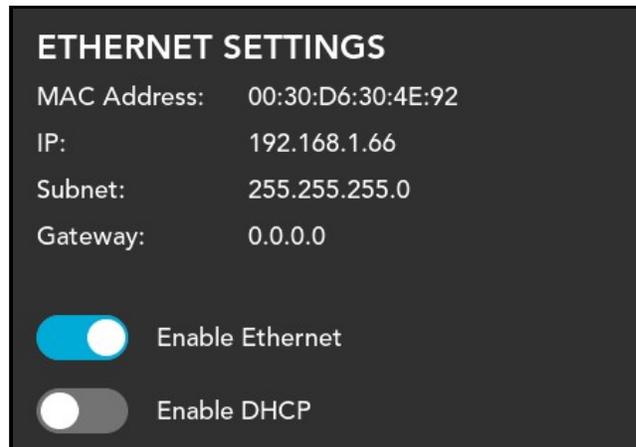
Enable DHCP

Figure 19
Connection

Enable Ethernet Toggling this option enables or disables the Cubiscan 210-L's ability to communicate via Ethernet.

Enable DHCP Toggling this option enables or disables a Dynamic Host Configuration Protocol (DHCP) connection.

USB Settings

The USB Setting allows the user to set up the device USB type. Select whether to enable the **Virtual Serial** by selecting the option from the drop down menu next to Device USB Type.

USB SETTINGS

Device Usb Type: Virtual Serial

Disabled

Virtual Serial

COMMUNICATION
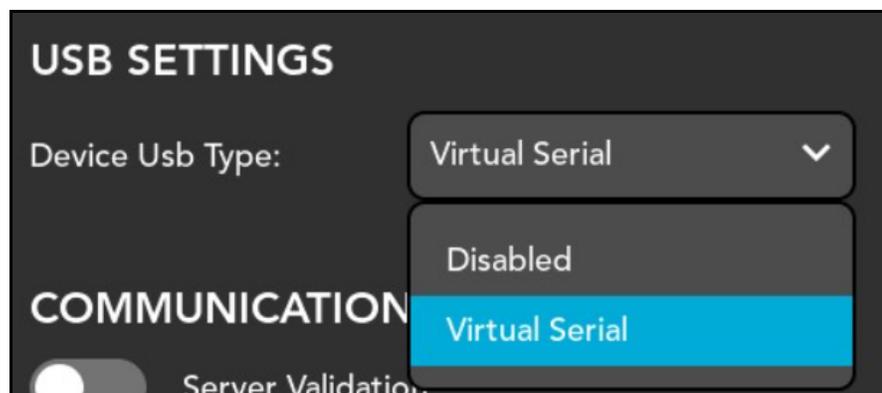
Server Validation

Figure 20
USB setting

Communication Settings

The Communication Settings Provides a toggle for server validation. Toggle the **Server Validation** to enable or disable server-side validation.
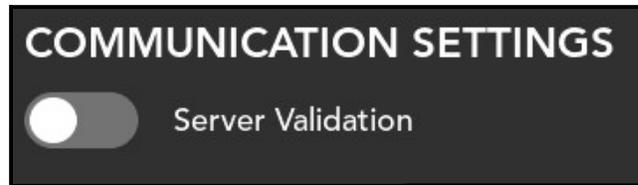
Figure 21
Communication settings

Web-server

The Web-server settings Provides options to set Protocol and certificate server request (CSR).

Figure 22
Connection - Protocol

Protocol | Enable or disable Protocol and set desired Protocol. Options include: **HTTP AND HTTPS**, **HTTP** only, and **HTTPS** only.

Write CSR to file | Tap **[Write CSR to file]** to copy the certificate signing request to file. If you would like to a different certificate for https than the self-signed, you may download the CSR file to create your own. After creating the CSR, upload it with the name "cert.pem".

Post

The Post section provides a toggle to enable or disable the posting of data.
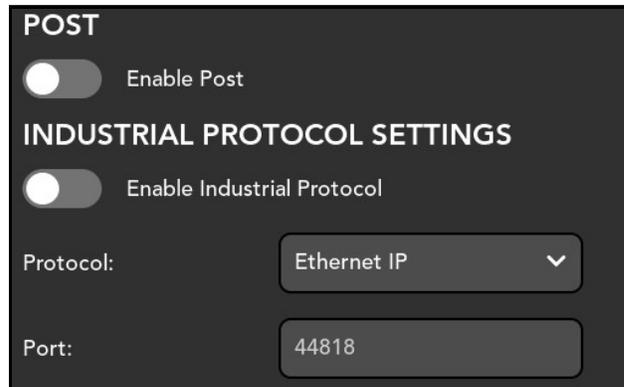
Figure 23
Connection - post

With post enabled, the following information will be needed for the Cubiscan to post data:

Port   Enter the network port used to transfer data.

Post URL   Enter the address of the computer or network to which the data will be transmitted.

Data Format   Select the format of the data to be transmitted. Options include JSON and XML.

Scale Setting

The Cubiscan 210-L can be configured to function with various third-party scales. To configure the scale, complete the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **SCALE**.

3. Under the drop-down menu next to **Scale**, select the option for your scale.
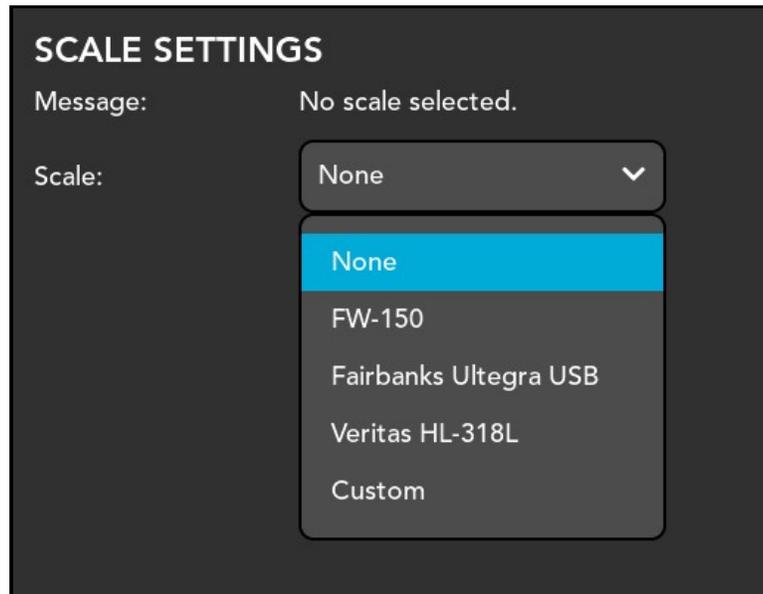
Figure 24
Scale drop-down

Custom scale settings

If your scale does not show up in the list, you may choose custom scale settings by entering the scales settings on the parse setting and connection setting screens. Be sure to tap **[SAVE SCALE CONFIG]** to save configuration.

Parse Settings

1. Select **Custom** from the drop down menu. *Custom Scale Settings* will appear.
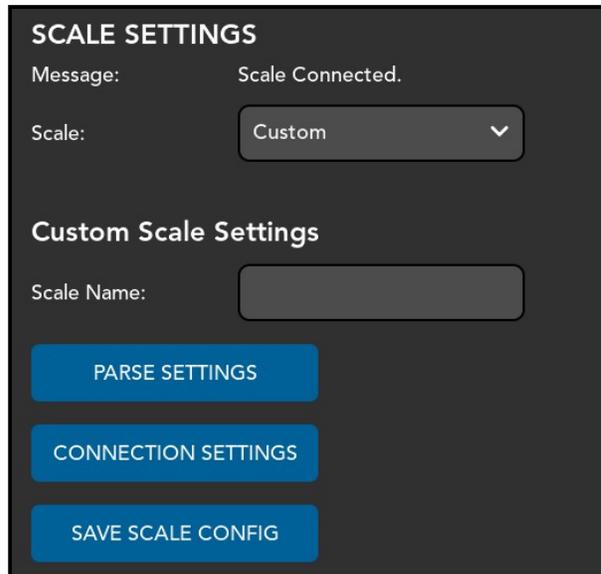
Figure 25
Custom scale settings

2. Enter the name of the scale by tapping in the text box.

Parse Settings

To enter the parse settings for the scale, tap **[PARSE SETTINGS]**. This will bring you to the Parse Settings screen. From here you can enter the values manually in the text fields according to the strings in the scale data packet.

You may need to consult the scale manufacturer for setting details. The following information is needed:
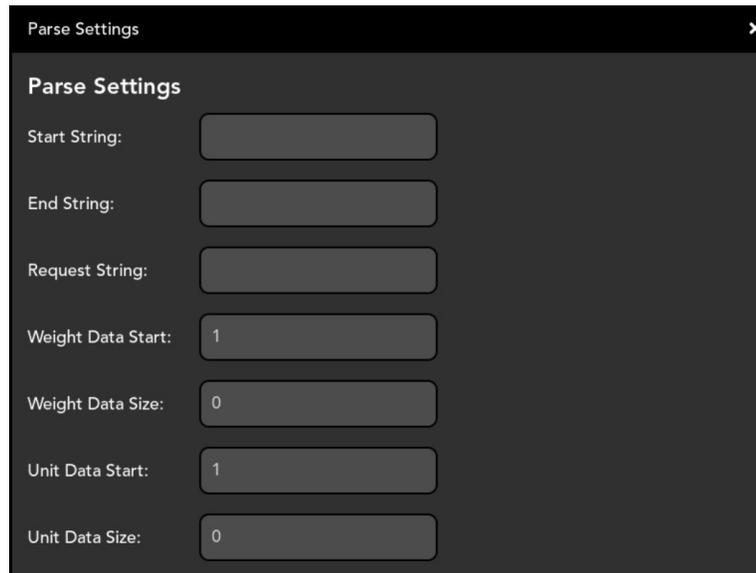
Figure 26
Parse settings

Start String   The start string is the series of characters that mark the beginning of the scale data packet.

End String   The end string is the series of characters that mark the end of the scale data packet.

Request String   The request string is the series of characters that are sent to the scale to request measurement. If the scale is continuously sending data, this field will be left blank.

Start strings, end strings, and request strings often have control characters that cannot be entered directly through the keyboard. To allow these characters, a **#** symbol followed by 2 hex numbers may be used. These will be converted to their ASCII equivalent of the numbers.

Common characters used in strings are STX, ETX, CR, and LF. The following are their hex numeric equivalent:

Character	Hex Number Equivalent
STX	#02
ETX	#03
CR	#0D
LF	#0A

Scale request: <STX>s<ETX><CR><LF>
Scale data packet: <STX>sAK0000.000,lb<ETX><CR><LF>

Start String: #02
End String: #03#0D#0A
Request String: #02s#03#0D#0A
Weight start position: 5
Weight data size: 8
Unit start position: 14
Unit data size: 2

Figure 27
Sample string

Weight Data Start	The weight data start determines the position of the first character in the scale's weight data.
Weight Data Size	The weight data size determine how long the weight data should be.
Unit Data Start	The unit data start determines the position of the first character in the scale's unit data (typically lb or kg).
Unit Data Size	The unit data size determine how long the unit data should be.

Connection Settings

To configure the connection settings for the scale, tap **[CONNECTION SETTINGS]**. Enter values for the scale connection in the text fields

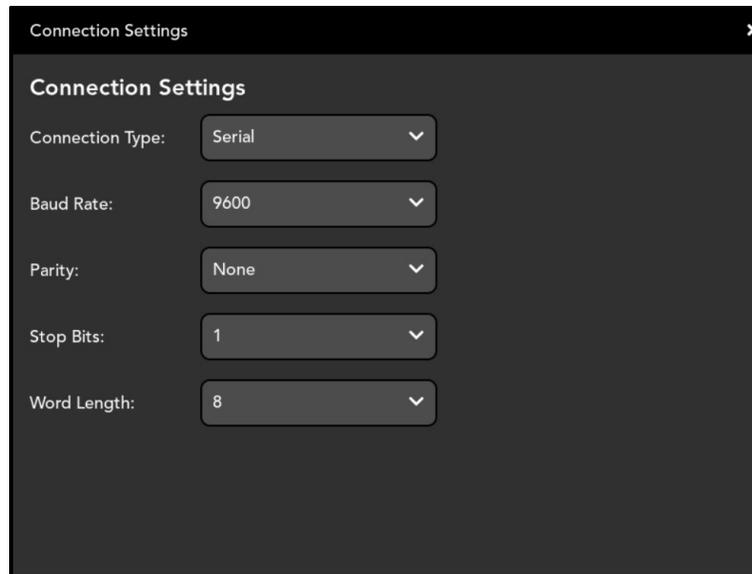
Figure 28
Scale connection settings

Once scale settings are entered, tap **[SAVE SCALE CONFIG]** to keep the new settings.

Sensor Settings

The Sensor Settings section provides options to configure and calibrate the Cubiscan 210-L sensors for better performance.

To access the sensor settings, perform the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **SENSOR SETTINGS**.
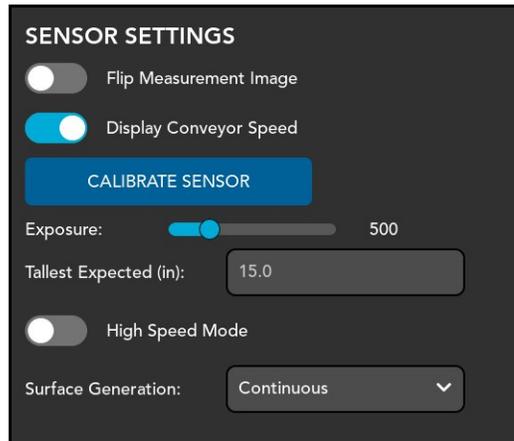
Figure 29
Sensor settings

| Flip Measurement Image | Depending on the position of the touchscreen display, it may be necessary to flip the measurement image in order to accurately display the orientation of what is being measured. Toggle the switch to enable this option. |

Display Conveyor Speed — Toggle this option to display the conveyor speed on the measurement screen.

Calibrate Sensor — Tap [Calibrate Sensor] to begin the sensor calibration process. For more information on the calibration process, see "Sensor Calibration" on page 38.

Exposure — Use the exposure bar to adjust the exposure length of the sensor. Adjustment of exposure may be necessary if the sensor is struggling to properly detect objects along the conveyor.

Tallest Expected — Set the maximum range for height.

High Speed Mode — Toggle to enable High Speed Mode. This will allow the Cubiscan to dimension objects at faster conveyor speeds. While this may be convenient, it should be used only if necessary as it may significantly impact the accuracy of dimensioning.

Surface Generation — Set the surface to be generated by the sensor. Options include **continuous, variable length or fixed length**.

Continuous – Does not require a photo eye input for measurement, but does require an appropriate height threshold parameter to be set. The sensor will self trigger for measurement based on the height threshold

setting. Due to the lack of a photo eye input, the data will be transmitted according to the *trailing edge* of the product plus variability.

Variable length – Requires the use of a photoeye to trigger the measurement. Data will be sent based on *trailing edge* of product. This requires the distribution board parameter to be set appropriately.

Fixed length - Requires the use of a photoeye to trigger measurement. Data will be transmitted based on *leading edge* of product. The trigger for measurement is base on a fixed time (equatable to length), determined by user in the settings. The system will NOT allow a new trigger signal until the current signal expires. This parameter requires the distribution board settings to be set appropriately.

Continuous is best for items that distinguishable start and stop edges that can act as a trigger for the sensor. If no distinguishable start and stop edges exist, then fixed length or variable length is preferred, depending on variability of product length.

Encoder

ENCODER

Resolution (mm/tick):   0.025

Frequency: 0
Frequency: 1892.8

Figure 30
Encoder

Resolution   Encoder resolution is expressed in millimeters per tick. Each tick represents to one of the four encoder quadranture signals (A+, A-, B+, B-).

– **Frequency**

Use the encoder frequency to verify that the encoder is wired to the sensor correctly. Frequency reading may also be used in manual calibration if necessary.

Part Detection

PART DETECTION

Height Threshold (in):	0.4
Gap Width (in):	2.0
Gap Length (in):	2.0
Padding Width (in):	0.0
Padding Length (in):	0.0
Min Area (in2):	9.30
Max Part Length (in):	39.4

Figure 31
Part detection

Height Threshold
Used to determine threshold for profile height of a particular part. Together with Threshold direction, the Height threshold will determine what should be measured and what should be excluded from each scan.

Gap Width
Determines the minimum separation between successive objects along the X axis. Parts within the Gap width will be measured as a single part rather than separate parts.

Gap Length
Determines the minimum separation between successive objects along the Y axis. Parts within the Gap length will be measured as a single part rather than separate parts.

Padding Width
Set added white space along the width of the captured measurement. Values are in inches.

Padding Length
Set added white space along the length of the captured measurement. Values are in inches.

Min Area
Determines the minimum area for a detected part. This value will allow the sensor to filter out small objects on the conveyor that should not be part of the measurement.

Max Part Length
Determines the maximum length of the part. In order to provide greater reliability, any measured object that exceeds the maximum length will be separated into two parts. This can also be use to measure multiple sections of the same object.

Distribution Board

Enter the values in the Distribution Board settings to calculate the Encoder Linear Resolution.
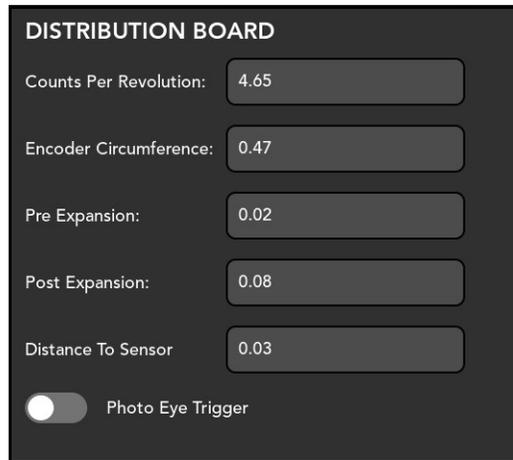
Figure 32
Sensor settings

Counts Per Revolution
: Set the revolutions per counts for the encoder resolution.

Encoder Circumference
: Enter the circumference of the conveyor roller.

Pre/Post Expansion
: Expand the surface by appending part of adjacent frames before or after the current frame.

Distance to sensor
: Enter the distance from conveyor to sensor.

Photo Eye Trigger
: Enable to allow the CS 210-L to trigger off of input from the photo eye.

Barcode

To setup and configure a barcode scanner to the CS 210-L, complete the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **Barcode.**

Figure 33
Enable barcode

3. Tap **Barcode Count** to select the number of barcodes to be scanned (one or two).
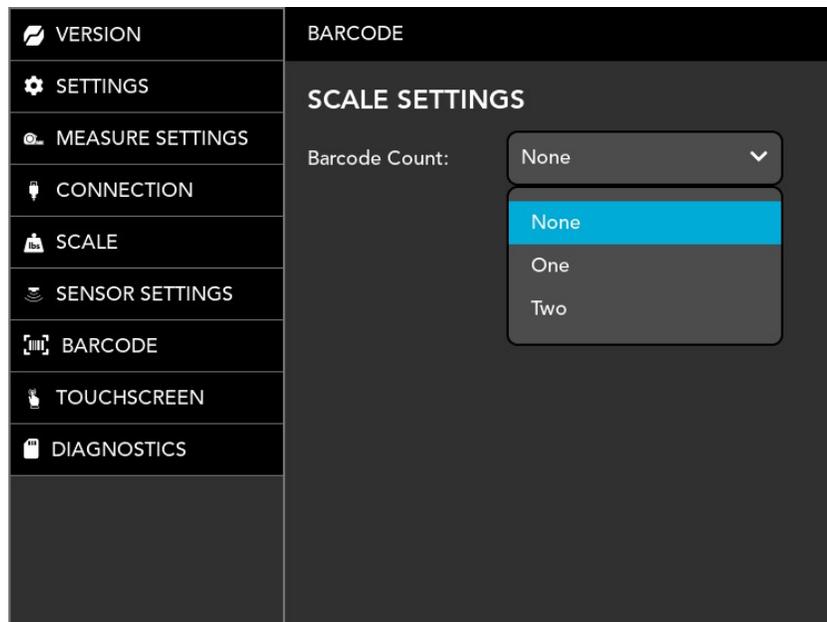
Figure 34
Barcode count

4. Next select the scanner type. CS 210-L allows you to connect a scanner with a USB or Ethernet connection.
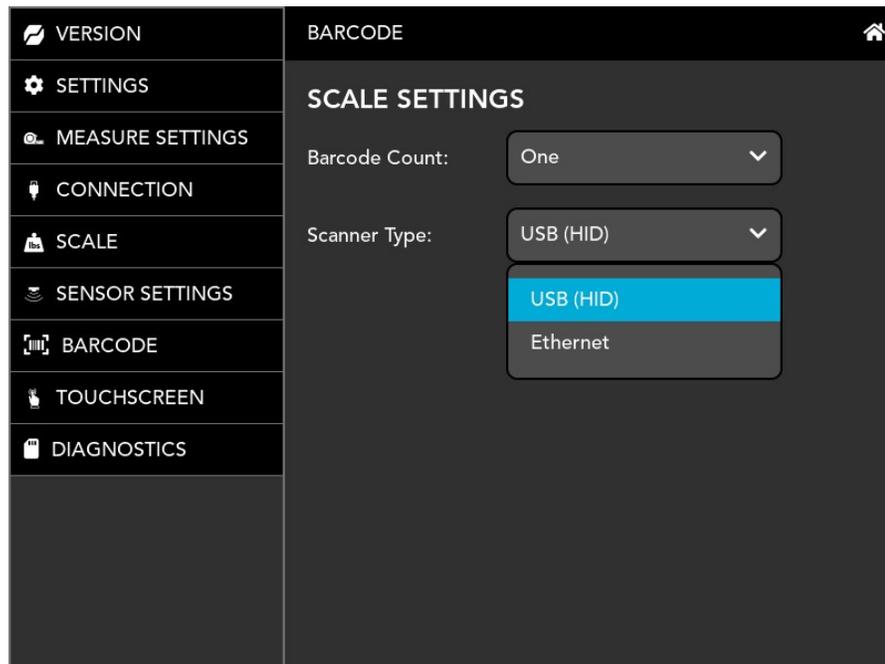
Figure 35
Scanner type

Touchscreen

The touchscreen for the Cubiscan 210-L is calibrated before it is shipped to the customer. However, there may be occasion where a calibration may be needed. To calibrate the touchscreen, complete the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

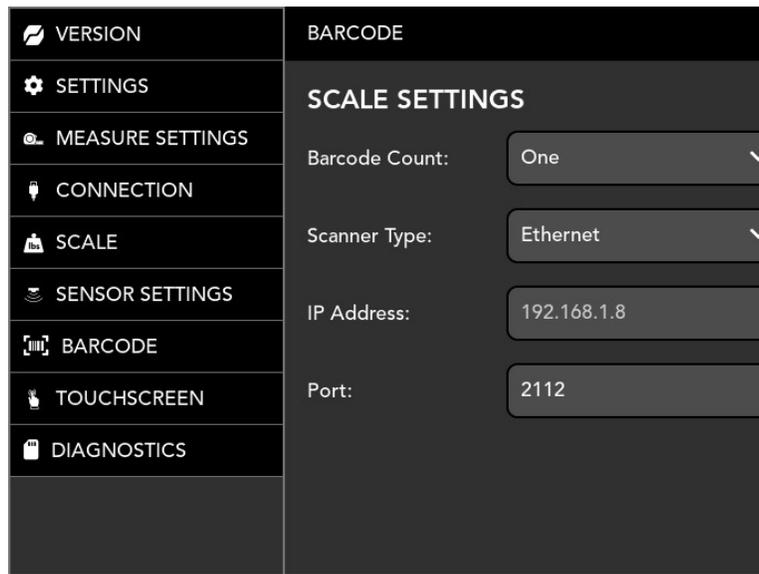2. From the menu side panel, select **TOUCHSCREEN**.

3. Tap **[Calibrate Touchscreen]** to begin the calibration.

Figure 36
Touchscreen calibration

4. When Prompted, tap the + on the screen

5. Once complete, a green check mark will appear, indicating the calibration is complete.

Figure 37
Calibration complete

CHAPTER 4
CALIBRATION

This chapter provides instructions for calibrating the Cubiscan 210-L sensor. Complete calibration includes measurement area and sensor alignment. Calibration will ensure that measurements are accurate and reliable and should be conducted whenever changes are made to the sensor, mounting, or conveyor.
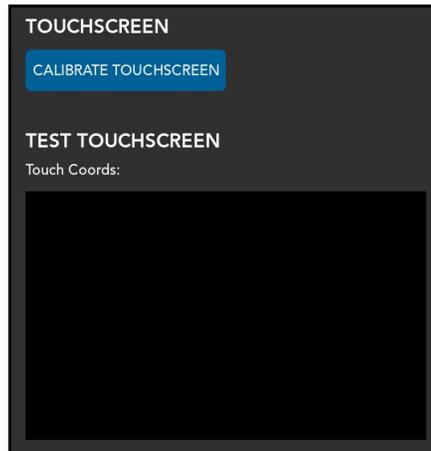
Periodic recalibration will also ensure that the sensor is operating within desired parameters. To assist in the calibration process a standardized calibration cube is provided with the CS 210-L assembly kit.

Sensor Calibration

Before operating the CS 210-L sensor, the measurement area must be calibrated. Each CS 210-L comes with a calibration cube to be used during the calibration process.

To calibrate the sensor complete the following steps:

1. Select **Sensor Settings** from side menu.

2. Tap **[CALIBRATE SENSOR]**.

Figure 38
Calibrate Sensor

3. Clear the area under the sensor.

4. Place the calibration cube (or box) on the conveyor against the edge.

5. Tap **[START CALIBRATION]** to begin the calibration process.

Figure 39
Sensor Calibration

6. After the sensor has finished measuring the cube on one edge of the conveyor, move the calibration cube to the other edge of the conveyor.

7. Tap **[CONTINUE]**.
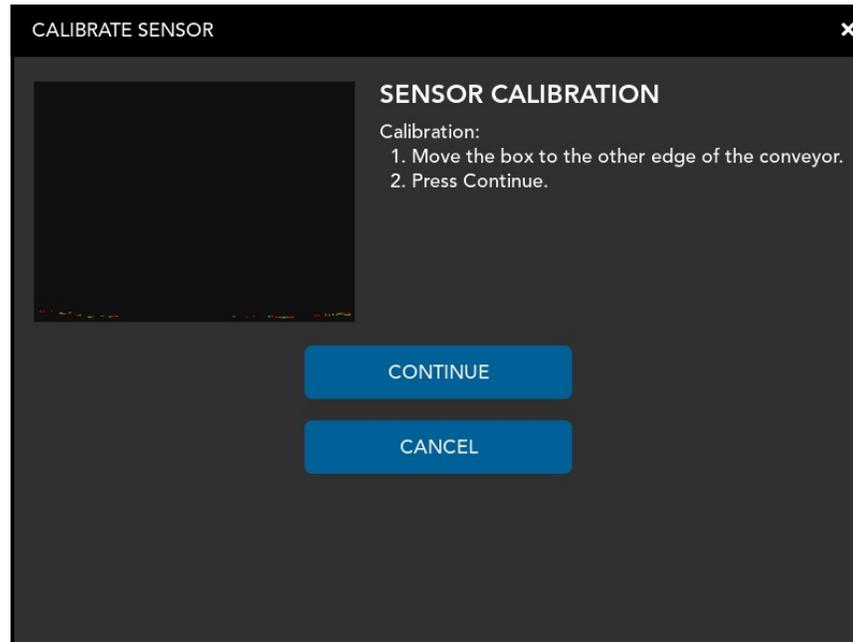
Figure 40
Calibration

Clear Calibration

The current calibration may be cleared at any time, resetting the sensor to factory calibration settings. This may be necessary if an improper calibration was performed, overly constraining the measurement area. This may make it difficult to properly calibrate the sensor.

To clear calibration, complete the following steps:

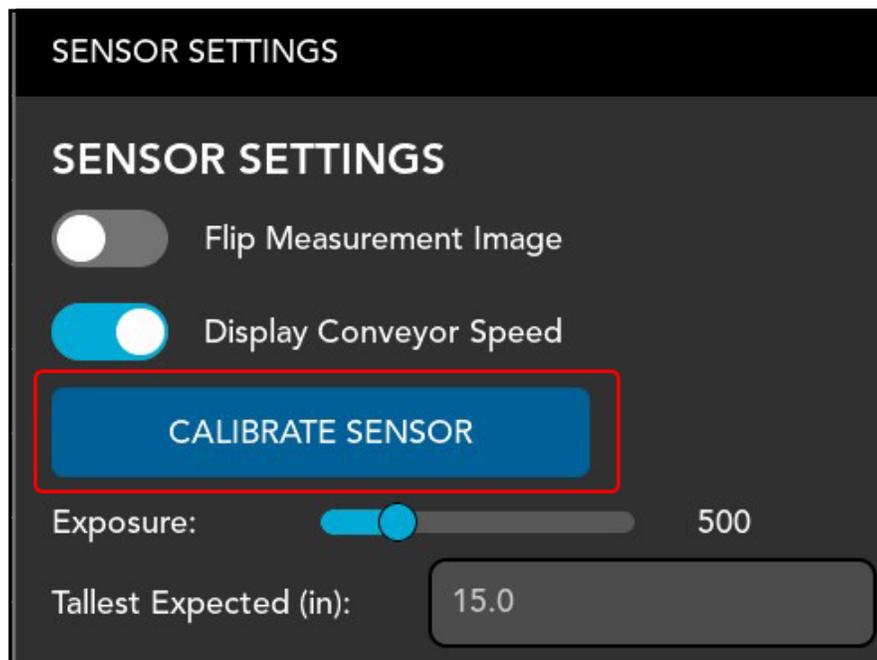1. Select **Sensor Settings** from side menu.

2. Tap [CALIBRATE SENSOR].
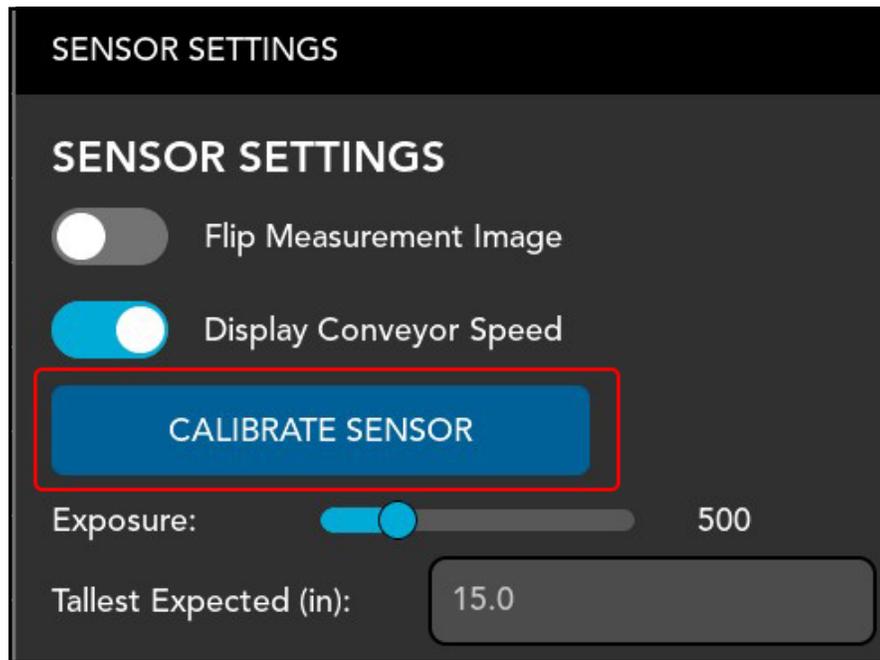
Figure 41
Calibrate Sensor

3. Clear the area under the sensor.

4. Place the calibration cube (or box) on the conveyor against the edge.
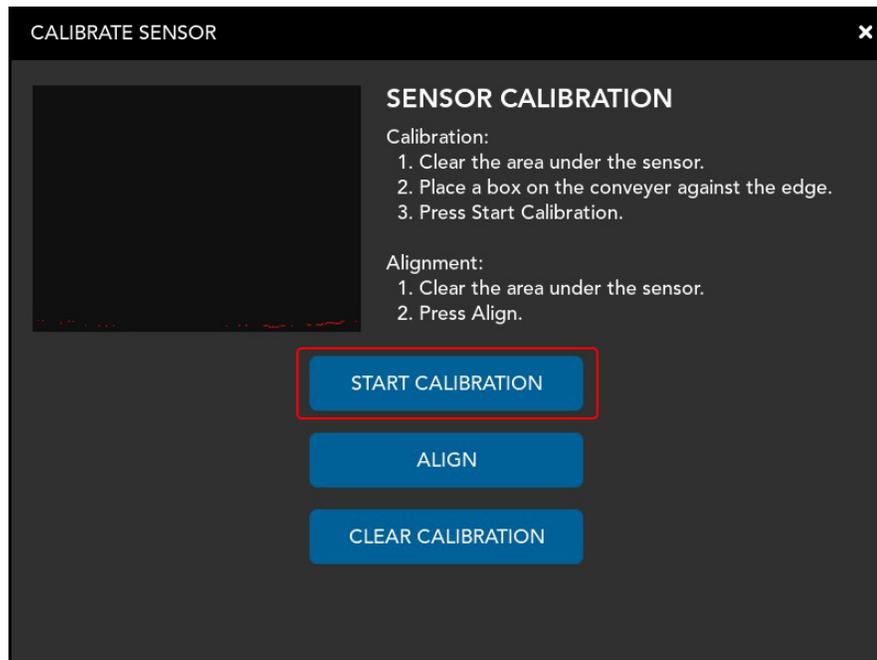
5. Tap **[CLEAR CALIBRATION]** to clear the calibration.
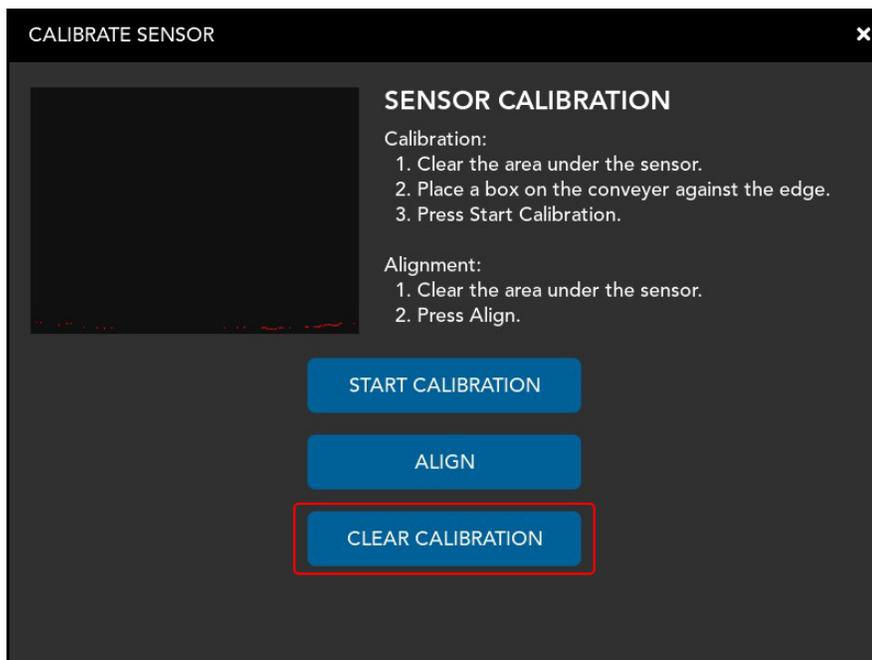
Figure 42
Sensor calibration

Sensor Alignment

Once the sensor is properly calibrated, the sensor will need to be aligned. Complete the following steps to align the sensor:

1. Select **Sensor Settings** from side menu.

2. Tap **[CALIBRATE SENSOR]**.
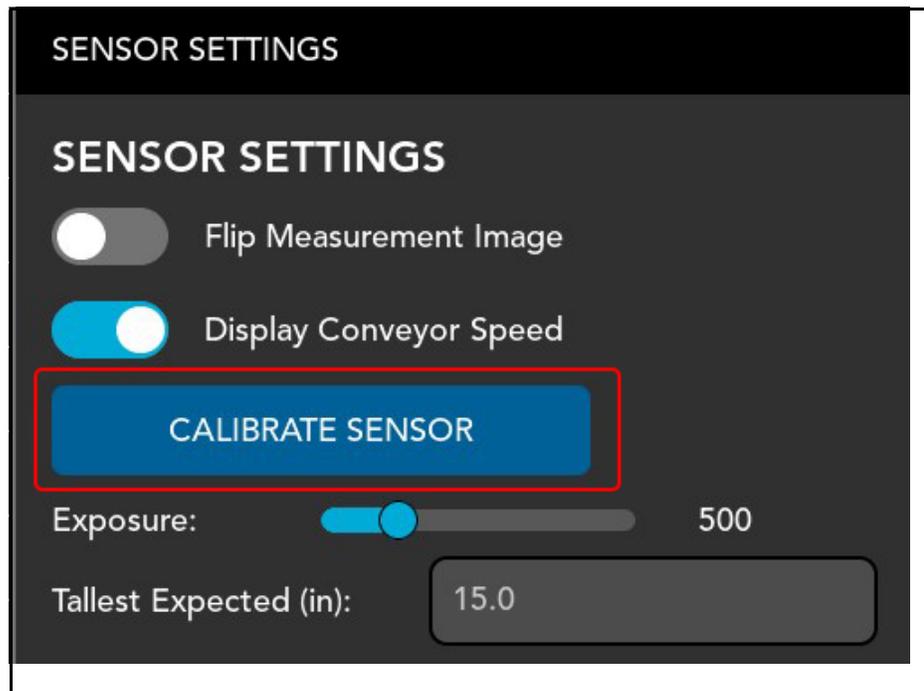
Figure 43
Calibrate sensor

3. Clear the area under the sensor.

4. Tap **[ALIGN]** to begin the calibration process.
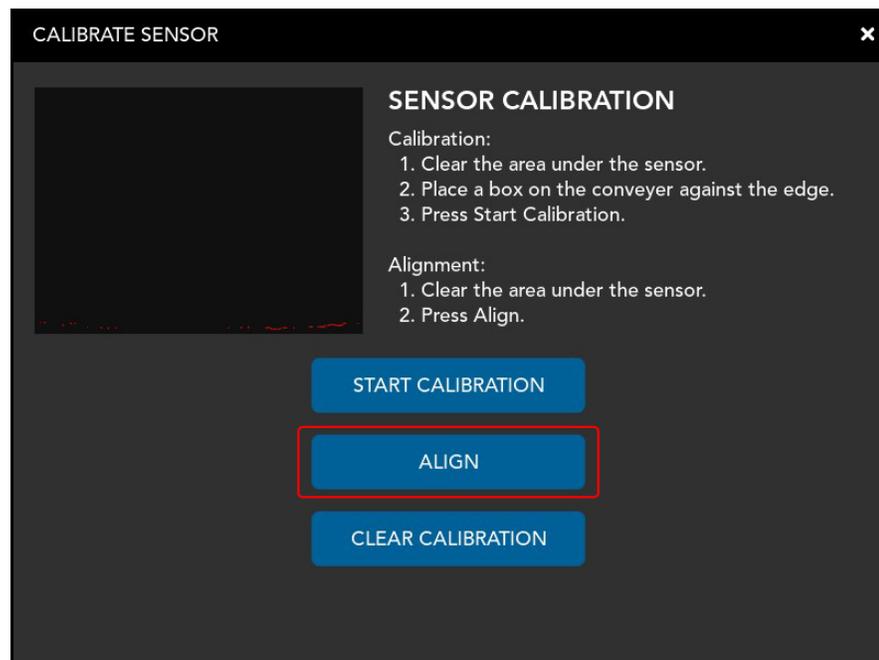
Figure 44
Align

5. Once the alignment is complete, product may be run.

CHAPTER 5
OPERATION

This chapter will provide information on the safe and effective operation of the CUBISCAN 210-L. Before operating the CS 210-L sensor, review precautions to ensure safe operation. If you have not already configured and calibrated your CS210-L sensor, review those chapters and follow the direction provided.

Correct configuration and calibration are necessary for the proper function of the sensor. Any deviation from the configuration listed in this manual or lack of proper calibration may result in a lack of consistency and reliability of measurements.

Operation

The CS 210-L is designed for autonomous operation along a conveyor system. Measurements are displayed on touch screen, which can be configured as desired. The following instructions explain the display features and optional manual operation.

Figure 45
Home screen

The basic configuration of the home screen displays the length, width, and height along the left side. The units of these measurement may be configured according to preference, see "Units" on page 23

Along the right side of the home screen is the measurement window. When product is measured a 2D rendering of the object will appear in the measurement window.
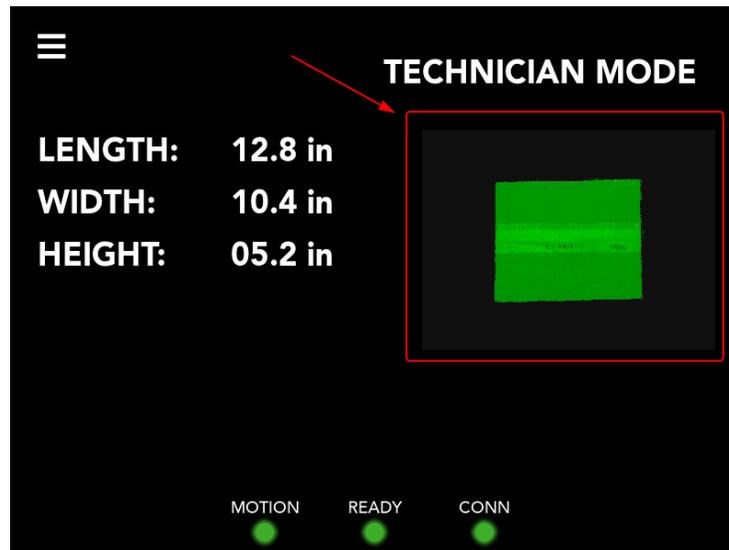
Figure 46
Measurement window

At the bottom of the touch screen are three indicator lights: Motion, Ready, Conn. When active these indicators will display green.

MOTION   Indicates that the conveyor is in motion.

READY   Indicates that the camera is ready to receive product. Do not run product unless this indicator is lit.

CONN   Indicates that the camera has an active network connection. If this indicator is not active, measurements captured by the camera and auxiliary devices will not be transmitted.

Optional measurements may also be displayed such as weight, dim-weight, and conveyor speed.

Weight

If you are using a scale with the CS 210-L, you may display the weight on the home screen. See "Scale Setting" on page 26 to set up a scale with the CS 210-L. Once the scale is set up, weight measurements will appear on the home screen.
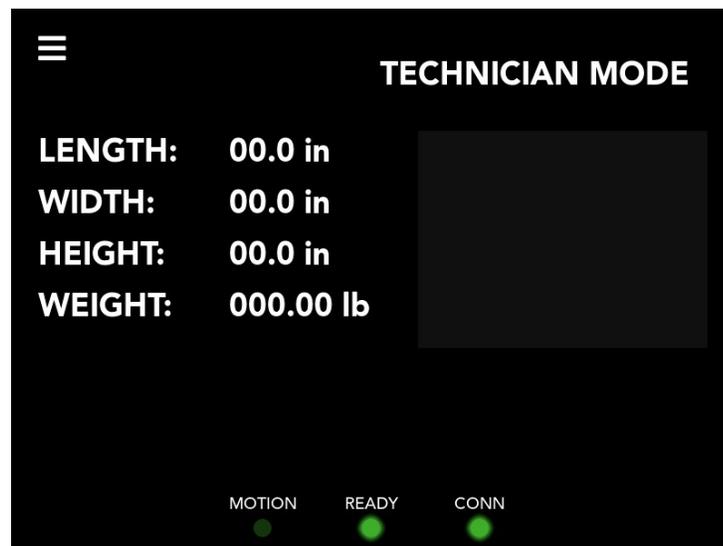
Figure 47
Weight

Dim-Weight

Along with weight measurements, the CS 210-L may be configured to display dim-weight.
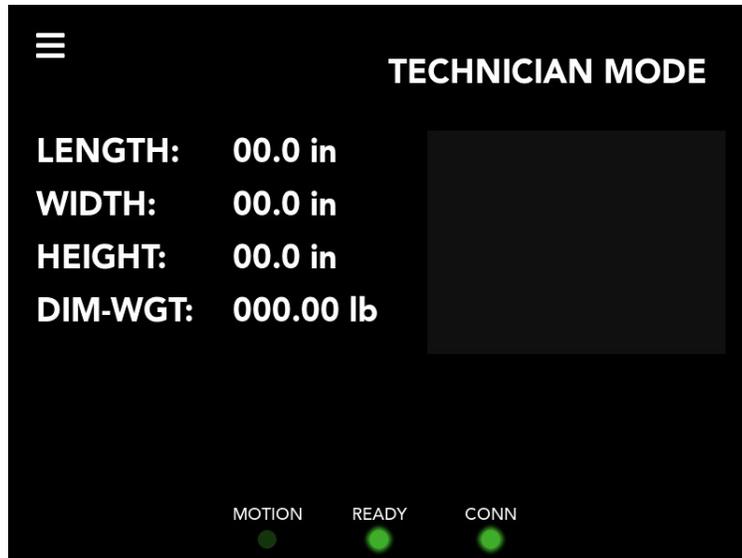
Figure 48
Dim-Weight

To display dim-weight on the home screen, perform the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **MEASURE SETTINGS**.

3.   Toggle **Display Dim-Weight** to enable.
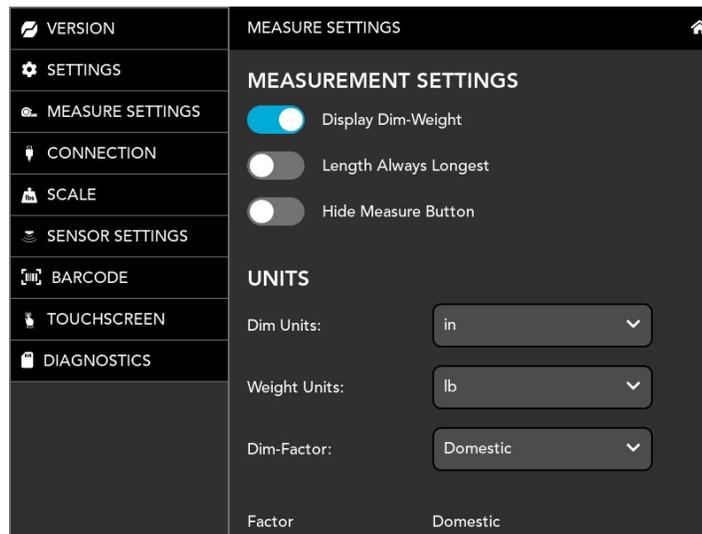
Figure 49
Display Dim-Weight

Speed

In some cases it may be useful to display the conveyor speed along with the dimensioning and weight measurements. The CS 210-L may be configured for this.

Figure 50
Speed

To display the speed on the home screen, perform the following steps:

1. Tap the menu icon in the upper left corner of the home screen.

2. From the menu side panel, select **CAMERAS.**

3. Toggle **Display Conveyor Speed** to enable.
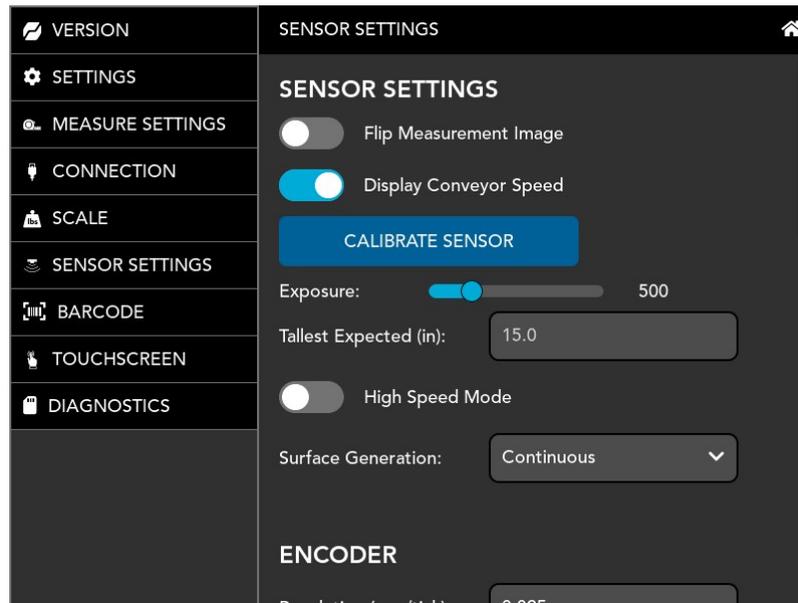
Figure 51
Display Speed

Barcode

If a barcode scanner is setup with the CS 210-L an indicator will display on the home screen for each barcode than requires scanning, according to the

configuration of the barcode (either one barcode or two). To setup a barcode, see "Barcode" on page 35.
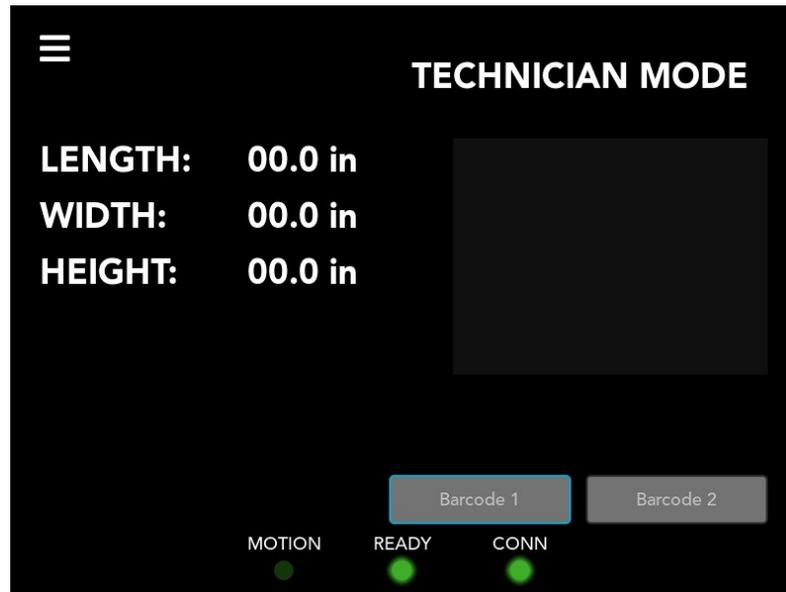
Figure 52
Barcode

CHAPTER 6
MAINTENANCE

This chapter provides information on the maintenance and care of the Cubiscan 210-L. Routine inspection and careful handling will help identify problems before they become serious and may prevent service calls or repairs.

Sensor Maintenance

Clean sensor window

Dust and dirt particles have a tendency to accrue, inhibiting the proper function of the sensor. A periodic cleaning is necessary for the sensor to function most efficiently. When cleaning, use a soft, lint-free cloth to prevent damage to the sensor window. Non-streaking glass cleaner or isopropyl alcohol is best to prevent residue on the windows after cleaning.

Laser should be powered off when not in use

Semiconductor lasers like those used in the sensor have a tendency to degrade over time. In order to prolong the lifespan, power off the sensor when not in use.

Avoid modifying files stored on the sensor

The CS 210-L sensor uses flash memory to store software files. This type of memory has an expected lifetime of 100,000 writes. In order to maximize lifetime for the sensor, avoid unnecessary or frequent file save operations.

Avoid strong light sources

Due to the sensitivity of the CS 210-L sensor, exposure to strong ambient light can cause degradation. To avoid this, do not operate the sensor near lighting fixtures or windows. Not only can this damage the sensor over time, it can lead to inaccuracies in measurement. Use light shielding whenever exposure to ambient light is unavoidable.

Avoid exposing to environmental hazards

To prevent harm to the sensor and ensure proper function, install the sensor in a location that is free from hazards that may cause harm to the sensor and its components. Examples of potentially harmful environments to avoid include locations:

- with a high temperature variance, such as places exposed to direct sunlight or other natural elements;
- with the presence of highly flammable or corrosive gases;
- where the sensor may experience strong reoccurring vibrations or concussive impacts;
- where water, oil, or harmful chemicals are present and may be transfered to the sensor;
- where high levels of static electricity may be generated.

Keep environmental conditions within accepted parameters

The components of the CS 210-L sensor may be operated in temperatures between 0 and 40° C (32° to 104° F) and 25–85% relative non-condensing humidity. The storage temperature for the CS 210-L is between -30 and 70° C.

The CS 210-L will produce heat while actively scanning. Since the sensor is highly sensitive to temperature changes, the heat produced from the sensor may negatively impact the functionality of the sensor.

To prevent the sensor from overheating, proper heat-sinking through the frame, where the sensor is mounted is required. A sensor that is properly heat-sunk, will maintain a reported temperature less than 15° C (59° F)

Cord Maintenance

The Cubiscan 210-L sensor uses two types of cord sets: the Power & Ethernet cord set and the I/O cord set.

The Power & Ethernet cord set provides power for the sensor and 1000 Mbit/s Ethernet communication. The I/O cord set provides digital I/O connections, an encoder interface, RS-485 serial connection, and an analog output.

In order to prevent electrical hazards to users and damage to the sensor, the cables should be maintained. This includes periodic inspection of the cords to ensure there is no damage to the wire insulation or fraying. If cords are found to be defective, they should immediately be replaced.

To prevent damage to the cords, care should be take to not overly bend or crimp them. Cords should be neatly managed and organized to prevent entanglement and possible tripping hazards. Objects should not be placed on top of cords as this may also cause damage.

This chapter provides safety guidelines for the operation of the Cubiscan 210-L sensor and assistance in identifying and solving common problems that may arise during setup and use.

Precautions

Laser Safety

The CS 210-L sensor uses semiconductor lasers to dimension objects. The light from the lasers may be both visible and invisible and should be handled with caution. The CS 210-L sensor uses lasers designated as Class 2 and 3R. These lasers have varying levels of intensity and may pose a safety hazard if used improperly.

Take the following precautions when operating the sensor:

- When working with the sensor, ensure that users do not look directly into the laser beam as this may cause damage to the eye. Consider using optical protection when working directly with an active sensor.
- Avoid obstacles that may cause unintended reflection.
- In all cases, it is preferred to restrict areas where laser is in use and clearly mark these designated areas, indicating any precautions that should be taken when entering.
- Personnel operating the sensor should be trained in working with laser equipment

The following resources can provide more information on the proper handling and possible hazards associated with the lasers as well as regulations outlined by the IEC and FDA:

- International standard IEC 60825-1 (2001-08) consolidated edition, Safety of laser products – Part 1: Equipment classification, requirements and user's guide.

- Technical report 60825-10, Safety of laser products – Part 10. Application guidelines and explanatory notes to IEC 60825-1.

- Laser Notice No. 50, FDA and CDRH (https://www.fda.gov/Radiation-EmittingProducts/ElectronicProduct RadiationControlProgram/default.htm)

Electrical Safety

The threat of an electrical surge can be a hazard not only to the sensor, but individuals operating the equipment. To ensure that electrical hazards are mitigated, refer to the following electrical safety precautions and provide proper assurance that each safety precaution is adhered to.

Sensors should be connected to earth ground

To prevent an electrical hazard the CS 210-L sensor housing should be thoroughly grounded, using electrically conductive hardware via an earth grounded frame. The CS 210-L sensor should be grounded to an earth source through its housings and through the grounding shield of the Power I/O cord set.

The housing of the CS 210-L is designed to provide adequate grounding through thee mounting screws. A multi-meter may be used to ensure that the sensor is properly grounded to the earth ground source.

NOTE 〉 *The frame or electrical cabinet that the sensor is mounted to must also be connected to an earth grounding source to be a suitable ground for the sensor.*

Minimize voltage potential between system ground and sensor ground

The voltage potential between system ground (the ground reference for I/O signals) and the sensor ground can provide an electrical hazard to the sensor. To determine if the voltage potential is within acceptable ranges, use a multi-meter to measure the voltage between the Analog out and system ground.

Although the permissible voltage potential is 12 V, care should be taken to keep it below 10 V, as the voltage potential has a tendency to fluctuate. To avoid harm to the sensor and damage to the serial and encoder connections, maintain all voltage potentials below 10V.

The following chart will help you determine the I/O connector pins to assess the voltage potential:

Function	Pin	Lead Color on Standard Cordset	Lead Color on High Flex Cordset
Trigger_in+	D	Grey	Blue / Red
Trigger_in-	H	Pink	Blue / Black
Out_1+ (Digital Output 0)	N	Red	Brown / Red
Out_1- (Digital Output 0)	O	Blue	Brown / Black
Out_2+ (Digital Output 1)	S	Tan	Green / Red
Out_2- (Digital Output 1)	T	Orange	Green / Black
Encoder_A+	M	White / Brown & Black	Pink / Red
Encoder_A-	U	Brown / Black	Pink / Black
Encoder_B+	I	Black	Yellow / Red
Encoder_B-	K	Violet	Yellow / Black
Encoder_Z+	A	White / Green & Black	White / Red
Encoder_Z-	L	Green / Black	White / Black
Serial_out+	B	White	Purple / Red
Serial_out-	C	Brown	Purple / Black
Serial_out2+	E	Blue / Black	Red
Serial_out2-	G	White / Blue & Black	Black
Analog_out+ (Reserved on Gocator 2500 series sensors)	P	Green	Gray / Red
Analog_out- (Reserved on Gocator 2500 series sensors)	F	Yellow & Maroon / White	Gray / Black & Orange / Black
Reserved	R	Maroon (not connected)	Orange / Red (not connected)

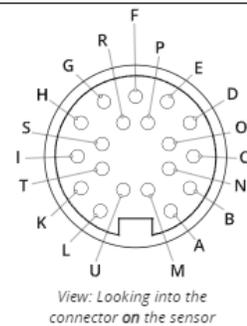*View: Looking into the connector **on** the sensor*

Figure 53
Connector Pins

Use a suitable power supply

To ensure proper function and prevent damage to the sensor, use an isolated supply with inrush current protection or a power supply that is capable of handling a high capacitive load. Review the specification for the CS 210-L to ensure that the provided power supply is within preferred limits (see "Specifications" on page 1).

Use care when handling powered devices

Due to electrical hazard concerns, all wires leading to the sensor should be well maintained and should never be handled while sensor is powered on. Frayed or damaged wires can provide an electrical safety concern to both the user and the equipment. To prevent electrical hazards, any frayed or damaged cords should be replaced immediately.

Heat Warning

Extreme temperature variations can affect the proper function of the CS 210-L sensor and may even cause damage. The sensor does produce heat during usage. This is part of its normal operating parameters. However, if the heat is not allowed to dissipate via a heat-sink, temperatures may exceed the acceptable operating parameters and cause damage to the sensor and harm to the user.

To avoid injury to users and ensure the proper function of the sensor, mount the sensor to a material that is thermally conductive, allowing for proper heat-sinking.

Basic Troubleshooting

Use the following recommended guidelines for basic troubleshooting. If you encounter problems not covered in this chapter, **contact Cubiscan Service and Support at 801.451.0500** or your system integrator for assistance.

The sensor is warm

The CS210-L typically runs 15° C warmer than the surrounding environment. This is normal behavior when the device is on and should not pose a problem with the functioning of the sensor.

Trouble connecting

In the case that the senor is not found when attempting to access through a network or the browser page will not load while connecting:

- Ensure the unit is powered on and connected to the network. This can be verified by the power indicator light on the sensor.
- Verify the network settings are correctly configured to the required specifications of the sensor.

Difficulties acquiring data

If the laser emits light, but the Data Viewer does not display the data points correctly:

- Ensure the sensor is receiving and transmitting properly. This can be done by observing the indicator lights on the back of the sensor. The indicators next to *power* and *laser* should be lit. A light should also appear on the junction board, indicating that it is receiving from the sensor.
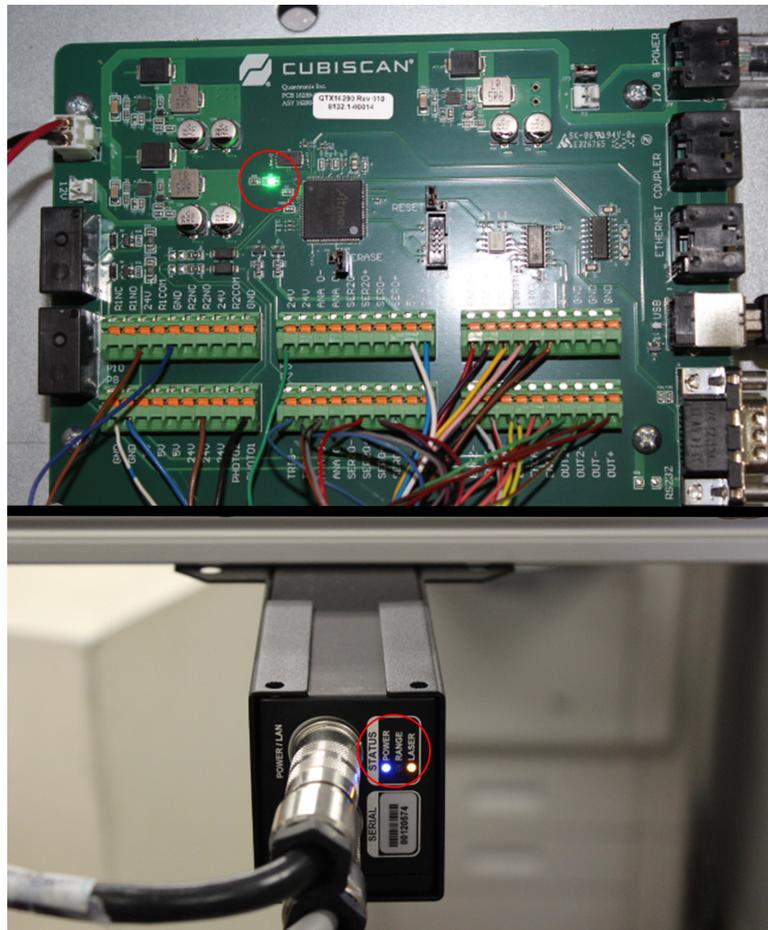

Figure 54
Indicator lights

If no light is present, than the sensor may not be receiving input. Check cable connections to ensure the sensor is properly plugged in and transmitting to the board.

- The measurement target may not be within the sensor's field of view and measurement range. Review the measurement specifications for the senor and ensure that you have the sensor positioned correctly in order to fully measure the target. The sensor may need to be remounted or aligned (see CHAPTER 2 "SETUP" on page 10).

- Seasonal variations in lighting and temperature may cause measurements to vary. For this reason, it is important that the sensor is in an area that is well insulated, preventing drastic temperature changes, and away from sources of natural lighting that may interfere with measurement process.

- Materials that have a high black sheen may cause spectral reflection that can interfere with measurements or make it difficult for the sensor to track. In some cases, the sensor may be configured to account for these issues. For more help with configuring the sensor, **contact Cubiscan Service and Support at 801.451.0500**

The following is a list of parts that can be purchased for the Cubiscan 210-L as spare parts or if replacement is necessary.

Part No.	Description	Quantity
16174	MID RANGE SENSOR*	1
16176	FULL RANGE SENSOR*	1
16934	FULL RANGE NTEP SENSOR*	1
16790	CS210-L CONTROL BOX	1
15612	FRAMES, EXTRUDED ALUMINUM**	1
16377	ENCODER MOUNT ASSEMBLY	1

NOTE ⟩

Sensor is dependent on system you have installed.
**The sensor and control box is mounted on the extruded frame. These frames may be customized according to the clients conveyor and sensor needs.*