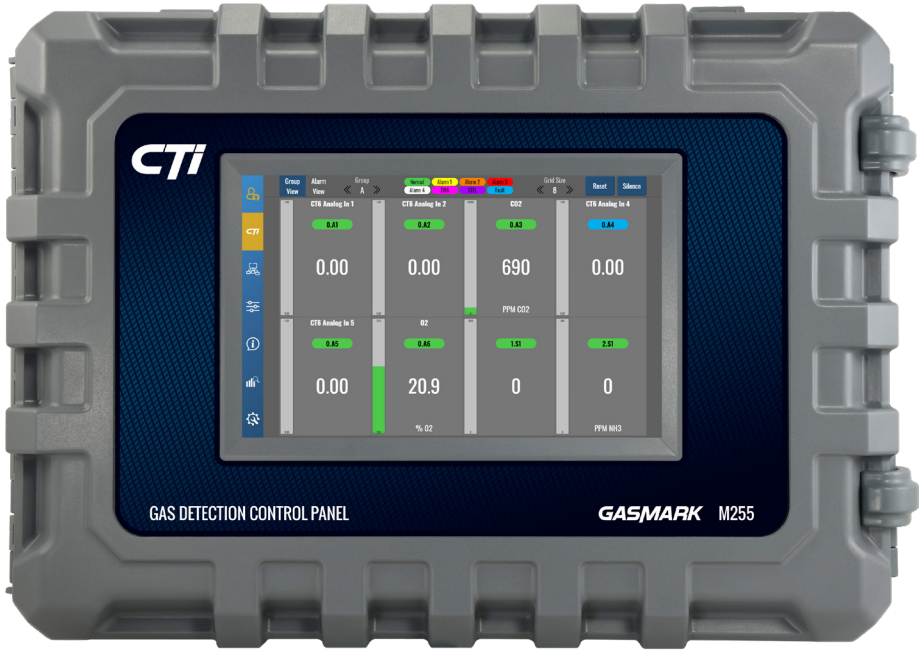

GASMARK M255

GAS DETECTION CONTROL PANEL

Installation and Operation Manual

CTi GAS DETECTION SPECIALISTS

ctigas.com | 866-394-5861

Warning

To ensure your personal safety, read the Safety Information section before installing or servicing this device. Use this product only in the manner described in this manual.
If the equipment is used in a manner not specified by CTI, the protection provided by the equipment may be impaired.
This equipment should be installed by qualified personnel.

For technical support, contact:

CTI
920 N Tradewinds Pkwy
Columbia, MO 65201

phone: 866-394-5861
email: sales@ctigas.com
website: ctigas.com

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Safety Information

Use this product only in the manner described in this manual. If the equipment is used in a manner not specified by CTI, the protection provided by the equipment may be impaired.

Equipment should not be operated or serviced without reading the manual first.

This equipment should be installed by qualified personnel.

Any service performed on this equipment should be completed by qualified/authorized personnel; equipment does not contain user serviceable components.

If disposing of the M255 controller, take care to properly dispose of or recycle the CR 2032 coin cell lithium battery.

Always disconnect power before performing any wiring or service of the controller.

See power rating and caution label on exterior of equipment, near latches.

1. General Description

The M255 is a Modbus gas detection controller specifically designed for use with CTI Modbus capable devices. It has four RS-485 Modbus channels and can handle up to 255 devices. Additionally the M255 is backwards compatible with all CTI 4/20 mA devices.

It has two on board 24Vdc power supplies to provide power for the controller, gas detectors and audible/visual devices.

The color LCD touchscreen provides an at-a-glance status of gas concentrations and alarms.

The M255 control panel is assembled into a wall mounted enclosure designed for indoor Non-Classified locations only. The supported Modbus devices can be installed up to 4,000' from the controller.

The eight programmable on board relays have on/off time delays and can be programmed to be silenceable, latching and normally energized.

All operator functions are performed from the touchscreen on the front of the panel.

Note: "Device(s)" in this manual will refer to any component which may be controlled and/or read via a Modbus address.

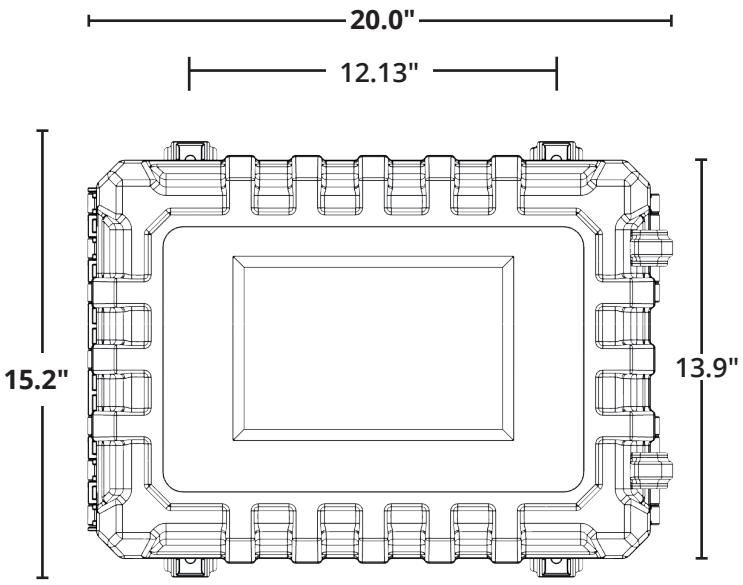
2. Installation

2.1 Installation Guidelines:

Locating the M255 Gas Detection Control Panel (controller)

- The important consideration when installing the M255 is that it must be easily accessible for operating personnel.
- Mount the controller indoors on a solid surface with minimal vibration. If mounting on a wall with studs, the mounting screws should be screwed into the studs.
- Mount the controller through the holes in the mounting flanges.
- Mount the controller in a general-purpose location only. Do not install in a hazardous environment.
- Mount the controller away from electromagnetic interference.
- Protect the controller from physical damage.
- When connecting to metallic conduit, attach appropriately sized conduit hub to conduit prior to connection with enclosure is made.

2.2 Dimensions:



6.2" deep

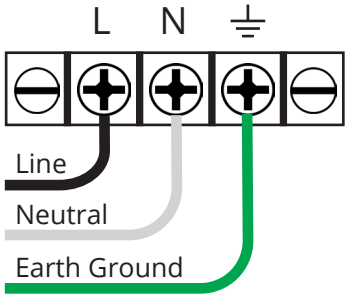
2.3 Wiring:

2.3.1 Wiring Guidelines:

- **Electrical wiring must comply with all applicable codes**
- Use stranded, copper wire/cable with a minimum of 167°F rating (75°C rating).
- All wiring should be rated for 300V or greater (see illustration on page 13 for label location).
- Always use insulated, stranded, shielded copper cable for all communication cables. Refer to individual device manuals for wiring instructions.
- Do not pull communication wiring with AC power cables. This can cause electrical interference.
- Use only the existing conduit hole for connections to each device.
- Bonding between metallic conduit connections is not automatic with the non-conductive enclosure. Separate bonding must be provided.
- During installation, cover conduit holes and close the enclosure cover to prevent debris from falling into the equipment.
- After wiring, any unused conduit holes should be covered with an appropriate sized plug, flammability rating V-1 or better, to maintain integrity of enclosure.

2.3.2 AC Power Wiring:

- Power should be provided by a dedicated 15A circuit breaker. It is recommended that the circuit breaker be located near the equipment, and clearly marked as the disconnect for the M255.
- See Specification on page 54 for requirements.



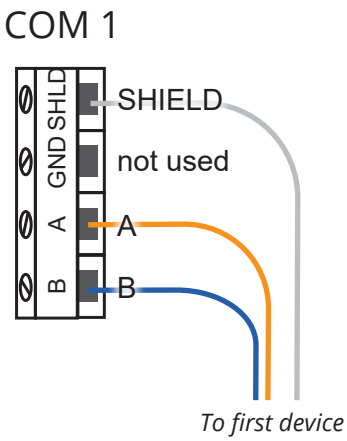
- For 200-240Vac input voltage, the input voltage selector switch must be switched. The factory setting is 100-120Vac. It is located on the side of the right power supply. See illustration on page 13. Red circle shows location of switch. The switch is located behind the protective cage of the power supply, but is accessible by using a small screwdriver or pointy object.

2.3.3 Communication Wiring:

The M255 has four Modbus communication channels. Up to 255 devices can be installed on the M255, distributed among the four channels.

It is recommended to pull 24Vdc power cable with the communication cables. These cables can share the same conduit.

- RS-485 communication cable, 22-24 AWG, 2 conductor, twisted pair, shielded, stranded, with drain wire (Alpha Wire 6460 or equivalent)
- 4,000 ft max per channel.
- For optimum performance, it is recommended that no more than 128 devices are connected on any of the four channels.
- For optimum performance, CTI recommends that the M255 is always at the end of the line. When the M255 is at the end of the line, the EOL switches should always be set to the ON position.
- Avoid splices and T-taps. All terminations should be made at network device wire terminals.
- Wire shields must be connected at all shield terminals, creating a continuous shield run from the M255 to the device at the end of the line.



Terminal Block Plug (Field Wiring):
SHLD: To shield terminal of first network device.
GND: Not used
A: To RS-485-A terminals of first network device.
B: To RS-485-B terminals of first network device.

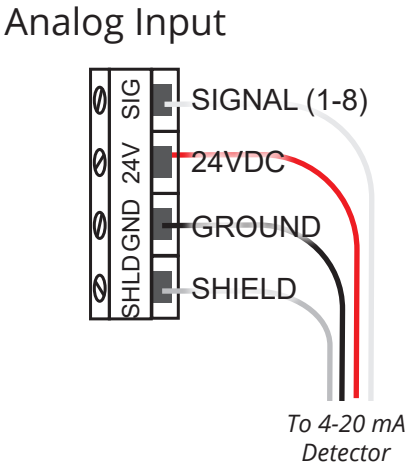
See supported Modbus device installation manuals for more details on communication wiring.

Each device has a communication port with two terminals, A and B. In these two terminals, the communication cable is connected so that all the devices that take part in the communication are connected in parallel. All of the 'A' terminals must be connected together and all the 'B' terminals must be connected together, respectively.

2.3.4 Analog Detector Wiring

The M255 can support up to 8 4-20 mA detectors.

- Refer to the manual for each detector for cable recommendations.
- Analog detectors must be home-run back to M255.
- Length of cable should not exceed 1500 feet (457 meters), See detector manual for maximum length recommendations.



2.3.5 Device Power Wiring:

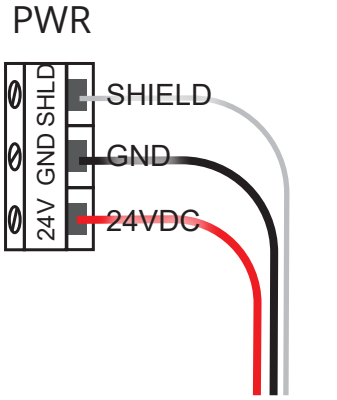
24Vdc power is provided by the on board 24Vdc power supplies within the M255. Additional power supplies can be added on the Modbus channels distributed throughout the network as needed.

See supported Modbus device installation manuals for more details on device power wiring. A power wiring calculator is available upon request, contact CTI for help with recommendations.

Caution:
To prevent excessive voltage drops and/or power supply overloads, careful consideration should be taken to take into account all 24Vdc devices on the power supplies. This includes gas detectors, audio/visual devices, etc. See Specifications on page 54 for maximum current draw for all devices.

If the supply voltage drops below 16V, a power supply should be added (see 2.4.1). When utilizing the 24Vdc supply for any connected relays for external devices (horn-strobes, fan controllers, etc.), ensure all device's minimum supply voltage is maintained under full load (all devices active)."

Note:
When adding a power supply, make sure to tie the power supply grounds (2.4) together to maintain the same ground for all devices on that Modbus channel.

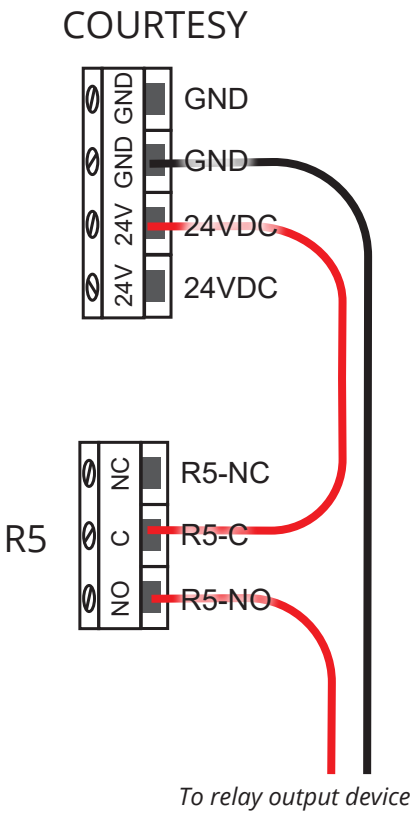


Terminal Block Plug (Field Wiring):
SHLD: To shield terminal of first network device.
GND: To ground terminal of first network device.
24V: To 24Vdc terminal of first network device.

2.3.6 Relay Output Wiring:

There are nine relay outputs local to the M255. One is designated as the Fault Relay, while the other eight are general purpose, user configurable relays.

- AC wiring must be run in separate conduit from the detector cables.
- All relays have Form C dry contacts, and are rated 5A @ 24Vdc or 8A @ 240Vac (dry contacts require external power).
- The fault relay is normally energized. It will trip upon loss of power or hardware failure of the M255.
- Each relay has a status LED to show the state of the relay.
- When utilizing the on board power supplies of the M255 for powering of external devices such as horn/strobes, make sure the total current draw of all powered devices does not exceed the current limits on page 54.
- There are two courtesy 24Vdc and ground terminal blocks amongst the relays. These can be used to provide power for external devices such as audio/visual devices, exhaust fan control, etc.
- See Relay Output section (3.4.4.3.1) in the Setup menu for more details on relay configuration.



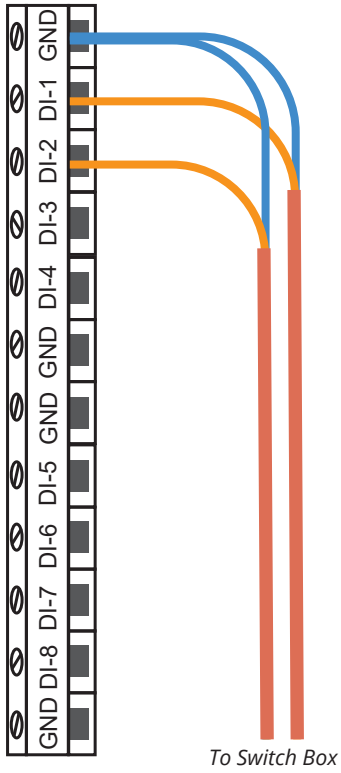
2.3.7 Discrete Input Wiring:

The M255 has eight discrete inputs located on the main interface board, for use with the Discrete Inputs feature (see 3.4.4.2.2).

Note: These are intended to show contact open/closure only and should not have voltage applied.

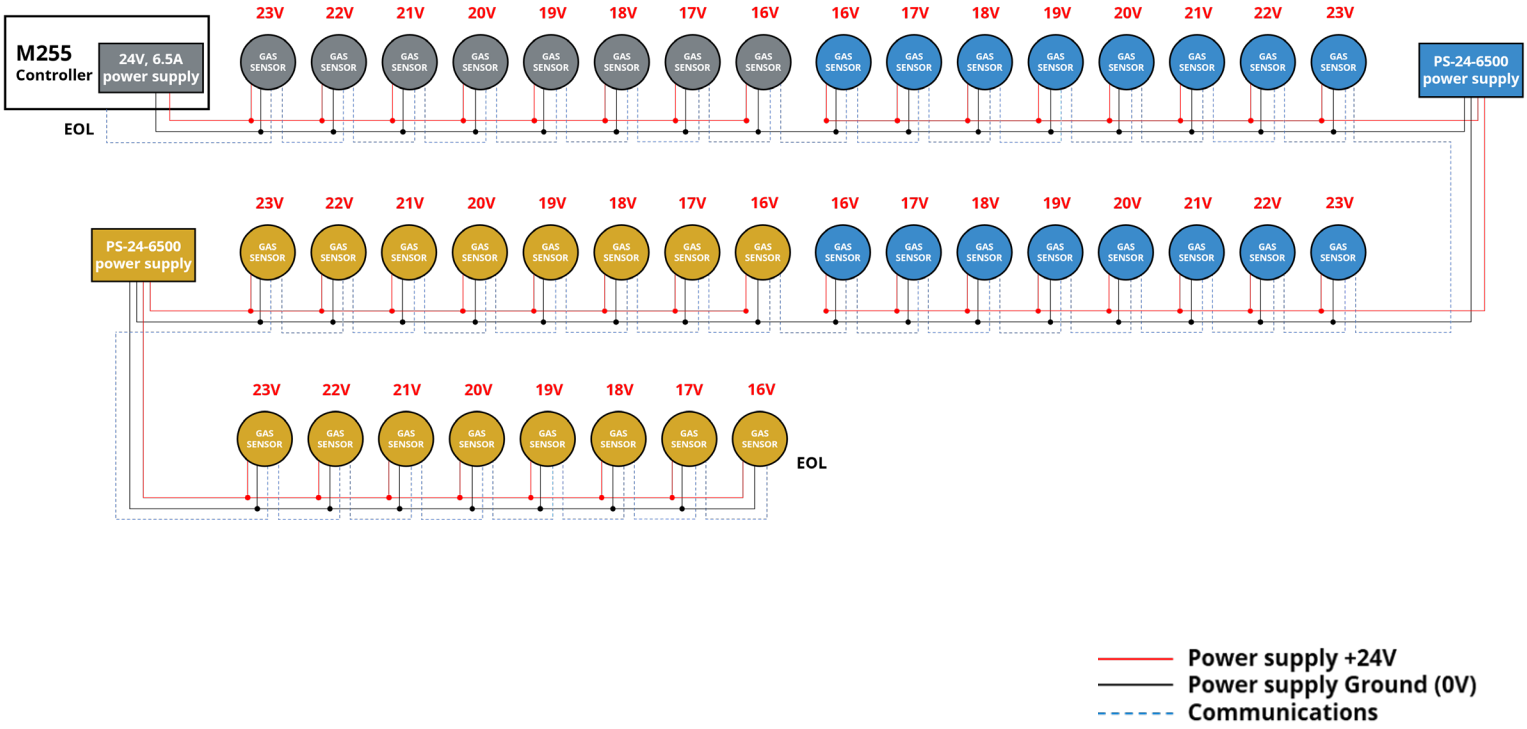
The inputs are all wired through a twelve position header, 8 inputs and 4 ground. One end of the input should be wired to DI-1 through DI-8 and a ground on the header; the other end should be wired to a selected switch.

- Use 22 AWG, x-conductor, stranded instrumentation cable, with drain wire and PVC jacket (Alpha Wire 6460 or equivalent)

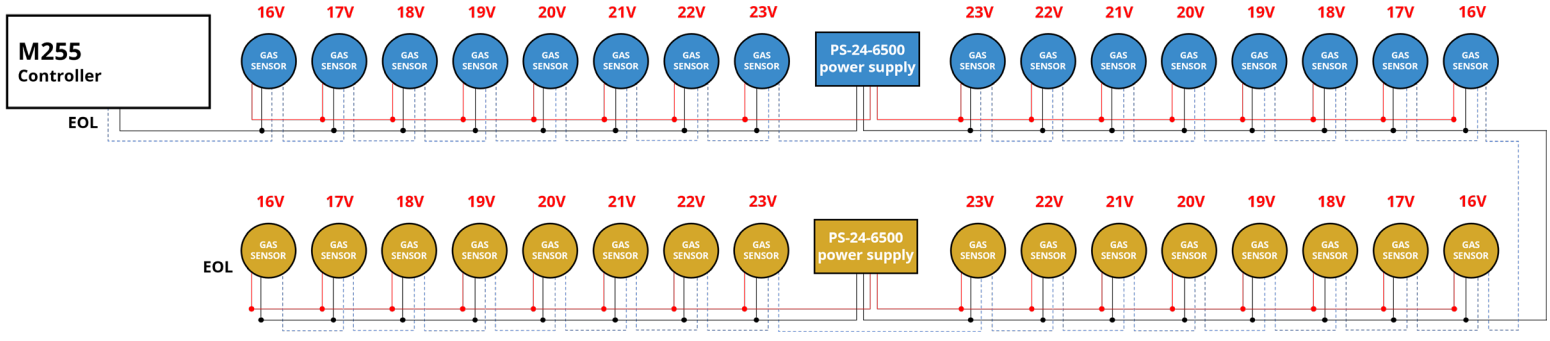


2.4 Network Layout Example

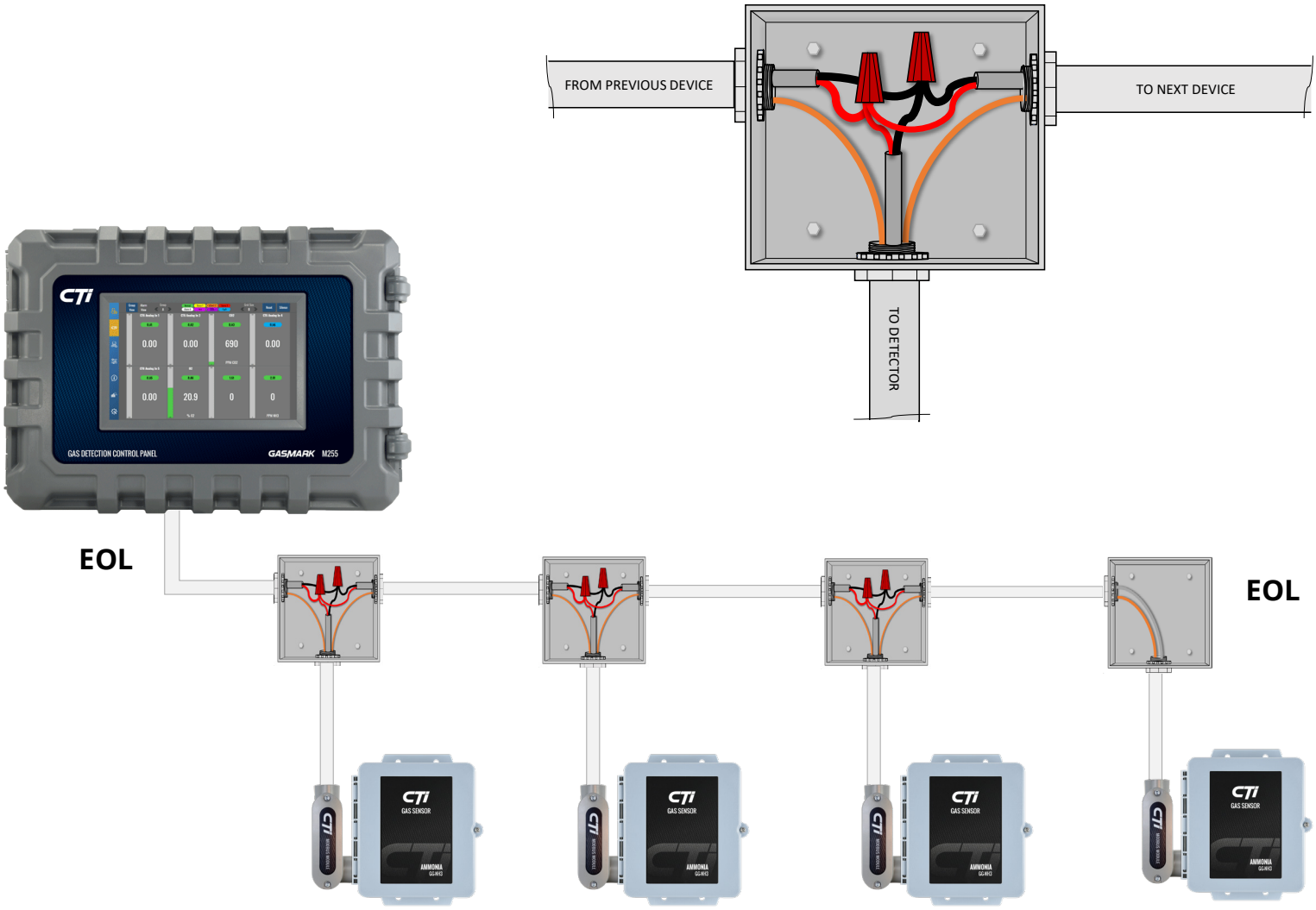
2.4.1 Gas Detector Network with M255 onboard power supply and external power supplies.



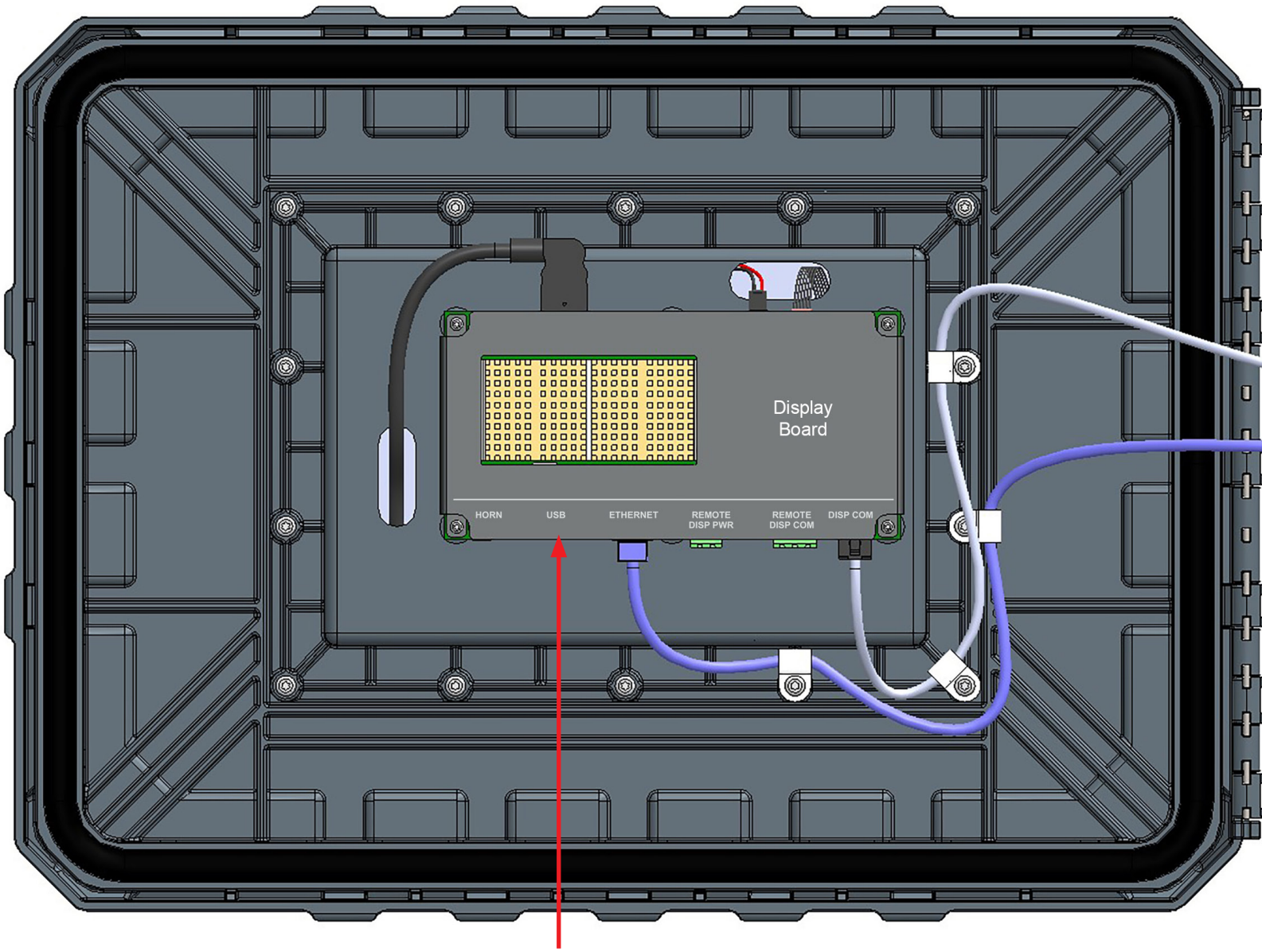
2.4.2 Gas Detector Network with only external power supplies.



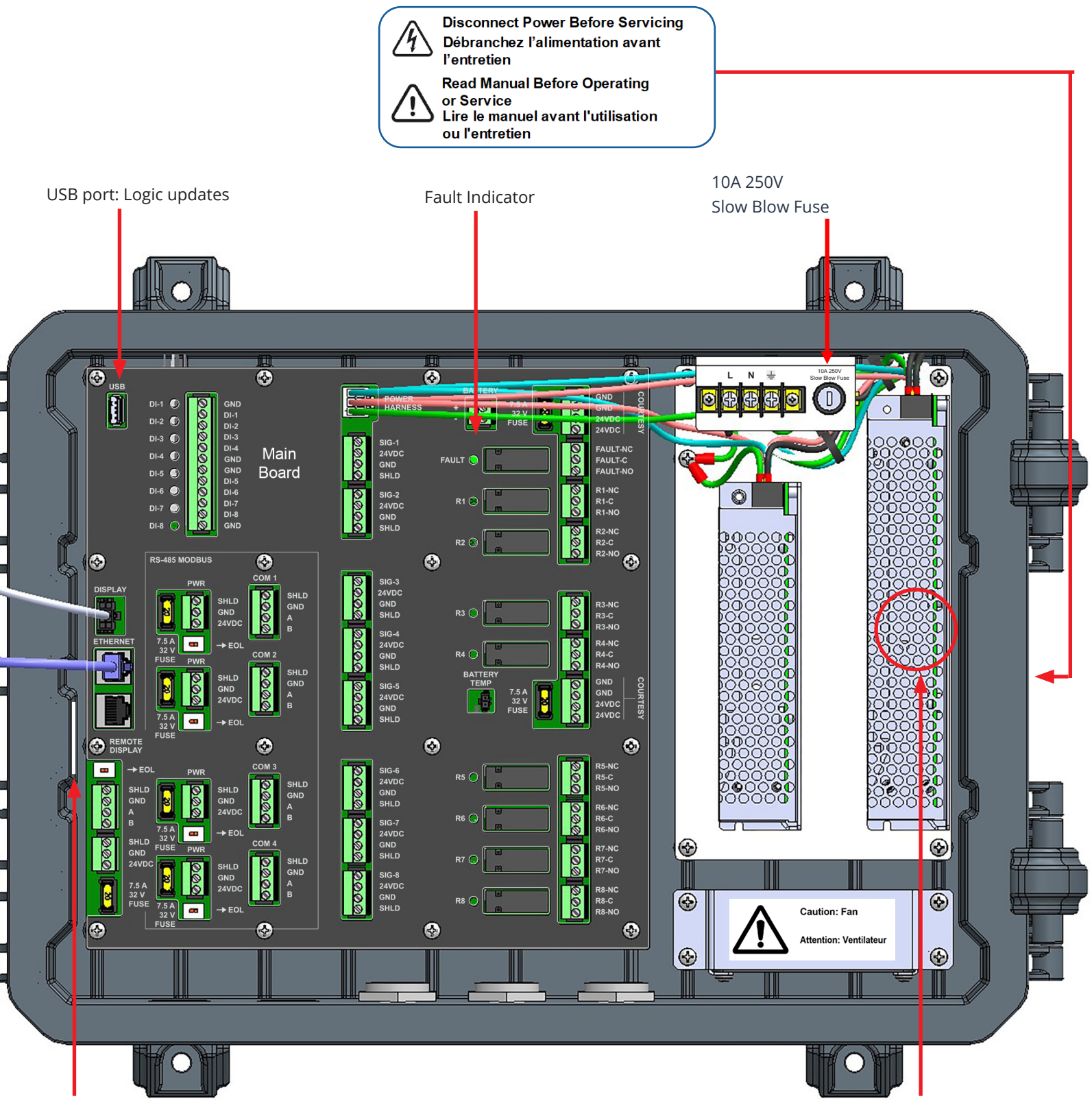
2.4.3 Gas Detector Network with wiring at junction boxes.



2.5 M255 Terminals, Ports, Components, and Board Layout



USB port: Display updates



Any service performed on this equipment should be completed by qualified/authorized personnel; equipment does not contain user serviceable components.

3. Operation

3.1 Power-up

Before applying power, make a final check of all wiring for continuity, shorts, grounds, etc. It is usually best to disconnect external alarms and other equipment from the control panel until the initial start-up procedures are completed.

3.1.1 Normal Use

Operation of the unit is considered normal use only when the enclosure is closed. Opening of the enclosure should only be performed by qualified personnel, after disconnection from power and review of operation guidelines. Upon opening of enclosure please be aware of all internal markings prior to performing any tasks.

3.1.2 Initial Startup

The "CTi" logo will be displayed while the system initializes the hardware and software components. The Initial Startup sequence will be initialized by simply powering up the unit from an OFF state.

3.1.3 Home Screen

The initial system status screen will only show analog inputs prior to discovery of other networked devices. The home screen may be accessed at any time (See 3.4.3).

3.2 Programming the Controller

Note:
If Importing a previously saved Configuration file, skip to Import/Export section of this manual (3.4.5.4).

3.2.1 Preparation

The key to accurate and timely programming is defining the configuration parameters ahead of time.

Included with the control panel are blank worksheets to fill out prior to programming. Make sure to notate the Modbus ID along with detector name and location as this will be needed for detector configuration later.

Defining the configuration parameters in the following order will usually make programming easier to assimilate.

1. Detectors
2. Discrete Inputs
3. Groups
4. Relays
5. Analog Outputs

3.2.1.1 Connected Devices

Once powered, make sure all connected devices are programmed with unique Modbus ID's (1-255). See device manuals for details.

3.2.1.2 Naming

Keep in mind character length (max 20) when naming. Abbreviations may need to be used.

Detectors: Typically, using the detector location for the name provides the best information. For example: Blast Freezer, Comp Room, etc.

Relays: The relay output function typically works best for the name of the relay. For example: Vent fan North, etc.

3.2.2 Navigating the screens

3.2.2.1 Scrolling

Scroll up or down to view more table rows when applicable. Where side scroll bars are present, they can be used for fasting scrolling.

3.2.2.2 Page Activity

The M255 screen will remain active continuously.

3.2.2.3 Tables

When the user selects a box/field on a page with a table, a pop-up keyboard will allow edits to the field. Tables can scroll beyond the page.

Unless otherwise specified, if the user presses any of the column headers in a table, the data will be sorted in descending order by that columns data. If the user presses the column header again, the data will toggle between descending and ascending sort order.

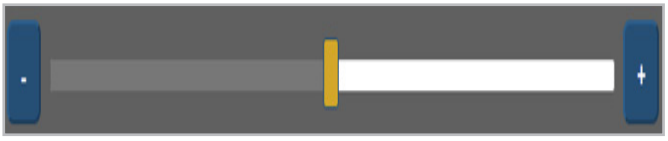
3.2.2.3.1 Pop-up Interface

When the user input is required, a pop-up interface, either numeric or alpha-numeric, will appear; all pop-up interfaces will:

- Have a cursor to show the location of the next typed character and allow the user to touch the data entry screen and select the location of the next typed character.
- Have a Cancel key that will exit the keyboard without changing the field. This may either appear as:

- Have an Enter key that will exit the keyboard and save the entered value. This may appear either:

- Certain value entries will include a slider. The user may move the slider with their finger to increase or decrease values quickly, using the "+" and "-" to make fine adjustments.



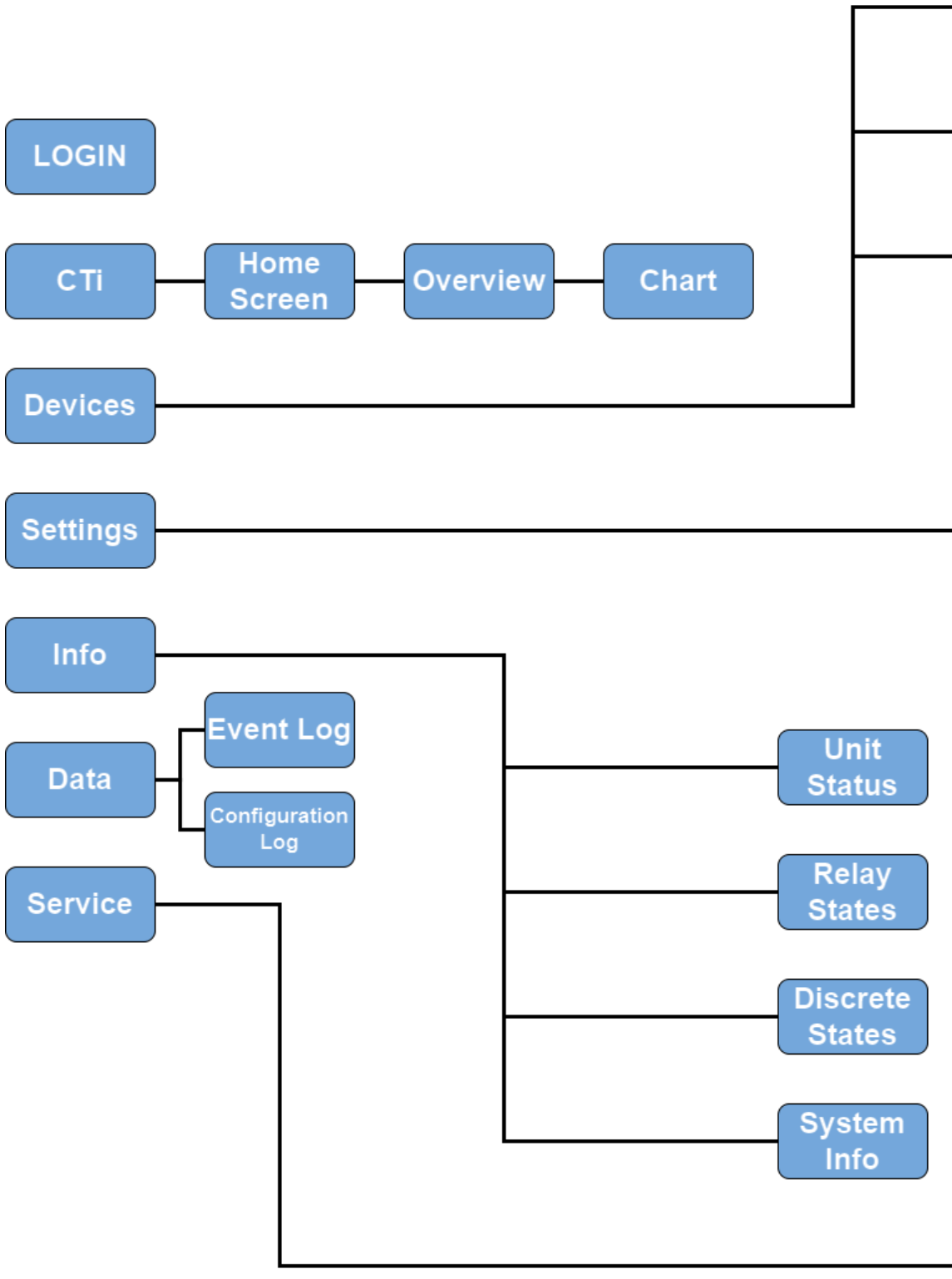
3.3 Quick Start Guide

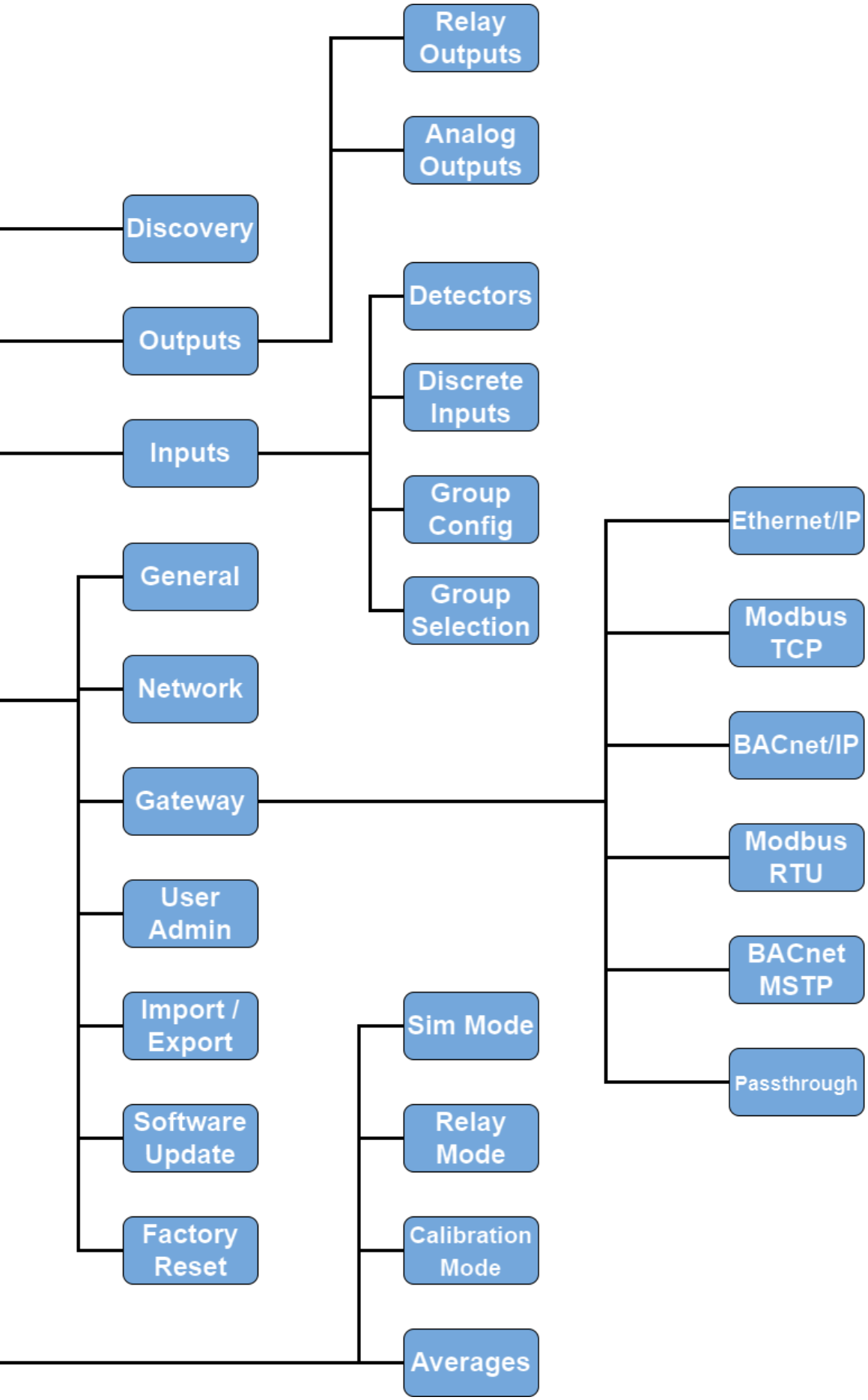
1. **Check Wiring**: Make sure all connected devices are terminated and wire terminals are tightened.
2. **Apply Power**: Turn on AC power breaker to apply power to the system.
3. **Setup**: Configure all connected devices with proper Modbus ID's per device instructions.
4. **Discovery:** Discover all connected devices.
5. **Devices**: Configure all settings.
6. **Programming:** Complete M255 programming, tying detector Groups to intended Relay Outputs or Analog Outputs.
7. **Test System:** Perform extensive startup test to verify all alarm functions perform as intended.
8. **Export:** Save new configuration and system settings to USB drive for backup.

3.4 Menu Screens

3.4.1 Menu tree outline

The Menu Tree can be used to quickly find screens. It also shows which screens are configurable and which are view only.




Relay Outputs
Analog Outputs
Discovery
Outputs
Detectors
Discrete Inputs
Inputs
Group Config
Group Selection
General
Ethernet/IP
Network
Modbus TCP
BACnet/IP
Gateway
Modbus RTU
User Admin
BACnet MSTP
Import / Export
Sim Mode
Passthrough
Software Update
Relay Mode
Factory Reset
Calibration Mode
Averages

Page intentionally blank

3.4.2 Login Screen

To change configurations or system settings, a login is required. A login pop-up screen will appear when the user attempts the changes.

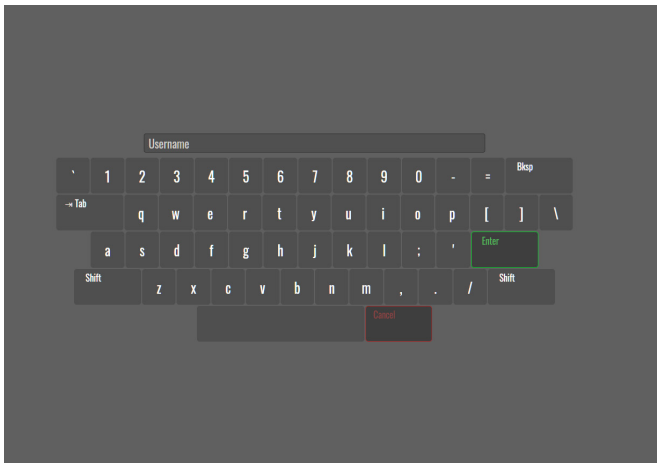
Note: Each user will be assigned a role by an admin; the role for each user will determine access to various functions of the M255.

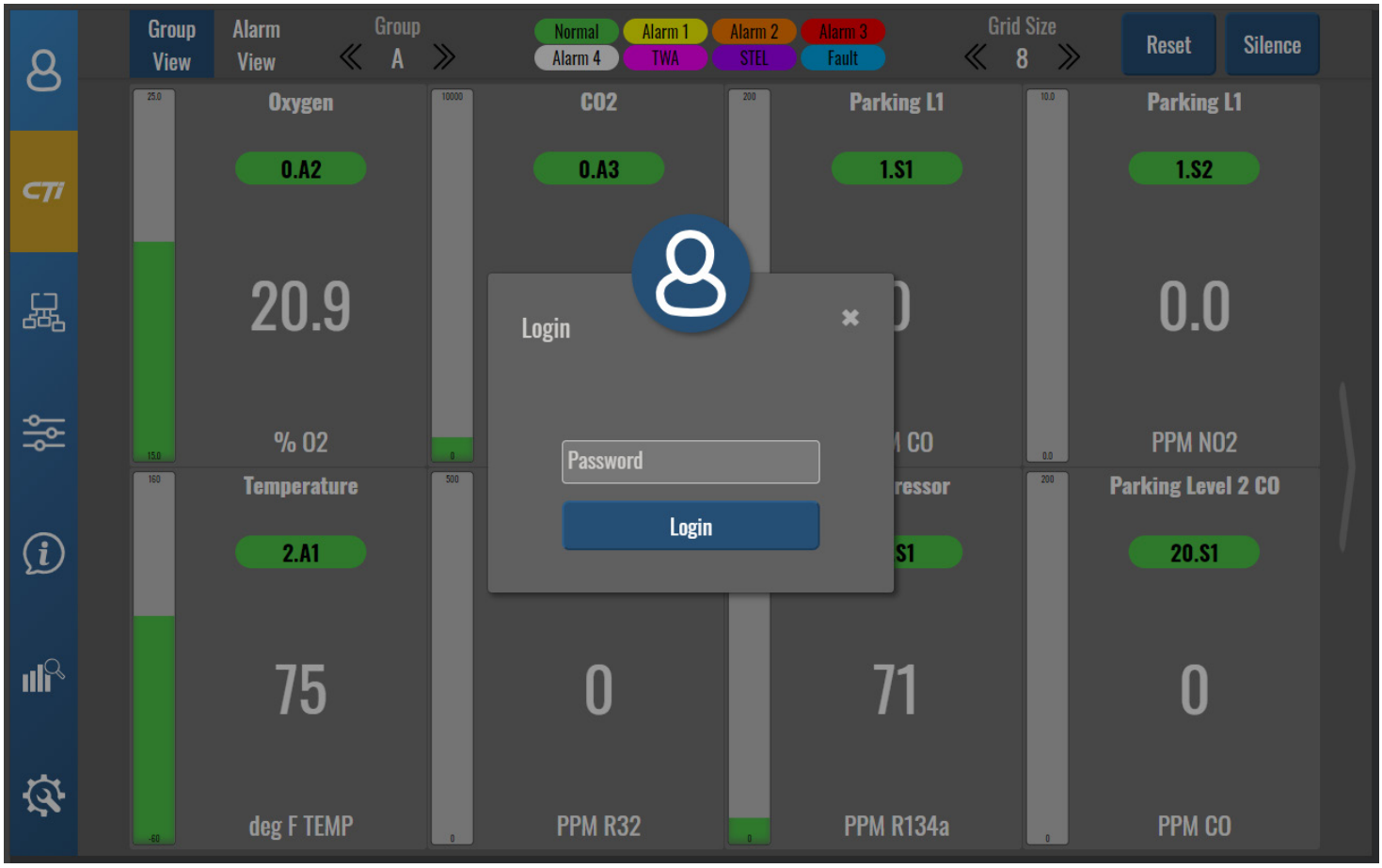
The user may also directly access the login feature from the home screen, at top left, when they begin the updates.

Once the login pop-up appears:

- Tap the Password field.
- Use keyboard to enter password, only dots will appear above keyboard. Press "Enter" to save and return to login entry.
- Tap the Login key.

Once logged in successfully, the Login icon on the home screen will show yellow with a key.





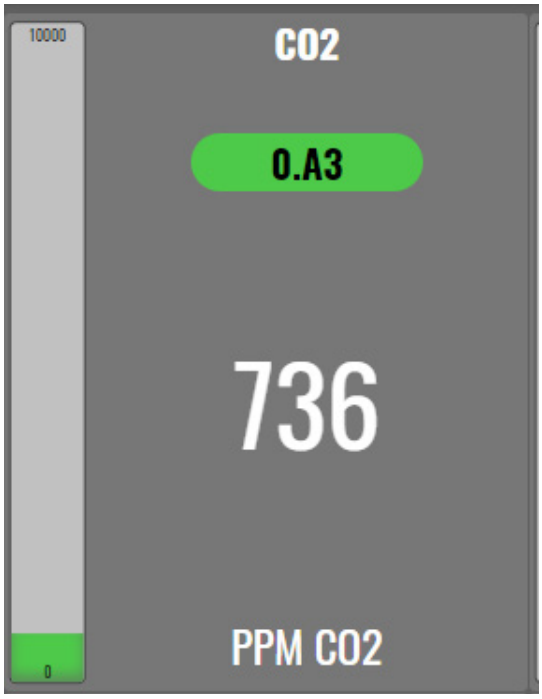
3.4.3 CTI Home Screen

The user may access the Home Screen at any point by tapping the "CTi" button on the left side of screen.

The Home Screen allows an at-a-glance view of the status of all connected devices. Data from each device is displayed in a grid pattern.

Each configured device will display:

- Name of Device (If named)
- Device ID (colored to current state*)
- Current detector reading
- Signal Level Indication Bar
- Gas being sensed
- Method of Indication (PPM or %)
- Gas being measured



Group View allows the user to view current state and readings of devices.

Users may toggle between assigned groups of devices (3.4.4.2.3) by using the arrow keys.

Alarm View will display any special states that exist and at what time it occurred.

Grid Size allows the user to change the number of displayed devices by using with arrow keys.

Note: When more devices are configured to the M255 than are displayed in the Grid Size, users may toggle between the different screens using arrows located to the side of the readings.

The state* will be color coded with a key available at the top of the screen. The colors maybe configured (3.4.5.1).

If the M255 receives alarm (3.6) or fault (3.7)* signals, the user may **Reset** or **Silence** from the M255 Home Screen.

***The colored "pill" around the Device ID will flash on and off if the device is in any state other than normal.**

3.4.3.1 Overview

From the CTI Home Screen users may view data for an individual device by tapping on the appropriate device from the home screen.

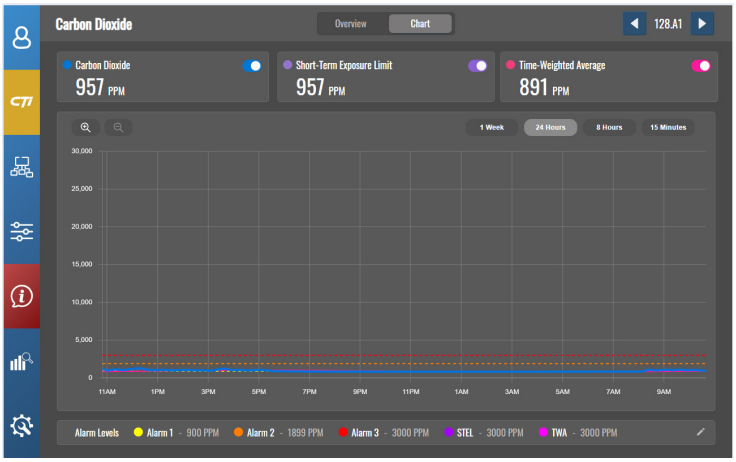
The device overview screen allows a user to quickly view the current settings, alarms and the concentration levels for the last 8 hours of the device. Alarm setpoints are visually indicated on the chart with a corresponding colored line

Users may cycle between devices by tapping the arrow keys on the top right of the screen

The detector (3.4.4.2.1) and discrete input (3.4.4.2.2) settings alarms may be accessed from this screen by tapping on either pencil icon

3.4.3.1.1 Chart

By tapping on the concentration level chart users can see the chart in larger format with options to scale the time period being viewed from 15 minutes up to 1 week.



Users may further zoom into the chart by clicking on the magnifying glass icon.

3.4.4 Devices Screen

3.4.4.1 Discovery Screen

Discovery attempts to communicate with all Modbus addresses to establish communications with all connected devices.

Prior to using Discovery, make sure all devices are installed, powered, and are programmed with unique Modbus ID's. See device instruction manuals for Modbus ID setup.

When ready, select "Devices" on the Home screen. Then "Discovery."

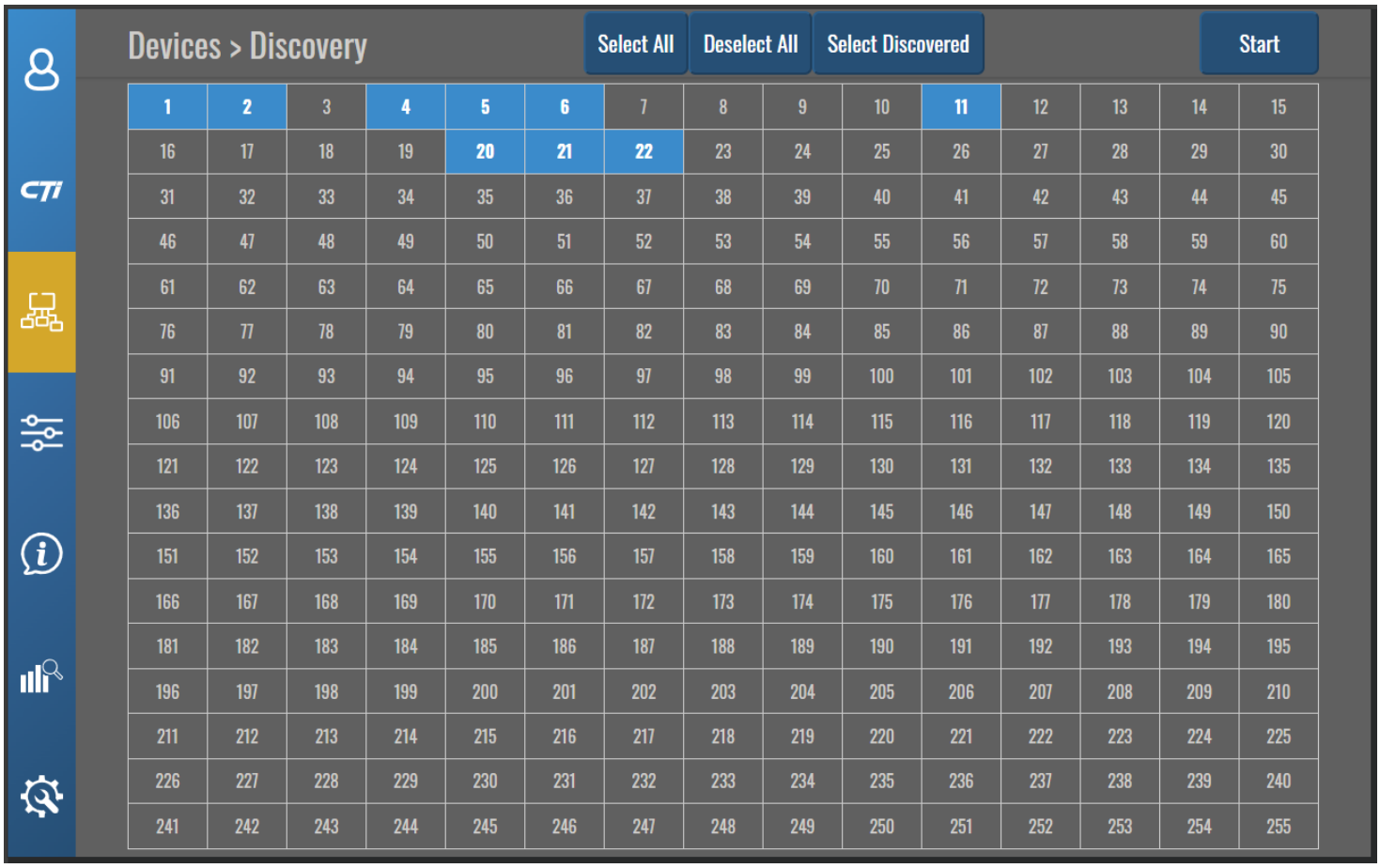
The user may select individual Modbus ID's by tapping the appropriate numbers on the grid or they can attempt a full discovery by using the "Select All." After the selection has been made, tap start.

The time it takes to discover devices will depend on the number of devices selected.

There will be no duplicates, only unique discovered devices will be added to the lists.

After Discovery, verify all devices have been discovered.

If it appears that one or more devices were not discovered, verify Modbus addresses and perform Discovery process again.



3.4.4.2 Inputs Screen

3.4.4.2.1 Detectors Screen

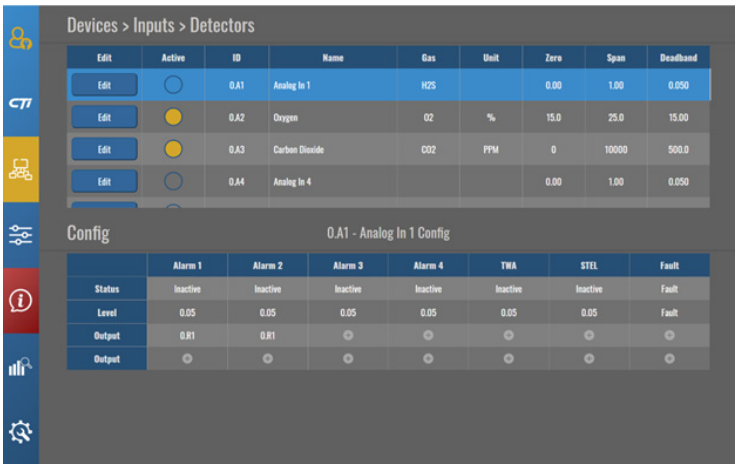
The Detector input page allows the user to:

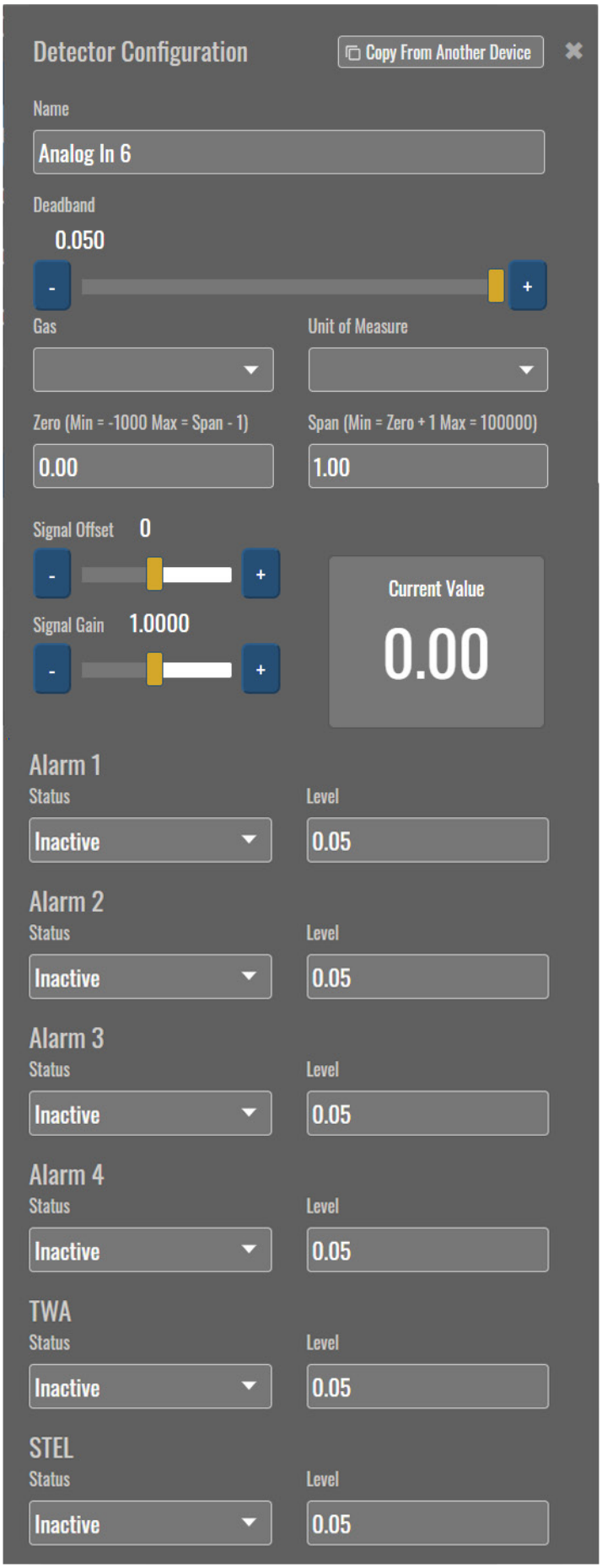
- Configure both analog and Modbus detectors.
- Edit the settings of each detector.
- De/activate the detectors. ***Note:*** All detectors are made Active by default during Discovery.
- Assign one or more outputs to each alarm setpoint for the detector by tapping on the "plus" sign in the Output row of the Config table. Options may be filtered by Modbus Address by tapping the filter icon.

Detector Settings:

1. Assign detector name and/or location. Use abbreviations for long names.
2. Adjust Deadband
3. Assign the Gas.
4. Specify Unit of Measure.
5. Designate Zero and Span for the detector.
6. Adjust Offset and Gain
7. Adjust Alarm set points if desired.
8. Copy Settings from Another Device. For use when installing multiple devices which have the same settings. Tap copy settings button and select device to copy from.

Note: A scroll bar (light grey) is available to the right of table to access additional rows.





3.4.4.2.2 Discrete Inputs Screen

The Discrete Inputs screen allows the user to configure the inputs to control outputs of the system.

The user is able to:

- Configure the Name
- Configure the Active State of the input, choose whether it is "Open" or "Closed." This designates at which condition the input becomes active.
- Configure whether the Function is "Discrete," "Reset," or "Silence."

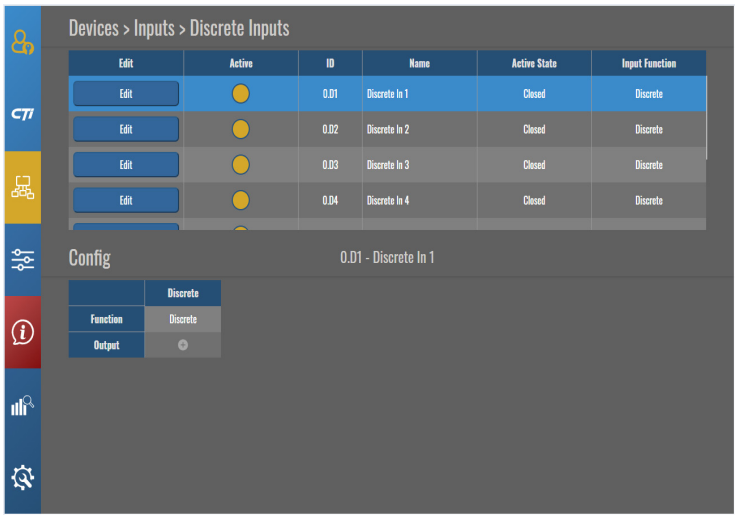
When the user selects Active State of Closed and Function as Discrete the input will Alarm when the input becomes closed.

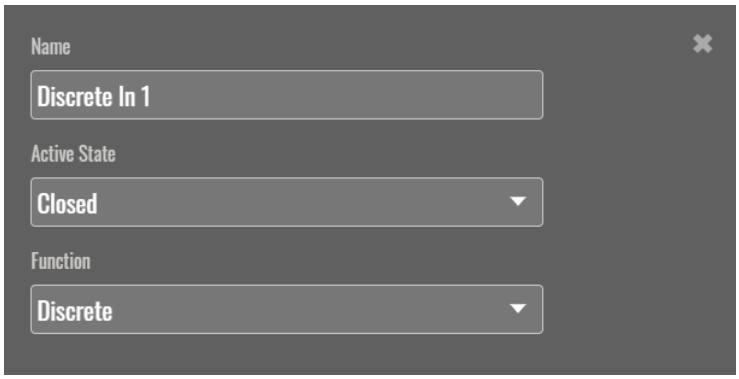
When a discrete input is configured with its Input Function as Silence or Reset; the input may be used as a remote Silence or Reset.

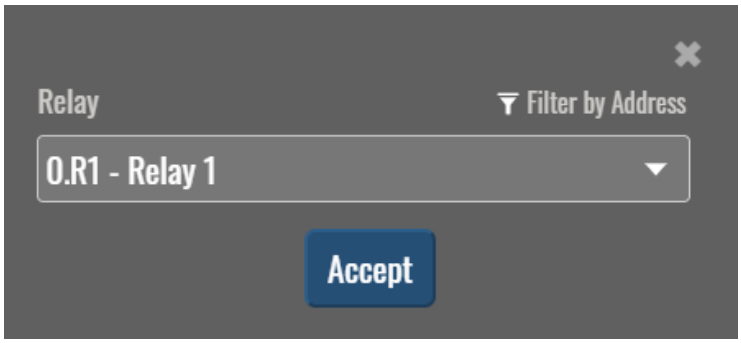
Each Discrete Input may also be assigned to one or more outputs by adding the input to a relay with its Modbus Address.

Tap on Discrete Input you would like to assign, ensuring it is highlighted in blue. Then tap the "plus" sign in Output row of the Config Table. A pop-up will appear to select desired output, this may be filtered by Modbus Address.

This process may be repeated for any number of relays the user wants to assign this input. Each time an output is added a new line will populate in the Config section.







3.4.4.2.3 Group Selection Screen

The Group Selection screen allows the user to group Active Input Signals into a common alarm. The M255 supports up to 26 different groups.

Group A includes all active Input Signals. The user may configure Groups B-Z as needed.

The user will be able to quickly see which detectors are actively a part of a group.

By selecting the edit button the user may assign each group a specific name. Detectors may be selected or removed from groups by tapping the dot corresponding the detector and group.

3.4.4.2.4 Group Config Screen

The Group Configuration screen allows the user to configure and link groups of inputs to outputs of the system.

Tap on Group you would like to configure, ensuring it is highlighted in blue. Then tap the "plus" sign in Output row of the Config Table. A pop-up will appear to select desired output, this may be filtered by Modbus Address.

Each Group can have up to 24 outputs assigned. Each device within the group that has an output assigned will be displayed on a separate line.

Note: Alarm conditions are read together.

3.4.4.3 Outputs Screens

3.4.4.3.1 Relay Outputs Screen

The Relay Outputs screen allows the user to configure the relay settings on board the M255 controller.

User may quickly:

Name: Relays may have a name assigned by selecting the Edit button. Assigning a name during installation/start-up provides an at-a-glance relay assignment on the Home Screen and status menu without the need for electrical drawings lookup.

Active: Allows a simple single tap activation/deactivation of relays. Any listed relay set to Active will trip when all of the following conditions are met.

- Gas concentration exceeds the set point for the configured alarm.
- Time exceeds the On Delay time setting

ID: Designates on which unit the relay is located (E.g. 0.R1 is located on board the M255).

Normally Energized: Selecting normally energized keeps the relay energized in the non-alarm state.

Latching: Setting the relay to latch (typically recommended for equipment shutdown) will require a manual reset from the M255 operator interface. A latching relay is only able reset after the gas concentration has dropped below the alarm set points. A non-latching relay automatically resets after the gas concentration has dropped below the alarm set points.

Silenceable: Setting the relay to be silenceable (typically used for buzzers/horns) allows the relay to be reset by pressing SILENCE from the M255 operator interface.

Add Config:

The M255 controller allows the user to add and configure which devices or group of devices are connected to a certain relay.

All of the on board relays are listed in the Relay Configuration table, along with any connected devices. Below is an explanation of the relay configuration settings.

Input Type: The user may specify whether it will be a Detector, Discrete input, or Group.

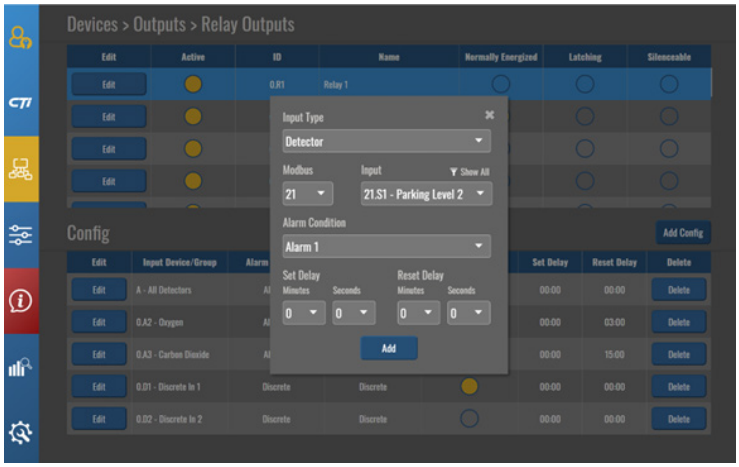
Input: Choose which input is appropriate for the device.

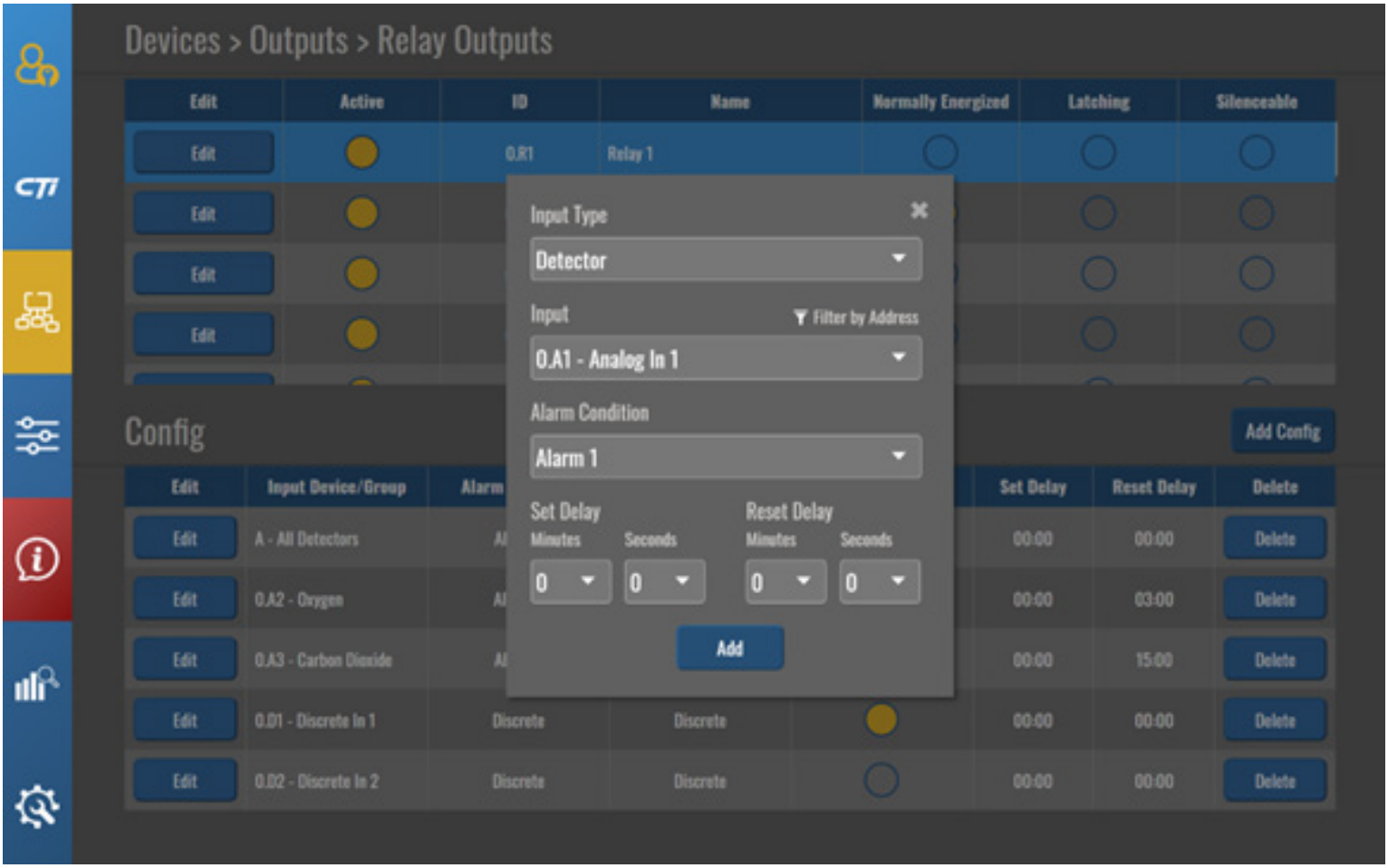
Modbus Address: The Input selection may be filtered by address. Select "Filter by Address" option about the Input drop down the pop-up will reset with an address box. The Modbus Address may now be selected from previously discovered device addresses if analog or discrete.

Alarm Condition: Select from prior specified conditions the relay will be tripped and signal an alarm.

Set Delay: Set relay on-time delay

Reset Delay: Set relay off-time delay





3.4.4.3.2 Analog Outputs Screen

The Analog Output Configuration page allows the user to configure the 4-20 mA analog output on remote devices.

Using your provided worksheet and notes:

1. Make the device analog output active (if desired).
2. Assign name and/or location. For example, Exhaust Fan 3. Use abbreviations for long names
3. Select detector or group source. Selecting "None" will disable the analog output.

Each Active detector has a 4-20 mA value, equivalent to it's gas concentration, calculated based on the range of the detector.

Each Group has a 4 to 20 mA value calculated, based on the largest 4-20 mA value in that group. If a Group is selected as the Source, the devices Analog Output will be commanded to output the calculated 4-20 mA for that Group.

Refer to your specific device manual for details and requirements for analog and discrete inputs for fan activation and speed control.

3.4.5 Settings Screens

3.4.5.1 General

The user may adjust Date/Time, User Time-out, Main Menu Time-out, Local Reset/Silence, and Alarm/Special State colors through the Settings menu by selecting "General."

Having the correct date and time is important for accuracy of the Event Log. It is recommended to review and adjust time during each calibration.

Note: Time does not adjust automatically for daylight savings time.

User and Main Menu Time-out settings allow users to specify how long, in minutes, a login will remain active.

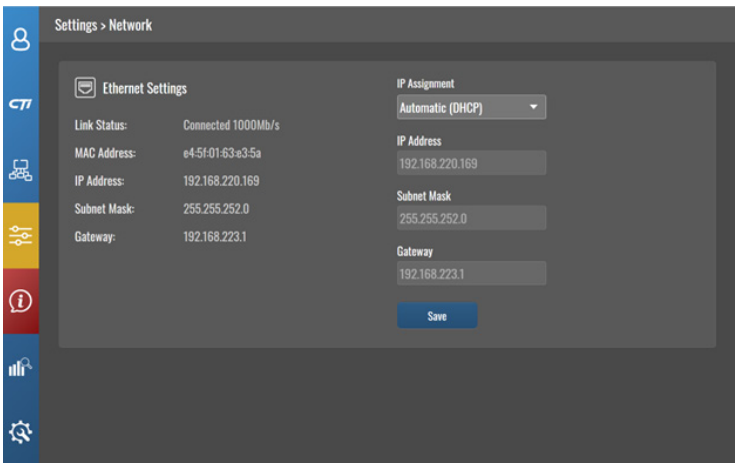
Local Reset/Silence (3.4.4.3.1) setting allows the user to allow alarms and special states to be controlled at the individual detectors/devices

The user may also change the colors indicated on the Home Screen representing the status of each device.

3.4.5.2 Network

Users with a PLC may set the IP Address manually via the Network settings page.

- Switch from Automatic to manual.
- Enter IP Address.
- Enter Subnet Mask.
- Enter Gateway (optional).



3.4.5.3 Gateway

The M255 Gateway feature allows a network interface between the control panel and an existing plant PLC communicating either with Ethernet or RS-485 using the following protocols:

Ethernet:

- Ethernet/IP
- Modbus TCP
- BACnet/IP

RS-485

- Modbus RTU
- BACnet MSTP
- Passthrough

Note: When selecting the RS-485 Gateway modes please note that Modbus operates using 8-E-1 data formatting and BACnet uses 8-N-1.

Users may adjust the Baud of the Gateway; this only effects the communication between the M255 and the PLC. The M255 will communicate at 9600 Baud to any devices attached.

3.4.5.3.1 Gateway Mapping

All Gateway features will require management of the Gateway Map which maps sensor levels, analog signals, alarm states, and relay states to values in the PLC tag arrays.

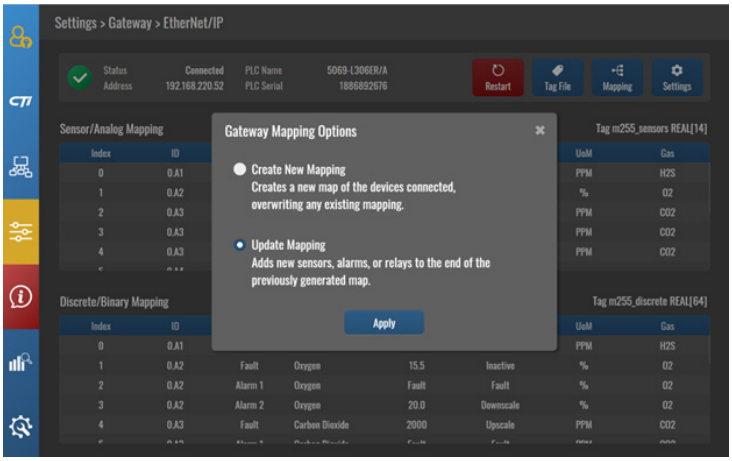
This ensures PLC tags are consistent when devices are added, removed, or configuration changes occur on the M255.

Each Gateway feature will have a Mapping button available.

Users will be able to:

Create New Mapping: Creates a map of connected devices, overwriting any existing mapping.

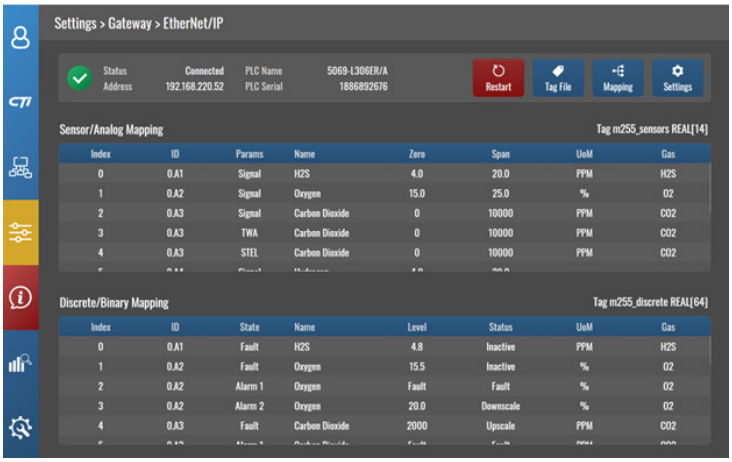
Update Mapping: Adds new sensors, inputs, relays, and alarms to the end of the previously generated map. For installations, Update Mapping will create a new map.



3.4.5.3.2 Ethernet

3.4.5.3.2.1 Ethernet/IP

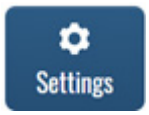
The M255 has built-in support for Ethernet/IP communication with most industrial PLCs using controller tags. Tags provide values for sensor levels, analog signals, alarms states, and relay states.



3.4.5.3.2.1.1 Ethernet/IP Setup

PLC Tags can be created by importing the Tag File generated by the M255 or by manually creating the Tags in PLC software.

Manual PLC configuration will require the user to access the Ethernet/IP Setting button.

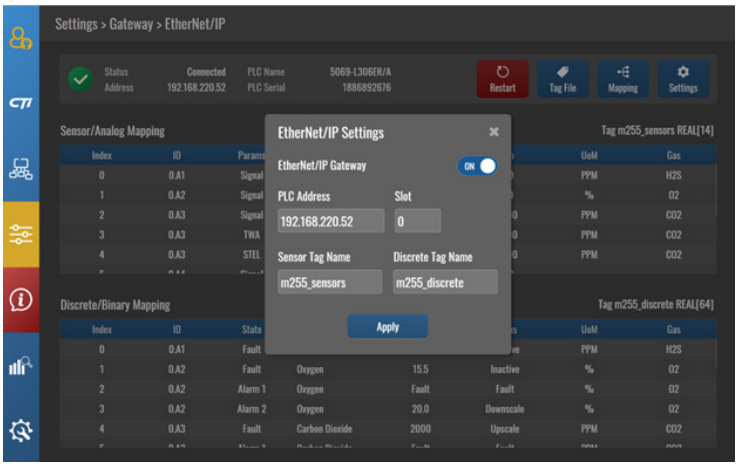


The default Tag Names are:

- m255_sensors
- m255_discrete

Tag names can be changed if needed in the settings.

The Tag Data Type Should be REAL[size] array, with the size matching the values provided on the Ethernet/IP screen or by simply using the provided Tag File.



Example Import of Tag File:

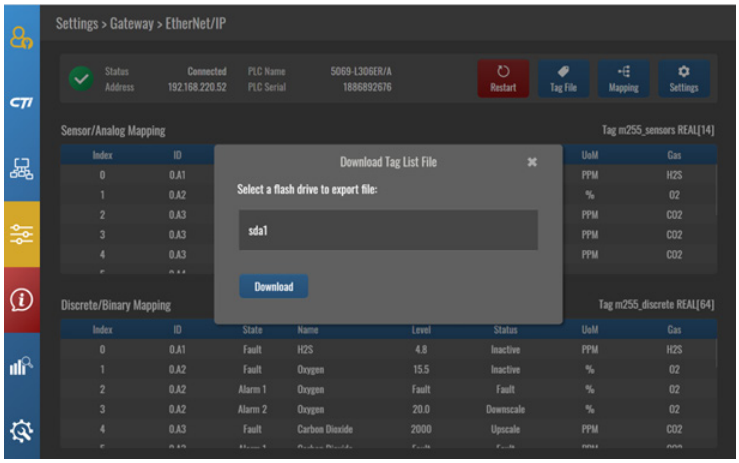
1. On the M255 navigate to Settings > Gateway > Ethernet/IP
2. If a Gateway Mapping has not already been created, press Mapping.
   a. Select Update Mapping.
   b. Press Apply.
3. Press Settings.
   a. Enable the Ethernet/IP Gateway by toggling the switch to ON.
   b. Enter the PLCs IP Address, optionally you can change the Slot number.
   c. Press Apply.

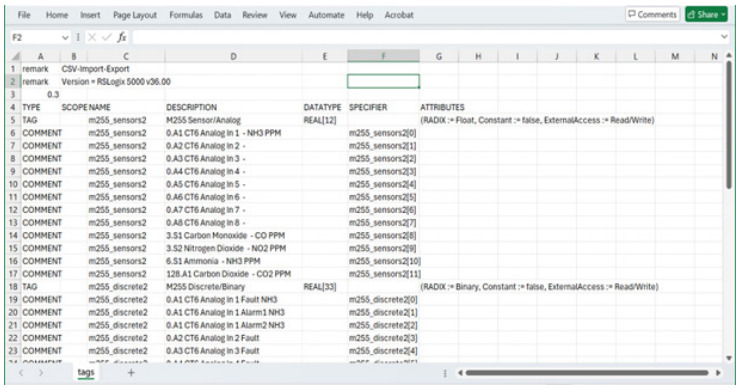
The M255 will now connect to the PLC and continually update the PLC tags. If the connection is interrupted, from network or power issues, the M255 will automatically reconnect to the PLC every 30 seconds.

3.4.5.3.2.1.2 Tag File Export

A Tag file may be created with the Tag File button it generates a CSV file that can be loaded into PLC software such as Logix Studio.

The tag file includes additional information about the tags, including tag names and descriptions. Insert a USB drive into the door of the M255, select the drive from the export menu, then press Download.





3.4.5.3.2.1.3 Restart

The Restart button forces the gateway to immediately disconnect, then reconnect to the PLC, provided the Gateway is “On” in the settings. This is useful when troubleshooting and bypassing the 30 second auto-reconnect interval.

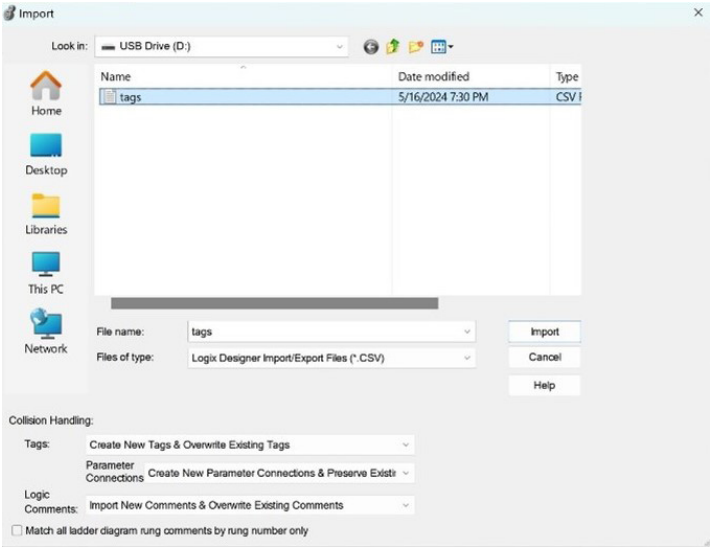
3.4.5.3.2.1.4 PLC Setup

The M255 Ethernet/IP Gateway works with all PLCs that support controller tags. Before setting up the PLC, ensure the M255 settings have been updated, and the Gateway Mapping has been completed as described (3.4.5.3.1). Then export the Tag File as outlined above to a USB Drive (3.4.5.3.2.1.2).

***Example** (uses Studio 5000 with an Allen-Bradley PLC):*

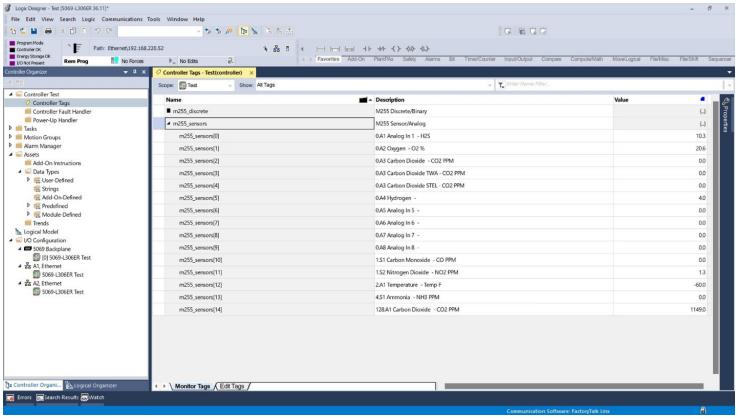
Importing the Tag File into Logix Designer:

1. Ensure Logix is offline, the click Tools > Import > Tags and Logic Comments.
2. Select the tags.csv file from the USB Drive, and set the following options:
   a. **Tags:** Create New and Overwrite Existing Tags
   b. **Comments:** Import New and Overwrite Existing Comments
3. Click Import.
4. Save the project and Upload to the PLC.



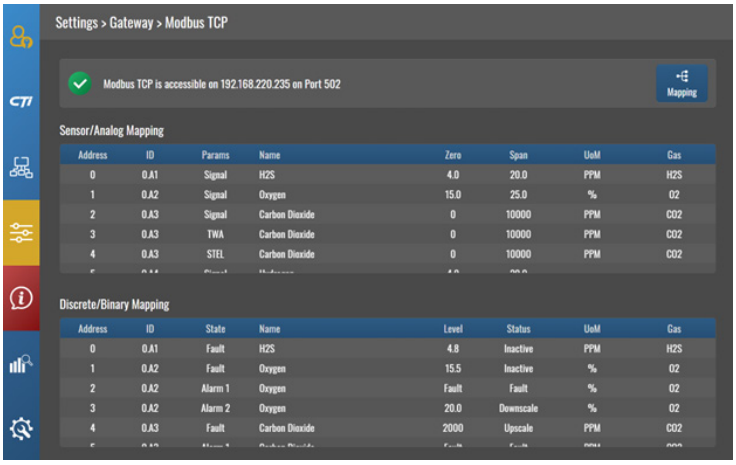
Viewing Tags in Logix Designer:

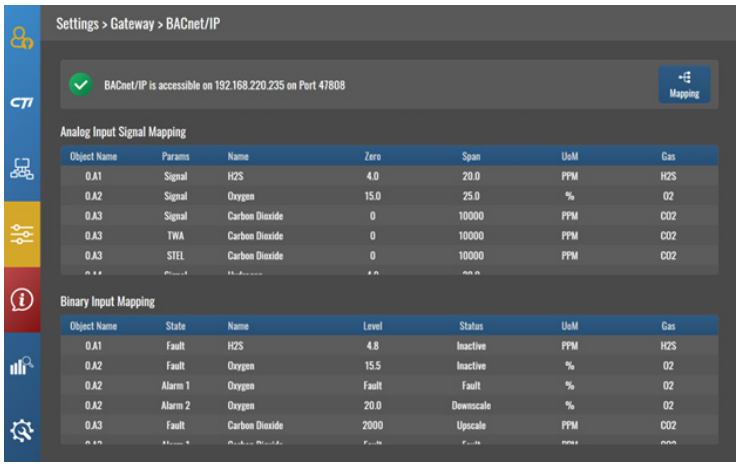
The default Tag Names can be changed on the M255 (3.4.5.3.2.1). The M255 will continually update the tags as values change. If the connection is interrupted, from network or power issues, the M255 will automatically reconnect to the PLC, and resume updating the Tags.



3.4.5.3.2.2 Modbus TCP & BACnet/IP

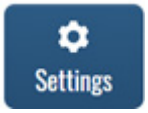
Use the Gateway Mapping feature (3.4.5.3.1) to acquire appropriate values for Modbus TCP and BACnet/IP tags on your PLC.





3.4.5.3.3 RS-485

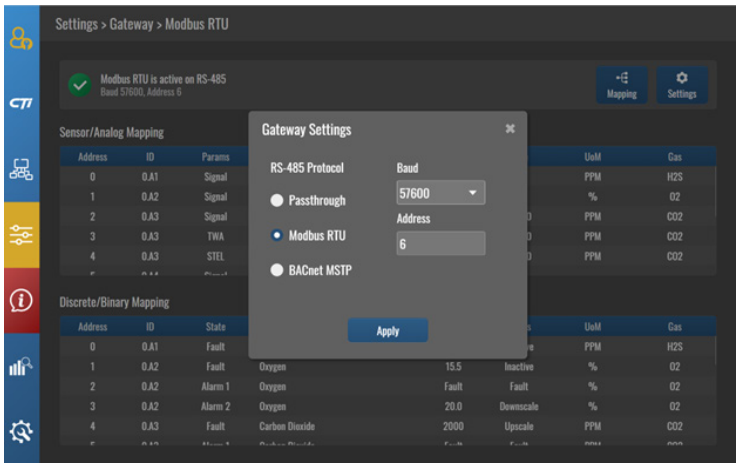
Each RS-485 Gateway feature may be enabled via main menu and can be further accessed settings button located on the feature screen.



3.4.5.3.3.1 Modbus RTU

Modbus RTU protocol requires a user to set the baud and address for the M255 via the settings button.

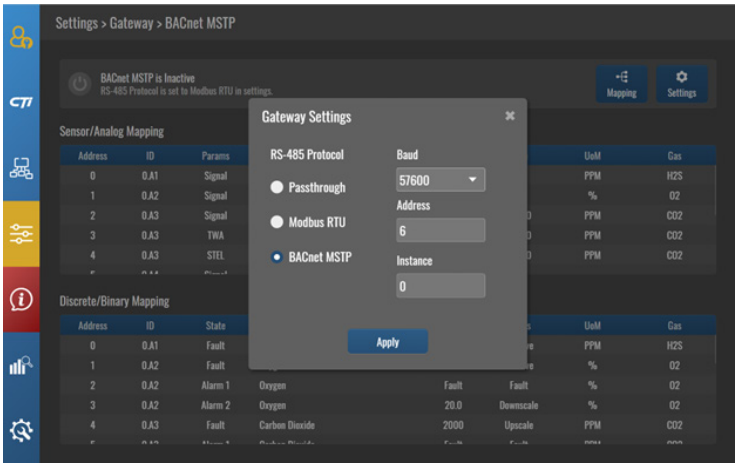
Once completed, a new or updated Gateway Map should be generated.



3.4.5.3.3.2 BACnet MSTP

BACnet MSTP requires users to set the Baud, Address, and instance of the M255 on the BACnet network via the settings button.

Once completed, a new or updated Gateway Map should be generated.



3.4.5.3.3.3 Passthrough

The Passthrough feature allows a PLC to view the analog in signal of a device networked with the M255; requested signal is queried by the M255 and relayed out to the PLC.

Users are able to adjust the Baud via the settings button.

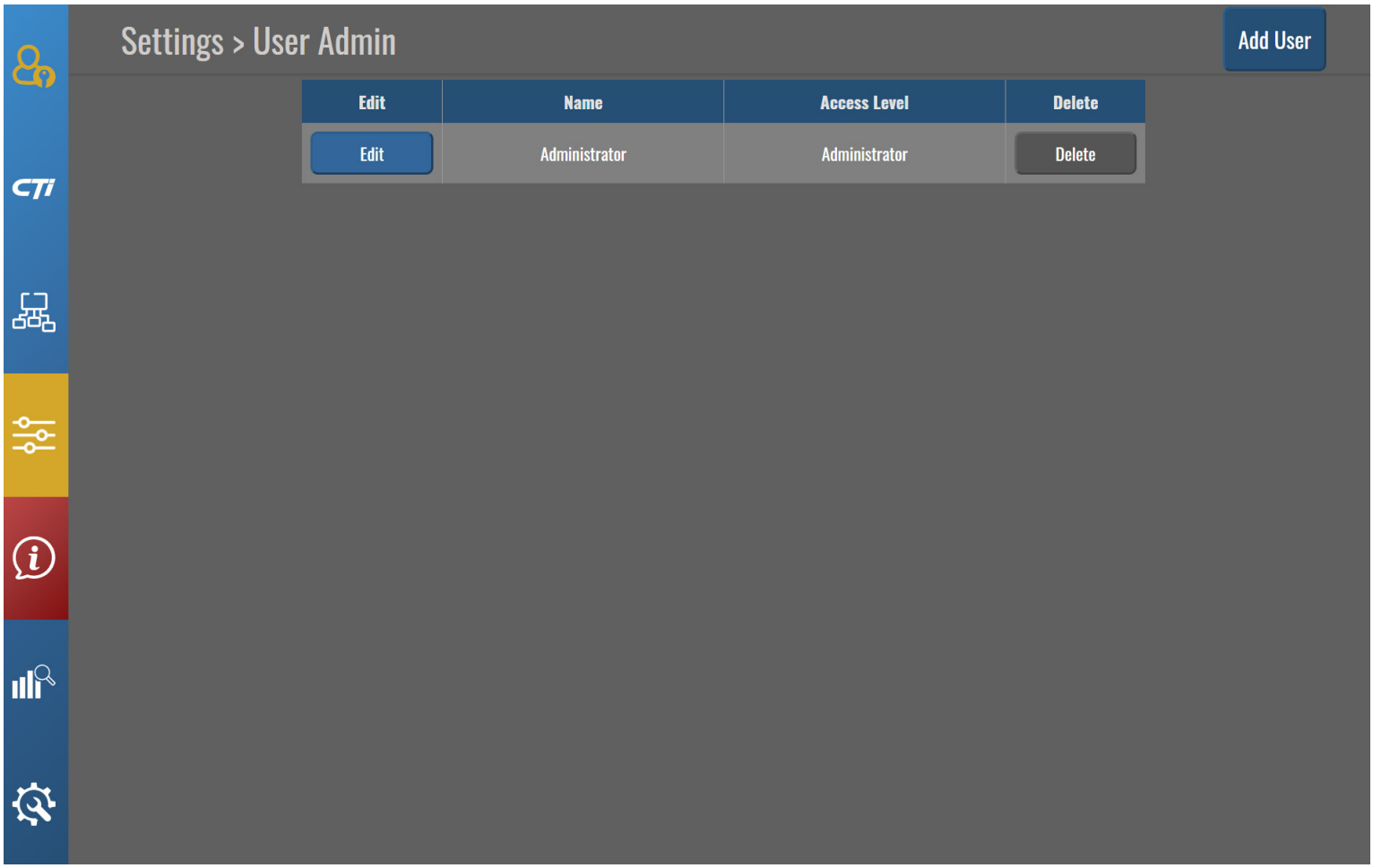
3.4.5.4 User Admin Screen

During initial start-up of the M255 the general Admin Username and Password is used to designate additional users depending on their role.

Admin Password: 5861

Users will be classified as one of:

- User - View Only, able to silence/reset alarms
- Manager - View/Change all, except Settings/User Admin and delete logs
- Administrator - View/Change all, except delete logs



3.4.5.5 Import/Export Data Screen

To import or export files:

1. Use a USB flash drive >1GB.
2. Insert the flash drive into the USB port on the main display unit on the inside of the enclosure door (see page 12).
3. Select *Click to select USB,* and select the USB.
4. Use the drop-down menu to select files to be imported or exported.

Import

The Import feature allows users to import a system configuration file (xxx.mff from the flash drive.)

This file can be imported to restore corrupt configuration, or uploaded into another M255 controller to duplicate the configuration.

Export

The Export feature allows the user to export the following controller files to the flash drive:

System Configuration: Creates a backup .mff file of the user programmed data tables in the event of a system crash or software corruption.

Event Log: Creates a CSV file of all events with a date/time stamp.

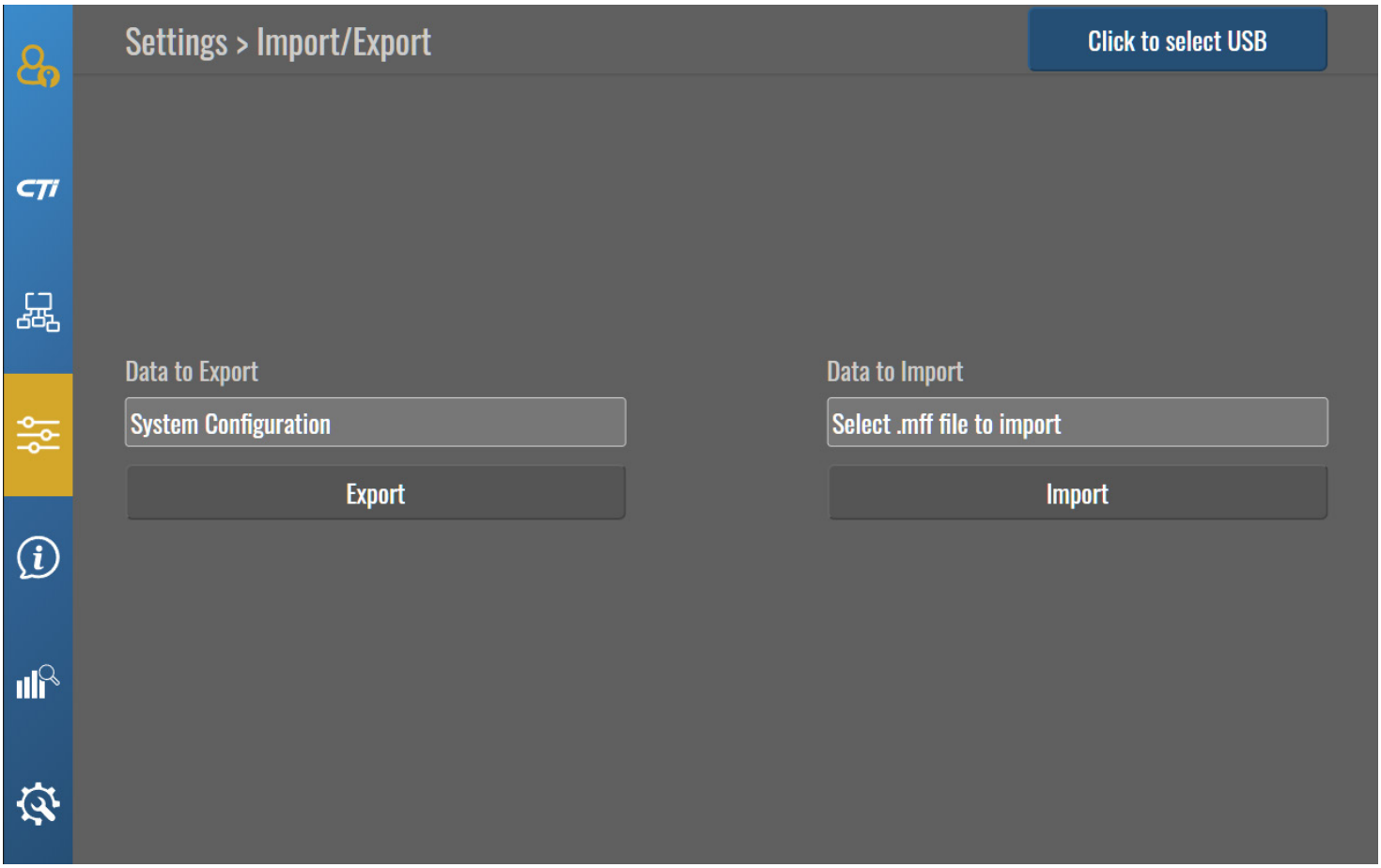
Diagnostics Log: For CTI personnel diagnostics.

Configuration Log: Creates a CSV file displaying configuration changes to all devices with date/time stamp.

Signal Data: Creates CSV file of all signal data by date/time stamp.

Gateway Analog Mapping: Creates a CSV file displaying the current map with Modbus address.

Gateway Discrete/Binary Mapping: Creates a CSV file displaying current map with Modbus address.



3.4.5.6 Software Update Screen

Updating the M255 software will require use of an empty USB drive, FAT32 formatted.

The software can be emailed to the user and loaded onto the USB flash drive.

The M255 should be powered on and fully booted prior to starting update.

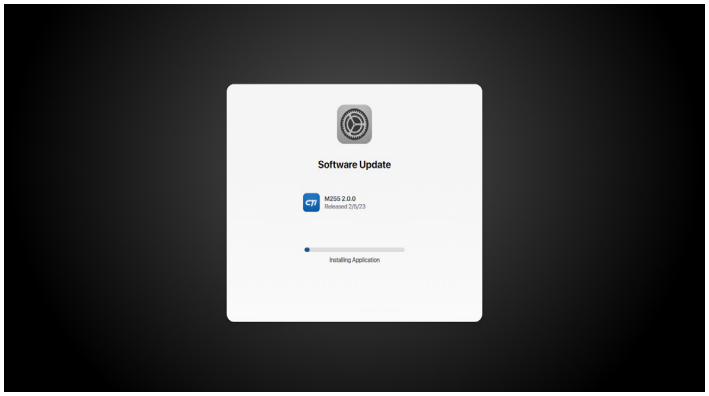
3.4.5.5.1 Display Update

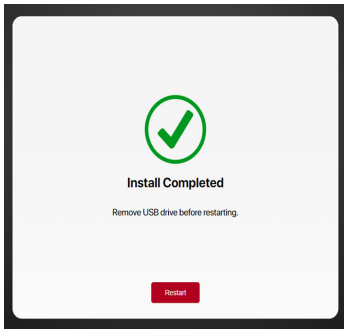
Plug USB drive into the port located on the back of the lid (see page 12). When the USB has been plugged in, the M255 will read the drive and display all available updates.

Users will see either/both system updates or application updates (M255).

Select updates one at a time and tap the install key.

The unit will install software and prompts for a restart of the M255.





Note: Updating Display software requires the M255 to restart after each update. A single update package could include more than one restart. Updates should be scheduled for when these restarts will not impact safety.

3.4.5.5.2 Logic Update

Note: Updating the logic software will not utilize the display.

Only a single update, bin file, should be loaded onto the USB drive. Place the bin file on the top level of USB drive.

Plug USB drive into the port located on the interface board (see page 13).

The fault indicator light located on the interface board (see page 13) will deactivate while software updates. If the light does not deactivate within 6 seconds remove and reinsert drive.

Once update has completed fault light will reactivate and the USB drive may be removed and the M255 has been updated.

3.4.5.7 Factory Reset Screen

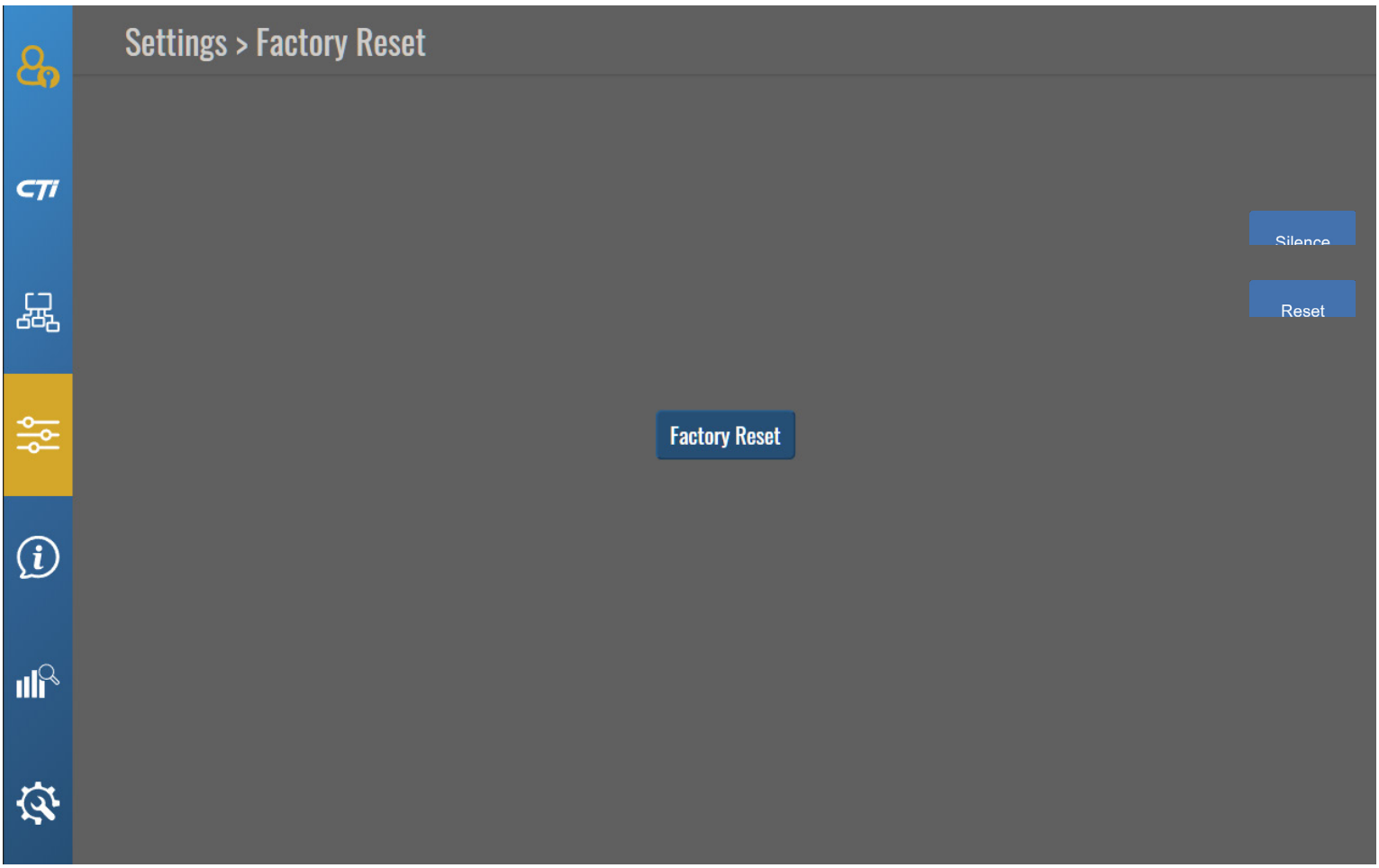
Similar to smart phones and other devices, factory reset deletes data tables and configuration files, and restores it back to factory settings.

Note: Event Log (3.4.7.1) and Configuration Log (3.4.7.2) will not be erased if a factory reset is performed.

This cannot be undone once the Reset button is selected.

Make sure you have a good backup copy of the M255 config file that is intended to be imported into the M255, or be prepared to start over with programming of the M255.

Note: If the Flash version has changed any current configurations will reset. It is recommended to document the current configurations before performing reset.



3.4.6 Info Screens

The following screens are view-only status screens.

3.4.6.1 Unit Status

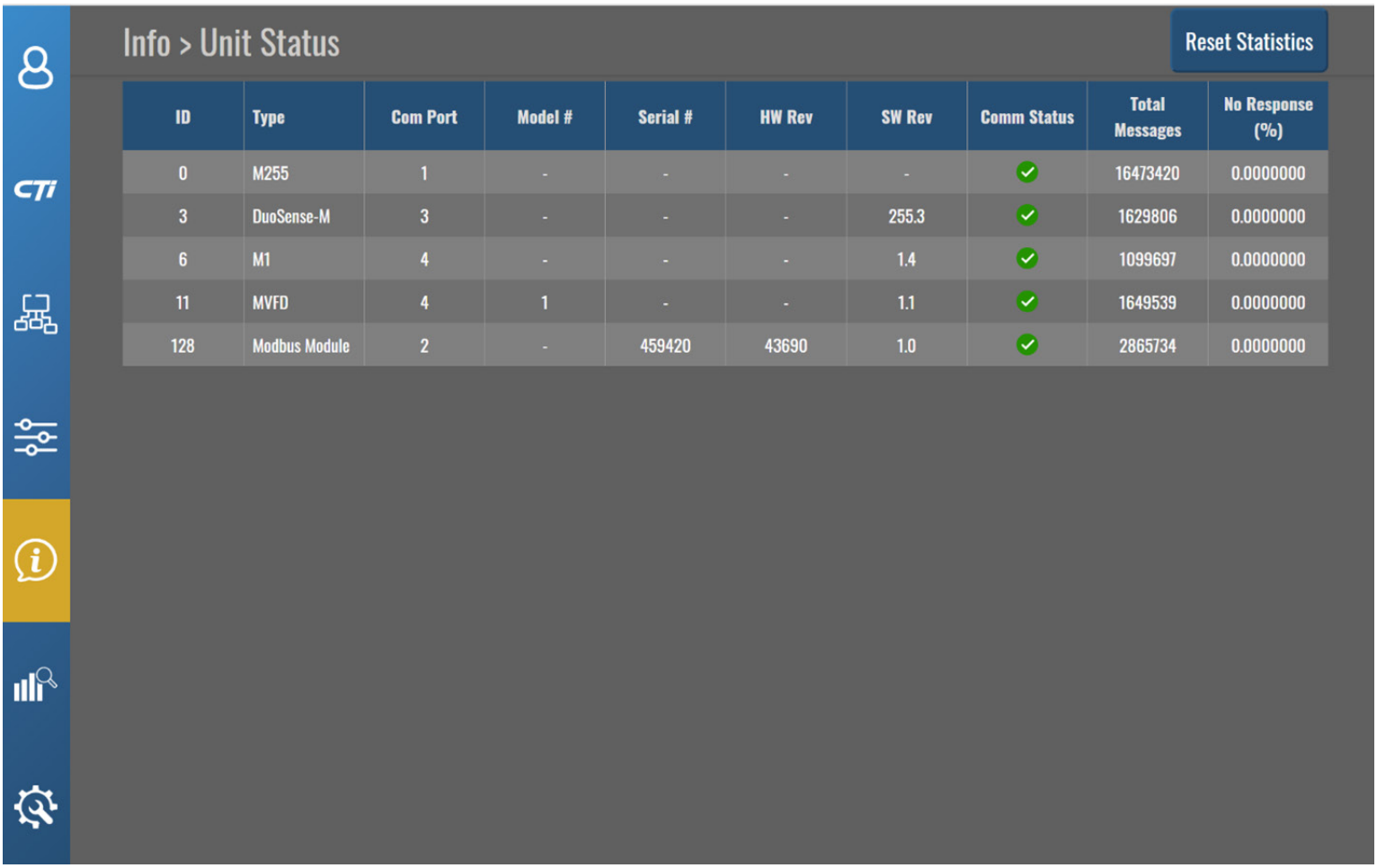
A unit is a group of devices that share the same Modbus address. (e.g. - An M1 is a single unit with 1 detector with up to 2 relay devices.)

The Unit Status screen is an at-a-glance view of what type of units are currently tied into the network. It provides network communication diagnostics data for each unit including which communication ports are currently being utilized.

This table is a useful tool for diagnosing anomalies and other intermittent issues for units and power/comm wiring. If the M255 detects a Communication Fault with a device the Comm Status will reflect an error.

It also displays the hardware revision and current software revision of the discovered devices.

Contact service at CTI for help troubleshooting.



3.4.6.3 Relay States Screen

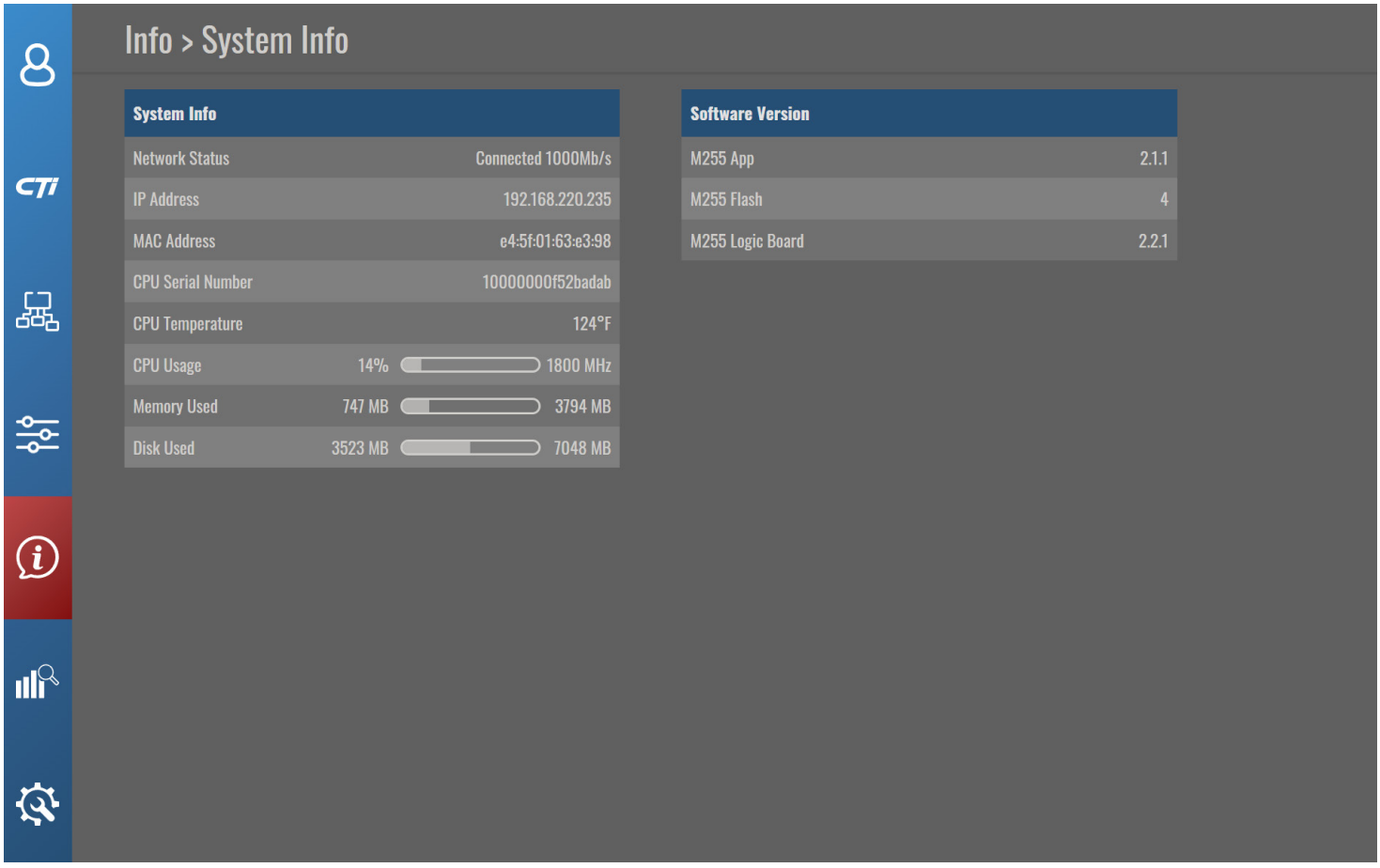
The relay states screen shows which relays on the network are active, and whether they are tripped due to an event.

3.4.6.4 Discrete States Screen

The Discrete States Screen provides a quick at a glance view of which discrete inputs are currently active.

3.4.6.4 System Info Screen

The system info screen provides a convenient view of vital hardware and software information.



3.4.7 Data Screens

3.4.7.1 Event Log Screen

The event log records every event and stores them in chronological order, with date and time stamps.

Note: The event log is not erased when the M255 is restored to factory defaults (3.4.5.6).

Date & Time

Event:

The event can be any of the following:

- Alarm, vent or fault activated or cleared
- A relay tripped or cleared
- M255 powered on
- Cal timer started or ended
- Alarms enabled or disabled

Set Point (PPM):

If applicable, shows the gas concentration alarm trigger level.

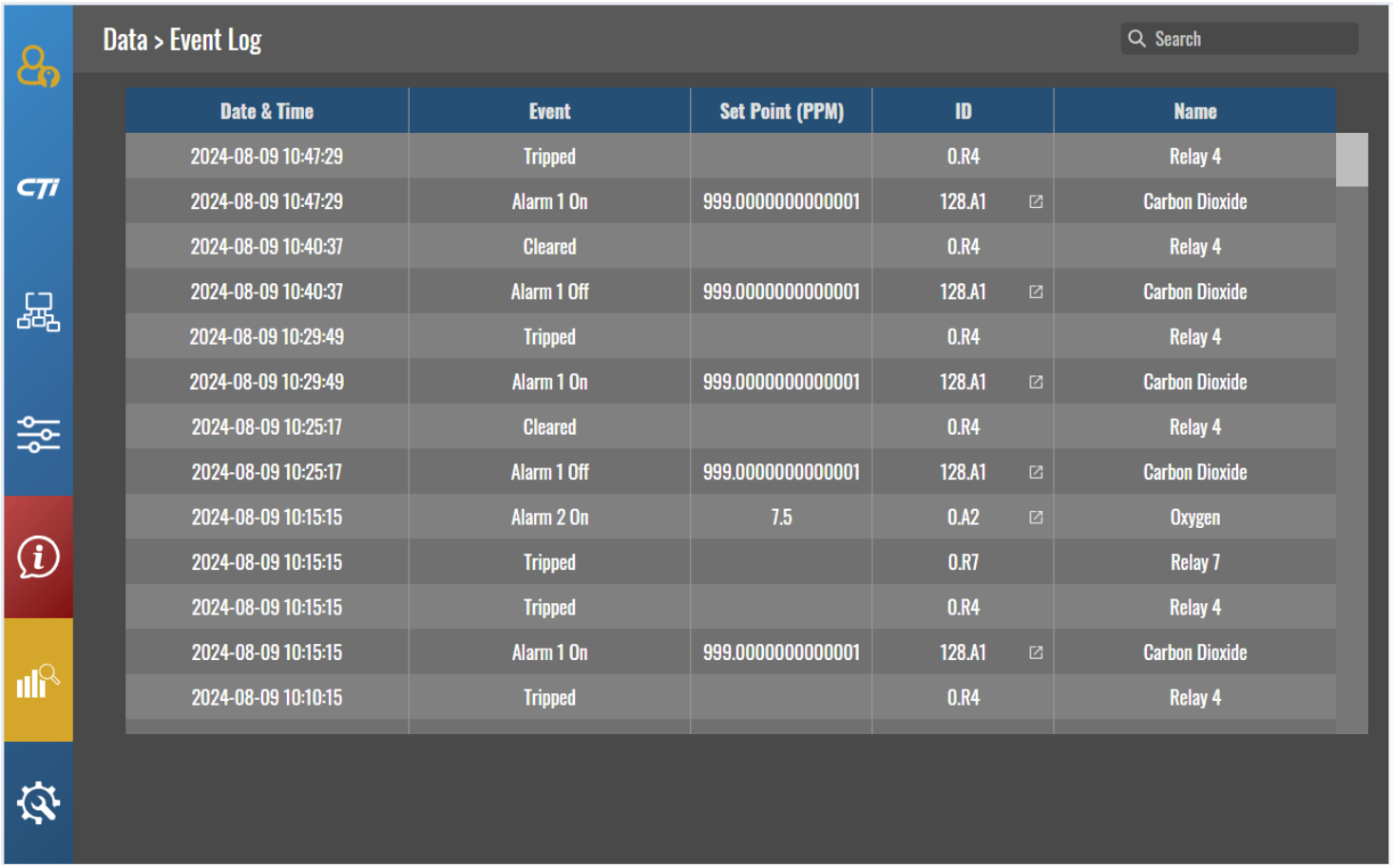
ID:

Shows the Modbus ID of the device.

Links to view event on device overview graph (3.4.3.1).

Name:

Shows the name of the device.



3.4.7.2 Configuration Log Screen

The Configuration Log records when a user changes a setting through the M255 controller.

Changes are stored chronologically with a date and time stamp.

Note: The Configuration Log is not erased when the M255 is restored to factory defaults (3.4.5.6).

User:

Individual user logins are recorded when configuration changes are made.

ID:

Shows which device on the system was changed, if value is blank the change occurred to M255 controller.

Parameter:

Shows which parameter was changed.

Values:

Shows last recorded and newly changed value for the parameter changed.

Date & Time	User	ID	Name	Parameter	Old Value	New Value
2024-07-03 11:18:28	Administrator	0.A5	Analog In 5	Gas	Ammonia	
2024-07-03 11:18:22	Administrator	0.A5	Analog In 5	Gas		Ammonia
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	STEL Level	1500	3000
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	TWA Level	1500	3000
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	Alarm 3 Level	1500	3000
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	Alarm 2 Level	1500	1899
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	Alarm 1 Level	1500	900
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	STEL Status	Inactive	Upscale
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	TWA Status	Inactive	Upscale
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	Alarm 3 Status	Inactive	Upscale
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	Alarm 2 Status	Inactive	Upscale
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	Alarm 1 Status	Inactive	Upscale
2024-07-03 11:15:27	Administrator	0.A4	Carbon Dioxide	Span	1.00	30000

3.4.8 Service Screens

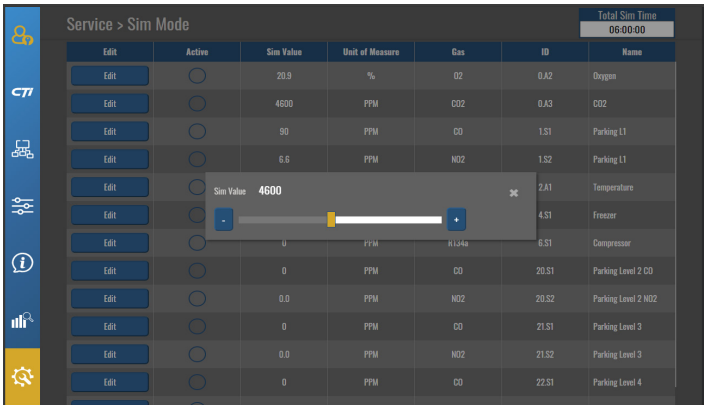
3.4.8.1 Sim Mode Screen

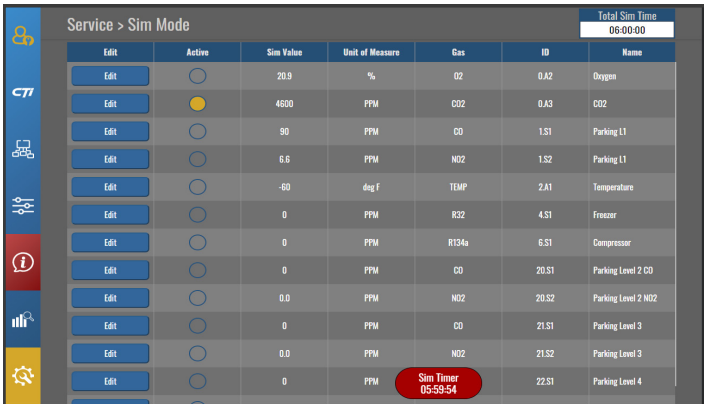
The M255 Sim Mode allows the user to simulate different values detected for the purpose of testing alarm and gas threshold actions as programmed and configured.

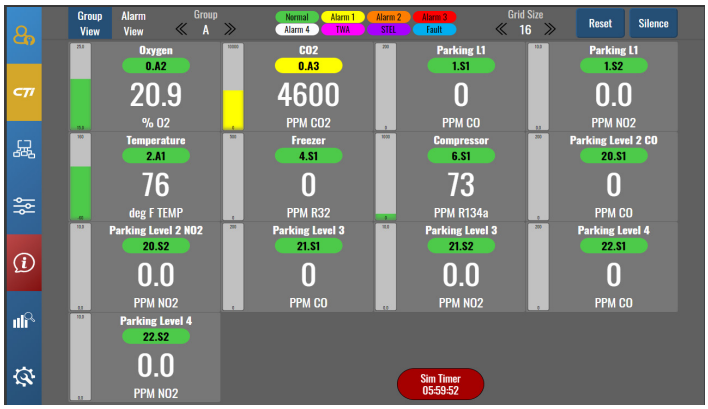
The user may select a specific device to test. Tap the edit button for the selected device, use the slider that appears to adjust the simulated value to be tested.

The simulation must be activated by tapping the "Active" dot on the screen corresponding with the device.

Once active the simulation timer will appear on the display in red and will remain even if the user navigates away from the Sim Mode Screen.







3.4.8.2 Relay Mode Screen

The M255 Relay Mode is used to disable and test relays in the controller.

If the user disables a relay, a disable will start; while relay is disabled it will not go into alarm. If the timer counts down to zero all disabled relays will re-enable.

If the user presses the relay test button, a test timer will begin, time-out is set in the General menu. A relay in test will be forced into an alarm state. If the test timer expires the relay will return to its normal operating state.

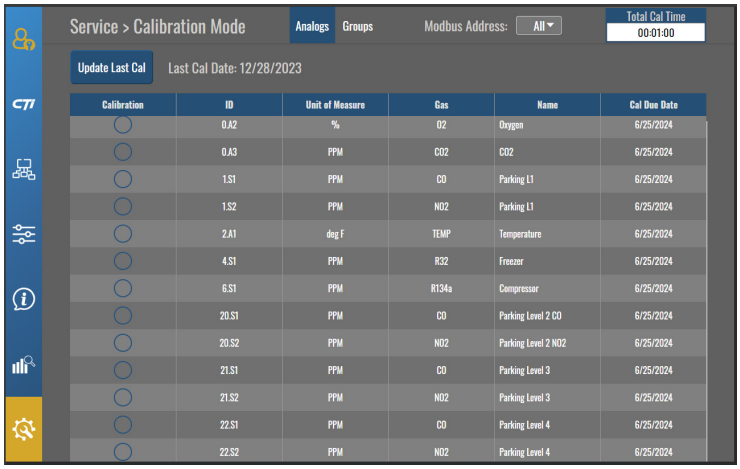
3.4.8.3 Calibration Mode Screen

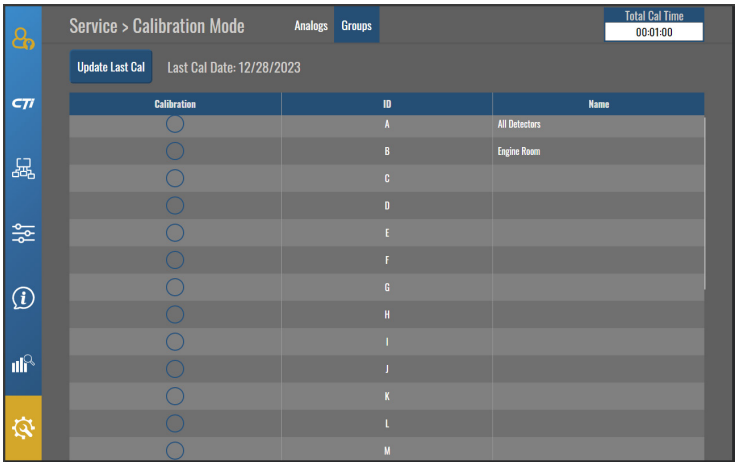
The M255 Calibration Mode is used to put a selected number of devices into calibration mode so a calibration gas may be applied to the device in order to adjust the zero and span.

When a user activates calibration mode, a timer will activate. The time needed for each calibration is chosen by the user.

While in calibration mode the alarms associated with the selected device will disable. When the timer completes its count down, selected devices will return to normal operation.

After all calibrations have been completed, the user must press the "Update Last Cal" button for the "Last Cal Date" and "Cal Due Date" to change.





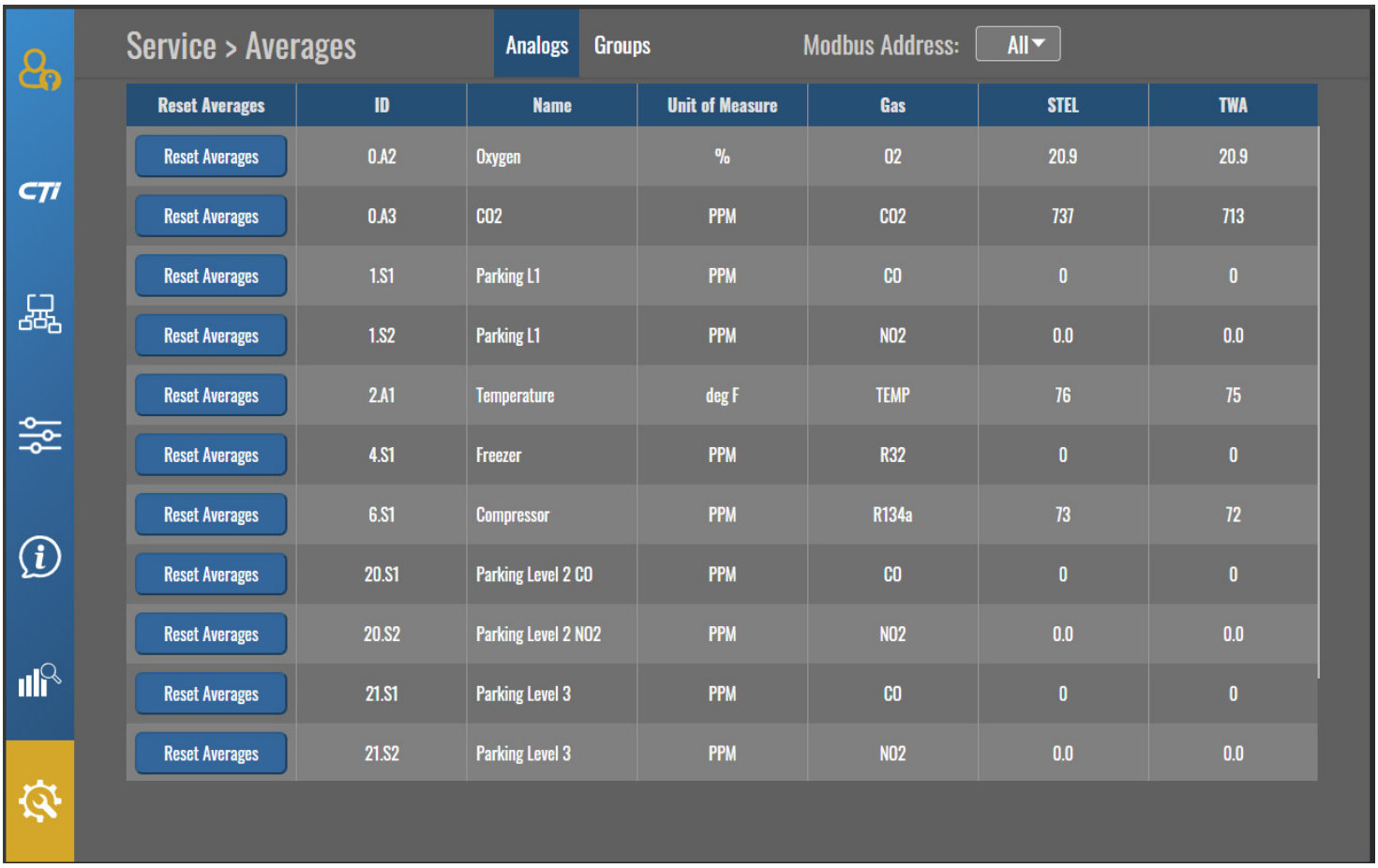
3.4.8.4 Averages Screen

The Averages Screen provides users a way to view the Time Weighted Average (TWA) and Short Term Exposure Limit (STEL) for all devices.

TWA is calculated over an 8 hour period.

STEL is calculated for a 15 minute period.

Users have the ability to reset the averages for individual devices.



Reset Averages	ID	Name	Unit of Measure	Gas	STEL	TWA
Reset Averages	0.A2	Oxygen	%	O2	20.9	20.9
Reset Averages	0.A3	CO2	PPM	CO2	737	713
Reset Averages	1.S1	Parking L1	PPM	CO	0	0
Reset Averages	1.S2	Parking L1	PPM	NO2	0.0	0.0
Reset Averages	2.A1	Temperature	deg F	TEMP	76	75
Reset Averages	4.S1	Freezer	PPM	R32	0	0
Reset Averages	6.S1	Compressor	PPM	R134a	73	72
Reset Averages	20.S1	Parking Level 2 CO	PPM	CO	0	0
Reset Averages	20.S2	Parking Level 2 NO2	PPM	NO2	0.0	0.0
Reset Averages	21.S1	Parking Level 3	PPM	CO	0	0
Reset Averages	21.S2	Parking Level 3	PPM	NO2	0.0	0.0

3.5 Startup test

Once the system is powered up and the M255 has been fully programmed, a system startup test should be performed, testing all intended alarms are working as intended.

Start-Up Test Recommendations:

1. CTI recommends users perform detector calibration upon start-up per detector instructions.
2. A second person may be needed to confirm alarms, exhaust fans, louvers, audio/visuals devices, etc are working as intended.
3. A person may be needed to stay at the M255 controller to silence and reset the alarms.

3.6 Responding to Alarm

When an alarm occurs on a device configured to the M255 controller, the status color of the device will change according to the alarm being signaled. The user will have the options to Silence and/or Reset the alarm (if configured accordingly), and take appropriate action.

Note: Modbus devices configured to be controlled by the M255 cannot be silenced or reset from the local device.

Silence Button

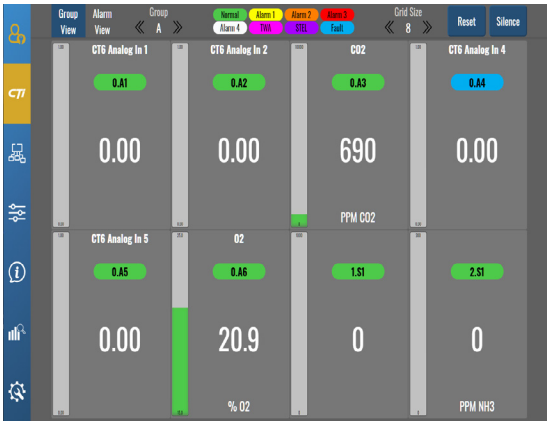
Pressing the Silence button will clear all silenceable relays. This is typically used for horns/buzzers. All silenceable relays will clear even if conditions triggering the alarm continue. Silenceable relays are configured on the Relay Configuration screen (3.4.4.3.1).

Reset Button

Pressing the reset button will clear all latched relays only if the detector has sensed that conditions have fallen below Alarm set point. Latching relays are configured in the Relay Configuration screen.

3.7 Responding to Fault

If the M255 receives a Fault signal from a configured device the color of the device ID will change, defaulted to blue.



Sensor Element not detected:

If the sensor element attached to a discovered detector has become unseated a fault will be signaled, try removing sensor element and reseating it. Use this opportunity to check the electrical contact points for corrosion or other damage.

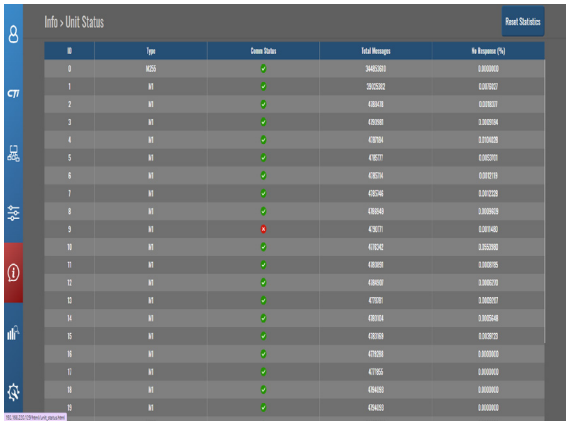
Communications Fault:

A communication fault can occur if the M255 loses communication with supported devices.

A fast way to check is to access the Unit Status screen.

This is usually a wiring problem but can be occur if supported devices share a Modbus ID or there has been a hardware failure with a device.

Check the RS-485 Modbus wiring, if there is a break all devices after the break will have faulted Comm Status and should be obvious when viewed at the control panel.



4. Maintenance

4.1 System Maintenance

All gas detection systems should be calibrated with certified calibration gas as specified in the individual device manuals. All alarm functions and outputs should be tested, verified, and documented after calibration.

4.2 Detector Maintenance

If detector span or zero cannot be adjusted, the detector may be approaching its end of life and must be replaced. Keep an operation log of all maintenance, calibrations and alarm events.

4.3 Cleaning

Cleaning of the controller should only be done with a damp, soft cloth. Do not use solvents or chemicals.

Any service performed on this equipment should be completed by qualified/authorized personnel; equipment does not contain user serviceable components.

5. Specifications

Input Power Requirements:
100-120Vac, 5.5A 50/60Hz
200-240Vac, 3.5A 50/60Hz (selected by switch on side of power supply - see page 12)

Fuses:
AC power: (250V, 10A slow blow fuse 5x20mm)
RS-485 Modbus channels: (x4) (32V, 7.5A)
Courtesy relay outputs: (x2) (32V, 7.5A)

Output 24 Vdc Power available for detector and audio/visual devices:
24Vdc, 4A @ 86°F (30°C)
24Vdc, 3.25A @ 104°F (40°C)

Communications:
RS-485 Modbus RTU, 4 channels, compatible with CTI Modbus capable device models only.
Analog Inputs: (8) 4-20 mA, 251 Ohm input impedance.

Capacity:
255 devices.

Cable Recommendation:
Communication: RS-485 communication cable, 22-24 AWG, 2 conductor, twisted pair, shielded, stranded, with drain wire (Alpha Wire 6460 or equivalent). 4,000 ft (1,220 m) per channel max.
Device Power: See detector manual for wiring specifications.
Analog Inputs: See detector manual for wiring details (typically 3-conductor, shielded, stranded, 18 AWG cable; General Cable C2535A or equivalent, up to 1500 ft).

Relay Outputs:
(8) Programmable relays, SPDT, Form C dry contacts 5A @ 24Vdc or 8A @ 240Vac
(1) Dedicated Fault relay, normally energized, SPDT, Form C dry contacts 5A @ 24 Vdc or 8A @ 240 Vac

Discrete Inputs:

(8) Programmable discrete inputs, contact closure only; do not apply voltage.

Dimensions:
14.5” high x 19.5” wide x 6.2” deep (368mm high x 483mm wide x 158mm deep)

Weight:
15 lbs (6.8kg)

Enclosure:
Polyurethane with neoprene gasket. Continuous stainless-steel hinge pin. Clasp-type latches with captive locking screw in latch. For Indoor non-classified areas. Tighten captive screw on latch to 0.56 N-m (5.0 in-lbs).

Temperature Range:
-4°F to 104°F (-20°C to 40°C)

Humidity Range:
0-95% RH condensing

Terminal Block Plugs (Field Wiring):
26-12 AWG, torque 4.4 in-lbs.

User Interface/Display:
10" (254mm) color, capacitive touch LCD.

Language:
English only

Altitude:
Up to 2000 m (6561ft)

Pollution Degree Classification:
Pollution degree 2

Transient Overvoltage:
Category II

Certification: Nemko Listed:
Conforms to UL 61010-1
Certified to CSA C22.2 No. 61010-1-12

6. Warranty

Limited Warranty & Limitation of Liability

Calibration Technologies, LLC (CTI) warrants this product to be free from defects in material and workmanship under normal use and service for a period of 2 years, beginning on the date of shipment to the buyer. This warranty extends only to the sale of new and unused products to the original buyer. CTI's warranty obligation is limited, at CTI's option, to refund of the purchase price, repair, or replacement of a defective product that is returned to a CTI authorized service center within the warranty period. In no event shall CTI's liability hereunder exceed the purchase price actually paid by the buyer for the product.

This warranty does not include:

a. routine replacement of parts due to the normal wear and tear of the product arising from use;
b. any product which in CTI's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling or use;
c. any damage or defects attributable to repair of the product by any person other than an authorized dealer or contractor, or the installation of unapproved parts on the product

The obligations set forth in this warranty are conditional on:

a. proper storage, installation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of CTI;
b. the buyer promptly notifying CTI of any defect and, if required, promptly making the product available for correction. No goods shall be returned to CTI until receipt by the buyer of shipping instructions from CTI; and
c. the right of CTI to require that the buyer provide proof of purchase such as the original invoice, bill of sale or packing slip to establish that the product is within the warranty period.

THE BUYER AGREES THAT THIS WARRANTY IS THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CTI SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT OR RELIANCE OR ANY OTHER THEORY.

Need help?

We answer the phone and monitor email!

Monday-Friday

8:30a - 4:30p (Central Time)

sales@ctigas.com |866-394-5861

CTI GAS DETECTION SPECIALISTS

CT6-DOC2-3
SW version: 2.3.1
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