MVE   VEHICLE EMISSIONS MODBUS CONTROLLER

GAS DETECTION CONTROL PANEL   MVE

CALIBRATION TECHNOLOGIES INC.
GAS DETECTION SPECIALISTS

Installation and Operation Manual

Warning

**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**

Table of Contents

1. General Description

The MVE is a Modbus gas detection controller specifically designed for use with the DuoSense-M CO/NO2 gas detectors and MVFD fan controllers. It has four RS-485 Modbus channels and can handle up to 255 devices.

It has an onboard 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 MVE control panel is assembled into a wall mounted enclosure designed for indoor locations only. The DuoSense-M CO/NO2 gas detectors can be installed up to 4,000' from the controller.

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

Analog outputs of the MVFD devices can be configured on the MVE controller to control exhaust fans.

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

2. Installation

2.1 Installation Guidelines:

Locating the MVE Control Panel

- The important consideration when installing the MVE control panel is that it must be easily accessible for operating personnel.
- Mount 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 controller through the holes in the mounting flanges.
- Mount controller in a general-purpose location only. Do not install in a hazardous environment.
- Mount controller away from electromagnetic interference.
- Protect controller from physical damage.

2.2 Dimensions:

19.5"
12.125"
14.5"
13.125"
6.2" deep
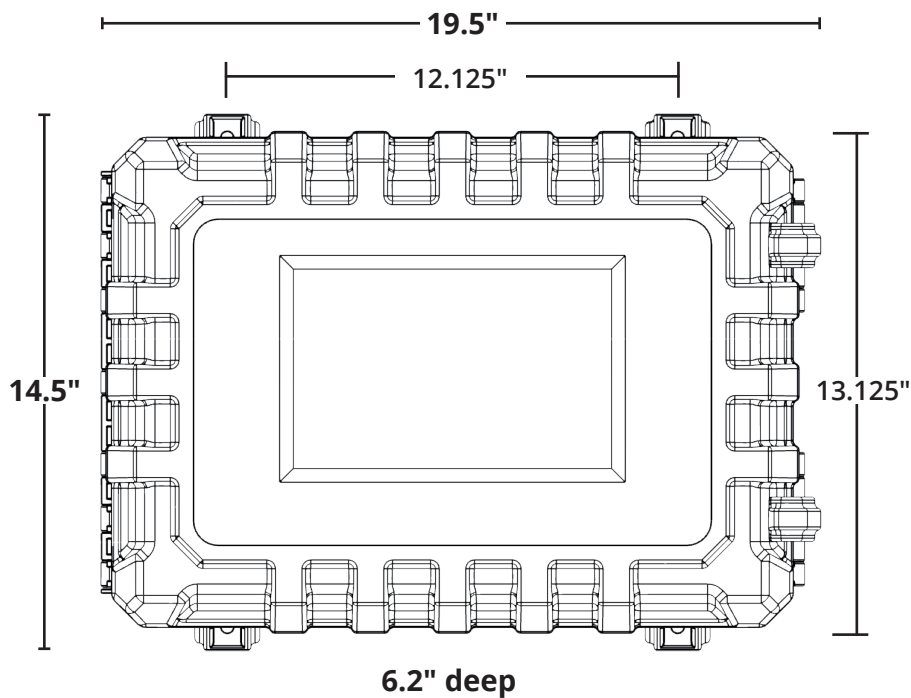
2.3 Wiring:

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).
- 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.

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 MVE gas detection control panel.
- See Specification on page 37 for requirements.

L   N   ⏚

Line
Neutral
Earth Ground
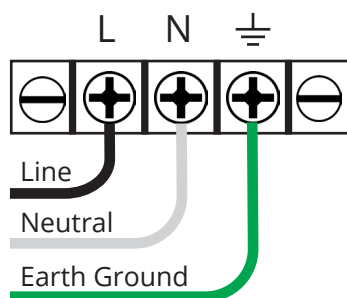
- For 200-240Vac input voltage, the input voltage selector switch must be switched. The factory setting is 100-120Vac. It is located on the side of the right power supply. See illustration on page 11. Red circle shows location of switch. The switch is located behind the protective cage of the power supply, but is accessible by using a small screwdriver or pointy object.

Communication Wiring:
The MVE controller has four Modbus communication channels. Up to 255 devices can be installed on the MVE, 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 Quabbin 8302 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 MVE controller is always at the end of the line. When the MVE controller 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 controller to the device at the end of the line.

COM 1

GND SHLD — SHIELD
— not used
A — A
B — B

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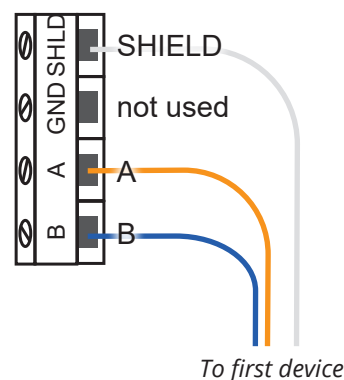
Terminal Block Plug (Field Wiring):
SHLD: To shield terminal of first network device.
GND: Not used
A: To RS-485-A terminals of first network device.
B: To RS-485-B terminals of first network device.

See DuoSense-M and MVFD 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.

Device Power Wiring:

24Vdc power is provided by the onboard 24Vdc power supply in the MVE controller. Additional power supplies can be added on the Modbus channels distributed throughout the network as needed.
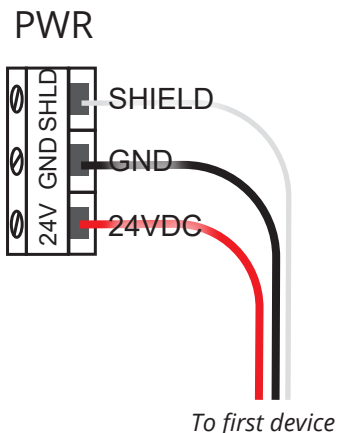
- Use 18 AWG, 2 conductor, shielded, stranded cable with a drain wire (General Cable C2534A or Belden 8760 or equivalent)

See DuoSense-M and MVFD installation manuals for more details on device power wiring.

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 for maximum current draw for all devices.

If the supply voltage drops below a devices minimum supply voltage at any device on the network, a power supply should be added at that point on the power cable. When utilizing the 24Vdc supply for any connected MVFD relays for external devices (horn-strobes, fan controllers, etc.), make sure all device's minimum supply voltage is maintained under full load (all devices active)."

Relay Output Wiring:

There are nine relay outputs local to the MVE. 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 sensor 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 MVE controller.
- Each relay has a status LED to show the state of the relay.
- When utilizing the onboard power supply of the MVE controller for power 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 37.
- 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 in the Setup menu for more details on relay configuration.

COURTESY

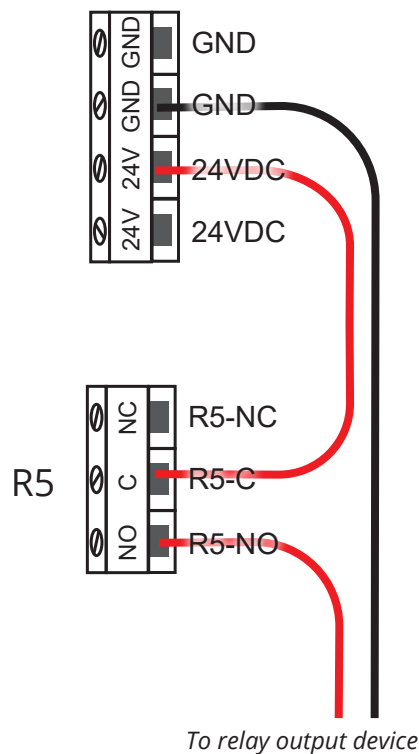
To first device

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.

To relay output device

Network Layout Example

Relay Output

Horn/strobes

CO - NO2   CO - NO2   CO - NO2

18 AWG, 2 conductor
(General Cable C2534A or equal)

22-24 AWG, 2 conductor
(Alpha Wire 6460, Quabbin
8302 or equal)

RS-485 Modbus *(x 4)*   DuoSense-M

MVFD

MVFD

Ventilation
Fans

MVE Terminals, Ports, Components, and Board Layout

3. Operation

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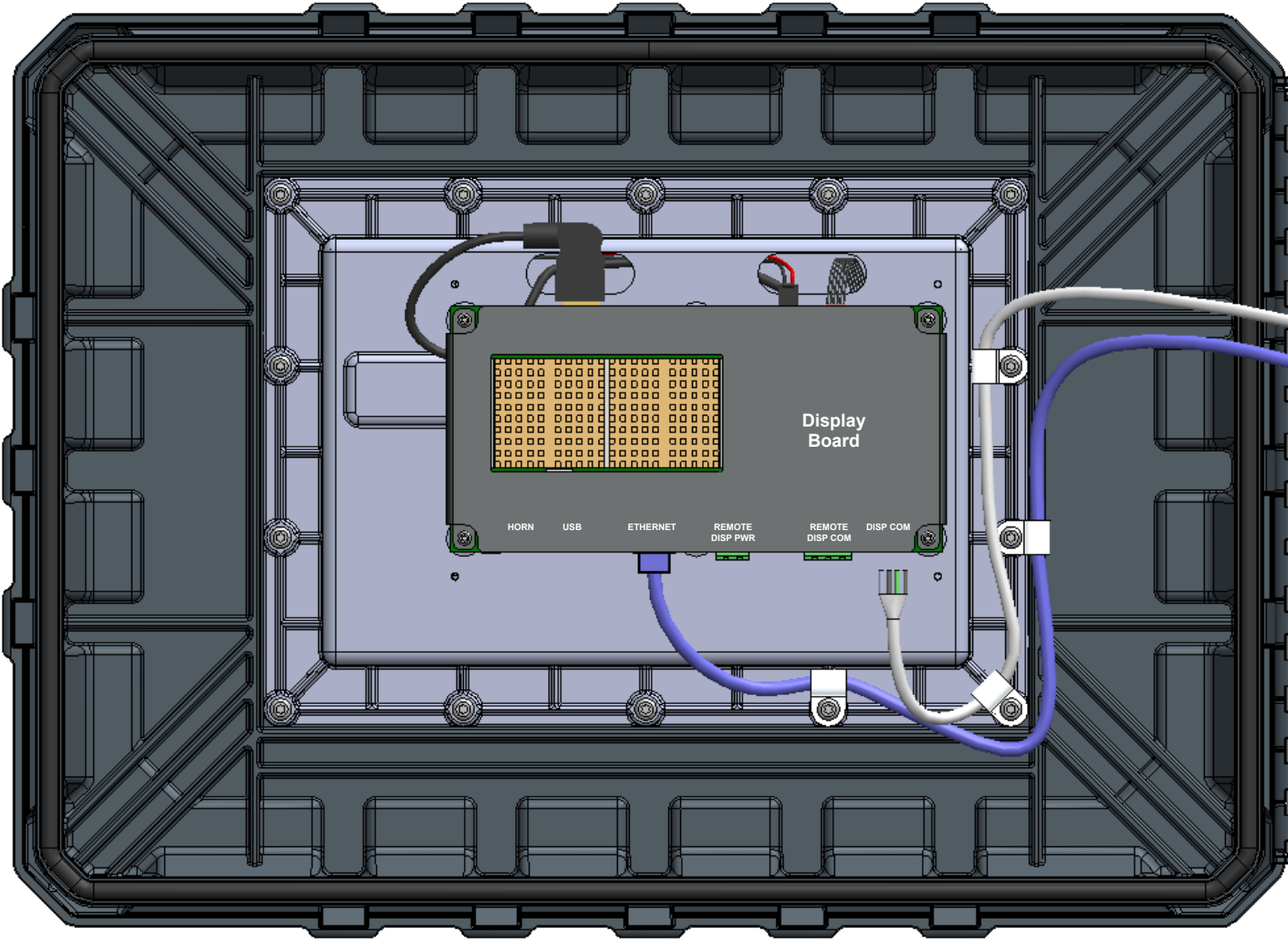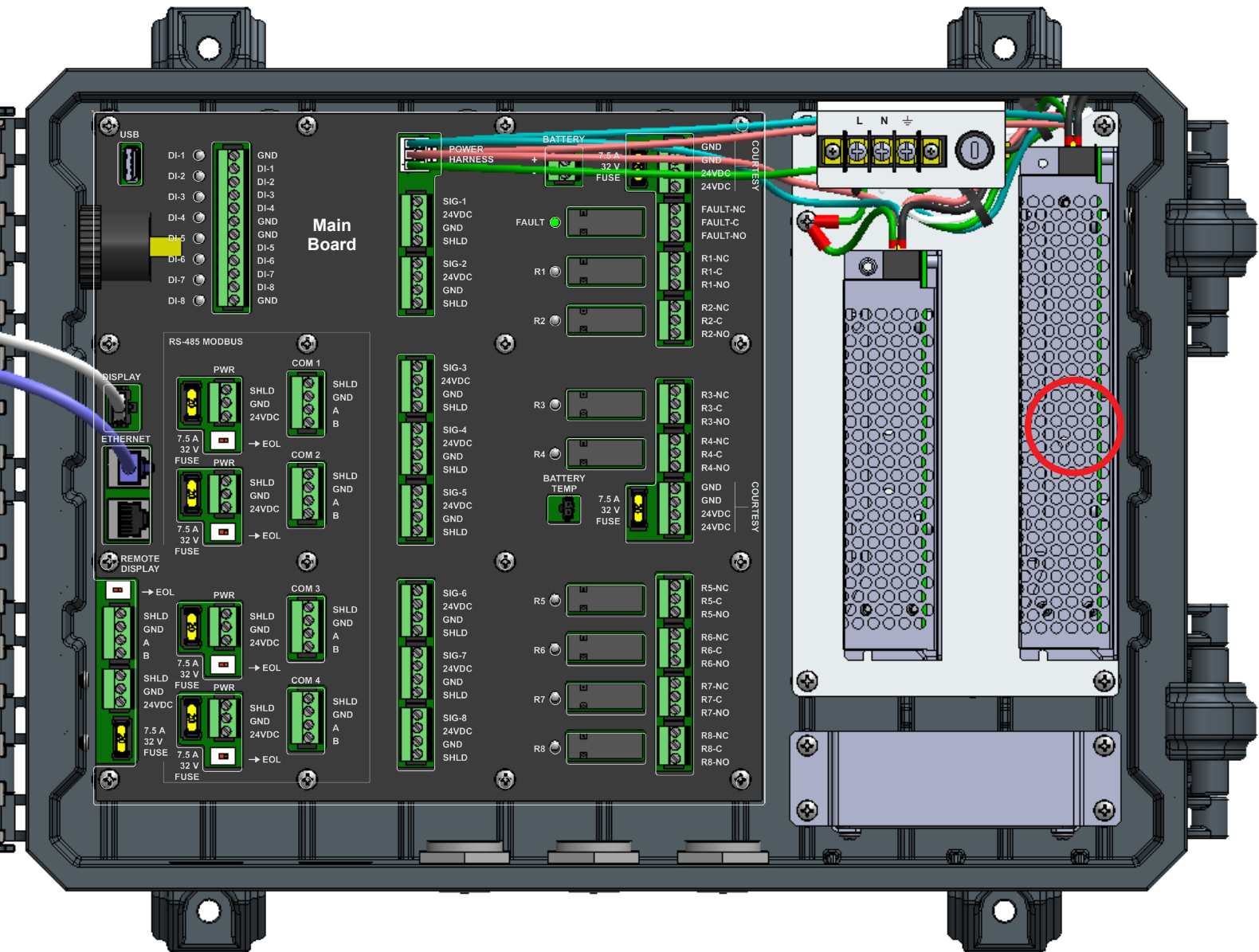
Before applying power, make a final check of all wiring for continuity, shorts, grounds, etc. It is usually best to disconnect external alarms and other equipment from the control panel until the initial start-up procedures are completed.

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.

Home Screen (shown below)

The initial System Status screen won't show any connected devices until they are discovered.

3.2 Programming the Controller

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

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 sensor name and location as this will be needed for sensor configuration later.

Note:
For MVE controller programming, the only way to tie inputs to outputs is through Groups, not sensors.

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

1. Sensors
2. Groups
3. Relays
4. Analog Outputs

System Status: Normal						April 13, 2022 1:30:24 PM

Search: [   ]

		CO		NO2		Silence
ID	Name	Level (PPM)	Status	Level (PPM)	Status	Reset
		No data available in table				

Info

Utilities

Connected Devices (DuoSense-M and MVFD)

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

Naming

Keep in mind character length when naming. Abbreviations may need to be used.

Sensors: Typically, using the sensor location for the name provides the best information. For example: Column 22, Loading Area 1A, etc.

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

Navigating the screens

Swiping

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

Page Activity

The controller display will default to screensaver mode after 60 minutes of inactivity. Press the screen to activate.

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.

Pop-up keyboard

Any pop-up keyboard 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.
- Have an Enter key that will exit the keyboard and save the entered value.
- Have a backspace (BKSP) key that will delete the character to the left of the cursor.
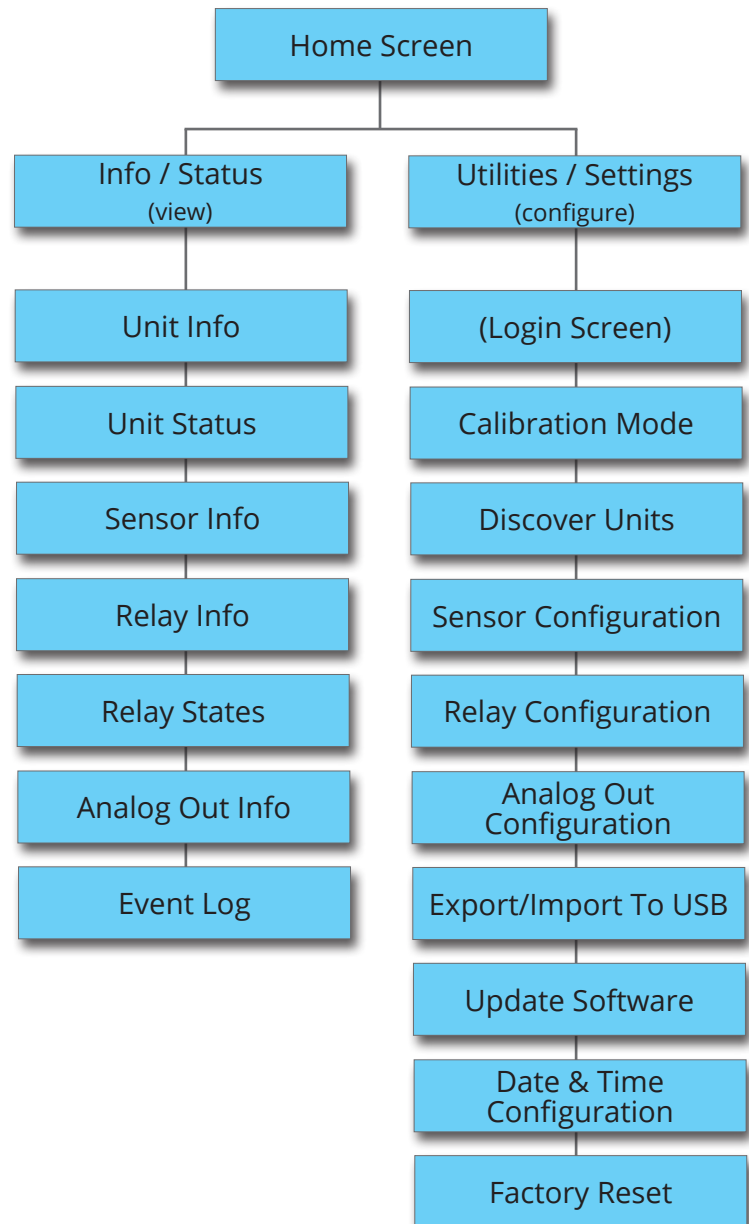
Numeric Keyboard

Whenever a field is selected that needs a numeric value, a numeric keyboard will pop-up with the numbers 0-9, ".", "-" and a space.

Alpha-numeric Keyboard

Whenever a field is selected that needs an alpha-numeric value, a full QWERTY alpha-numeric keyboard will pop-up.

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.

```
                    Home Screen
                         |
        ┌────────────────┴────────────────┐
  Info / Status                    Utilities / Settings
     (view)                            (configure)
        |                                 |
    Unit Info                       (Login Screen)
        |                                 |
   Unit Status                     Calibration Mode
        |                                 |
   Sensor Info                      Discover Units
        |                                 |
    Relay Info                   Sensor Configuration
        |                                 |
   Relay States                  Relay Configuration
        |                                 |
  Analog Out Info                    Analog Out
        |                            Configuration
    Event Log                            |
                                 Export/Import To USB
                                          |
                                  Update Software
                                          |
                                    Date & Time
                                    Configuration
                                          |
                                   Factory Reset
```

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.

4. **Discover:** Discover all connected devices

5. **Utilities**: Configure all settings.

6. **Programming:** Complete MVE programming, tying sensor 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.

Login to Utilities

To login to Utilities, press the Utilities button on the bottom right of the Home page.

A Login screen will pop-up.

The User name will be pre-populated with: CTI Admin

Press the Password field. A numeric keyboard will pop-up and allow a 4-digit password. This password is provided with the MVE controller, inside of the shipping box with the manual. Enter the 4-digit password and press the Enter key. Then press the Login key.
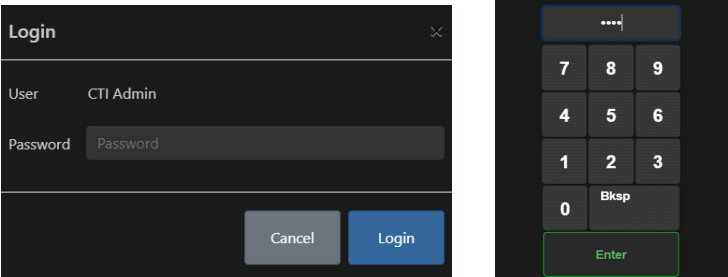
Once logged in successfully, the Utilities screen is now accessible for all configurable settings.
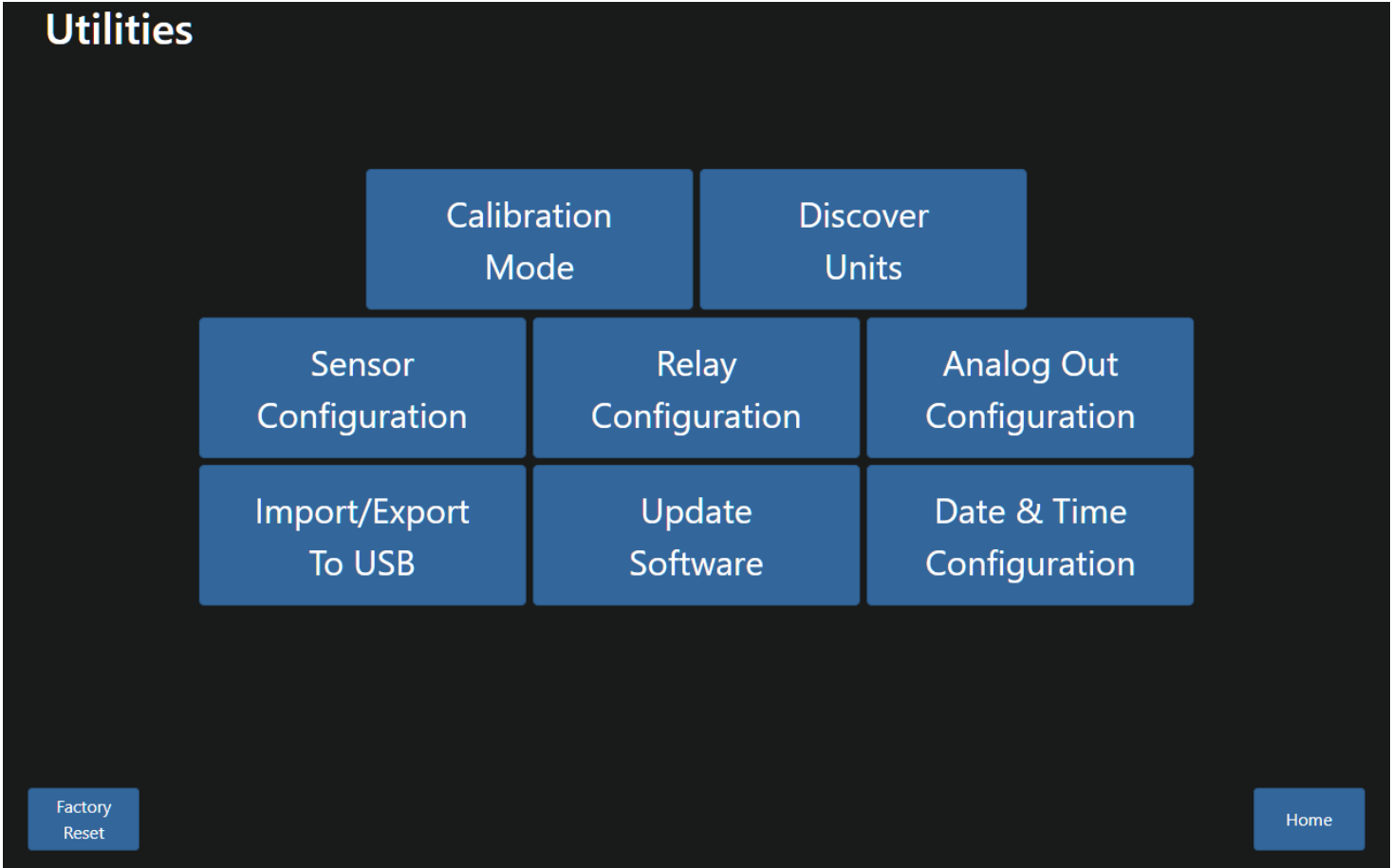
Discover Mode

Discover Mode attempts to communicate with all Modbus addresses 1 thru 255 on each of the four channels to establish communications with all connected devices.

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

When ready, select Start on the Discovery Process screen. This may take a couple of minutes depending on the number of connected devices.

There will be no duplicates, only unique discovered devices will be added to the lists. If two devices have the same Modbus address on the same Modbus channel, they will not be discovered. If two devices have the same Modbus address on different Modbus channels, only one will be discovered.

If it appears that one or more devices were not detected, for example if the Modbus addresses were not set, the Sensor Configuration page should be useful to find the devices that were not discovered.

Discovery Progress

COM 1	COM 2	COM 3	COM 4
1	1	1	1

Start

Cancel

Sensor Configuration

The Sensor Configuration page allows the user to configure and activate the detector settings.

Default settings will be pre-populated for the Vent and Alarm setpoints for both the CO and NO2 detectors.

Note: All sensors are made Active by default during Discovery.

Using your provided worksheet and notes:

1. Assign sensor name and/or location. Use abbreviations for long names

2. Adjust Vent and Alarm setpoints if desired.

3. Select sensor Group. Keep in mind that the Group will be tied to a specific relay output or analog output (see Relay Configuration section).

Swipe up on the screen to access more table rows.

Sensor Configuration

Search: [ ]

ID	Active	Name	CO Levels (PPM)		NO2 Levels (PPM)		Groups			
			Vent	Alarm	Vent	Alarm	1	2	3	4
1	●	Column A01	35	200	1.0	3.0	●	○	○	○
2	●	Column A02	35	200	1.0	3.0	●	○	○	○
3	●	Column A03	35	200	1.0	3.0	●	○	○	○
4	●	Column A04	35	200	1.0	3.0	●	○	○	○
5	●	Column B01	35	200	1.0	3.0	○	●	○	○
6	●	Column B02	35	200	1.0	3.0	○	●	○	○
7	●	Column B03	35	72	1.0	3.0	○	●	○	○
8	●	Column B04	35	200	1.0	3.0	○	●	○	○
9	●	Column C01	35	200	1.0	3.0	○	○	●	○
10	●	Column C02	35	200	1.0	3.0	○	○	●	○
11	●	Column C03	35	200	1.0	3.0	○	○	●	○
12	●	Column C04	35	200	1.0	3.0	○	○	●	○
13	●	Column D01	35	200	1.0	3.0	○	○	○	●
14	●	Column D02	35	200	1.0	3.0	○	○	○	●
15	●	Column D03	35	200	1.0	3.0	○	○	○	●

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Home

Relay Configuration

The Relay Configuration page allows the user to configure the relay settings onboard the MVE controller, along with any connected MVFD fan controller relays.

The MVE controller has one dedicated fault relay that is not programmable or part of any sensor group. This relay is normally energized, and will trip upon loss of power, hardware failure of the MVE controller, or device communication error.

All of the other eight MVE onboard relays are listed in the Relay Configuration table, along with any connected MVFD fan controller relays. Below is an explanation of the relay configuration settings.

Most vehicle emissions applications utilize the relays for exhaust fan VFDs, audio/visual devices, louvers and general alarm notification.

Active: Any listed relay set to Active will trip when all of the following conditions are met:

* Sensor is within the selected Group
* Gas concentration exceeds the set level (Vent or Alarm)
* Time exceeds the On Delay time setting

Name: Press within the name field and use the pop-up keyboard to enter relay name. Assigning a relay name during installation/start-up provides an at-a-glance relay assignment in the status menu, without the need for electrical drawings lookup.

Level: Select Fault, Vent or Alarm gas concentration at which the relay trips. (see Sensor Configuration on previous page). **Note**: Selecting Fault will only trip the relay upon a device communication error, not to be confused with the dedicated MVE fault relay which will trip upon power loss or hardware failure of the MVE.

Group: Select which sensor group (1 through 4) the relay is associated with. Selecting "None" will make this relay inactive. (see Sensor Configuration on previous page)

Normally Energized: Selecting normally energized keeps the relay energized in the normal state. This may not be ideal for most applications, as a relay set to normally energized will trip during power loss.

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

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

On Delay: Set relay on-time delay

Off Delay: Set relay off-time delay

ID	Active	Name	Level	Group	Failsafe	Latching	Silenceable	On Delay	Off Delay
0.R1	●	Venti Group 1	Vent	Group 1	○	○	○	00:00:10	00:00:02
0.R2	●	Vent Group 2	Vent	Group 2	○	○	○	00:00:10	00:00:02
0.R3	●	Vent Group 3	Vent	Group 3	○	○	○	00:00:10	00:00:02
0.R4	●	Audio/Visuals	Alarm	None	○	●	○	00:00:10	00:00:02
0.R5	●	Fire Panel	Alarm	None	○	○	●	00:00:30	00:00:02
0.R6	○		Vent	None	○	○	○	00:00:00	00:00:00
0.R7	○		Vent	None	○	○	○	00:00:00	00:00:00
0.R8	○		Vent	None	○	○	○	00:00:00	00:00:00

Analog Output Configuration

The Analog Output Configuration page allows the user to configure the 4-20 mA analog output settings onboard any connected MVFD fan controller.

Using your provided worksheet and notes:

1. Make MVFD analog output active (if desired).

2. Assign name and/or location. For example, Exhaust Fan 3. Use abbreviations for long names

3. Select sensor group Source. (Groups 1 through 4). Selecting "None" will disable the analog output.

Each Active sensor has a 4-20 mA value, equivalent to it's gas concentration, calculated based on the range of the sensor. 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 MVFD's Analog Output will be commanded to output the calculated 4-20 mA for that Group.

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

Analog Out Configuration

Search:

ID	Active	Name	Source
		No data available in table	

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Date & Time Configuration

Set current date and time. Having the correct date and time is important for accuracy of the Event Log.

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

Date & Time Configuration

12/08/2021 01:29 PM						

<	Dec ⌄		2021 ⌄			>
Su	**Mo**	**Tu**	**We**	**Th**	**Fr**	**Sa**
28	29	30	1	2	3	4
5	6	7	**8**	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

1 ⌄ : 29 ⌄ PM ⌄

Cancel   Apply

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Home

Import/Export Data

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.

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.MVE) from the flash drive.

This file can be Imported to restore corrupt software, or uploaded into another MVE controller to duplicate the configuration.

Export

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

System Configuration: Creates a backup .MVE 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.

Data Log:
For CTI personnel diagnostics

Diagnostics Log:
For CTI personnel diagnostics

Import/Export Data

Click to select USB

| Data to Export | Select data to export ⇕ |

Export

| Select .mve file ⇕ |

Import

Back

Home

Update Software

The Update Software feature provides an option for easy software updates of the display board and main board. Pay close attention to the instructions of which USB port, since there are two ports. The software can be emailed to the user and loaded onto a USB flash drive:

Save existing configuration file
1. Insert a flash drive into the USB port on the display unit on the inside of the enclosure door. See page 10 for USB location on display board.
2. Export the System Configuration data (see page 20)

Update logic board
1. Insert the flash drive into the USB port on the main board (top left corner).
2. The green fault relay LED will de-energize momentarily.

After a minute, the software update should be complete.

Update display board
1. Insert the flash drive into the USB port on the main display unit on the inside of the enclosure door.
2. Select Software Update. The pop-up screen should display CTI_UPDATE
3. Select Accept.

After 1-2 minutes, the software update should be complete.

Restore factory defaults.
1. In order to synchronize files between the main board and display board, perform a factory reset (see page 23)
2. Cycle power of the MVE controller

Restore configuration file
1. Insert a flash drive into the USB port on the main display unit on the inside of the enclosure door.
2. Import the System Configuration data (see page 20)

Perform a test of the system to make sure it is operating normal.
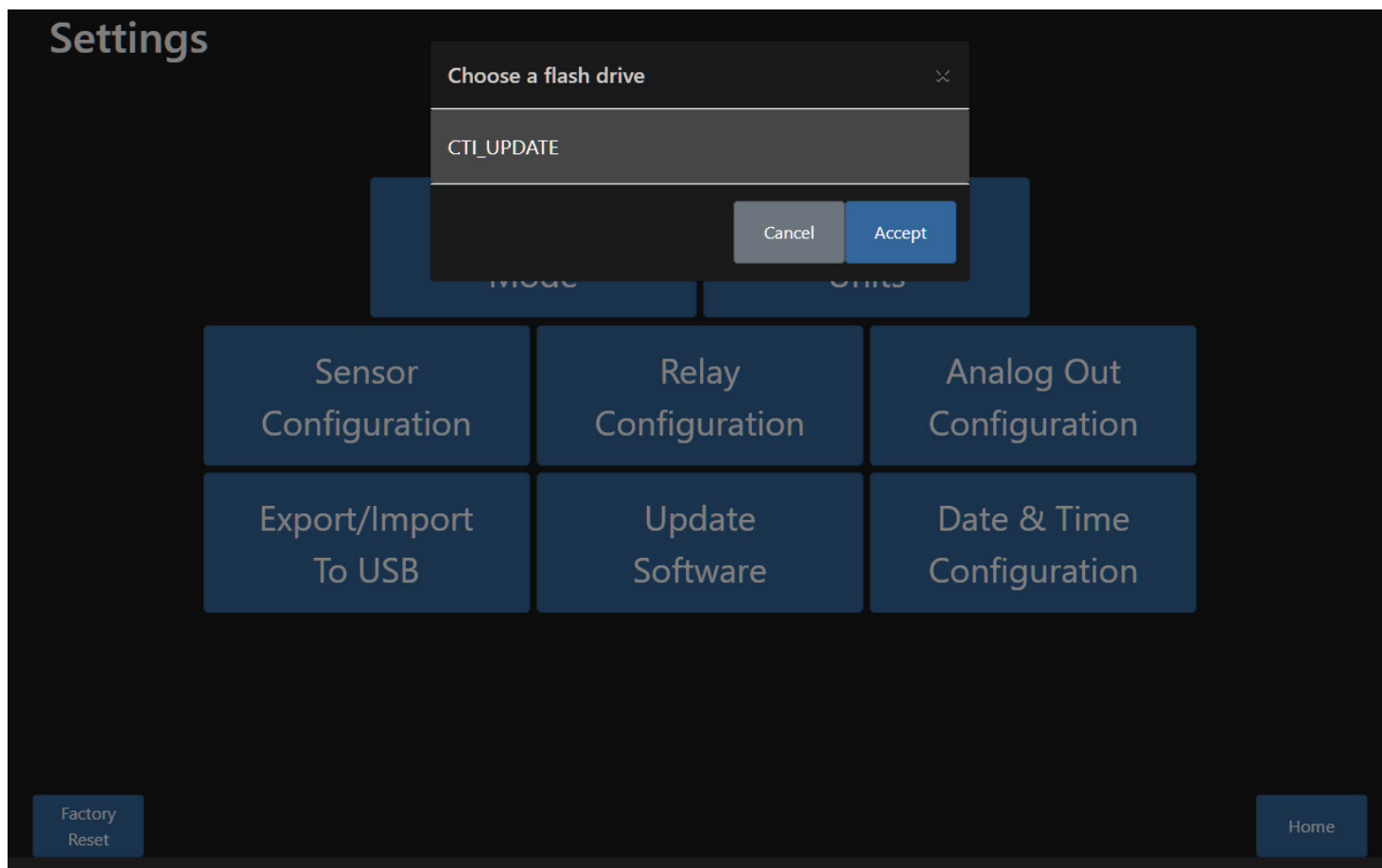
Calibration Timer

The calibration Timer allows for field calibration and maintenance on the sensors and other devices.

Disabling the Alarms will keep the selected device, or group of devices, from tripping any of the relays associated with that device's Alarms. Vents and Alarms are logged during Cal Mode.

Once you hit the Start key, the screen will jump to the Home screen with the Calibration Timer showing on the top of the screen.

When the timer counts down to zero, the Alarms will be re-enabled, and the timer will reset.

The timer can be stopped on the Home screen by pressing the red cancel button.

| Cal Mode 11:56:28 | Cancel |

Calibration Timer

Hours	Minutes	Seconds
+	+	+
2	0	0
-	-	-

Start

Cancel
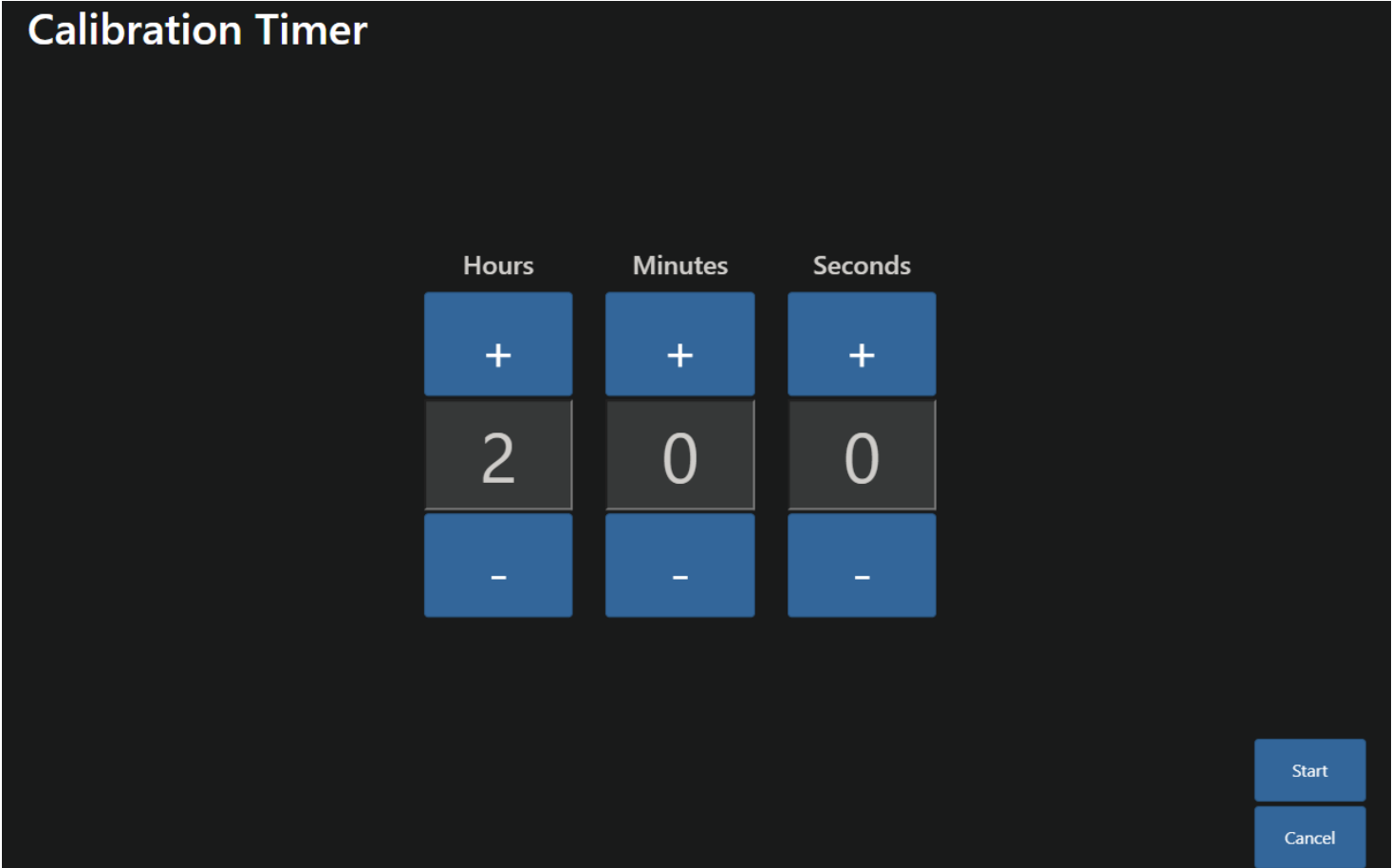
Factory Reset

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

This cannot be undone once the red Reset button is selected.

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

Settings

Are you sure you want to Factory Reset this device? ✕

Cancel   Reset

Mode   Units

Sensor Configuration   Relay Configuration   Analog Out Configuration

Export/Import To USB   Update Software   Date & Time Configuration

Factory Reset   Home
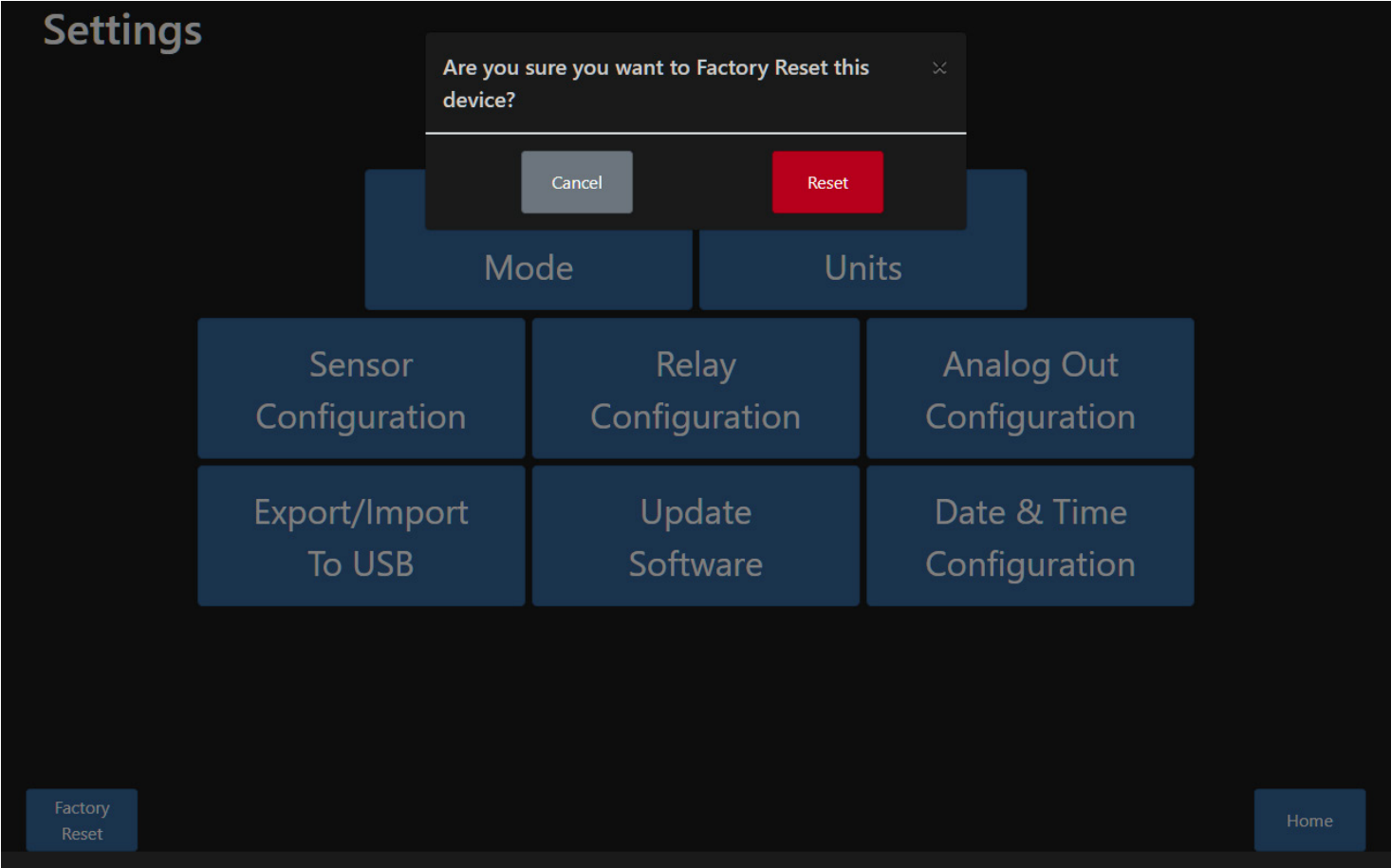
3.3 Home Screen

System Status

The System Status on the Home screen provides an at-a-glance indication of the overall status of the gas detection system.

Sensor Status Table

All alarm conditions or device faults take priority and move to the top of the list.

All other devices in "Normal" status are in Modbus ID numerical order from top to bottom

Status conditions sorting level and colors:

- **Alarm** (high alarm), red, first priority
- **Vent** (low alarm, amber, second priority
- **Fault** (device comm error), blue, third priority
- **Normal**, white, fourth priority

		CO		NO2		
ID	**Name**	**Level (PPM)**	**Status**	**Level (PPM)**	**Status**	
3		0	Normal	0.0	Normal	Silence
4		0	Normal	0.0	Normal	
5		0	Normal	0.0	Normal	Reset
6		0	Normal	0.0	Normal	
7		0	Normal	0.0	Normal	
8		0	Normal	0.0	Normal	
9		0	Normal	0.0	Normal	
10		0	Normal	0.0	Normal	
11		0	Normal	0.0	Normal	
12		0	Normal	0.0	Normal	
13		0	Normal	0.0	Normal	
14		0	Normal	0.0	Normal	
15		0	Normal	0.0	Normal	
16		0	Normal	0.0	Normal	
17		0	Normal	0.0	Normal	
18		0	Normal	0.0	Normal	Info
19		0	Normal	0.0	Normal	
20		0	Normal	0.0	Normal	Utilities

System Status: Normal

April 5, 2022
1:38:16 PM

Search:

Responding to an alarm

When an alarm occurs on the MVE controller, the Alarm View screen will pop-up showing the current alarm status. Responsible personnel then have the options to Silence and/or Reset the alarm (if configured accordingly), and take appropriate action.

Silence Button

Pressing the Silence button will clear all silenceable relays typically used for horns/buzzers. All silenceable relays will stay clear until the next alarm event. Silenceable relays are configured on the Relay Configuration screen.

Reset Button

Pressing the reset button will clear all latched relays as long as the Alarm, Vent or Fault is no longer present. Latching relays are configured in the Relay Configuration screen.

System Status: Alarm

December 10, 2021
10:10:12 AM

Search:

ID	Name	CO		NO2		
		Level (PPM)	Status	Level (PPM)	Status	
1	Column A01	250	Alarm	0.0	Normal	Silence
2	Column A02	0	Fault	0.0	Fault	
3	Column A03	0	Normal	1.9	Vent	Reset
4	Column A04	0	Normal	0.0	Normal	
5	Column B01	0	Normal	0.0	Normal	
6	Column B02	0	Normal	0.0	Normal	
7	Column B03	0	Normal	0.0	Normal	
8	Column B04	0	Normal	0.0	Normal	
9	Column C01	0	Normal	0.0	Normal	
10	Column C02	0	Normal	0.0	Normal	
11	Column C03	0	Normal	0.0	Normal	
12	Column C04	0	Normal	0.0	Normal	
13	Column D01	0	Normal	0.0	Normal	
14	Column D02	0	Normal	0.0	Normal	
15	Column D03	0	Normal	0.0	Normal	
16	Column D04	0	Normal	0.0	Normal	
17	Column E01	0	Normal	0.0	Normal	Info
18	Column E02	0	Normal	0.0	Normal	

3.4 Status Menu

The following screens are view-only status screens.

Unit Info

The Unit Info screen is the main screen for all Info/Status screens.

It also displays the current software version at the top left of the screen.

Unit Status

The Unit Status screen lists all connected devices and provides network communication diagnostics data for each.

This table is a useful tool for diagnosing anomalies and other intermittent issues for devices and power/comm wiring.

Contact service at CTI for help troubleshooting.

Unit Status

ID	Type	Comm Status	CRC Status	Total Messages	No Response (%)
3	DuoSense-M	Normal	Normal	593923	0.000
4	DuoSense-M	Normal	Normal	593923	0.000
5	DuoSense-M	Normal	Normal	593923	0.000
6	DuoSense-M	Normal	Normal	593923	0.000
7	DuoSense-M	Normal	Normal	593923	0.000
8	DuoSense-M	Normal	Normal	593923	0.000
9	DuoSense-M	Normal	Normal	593923	0.000
10	DuoSense-M	Normal	Normal	593923	0.000
11	DuoSense-M	Normal	Normal	593923	0.000
12	DuoSense-M	Normal	Normal	593923	0.000
13	DuoSense-M	Normal	Normal	593922	0.000
14	DuoSense-M	Normal	Normal	593922	0.000
15	DuoSense-M	Normal	Normal	593922	0.000
16	DuoSense-M	Normal	Normal	593922	0.000
17	DuoSense-M	Normal	Normal	593922	0.000
18	DuoSense-M	Normal	Normal	593922	0.000
19	DuoSense-M	Normal	Normal	593922	0.000
20	DuoSense-M	Normal	Normal	593922	0.000
21	DuoSense-M	Normal	Normal	593922	0.000

Reset Statistics

Search:

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Sensor Info

The viewable-only sensor info screen is a copy of the Sensor Configuration screen, providing all of the active sensors and their configuration

Sensor Information

Search: [   ]

ID	Active	Name	CO Levels (PPM)		NO2 Levels (PPM)		Groups			
			Vent	Alarm	Vent	Alarm	1	2	3	4
3	●		9	72	1.0	3.0	●	●	○	○
4	●		9	72	1.0	3.0	●	●	○	○
5	●		9	72	1.0	3.0	●	●	○	○
6	●		9	72	1.0	3.0	●	●	○	○
7	●		9	72	1.0	3.0	●	●	○	○
8	●		9	72	1.0	3.0	●	●	○	○
9	●		9	72	1.0	3.0	●	●	○	○
10	●		9	72	1.0	3.0	●	●	○	○
11	●		9	72	1.0	3.0	●	○	●	○
12	●		9	72	1.0	3.0	●	○	●	○
13	●		9	72	1.0	3.0	●	○	●	●
14	●		9	72	1.0	3.0	●	●	●	○
15	●		9	72	1.0	3.0	●	○	●	○
16	●		9	72	1.0	3.0	●	○	●	○

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Relay Info

The viewable-only relay info screen is a copy of the Relay Configuration screen, providing all of the active relays and their configuration.

Relay Information

Search: [   ]

ID	Active	Name	Level	Group	Failsafe	Latching	Silenceable	On Delay	Off Delay
0.R1	●	CT6 Relay 1	Vent	Group 1	○	○	○	00:00:10	00:00:02
0.R2	●	CT6 Relay 2	Alarm	Group 1	○	●	●	00:00:10	00:00:02
0.R3	○	CT6 Relay 3	Vent	None	○	○	○	00:00:00	00:00:00
0.R4	○	CT6 Relay 4	Vent	None	○	○	○	00:00:00	00:00:00
0.R5	○	CT6 Relay 5	Vent	None	○	○	○	00:00:00	00:00:00
0.R6	○	CT6 Relay 6	Vent	None	○	○	○	00:00:00	00:00:00
0.R7	○	CT6 Relay 7	Vent	None	○	○	○	00:00:00	00:00:00
0.R8	○	CT6 Relay 8	Vent	None	○	○	○	00:00:00	00:00:00
50.R1	●	South MVFD Vent	Vent	Group 2	○	○	○	00:00:00	00:00:00
50.R2	●	South MVFD Alarm	Alarm	Group 2	○	○	○	00:00:00	00:00:00
50.R3	○		Vent	None	○	○	○	00:00:00	00:00:00
51.R1	●	North MVFD Vent	Vent	Group 3	○	○	○	00:00:00	00:00:00
51.R2	●	North MVFD Alarm	Vent	Group 3	○	○	○	00:00:00	00:00:00
51.R3	○		Vent	None	○	○	○	00:00:00	00:00:00

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Relay States

The viewable-only Relay States screen shows which relays on the network are active, and also if they are currently tripped (in the alarm state) due to an event.

Analog Output Info

The viewable-only Analog Out Information screen is a copy of the configurable screen in the Utilities section. It shows which analog outputs are active in the system.

Analog Output Information

Search:

ID	Active	Name	Source
50.O1	⚪	South MVFD	Group 2
51.O1	⚪	North MVFD	Group 3

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Event Log

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

Event:

The event can be any of the following:

- Alarm, vent or fault activated or cleared
- A relay tripped or cleared
- MVE 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

Name:

Shows the name of the device

Event Log

Search:

Date & Time	Event	Set Point (PPM)	ID	Name
2022-04-08 11:35:19	Cleared		0.R2	CT6 Relay 2
2022-04-08 11:35:19	Reset			Reset
2022-04-08 11:34:55	Vent Off	9	37.S1	
2022-04-08 11:34:54	Vent On	9	37.S1	
2022-04-08 11:34:52	FAULT Off	-2.5	37.S2	
2022-04-08 11:34:52	FAULT Off	-50	37.S1	
2022-04-08 11:34:52	Comm Resumed		37	DuoSense-M
2022-04-08 11:33:54	Cleared		0.R1	CT6 Relay 1
2022-04-08 11:33:52	Vent Off	9	32.S1	
2022-04-08 11:33:18	Alarm Off	72	32.S1	
2022-04-08 11:30:24	Comm Loss		37	DuoSense-M
2022-04-08 11:30:14	Tripped		0.R2	CT6 Relay 2
2022-04-08 11:30:04	Alarm On	72	32.S1	
2022-04-08 11:29:52	Tripped		0.R1	CT6 Relay 1
2022-04-08 11:29:43	FAULT Off	-50	32.S1	
2022-04-08 11:29:43	Vent On	9	32.S1	
2022-04-06 16:03:51	Alarms Enabled			Alarms
2022-04-06 16:03:51	Cal Ended			Calibration
2022-04-06 16:03:49	Alarms Disabled			Alarms

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Software Info

This screen lists the software versions of several main
components of the MVE controller.

Software Information

Search: _____

Name	Version
MVE Backend	1.0.0b
MVE Flash	248
MVE Logic Board	1.100
MVE Release	2.0.0e
MVE Socket Server	1.0.0b
MVE Webserver	1.0.0a

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Service Required Screen

This screen will pop up every 6 months as a reminder to calibrate the gas detectors. Press the Acknowledge button to clear the screen. Then schedule calibration service as soon as possible.

The Service Required timer will be reset when the system is put into Calibration Mode.

3.5 Startup test

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

Start-Up Test Recommendations:

1. Expose each gas detector to target gas.

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 MVE controller to silence and reset the alarms.

4. Maintenance

All gas detection systems should be calibrated with certified calibration gas every six months. At this interval, all alarm functions and outputs should be tested, verified and documented.

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

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 AC Power Wiring section)

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 sensors 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 DuoSense-M and MVFD models only. 4,000 ft (1,220 m) per channel max.

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 Quabbin 8302 or equivalent).
Device Power: 18 AWG, 2 conductor, shielded, stranded cable with a drain wire (General Cable C2534A or Belden 8760 or equivalent).

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

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:
Polycarbonate with neoprene gasket. Continuous stainless-steel hinge. Clasp-type latches with captive locking screw in latch. For non-classified areas.

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

6. Warranty

Limited Warranty & Limitation of Liability

Calibration Technologies, Inc. (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.