Operation Manual

Rev. C | Firmware 2.2 onwards | 2024.05

FCS Flexible Control System Controllers

NEED MORE INFORMATION?

This is the **FCS Operation Manual** for the FCS Flexible Control System with firmware v2.2 onwards.

For more installation information including the following topics, please refer to the applicable **FCS Installation Manual**:

- Instrument Specifications
- Location of System Installation
- Standard Enclosure Mounting Components
- Wiring Power Supply
- Wiring Remote Power Supply
- Wiring Analog Inputs
- Wiring Analog Output
- Wiring Digital Inputs
- Wiring Peripheral Devices - LNK-AO, LNK-AI, LNK-XT
- Wiring Remote Strobe/Horn
- Wiring Internal and Remote Relays
- Wiring RDM Remote Display
- Wiring to a Building Automation System (BAS)
- Warm up and Power up

If you would like to view or download the **FCS Installation Manual** from our website click here

The most up-to-date version of the manual will always be on our website.

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1 POLICIES

1.1 Important Note

Read and understand this manual prior to using this instrument. Carefully read the warranty policy, service policy, notices, disclaimers and revisions on the following pages.

This product must be installed by a qualified electrician or factory trained technician and according to instructions indicated in this manual. This instrument should be inspected and maintained on a regular basis by a qualified and trained technician.

This instrument has not been designed to be intrinsically safe. For your safety, **do not** use it in classified hazardous areas (explosion-rated environments).

INSTRUMENT SERIAL NUMBER:

_____

PURCHASE DATE:

_____

PURCHASED FROM:

_____

1.2 Warranty Policy

Critical Environment Technologies Canada Inc. warrants the products we manufacture (excluding sensors, battery packs, batteries, pumps, and filters) to be free from defects in materials and workmanship for a period of two years from the date of purchase from our facility. Sensors are consumable items and once they leave our factory, we cannot reuse or resell them. As such, all sensor sales are final. Should the sensor itself be faulty, there is a one-year pro-rated warranty that would apply from the date of purchase from our facility. The warranty status may be affected if the instrument has not been used and maintained as per the instructions in the manual or has been abused, damaged, or modified in any way. The product is only to be used for the purposes stated in the manual. Critical Environment Technologies is not liable for auxiliary interfaced equipment or consequential damage.

Prior to shipping equipment to CETCI, contact our office for an RMA #. All returned goods, regardless of reason, must be accompanied with an RMA number. Please read our Warranty and Returns Policy and follow our RMA Instructions and Form.

Due to ongoing research, development, and product testing, the manufacturer reserves the right to change specifications without notice. The information contained herein is based

on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data

1.3 Service Policy

CETCI maintains an instrument service facility at the factory. Some CETCI distributors / agents may also have repair facilities; however, CETCI assumes no liability for service performed by anyone other than CETCI personnel.

Repairs are warranted for 90 days after date of shipment (sensors have individual warranties). Should your instrument require non-warranty repair, you may contact the distributor from whom it was purchased or you may contact CETCI directly.

Prior to shipping equipment to CETCI, contact our office for an RMA #. All returned goods, regardless of reason, must be accompanied with an RMA number. Please read our Warranty and Returns Policy and follow our RMA Instructions and Form.

If the product is deemed repairable, for liability reasons, CETCI will perform all necessary repairs to restore the instrument to its full operating condition.

1.4 Copyrights and Registered Trademarks

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Modbus® is a registered trademark of Gould Inc. Corporation.
BACnet® is a registered trademark of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

1.5 Disclaimer

Under no circumstances will CETCI be liable for any claims, losses or damages resulting from or arising out of the repair or modification of this equipment by a party other than CETCI service technicians, or by operation or use of the equipment other than in accordance with the printed instructions contained within this manual or if the equipment has been improperly maintained or subjected to neglect or accident. Any of the foregoing will void the warranty.

Under most local electrical codes, low voltage wires cannot be run within the same conduit as line voltage wires. It is CETCI policy that all wiring of our products meet this requirement.

1.6 Revisions

This manual was written and published by CETCI. The manufacturer makes no warranty or representation, expressed or implied including any warranty of merchantability or fitness for purpose, with respect to this manual.

All information contained in this manual is believed to be true and accurate at the time of printing. However, as part of its continuing efforts to improve its products and their documentation, the manufacturer reserves the right to make changes at any time without notice. In addition, due to improvements made to our products, there may be information in this manual that does not exist in the version of the product the user has. Should you detect any error or omission in this manual, or should you want to inquire regarding upgrading the device's firmware, please contact CETCI at the following address:

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Telephone: +1.604.940.8741
Email: help@cetci.com
Website: www.critical-environment.com

In no event will CETCI, its officers or employees be liable for any direct, special, incidental or consequential damages resulting from any defect in any manual, even if advised of the possibility of such damages.

The most up-to-date version of the manual will always be on our website.

2 SYSTEM OPERATION

NOTE: If you are looking for information about installing and wiring the FCS Flexible Control System, please find the Installation Manual on our website.

Thank you for purchasing our FSC Flexible Control System. The FCS Flexible Control System is a sophisticated, high performance controller that offers multi-channel configurations for monitoring toxic, combustible and refrigerant gases with versatile control functionality for non-hazardous, non-explosion rated, commercial and light industrial applications. The FCS is designed to accept inputs from digital and/or analog transmitters and/or Peripheral Devices (in various combinations), using Modbus® RTU RS-485 or 4-20 mA analog input.

The FCS is available in 4 channel, 8 channel, 32 channel and 128 channel models with either Modbus® RTU RS-485 WAN output or with BACnet® MS/TP RS-485 WAN output for communicating with a Building Automation System (BAS).

All models include, four configurable SPDT dry contact relays with field configurable time delays and trigger levels, a full colour LCD resistive touch screen with LED panel indicating configurable channel alarm status, relay status and fault conditions, extensive menu system with password protection, enhanced logic control, priorities/zoning capabilities, a USB port for firmware upgrades, data logging and a door-mounted, audible alarm. The FCS has flexible configuration settings for analog outputs and supports 4-20 mA and Modbus® driven VFDs.

2.1 Home Screen Display

There are two configurations for the home screen - the Summary Display or the Channel Display. The Summary Display is the factory default display setting. It shows the status, number of channels, relays and other devices.

All devices can be viewed by tapping the category icon & badge on the left-hand side of the screen. A maximum of five colored statuses are displayed per category. In the unlikely event that more than five statuses are active at the same time for a category, the five highest-priority statuses will be displayed. The statuses below are listed in order of priority from lowest to highest.

CHANNELS

The CHANNELS category on the main display of the FCS shows a summary of the status of the channels. If the channels are in different statuses, it will display the highest status from left to right and indicate the number of items that have that status. Each status box will change colour depending on the severity of the status.

STATUS ABBREVIATION	STATUS	DESCRIPTION
OK	OK	Not in alarm or fault
DISAB	Disabled	Triggers when a channel is set to disabled.
LOW	Low Alarm	Triggers when a channel is in low alarm state
MID	Mid Alarm	Triggers when a channel is in mid alarm state
HIGH	High Alarm	Triggers when a channel is in high alarm state
STEL	STEL Alarm	Triggers when STEL alarms are enabled & channel is in the state
TWA	TWA Alarm	Triggers when TWA alarms are enabled & channel is in the state
IDLH	IDLH Alarm	Triggers when IDLH alarms are enabled & channel is in the state
FAULT	FAULT	There is a problem with the channel source

STEL Alarm
The short term exposure limit (STEL) is the maximum permissible gas concentration a worker can be safely exposed to for short periods of time (5-15 minutes maximum).

TWA Alarm
The time-weighted average (TWA) is a safety measure used to determine accumulated averages of gases. An average is determined using the Occupational Safety and Health Administration (OSHA) method to ensure the worker leaves an area when the maximum average is accumulated.

IDLH Alarm
Immediately dangerous to life and health (level that interferes with the ability to escape).

RELAYS
The FCS has four internal SPDT dry contact relays labeled RL1, RL2, RL3 and RL4. Strobe, horns and the internal audible buzzer are also counted as relays. The FCS may also have remote relays (RLY-4 and/or RLY-8) connected to it.

The RELAYS category on the main display of the FCS shows a summary of the status of the relays, which includes the internal relays, remote relays and any remote strobes and horns. If the relays are in different statuses, it will display the three most important statuses in order from left to right. The bar will also change colour depending on the severity of the status.

STATUS ABBREVIATION	STATUS	DESCRIPTION
OK	OK	Relay is not tripped by alarm level, time, fault, etc.
DISAB	Disabled	Triggers when a relay is set to disabled
SILENC	Silenced	Relay has been tripped and silenced
ON TD	In On Time Delay	Relay will trip after the on delay
OFF TD	In OFF Time Delay	Relay will un-trip after the off delay
LATCH	Latched	Relay has tripped and will remain tripped until manually un-tripped
TIME	Tripped Time of Day	Relay has tripped because of time-of-day priority
GAS T	Tripped Gas	Relay has tripped because of gas level
FAULT	FAULT	There is a problem with the relay communication

OTHER
The OTHER category on the main display of the FCS may show system SD card problems or self check troubles. It also shows whether data logging is enabled or disabled. Plus, it shows the status of the analog outputs, which includes the internal and any remote LNK-AO devices or Modbus® VFDs. If the analog outputs are in different states, it will display the three most important states in order from left to right. The bar will also change colour depending on the severity of the state.

The state "Fault" is displayed in red and shows the number of devices that the FCS cannot communicate with. The communication failure is between the FCS and an LNK-AO, Modbus® VFD or the internal analog output connection. An example of what could cause a "Fault" is a broken or unconnected wire.

NOTE: The FCS only communicates with the device it is immediately connected to. It does not communicate with the device(s) the LNK-AO or the Modbus® VFD is connected to.

The state "DISAB is displayed in grey and specifies the number of analog outputs that have been disabled. An analog output connection may be disabled for period of time to clean or maintain the equipment that is driven by the analog output.

STATUS ABBREVIATION	STATUS	DESCRIPTION
OK	OK	Analog output is working normally
DISAB	Disabled	Triggers when a channel is set to disabled
FAULT	FAULT	There is a problem with the LNK-AO communication
FCS Log	OFF	Data logging is disabled
FCS Log	ON	Data logging is enabled

LED INDICATORS
There are 5 LED lights on the front of the FCS that indicate the following:

LED INDICATORS*	DESCRIPTION
All are Green	All channels are not detecting gas at any alarm level, the air is safe
Status 1 is Red	At least one channel is in low alarm
Status 1 & 2 are Red	At least one channel is in mid alarm
Status 1, 2 & 3 are Red	At least one channel is in high alarm
Fault is Red	At least one channel is in Fault condition. Also can indicate problems with relays, analog inputs/outputs, RDM, self check

*exclusive of other possible states occurring at the same time

Pressing the CONFIGURE button will take you to the ENTER PASSWORD screen. Refer to Section 2.2 Accessing the Menu. Pressing INFO will show the part number, serial number, firmware version and communication type.

Press EXIT to return to the main display.

2.1.1 Changing the Summary Display to the Channel Display

The Channel Display shows the channel status bars for each channel. You can press on any bar and see the channel details. If the system has more than 5 channels, you can set the scroll rate so all channels can be viewed in rotation.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press DISPLAY and then FCS DISPLAY.
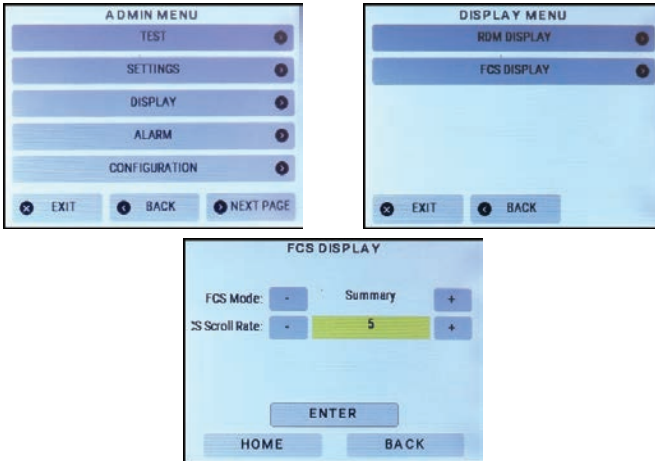
Press the - or + buttons to change Summary to Channel. Change the scroll rate as desired.
Press ENTER. Press HOME and the main display will now look like this:
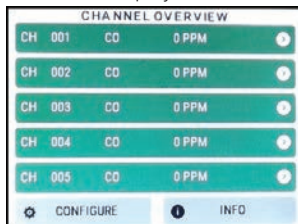
The circular arrow icon on the right side of the screen indicates you can press on the bar and

the details for that channel will be displayed.
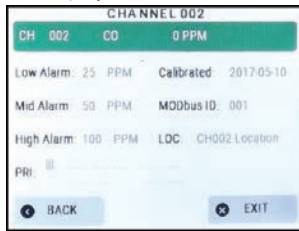
2.1.2 Display Touch Location Calibration

The FCS has a 1/4 VGA full colour resistive touch LCD display. A certain amount of pressure is required to engage the buttons, as is a certain length of time. If the touch response is not working as well as it used to, you can recalibrate the display.

Hold the Reset/Restart button for approximately 15 seconds and let go. As soon as the screen goes blank immediately touch and hold the display anywhere on the screen until you see the 'Performing touch screen calibration' message.
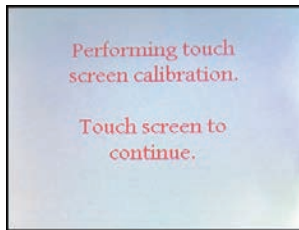
Touch the screen to continue.

Follow the directions until the process is complete. When you exit the screen calibration, the system will go through a 10 second countdown and then display the home screen again.

2.2 Accessing the Menu

From the Summary Display or the Channel Display screen press CONFIGURE to bring up the Enter Password screen.
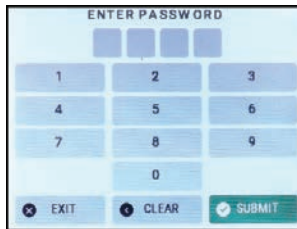
Enter one of the following numeric passwords and then press SUBMIT.

- Service Password: 2020
- Admin Password: 2019

NOTE: Service Password 2020 is ideal for service technicians or anyone who only needs quick access to Testing and some basic system setup.

2.3 Navigating the Menu Structure

The FCS has a 1/4 VGA full colour resistive touch LCD display and an intuitive menu structure that is aided by colour coding. Press firmly and purposefully using your fingertip or a dull pointed instrument such as a stylus to navigate through the menu.

After entering a menu item, BACK will take you back one menu level and EXIT will return you to the main display, logging you out of the password protected menus.

Depending on your preference you can enter values using the - or + buttons or if you press on the yellow field you can use a keypad to input your selection. If you are entering a number, the numeric keypad will appear. If you are entering text the alphanumeric keypad will appear.
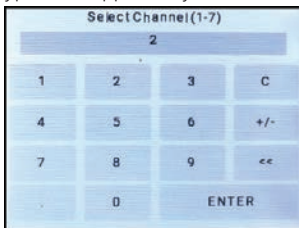
To use the keypad:

- Use the **Del** key to delete existing characters (one character will always remain). The red character is the character you are currently on, meaning if you press a letter/number key, the red character will change.

- To add a character, press the **Ins** key.

- Choose the desired number, letter or symbol by pressing on the key repeatedly until

the desired character appears. For example, if you want the letter C you have to press on the first button (1ABC) 4 times to get to the letter C.

- **<** and **>** moves the cursor backwards or forwards

When a value is changed, the SAVE button will turn green. Press it to save the changes and it will change to its standard colour indicating the change has been made.

Many of the channel, relay and priority set up screens have an autosave function. If you are going through more channels (or relays or priorities) on the same screen, the system will autosave when you press the + or - to proceed or return to the next channel (relay, priority) number. If you press HOME or BACK, the changes will not be saved. The SAVE button will turn green after a change has been made and you can choose to press SAVE if in doubt.

2.4 Factory Default Settings

The channel/gas operation type settings are configured at the factory according to the specifications at time of order. The remaining settings are usually configured in the factory according the default settings listed below. (There may be some differences in the default settings depending on application.) If changes to the default settings are desired, the settings can be changed in the field as indicated in the table below.

ITEM	DEFAULT SETTING	FIELD CONFIGURABLE SETTINGS
Door Mounted Buzzer	Enabled - Normal	Enable, Disable - Failsafe, Normal
Alarm Level	High	Low, Mid, High
ON Delay	10 seconds	value is application dependant
Silence Interval	300 seconds (5 min)	0 to 9999 seconds
Strobe / Horn	Enabled - Normal	Enable, Disable - Failsafe, Normal
ON Delay	10 seconds	value is application dependant
Silence Interval	300 seconds (5 min)	0 to 9999 seconds
Data Logger	Disabled 5 minutes	Enable, Disable 1 to 1080 (18 hrs)
Relay 1	Low - Failsafe	Low, Mid, High - Failsafe, Normal
Relay 2	Mid - Failsafe	Low, Mid, High - Failsafe, Normal
Relay 3	High - Failsafe	Low, Mid, HIgh - Failsafe, Normal
Relay 4	Fault - Failsafe	Failsafe, Normal
ON Delay (each relay)	10 seconds	value is application dependant
OFF Delay (each relay)	10 seconds	value is application dependant
Alarm Setpoints	values are gas dependant Ascending	values are gas dependant Ascending, Descending (ie. O_2)

LAN Modbus® Baud Rate	19,200	changing is not recommended
WAN Modbus® Baud Rate Modbus ID	19,200 100	Refer to Section 7.1 1 to 127
WAN BACnet® Baud Rate MAC Address Instance ID	76,800 100 270100	Refer to Section 7.1 1 to 127 1 to 4,194,302 per BACnet definition
Analog Input Calibration	4 - 20 mA	0 - 20 mA
Analog Output Calibration	4 - 20 mA	0 - 20 mA
STEL / TWA / IDLH Display Channel Alarm Global Alarm	Off Disabled Disabled	On, Off Disable, Enable Disable, Enable

The Basic menu allows you to set parameters such as the date and time, data logging sample rate, Modbus® ID and baud rates (or BACnet® ID and baud rate if an FCS-B model).

2.5 Set Clock
Allows you to set the correct date and time.
This is a 24 hour clock (ie. 9am = 09 and 1pm = 13).

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press SETTINGS and then SET CLOCK.

Use the + or ‾ buttons to increase or decrease the numbers or press the yellow fields and use the keypad to match the current Year, Month, Day, Hour and Minute. Press ENTER to save.

2.6 Data Logging Settings

The FCS comes standard with an SD card installed and data logging disabled. You are able to change the logging interval, disable data logging, delete logs and download the log files onto a computer to analyse the data.

Data logging includes internal logging memory that will store over one year's worth of readings (when set at a rate of logging once per minute). Data is saved in a format and can be extracted from the unit with a standard USB connection. Once the data is downloaded, copy the file to a name that has an extension of .csv. Users can then analyze and graph data using Microsoft® Excel® or any program that works with .csv files. The files are stored in directories organized by months and years.

When enabled, the default logging interval is every 5 minutes and the value recorded is the value at each 5 minute mark. An alarm condition or a large change between the current and last value will also create a log entry. A log file is created every 24 hours at midnight local time and every time the FCS is powered up/restarted.

The system will display a Data Log Failure fault on the home display if the card becomes corrupt or full or dislodged. Data logging will become disabled and the process will latch until data logging is re-enabled. Refer to Section 2.6.2 Clear a Data Log Failure Fault for more information.

2.6.1 Enable / Disable Data Logging and Change Logging Interval

NOTE: The correct time and date should be set prior to enabling data logging. Refer to Section 2.5 Set Clock for more information.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press SETTINGS and then DATA LOGGER.

Use the **+** or **–** button to increase or decrease the sampling rate (in minutes), or press the yellow field and use the keypad.

> **Minutes:** Enter the logging interval you want to set. Factory default is 5 minutes. The system will log the value at each 5 minute mark. Minimum is 1 minute, maximum is 1080 minutes (18 hours).

> **Enable/Disable:** Use the + or - buttons to choose to enable or disable the data logging functionality.

Data logging is disabled by default and can be enabled by using the + or - to change Disabled to Enabled. Press ENTER to save.
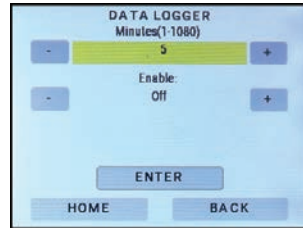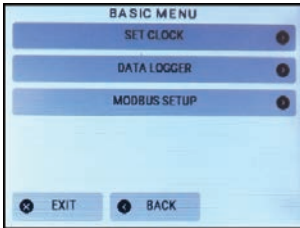
NOTE: If the message "SD Card Not Present" shows on the display, check to make sure the SD card is properly installed. If the SD card is missing or dislodged, UNPOWER the FCS before using your finger to pull the metal cover down very gently. Put in the SD card or fix the position of the card and close the slot door. Power the FCS back on and set data logging Enabled/Disabled as desired.

2.6.2 Clear a Data Logging Failure Fault
If something happens to the SD card - it becomes corrupt, dislodged or full - the home display will show a Data Log Failure Fault and the data logging functionality will be disabled. To clear the fault, fix the SD card issue and go into SETTINGS and enable data logging in the DATA LOGGER menu.

2.6.3 Delete Data Log Files
A log file is created every 24 hours at midnight local time and every time the FCS is powered up/restarted. Over time the files take up space and can slow down the logging system. You can delete all or select individual log files to delete.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press NEXT PAGE and then FILE MANAGEMENT. The Data log files are under Logs.

Press the yellow Logs bar to select it and it will turn green.

> **Delete**: Pressing Delete will delete all log folders and files at once.

> **Open:** Press the Open button to drill down to the list of folders containing the log files. The folders are listed in the order they were created and named by year_month (eg. 1-2021_04)

> Pressing on a folder will turn it green, indicating that has been selected. You can select one or mulitple folders. If you want to select all the folders press the Select All button.

> To access the individual log files, choose the folder and press the Open button. The individual log files are listed in the order they were created and named year month day_time (eg. 3-210407_1512.CET). Again you can press Select All to delete all the files or choose the one(s) you want to delete by pressing one or more files and then pressing Delete.

Press BACK to go back to the previous screen or press HOME to exit.

2.7 Configure RDM Remote Display(s)

The RDM Remote Display is designed to communicate with the FCS and provide convenient viewing of the gas readings, channel status and faults from an alternate and relevant location to the Controller, such as a refrigeration application where there are two entrances to the chiller room. This setting allows you to tell the FCS how many RDMs are connected to it, choose the display mode and a scroll rate.

Maximum number of RDM Remote Displays by FCS model:

FCS-4	FCS-8	FCS-32	FCS 128
4 max	4 max	20 max	20 max

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press DISPLAY and then RDM DISPLAY.
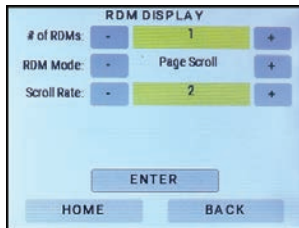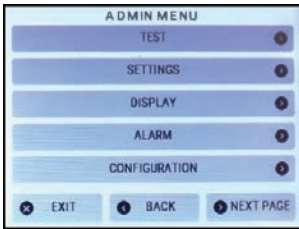
# of RDMs: Use the + or - buttons or press the yellow field to use the keypad to enter the number of remote displays connected to the FCS.

RDM Mode: Choose from these display modes:

- Line Scroll - ALL channels in the system will be displayed and the four line display will scroll up by one line at a time

- Page Scroll - ALL channels in the system will be displayed and the four line display will scroll up page by page (four lines at a time)

- High Channels - the four line display will show the FOUR channels with the current highest gas readings in order of highest to lowest (based on percentage of range, not measure of unit). This display setting is primarily used with the FCS-4, because the display will only show a maximum of four channels.

- Selected Page - SELECTED channels will be displayed and the four line display will scroll by page.
- Selected Line - SELECTED channels will be displayed and the four line display will scroll by line

Scroll Rate: Enter how fast (in seconds) you want the display to scroll through the information. Choose from 0 to 63 seconds. For line scroll, a scroll rate of 2 is a suggestion. For a page scroll, a scroll rate of 5 is a suggestion.

Press ENTER to save.

NOTE: Because the DM has a four line display, the scrolling feature (line or page) only applies if there are more than 4 channels to display. If desired, any of the four lines can be hidden. Refer to the RDM Operation Manual for more information.

NOTE: Only the channels being displayed by the RDM Remote Display can trigger the buzzer or strobe connected to the RDM. Only the channels being displayed by the RDM can be silenced.

NOTE: If the display mode is changed in the field and the channels being displayed are not showing as expected, a restart of the FCS is required for the changes to take effect. Push and hold the button on the FCS circuit board until the buzzer chirps (approximately a count of 10), let go and the FCS will do a restart. Restarting the FCS only resets the FCS, the transmitters and peripherals are not affected.

For more information on the RDM, see the RDM Remote Display Operation Manual. For more information on how to configure the RDM to display selected channels (ie. one specific gas channel or selection of channels), refer to Section 8.3.5 RDM Channel Selection Priority Logic.

2.8 Test Menu Functions

In the Test menu, you can test the audible alarm, strobe, relays and analog output to ensure they are working correctly. For each test you can set the length of time for the test to last. The range that can be set is 0 seconds to 60 minutes.

The test starts when you press the Start Test button and it will continue for as long as the time was set. You can exit the Test menu without affecting the time. If you want to end the test before the time is up, you must re-enter the Test menu and enter a value of "0" for the test length of that function.

The + and - buttons on all the Test screens function like this:

+.1	will increase the time by six seconds each time it is pressed
+ 1	will increase the time by one minute each time it is pressed
− 1	will decrease the time by one minute each time it is pressed
− .1	will decrease the time by six seconds each time it is pressed

Or you can enter the desired number by pressing on the yellow field and using the keypad to enter the number.

2.8.1 Test Audible (Buzzer)
NOTE: Before testing the audible alarm, warn people in the vicinity of where the sound will be heard so it does not cause unnecessary distress or response.

Press CONFIGURE and enter password 2020. Press the SUBMIT button.
Press TEST and then TEST AUDIBLE.
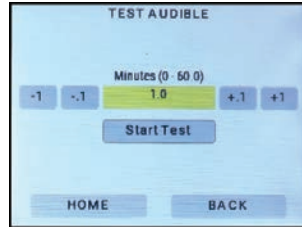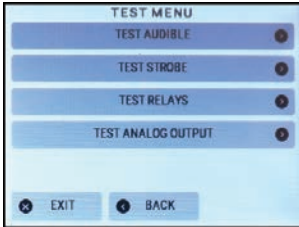
Enter the length of time you want to test the audible for. Press Start Test to begin the test.

To cancel the test, go back into the TEST MENU, open the TEST AUDIBLE screen and enter 0 in the Minutes field and press Start Test.

2.8.2 Test Strobe
NOTE: Before testing the strobe, warn people in the vicinity of where the strobe will be seen so it does not cause unnecessary distress or response.

Press CONFIGURE and enter password 2020. Press the SUBMIT button.
Press TEST and then TEST STROBE.

Enter the length of time you want to test the strobe for. Press Start Test to begin the test.

To cancel the test, go back into the TEST MENU, open the TEST STROBE screen and enter 0 in the Minutes field and press Start Test.

2.8.3 Test Relays

NOTE: Before testing the relays, notify the appropriate people so unnecessary distress or response is not caused.

Press CONFIGURE and enter password 2020. Press the SUBMIT button.
Press TEST and then TEST RELAYS.

Enter the relay number you want to test and enter the length of time you want to test the relay for. Press Start Test to begin the test.

To cancel the test, go back into the TEST MENU open the TEST RELAYS screen and enter 0 in the Minutes field and press Start Test.

NOTE: Relay ON and OFF delays do NOT apply in test mode.

2.8.4 Test Analog Outputs

The purpose of this test is to make sure the wiring is correct and the connected devices operate as expected.

NOTE: Before testing the analog outputs notify the appropriate people so unnecessary distress or response is not caused.

Press CONFIGURE and enter password 2020. Press the SUBMIT button.
Press TEST and then TEST ANALOG OUTPUTS.
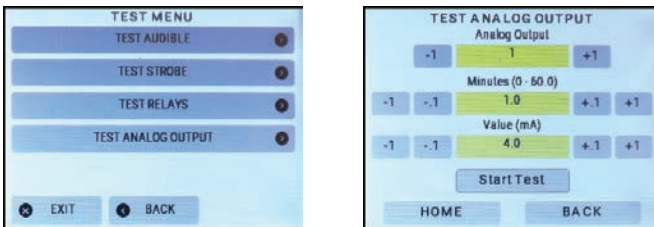
Enter the corresponding number for the analog output that you want to test and enter the length of time you want to test the test to last. Enter the output value in mA that you want tested. Press Start Test to begin the test.
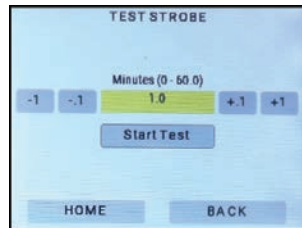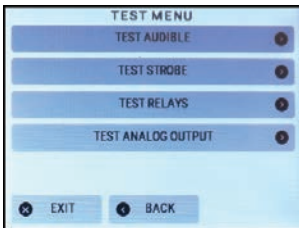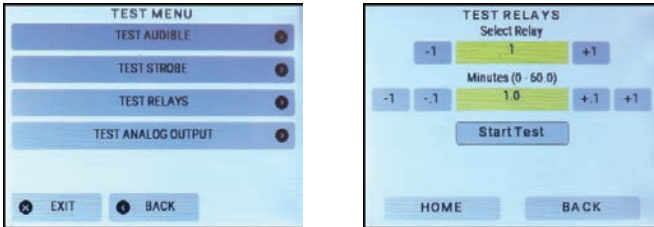
To cancel the test, go back into the Test MENU, open the TEST ANALOG OUTPUT screen and enter 0 in the Minutes field and press Start Test.

3 CHANNEL SETTINGS AND CONFIGURATIONS

Channels can be enabled/disabled, named, defined, assigned alarm levels, priority levels and relay and priority logic parameters.

3.1 Enable / Disable Channels, Assign ID, Channel Number & Communication Type

This setting allows you to enable or disable each channel, and specify the channel ID number, choose the communication type (analog or digital) and specify the channel sensor number.

If a channel is disabled, it will show on the Summary display and Channel Details display with 'L-Dis' at the end of the line. While disabled, the gas readings provided by that channel will not be used to control the relays and/or alarms. Data logging entries will not be recorded for a disabled channel. A disabled channel acts as if it does not exist - it will not show gas readings and there will be no data logging information gathered or saved while it is disabled.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press CONFIGURATION and then CHANNEL HARDWARE.

Use the + or - button or enter the specific channel number by pressing the yellow field and using the keypad to choose the desired channel. Press Enabled or Disabled for that channel. The Save button will turn green after a change has been made.

If you want to review the current settings channel by channel, press the + or - buttons. To skip ahead by 10 channels at a time, press the +10 button. To change the settings, choose the channel number and use the + or - buttons to change the values, or press the yellow fields and use the keypad.

For each channel you can enter:

Enabled, Disabled or Hidden: If a channel is disabled, it will show on the normal display with a "L-Dis." at the end of the line. If a channel is hidden, it will not be shown on any other screen, nor will it affect any ventilation control or have data log entires. An analog output that is defined to follow a hidden channel will be shown in a Fault state since there is no data for it to follow.

Com Type: Analog or Digital (communication type between the FCS and the Transmitter assigned to that channel). "Analog" should be assigned to 4-20 mA transmitters and "Digital" to digital (Modbus®) transmitters. If assigning a digital CGAS, CXT, CXT2, ART, AST-IS12 or AST-IS18, choose that name from the list. If connecting any other digital transmitter than the CGAS-D, choose Digital. If the wrong Com Type is assigned to the transmitter the FCS will go into Communication Fault.

ID No.: (enter up to 3 digits). Analog transmitters have an ID starting at 1. Digital transmitters have an ID starting at 101.

NOTE: Choose ID No. 229 only if you want to remove all subsequent existing channel configurations. For example, if you are editing channel 10 and you enter 229 in the ID No. field, channel 10, 11, 12 and so on will be deleted. Channel 1 to 9 will remain intact.

Sensor No.: (choice of 1 through the maximum number of channels that a transmitter can have, eg. CGAS-D can have up to 2 channels, LPT-M can have up to 3 channels, etc.) Single channel analog transmitters or other 4-20 mA analog inputs are assigned on a one to one basis. Digital transmitters may be 1, 2 or 3 channels and each sensor needs to be assigned a unique Sensor No.

Loc: Use the alpha-numeric keypad entry screen to enter useful information about the sensors like a description, name or location. This field is for reference only, it has no operational function.

The Save button will turn green after a change has been made. If you are going through more channels on the same screen, the system will autosave when you press the + or - to proceed or return to the next channel number. If you press Home or Back, the change will not be saved. You can choose to press Save if in doubt.

3.2 Set Channel Name, UOM and Gas Range Values
This setting enables you to give each channel a name, specify the units of measure, number of decimal places and enter a value for the Zero and the Range.

NOTE: It is important that the FCS settings be consistent with the settings of the transmitter that is providing the information.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.

Press CONFIGURATION and then CHANNEL CONFIG.

If you want to review the current setting channel by channel, press the + or - buttons. To skip ahead by 10 channels at a time, press the +10 button. To change the settings, choose the channel number and use the Edit and the + or - buttons to change the values, or press the yellow fields and use the keypad.

For each channel you can enter:

Name: Enter a name for the channel. For most gas detection applications, where the channel is a gas channel, the formula of the gas is normally used. For example, CO or NO2, but any 5 letter name can be assigned.

Units: For most gas detection applications, where the channel is a gas channel, the unit is the unit of measure for the particular gas. For example, %LEL or PPM. To change the unit of measure press on the desired number, letter or symbol button repeatedly until the desired character appears.

Press Save to save the edits made to the Name or Units.

For each channel, you can change the Decimals, Zero and Range by using the + or - buttons to change the values:

Decimals: For gas measurements that require decimal places, you can configure the reading to show up to two decimal places.

NOTE: Setting a decimal place of 1 or 2 does not increase the sensitivity of that sensor. It is not recommended to set decimal places for ranges larger than 100.

Zero: For most gas detection applications, where the channel is a gas channel, the Zero value will be set to 0.

Range: For most gas detection applications, where the channel is a gas channel, the Range value is the sensor range as specified by CETCI for that sensor. For example, if the channel was being configured for monitoring CO, a CO sensor from CETCI has a range of 0 to 200 ppm. The Range value to enter in this example would be 200.

The Save button will turn green after a change has been made. If you are going through more channels on the same screen, the system will autosave when you press the + or - to proceed or return to the next channel number. If you press Home or Back, the change will not be saved. You can choose to press Save if in doubt.

3.3 Set Date the Channel was Calibrated

This setting allows you to set today's date as the calibration date either channel by channel or to all channels at once. The default calibration date is the date the device was manufactured. This functionality works with the Calibration Expired Priority and can be used as a reminder for routine calibration. Refer to Section 8.3.3 Calibration Expired Priority Logic for more information.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press CONFIGURATION and then CHANNEL CALIBRATION DATE.
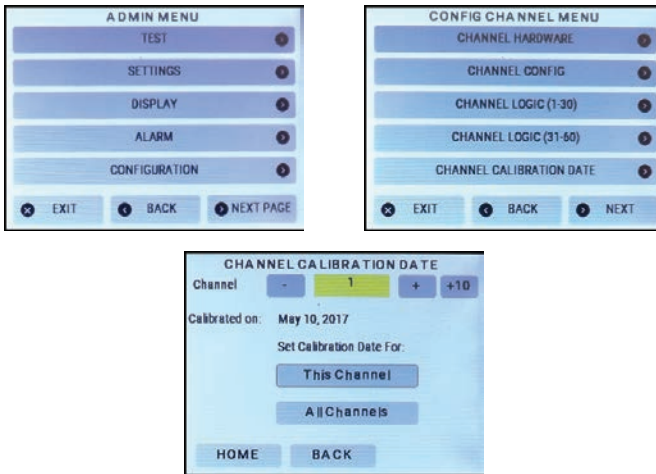
If you want to review the current settings for each channel, press the + or - button to scroll through the summary screen of each channel or press the yellow field and use the keypad to enter the desired channel number.

To change the settings, use the + or - buttons to choose the channel number or press the yellow field and use the keypad.

To change the calibrated date for the one channel you have chosen, press This Channel. To change the calibrated date for all channels, press All Channels. The calibrated date will be set to today's date.

3.4 Set Channel Alarm Setpoints

This setting allows you to set ascending and descending LOW, MID and HIGH alarm setpoints for each channel. The number entered as the setpoint is the gas concentration at which the alarm will be triggered.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press ALARM and then CHANNEL ALARMS.

If you want to review the current settings for each channel, press the + or - button to scroll through the summary screen of each channel or use the keypad to enter the specific channel number.

To change the settings, choose the channel number and use the + or - buttons or press the yellow fields to use the keypad and change the values:

HIGH, MED and LOW gas reading level at which the alarm is triggered.

Des or Asc: Choose the direction of the alarm point - descending or ascending. For most gases, the alarm direction is ascending (as the gas level increases, the alarm is set to go off). For Oxygen, it is usually descending (as the oxygen level decreases, the alarm is set to go off).

Diff: Also referred to as hysteresis. This is the difference between the ON point and OFF point of the alarm. For example, if the alarm is set to come on at 100 ppm and the hysteresis is set for 10 ppm, the alarm will not turn off until the gas is below 90 ppm. This prevents the alarm from chattering on and off repetitively if the gas fluctuates just above and just below 100 ppm.

The Save button will turn green after a change has been made. If you are going through more channels on the same screen, the system will autosave when you press the + or - to proceed

or return to the next channel number. If you press Home or Back, the change will not be saved. You can choose to press Save if in doubt.

4 RELAY, STROBE, HORN AND AUDIBLE SETTINGS AND CONFIGURATIONS

The FCS has four on board relays that can be configured to be enabled or disabled, operate in a failsafe or not failsafe manner, and be configured with ON delays and/or OFF delays. Relays can be overridden for a forced, timed action such as during maintenance or testing. The relays are rated 5 amps @ 240 VAC each and can be used to control remote alarms, strobes, exhaust fan starters, make up air fan contactors, or signaling other equipment like fire panels or alarm systems, etc.

NOTE: The door mounted buzzer and the terminal connected horn and/or strobe devices are considered to be relays by the FCS. However, instead of using relay numbers, the words AUDIBLE, STROBE and HORN are displayed in the relay fields of the various configuration screens.

If more relays are required, the FCS can be connected to the RLY-4 Remote Relay which offers four additional SPDT dry contact relays plus two horn/strobe 24 VDC drives. or similarly, the RLY-8 Remote Relay that offers eight additional SPDT dry contact relays plus four horn/strobe 24 VDC drives. The remote relay devices communicate with the FCS using Modbus® communications protocol.

Maximum number of RLY-4 and RLY-8 remote relay devices by FCS model:

	FCS-4	FCS-8	FCS-32	FCS 128
RLY-4	1 max	2 max (no RLY-8)	Total # of available relays (internal + remote) plus strobe/horn drives is 64. Max number of RLY-4 and/or RLY-8 varies depending on number of strobe/horn drives used and internal relays used.	
RLY-8	0	1 max (no RLY-4)		

NOTE: The remote relays are in addition to the four internal relays that come standard with each FCS model.

4.1 Enable / Disable Relays, Assign Modbus ID & Change Mode of Operation

This setting allows you to specify the relay number, associated Modbus ID, enable or disable relays and choose the mode of operation (normal or failsafe, latching, silencing, not silencing, etc.).

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press CONFIGURATION, then NEXT and press RELAY HARDWARE.

If you want to review the current settings relay by relay, press the Relay + or - buttons. To skip ahead by 10 sequential relays at a time, press the +10 button. Or press the yellow field to reveal the keypad to enter a specific number.

To change the settings, choose the relay number and use the + or - buttons or press the yellow fields to use the keypad to change the values.

To enable or disable the channel, latching, failsafe mode or silencing, press on the corresponding button - green indicates the feature is enabled and white indicates the feature is disabled.

For each relay you can select:

> **Modbus ID:** The address of the device that houses the relay (ie. the FCS and/or RLY-4 or RLY-8). If it is an internal relay (in the FCS), the Modbus ID will be 1 (for the 4 internal relays) or 2 (for the audible horn or strobe). If it is a remote relay it will be a number between 30 to 49. The value of 229 is the default if a relay is not configured.

NOTE: Choose Modbus ID 229 only if you want to remove all subsequent existing relay configurations. For example, if you are editing relay 10 and you enter 229 in the Modbus ID No. field, relays 11, 12, 13 and so on will be deleted. Relay 10 will remain unconfigured/inactive. Relays 1 to 9 will remain intact as configured.

> **Relay No:** The relay number 1, 2, 3 etc. or STROBE, HORN, AUDIBLE that you are configuring. The relay number is sequential for the relays within each device (FCS, RLY-4, RLY-). So there will be a relay number 1 in the FCS and a relay number 1 in the RLY-4, for example.

NOTE: If you are configuring the internally connected STROBE, HORN or AUDIBLE it is best

not to change the Modbus ID or the Relay No that was assigned at the factory.

Enabled/Disabled: To enable a relay, press the button to turn it green and the word Enabled will be displayed. To disable a relay press the button so it is white and the word Disabled is displayed. A disabled relay will show on the normal display with a 'DISAB' at the end of the line, unless the line has been removed from showing on the display.

NOTE: A disabled relay acts as if it does not exist therefore it will not be triggered by any gas or priority event.

Failsafe/Normal: The FCS is designed to be fail-safe so the relay is energized in a non-alarm state for failsafe operation. When the channel has been set to trigger in a failsafe mode, the button will be green and the word Failsafe will be displayed (this is the factory default). If required, the FCS can be configured for normal relay operation by choosing Normal. When a channel is set to trigger in a normal mode, the button will be white and the word Normal will be displayed.

Latching/Not Latching: A latched relay is a relay that has triggered an event/it is active and it will remain so until it is manually cleared/turned off. To enable relay latching, press the button to turn it green with the word Latching displayed. To disable relay latching, press the button to turn it white with the words Not Latching displayed.

NOTE: If the relay latching has been enabled, the relay will not un-trip until the cause of tripping (alarm level, time of day, etc.) has cleared AND the Clear Latched button is pressed on the Relay Overview screen. For more information, refer to Section 4.4 Clear a Latched Relay.

Silencing/Not Silencing: If you would like to silence the channel of the internal audible buzzer, a terminal connected strobe or horn or a remote strobe or horn, press the button so it is green and with the word Silencing displayed. To not use the silencing feature, press the button so it is white with the words Not Silencing displayed.

NOTE: Any relay defined with the silencing functionality will respond to the Silence ? button activity. Meaning if a relay that controls a fan is set to Silencing, when the relay is triggered, the Silence ? notification will appear and if you press Yes, the relay (the fan) will be turned off, "silenced". Therefore make sure the logic behind the setting is appropriate.

Loc: Use the alpha-numeric keypad entry screen to enter useful information about the relay like a description, name or location. This field is for reference only, it has no operational function.

NOTE: The flexibility built into configuring relays may allow parameters to be set that don't make a lot of sense. The system does not stop you from setting nonsense combinations such as enabling latching and silencing on the same relay or setting a time of day priority tripping a relay that is defined to be latching. Make sure the logic behind your settings is appropriate.

The Save button will turn green after a change has been made. If you are going through more relays on the same screen, the system will autosave when you press the + or - to proceed or return to the next relay number. If you press Home or Back, the change will not be saved. You can choose to press Save if in doubt.

To continue changing or reviewing the settings for each relay press use the + to proceed to the next relay number.

4.2 Using Relay Timers to Set ON / OFF Delays

The relay timers functionality offer a high degree of flexibility, allowing for many variations in settings for turning on and off relay triggered events such as fans and/or signaling a Building Automation System.

ON Delays are useful for addressing spikes in gas levels that only occur for short moments during which there is no need to turn on the fans. For example, a car that is parked near the gas detector is stationary idling for a few moments before leaving. The gas level in that area could increase above the alarm setpoint and then drop a few moments later when the car leaves. The ON Delay tells the system to wait a specified length of time before taking the gas level seriously and to turn on the fans.

OFF Delays are useful for clearing a full cycle of air in the area that caused the gas level alarm. Instead of turning off the fans as soon as the gas level drops below the alarm setpoint the system keeps the fans activated for a specified amount of time to allow the air to clear completely and then turns them off. This is especially useful in situations where the fan is farther away from the area of gas and clearing the air takes more time.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press CONFIGURATION, then NEXT and press RELAY TIMERS.

If you want to review the current settings relay by relay, press the Relay + or - buttons. To skip ahead by 10 sequential relays at a time, press the +10 button. Or press the yellow field to

reveal the keypad to enter a specific number.

To change the settings, choose the relay number or STROBE, HORN, AUDIBLE and use the + or - buttons or press the yellow fields to use the keypad to change the values.

Enter the time (in seconds) for each function required. Use the +10 button to jump ahead by 10 seconds at a time.

D-ON: ON Delay is the length of time before the relay is activated after an alarm condition has been triggered. This is useful for example, if you want the audible buzzer and strobe to come on at different times, or if the monitored area has frequent gas level readings that could trigger an alarm but not last very long (such as an idling car in a parking garage/car park).

D-OFF: OFF Delay is the length of time after the alarm condition has gone back to normal and the relay continues to be activated. This is useful for example if you want to allow extra time for the ventilation of the area. Setting an OFF Delay for a horn, strobe or audible will be the amount of time that the device will be silenced after having sounded and the Silence All button on the Silence? screen is pushed.

The Save button will turn green after a change has been made. If you are going through more relays on the same screen, the system will auto save when you press the + or - to proceed or return to the next relay number. If you press Home or Back, the change will not be saved. You can choose to press Save if in doubt.

To continue changing or reviewing the settings for each relay press use the + to proceed to the next relay number.

4.3 Override Relays
This setting allows the relays, the audible and/or horn/strobe to be overridden; either forced on or forced off for a given length of time. This may be useful in situations where maintenance is being done or a special event is occurring and requires extra safety precautions.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press ALARM and then press RELAY OVERRIDE.

Use the + and - buttons or enter the specific relay number by pressing the yellow field and using the keypad to choose the relay number, Audible, Strobe or Horn you want to override.

Enter the number of minutes (up to a maximum of 999) that you would like the override to be in effect for.

Use the -H and +H buttons to change by 60 minute/1 hour increments and the -M and +M by one minute at a time.

Set: Select to force the relay into its active state immediately upon pressing Save. The override will continue for the duration of the time specified.

Clear: Select to force the relay into normal mode, to not activate even if it is configured to do so. For example, the relay will NOT activate if the gas readings reach or surpass the alarm set point. The override will start immediately upon pressing Save and will continue for the duration of the time specified.

The Save button will turn green after a change has been made. If you are going through more relays on the same screen, the system will auto save when you press the + or - to proceed or return to the next relay number. If you press Home or Back, the change will not be saved. You can choose to press Save if in doubt.

To continue changing or reviewing the settings for each relay press use the + to proceed to the next relay number.

NOTE: A latched relay cannot be overridden.

The override status along with the amount of time left for it to be in that state can be viewed by pressing on the Relay Status Bar and using the + or - buttons to scroll to the relay that has been overridden.

4.4 Clear a Latched Relay
A latched relay is a relay that has triggered an event and will remain active until it is manually cleared/turned off. This functionality is commonly used in situations where the desire is for the alarm to remain on until it is properly dealt with by someone who knows what they are doing. It prevents someone turning off the alarm, ignoring the reason for it and continuing to work in a potentially dangerous area. This feature could be used for safety interlocks where the shutoff of equipment is triggered and latched such as shutting of the ammonia

compressor if there is an ammonia leak.

A relay will only latch if it has been enabled to do so. For more information about enabling or disabling relay latching, refer to Section 4.1 Enable / Disable Relays, Assign Modbus ID & Change Mode of Operation.

The Summary display will show a latched relay in the RELAY status bar. To clear the latched relay, press on the LATCH button to bring up the RELAY OVERVIEW screen. Press the UN-LATCH button.
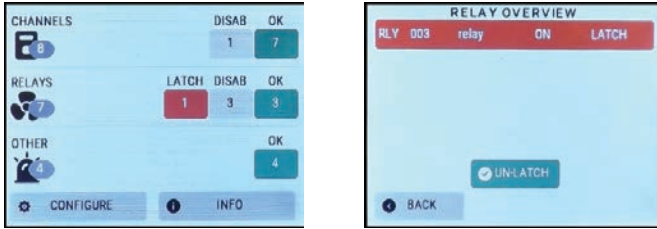
NOTE: A latched relay cannot be cleared if the cause of the relay activation is still present or has not resolved. For example, if the gas level reading is still above the alarm setpoint, pressing the UN-LATCH button will not work.

4.5 Silencing the Internal Audible Alarm, Terminal Connected and/or Remote Horns and Strobes

The FCS comes with a door mounted, audible alarm. This alarm and any remote strobe/horn devices connected to the Remote Strobe/Horn Terminal and/or the relays (if configured to do so) will sound when the high alarm is reached. Upon sounding, the Silence? screen will appear, giving you the ability to silence all the alarms for a predetermined amount of time. You will also be able to see how many alarms have been previously silenced and how many are currently sounding.
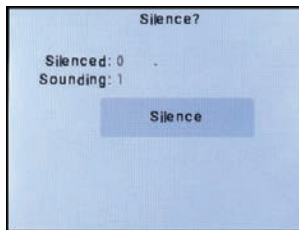
You can silence all or none of the alarms. When the Silence is pushed, all sounding alarms will be silenced. If another channel starts to indicate high alarm, the system works through the configuration and the audible alarm will come back on for that channel. Pressing Silence will stop the alarm from sounding and restart the silence interval for the previous channel(s) causing the alarm.

The alarms will stop for a preconfigured amount of time (the factory default is 5 minutes). Refer to Section 4.2 Using Relay Timers to Set ON / OFF Delays to change the silence interval

(OFF Delay) for each device (Strobe, Horn, Audible).

When the Silence button is pressed, the associated horn/strobe/audible/buzzer detailed relay information will show as SILENCE in the relay overview screen.

When the preconfigured silenced amount of time (OFF Delay) has passed, the strobe/horn and buzzer will sound and the Silence? screen will appear again. The silence interval is specific to each audible relay. The OFF Delay for that relay sets the silence duration.

To let the alarm(s) continue sounding, don't press Silence All. Each alarm will continue sounding until the cause of the alarm comes to an end.

NOTE: The Silencing functionality applies to ALL relays that have been configured as silenceable. However, it is intended for AUDIBLE devices (horns, integral buzzer, etc.) directly connected to the FCS or the relays (including the RLY-4 or RLY-8); but any relay can be configured as silenceable.

5 ANALOG INPUT AND ANALOG OUTPUT SETTINGS

The FCS can be configured to accept analog inputs from transmitters and connect internally or remotely to analog output devices such as fans, heaters, Modbus® VFDs, etc. The summary information for the analog inputs and/or outputs will be displayed on the third coloured bar on the home screen display.

NOTE: If two -AO boards are installed, there cannot be any internal analog inputs (Option -AI). If required, remote analog inputs may be added by using one or more LNK-AI Peripheral Devices connected to the LAN Terminal on the main FCS board.

5.1 Enable / Disable Analog Inputs, Assign Modbus® ID & Channel Number and Type

The FCS does not have any internal analog inputs unless the optional Analog Input board(s) has been installed (Option -AI or Option -2AI) on the main board. Option -AI and Option -2AI are factory installed at the time of order.

These settings allow you to enable or disable each analog input, specify the Modbus® ID number, and associated analog input channel number. Using these settings, the FCS can obtain readings from any analog input device such as CETCI's 4-20 mA analog transmitters that may be connected to the internal -AI Option(s) and/or the LNK-AI peripheral device(s)

and associated analog input channels.

Each analog input can be assigned to one or more channels, providing the gas concentration (for example) for the channel. For more infromation on assigning priorities, refer Section 8.1 Assign Priority Levels to Channels.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press NEXT PAGE, ANALOG CONFIGURATION and then press ANALOG INPUT HARDWARE.
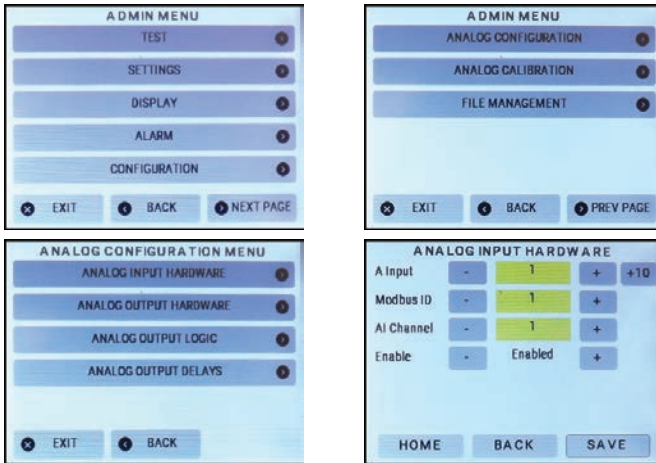
If you want to review the current settings for other analog inputs, press the + or - buttons. To skip ahead by 10 devices at a time, press the +10 button. Or press the yellow field and use the keypad to enter a specific number.

Use the + or - buttons or press the yellow fields and use the keypad to change the values for each analog input. You can select:

A. Input: Choose the analog input number/channel that you want to configure. The FCS can have a total of 60 analog inputs (internal and remote combined), therefore this number will be 1 to 60. The FCS-8 can have a total of 8 analog inputs, therefore this number will be 1 to 8.

Modbus ID: Set the Modbus® ID for the analog input device. For an internal -AI Option choose 1 (if the AI board is installed in the top position) or 2 (if the AI board is installed in the bottom position). For an LNK-AI peripheral device, choose a number from 50 to 74. For the last input channel, choose 229 to indicate that this and all higher analog input channels are not being used.

NOTE: Modbus® ID 1 or 2 reserved for the internal analog boards and are strictly 4-20 mA. When selected, you will not be able to change the Type field, it will automatically populate with 4-20 mA.

NOTE: Every digital device in the system must have a unique Modbus ID. Choose a number that hasn't yet been assigned to another device in the system. The number entered here must match the Modbus ID number of the actual device.

>   **AI Channel:** Choose the channel (1 to 4) you are enabling or disabling on the analog input device.

NOTE: Each internal -AI Option has four 4-20 mA analog input channels. Each LNK-AI peripheral device has four 4-20 mA analog input channels.

>   **Enable/Disable:** Select Enable or Disable for the chosen channel.

Press Save to save the changes.

5.2 Enable / Disable Analog Outputs, Assign Modbus ID & Channel Number and Type

The FCS does not have any internal analog outputs unless the optional Analog Output board(s) have been installed on the main board. Option -AO and Option -2AO are factory installed at the time of order. Each Analog Output board offers 4 analog outputs. The FCS provides 24 VDC (low voltage power) to the Analog Output Terminal on the optional -AO board(s). The analog output is a field configurable 4 - 20 mA current or 0 - 10 volt source.

NOTE: If more analog outputs are required LNK-AO peripheral device(s) can be added to the system. **E**ach LNK-AO peripheral device has four 4-20 mA analog outputs and if required the output can be converted to 2 - 10V by using a 500 ohm resistor between the output terminal (e.g. A1) and the ground terminal (GND).

These settings allow you to enable or disable each analog output, specify the Modbus® ID number for each analog output. Using these settings, the FCS can signal devices such as a data / trend / logging system or a BAS or DDC or VFDs that are connected to the internal -AO Option(s) and/or the LNK-AO peripheral device(s) and associated analog output channels.

VFDs can be driven as an analog 4 - 20 mA, 0 - 10 volt or Modbus® connection. The VFD Configuration screen is for Modbus® VFD configuration. Configuring 4-20 mA or 0 - 10 volt VFDs is done the same was as any other 4-20 mA or 0 - 10 analog output. The FCS has been designed to work with the Lenze AC Tech and the ABB ACH 550 VFD product lines.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press NEXT PAGE, ANALOG CONFIGURATION and then press ANALOG OUTPUT HARDWARE.
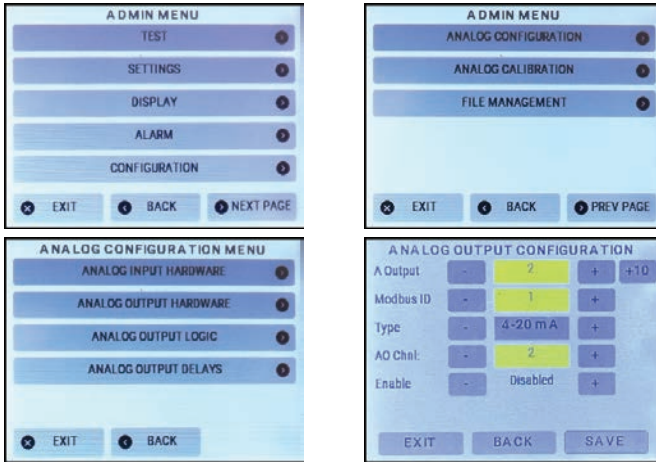
If you want to review the current settings for other analog outputs, press the + or - buttons. To skip ahead by 10 devices at at time, press the +10 button. Or press the yellow field and use the keypad to enter a specific number.

Use the + or - buttons or press the yellow fields and use the keypad to change the values for each analog output. You can select:
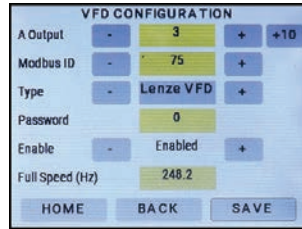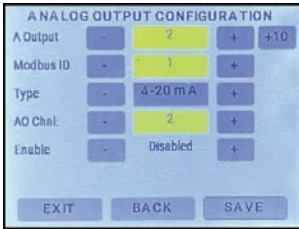
   A. Output: Choose the analog output number/channel that you want to configure. Generally speaking, the minimum number can be 1 and the maximum number can be 60, but conditions apply depending on the number of Modbus® VFDs that are included. For the FCS-8 which can have a total of 8 analog outputs, this number can be 1 through 8.

   Modbus ID: Set the Modbus® ID for the analog output device. For an internal -AO Option choose 1 (if the AO board is installed in the top position) or 2 (if the AO board is installed in the bottom position). For an LNK-AO peripheral device or Modbus® VFD, choose a number from 75 to 99. For the last output channel, choose 229 to indicate that this one and all higher analog output channels are not being used.

NOTE: Every digital device in the system must have a unique Modbus ID. Choose a number that hasn't yet been assigned to another device in the system. The number entered here must match the Modbus ID number of the actual device.

   Type: Choose the type of analog output. You can choose 4-20 mA output, 0 - 10 volt output or a preconfigured VFD output. If you choose a preconfigured VFD output, the communication is Modbus. To use a 4-20 mA or 0 - 10 volt connection to a VFD, use the Analog Output Configuration.

Modbus® ID 1 or 2 are reserved for the internal analog boards and are strictly 4 - 20 mA or 0 - 10 volts. Modbus IDs for VFD Configuration must be 75 to 99 and the number used cannot be used on any other analog output.

For 4-20 mA or 0 - 10 volts configuration:

AO Chnl: Choose the channel (1 to 4) you are enabling or disabling on the analog output device.

Enable/Disable: Select Enable or Disable for the chosen channel.

For Modbus® VFD configuration:

Password: Enter the same password that gives you access to the VFD (applicable for the Lenze VFD only).

Enable/Disable: Select Enable or Disable for the chosen VFD.

Full Speed (Hz): Enter the top speed frequency in Hz for that VFD. This value should match the specs of the VFD.
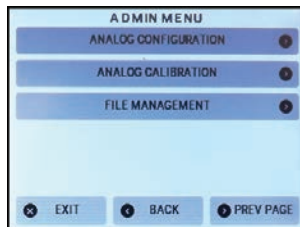
Press Save to save the changes.

5.3 Changing Analog Output Type (Milliamps - Voltage)

When the FCS is ordered with internal analog outputs, the default factory setting is 4 - 20 mA current. This can be changed to voltage in the field. The default voltage is 0 - 10 volts. You can change the voltage to 1 - 5 volt, 2 - 5 volt. 2 - 10 volt, etc. if needed by adjusting the D/A values. Refer to Section 5.6 Analog Output Calibration for more information on adjusting D/A counts.

To change the analog output type from 4 - 20 mA to 0 - 10 volts, press CONFIGURE and enter password 2019. Press the SUBMIT button.

Press NEXT PAGE, ANALOG CONFIGURATION and then press ANALOG OUTPUT HARDWARE.
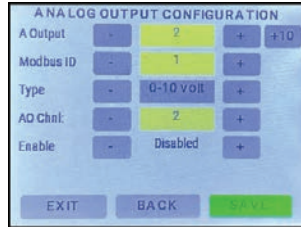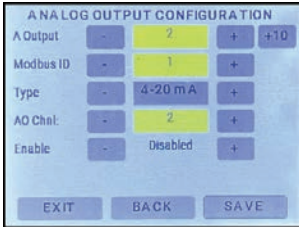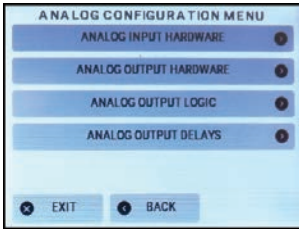
Use the + or - buttons or press the yellow field to chose the analog output number you want to change to voltage.

Use the + or - button in the Type field and choose 0 - 10 volts.

Press Save to save the changes.

5.4 Default Analog Output Logic and Delays
Analog outputs can be configured with ON/OFF delays and logic settings assigned to them.
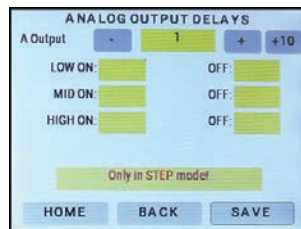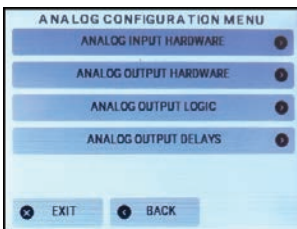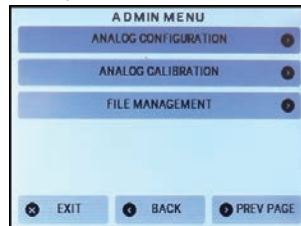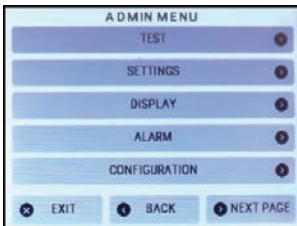
Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press NEXT PAGE, ANALOG CONFIGURATION and then press ANALOG OUTPUT DELAYS.

Analog output delays can:
- Only be active if the analog output logic for that analog output number/channel is set to Step Mode.
- Only be applied to LOW, MID and HIGH alarm triggered events
- Range from 0 to 30 minutes
- Default factory setting is 0 minutes (ie. no delay)

5.5 Assign Priority Levels & Logic Conditions to Analog Outputs

There are three ways to control the analog output:
- First is to monitor a priority and follow either Peak, Average or Step.
- Second is follow a specific Channel.
- Third is to output a specific value under specific conditions.

This setting enables you to assign priority levels to each analog output. One analog output can be assigned to none through 60 priority levels and multiple analog outputs can be assigned to the same or different priority levels. The actual value output will be the highest value determined from all the priorities it is configured to look at.

A priority level can indicate a physical connection to a device (controlling that device) or a set of logic (if this happens, do this or if that happens, do that).

NOTE: Depending on the Type selected in the Analog Output Configuration screen for the analog output you are setting the logic for, the fields to fill in on the Analog Output Logic screen will either be a mA value or, the percentage of the maximum Full Speed (Hz) value entered in the VFD Configuration screen.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press NEXT PAGE, ANALOG CONFIGURATION and then press ANALOG OUTPUT HARDWARE.
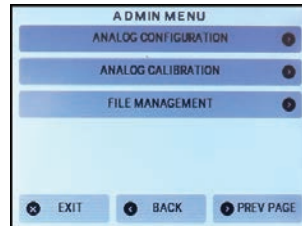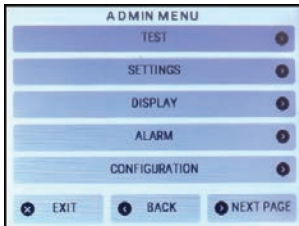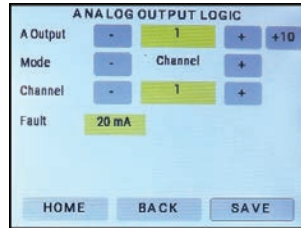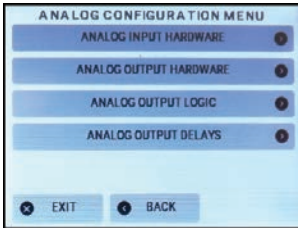
If you want to review the current priority settings for each output, press the + or - buttons. To skip ahead by 10 devices at time, press the +10 button. Or press the yellow field and use the keypad to enter the specific number.

Use the + and - buttons or press on the yellow fields to use the keypad to change the settings:

A. Output: Choose the analog output for which you want to configure the logic using the appropriate mode.

Mode: Choose the mode the analog output will operate in. The screen will change depending on which mode you choose:
- OFF will result in a 0 current or percentage output. The OFF feature allows you to set any analog outputs you are not using to OFF or to stop the analog output from controlling whatever it is configured to control.

- CHANNEL allows you to choose a specific channel (1 through 128 or 1 through 8 for the FCS-8) that the analog output will monitor.

    Channel: Choose the channel number that the analog output will monitor.

    Fault: Output this value if the channel goes into fault.

- AVERAGE is the average gas concentration reading that is calculated by looking at all the channels assigned to each chosen priority level. All channels in the first priority level are averaged, then all the channels in the next priority level are averaged, etc. The priority level that has the highest average is the value that is used to drive the analog output.

    Priority: Add, change or remove the priority levels this analog output will look at.

    Fault: Output this value if any of the channels in the priorities selected go into fault.

    Digital: Output this value if one or more of the channels in the selected priorities has a time of day priority engaged.

    Normal: Output this value if the channels in the selected priorites are reporting everything is normal but you want the the analog output to remain on.

NOTE: The AVERAGE and the PEAK are based on the value of the channel relative to its range. Meaning be aware for example, that an Oxygen sensor has a range of 0 - 25% vol and a normal reading is 20.9%, which is 83% of the sensor's range. CO has a range of 0 - 200 ppm and the low alarm is set at 30 ppm, which is 15% of the sensor's range. If you were to group these two channels together in the same priority, it would result in skewed average or peak calculations. It is best to group like channels together and assign them to the same priority.

- PEAK is the highest gas concentration indicated by the channels assigned to that chosen priority level.

    Priority: Add, change or remove the priority levels this analog output will look at.

    Fault: Output this value if any of the channels in the priorities selected go into fault.

    Digital: Output this value if one or more of the channels in the selected priorities has a time of day priority engaged.

    Normal: Output this value if the channels in the selected priorities are reporting everything is normal but you want the analog output to remain on.

    Press SAVE to save the changes.   .

- STEP allows you to specify a Low, Mid and High percentage of the maximum output for a particular analog output. This is useful for controlling variable speed fans (VFDs). The STEP value increases or decreases by 5% increments for VFDs (otherwise 1 mA) if you use the + or - buttons. If you use the keypad to enter a number it will be rounded to the nearest 5% or 1 mA. For the specified priority, if a channel goes into Low Alarm, it will output the percentage value that is entered in the Low field; at Mid Alarm, it will output the percentage value that is entered in the Mid field, etc.

    Priority: Add, change or remove the priority levels this analog output will look at

    Fault: Output this value if any of the channels go into fault.

    High: Output this value if any of the channels go into high alarm.

    Low: Output this value if any of the channels go into low alarm.

    Digital: Output this value if a priority has a time of day priority engaged.

    Mid: Output this value if any of the channels go into mid alarm.

    Normal: Output this value if all priorities are reporting everything is normal but you want the analog output to remain on.

    Press SAVE to save the changes.

NOTE: The step functionality does not cause the fan to ramp up, it is a step up action. The VFD may have a ramping function in its own configuration.

Gas Alarm Setpoints and Range
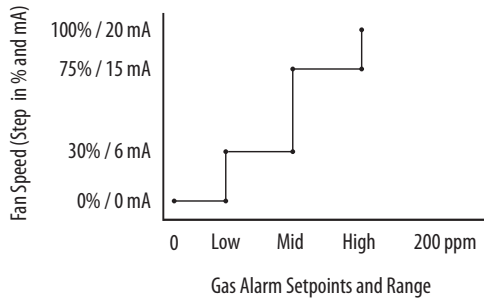
5.6 Analog Input Calibration (requires a 4-20 mA source)

If it is necessary to recalibrate the analog inputs, use an accurate current source and adjust the A/D counts to reach the required 4 mA and 20 mA input values.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press NEXT PAGE, ANALOG CALIBRATION and then press ANALOG INPUT CALIBRATION
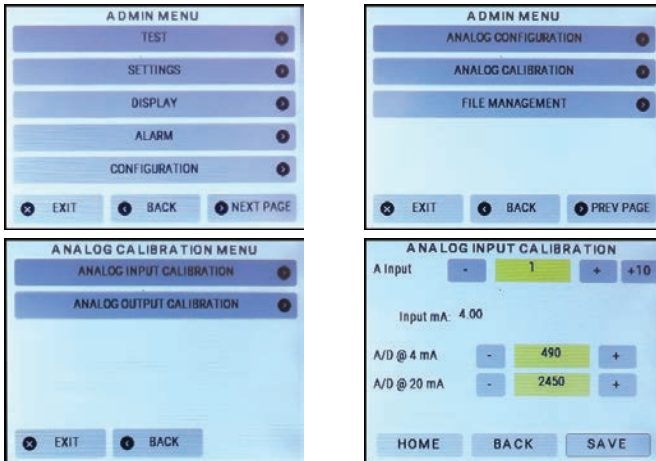
Use the + or - buttons or press the yellow fields and use the keypad to change the values, for each analog input. You can select:

A. Input: Select the analog input number (1 to 60) of the analog input you are setting the current values for.

mA: This is the measured input current, what the FCS thinks the current is; this value will change as you change the A/D values or the 4 - 20 mA source.

A/D @ 4 mA: While applying 4 mA, change the number until the mA value is 4 mA.

A/D @ 20 mA: While applying 20 mA, change the number until the mA value is 20 mA.

Press SAVE to save the changes.

5.7 Analog Output Calibration (requires a multimeter)

If it is necessary to recalibrate the analog outputs or set different ranges than the default settings, use an accurate current or voltage source and adjust the A/D counts to reach the required low and high mA or voltage output values.

For 4 - 20 mA, the default D/A values are:
- 496 = approx 4 mA
- 2482 = approx 20 mA

If other mA values are desired, follow the steps using the preferred mA value instead of 4 mA and 20 mA.

For 0 - 10 volts, the default D/A values are:
- 0 = 0 volts
- 2482 = approx 10 volts

The D/A @ 0 volt and D/A @ 10 volt values can be changed as needed to achieve 1 - 5 volt, 2 - 5 volt. 2 - 10 volt, etc. Follow the steps using the preferred voltage value instead of 0 volts and 10 volts.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press NEXT PAGE, ANALOG CALIBRATION and then press ANALOG OUTPUT CALIBRATION
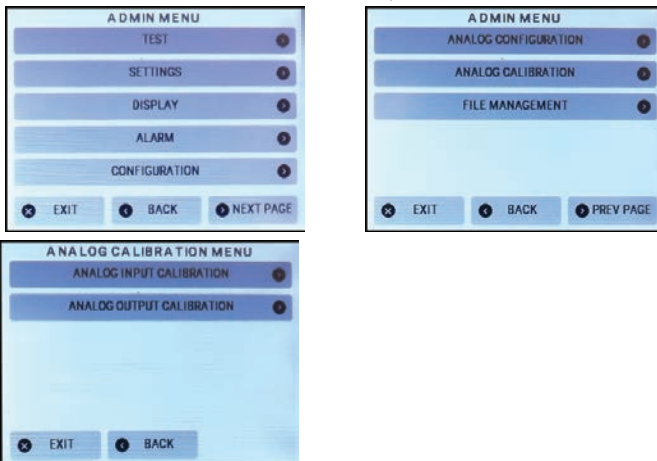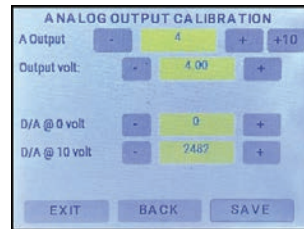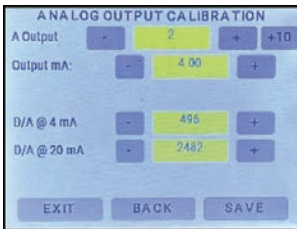
Use the + or - buttons or press the yellow fields and use the keypad to change the values, for each analog output. You can select:

A. Output: Select the analog output number of the analog output you are calibrating.

For Current Output:

Output mA: Enter the desired output value (ie. 4 mA or 20 mA).

D/A @ 4 mA: When requesting 4 mA output, change the number until the amp meter reads 4 mA.

D/A @ 20 mA: When requesting 20 mA output, change the number until the amp meter reads 20 mA.

Press SAVE to save the changes.

For Voltage Output:

Output Volt: Enter the desired output value (ie. 0 volts or 10 volts).

D/A @ 0 volt: When requesting 0 voltage output, change the number until the multimeter reads 0 volts.

D/A @ 10 volt: When requesting 10 voltage output, change the number until the multimeter reads 10 volts.

Press SAVE to save the changes.

NOTE: Each AO channel number must be calibrated for a low and a high range (ie. 4 mA and 20 mA or 0 volts and10 volts). Because the D/A counts can fluctuate in relation to each other, when finished, double check to ensure both values have remained acceptable. Adjust if required.

NOTE: The system will continue to show the output value as 0 - 10 volts, even If you change the range to something other than 0 - 10 volts.

6 STEL AND TWA SETTINGS

STEL (Short-term Exposure Limit)
The STEL is the acceptable average exposure over a short period of time, usually 15 minutes as long as the time-weighted average is not exceeded at any time or so many times in succession (depends on local regulations) during a workday. The concentrations are given in ppm. For example, the STEL for CO is 100 ppm.

TWA (Time Weighted Average)
The TWA indicates a time-weighted average concentration for up to an 8 hour (OSHA) or a 10 hour (NIOSH) workday during a 40 hour week. The concentrations are given in ppm. For example, the TWA for CO is 25 ppm.

IDLH (Immediately Dangerous to Life and Health)
IDLH is defined by NIOSH and OSHA as exposure to airborne contaminants that is "likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment".

NOTE: IDLH level for a particular gas may be above the measurement range. For example, the measurement range for CO is 0 to 200 ppm. The IDLH is 1,000ppm.

6.1 Enable / Disable & Set Channel (INDIVIDUAL) STEL & TWA Alarms

This setting allows you set the STEL, TWA and IDLH values channel by channel and choose to see or not see these values on the channel status detail screen.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press ALARM and then press CHANNEL STEL & TWA.

If you want to review the current STEL & TWA settings for each channel, press the + or

---

- buttons. Or use press the yellow field to use the keypad and enter the specific channel number.

Use the + and - buttons or press the yellow field to use the keypad to change the values in the STEL, TWA and IDLH fields. For each measurement you can disable or enable it by pressing on the Dis or En buttons. Press SAVE to save the changes. If disabled, the channel will not alarm based on STEL, TWA or IDLH levels and the channel detail screen will not display the STEL, TWA or IDLH readings.
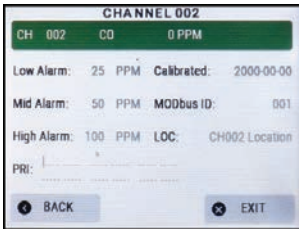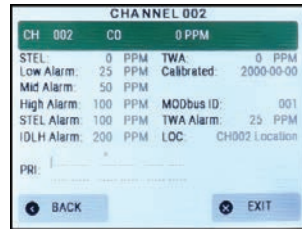
Disabled   Enabled

6.2 Enable / Disable System (GLOBAL) STEL & TWA Alarms

This setting allows you to enable or disable the STEL, TWA and IDLH alarms for the entire system at once (a global enable or disable). The flags in this screen will override the functionality of the enable/disable flags in the Channel STEL & TWA screen, but will not reset the individual channel flags. If the system STEL, TWA and IDLH are disabled, the functionality of the channel settings is ignored. Thus it is important to check if the global system flags are enabled or disabled if you are trying to show the STEL, TWA & IDLH for individual channels only.

NOTE: The factory default is the System STEL, TWA and IDLH flag is Dis (disabled).

NOTE: For Title-24 functionality to work properly, the Title-24 Faults flag and the Calib. Expired Faults flag must all be En (enabled).

Press SYSTEM STEL/TWA instead of CHANNEL STEL & TWA.
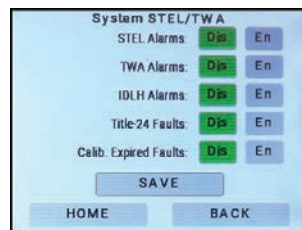
Press on Dis (disable) or En (enable) for each of the STEL, TWA and/or IDLH alarms.

Press SAVE to save the changes.

NOTE: If the STEL, TWS and IDLH alarm levels are not set (ie. are 0) and the global functionality is enabled, it may cause the system to go into alarm. Either enter appropriate values in the Channel STEL & TWA screen or disable the global functionality in the System STEL & TWA screen.

7 MODBUS® / BACNET® SETTINGS AND CONFIGURATIONS

7.1 Modbus® Setup / BACnet® Setup

NOTE: If the FCS Controller is an FCS-B with BACnet® WAN output, see the FCS default WAN BACnet® communications parameters further along in this section.

NOTE: AFTER MAKING WAN CHANGES, POWER OFF THE FCS AND POWER IT BACK ON.

NOTE: All devices on each network must be set to the same baud rate.
The FCS can be configured for the following baud rates:

- 9,600 (LAN Modbus® for AST-IS18-M)
- 14,400
- 19,200 (LAN / WAN Modbus® factory default)
- 38,400
- 57,600
- 76,800 (WAN BACnet® factory default)
- 115,200

There are two networks on the FCS. The first is the local area Modbus® RS-485 RTU network (LAN) used for communications with connected CETCI digital transmitters and peripheral devices.

<u>FCS default LAN Modbus® communications parameters</u>:

- Baud rate =19,200
- BUS Controller is the FCS
- Parity = no parity
- Stop bits = 1
- Data bits = 8

NOTE: The FCS has been designed to operate with these parameters and any changes made could affect its ability to work as intended. If these values are changed, CETCI will not troubleshoot the system for communication faults until they are returned to factory defaults.

The second network is the wide area Modbus® or BACnet® network (WAN) used for communications with building automation systems.

<u>**FCS default WAN Modbus® RTU (version 1.1b3), RS-485 communications parameters**</u>:

- Baud rate =19,200
- BUS Controller is the BAS/DDC
- Modbus® ID of FCS = 100
- Parity = no parity
- Stop bits = 1
- Data bits = 8

NOTE: It is the customer's responsibility to supply the correct wiring for the communication back to their BAS. The baud rate and Modbus® ID can be changed to match the BAS system.

<u>**FCS default WAN BACnet® MS/TP (version 1 rev 14), RS-485 communication parameters**</u>:

- Baud rate =76,800
- MAC address = 100
- Instance ID = 270100
- Parity = no parity
- Stop bits = 1
- Data bits = 8

NOTE: For Modbus® network communications wiring, use 4-conductor, 16 AWG stranded shielded wire.

As per the requirements of the RS-485 protocol, a termination resistor must be installed / enabled on the last device at the end of the network wiring. This includes the Building Management System (if used).

7.1.1 Set Modbus® ID, Remote Baud Rate and Local Baud Rate

For an FCS Controller with Modbus® WAN output, press CONFIGURE and enter password 2019. Press the SUBMIT button. Press SETTINGS and then MODBUS SETUP.
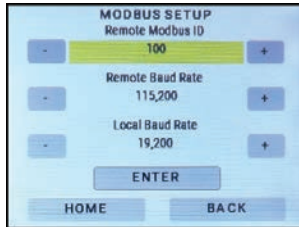
Remote Modbus® ID: Use the + and - buttons to increase or decrease the number until the correct Remote Modbus® ID is displayed, or press the yellow field and use the keypad to enter the number. Press ENTER to save.

Remote Baud Rate: Use the + or - to increase or decrease the number or press the yellow field and use the keypad to choose the correct Remote Baud Rate. Press ENTER to save.

Local Baud Rate: Use the + or - to increase or decrease the number until the correct Local Baud Rate is displayed. Press ENTER to save.

Power the FCS off and then on again.

7.1.2 Set WAN BACnet® Base Address, MAC Address and Baud Rate
For an FCS Controller with BACnet® WAN output, press CONFIGURE and enter password 2019. Press the SUBMIT button. Press SETTINGS and then BACNET SETUP.
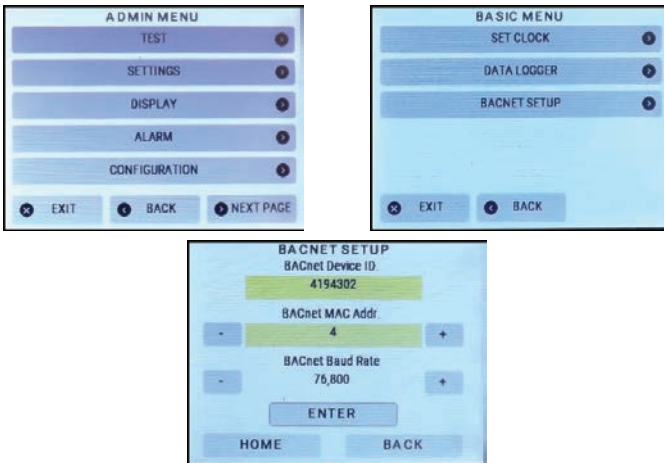
BACnet Device ID.: Press the yellow area and use the keypad to enter the desired BACnet Device ID. Allowed values are 1 to 4,194,302 (a valid BACnet Device ID per the BACnet definition.) Press ENTER to save.

BACnet MAC Addr.: Use the + or - to increase or decrease the number or press the yellow field and use the keypad to choose the correct MAC address. The FCS factory default is

100. Press ENTER to save.

BACnet Baud Rate: Use the + or - to increase or decrease the number until the correct baud rate is displayed. The FCS factory default baud rate is 76,800. Press ENTER to save.

Power the FCS off and then on again.

7.2 Modbus® Holding Registers

The FCS Controller is configured to communicate with a Building Automation System or Direct Digital Control System on an RS-485 network using Modbus® RTU protocol (version 1.1b3, RS-485). In order for communication to be successful between devices, be sure your network connection is complete, the network termination switches are set appropriately and all the devices are configured with the same baud rate, character format, etc. Each device will have its own unique Modbus® ID.

If you have specific requirements, have any questions or require clarification about these holding registers, please contact CETCI for assistance.

7.2.1 Read Coil (Relays, Buzzer, Strobe)

The discrete outputs registers are the present state of the relays, strobe, buzzer and remote relays. These reflect the alarm condition. They are read only

Alarm Conditions: 0 = Normal (non-active)
1 = alarm (active)

Modbus Function1 (Read Coils). Reply from the device is 1 bit per coil, packed in bytes.

Coil	Register	Description	Range
1	0	Relay 1	0 or 1
2	1	Relay 2	0 or 1
3	2	Relay 3	0 or 1
4	3	Relay 4	0 or 1
5	4	Strobe (connected to remote strobe/horn terminal	0 or 1
6	5	Audible (internal)	0 or 1
7	6	Horn (connected to remote strobe/horn terminal	0 or 1

8	7	Remote_Relay 1	
9	8	Remote_Relay 2	
10	9	Remote_Relay 3	0 or 1
11	10	Remote_Relay 4	
12	11	Remote_Relay 5	up to 57 remote relays equaling
13	12	Remote_Relay 6	64 relays in total
...	...	...	
64	63	Remote_Relay 57	

7.2.2 Input Registers

Input registers are the present channel/sensor readings. They are read only. Units are defined in the configuration holding registers for each channel (for example, Channel 1 registers are 50,028, 50,029 and 50,030).

Scaler: $10^{(decimals + 1)}$

Every channel has its own scaler value. For example, an NO2 gas measurement normally has 1 decimal place, so its scaler value is 100. An ambient NO2 gas measurement of 0.4 ppm would be represented in the register as 0.4 x 100 = -40

NOTE: The STEL and TWA values are not valid if the configuration does not enable STEL and TWA calculations.

Modbus Function 4 (Read Input Registers) or Function 3 (Read Holding Registers)

Register	Address	Description	Range	Units
30,001	30,001	Channel 1 Reading	present gas reading x scaler	LEL, ppm, % vol, etc.
30,002	30,002	Channel 1 STEL	present STEL reading x scaler	LEL, ppm, % vol, etc.
30,003	30,003	Channel 1 TWA	present TWA reading x scaler	LEL, ppm, % vol, etc.
30,004	30,004	Channel 1 Alarms	bit encoded contact CETCI for bit allocation	LEL, ppm, % vol, etc.

30,005	30,005	Channel 2 Reading	
30,006	30,006	Channel 2 STEL	
30,007	30,007	Channel 2 TWA	
30,008	30,008	Channel 2 Alarms	
30,009	30,009	Channel 3 Reading	
30,010	30,010	Channel 3 STEL	
30,011	30,011	Channel 3 TWA	repeat functionality of Chanel 1 for channels 2 through to the number of channels used in the system (up to a maximum of 128 for the FCS models and up to a maximum of 8 for the FCS-8 models)
30,012	30,012	Channel 3 Alarms	
	30,013	Channel 4 Reading	
	30,014	Channel 4 STEL	
	30,015	Channel 4 TWA	
	30,016	Channel 4 Alarms	
	30,017	Channel 5 Reading	
	30,018	Channel 5 STEL	
	30,019	Channel 5 TWA	
	30,020	Channel 5 Alarms	
...	...	...	
30,561	30,561	Channel 128 Alarms	

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7.2.3 Priority Status Registers
Priority Status registers are the present status of the priorities. They are read only.

Register	Description	Range
31,001	Priority_[0].status	
31,002	Priority_[1].status	
31,003	Priority_[2].status	
31,004	Priority_[3].status	
31,005	Priority_[4].status	31,001 - 31,060
31,006	Priority_[5].status	bit encoded
31,007	Priority_[6].status	contact CETCI for more details
31,008	Priority_[7].status	
31,009	Priority_[8].status	
31,010	Priority_[9].status	
etc.		

7.2.4 Analog Output Registers
Analog output registers are the present value being output to the analog output channels and are read only. The value is dependent on the present status and configuration of the system.

Scaled to: 0 to 2000 (mA x 100)

Register	Description	Range	Units
40,001	Analog Output Value 1		
40,002	Analog Output Value 2		
40,003	Analog Output Value 3		
40,004	Analog Output Value 4		
40,005	Analog Output Value 5	40,001 - 40,060	
40,006	Analog Output Value 6		
40,007	Analog Output Value 7	Range: 0 - 20 (scaled 0-2000)	
40,008	Analog Output Value 8	Units: mA	
40,009	Analog Output Value 9		
40,010	Analog Output Value 10		
etc.			

7.2.5 Internal and Peripheral Devices Preassigned Modbus® IDs

Below is a list of the Modbus IDs that have been factory assigned to the internal relays and analog inputs/outputs and the remote peripheral devices.

Device	Modbus ID
Internal relays	1
Internal Strobe/Horn	2
Internal Analog Input (Option -AI or 2AI)	1 or 2
Internal Analog Output (Option -AO or 2AO)	1 or 2
Internal Analog Input and Output (Option -AIAO)	1 or 2
RLY-4 or RLY-8	30 to 49
LNK-AI	50 to 74
LNK-AO	75 to 99
CGAS-D, CGAS-DP, CXT-D, CXT2-D, LPT-M or LPT-P	100 to 228
RDM	230 to 249
End of list mark	229

8 LOGIC AND PRIORITY SETTINGS AND CONFIGURATIONS

8.1 Assign Priority Levels to Channels

This setting enables you to assign priority levels to each channel. One channel can be assigned to none through 60 priority levels and multiple channels can be assigned to the same or different priority levels. A priority level can indicate a physical location (zoning) or a set of logic (if this happens, do this or if that happens, do that). To configure the logic for the priority levels, refer to 8.3 Configure Priority Logic.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press CONFIGURATION and then CHANNEL LOGIC (1-30) or CHANNEL LOGIC (31-60).
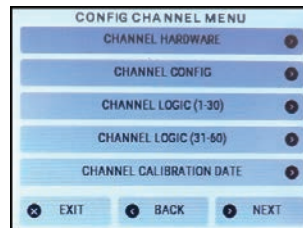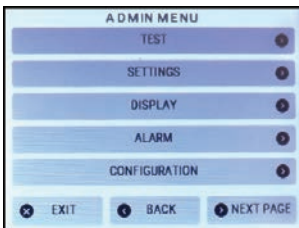
If you want to review the current priority settings for each channel, keep pressing the + button to scroll through the summary screen of each channel or enter the specific channel number by pressing the yellow field and using the keypad. The buttons highlighted in green indicate the priorities that are active for that channel.

To change the priority settings, press on the priority button(s) you want to activate (green) or deactivate (grey). You can assign up to 60 priority levels to each channel.

8.2 Assign Priority Levels to Relays, Strobe, Horn & Audible

This setting enables you to assign priority levels to each relay, strobe, horn and/or audible buzzer. One relay, strobe, horn or audible can be assigned to three priorities in combinations of:

- AND (both priorities must be met to activate the relay)
- OR (either priority can activate the relay)

Using this AND and OR logic, the priorities can be combined in multiple ways, increasing the number of possible configurable relay combinations.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press CONFIGURATION and then NEXT. Press RELAY LOGIC.
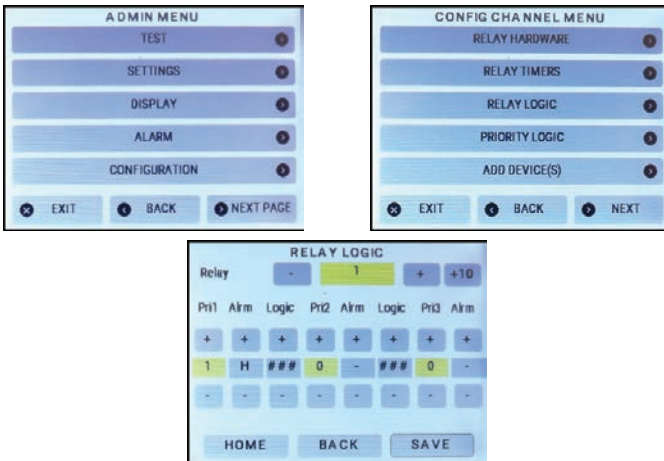
Select the relay number you want to configure using the + or - buttons or enter the specific

relay number by pressing the yellow field and using the keypad. Continue entering the parameters using the + or - buttons:

Pri1: Choose the first priority/trigger level the relay will respond to (0 through 60) for the relay selected

Alrm: Choose a condition upon which the relay will be activated:
- L = Low   low gas level reading
- M = Mid   mid gas level reading
- H = High   high gas level reading
- I = IDLH   IDLH gas level reading
- F = Fault   system Fault
- - = none   will not be activated
- D = Digital   non gas related logic (such as Time of Day)
- T = TWA   TWA calculation
- S = STEL   STEL calculation

Logic: Assign the type of logic condition(s). Up to three levels of logic can be assigned to each relay. Choose from ###, OR, AND.
- If no additional condition needs to be met, choose ###.
- If one OR another condition needs to be met, use OR.
- If one AND another condition needs to be met, choose AND.

If required, repeat for the second and third trigger level (Pri2 and Pri3) that the relay, strobe and/or audible are assigned to. The Save button will turn green after a change has been made. If you are going through more relays on the same screen, the system will autosave when you press the + or - to proceed or return to the next relay number. If you press Home or Back, the change will not be saved. You can choose to press Save if in doubt.

NOTE: If you have a requirement that needs combinations of multiple channels and timing, contact CETCI Service with an explanation of your needs.

8.3 Configure Priority Logic
You can choose to configure the priority logic for gas concentration settings, time of day settings, expired calibration date, Title-24 occupied time settings and selected channels to display on the RDM.

The FCS has a total of 60 priorities that can be configured and assigned to channels. They are evaluated in order from 1 to 60. If there is any conflict between the priorities, the last one evaluated will be applied. To assign priorities to Channels, refer to Section 8.1 Assign Priority Levels to Channels.

Press CONFIGURE and enter password 2019. Press the SUBMIT button.
Press CONFIGURATION and then NEXT. Press PRIORITY LOGIC.

NOTE: The Priority Logic screen that is displayed first could be any one of four depending on what priority logic type was last saved. Regardless of the priority logic type, you first must select the Priority number you want to configure using the + or - buttons. To jump ahead by 10 consecutively numbered priorities, press on the +10 button. Then use the + or - buttons to choose the priority logic type:

- Gas Concentration (refer to Section 8.3.1)
- Time of Day (refer to Section 8.3.2)
- Calibration Expired (refer to Section 8.3.3)
- Title-24 Occupied (refer to Section 8.3.4)
- RDM Channel Select (refer to Section 8.3.5)

8.3.1 Gas Concentration Priority Logic

This setting allows you to configure the number of channels that are required to trigger this priority based on gas concentration level, set allow remote disable and/or remote override and set a timer (JTimer) that will escalate the event to a higher priority if required.
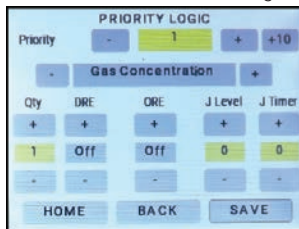
Use the - and + buttons to ensure Gas Concentration is showing.

Priority: Choose a priority number that will be assigned to the channels that you want to assign the Gas Concentration Priority to.

Qty: Select the channel quantity (0 to the number of channels that will have that priority). This is the number of channels that need to be in alarm before the priority will be triggered.

DRE: (DRE = Disable Remote Enable) Choose On to allow remote disable and Off to disable remote enable. If the gas detection system is not connected to a remote interface such as a DDC, BAS, FIRE PANEL etc., the flag should be set to Off. If set to On, it means the priorities can be enabled from a remote device (such as a BAS or DDC system).

ORE: (ORE = Override Remote Enable). If set to On means the remote enable can be overridden.

J Level: Specify which priority level to jump forward to if the length of time set in JTimer runs out.

JTimer: Specify the length of time in seconds (0 to 30,000 / 500 minutes maximum) before the priority escalates to the next level.

The J Level and JTimer can be used to trigger additional actions if the first priority has not generated resolution to the alarm condition. The priority being jumped to normally will not monitor any channels but will be assigned to a Relay or Strobe or Audible or Analog Output. The timer will normally be set to a value large enough to give the first priority time to complete or resolve the cause of the issue. The jump to priority is used as an escalation tool.

Once the priority has been created, you need to go to Channel Logic and assign the priority to each applicable channel. Refer to Section 8.1 Assign Priority Levels to Channels. For an example of using the Gas Concentration Priority, refer to Section 8.4.1 Gas Concentration Priority Example.

8.3.2 Time of Day Priority Logic
Use this feature to trigger events such as tripping relays and/or setting analog output levels (VFD control) during certain times of the day. For example, in an underground parking lot there may be a buildup of CO during the time period people are arriving at work due to the high number of vehicles being parked.

NOTE: If the STEL/TWA functionality is enabled, both values will be zeroed at the start time of the time of day priority configuration. This would be useful if you were required to monitor the STEL/TWA throughout a work shift.

Use the - and + buttons to ensure Time of Day is showing.

Priority: Choose a priority number that will be assigned to the channel(s) that you want to assign the Time of Day Priority to.

S-Hour: Enter the hour at which the priority will start. This is a 24 hour clock. (ie. 6am = 6 and 3pm = 15).

S-Min: Enter the minute(s) at which the priority will start.
M, T, W, T, F, S, S: Choose the day(s) of the week that this priority will be active. The button will turn green when pressed, indicating that day has been selected. To unselect, press the button again.

E-Hour: Enter the hour at which the priority will end. This is a 24 hour clock. (ie. 9am = 9 and 1pm = 13).

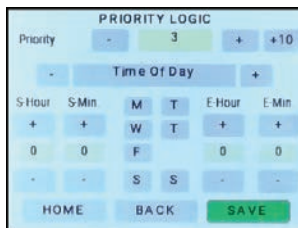**E-Min:** Enter the minute(s) at which the priority will end.

Once the priority has been created, you need to go to Channel Logic and assign the priority to each applicable channel. Refer to Section 8.1 Assign Priority Levels to Channels. For an example of using the Time of Day Priority, refer to Section 8.4.2 Time of Day Priority Example.

8.3.3 Calibration Expired Priority Logic
Calibration frequency depends on many factors such as: the type of gas detection system, how it is being used, the required accuracy of the system, manufacturer's recommendations, application specific health and safety laws and regulations, whether you suspect there are environmental conditions or potential damage that has occurred to the instrument that could affect its performance, whether bump tests are part of your regular maintenance program, etc. At the bare minimum, fixed gas detection systems in underground parking garages, refrigeration applications and other less frequently occupied areas or occupied on a short term basis should be calibrated annually. Applications like swimming pools (chlorine), arenas (ammonia) and frequently occupied or occupied for long periods of time areas should be calibrated a minimum of every 6 months. Be sure to follow the Occupational Health and Safety standards and regulations for the type of application and jurisdiction.

Use the Calibration Expired Priority to set the number of months within which the sensor(s) should be calibrated. If /when the time expires, the FCS will trip that priority as a fault. If the fault occurs, the senor should be calibrated as soon as possible. The system will remain operational, monitoring the gas levels but scheduling a calibration is highly recommended. Once the sensor has been calibrated, the Set Channel Calibration Date should be updated. Refer to Section 3.3 Set Date the Channel was Calibrated.

NOTE: The Calibration Expired Priority Logic will not work if the Calib. Expired Faults flag is set to Dis (disabled) in the System STEL/TWA screen. Refer to Section 6.2 Enable / Disable System (GLOBAL STel & TWA Alarms).
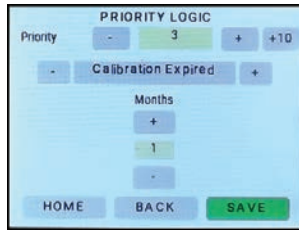
Use the - and + buttons to ensure Calibration Expired is showing.

Priority: If all the sensors require the same length of time before calibration, choose one priority number to assign to the channels for which you want to use as the Calibration Expired Priority. If some sensors need to be calibrated in 6 months and others in 12, set up two priority numbers.

Months: Enter the number of months that the calibration is valid for. 12 months (1 year) is the default factory setting. The reference used for counting the months is the current date of the real time clock in the FCS, which is set by the factory when the device was manufactured. To change or update the date and/or time, refer to Section 2.5 Set Clock.

NOTE: The priority must be assigned to the Channel Logic screen. In the Relay Logic screen, the priority number should be set and the alarm type should be set to F.

Once the priority has been created, you need to go to Channel Logic and assign the priority to each applicable channel. Refer to Section 8.1 Assign Priority Levels to Channels. For an example of using the Calibration Expired Priority, refer to Section 8.4.3 Calibration Expired Priority Example.

8.3.4 Title-24 Occupied Priority Logic
NOTE: The Title-24 Occupied Priority Logic will not work if the Title-24 Faults flag is set to Dis (disabled) in the System STEL/TWA screen in the Set Alarm Menu. Refer to Section 6.2 Enable/Disable System (GLOBAL) STEL & TWA Alarms.

NOTE: To comply with the Title-24 requirements, you must also configure the Calibration Expiry Date functionality (refer to Section 3.3 Set Date the Channel was Calibrated) and Calibration Expired Priority (refer to the previous Section 8.3.3).

Title-24 is a California Building Standards Code that governs the design and construction of all building occupancies and associated facilities and equipment throughout California relating to fire, life safety, structural safety and access compliance. The Title-24 Occupied Priority Logic functionality complies to the California Title-24 requirements for parking garages and is applicable in the state of California only. It detects and signals faults as per the Title-24 requirements.

If more than one occupied time needs to be set up, you will need to set up another priority.

Time that is not set as occupied is considered to be unoccupied, as per the Title-24 requirements.

The Time of Day priority can be applied to relay output and/or analog output.

NOTE: The occupied time functionality uses a 24 hour clock. (ie. 9am = 9 and 1pm = 13).
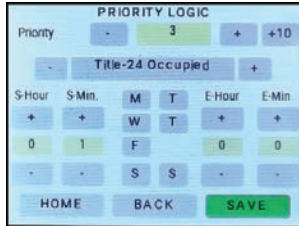
Use the - and + buttons to ensure Title-24 Occupied is showing.

Priority: Choose a priority number that will be assigned to the channel(s) that you want to assign the Title-24 Occupied Priority to.

S-Hour: Enter the hour at which the priority will start.
S-Min: Enter the minute(s) at which the priority will start.

M, T, W, T, F, S, S: Choose the day(s) of the week that this priority will be active. The button will turn green when pressed, indicating that day has been selected. To unselect, press the button again.

E-Hour: Enter the hour at which the priority will end.
E-Min: Enter the minute(s) at which the priority will end.

If the occupied time includes a range that spans over midnight, you will need to set up two priorities. For example, if the occupied time is from 9:30pm to 3am - you would configure the first priority with the S-Hour at 21, S-Min at 30, E-Hour at 23 and E-Min at 59. The second priority would be set with S-Hour at 0, S-Min at 0, E-Hour at 3 and E-Min at 0.

Once the priority has been created, you need to go to Channel Logic and assign the priority to each applicable channel. Refer to Section 8.1 Assign Priority Levels to Channels. For an example of using the Title-24 Occupied Priority, refer to Section 8.4.4 Title-24 Occupied Priority Example.

8.3.5 RDM Channel Selection Priority Logic
There may be applications where instead of displaying all the channel readings on the RDM, you want to show only particular channels. Use the RDM Channel Select priority logic feature to select the specific channels you want displayed on the RDM. First create a priority and then assign it to each of the channels you want displayed.
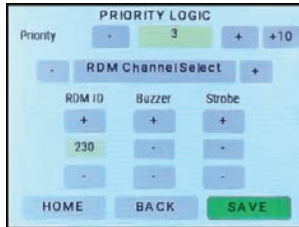
Use the - and + buttons to ensure that the RDM Channel Select is showing.

Priority: Choose a priority number that will be assigned to the channels that you want displayed on the RDM you are configuring.

RDM ID: This is the Modbus ID of the RDM you are configuring. When selective channel display is desired on a system with more than one RDM, an RDM Channel Select Priority must be set up for each RDM.

Buzzer: Use the - or + to choose a condition upon which the internal buzzer of the RDM will respond:
- L = Low   low alarm level reading
- M = Mid   mid alarm level reading
- H = High   high alarm level reading
- I = IDLH   IDLH alarm level reading
- F = Fault   system Fault
- - = none   will not be activated
- D = Digital   non gas related logic (such as Time of Day)
- T = TWA   TWA calculation
- S = STEL   STEL calculation

Strobe: If there is a remote strobe (or strobe/horn combo) connected to the RDM, use the - or + to choose a condition upon which the strobe will respond:
- L = Low   low alarm level reading
- M = Mid   mid alarm level reading
- H = High   high alarm level reading
- I = IDLH   IDLH alarm level reading
- F = Fault   system Fault
- - = none   will not be activated
- D = Digital   non gas related logic (such as Time of Day)
- T = TWA   TWA calculation
- S = STEL   STEL calculation

NOTE: The buzzer and strobe that is connected to the RDM will only be triggered by the channels being displayed on that RDM.

Once the priority has been created, you need to go to Channel Logic and assign the priority to each channel you want to be displayed on the RDM. Refer to Section 8.1 Assign Priority Levels to Channels.

NOTE: You can also choose how the selected channels are displayed - either scrolling by line or scrolling by page. Refer to Section 2.7 Configure RDM Remote Display(s).

For an example of using the RDM Channel Select Priority, refer to Section 8.4.5 RDM Channel Select Priority Example.

8.4 Examples of Using Priorities

The logic control and flexibility of the priority level structure in the FCS is unlimited, allowing numerous monitoring and alarming configurations. Here are a few examples of how to use the different priority types.

NOTE: The priority numbers, channel numbers and relay numbers used in the examples are arbitrarily chosen. In real life it is common to start with the first unused number and proceed from there.

8.4.1 Gas Concentration Priority Example

SCENARIO: There are 3 single channel, CO gas detectors covering an area monitoring the levels of CO gas. Each gas detector has been assigned a channel number on the FCS. Relay 1 on the FCS has been configured to control an exhaust fan. There are several workers in this area and it is company policy that the CO levels should never be allowed to reach the standard 25 ppm for occupancy. However, you do not want the fans continuously running.

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / NEXT PAGE / RELAY LOGIC

For Relay 1:

- Set Pri1 to priority level 1
- Set Alrm to L, for Low alarm
- Set Logic to OR
- Set Pri2 to priority level 2
- Set Alrm to M, for Mid alarm
- Set Logic to ###
- Leave Pri3 as 0 and the last Alrm value blank
- Press Save

CONFIGURE / PASSWORD 2019 / ALARM / CHANNEL ALARMS

For EACH of the 3 Channels (sensors):

- Set High Alarm 100 ppm
- Set Mid Alarm point at 25 ppm
- Set Low Alarm at 10 ppm

- Set ASC - ascending
- Press Save

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For Priority 1:

- Choose Gas Concentration
- Set QTY to 3
- Leave DRE and ORE OFF
- Leave J Level and J Timer as 0
- Press Save

For Priority 2:

- Choose Gas Concentration
- Set QTY to 1
- Leave DRE and ORE OFF
- Leave J Level and J Timer as 0
- Press Save

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / CHANNEL LOGIC (1-30)

- Assign EACH of the 3 Channels (sensors) to priority 1 and 2
- Press Save

This configuration will keep the standard occupancy CO levels below 25 ppm and the exhaust fan will keep the average CO level below 10 ppm. If the CO levels reach 10 ppm, and all 3 channels go into Low Alarm, OR if the CO level reaches 25 ppm and if any of the channels goes into Mid Alarm, the exhaust fan will be turned on.

8.4.2 Time of Day Priority Example
SCENARIO: During the time that people arrive for work and park in the underground parking lot, you want to make sure that the CO levels are kept at a safe level and the gas detector alarms don't go off. People do start at different times but usually arrive between 6:30am and 8:30am Monday through Friday.

NOTE: The priority numbers, channel numbers and relay numbers used in the examples are arbitrarily chosen. In real life it is common to start with the first unused number and proceed from there.

NOTE: The time functionality uses a 24 hour clock. (ie. 9am = 9 and 1pm = 13).

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / NEXT PAGE / RELAY LOGIC

For Relay 2:

- Set Pri1 to priority level 3
- Set Alarm to D, for digital non gas related logic
- Leave the remaining settings Pri as ###, and Logic 0
- Press Save

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / NEXT PAGE / PRIORITY LOGIC

For Priority 3:

- Choose Time of Day
- Set S-Hour to 6
- Set S-Minute to 30
- Select M, T, W, T, F (buttons turn green when selected)
- Set E-Hour to 8
- Set E-Min to 30
- Press Save

This configuration will keep the exhaust fans on between the hours of 6:30am to 8:30am on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays. If you wanted to set more time of day settings for those days or the weekend, you would need to use another priority number; each time of day setting requires its own priority number.

If you required the fan to be on during a period of time that includes midnight, you would need to set a minimum of 2 priorities. For example, if you wanted the fan to be on from 10pm until 2am, you would set one priority to start at 22 and end at 23:59 and set a second priority to start at 0 and end at 2.

8.4.3 Calibration Expired Priority Example
SCENARIO: Channels 1, 2 and 3 have sensors that should be calibrated every year and channels 4 and 5 have sensors that should be calibrated every 6 months. You would like the system to keep track of when these sensors should be calibrated next.

Press the INFO button on the main display and make sure the real time system date is set and is correct on the FCS.

Make sure the Calib. Expired Faults flag is set to En (enabled) in the Set Alarm Menu. Refer to Section 6.2 Enable / Disable System (GLOBAL) STEL & TWA Alarms.

Check that the calibrated date listed for each of the 6 channels makes sense. This is the date from which the number of months you specify in the Calibration Expired Priority will start counting from. Refer to Section 3.3 Set Date the Channel was Calibrated.

NOTE: If you need to change the calibrated date for individual channels or for all channels,

it can only be changed to today's date. Refer to Section 3.3 Set Date the Channel was Calibrated for more information.

NOTE: The priority numbers and relay numbers used in the examples are arbitrarily chosen. In real life it is common to start with the first unused number and proceed from there.

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / CHANNEL LOGIC (1-30)

- Assign each Channel (sensor) that needs to be calibrated every 12 months to priority 4
- Assign each Channel (sensor) that needs to be calibrated every 6 months to priority 5
- Press Save

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / NEXT PAGE / PRIORITY LOGIC

For Priority 4:

- Choose Calibration Expired
- Use the + button to enter 12
- Press SAVE

For Priority 5:

- Choose Calibration Expired
- Use the + button to enter 6
- Press SAVE

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / NEXT PAGE / RELAY LOGIC

For Relay 1:

- Use the + button to enter 4 in the Pri1 field.
- Set Alarm to F, for Fault
- Leave the remaining fields their default values
- Press SAVE.

For Relay 2:

- Use the + button to enter 5 in the Pri1 field.
- Set Alarm to F, for Fault
- Leave the remaining fields their default values
- Press SAVE.

Relay 1 will trip when the 12 month time period from the channel calibration date has expired and Relay 2 will trip when the 6 month time period from the channel calibration date has

expired. The FCS will show a Fault on the channel status details for the channel for which the channel calibration date has expired.

8.4.4 Title-24 Occupied Priority Example

NOTE: This priority setting should only be used for systems that must comply with California's Title-24 requirements for enclosed parking garages.

Title 24 Section 120.6 (c) requires that enclosed parking garages have the design and system to:

1. Detect contaminant levels and stage fans or modulate fan airflow rates to 50% or less of design capacity provided acceptable contaminant levels are maintained.
2. Have controls and/or devices that will result in fan motor demand of no more than 30% of design wattage at 50% of design airflow.
3. CO shall be monitored with at least 1 sensor per 5,000 ft2, with sensor located in the highest expected concentration locations, with at least 2 sensors per zone.
4. CO concentration at all sensors is maintained at 25 ppm or less at all times.
5. The ventilation rate shall be at least 0.15 cfm.ft2 when the garage is scheduled to be occupied.
6. System shall maintain the garage at negative or neutral pressure relative to other occupied spaces when the garage is scheduled to be occupied.
7. CO sensors shall be:
   - Certified by the manufacturer to be accurate within ±5% of measurement
   - Factory calibrated
   - Certified by the manufacturer to drift no more than 5% per year
   - Certified by the manufacturer to require calibration no more frequently than once a year
   - Monitored by control system that transmits:
     - An alarm to facility operator on fault detection
     - Resets to design ventilation rates on fault detection
     - Checks for and reports a sensor fault if:
       - Sensor not calibrated within the specified calibration period (once per year)
       - During unoccupied periods a sensor deviates from the average for the zone by more than ±15 ppm for 4 hours.
       - During occupied periods a sensor's 30 minute rolling average deviates from the 30 minute rolling average of other sensors in the proximity zone.

For more information relating to Title-24 please consult the appropriate documents available on the California Building Standards Commission website http://www.bsc.ca.gov/

SCENARIO: Building with an underground parking area is occupied from 8am to 5pm on weekdays and on Saturdays from 8:30am to noon. It is unoccupied the rest of the time.

NOTE: This example assumes the Channel gas name and alarm setting configurations and the Relay configurations for exhaust fans have been set up already.

To use the Title-24 functionality, make sure the Title-24 Faults flag is set to En (enabled) and the Calib. Expired Faults flag is set to En (enabled) in the Set Alarm Menu. Refer to Section 6.2 Enable / Disable System (GLOBAL) STEL & TWA Alarms.

Make sure the Calibration Expired Priority is configured and assigned to all the appropriate channels.

NOTE: The priority numbers and relay numbers used in the examples are arbitrarily chosen. In real life it is common to start with the first unused number and proceed from there.

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / NEXT PAGE / PRIORITY LOGIC

For Priority 6:

- Choose Title-24 Occupied
- Set S-Hour to 8
- Set S-Minute to 0
- Select M, T, W, T, F (buttons turn green when selected)
- Set E-Hour to 17
- Set E-Min to 0
- Press Save

For Priority 7:

- Choose Title-24 Occupied
- Set S-Hour to 8
- Set S-Minute to 30
- Select the first S (buttons turn green when selected)
- Set E-Hour to 12
- Set E-Min to 0
- Press Save

NOTE: The time (hour and minute) functionality uses a 24 hour clock. (ie. 9am = 9 and 1pm = 13).

CONFIGURE / PASSWORD 2019 / SUBMIT / CONFIGURATION / NEXT PAGE / RELAY LOGIC

For Relay 3:

- Set Pri1 to 6 (Priority 6)
- Set Alrm to F (Fault)
- Set Pri2 to 7 (Priority 7)
- Leave the remaining settings as their default values (-, ###, 0)
- Press Save

With these settings, the system will follow the Title-24 requirements. The system will go into fault if the STEL or TWA values exceed the pre-programmed levels. When the start time (8am on weekdays or 8:30am on Saturday) passes, the STEL and TWA value will be zeroed. The system will indicate a fault if the calibration expired date has passed.

8.4.5 RDM Channel Selection Priority Example

SCENARIO: In a facility with an ice rink and a restaurant, you want the RDM in the restaurant to only display the Carbon dioxide (CO_2) gas readings from the sensor in the CO2 tank room and the RDM mounted at the second door entrance of the chiller room to display only Ammonia (NH_3) readings. Each RDM is attached to a remote strobe.

NOTE: The priority numbers, channel numbers and relay numbers used in the examples are arbitrarily chosen. In real life it is common to start with the first unused number and proceed from there.
Let's say Channel 1 is CO_2 and Channel 2 is NH_3.

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For Priority 8:

- Choose RDM Channel Select
- Set the Modbus ID of the RDM you want to have display the CO_2
- Set the trigger for the Buzzer to -
- Set the trigger for the Strobe to LOW
- Press Save

For Priority 9:

- Choose RDM Channel Select
- Set the Modbus ID of the RDM you want to have display the NH_3
- Set the trigger for the Buzzer to LOW
- Set the trigger for the Strobe to LOW
- Press Save

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For Channel 1:
- Assign 8 to Channel 1
- Press Save

For Channel 2:

- Assign 9 to Channel 2
- Press Save

With these settings the RDM in the restaurant will only show the CO_2 gas readings and if the level reaches the LOW alarm setpoint, the remote strobe will come on as a visual alert. The internal buzzer will remain off so as to not cause an audible alarm for patrons. The RDM at the chiller room entrance will show the Ammonia levels inside the room and if the level reaches the LOW alarm setpoint, the remote strobe and the internal buzzer will be triggered.

Each RDM requires its own single priority logic. The system knows which RDM is which based on its Modbus ID. If you set more than one priority for one RDM, the priority logic will conflict and the channels will not display as expected.

If you have more than 4 channels displaying on one RDM, you can choose to have the channels scroll on the display line by line or page by page. Refer to Section 2.7 Configure RDM Remote Display(s).

9 ADD CET DEVICES TO AN EXISTING FCS NETWORK

The FCS can auto find and add the following devices to an existing FCS network:
- Digital Transmitters
    - CGAS-D
    - CXT-D
    - CXT2-D
    - LPT-M
    - LPT-P
- LNK-AI Analog Inputs
- LNK-AO Analog Outputs
- RLY-4 and RLY-8 Remote Relays
- RDM Remote Display
- Digital (Modbus) VFDs
    - Lenze AC Tech
    - ABB ACH 550

This automated process helps reduces the time it takes to add these devices manually but it does not add analog channels or configure priorities for any of the devices. For more information and assistance with this process, please contact our Technical Service Department.

10 DELETING, RESTORING AND UPDATING SYSTEM CONFIGURATION FILES

FCS systems shipped from the factory are preconfigured as per instructions given at time of order. The FCS saves it's current configuration upon power up or restart, adding the file to the SD card. Configuration files can be deleted to save space and previous configurations can be restored if necessary. Please contact our Technical Service Department for assistance on deleting or restoring configuration files. If major system configuration changes are needed, our Technical experts can guide you through the process of updating system configuration files.

11 MAINTENANCE

The FCS requires no assembly and virtually no maintenance. Check the unit for wear and tear, tampering, accidental or deliberate damage; for cracks, water damage, loose screws or wires and make sure there isn't a buildup of dust on the outside or inside of the enclosure. It is important to ensure that water and/or dust is not somehow entering the enclosure and physically damaging the circuit board or internal components.

12 TROUBLESHOOTING

FCS won't power up.
Is the power properly connected? Check the connections. Refer to Section 6.6 Wiring Power Supply Connections in the FCS Installation Manual for more information.

Number won't change when using the numeric key pad.
Press the C to clear the current value, or use the << to delete by one digit at a time and then enter new value.

How to exit the numeric key pad without making changes.
If you enter the numeric key pad and change a value but you don't want to save that value, to exit without saving changes, press the C to clear. The ENTER button will change to CANCEL. Press CANCEL to exit.

On the home screen display, one of the channels shows a 'COMM' at the end of the line, indicating the FCS cannot communicate with the transmitter assigned to that channel.

- Check to make sure the Com Type ANALOG or DIGITAL is correctly set for the type of transmitter (analog or digital) assigned to that channel. Refer to Section 3.1 Enable/Disable Channels, Assign ID, Channel Number & Communication Type for more information.

- Check that local area network wiring is correct, especially the A and B lines to make sure they are not swapped between devices on the network.

- Check that the remote device is working properly itself.

RDM constantly shows "Connection Lost". Check that the # of RDMs is set correctly. Refer to Section 2.7 Configure RDM Remote Display(s) for more information.

Changes made to the RDM standard or selected channels display and priority configurations are not working as expected. After a change in configuration, it is recommended to do a restart of the FCS. Push and hold the button on the FCS circuit board until the buzzer chirps (approximately a count of 12), let go and the FCS will do a restart.

NOTE: Restarting the FCS only resets the FCS, the transmitters and peripherals are not affected.

Touch response of the screen is not working as well as it used to.
Recalibrate the display. Refer to Section 2.1.2 Display Touch Location Calibration

NOTES

NOTES

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