



FARR

Air Pollution Control



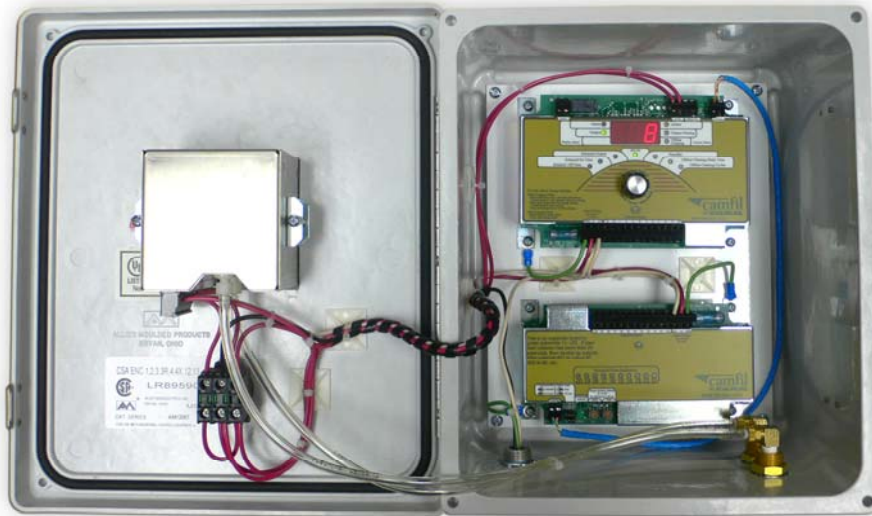
INSTALLATION & OPERATION MANUAL

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FEATURES

- NEMA 4X
- Padlockable Enclosure
- Communicates via 2 wire CANbus network
- Universal input voltage 100-240 VAC, 50/60 Hz
- Up to 20 outputs on-board, expands to 990 outputs (with expansion boards)
- Solenoid current sense:
 - allows automatic system setup
 - senses 3 solenoids per output
 - monitor up to 2970 solenoids
- Diagnostic/program LEDs for “at-a glance” system status indication
- Finger-safe terminations
- Simple programming via pushbutton and dial knob
- Non-volatile memory for program and status storage
- On-Demand operation with Farr Differential Pressure Meter
- 3-digit, 7-segment alpha-numeric Display
- Settable alarm output relay normally open or normally closed on timer module
- 51 element tri-color LED meter movement
- Programmable ΔP cleaning relay output
- Programmable ΔP alarm relay output
- Cleaning status LED
- Alarm status LED
- 0-10” w.c. ΔP range
- Source or sink 4 to 20 mA ΔP output
- User selectable program access code

Programmable Parameters:

- Solenoid ON-Time / OFF-Time
- Number of Offline Cleaning Cycles
- Offline Cleaning Cycle delay
- Run / Standby: enable / disable outputs
- Differential pressure cleaning limits: high set point / low set point
- High Differential pressure alarm limit
- Solenoid Fault alarm relay (normally open or normally closed)
- Outputs: 1 to 990 manual or auto-configured
- Units of measure (inches w.c. or kPa)
- Security code (user settable)
- ΔP offset compensation

Status LEDs: when illuminated

- **Differential Pressure:** Display indicates ΔP
- **Output:** Display indicates current output
- **Alarm (System Status):** ΔP & Solenoid Fault

- **Output Pulsing:** Display indicates the next output to be pulsed
- **Cycle Down:** Unit in cycle down mode
- **Output Status:** Unit pulsing solenoids
- **CANbus Status:** CANbus transmission activity

SPECIFICATIONS

INPUTS

Supply: 100-240 VAC, 50/60Hz, 4 VA max. at 240VAC without loads
Fuse: 3A fast, 5x20 mm
Δ Pressure Switch Input: Dry contact, 4 mA at 13 VDC max.
Offline Clean Switch Input: Dry contact, 4 mA at 13 VDC max.

SOLENOID OUTPUTS

Solenoid Outputs: Up to 20 (10 per module)
Output Type: Triac
Output Rating: 150 VA (at max. ON, min. OFF, 1 output selected)
Timing Accuracy: -2mS, +10 mS or +1% (whichever is greater), ON-time synchronized to AC line
Solenoid Fault Alarm Relay: Form-A contact, 3A at 250 VAC/30 VDC, programmable normally open or normally closed

METER OUTPUTS

Alarm Output Type: Form A relay contact
Alarm Output Rating: 5 A at 240 VAC/30 VDC
Control Output Type: Form-A relay contact
Control Output Rating: 5 A at 240 VAC/30 VDC

CURRENT LOOP

Type: 4 to 20 mA current loop, switch selectable sink/source, represents 0 to 10" w.c. Δ pressure
Accuracy: ±0.3 mA of displayed pressure
Measurement: Current of 4 to 20 mA = pressure of 0 to 10 in. water

DISPLAY INDICATORS

3-digit 7-segment LED display, 0.56 in. red
Program Parameters/Display Status/CANbus Status: 17 green LEDs
Alarm: 1 red/yellow LED
Output Status: 1 red/green LED
Solenoid Pulse Indication: 10 green LEDs, 20 with expander
CANbus Status: Green LED

DISPLAYS

Units: Programmable for in. water or kPa
Bar graph Display: 51 element tri-color LED analog differential pressure bar graph

Green = Differential pressure

Yellow = Cleaning set points

Red = Alarm set points

Digital Display: 3-digit, 7-segment differential pressure display, 0.3 in. tall

Range: 00.0 to 10.0 in. (00.0 to 02.5 KPa)

Discrete LED Indicators:

Cleaning = Green

Alarm = Red / Yellow

PRESSURE SENSOR

Type: *Silicon piezo resistive transducer*

Measurement Range: *0.0 to 10.0 in. water (0-2.5 KPa)*

Accuracy: *±2% of full scale at 77°F (25°C); ±5% of full scale over temperature and voltage range*

Maximum Continuous Pressure: *10 psi*

PARAMETER RANGES

ON-Time: *0.10-0.50*

OFF-Time: *1-999 sec.*

Timing Accuracy: *-2 ms, +10 ms or +1% (whichever is greater), ON-time synchronized to AC line*

Cycle Down Cycles: *1-20, none*

Cycle Down Delay: *60-600 sec.*

COMMUNICATIONS

Type: *CANbus architecture*

Terminations: *Screw terminals, #12 to #28 AWG, finger safe*

ENVIRONMENTAL

Operating Temperature: *-40°F to +150°F (-40°C to +65°C)*

Environmental Protection: *Conformal coating for humidity and vibration*

WARRANTY:

All of Farr Dust Collector Controller products are warranted for a period of 1 year against defects and workmanship. Because certain conditions may apply to different product categories, contact the factory for detailed warranty information.

IMPORTANT NOTICE TO USERS:

Farr APC products are capable of use in a wide array of devices and applications. Any device or system incorporating a Farr APC product should be designed that, in the event of failure, malfunction, or normal wear of the product, the device or system will become inoperative in a manner which will prevent bodily injury or property damage. In order to keep abreast with the latest technology, Farr APC reserves the right to change components, design, and specifications without notice.

1.0 SYSTEM OVERVIEW

The Farr Dust Collector Controller's flexible design allows it to be adapted to many dust collector configurations. The Core Timer Control Module will sequentially pulse up to ten outputs in "On-Demand" mode based upon the Pressure Switch closure on the Pressure Differential Meter. If more output capability is needed, up to 980 additional outputs can be controlled with multiple Farr Core Expander Modules connected to the controller. Furthermore, the controller features a current sensing capability, which allows electrical fault monitoring for up to three solenoids per output. This capability makes it possible to control and monitor up to 2,970 individual solenoids from one Control Module, and has the added convenience of providing an Auto Configuration option for ease in initial setup.

The Farr Pressure Differential Meter is a digital/bar graph differential pressure (ΔP) control meter, and is designed to interface with the Farr Core Timer Control Module. The Pressure Differential Meter is capable of measuring differential pressure and displaying that value in both analog bar graph and digital displays. Both Hi/Lo Cleaning and Hi Alarm set points can be programmed. The Cleaning relay will change state when the measured pressure exceeds the High Cleaning Set point, and will return to normal when the measured pressure goes below the Low Cleaning Set point. The Alarm relay will change state whenever the measured pressure is equal to or exceeds the window defined by the High Alarm Set point, and return to normal when the Δ pressure falls below the set point. The Pressure Differential Meter will accept a 0-10" w.c. pressure input. A 4-20mA output loop is provided from the internal pressure sensor. A 3-digit security code is also provided to prevent unauthorized changes. The meter is equipped with non-volatile memory, which will store all operating parameters when power is removed.

The Farr Core Expander is the expansion output module in the Farr Dust Collector Controller. The Expansion Module operates in conjunction with the Core Timer Controller with up to 98 unique address expansion boards for a total of 990 outputs. The Expansion Output Core Expander Module communicates with the Core Timer Controller Module through a twisted pair of wires using CANbus architecture, which provides robust noise immunity. Two rotary switches on the Expansion Module are used to set the address and provide a visual indication of the address selected.

Additionally, the simple five step intuitive programming procedure makes it easy to setup or change any program item. Using a single Pushbutton/Encoder along with 19 LED's and a 3-digit display, the programming procedure can be self-taught in less than one minute. Following is a list of the user programmable Controller functions:

- Cycle Down Mode
- Solenoid Pulse Times
- Auto or Manual Output Configuration
- Run/Standby Mode
- Δ Pressure Control Set Points

- Δ Pressure Alarm Set Points
- Solenoid Fault Alarm Contact Configuration (N.O. or N.C.)
- Output Pulsing Options

A universal input power supply lets you apply nominal input voltage ranging from 100 to 240 Vac, 50/60 Hz to the Controller, and the supplied voltage will be correspondingly switched to the outputs.

2.0 INSTALLING THE CONTROLS

The Farr Dust Collector Controller is designed to be mounted in most industrial environments. It's NEMA 4X enclosure also allows it to be mounted outdoors as well as in dusty environments.

DO NOT:

- Install these controllers in Hazardous environments without suitable protection. Improper installation will void the warranty.
- Install this unit in an area of high vibration.
- Install this unit close to strong magnetic fields.
- Install Conduit entries in the top of the controller. Conduit entries should always enter the bottom of the enclosure to avoid moisture from entering into the controller.

3.0 ELECTRICAL HOOKUP

Refer to the corresponding wiring diagrams, in the back of this manual, for proper wiring of Controller. Connect Dust Collector Controller to a utility power source, which ranges from 100 to 240 VAC 50/60 Hz. Do not connect this unit to a "converter" or "inverter" type power source. This unit should be installed on its own 15-amp circuit. Do not connect this unit to a power source that is subjected to large switched loads, such as, electric motors, compressors, electric tools, etc.

WARNING: MAKE SURE THAT THE CIRCUIT THAT YOU ARE WORKING WITH, IS "TURNED OFF", BEFORE YOU MAKE THESE CONNECTIONS. SERIOUS INJURY MAY RESULT IF YOU DO NOT TAKE THE PROPER SAFETY PRECAUTIONS.

For 120-volt input, using the supplied wire nuts, connect the "hot" or "high side" of the incoming power source to wire lead labeled L1. Connect the "Neutral" to wire lead labeled L2.

For 240-volt input, using the supplied wire nuts, connect one side of the 240-volt line to the wire lead labeled L1 and connect the other side of the 240-volt line to the wire lead labeled L2.

Connect the solenoid air valves to the terminal strip. These are labeled "Solenoid Outputs" and they are numbered 1 through 10. (or terminals 11-20 if the Expander Module is present). You can connect more than one solenoid on each output, as long as you do not exceed the 150VA (Watt) rating on each. The current sense circuit will only sense up to three solenoids per output.

The return wires "commons" from the solenoids will return to the "L2" terminals.

Connect the 4 – 20 mA current loop (if used) to receiver, and make sure to route any high voltage lines separate from the low voltage 4–20 mA current loop lines.

4.0 DUST COLLECTOR CONTROLLER OPERATION

The Farr Dust Collector Controller is shipped from the factory with the default program (see details below). Power must be applied and solenoid(s) connected, in order to have a functioning system. From this point, Program Items can be tailored to the specific application.

There are four basic modes of operation for the Controller; Run, Cycle Down, Standby, and Program. There are also 2 alarm events that can be monitored.

4.1 RUN Mode

This mode is the normal functional operating state of the controller. The Pressure Differential Meter Monitors the ΔP of the collector and controls the cleaning switch. The status of the dust collector is available to the user by the information visible on the display as well as the information LEDs. The display of the Core Timer will show the next output to pulse.

4.2 OFFLINE CLEANING Mode

The Offline Cleaning Mode allows the user to clean the dust collector filters "off-line" when the fan shuts down by connecting an auxiliary set of N.O. contacts from the ventilation fan to the cycle down input (Offline Cln.) of the Core Timer Module. The Offline Cleaning Mode is enabled by programming a number between 1 and 20 in the "Offline Cleaning Cycles" program item, and by programming the "Offline Cleaning Delay Time" program item with a value between 60 and 600 seconds. Offline Cleaning Mode is disabled (set to -) when the controller ships from the factory. If the Offline Cleaning mode is enabled, normal operation of the controller occurs when the Offline Cln. input is shorted. Opening the Offline Cln. input will begin the Offline Cleaning Delay time, which is indicated by the flashing Offline Cleaning LED to the right of the display. During this time, the solenoid outputs are disabled. At the end of this delay, the unit will cycle through all the selected outputs

as determined by the number of cycles selected with the "Offline Cleaning Cycles" program item, beginning at output number 1. After all the cycles are finished, the Offline Cleaning LED will stop flashing and turn on steady, when the Offline Cln. input is closed once again, the unit shall resume normal operation and the Offline Cleaning LED will turn off.

4.3 Standby Mode

To allow for normal maintenance or diagnostic investigation, the Standby Mode feature is available. When the Standby Mode is invoked, all controller functions operate as in normal RUN Mode with the exception of the Solenoid Outputs, they are disabled.

4.4 Program Mode

Easy access to view and change the program items is available through the Program Mode. While in the Program Mode, normal operation of the controller is maintained, and any changes to any of the Program Items do not take effect until they are saved into the memory. In other words, normal dust collector filter cleaning can continue even while the controller is in Program Mode. If the controller is allowed to remain in Program Mode for longer than 90 seconds without any interaction on the Program Select knob, normal RUN mode will automatically resume.

4.5 Alarm Events

Alarm events are generated either by faulty solenoid detection or by High ΔP alarm detection. When a Solenoid Fault occurs, the Alarm Relay located on the Core Timer module changes state and the "System Status Alarm" LED turns on. To acknowledge the alarm and view its corresponding information, press the "Program Select" knob once to display the alarm condition. At this time, the "System Status Alarm" LED changes from red to amber, and the "Display Status Alarm" LED turns on indicating that the Display is showing alarm information. Press the knob once again to view the output that was being pulsed when the alarm event occurred; a final knob press returns the Display back to showing normal system status. If there are multiple alarm events, this sequence of three knob presses will step through all of the outstanding alarm events currently detected by the controller in order of occurrence.

A High ΔP alarm occurs when the ΔP exceeds the "High Alarm Set Point". In the event of an Alarm condition, the Alarm LED will flash Red and the Alarm Relay contacts located on the Pressure Differential Meter will change state. Pressing the "Set/Alarm Cancel" button will return the relay contacts to its normal state and cause the Alarm LED to change to solid Yellow to indicate that the alarm has

been acknowledged. Note that an Alarm will automatically cancel when the alarm condition is no longer present.

5.0 PROGRAMMING THE CORE TIMER MODULE

During normal operation the "Run" LED will be on. To enter the Programming mode, press and hold the "Program Select" knob switch about 2 seconds until the "Run" LED flashes and the Display shows "pr9". Release the knob. The "Program Select" knob can now be rotated either way to view the various Program Items. Note that when a Program Item is selected as indicated by its LED, the current value for that Program Item will be shown in the display. To change a value, press and release the "Program Select" knob and the Program Item LED will flash. Turn the knob to set a new value, then press and release it to enter the new value. The LED will stop flashing and again light solid. Continue to view/change other Program Items in the same manner. When programming is complete, rotate the "Program Select" knob until the "Run" LED is flashing, then press/release it. The display will change from "Pr9" back to showing runtime information. If the system is left in the Programming mode for more than 90 seconds without making a change, the unit will change back to the RUN Mode.

5.1 Solenoid Output (Default- "Total # of Outputs Avail")

Select the "Solenoid Output" Program Item as described above. This value sets the last solenoid to be pulsed, and is adjustable from 1 up to the maximum number of solenoids available. The number of expansion boards connected to the system on power-up determines the maximum number of solenoids available. On power-up the Controller "polls" the CANbus to determine the number of outputs available. This number can be viewed by selecting "Output" Program Item. Note that when manually selecting the last output in this manner, the "current sense" feature of the Controller is not enabled, and that all solenoids from 1 through the last will be operated.

To enable the "current sense" feature, set the "Solenoid Output" Program Item to "A" (auto) and press/release the "Program Select" knob. The Controller will briefly operate each output and record its corresponding current consumption value to determine if there is a solenoid present at that output. During this time the "Solenoid Output" LED will flash. When the test is complete the LED will again light solid and the display will show the last output. This "auto" feature will allow the system to monitor the current value of each solenoid output and report changes as to "overcurrent", "undercurrent" or "shorted output", where the output is always On". The "auto" feature also allows unused inputs in the middle of the sequence to be skipped.

5.2 Solenoid On Time (Default- "0.15")

Select the "Solenoid On Time" Program Item as described above. This value sets the ON duration of the solenoid, and is adjustable from 0.10 to 0.50 seconds.

5.3 Solenoid Off Time (Default- "15")

Select the "Solenoid Off Time" Program Item as described above. This value sets the OFF duration of the solenoid, and is adjustable from 1 to 999 seconds.

5.4 Number of Offline Cleaning Cycles (Default- "---")

Select the "Number of Offline Cleaning Cycles" program item as described above. This value sets the number of cleaning cycles the unit will attempt after the "Offline Cln" switch is opened. The number of cycles is adjustable from 1-20, and "- - -" equals "disabled".

5.5 Offline Cleaning Time Delay (Default- "60")

Select the "Offline Cleaning Time Delay" program item as described above. This value sets the delay from the time the "Offline Cln" switch is opened until the Offline Cleaning sequence begins. This time is adjustable from 60 to 600 seconds.

5.6 Standby:

Select the "Standby" mode as described above. This mode allows the outputs to be disabled, while the monitoring functions of the Controller continue to operate. To change modes, select "Standby", then select either "Sby" or "run".

6.0 Δ P PRESSURE DIFFERENTIAL METER PROGRAMMING

Refer to PS700 Programming Procedure (fig.1) on page 14. During normal operation the display will show the pressure differential being measured. To enter the Programming mode, press and hold the "Set" button 2 seconds until the digital display shows the "Low Alarm Set point" as indicated by the Low Alarm LED (red) flashing. (Note that if a security code has been entered, the display will show "0.0.0." first. To enter a code, see below). To change a value, press the "up arrow" or "down arrow" button. To move to the next parameter, press the "Set" button. Once in the Program Mode, all of the items must be sequenced through in order to exit into normal operation mode. If the system is left in the Programming mode for more than 30 seconds without making a change, the unit will change back to the normal operating mode and not save any changes.

6.1 Δ P Alarm High Set point (Default- "6.0")

To view the "Alarm High Set point", enter the programming mode in the sequence as described above. The Alarm High LED (red) will flash and the digital display will show the current value. To change this value, press either the "up arrow" or "down arrow" button. Note that the "Alarm High Set point" cannot equal or be less than the "Cleaning High Set point". If the "Alarm High Set point" is set to greater than 10.0, the digital display will show "---" which indicates that the alarm is disabled. Once the programming mode is exited, the "Alarm High Set point" LED will not be displayed if disabled. To continue programming, press the "Set" button again.

6.2 Δ P Cleaning Low Set point (Default- "1.5")

To view the "Cleaning Low Set point", enter the programming mode in the sequence as described above. The Cleaning Low Set point (yellow) will flash and the digital display will show the current value. To change this value, press either the "up arrow" or "down arrow" button. Note that the "Cleaning Low Set point" cannot be less than or equal to the "Alarm Low Set point", or be greater than the "Cleaning High Set point"; however, it can be equal to the Cleaning High Set point to allow for zero hysteresis. To continue programming, press the "Set" button again.

6.3 Δ P Cleaning High Set point (Default- "2.0")

To view the "Cleaning High Set point", enter the programming mode in the sequence as described above. The Cleaning High Set point (yellow) will flash and the digital display will show the current value. To change this value, press either the "up arrow" or "down arrow" button. Note that the "Cleaning High Set point" cannot be greater than or equal to the "Alarm High Set point", or be less than the "Cleaning Low Set point"; however, it can be equal to the Cleaning Low Set point to allow for zero hysteresis. To continue programming, press the "Set" button again.

6.4 Δ P Unit of Measure (Default-"IN")

To view the "Units of Measure", enter the programming mode in the sequence as described above. The digital display will show "IN" or "PA" which equals the units of measure to be displayed (INches Water or kiloPascals). This setting can be toggled by pressing either the "up arrow" or "down arrow" button. To continue programming, press the "Set" button again.

6.5 Security Code (Default- "0.0.0")

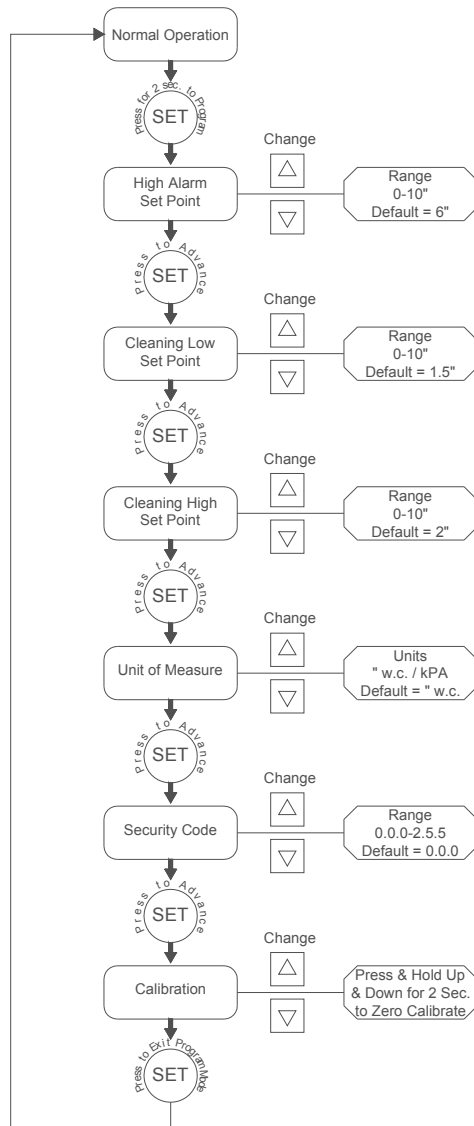
To view the "Security Code", enter the programming mode in the sequence as described above. The digital display will show a

number from "0.0.0" to "2.5.5". This is the security code option. Note that decimal points have been added between the digits to help distinguish this number from other programming values. If the number is left at "0.0.0." the operator will not be prompted to enter a code when programming. If any other number is entered here, the user will be prompted at the beginning of the programming sequence to enter that number. If the number is entered correctly, the programming sequence will continue. If the number is entered incorrectly, the display will revert to normal operation. If the security code is forgotten, Farr APC Customer Service must be contacted for an emergency security code.

6.6 Zero Calibration

To calibrate the Pressure Differential Pressure meter, advance the programming until the display flashes set. With the system shut down (Blower stopped) press and hold the Up and the Down arrow buttons simultaneously until display stops flashing. Press the set button one time to exit programming and check to see if the meter is reading "00.0".

Figure 1: Pressure Differential Meter Programming



Notes:
 1. To enter program mode press and hold the "SET" button for 2 seconds and release. The display should then show the first program parameter (High Alarm Set point), and flash it's corresponding LED. Use the "UP/DOWN" buttons to change the value. Press the "SET" button when done to advance to the next parameter.
 2. Once in Program Mode all items must be sequenced through in order to exit into Normal operation. If no changes are made after 30 seconds the unit will automatically return to Normal operation

7.0 CORE EXPANDER MODULE ADDRESSING (Default-“01”)

The address of the Expansion Module is set by means of two rotary switches. Using a small screwdriver set the address of the board from 01 to 98. Note that addressing of the boards must start with 01 and continue in sequence up to a maximum of 98, however, it is not necessary that the boards be physically connected to the CANbus in any particular order. It is allowable to set multiple boards to the same address in order to have their outputs operate in parallel, however, if this is done the Main Controller must be programmed for Manual Outputs (the Auto-Configuration must not be used as the current-sense feature will not report correctly). Address 00 is used to put the board in an "off-line" mode. This allows the board to be taken off the CANbus without physically disconnecting the wires. Note that the Main Controller will continue to sequence through these outputs even though they are not available.

7.1 Communications Jumper Logic

There are two jumpers on the T2610-020 that set the end-of-line termination resistance. When the Expansion Module is physically the last unit on the CANbus (furthest from the Main Controller), both jumpers must be on pins 2-3 (right). When the Expansion Module is on any other position on the CANbus, both jumpers must be on pins 1-2 (left).

8.0 CORE TIMER MODULE STATUS LEDs

8.1 Alarm (Display Status)

When pressing the “Program Select” knob to view and cancel an alarm event, this LED will light to indicate that the display is showing alarm event information.

8.2 Output

When in the Run mode, this LED will light when the value displayed represents the next output to fire.

8.3 Alarm (System Status)

This LED will flash Red when an Alarm occurs, and will light Yellow when the Alarm is acknowledged. An Alarm can be acknowledged by pressing the "Program Select" switch, which will cause the Alarm output to turn off. The Alarm will reset when the fault is clear.

8.4 Output Pulsing

This LED will flash whenever an output is activated, and will remain “On” for the duration of the “On Time”. Note that this LED represents an output that is being fired, either locally or remote.

8.5 Offline Cleaning

If the Offline Cleaning feature has been enabled, this LED will start to flash when the "Offline Cln" input is opened and will continue flashing for the duration of the Offline Cleaning Delay and the Offline Cleaning Sequence. At the completion of the programmed number of Offline Cleaning Cycles, the LED will light solid and remain on until the "Offline Cln" input is closed. The Offline Cleaning Cycle can also be cancelled by closing the input again.

8.6 Output Status

The Output Status LED will light Green whenever the outputs on the Controller or expansion board are scheduled to fire. In case of an output related alarm (overcurrent, etc), the LED will turn Red until the Alarm is cleared or the outputs are no longer in queue

8.7 CANbus Status

The CANbus Status LED will light whenever the unit is transmitting.

9.0 EXPANSION MODULE LEDs

9.1 Solenoid Pulse Indication

There are 10 Green LEDs, which represent the 10 triac outputs on the Expansion Module. Each LED will light for the duration that its corresponding output is on.

9.2 Output Status

The Output Status LED will light Green whenever the outputs on the Expansion Module are scheduled to fire. In case of an output related alarm (overcurrent, etc), the LED will turn Red until the Alarm is cleared or the outputs are no longer in queue

9.3 CANbus Status

The CANbus Status LED will light whenever the unit is transmitting.

Figure 3: Core Timer Wiring

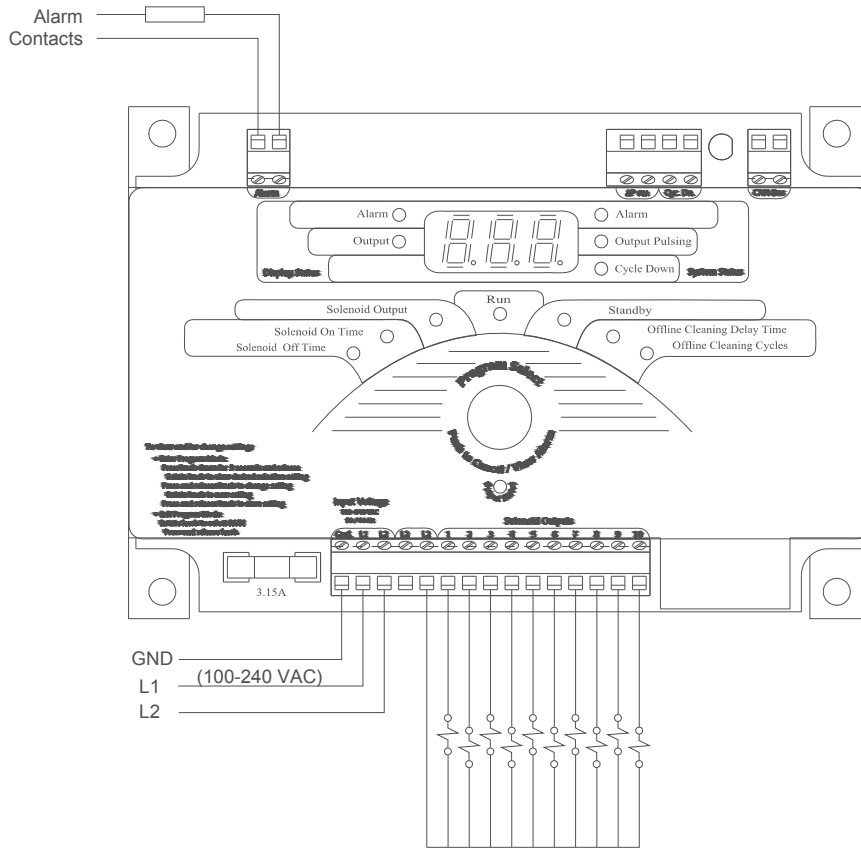
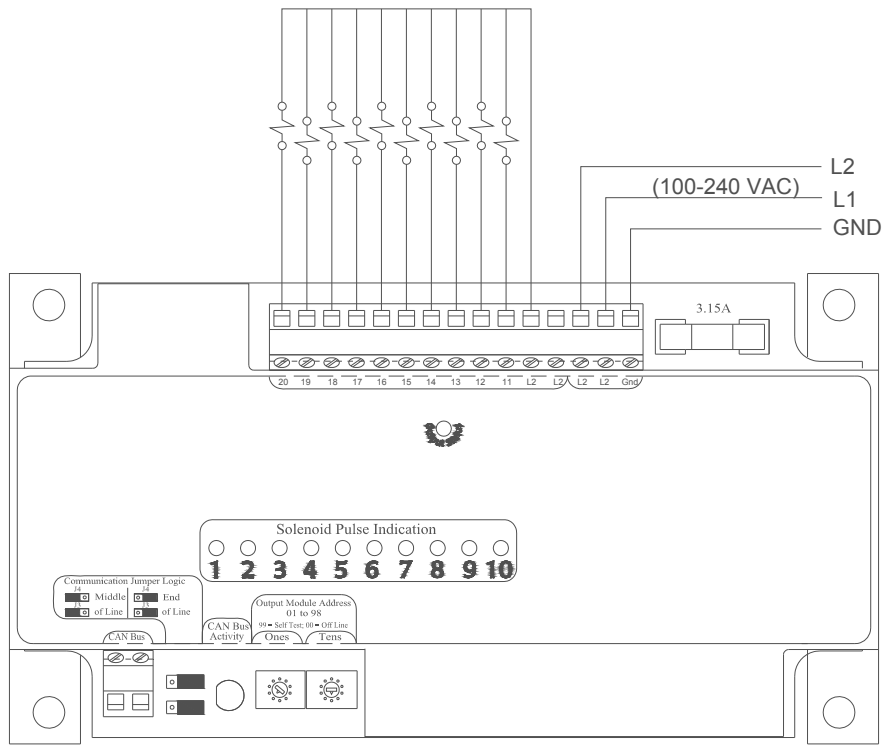


Figure 4: Core Expander Wiring





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