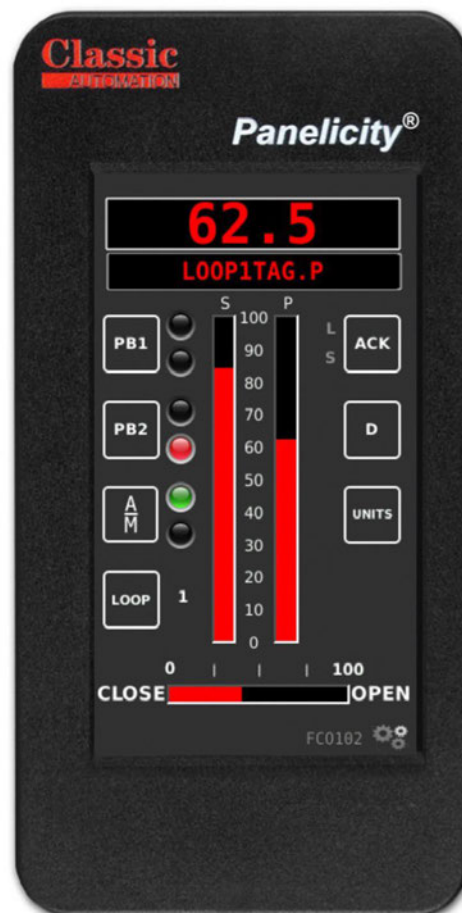


Panelicity[®] Series 36

Setup Guide



This Setup Guide assumes that the reader has some knowledge of process control and installation/wiring of panel mount process controllers. All configurations are performed from the front face of the controller. There is no need to purchase or learn any programming software.

Panelicity[®] is a registered trademark of Classic Automation LLC

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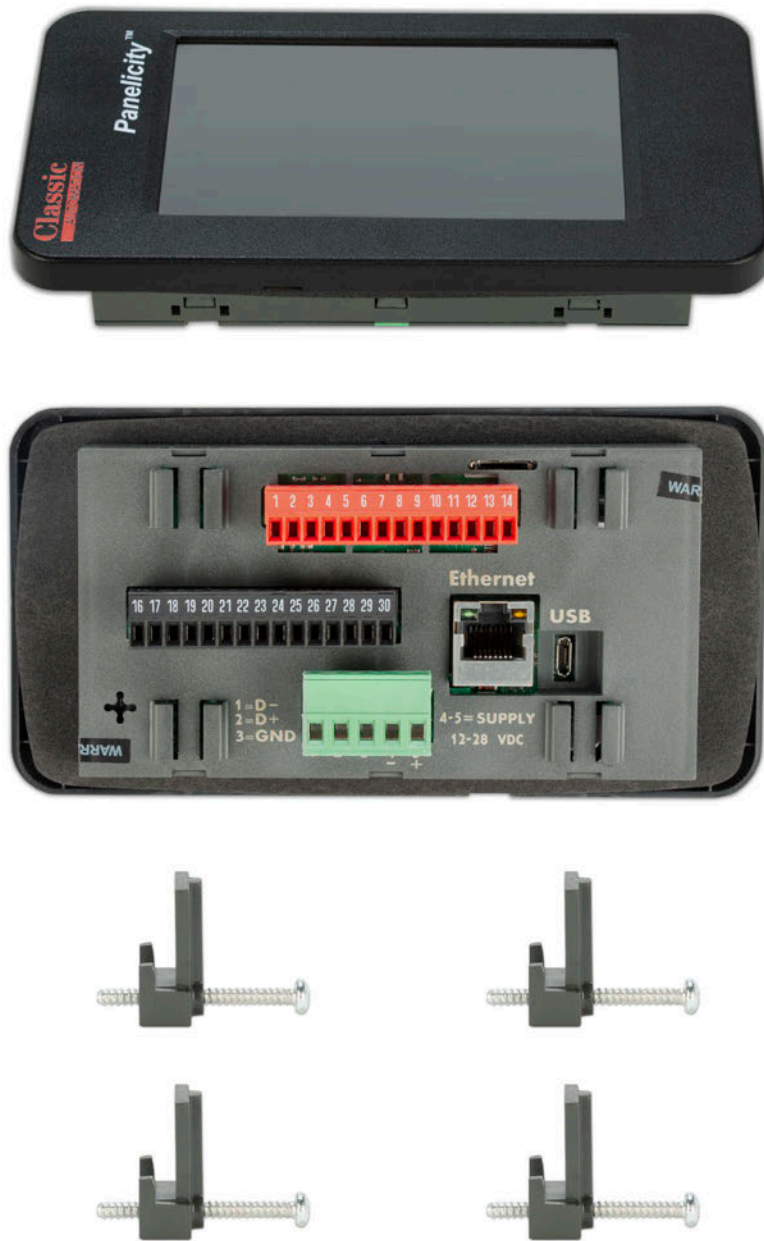
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1. Unpacking

The box contains the **Panelicity® Series 36** Controller, (4) mounting clips, bezel, gasket, and terminals for power and I/O wiring.

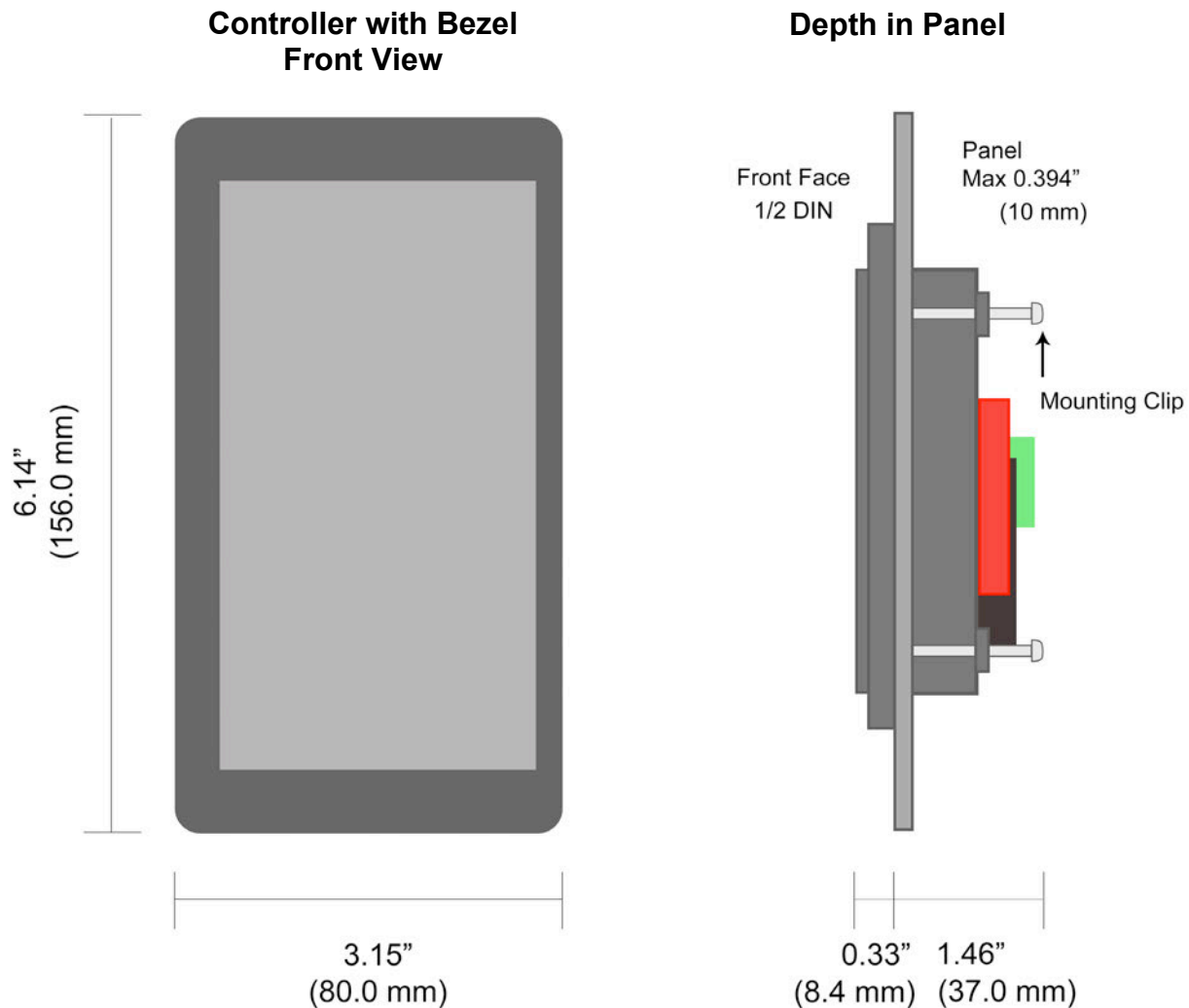


2. Installation and Wiring

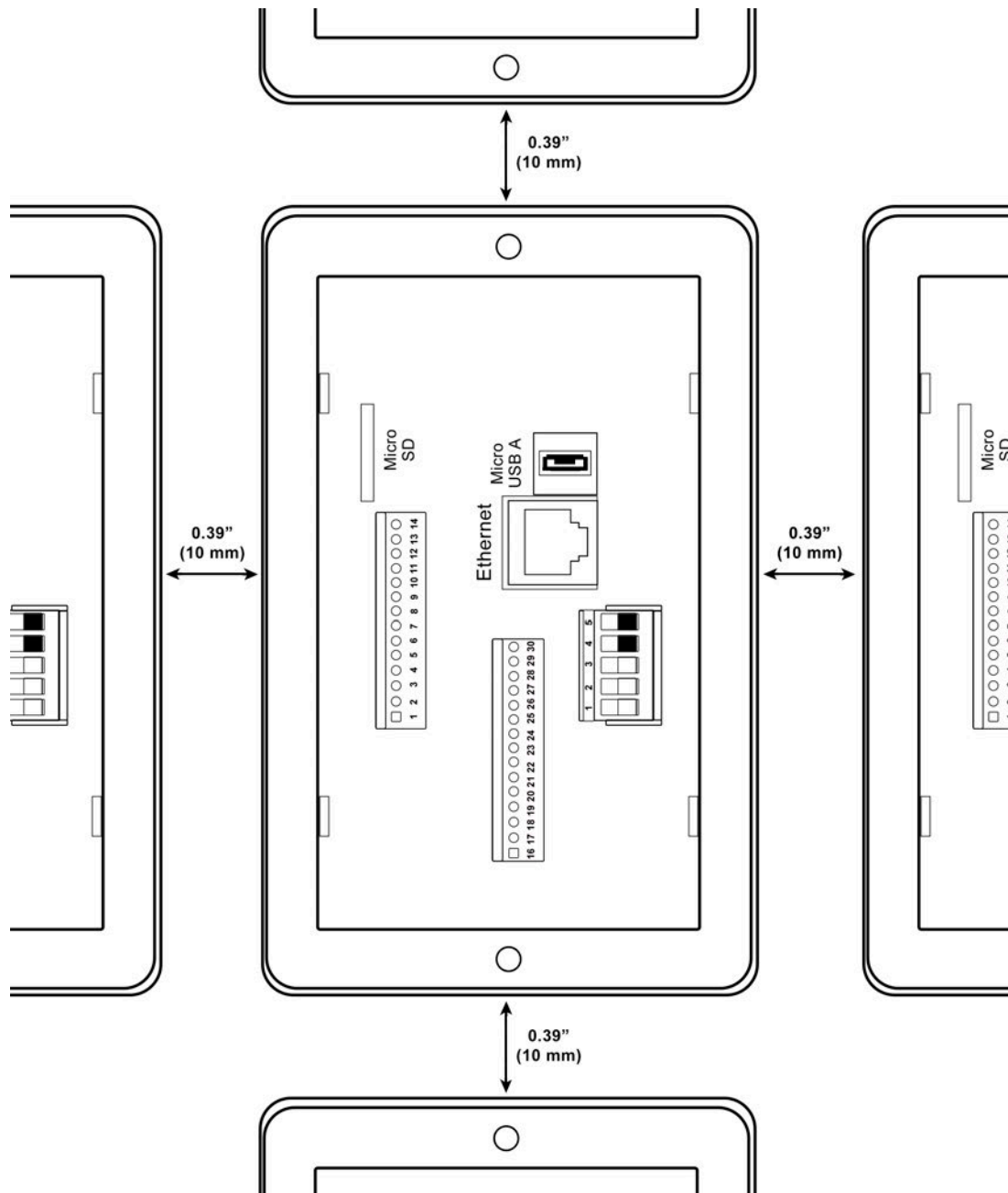
Panelicity® Series 36 is designed to be mounted vertically in a panel and can operate within a temperature range of 0 to 131 F. The controller front face is rated for IP65 (water resistant). Electromagnetic ratings tested per EN 61326-1, EN 61131-2, and EN 61000-6-2.

There are electronic components that can be damaged by electrostatic discharge. Be sure to connect to ground when handling the controller.

The controller uses 24VDC power. There is no built-in power switch or fuse. Keep the power supply cable as short as possible and separated from other higher voltage power cables. Avoid the presence of other power actuators, high humidity, or corrosive gas in the panel.



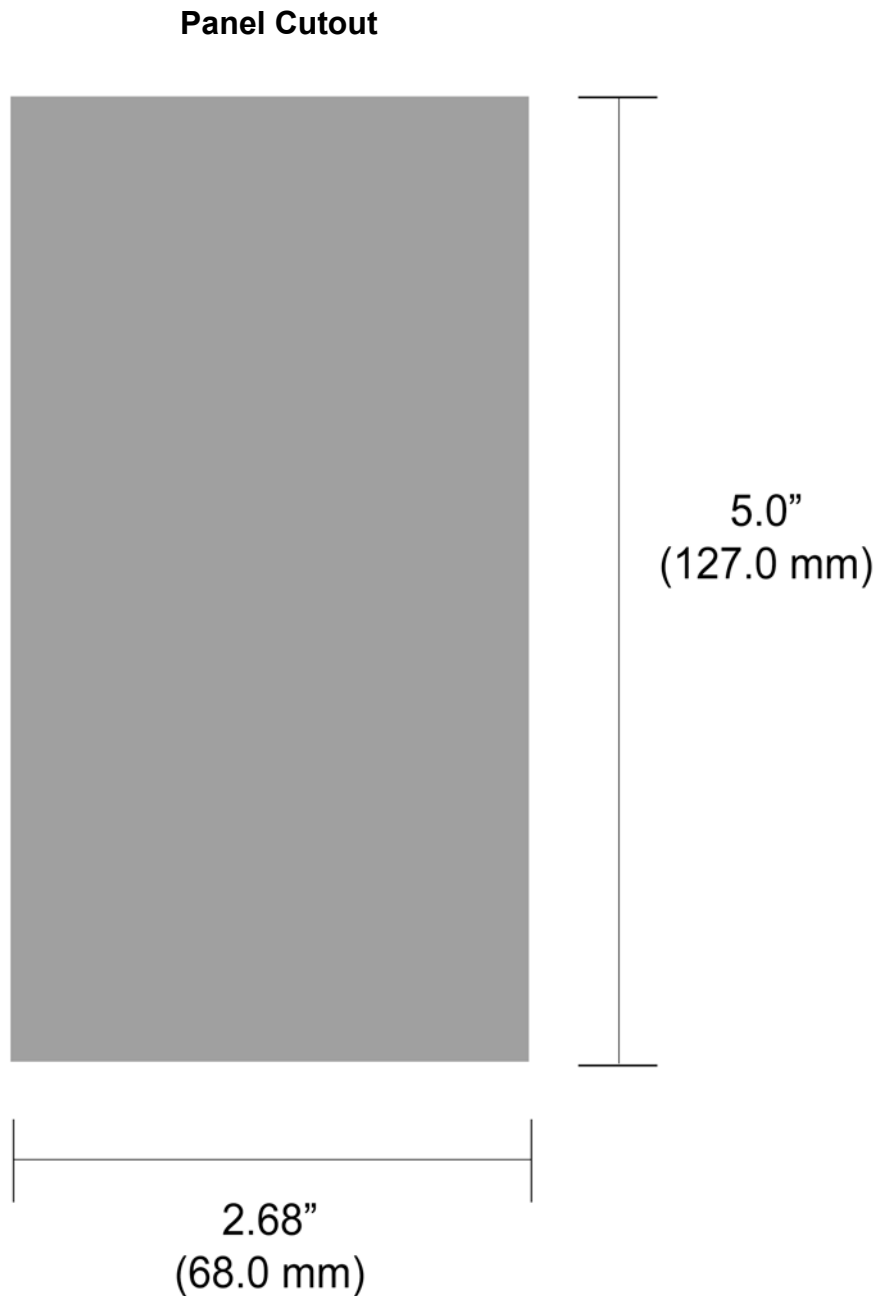
Spacing Multiple Controllers in Panel



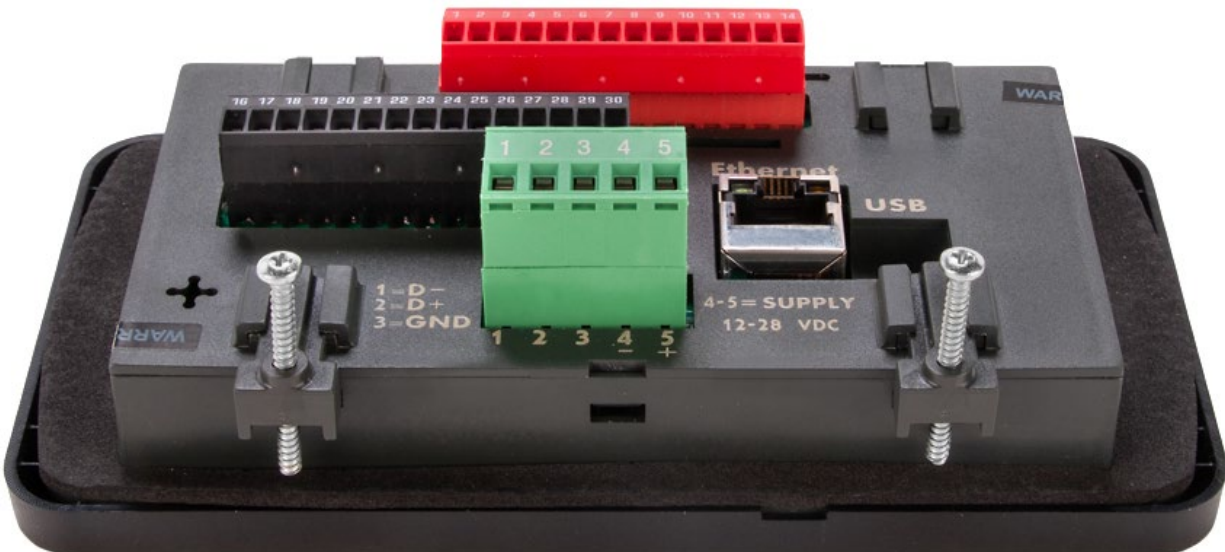
For multiple controllers in the same panel, provide a minimum 0.394 inches (10 mm) spacing on all sides from outside edge of bezel. Allow 0.25 inch additional space for wires exiting the rear of the terminal blocks and 1.0 inch if an Ethernet cable is to be installed.

2.1 Rear Panel Mounting

1. For retrofit installations, simply remove the existing controller and replace with **Panelicity® Series 36**. For new installations, cut a 5 inch by 2.68 inch hole in the panel.

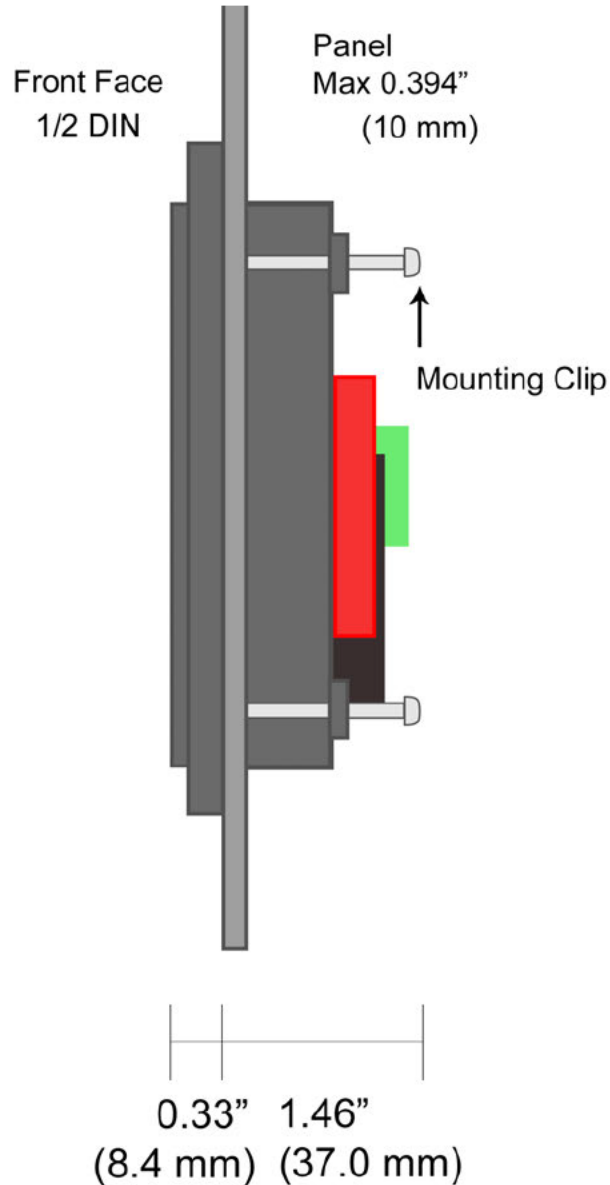


- Four mounting clip slots are located on the rear of the controller, one in each corner. Insert 2 mounting clips, on the long side of the controller housing. To install, slide the clip into the slot while pushing down.



3. Insert controller into the panel. Install the other two mounting clips. Tighten all mounting screws only enough to hold securely. Overtightening may break the mounting clips and create excessive pressure on the touchpanel causing it to function improperly.

Controller Installed in Panel



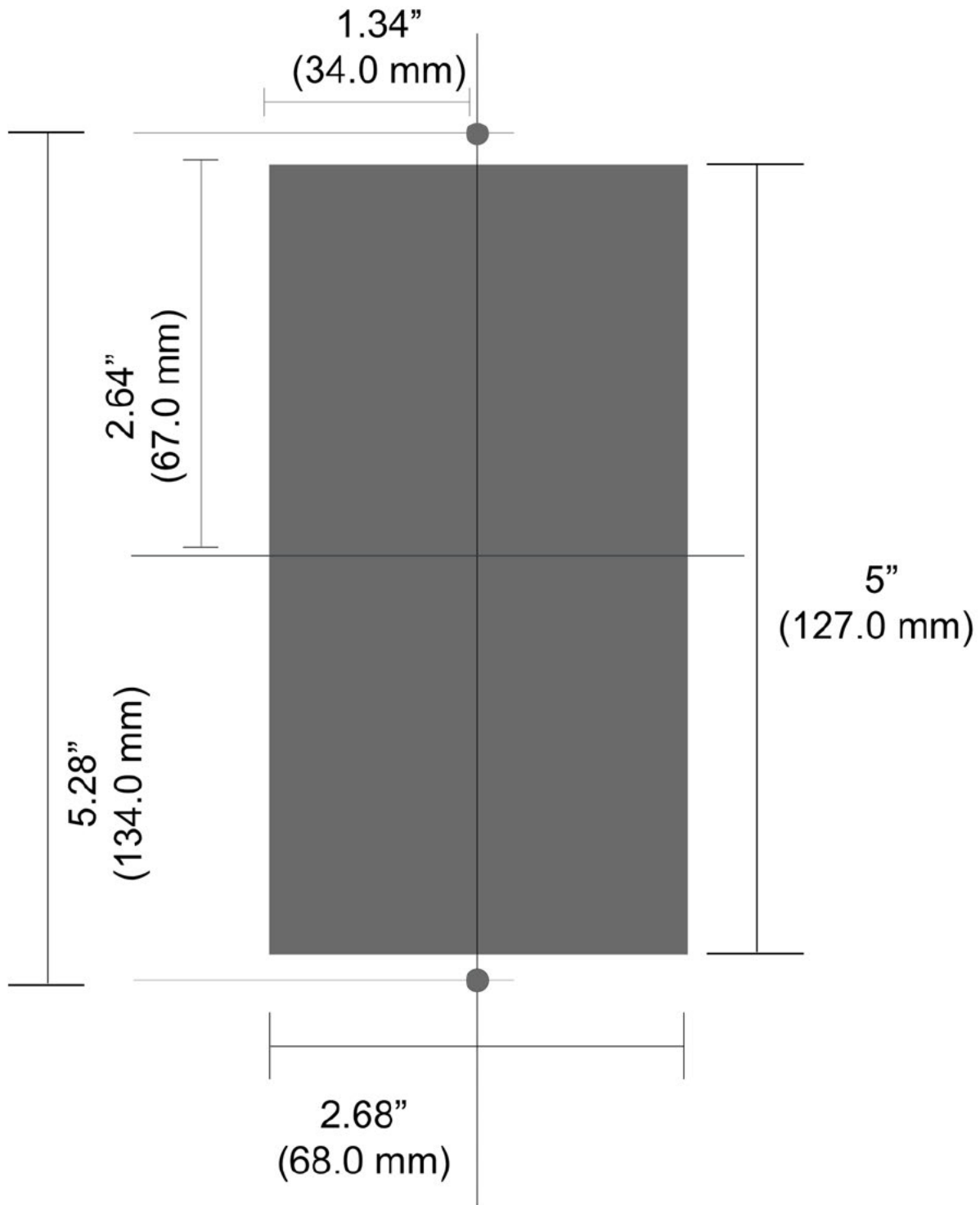
2.2 Front Panel Mounting

1. Remove the bezel from the controller. Place your thumbs just outside the outer edges of the display screen. Press down with your thumbs and lift up with your other fingers. The bezel snaps off. Remove the gasket.

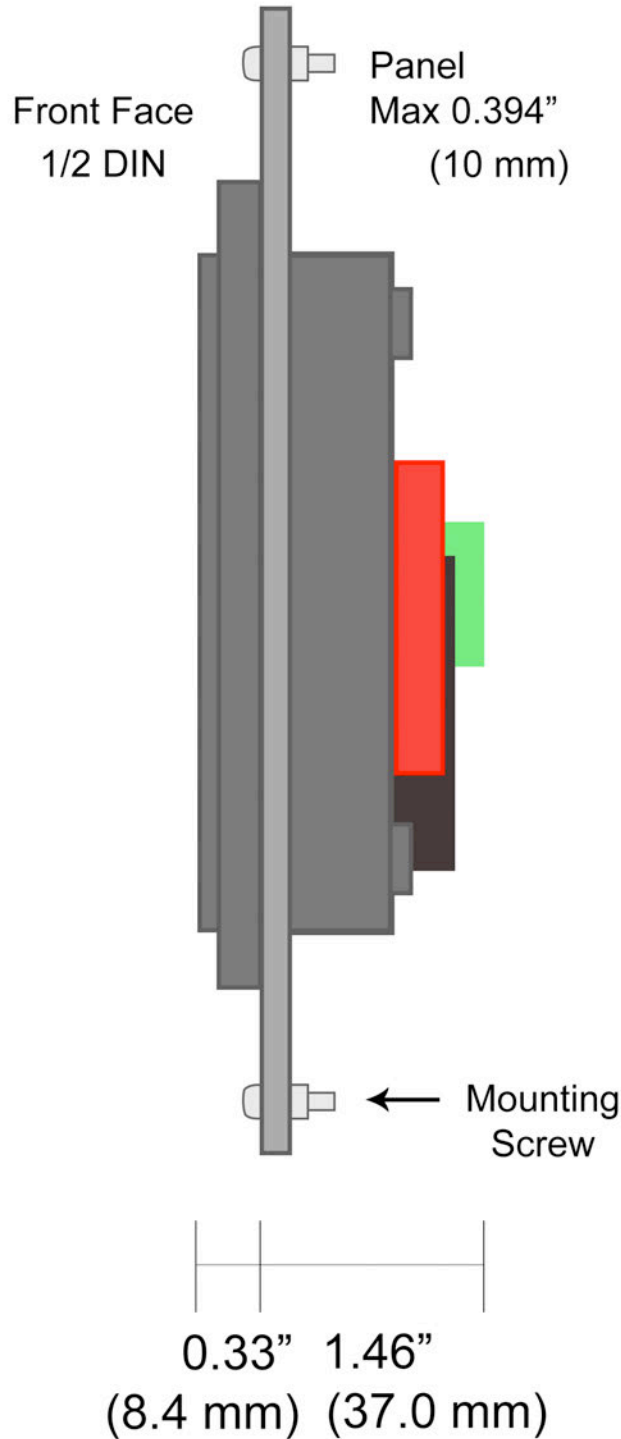
Bezel Removal



2. For retrofit installations, simply remove the existing controller. For new installations, cut a 5 inch by 2.68 inch hole in the panel. Drill two holes through the panel and gasket.

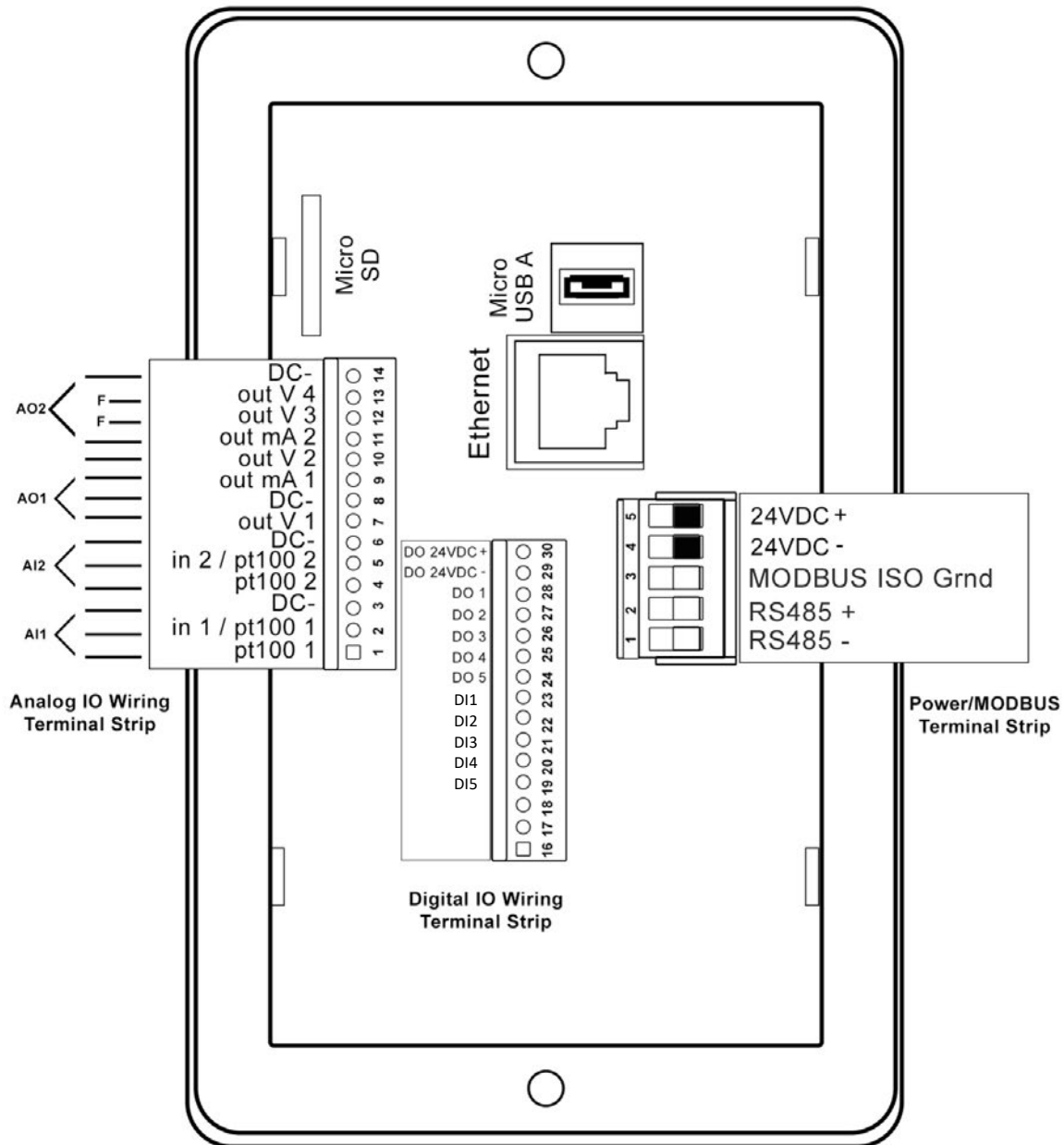


Insert the controller/gasket into panel. Tighten screws to secure to panel. Do not over tighten. Overtightening may break the mounting clips and create excessive pressure on the touchpanel causing it to function improperly.



2.3 Rear Connections

Note that terminals may be live even if they are unused. Do not wire to unused terminals.

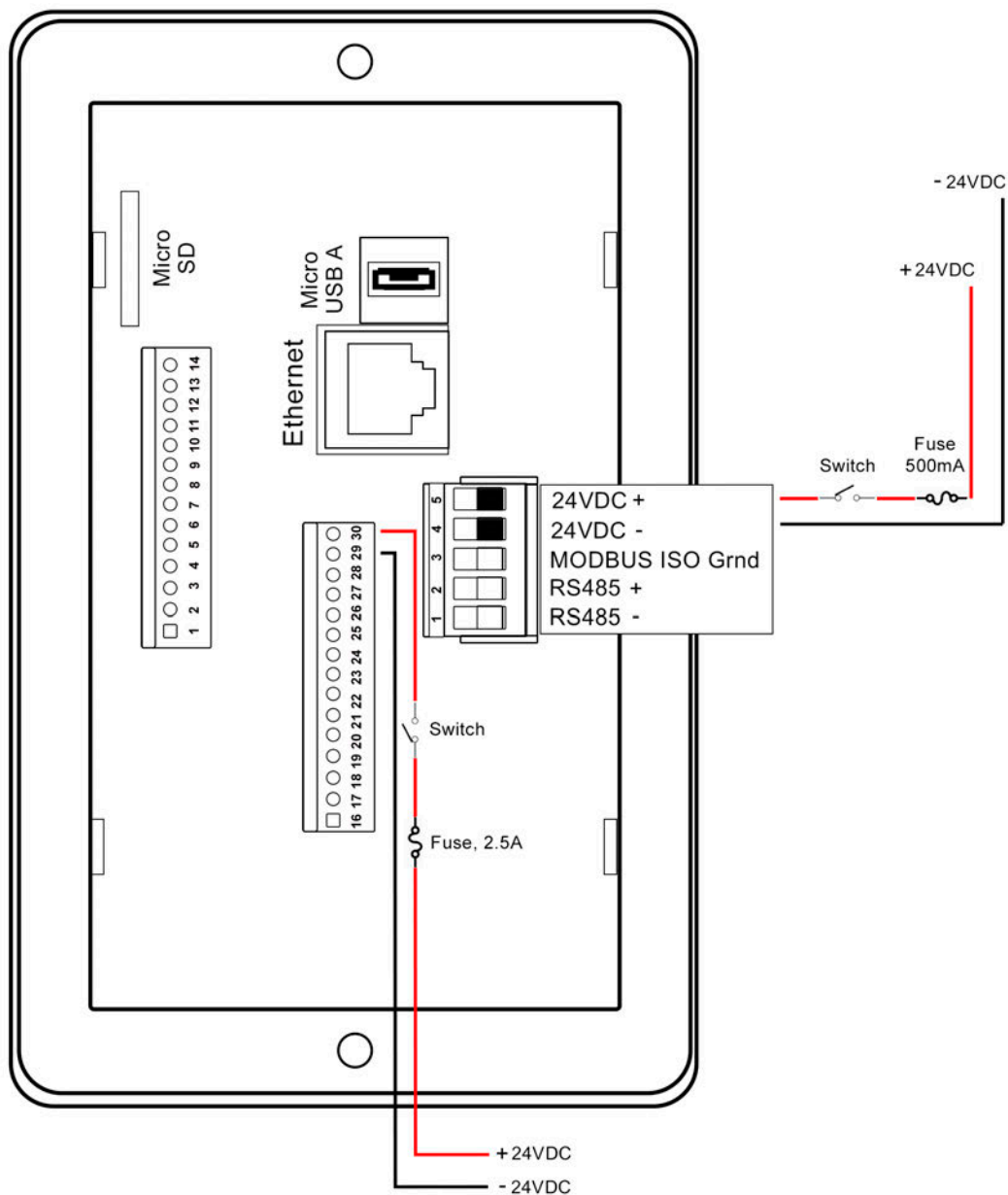


Analog I/O are connected to the Analog I/O Wiring Terminal Strip, terminals 1 thru 14. Digital Inputs and Outputs are connected to the Digital I/O Wiring Terminal Strip, terminals 16 thru 30. Power and MODBUS wires are connected to the Power/MODBUS Terminal Strip, terminals 1 thru 5. Note that there are some I/O channels designated “F” that are reserved for future use or for custom applications.

2.4 Power Supply Wiring

The controller has galvanic isolation between the power supply and RS485 serial line. The controller uses a 12VDC to 28VDC supply for the main board and expansion board as shown below. The circuit of the digital outputs is powered by 29 (-) and 30 (+) terminals. System is protected against reverse power supply polarity. We recommend a 500mA fuse for the controller and analog I/O and a separate fuse for the digital outputs.

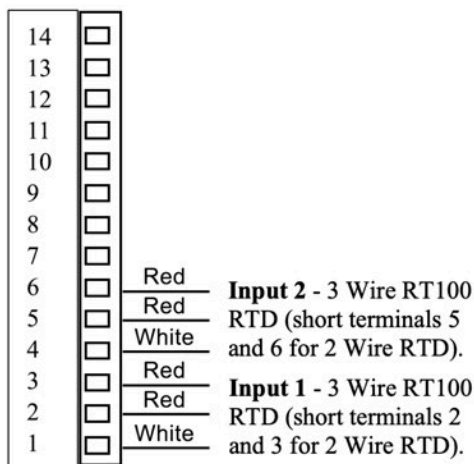
Recommended Power Supply and Fuse Wiring



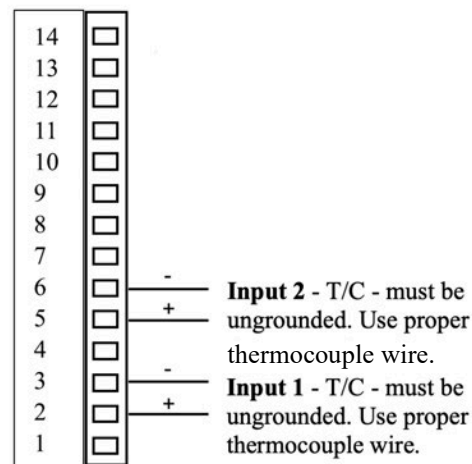
2.5 Analog Input Wiring

The input type is selected on the *I/O Setup - AIN Display*. There are no hardware switches or jumpers to change. Analog inputs are not isolated. If you connect multiple current inputs in series the other devices must all be isolated and the *Panelicity* controller must be the last device connected in the loop, eg, closest to the power supply negative.

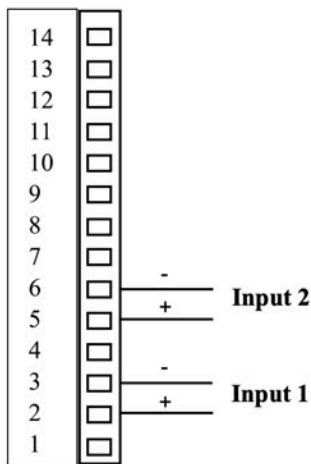
RTD 3-Wire PT100



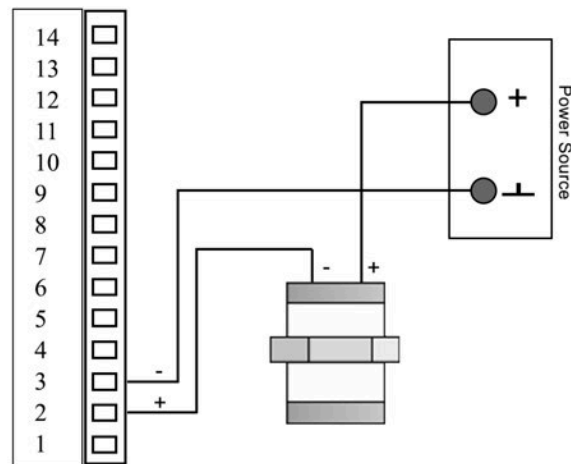
T/C



Voltage or mA



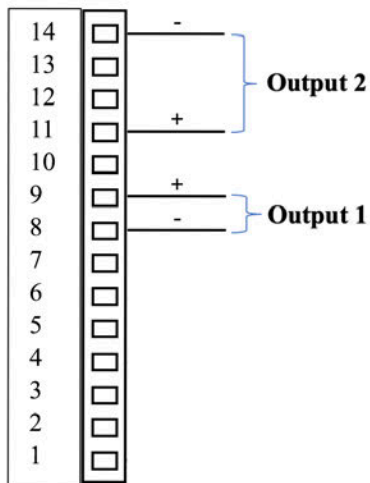
2-Wire Transmitter w/ Power Supply – Input 1 Shown



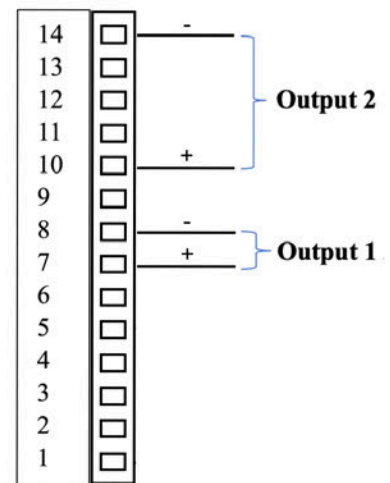
2.6 Analog Output Wiring

The output type is selected on the *I/O Setup - AOUT Display*. There are no hardware switches or jumpers to change.

Current (mA)



Voltage (VDC)



2.7 Digital Input Wiring

Digital Inputs 1 thru 5 can be assigned:

None -	No action
GACK -	Global Alarm Acknowledge
L1 LOC/REM -	Loop 1 Setpoint Source, Local (False) or Remote (True)
L2 LOC/REM -	Loop 2 Setpoint Source, Local (False) or Remote (True)
TOT1 RESET -	Resets Totalizer 1 Batch Total
TOT2 RESET -	Resets Totalizer 2 Batch Total

Use a momentary switch for Global Alarm Acknowledge and batch total reset. Use a maintained switch for Local/Remote Setpoint Source.

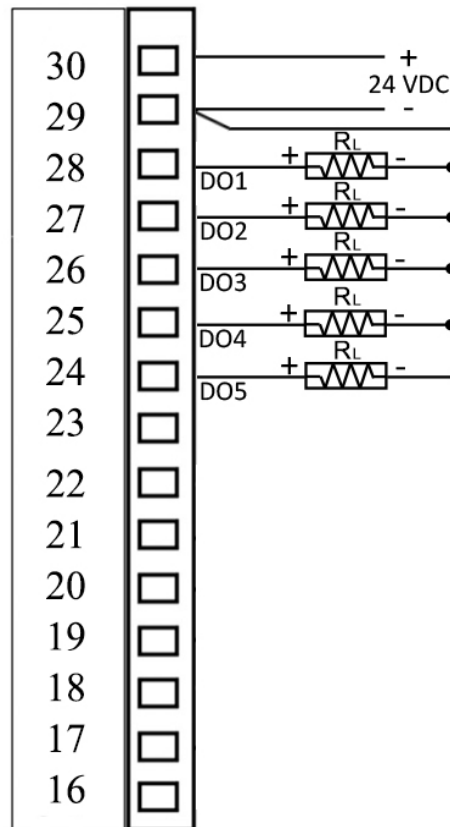
Refer to the *I/O Setup - DIN Display*. There are no hardware switches or jumpers to change.

2.8 Digital Output Wiring

Note that the onboard digital outputs are pilot duty (solid-state PNP), 200 mA max for each output (2A max for all outputs - will only be 1A for 5 outputs).

It is **STRONGLY RECOMMENDED** that you use interposing relays to switch external loads.

Digital Outputs 1 thru 4 can be assigned to Loop Alarm Tripped, Loop Alarm Unacknowledged, Totalizer Presets, Totalizer Pulse Outputs, or ON/OFF Control Digital Outputs. Digital Output 5 is preassigned the Global Alarm tripped or unacknowledged. Refer to the *I/O Setup – DOUT Display*. There are no hardware switches or jumpers to change.



2.9 Optional Relay Board Wiring

We offer the **ACIN01** Relay Board which has five (5) double-throw Form C relays. Other relays may be used providing the coil operates on 24VDC and the maximum coil current draw is less than 200 mA.

ACIN01 – the ACIN01 Relay Board has five (5) double-throw Form C relays with an RC snubber between the common and normally open contact. The relays can be controlled with a “pnp” 24VDC polarity signal (with LED signal) and can switch voltages up to 250VAC (max 5A) or 30VDC (max 3A). The output and control signals are supported on two (2) separate pull-out terminal blocks. The ACIN01 uses 24VDC power. There is no build-in power switch or fuse.

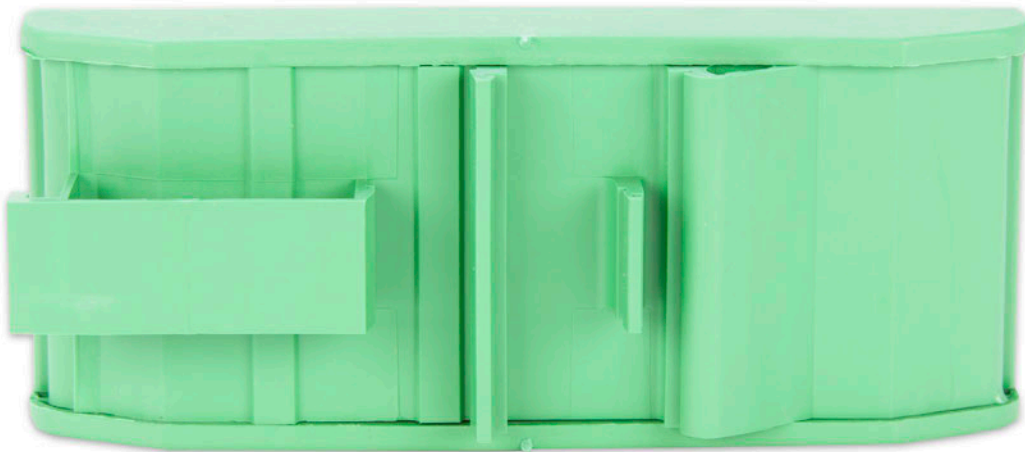
Keep the power supply cable as short as possible and separated from other higher voltage power cables.

Avoid the presence of other power actuators, high humidity, or corrosive gas in the panel. The board is housed in a plastic housing with DIN connectors for mounting. Housing can be mounted using DIN rails DIN-EN-50022 or DIN-EN-50035.

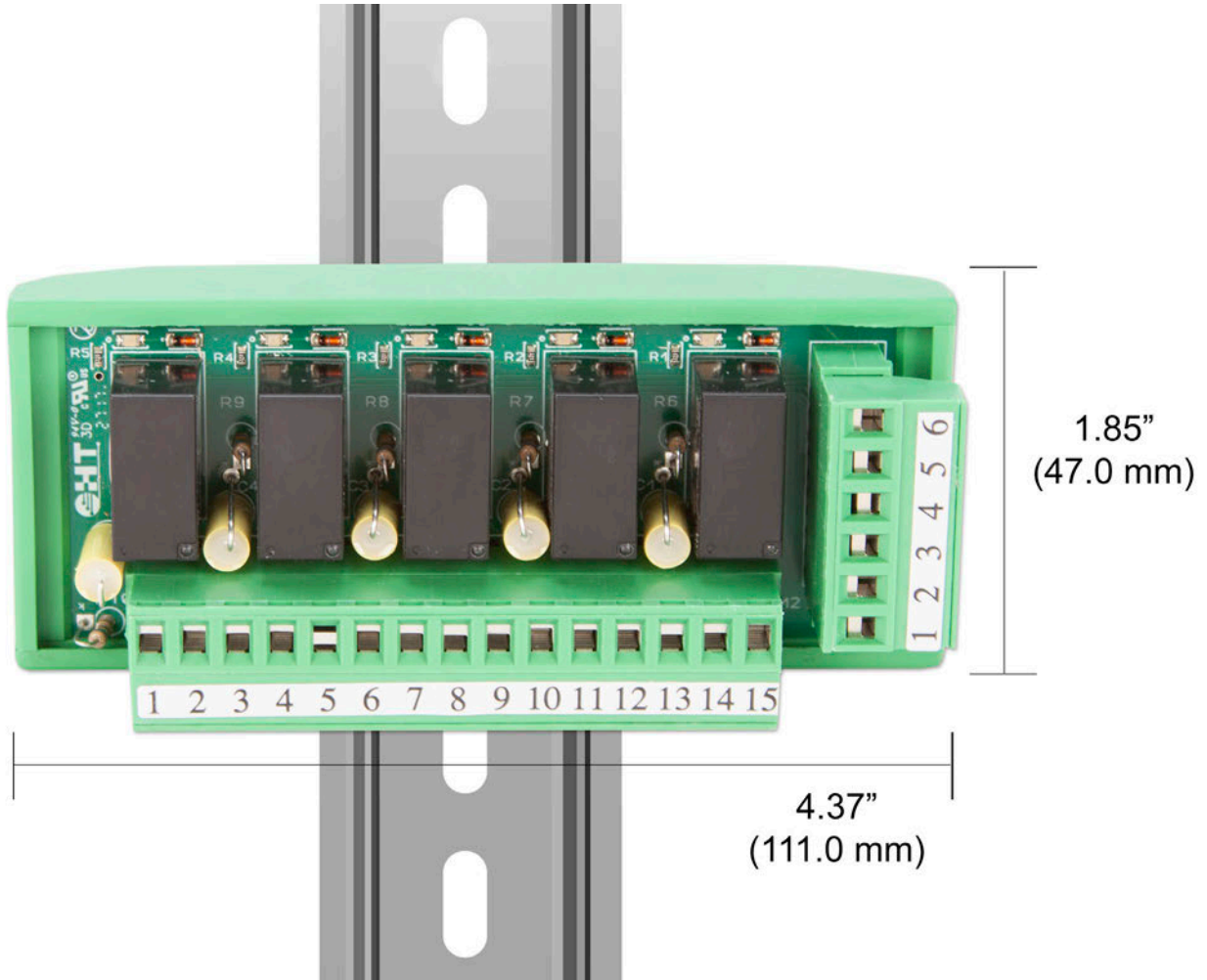
ACIN01 Top View



ACIN01 Bottom View

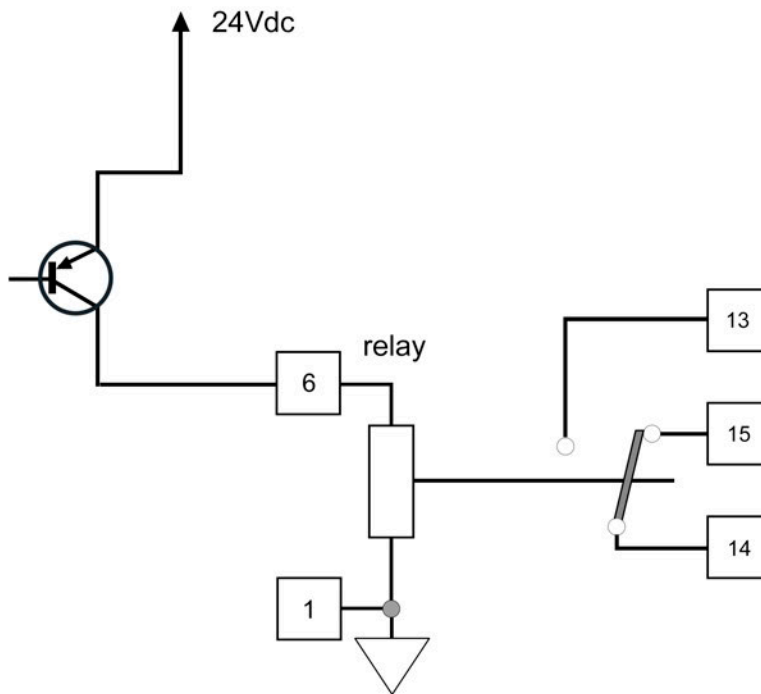


ACIN01 Top View - Mounted on DIN Rail

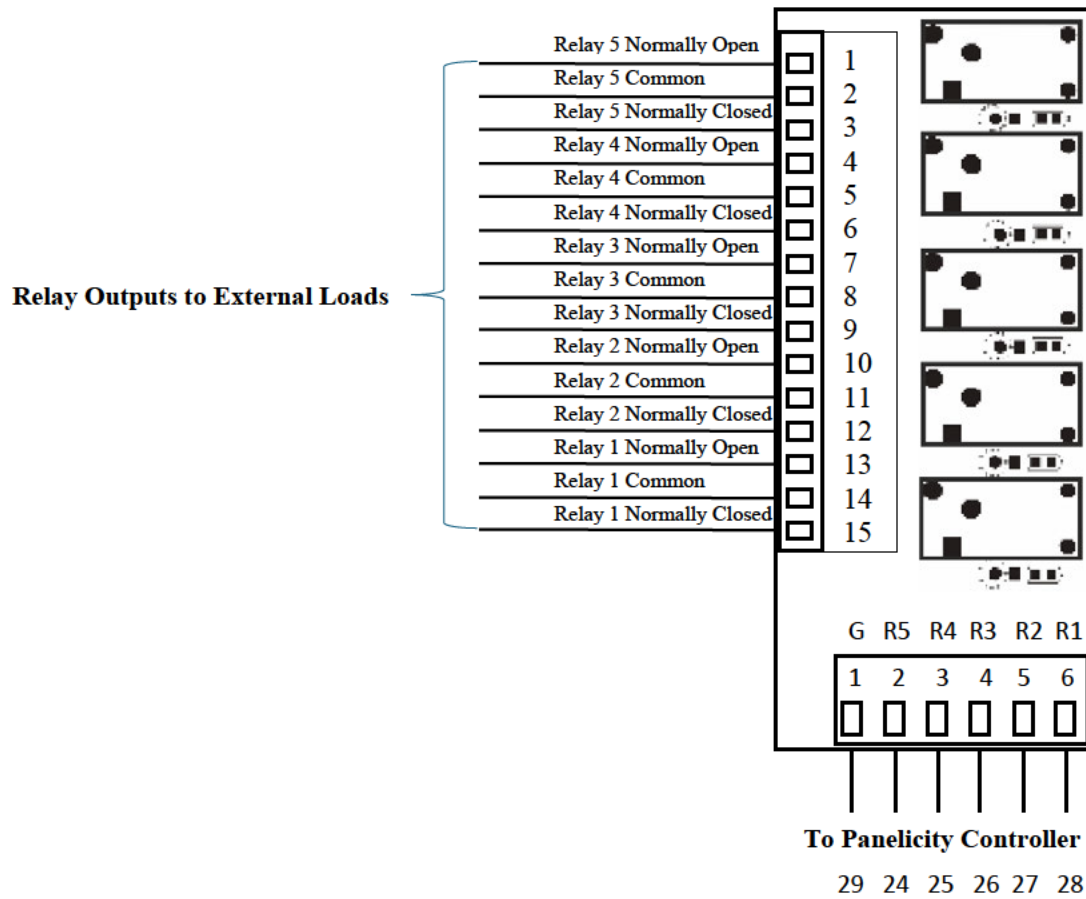


ACIN01 Functional Diagram – Relay 1 Shown

(24VDC from controller terminal 30)
Transistor shown is the Panelicity controller internal DO circuit



ACIN01 Wiring



3. Power Up Display

Setup the *Panelicity*[®] Controller in the order documented in this Setup Guide. For controller setup, use of a stylus pen is recommended because of the detail on some of the displays. Note that the first time you open a setup display it takes a couple of seconds. This is normal. Use of fingers is fine for the operational displays. If you want to clean the touchscreen we recommend use of a soft, damp cloth, without soap or detergents.

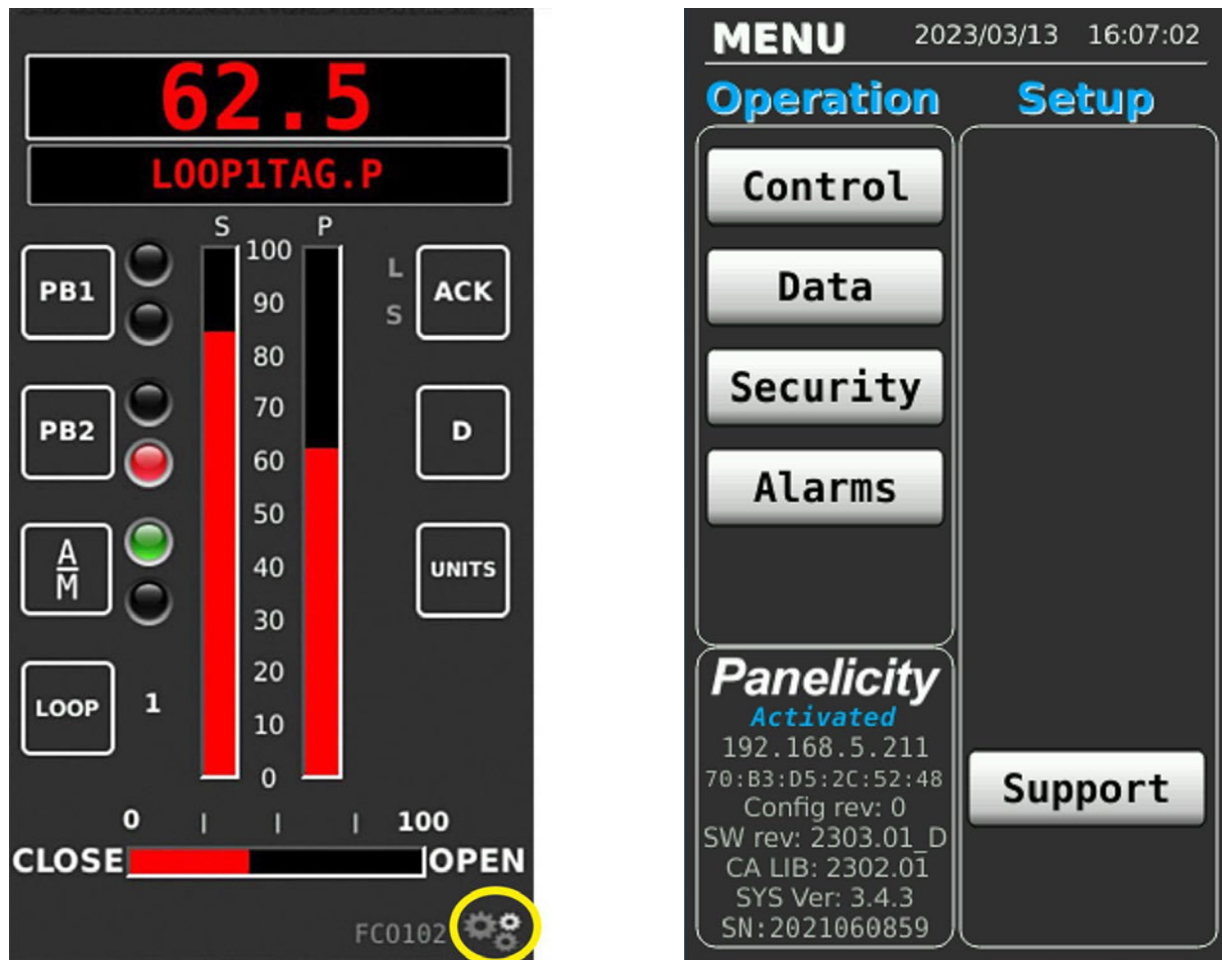
Upon controller power up and during initialization, the Display shows the *Panelicity*[®] **Series 36** logo.

After initialization, the Controller opens the *Control Display*.



4.0 Primary Operator Display

After initialization, the controller opens the *Control Display*. Controller setup displays can be accessed from the *Main Menu Display*.



Select the **Gear** icon on the *Control Display* to open the *Main Menu Display*.

5.0 Main Menu Display

The appearance of the *Main Menu Display* changes based on the Security Access Level. There are four (4) Security Access Levels. Users have the ability to perform additional functions with increasing Security Access Authorization. Operate Access Level is the default and the *Main Menu Display* below is displayed until a user logs in. Select Security to open the *Security Settings Display* and login.

Main Menu Display Operate Access Level



The controller is activated at the factory and loaded with operating software.

6.0 Security

Summary of Security Access Levels From Lowest To Highest:

1. **Operate (Level 0):** Authority to change Controller mode, Setpoint, Output, etc. This is the Default with no password.
2. **Tune (Level 1):** Operate plus authority to change tuning and alarm parameters.
3. **Configure (Level 2):** Tune plus authority to change all loop parameters, change passwords for Access Levels 1 and 2, and change Log In TIMEOUTS.
4. **Engineer (Level 3):** Configure plus access to System Parameters, and change passwords for all Access Levels.

Summary of All Security Access Levels

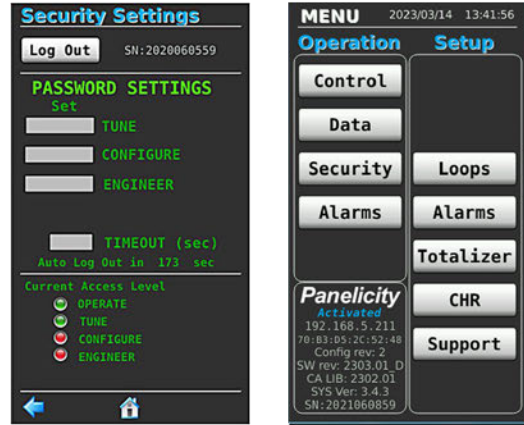
Operate Access



No password required
Change controller Setpoints, Output, Mode (Auto/Manual)

On Security Setup Display: View Access Level or Log In.

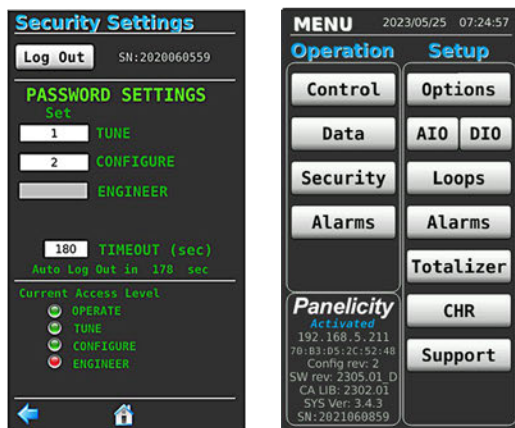
Tune Access



Password required
Perform all Operate Functions
Modify Loop Tuning and Alarm parameters

On Security Setup Display: View Access Level or Log Out.

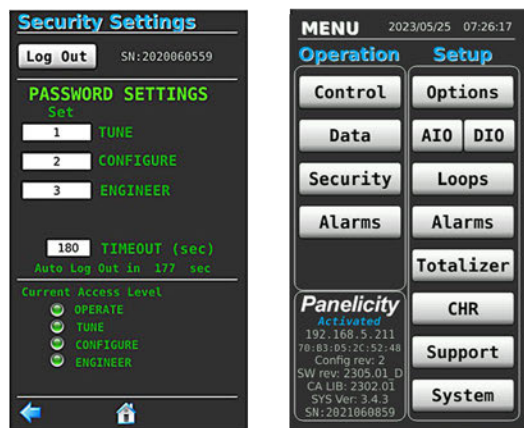
Configure Access



Password required
Perform all Operate Functions
Modify all Loop parameters
Modily Alarm parameters

On Security Setup Display: View Access Level and change passwords for Tune/Config Access Levels or Log Out.

Engineer Access

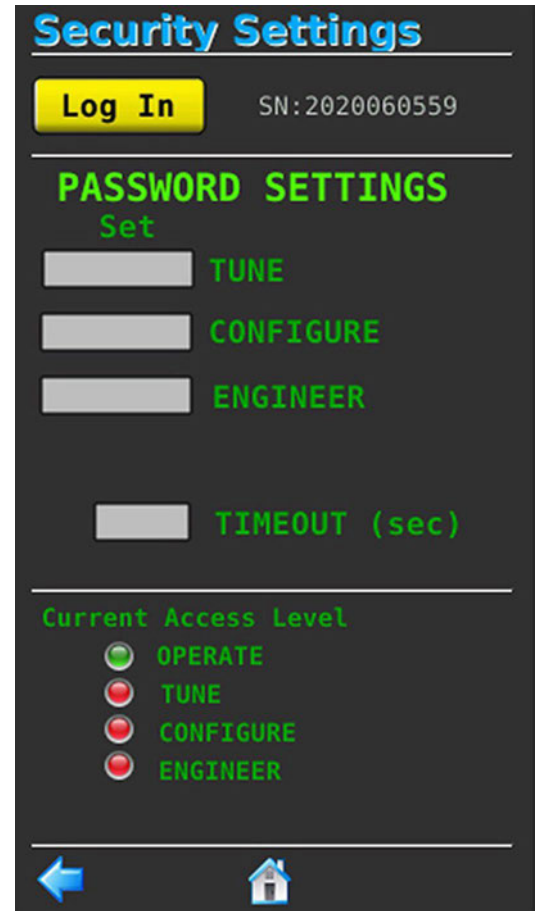


Password required
Perform all Operate Functions
Modify all Loop parameters
Modify Alarm parameters

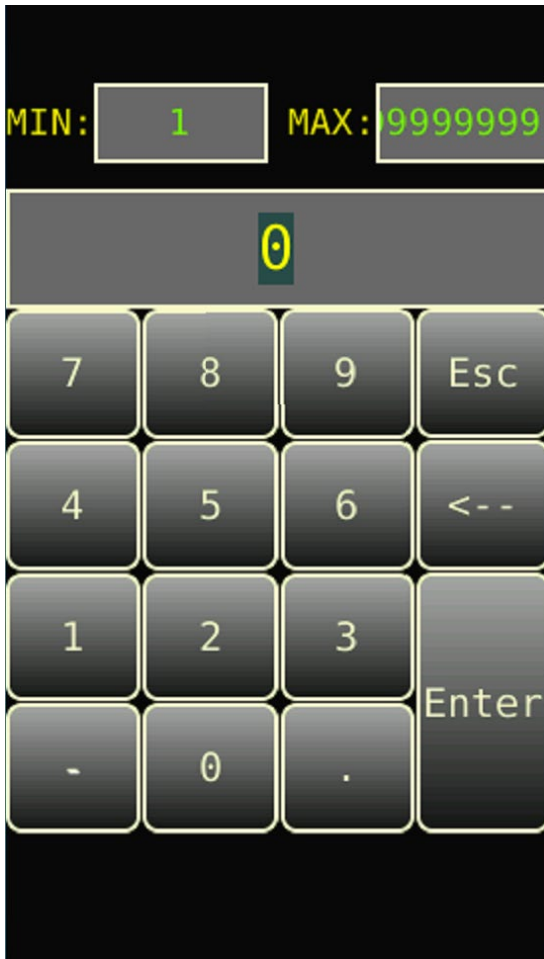
On Security Setup Display: View and change passwords for all Access Levels, System Level access or Log Out.

Security Login Keypad Display

Select Security on the *Main Menu Display* to open the *Security Settings Display*



Select Log In/Log Out on the *Security Settings Display* to open the *Login Keypad Display*. Refer to *Security Settings Display*. The keypad on the *Login Keypad Display* is typical of other Keypad displays although the min and max values may be different.



The **current value** is highlighted on the *Numeric Display*. The cursor flashes to the right of the current value. Select the characters on the keypad to input data.

Select **Esc** to ignore any entry and return to the *Security Settings Display*.

Select the **Delete** character < - - to remove the last character selected or all if the characters were highlighted and move the cursor to the left.



Select **Enter** to log in and return to the *Security Settings Display* (displaying the Current Access Level based on the password). If the password is entered incorrectly, the Controller beeps. Refer to the *Security Settings Display*.

6.1 Change Passwords and Timeout

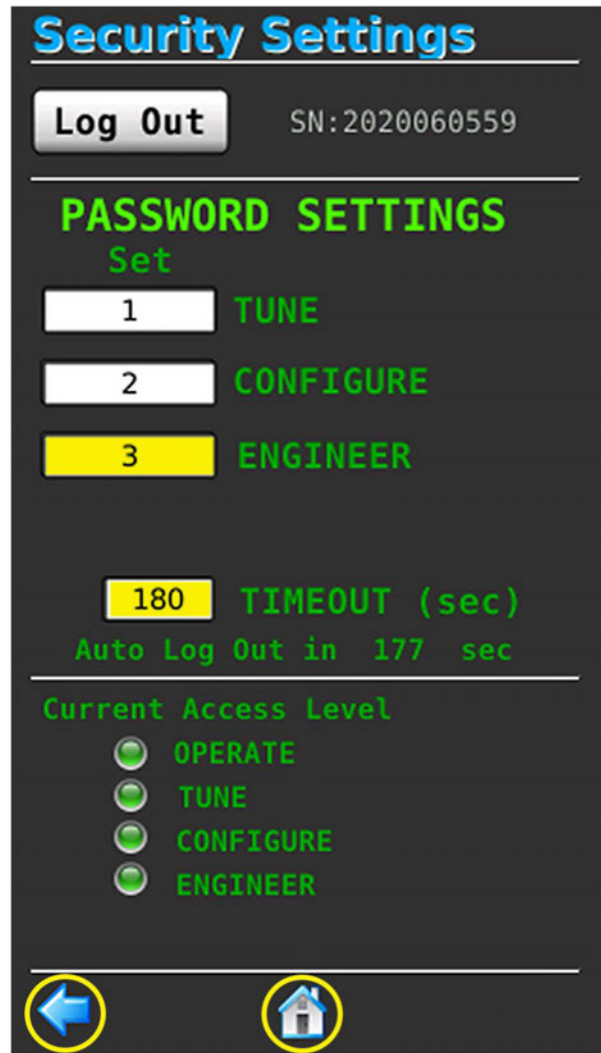
The **TIMEOUT** is the length of idle time, in seconds, that the current Security Access Level (based on Login) remains in effect. Changing displays and most entries reset the timer to the configured value. At the end of the **TIMEOUT**, the Security Access Level returns to **OPERATE**. On the right is the *Security Settings Display* with a user logged in with **ENGINEER** Security Access Level.

Select Set **TUNE**, Set **CONFIGURE**, or Set **ENGINEER** to open the corresponding *PASSWORD SETTINGS Display*. It is strongly recommended that the default passwords be changed before placing the controller into service.

Select Set **TIMEOUT** to open the *TIMEOUT SETTINGS Display*. Default values are shown to the right.

Select the **Left Display Arrow**  or the **Home Icon**  to open the *Main Menu Display*.

Security Settings Display Engineer Access

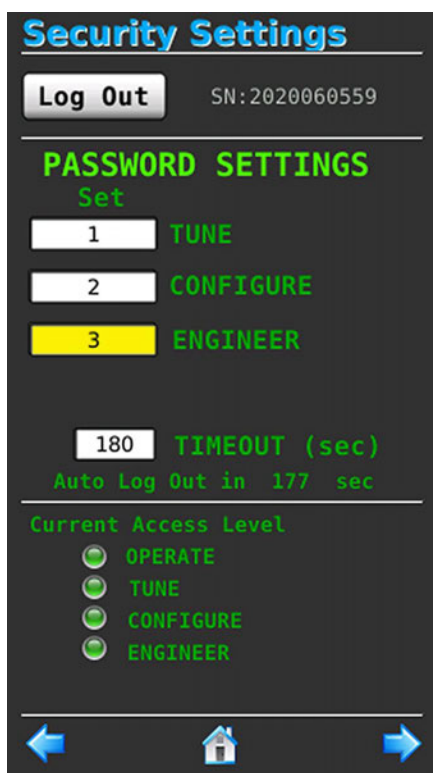


6.1.1 Entering a New Password

IT IS UP TO THE USER TO DOCUMENT AND KEEP TRACK OF THEIR PASSWORDS.

Select Set **TUNE**, Set **CONFIGURE**, or Set **ENGINEER** to open the corresponding *Password Keypad Display*. Refer to *Security Settings Display*.

Select Set **ENGINEER**.



The current password is highlighted in the *Numeric Display*. Default passwords “1”, “2”, and “3” shown above. The cursor flashes to the right of the current password. Select characters on the keypad to input each new Password Character. Valid passwords are integers in the range of 0 to 99999999. Select **Esc** to ignore the characters selected and return to the *Security Settings Display*. Select **<- -** to remove the last character selected (or all characters if the characters were highlighted) and move the cursor to the left. After you have input all the password characters Select **Enter** to return to the *Security Settings Display* (displaying the new password). Refer to the *Security Settings Display*.

6.1.2 Entering a New Timeout

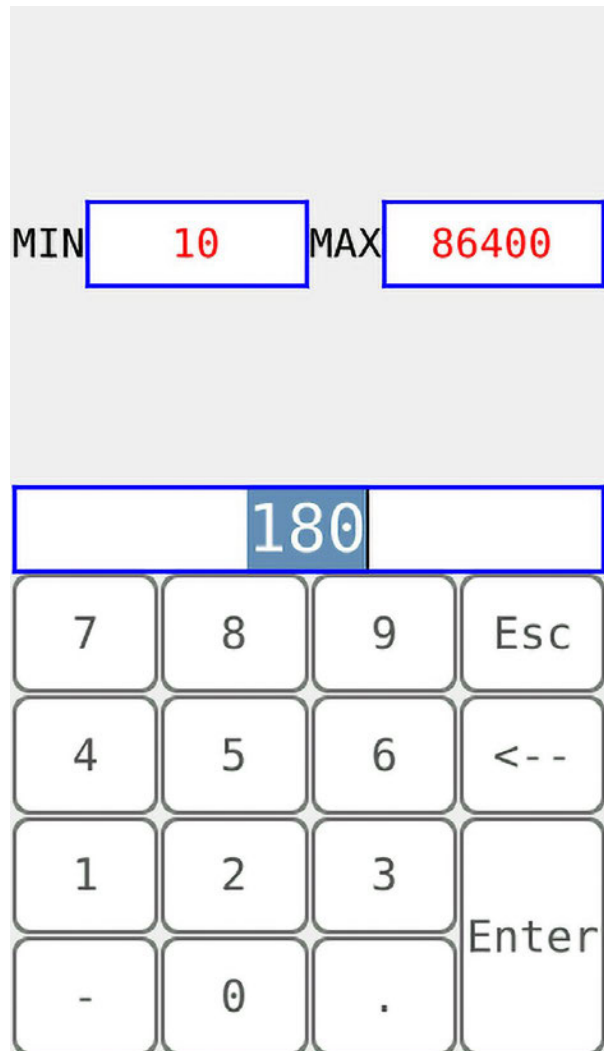
Select Set **TIMEOUT** to open the *Timeout Keypad Display*. Refer to *Security Settings Display*.

The current **TIMEOUT** is backlit and highlighted in the *Numeric Display*. The Cursor flashes to the right of the current **TIMEOUT**. Select characters on the keypad to input the **TIMEOUT** in seconds. Valid **TIMEOUT** is between 10 and 86,400 seconds.

Select the **Delete** character < - - to remove the last character selected or all if the characters were highlighted and move the cursor to the left. Select **Escape** to ignore the characters selected and return to the *Security Settings Display*.

After you have input the **TIMEOUT** select **Enter** to return to the *Security Settings Display* (displaying the new **TIMEOUT**).

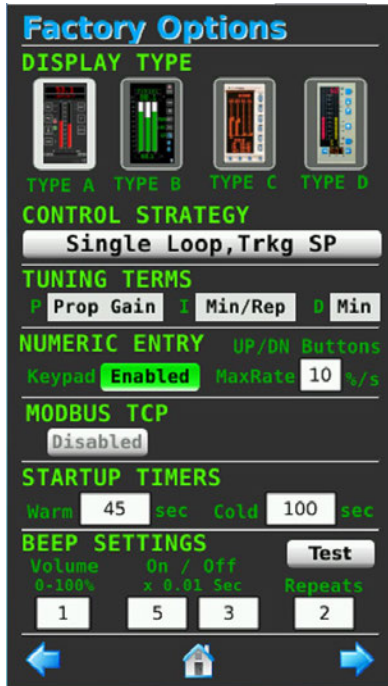
Refer to the *Security Settings Display*.



Password and timeout values can be changed to default values by performing a **Factory Reset**. Refer to *Factory Reset*.

7. Factory Options

Select **Options** on the *Main Menu Display* to open the *Factory Options Display*. Refer to *Main Menu Display*. Note that not all settings are saved until you exit setup displays. If you cycle power before closing the setup display, some or all changes will be lost.



DISPLAY TYPE - the available Display Types. The selected DISPLAY TYPE is highlighted.

CONTROL STRATEGY - the selected CONTROL STRATEGY.

TUNING TERMS - the selected units for proportion, integral, and derivative control calculations. Refer to the *Loop Configuration Display* for more details.

NUMERIC ENTRY - enable/disable keypad data entry for the operators.

UP/DN Buttons MaxRate - limits the maximum rate of change of value while depressing and holding an UP or Down arrow. Range 1 to 30 %/second.

MODBUS TCP - enable/disable MODBUS communications. **Note that there is no built-in network security.**

TREND WIDTH - for DISPLAY TYPE C the time in seconds.

STARTUP TIMERS -

On a power loss, the controller retains values of the output and mode prior to power loss. It also keeps track of the total time power was last. On powerup, there are three states and two timers (Cold Start and Warm Start) used to determine power up initialization.

The Cold Start timer must be greater than or equal to the Warm Start timer. If the controller down time was less than the Warm Start timer, the controller will perform a Hot Start. Mode and output will be the same as prior to power loss. If the controller down time was greater than the Warm Start timer but less than the Cold Start timer the controller will perform a Warm Start. Mode and output will be based on the PU LAST settings. If PU LAST is set to YES, mode and output will be the same as prior to a power loss. If PU LAST is set to NO, mode and output will be based on the values entered for POWER UP and PU MAN settings on the *Loop Configuration Display*.

Note that It takes approximately 35 seconds to perform the display power up initialization. Set the timers to values greater than 45 seconds for the timers to be effective. Setting both timers to 0 causes the controller to perform a hot start, regardless of how long it was powered down.

Startup States:

Hot Start - Down time was less than Warm Start timer value. Controller restarts with parameters from state prior to a power fail.

Warm Start - Controller will power up as defined by setup parameters where restart options appear, otherwise set to cold start conditions.

Timer setting range is 0 to 999,999 seconds and should be less than the cold start setting.

Cold Start - Controller will power up with all block outputs initialized to 0, unless otherwise configured in individual setup displays.

Timer setting range is 0 to 999,999 seconds.

BEEP SETTINGS

Volume - the volume for the controller beep. Range 0 minimum to 100 maximum.




On - the On time for the controller beep. This setting affects the tone of the beep and is the amount of On time in 1/100's of a second. Range 0 minimum to 100 maximum.

Off - the Off time for the controller beep. This setting is the amount of Off time between beeps in 1/100's of a second and only applies when the Repeats setting is greater than 1. Range 0 minimum to 100 maximum.

Repeats - the number of times the controller beep repeats. Range 0 minimum to 100 maximum. A setting of 0 disables the beep.

Test - tests the beep settings.

Factory Options values can be changed to defaults by performing a Factory Reset. Refer to *Factory Reset*.

Select the **Left Display Arrow**  or the **Home Icon**  to open the *Main Menu Display*, or the **Right Display Arrow**  to open the *I/O Setup - Analog Display*.

7.1 Change Factory Options

DISPLAY TYPE:

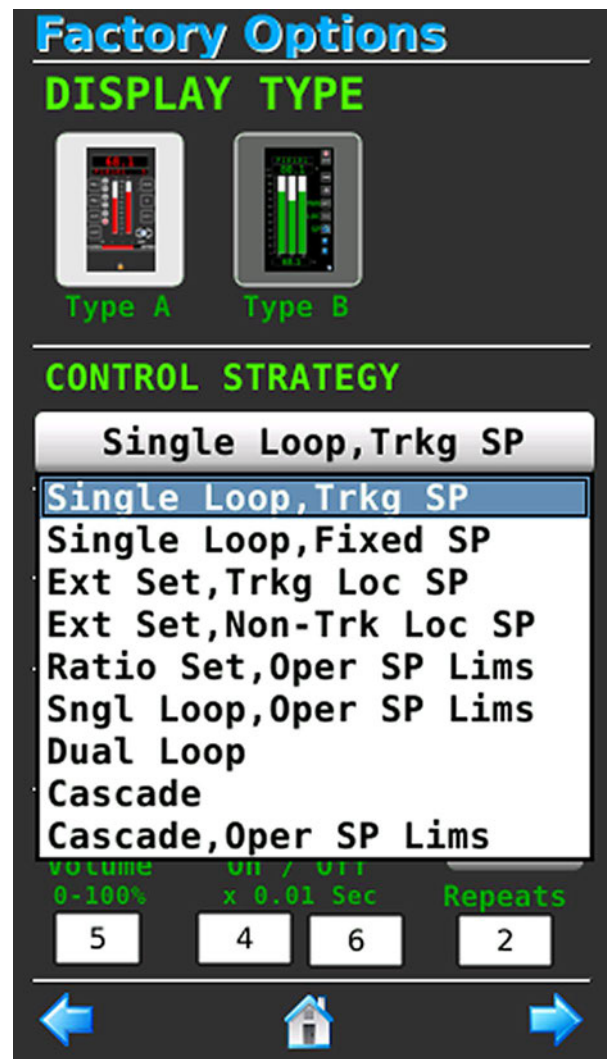
Select the desired DISPLAY TYPE. The selection will be highlighted. For DISPLAY TYPE Type C select the rectangle to the right of **TREND WIDTH** and enter the width in seconds.

CONTROL STRATEGY:

Select the rectangle under CONTROL STRATEGY to open the CONTROL STRATEGY pull-down menu. The current Control Strategy selection will be highlighted blue.

Select the desired CONTROL STRATEGY from the menu to return to the *Factory Options Display* (displaying the selected Control Strategy). **AFTER CHANGING TO A NEW CONTROL STRATEGY CYCLE POWER.**

TUNING TERMS - the selected units for proportion, integral, and derivative control calculations. Select the rectangle to the right of **P** to toggle Prop Gain and Prop Band. Select the rectangle to the right of **I** to toggle Min/Rep and Rep/Min. Select the rectangle to the right of **D** to toggle Min and Sec. Refer to the *Loop Configuration Display* for more details.



NUMERIC ENTRY:

Select the rectangle under **NUMERIC ENTRY** to Enable or Disable operator keypad data entry. The status toggles **Enabled** or **Disabled**. If **KEYPAD ENTRY** is disabled operators will only be able to change values using the UP/DOWN arrows.

UP/DN Buttons MaxRate - limits the maximum rate of change of value while depressing and holding an UP or Down arrow.

MODBUS TCP:

Select the rectangle to the right of **MODBUS TCP** to Enable or Disable **MODBUS TCP** communications. The status toggles **Enabled** or **Disabled**.

TREND WIDTH (Type C Display), UP/DN Buttons, STARTUP TIMERS: Warm, Cold; BEEP SETTINGS: Volume, On, Off, Repeats:
Select parameter to open the *Parameter Keypad Display*. Refer to the *Factory Options Display*.

Test: Select **Test** to test the controller beep.

8. I/O Setup

8.1 I/O Setup Analog

Select AIO on the *Main Menu Display* to open the *I/O Setup - AIN Display*. Refer to *Main Menu Display*. There are two (2) analog I/O Setup Displays, *I/O Setup - AIN* and *I/O Setup - AOUT*. Wiring terminal numbers are shown to the right of T #.

8.1.1 I/O Setup - Analog Input



AIN Name - the analog input name. Default names are AIN1 and AIN2. Setup is the same for both AIN's. **UNUSED** is shown if a channel is not being used.

AIN Type - the rectangle below **AI Name** shows the AI type. Available input types are **4-20 mA**, **0-20 mA**, **1-5 V**, **0-10 V**, **2-10 V**, **J TC**, **K TC**, **T TC**, **PT100E**, **PT100R**, **S TC**, **B TC**, **R TC**, or **off**.

Action - the analog input action, **Direct** or **Reverse**. Direct action is shown as a white arrow pointing to the right Reverse action is shown as a black arrow pointing to the left Action only applies to milliamp and voltage inputs. For a 4-20 mA input, **Direct** action means 4 mA represents 4,000 counts and 20 mA represents 20,000 counts. For a 4-20 mA input, **Reverse action** means 4 mA represents 20,000 counts and 20 mA represents 4,000 counts. The raw values represent field inputs and are not affected by changing the input action. For example, with a 4-20 mA input signal Direct action, at 8

mA the raw value is 8,000 and the EU value is 25%. When changed to reverse action, at 8 mA the raw value is still 8,000 but the EU value changes to 75%.

Filter - input filter time constant. Used to filter out extraneous impulses of the analog input.

Units - engineering units for the analog input.

DP - decimal point position.

Low - low range engineering unit value.

High - high range engineering unit value.

Zero Adj - offset for analog input. Used to account for sensor drift. The Zero Adj is not affected by changing the input action. For example, if zero adj value is -2, it subtracts 2 from the EU value whether the action is direct or reverse.

Linear/Sq Root/Mod Sq Rt - specifies whether or not to apply square root characterization to the input signal. Square root characterization is used for differential pressure flow measurements. The modified square root option makes the signal linear when it is below 10% of the input's raw span.

AI Mode - Normal (green), **Debug** (red), **Loopback AOUT1** (red) or **AOUT2** (red) for Dual Loop. Normal Mode displays the field input value in electrical units (mA, V or °). Debug Mode allows you to simulate the input without the need for a signal generator. The debug value is in counts and its limits depend on the signal type (i.e. for a 4-20mA input, 4mA = 4,000 counts). For a 4-20 mA input direct action a debug value of 4,000 represents 0%. For a 4-20 mA input reverse action a debug value of 4,000 represents 100%. Loopback Mode uses the Loop A/M output as the input source for debugging. For example selecting Loopback Mode for Input 1 would use Loop 1 or Loop2 output as the source for Input 1. Loopback is only available for process inputs, not remote setpoints or wild flows. For Ratio control, loopback for AIN2 causes AOUT1 to loopback to AIN2. For Cascade control, loopback for AIN1 and AIN2 causes loop1 and loop 2 output, process, and setpoint to track. The LoopBack value is taken from the signal sent to the corresponding output. Setting the output to reverse or changing its value in debug mode has no effect on the value that is looped back.

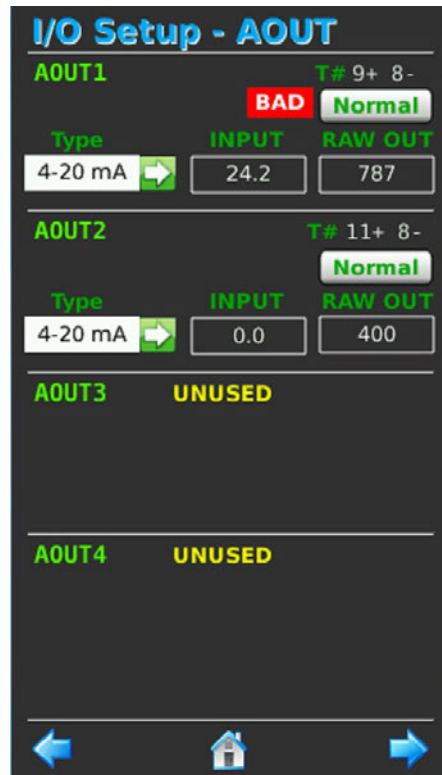
AIN Value (rectangle underneath **AIN Mode**) - The value in counts. The count value for mA and voltage inputs represents the electrical value times 1,000. The count value for thermocouple or RTD inputs represents the value in degrees, except for PT100R which is degrees times 10.

Data Quality - **BAD** will be displayed in white with a red background if the analog input is out of range. By default, the controller will return to manual and the output will be held

at last value. Refer to the *Enable RTM* parameter in the *Loop Configuration Setup* Display.

EU - the value of the analog input in engineering units.

8.1.2 I/O Setup - Analog Output



Wiring terminal numbers are shown to the right of **T #**.

AOUT Name - analog output name. Default names are AOUT1 and AOUT2. Setup is the same for both AOUT's. **UNUSED** is shown if a channel is not being used.

AOUT Type - the rectangle below **AOUT Name** shows the AOUT type. Available output types are **4-20 mA**, **0-20 mA**, **1-5 V**, **0-10 V**, **2-10 V**, or **off**.

Action - the analog output action, **Direct** or **Reverse**. For a 4-20 mA output, **Direct** action means 4 mA represents 400 counts and 20 mA represents 2,000 counts. For a 4-20 mA output, **Reverse action** means 4 mA represents 2,000 counts and 20 mA represents 400 counts. The raw values represent field outputs and are not affected by changing the output action. For example, with a 4-20 mA output signal Direct action, at 25% output, the raw value is 800 representing 8 mA. When switched to reverse action, at 25% output the raw value is 1,600 representing 16 mA.

Input - the value of the input to the analog output in %.

AOUT Mode - **Normal** (green) or **Debug** (red). Debug Mode allows you to simulate the output without the need for a signal generator. The normal and debug values in counts representing the electrical units, mA or volts (limits depend on the signal type). For a 4-

20mA output, 4mA = 400 counts. The raw values (rectangles under **AOUT Mode**) represent field outputs and are not affected by changing the output action. For example, with a 4-20 mA output signal Direct action, at 25% output, the raw value is 800 representing 8 mA. When switched to reverse action, at 25% output the raw value is 1,600 representing 16 mA.



Data Quality - **BAD** will be displayed in white with a red background if the analog output has BAD QUALITY. BAD QUALITY happens when:

1. Process input has BAD QUALITY or
2. Remote setpoint input has BAD QUALITY (only for remote setpoint strategies) and the setpoint source is Remote or
3. Specify ON/OFF control Digital Output (BAD QUALITY Alarm will not be generated in this case)

Select  to open the last display, select  to open the next display, or  to return to the *Main Menu Display*.

8.1.3 Change I/O Setup - Analog Inputs and Outputs

Input Type - Select the rectangle below **AIN Name** (default **AIN1**) to open Type pull-down Menu of input types, **4-20 mA**, **0-20 mA**, **1-5 V**, **0-10 V**, **2-10 V**, **J TC**, **K TC**, **T TC**, **PT100E**, **PT100R**, **S TC**, **B TC**, **R TC**, or **off**. Select the desired Type from the Menu to return to the *I/O Setup - AIN Display*.

AIN Action - select the arrow to the right of type to select  direct or  reverse.

Filter, Low, High, Zero Adj - select the **Filter**, **Low**, **Hi**, or **Zero Adj** to open the *Keypad Display*. Refer to the *I/O Setup - AIN Display*.

Units - selects Units. For voltage or milliamp inputs, the Engineering Units pull-down Menu opens. Select the desired Input Engineering Units or no units (very top of pull-down menu just above %) and return to the *I/O Setup - AIN Display*. For temperature inputs, the Engineering Units pull-down Menu opens. Select **DEG C** or **DEG F** to display the temperature in degrees Celsius or degrees Fahrenheit and return to the *I/O Setup - Analog Display*. For flow inputs or no units, the Flow Time Base pull-down menu opens (rectangle to the right of the Engineering Units pull-down Menu). Select the desired time base and return to the *I/O Setup - AIN Display*.

DP - select the desired decimal point position and return to the *I/O Setup - AIN Display*.

Linear/Sq Root/Mod Sq Rt - select for Linear, Square Root, or Modified Square Root characterization. The selection cycles **Linear**, **Sq Root**, or **Mod Sq Root**.

AIN Mode - select to choose **Normal**, **Debug**, or **Loopback**. The mode cycles showing **Normal** in green or **Debug** or **Loopback** in red. In Debug the user can select the Debug Value to open the *Keypad Display*. The limits on the value you can enter vary based on the input type.

Output Type - Select the rectangle below **AOUT Name** (default **AOUT1**) to open Type pull-down Menu of output types, **4-20 mA**, **0-20 mA**, **1-5 V**, **0-10 V**, **2-10 V**, or **off**. Select the desired Type from the Menu to return to the *I/O Setup - AOUT Display*.

AOUT Action - select the arrow to the right of type to select  direct or  reverse.

AOUT Mode - select to choose **Normal** or **Debug**. The mode toggles between **Normal** in green or **Debug** in red. In Debug the user can select the Debug Value to open the *Keypad Display*. Limits on the values you can enter vary based on the output type.

8.2 I/O Setup - Digital

Select DIO on the *Main Menu Display* to open the *I/O Setup - DIN Display*. Refer to *Main Menu Display*. There are two (2) digital I/O Setup Displays, *I/O Setup - DIN* and *I/O Setup - DOUT*. Wiring terminal numbers are shown to the right of **T #**.

8.2.1 I/O Setup - Digital Input

DIN Name - the digital input name. Default names are DIN1 thru DIN5.

DESTINATION - the DESTINATION for the digital output. See DIN sources below.

MODE - DIR, REV, OFF, or ON. OFF or ON allow the user to force the DIN off or on. Cycling power will reset all DIN's to DIR. DIR sets the DIN to the same action as the source. For example if the DIN DESTINATION is L1 LOC/REM and DIN MODE is set to DIR, the LOC/REM source will be remote when the DIN is active. REV sets the DESTINATION to the opposite action as the DIN.

FIELD STATUS LED - the status of the FIELD terminals of the DI, OFF (black) or ON (red).

DST STATUS LED - the status of the DESTINATION of the DIN, OFF (black) or ON (red).



8.2.1 I/O Setup - Digital Output

DOUT Name - the digital output name. Default names are DOUT1 thru DOUT5.

SOURCE - the SOURCE for the digital output. See DOUT sources below.

MODE - DIR, REV, OFF, or ON. OFF or ON allow the user to force the DOUT off or on. Cycling power will reset all DOUT's to DIR. DIR sets the DOUT to the same action as the source. For example if the DOUT SOURCE is L1 ALM1 and DOUT MODE is set to DIR, the DO will turn on when the alarm trips. REV sets the DO to the opposite action as the SOURCE.

SRC STATUS LED - the status of the SOURCE of the DO, OFF (black) or ON (red).

FIELD STATUS LED - the status of the FIELD terminals of the DO, OFF (black) or ON (red).



8.3 DIN Destinations

None	No action
GACK	Global Alarm Acknowledge
L1 LOC/REM	Loop 1 Setpoint Source, Local (False) or Remote (True)
L2 LOC/REM	Loop 2 Setpoint Source, Local (False) or Remote (True)
TOT1 RESET	Resets Totalizer 1 Batch Total
TOT2 RESET	Resets Totalizer 2 Batch Total

8.3 DOUT Sources




Digital Output 1 thru 4 Sources:

DO Source	
None	Digital Output Unused
L1 ALM1	Loop1 Alarm1 Active
L1 ALM1 UAK	Loop1 Alarm1 Unacknowledged
L1 ALM2	Loop1 Alarm2 Active
L1 ALM2 UAK	Loop1 Alarm2 Unacknowledged
AIN1 TOT P1	Analog Input 1 Batch Totalizer Preset 1 Tripped
AIN1 TOT P2	Analog Input 1 Batch Totalizer Preset 2 Tripped
BATOT1 PL	Analog Input 1 Batch Totalizer Pulse Output
L2 ALM1	Loop2 Alarm1 Active
L2 ALM1 UAK	Loop2 Alarm1 Unacknowledged
L2 ALM2	Loop2 Alarm2 Active
L2 ALM2 UAK	Loop2 Alarm2 Unacknowledged
AIN2 TOT P1	Analog Input 2 Batch Totalizer Preset 1 Tripped
AIN2 TOT P2	Analog Input 2 Batch Totalizer Preset 2 Tripped
BATOT2 PL	Analog Input 2 Batch Totalizer Pulse Output
L1 OUT	Loop1 ON/OFF Control Digital Output
L2 OUT	Loop2 ON/OFF Control Digital Output

Digital Output 5 Sources:

The Global Alarm is a preconfigured alarm that trips if any process alarm is active or if the data quality alarm is active. Digital Output 5 can change state based on the Global Alarm status or the Global Alarm Unacknowledged status. A typical use for the Unacknowledged status would be for a horn or flashing light.

DO Source	
None	Digital Output Unused
GALM	Global Alarm Active
GALM UAK	Global Alarm Unacknowledged

Select  to open the last display, select  to open the next display, or  to return to the *Main Menu Display*.

8.4.1 Change I/O Setup - Digital Inputs

DESTINATION - Select the rectangle under DESTINATION to open the DIN DESTINATION pull-down Menu. Select the desired input destination.

MODE - Select the DIN MODE to select the MODE for the digital input, DIR, REV, OFF or ON.

8.4.2 Change I/O Setup - Digital Outputs

SOURCE - Select the rectangle under SOURCE to open the DIO SOURCE pull-down Menu. Select the desired output source.

MODE - Select the DOUT MODE to select the MODE for the digital output, DIR, REV, OFF or ON.

The following applies to L1 OUT or L2 OUT sources for ON/OFF Control. **DOUT ON/OFF Enabled** will be shown on the *Loop Configuration Display*. Refer to *Loop Configuration Display*. Select DO Source to open the pull-down menu. Select L1 OUT or L2 OUT for the source.

I/O Setup - ON/OFF Control Digital Output



9. Loop Configuration

Select **Loops** on the *Main Menu Display* to open the *Loop1 Configuration Display*. The *Loop Configuration Display* is used to enter Tuning Parameters, Output Limits, Output Decimal Position, and SP Limits (for Control Strategies with Setpoint Limits). The Configuration for Loop 2 (used in Dual Loop and Cascade Control Strategies) is the same as for Loop 1. TUNE Security Access or higher is required to change Tuning Parameters. OP Range applies to PID Analog outputs. ON/OFF Control Digital Outputs are specified on the *I/O Setup - Digital Display*. Refer to *I/O Setup - Digital Display*. If ON/OFF Control Digital Output is being used, **DOUT ON/OFF Enabled** is displayed under Limits. PID Tuning and PID CYCLE parameters do not apply to ON/OFF control. Loop Tagnames can be changed on the *Tags Display*. Refer to *Tags Setup Display*.

PID Analog Output

Auto/Manual Transfer

Loop 1 Configuration
TAG: LOOP1TAG

Tuning Parameters

PB	TI	TD	DG
100	0.01	0	10
Prop Band (0=off)	Integ rep/min (0=off)	Deriv min (0=off)	Deriv Gain (1=off)

A/M Transfer

POWER UP	PU MAX	PU LAST	PID Action
AUTO	0.0 %	YES	REV

ARW **RTM** **Setpoint**

0.0 %	ENAB	TRK	ENAB
-------	------	-----	------

PID Cycle 500mS **PU** TRACKING

Limits **Low** **High**

OP	0.0	100.0	%
DP	00000.0	Lim MAN	YES

← Home →

Internal/External Setpoint

Loop 1 Configuration
TAG: LOOP1TAG

Tuning Parameters

PG	TI	TD	DG
1	100	0	10
Prop Gain (0=off)	Integ min/rep (0=off)	Deriv min (0=off)	Deriv Gain (1=off)

Ext/Int Setpoint

POWER UP	PU LAST	PID Action
INTERNAL	YES	REV

ARW **RTM** **Setpoint**

0.0 %	ENAB	TRK	ENAB
-------	------	-----	------

PID Cycle 500mS **PU** PREVIOUS

Limits **Low** **High**

OP	0.0	100.0	%
DP	00000.0	Lim MAN	YES

← Home →

Ratio Control

Loop 1 Configuration
TAG: LOOP1TAG

Tuning Parameters

PG	TI	TD	DG
1	100	0	10
Prop Gain (0=off)	Integ min/rep (0=off)	Deriv min (0=off)	Deriv Gain (1=off)

A/M Transfer

POWER UP	PU MAX	PU LAST	PID Action
AUTO	0.0 %	YES	REV

ARW **RTM** **Setpoint**

0.0 %	ENAB	TRK	ENAB
-------	------	-----	------

PID Cycle 500mS **PU** PREVIOUS

Ratio **DP** **LO LIM** **HI LIM**

1.00	0000.00	0.50	1.50
------	---------	------	------

Limits **Low** **High**

OP	0.0	100.0	%
DP	00000.0	Lim MAN	YES

SP **Low** **High**

0.0	100.0	%
-----	-------	---

← Home →

ON/OFF Control Digital Output

Loop 1 Configuration

TAG: LOOP1

Tuning Parameters

PG	TI	TD	DG
1.00	100.00	0.00	10.00
Prop Gain (0=off)	Integ min/rep (0=off)	Deriv min (0=off)	Deriv Gain (1=off)

A/M Transfer

POWER UP	PU MAN	PU LAST	PID Action
AUTO	0.0%	YES	REV

ARW	RTM	ENAB	SETPT TRK
PID CYCLE	500mS		NO

Limits

OP DOUT ON/OFF Enabled

DBAND	8.0%	
-------	------	--

ON/OFF Control Digital Output Enabled

Deadband

TAG - Loop Tagname, up to 8 characters.

Tuning Parameters units for the PID algorithm are selected on the *Factory Options Display*. The following are the selections available and their definitions:

P - Proportional Gain or Proportional Band. Proportional Gain is a multiplier applied to the error between process and setpoint to achieve the desired change in output to compensate for the error. Proportional Band is the Proportional Gain/100. A value of 0 disables the Proportional response.

I - Integral Time in minutes per repeat or repeats per minute. Integral Time is the amount of time for the Output to repeat the change made due to the Proportional response. A value of 0 disables the Integral response.

D - Derivative Time Setting in minutes or seconds. Derivative Time is the amount of time to project where the Process variable would be, based on an initial change in Process value or change in a controlled Process ramp rate. Unlike Derivative on error,

Derivative on Process does not cause an undesirable Output spike when the Setpoint is changed. Derivative action is rarely needed and is generally for applications that have a lag in Process signal or a slow reaction to Output change. The controller will adjust the output in an attempt to prevent the process from continuing to change in one direction. The greater the TD value, the more effect on the output response. A value of 0 disables the Derivative time response.

DG - Derivative Gain. Derivative Gain is a multiplier applied to the Derivative time calculation. A value of 1 disables the Derivative Gain response.

The following table summarizes the tuning parameters:

LIMITS				DEFAULTS
PROPOTIONAL				
GAIN		BAND		GAIN
MIN	MAX	MIN	MAX	
0.001	200	0.50000	1000	1
INTEGRAL RESET				
MINUTES/REPEAT		REPEATS/MIN		MINUTES/REPEAT
MIN	MAX	MIN	MAX	
0.001	4000	0.00025		100
DERIVATIVE TIME				
MINUTES		SECONDS		MINUTES
MIN	MAX	MIN	MAX	
0	100	0	6000	0
DERIVATIVE GAIN				
MIN	MAX			
1	30			10

Entering a 0 value for PB, TI, or TD is not practical on a live process but could be used to test control responses using just a portion of the control algorithm. For example, set PB, TI, and TD to 0 and test just the Derivative portion of the control algorithm.

The default Derivative Gain value is 10. It should be set to 1 for Display Types B, C, and D. If replacing a controller that does not use DG, set DG to 1.

Selecting a display type on the Factory Options page will set the tuning terms as follows:

- Type A: Gain, Min/Rep, Min
- Type B: Gain, Rep/Min, Min
- Type C: Prop Band, Min/Rep, Min
- Type D: Prop Band, Min/Rep, Min

Different tuning terms can be selected after selecting the display type. Current tuning values are converted when changing the terms.

A/M Transfer - POWER UP - MANUAL or AUTO.

A/M Transfer - PU MAN - The output value in % for MANUAL mode on power up.

A/M Transfer - PU LAST - YES or NO.

Explanation of Auto/Manual transfer on power up during a warm or cold start:

If PU LAST has been configured as YES, during a warm start all outputs are initialized at previous values and the controller will power up in the same condition (eg, same A/M state). When powering up in auto, the controller will execute in the manual mode for the first two scan cycles, allowing a controller to track the last value.

If PU LAST is set to NO, the setpoint source will be in the position set by the POWER UP parameter, either AUTO or MAN.

During a cold start, the setpoint source will be in the position set by the POWER UP parameter. When the POWER UP parameter is used and the block powers up in MANUAL, the manual value can be set using the PU MAN parameter.

Refer also to the *Factory Options Display*.

Ext/Int Setpoint parameters only appear for Control Strategies with External Setpoint including Ratio and Cascade.

Ext/Int Setpoint POWER UP - Specifies the Setpoint Source on a cold start, **EXTERNAL** or **INTERNAL**.

Ext/Int Setpoint PU LAST - YES or NO. If set to YES, the Setpoint Source will be the last position during a hot or warm start. If set to NO, the Setpoint Source will be in the position set by the POWER UP SET parameter.

Note that **Ext/Int Setpoint** parameters only appear for control strategies with external setpoints.

PID Action - Direct or Reverse. Specifies the direction the output changes when the process does not equal the setpoint. For a Reverse Acting Controller, the output decreases as the process variable rises above the setpoint. For a Direct Acting Controller, the output increases as the process variable rises above the setpoint. This cannot be changed when the controller is in AUTO.

ARW - anti-reset windup reduces or stops the PID integral response when the process approaches setpoint or when the output approaches its limits.

ARW has three modes:

- If ARW = 0, sets the integral value to zero when the process crosses the setpoint, or if the output reaches its high or low limit
- If ARW > 0, reduces integral value proportionally from +/- ARW deviation as it approaches the setpoint
- If ARW < 0, sets integral value to zero when deviation error is within +/- the absolute value of ARW from the setpoint

Range is +/- 100.0 %. Default is 0.0

Enable RTM - Reject to Manual - **NO** or **YES**. If there is an error in the process data quality the PID algorithm is set to manual and the output is held at last value. This prevents the output from continuing to change when the process is undetermined. There may be instances when you want the output to continue to change. For these instances set Enable RTM to **NO**.

PID CYCLE - The time in milliseconds (100 millisecond increments) for the PID algorithm calculation. Range is 100 milliseconds minimum to 1,000 milliseconds maximum.

Setpoint Tracking - **ENAB** or **DISAB**. Specifies whether or not to enable setpoint tracking. The value depends on the control strategy selected. You can choose to overwrite the value specified in the control strategy.

PU - Powerup setpoint value, **PREVIOUS** or **SET**. Previous uses the setpoint value when the controller shut down. Set allows you to specify an initial setpoint value. Set value is entered in engineering units.

Ratio - For Ratio Control Strategy, the desired ratio of Captive Flow Setpoint/Wild Flow.

DP - For Ratio Control Strategy, the decimal point position of the Ratio.

LO LIM - For Ratio Control Strategy, the ratio low limit.

HI LIM - For Ratio Control Strategy, the ratio high limit.

OP Limits - For PID analog outputs, specifies the output limits. For zero-based outputs, the range can be limited between 0% to 105%. For none zero-based outputs, the range can be limited -25% to 105%. In a cascade system, the Loop1 output range and engineering units match the Loop2 analog input range and engineering units. For ON/OFF Control Digital outputs, **DOUT ON/OFF Enabled** is displayed.

OP EU - Output engineering units, always % except for cascade Loop1.

DP - The output decimal point position.

Limit in MAN - **YES** or **NO**. Specifies whether or not to apply limits to the output when in MANUAL.

SP Limits - Specifies operator setpoint low and high limits. Only appears for Control Strategies with operator setpoint limits. Limits 0 to 110% of engineering units.

Ext/Int Setpoint parameters only appear for Control Strategies with External Setpoint including Ratio and Cascade.

Ext/Int Setpoint POWER UP - Specifies the Setpoint Source on a cold start, **EXTERNAL** or **INTERNAL**.

Ext/Int Setpoint PU LAST - **YES** or **NO**. If set to NO, controller will power up in the last position during a hot start, but during a warm or cold start controller will power up in the position set by the POWER UP parameter

DOUT ON/OFF Enabled will be displayed if ON/OFF Control Digital Output is being used. Specify DIO1 or DIO2 SOURCE as L1 OUT or L2 OUT in the Digital I/O Setup. Refer to *I/O Setup - Digital*.

DBAND will be displayed if ON/OFF Control Digital Output is being used. DBAND stands for Deadband which is the hysteresis as a % for ON/OFF control. For example, AIN1 range 0 to 200F, deadband = 4%, Direct Mode, setpoint = 100F. DO goes ON below 96F and OFF above 104F. This is much like a home thermostat.

Select  to open the last display, select  to open the next display, or  to return to the *Main Menu Display*.

9.1 Change Loop Parameters

PG, TI, TD, DG, PID CYCLE, PU SET, Ratio, Ratio LO LIM, Ratio HI LIM, OP Limits: Low, High, SP Limits: Low, High - select to open the *Parameter Keypad Display*. Refer to the *Loop Configuration Display*.

PID Action - Select **REV** or **DIR**.

A/M Transfer - POWER UP - Select **MANUAL** or **AUTO**.

A/M Transfer - PU MAN - Select to open the *Parameter Keypad Display*. Enter the output value in % for **MANUAL** mode on power up.

A/M Transfer - PU LAST - Select **YES** or **NO**.

Select **A/M Transfer** after you have entered A/M Transfer parameters. Ext/Int Setpoint parameters appear on the display.

Ext/Int Setpoint POWER UP - Select **INTERNAL** or **EXTERNAL**.

Ext/Int Setpoint PU LAST - Select **YES** or **NO**.

Enable RTM - Select **NO** or **YES**. **NO** is shown in red as a reminder that this allows PID control on an out of range input signal and is not normally selected.

PID CYCLE - Select to open a pull-down Menu of PID CYCLE times, 100mS thru 1000mS in 100 mS increments. Select the desired time from the Menu to return to the *Loop Configuration Display*.

Setpoint TRK - Select **ENAB** or **DISAB**.

PU SET - Enter the initial setpoint value in engineering units.



For PID analog output:

DP - Select the desired decimal point position and return to the *Loop Configuration Display*.

Limit in MAN - Select **YES** or **NO**.

For ON/OFF control digital output:

DBAND - Enter the deadband as % of engineering units range.

When finished, select  to return to last display or  to return to the *Main Menu Display*.

10. Alarms Setup Displays

Select Setup Alarms on the *Main Menu Display* to open the *Alarms Setup Displays*. Refer to *Main Menu Display*. Loop 2 Alarms Setup will only be displayed if there is a second loop. Loop 1 Remote Setpoint Alarms will only be displayed if there is a Remote Setpoint source.

Loop 1 Process

ALARM1		LOOP1TAG.P		Alarms	
ALM1_A1		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
110.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
HI	0	0	NO		
ALM1_A2		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
-10.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
LO	0	0	NO		
ALM1_A3		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
100.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
dEV	0	0	NO		
ALM1_A4		DISABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
0.0	0.5	NO		3	
TYPE	DLIN	DLOUT	RGBCK		
none	0	0	NO		

Loop 2 Process

ALARM2		LOOP2TAG.P		Alarms	
ALM2_A1		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
110.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
HI	0	0	NO		
ALM2_A2		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
-10.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
LO	0	0	NO		
ALM2_A3		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
100.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
dEV	0	0	NO		
ALM2_A4		DISABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
0.0	0.5	NO		3	
TYPE	DLIN	DLOUT	RGBCK		
none	0	0	NO		

Loop 1 Remote

ALARM2		LOOP1TAG.X		Alarms	
ALM2_A1		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
110.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
HI	0	0	NO		
ALM2_A2		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
-10.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
LO	0	0	NO		
ALM2_A3		ENABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
100.0	0.5	YES		3	
TYPE	DLIN	DLOUT	RGBCK		
dEV	0	0	NO		
ALM2_A4		DISABLED			
LIMIT	DBAND%	PU	EN	PRIOR	
0.0	0.5	NO		3	
TYPE	DLIN	DLOUT	RGBCK		
none	0	0	NO		

There is a built-in Data Quality alarm for each analog input which displays a red light to the right of **QUAL** for Bad Quality on the *Process Alarms Operation Display*. Bad Quality is handled as Priority 1 alarm and is triggered when the input value exceeds the upper or lower range value by more than 10%. For bad quality mA and V inputs, the *Control Display* will show the minimum or maximum value defined by Characterizers 1 and 2. Refer to *Character Setup Display*. For thermocouple and RTD inputs the *Control Display* will show the top of range value. Additionally, by default, the controller will return to manual and the output will be held at the last value. Refer to the *Enable RTM* parameter in the *Loop Configuration Setup Display*. For each Alarm, the Type, Priority, Limit, and Status LED are displayed on the *Process Alarms Operation Display*. The alarm name (defaults are ALM1_A1 thru ALM1_A4 and ALM2_A1 thru ALM2_A4) will be grayed if the alarm is disabled. Refer to the **Panelicity® User Manual**. There are 4

alarms for each input. Alarm parameters and setup for each input are identical. If displayed, the second alarm group applies to either a remote input (X) of a single loop strategy, or to the process input (P) of a second loop.

Name - the alarm name. Alarm names can be changed on the *Tags Display*. Refer to *Tags Setup Display*.

Enable - enable or disable the alarm.

LIMIT - trip point for the alarm in engineering units, -10 to 110% of the range.

DBAND% - deadband - the value in % of range that the process must change from the LIMIT before the alarm will clear.

PU EN - power up enable. The alarm can be enabled or disabled on a warm start or cold start. The alarm will be disabled by the amount of time entered in the STARTUP TIMERS Warm and Cold. Refer to the *Factory Options Display*.

PRIOR - alarm priority.

10.1 Priorities

Priority 1 - causes the Controller bar graphs and LEDs to flash and requires acknowledgement to stop flashing. This is the highest priority.

Priority 2 - causes the Controller bar graphs and LEDs to flash and stops flashing when the alarm clears (eg, self-clearing).

Priority 3 - causes the alarm LEDs to flash and stops flashing when the alarm is acknowledged.

Priority 4 - causes the alarm LEDs to flash and stops flashing when the alarm clears.

Priority 5 - displays the alarm but not require acknowledgement. This is the lowest priority.

TYPE - alarm type.

10.2 Types

none - no alarm.

HI - compares the process with the LIMIT and trips if the process is equal to or higher than the LIMIT. The alarm status clears when the process is less than the LIMIT minus the deadband.

LO - compares the process with the LIMIT and trips if the process is equal to or lower than the LIMIT. The alarm status clears when the process is greater than the LIMIT minus the deadband.

HdEV - compares the difference between the process and the setpoint with the LIMIT and trips if the difference is equal to or greater than the LIMIT. The alarm status clears when the difference is less than the LIMIT minus the deadband.

LdEV - compares the difference between the process and the setpoint with the LIMIT and trips if the difference is equal to or less than the LIMIT. The alarm status clears when the difference is greater than the LIMIT plus the deadband.

dEV - compares the absolute difference between the process and setpoint with the LIMIT and trips if the absolute difference exceeds the LIMIT. The alarm status clears when the absolute difference is within the LIMIT minus the deadband.

or - compares the process with the Range Limits and trips when the process exceeds the Hi or Low Range Limits.

DLIN (Delay-In Time) - requires that the input remain above (or below) the limit setting for the delay time before the alarm trips. This prevents nuisance alarms from tripping due to process noise.

DLOUT (Delay-Out Time) - requires that the input remain below (or above) the limit setting plus deadband for the delay time before the alarm clears. This prevents inadvertent clearing of alarms due to process noise.

RGBCK (Ringback) - requires alarm acknowledgement when the alarm trips and again when the alarm clears (priorities 1-4). (Alarms on both sides of alarm trip point).

Select  to open the last display, select  to open the next display, or  to return to the *Main Menu Display*.

10.3 Change Alarm Parameters

Name - the alarm name. Alarm names can be changed on the *Tags Display*. Refer to *Tags Setup Display*.

ENABLE - select to ENABLE/DISABLE the alarm. The status toggles **ENABLED** or **DISABLED**.

LIMIT - select **LIMIT** to open the *Keypad Display*.

DBAND% - select to open a pull-down Menu of deadband values, **0.1**, **0.5**, **1.0**, or **5.0**. Select the desired value from the Menu to return to the *Alarms Setup Display*.

PU EN - select to determine whether or not the alarm will be enabled on power up. The status toggles **NO** or **YES**.

PRIOR - select to open a pull-down Menu of alarm priorities, **1**, **2**, **3**, **4**, or **5**. Select the desired value from the Menu to return to the *Alarms Setup Display*.

TYPE - select to open a pull-down Menu of alarm types, **none**, **HI**, **LO**, **Hdev**, **LdEV**, **dEV**, or **or**. Select the desired type from the Menu to return to the *Alarms Setup Display*.

The alarm type is predefined for the *Type C* and *Type D* displays:

Loop1

HI - ALARM1_A1
LO - ALARM1_A2

Loop2

HI - ALARM2_A1
LO - ALARM2_A2

DLIN - select to open a pull-down Menu of alarm delay-in times, **0**, **0.4**, **1**, **2**, **5**, **15**, **30**, or **60**. Select the desired value from the Menu to return to the *Alarms Setup Display*.

DLOUT - select to open a pull-down Menu of alarm delay-out times, **0**, **0.4**, **1**, **2**, **5**, **15**, **30**, or **60**. Select the desired value from the Menu to return to the *Alarms Setup Display*.

RGBCK - select to determine whether or not alarm ringback is enabled. The status toggles **NO** or **YES**.

11. Totalizer Setup

Select Setup **Totalizer** on the *Main Menu Display* to open the *TOTALIZER Setup Display*. Refer to *Main Menu Display*. There is a totalizer available for each analog input. Note that the analog input must be a flow (volumetric or mass) or no units. Each totalizer has a RunTotal Time and 2 totals, BATCH TOTAL and RUN TOTAL. The BATCH TOTAL can be reset by an operator. The RUN TOTAL requires TUNE or higher security access to reset. Resetting the RUN TOTAL also resets the RunTotal Time and resets the BATCH TOTAL.

**Main Menu
with Totalizer**



Totalizer Setup



Totalizer Name - name of Totalizer 1 (default **BATOT1**) - input value and engineering units shown to the right. *invalid units* will be displayed for inputs which can not be totalized. Totalizer names can be changed on the *Tags Display*. Refer to *Tags Setup Display*.

Enable - enable or disable the Totalizer. If enabled, the totalizer can be started from the *Totalizer Operation Display*. Refer to the *Panelicity User Manual*. Disabling the totalizer turns off the pulse output and preset outputs. When a totalizer that is enabled is stopped, the pulse output and preset outputs are held at their last states.

PU_LAST - determines how the totalizer starts during a warm or cold start. During a warm start, if the configuration parameter PU LAST is set to YES, the integrator function will initialize with the last value prior to power down and the pulse output and preset outputs will be initialized to the last value prior to power down. If set to NO, or during a cold start, the integrator and pulse output and preset outputs will initialize to 0.

Wrap - specifies whether an incrementing Totalizer stops changing when reaching the high limit or continues to change crossing 0 when reaching the high limit. The high limit is 999999. For an incrementing totalizer with wrap YES the value continues changing from 999999 to 1. For an incrementing totalizer with wrap NO the value will stop changing at 999999. For a decrementing totalizer the value always stops changing at 0.

DPP - decimal point position.

TOT_SCAL - specifies the divisor to use for the count.

- TOT_SCAL = 1 - each count increments at the same rate as the analog input timebase rate.
- TOT_SCAL = 10 - each count increments 1/10th the analog input timebase rate.
- TOT_SCAL = 0.1 - each count increments 10 times the analog input timebase rate.

Init_Val - specifies starting value when either BATCH TOTAL or RUN TOTAL is reset

ZDO - specifies the value in engineering units below which the value will no longer be totalized. This is also called low flow cutoff. This ensures the totalizer will stop counting when the flow is shut off or the flowmeter zero is out of calibration.

PUL_SCAL - specifies the divisor to use for the Pulse Output:

- PUL_SCAL = 1 - the output comes on each time the count increments, turning off half way to the next increment.
- PUL_SCAL = 10 - the output comes every tenth count, turning off half way to the next increment.

- PUL_SCAL = 0.1 - the output comes every 1/10th count, turning off half way to the next increment.

The totalizer runs at a 100mSec rate. The minimum pulse period is 200 mSec meaning that the maximum frequency is 5 Hz or 5 pulses per second. If the maximum rate is too high, the PUL_SCAL factor can be adjusted (increased) to slow down the pulse. Note that the PULSE OUT LED on the Totalizer operation display is not capable of keeping up with the pulse rate but does indicate to the operator that the totalizer is running.

DIR_ACT - specifies whether the totalizer will increment or decrement.

DIR_ACT set to **YES** increments the totalizer (count up starting at INIT_VAL). **DIR_ACT** set to **NO** decrements the totalizer (count down starting at INIT_VAL). WRAP entry fields will be set to NO, grayed, and disabled.

Preset_1 - specifies the value for Preset 1. For an incrementing totalizer the preset output will turn on when the count value is greater than the preset value. For a decrementing totalizer the preset output will turn on when the count value is less than the preset value.

Preset_2 - specifies the value for Preset 2. Functions the same as Preset 1.

Select  to open the last display, or  to return to the *Main Menu Display*.

11.1 Change Totalizer Parameters

Totalizer Name - Totalizer names can be changed on the *Tags Display*. Refer to *Tags Setup Display*.

ENABLE/DISABLE - select to ENABLE or DISABLE the Totalizer. The status toggles **ENABLED** or **DISABLED**.

PU_LAST - select **YES** or **NO** to enable or disable PU_LAST functionality.

Wrap - select **NO** or **YES** to ENABLE or DISABLE wrap. (The status toggles NO or YES).

DPP - select to the desired decimal point position and return to the *TOTALIZER Setup Display*.

TOT_SCAL, INIT_VAL, ZDO, PUL_SCAL, PRESET_1, PRESET_2 - select the desired parameter to open the *Keypad Display* and enter data. Note that the PUL_SCAL limits change based on the analog input engineering units.

DIR_ACT - select to specify whether the totalizer will increment or decrement. The status toggles **YES** or **NO**.

11.2 Totalizer Examples:

Analog input engineering units range: 0-60 GAL /m

Totalizer INIT_VAL: 0

Totalizer DIR_ACT: YES

- Totalizer TOT_SCAL = 1, PUL_SCAL = 1

For constant flow rate of 1 GAL /m:

The totalizer starts counting up from 0. Each count represents 1 gallon. The pulse output turns on after 60 seconds and stays on for 30 seconds and then off for 30 seconds. The cycle repeats. Each pulse represents 1 gallon.

- Totalizer TOT_SCAL = 10, PUL_SCAL = 1

For constant flow rate of 1 GAL /m:

The totalizer starts counting up from 0. Each count represents 10 gallons. The pulse output turns on after 10 minutes and stays on for 5 minutes and then off for 5 minutes. The cycle repeats. Each pulse represents 10 gallons.

- Totalizer TOT_SCAL = 1, PUL_SCAL: 0.2

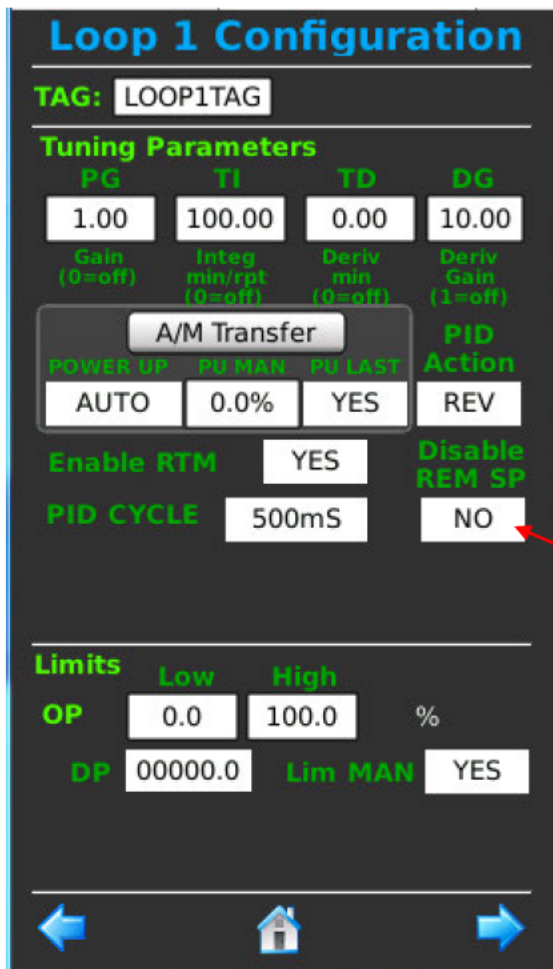
For constant flow rate of 1 GPM:

The totalizer starts counting up starting at 0. Each count represents 1 gallon. The pulse output turns on after every 12 seconds and stays on for 6 seconds and then off for 12 seconds. The cycle repeats. Each pulse represents 0.2 gallons.

Use the Analog input Debug mode to simulate your input and then look at the Totalizer Operation Display to see the effect on the pulse output for your particular analog input engineering unit range, **TOT_SCAL**, and **PUL_SCAL** settings.

Totalize AI2 on a Single Loop Control Strategy:

If you are using a single loop control strategy for AIN1 and want to totalize AIN2, select control strategy **Ext Set, Non-Trk Loc SP** and **Disable REM SP** on the Loop 1 Configuration display. The remote setpoint is enabled by default.



Select



12. Data Functions

Data logging is intended to be used to facilitate loop tuning and assist in analyzing the process. Controller built-in data collection is not intended to be a substitute for computer based data collection and analysis software.

There are twelve (12) data values logged, six (6) of which are used for trends.

Data collection and display has been automatically setup for Loop1 and Loop2 Process (PV1 and PV2), Setpoint (SP1 and SP2), and Output (OP1 and OP2). The predefined collection definitions are stored in files named trend1.csv and trend2.csv. It is possible for a user to modify what data is collected and at what rate but it is beyond the scope of this *Setup Guide*. If you are interested in logging additional data please contact Classic Automation.

The data collection rate is 1 second. Data collection is disabled when the controller is powered up. Select Setup **logStart** to start logging. A new log file is created daily at midnight. You can store data for 2 days (2 files).

Data Functions Menu Operate Access

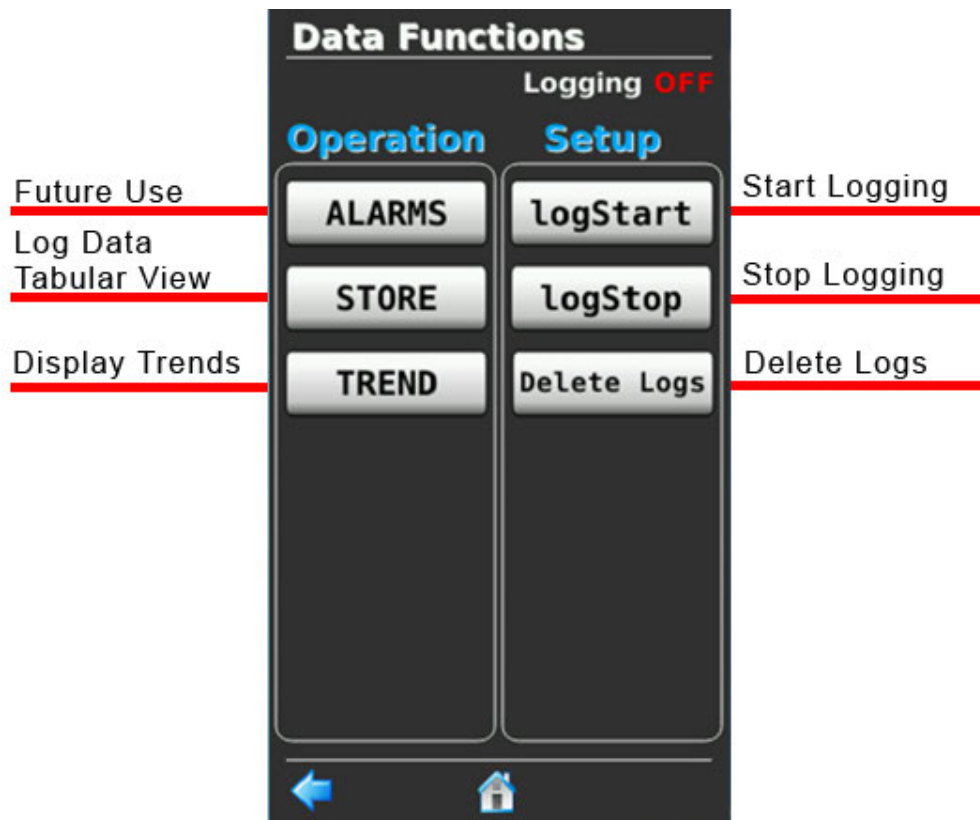




Select **Data** on the *Main Menu Display* to open the *Data Functions Menu Display*. Refer to *Main Menu Display*.

Data Functions Menu

Logging Status (**OFF** or **ON**) is shown at the top of the display. Tune or higher Security Access is required to access **logStart**, **logStop**, and **Delete Logs**.

There may be instances when you want to stop collecting trend data. Select **logStop** to stop data collection. Logging does not start automatically so make sure you select **logstart** to resume data collection.



Select the **Home icon**  to return to the Main Menu or select the **Back Arrow**  to return to the last display.

12.1 Displaying Trends

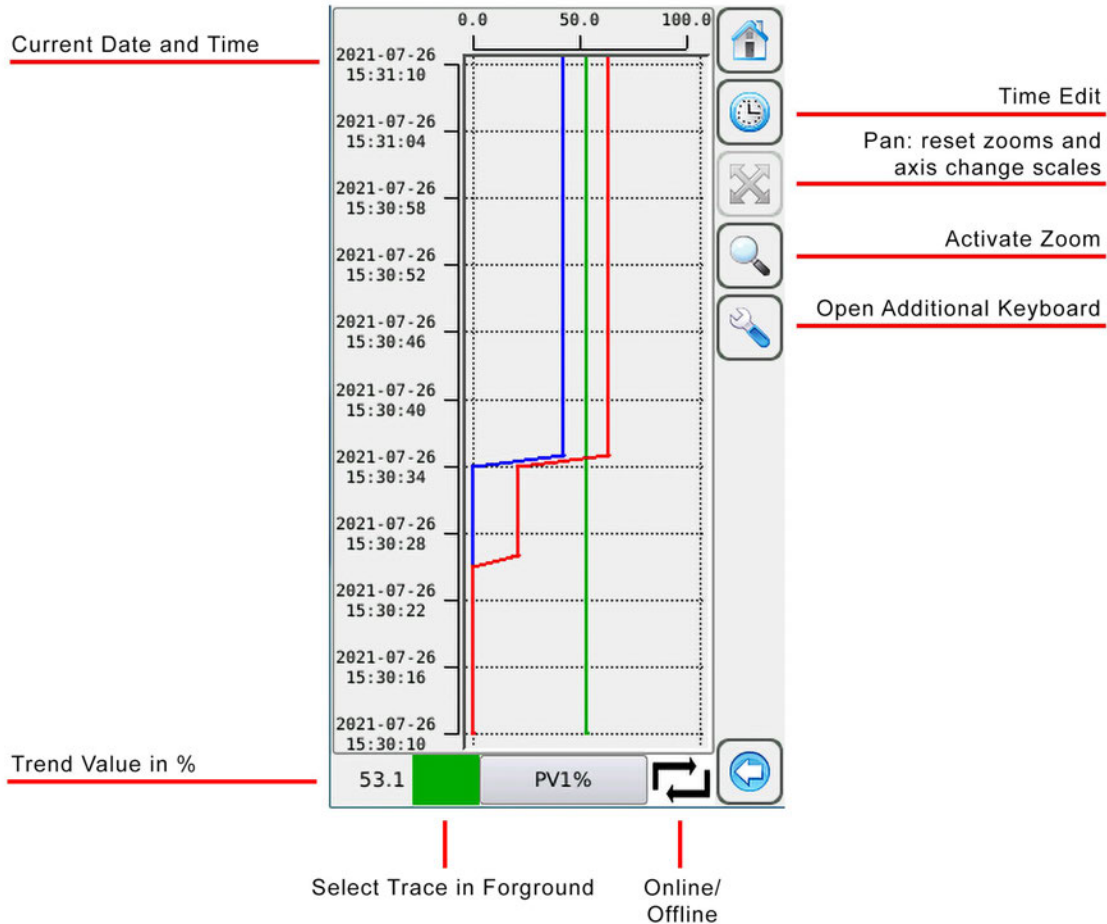
Select TREND on the *Data Functions Menu Display* to open the *TREND SELECTOR Display*. Refer to *Data Functions Menu Display*.

Select TREND to open the *TREND SELECTOR Display*.



Select either trend1.csv for Loop1 or Trend2.csv for Loop2 to open the *Trend Display* for that loop.


Trend Display Loop1





Three (3) traces are displayed, PV, SP, and OP.

The trend display works in 2 ways:

 Online: graph shifts automatically to always show the latest samples

 Offline: graph is static even when new samples are available. They will be shown only if in the actual display window.

When the Trend Display is first opened, the traces shown are real time (on-line).

Occasionally an hourglass will be shown where the  or  symbols appear. The hourglass indicates that the trend display is buffering data to display.







There are eleven (11) trend data values displayed.

The default trend window is 60 seconds with 6 second intervals.

To zoom an area, select the magnifying glass and select an area on the touchscreen.


Select the wrench to open an additional keyboard. Select the wrench again to close the additional keyboard.

Additional Keyboard

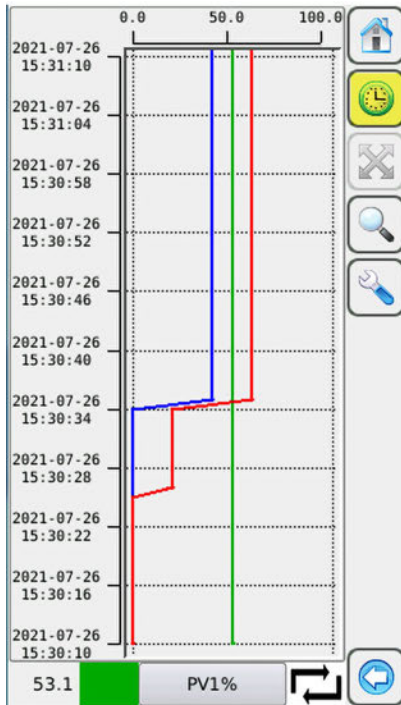
	shift forward time axis
	shift back time axis
	shift up values axis
	shift down values axis
	On/off line: enable/disable online mode
	saves on panel the actual screenshot

Up and down keys are enabled only if there are values outside the displayed range.

12.2 Change Trend Time

Select  TimeEdit on the *Trend Display* to open the *Trend Time Edit Display*. Refer to *Data Functions Menu Display*.

Trend Display Loop1



Trend Time Edit Display

Set Trend Start Date: 2021-09-08

Set Trend Start Time: 06:10:44

Select Number of Days to Display: Width 0 days


Set Trend Time Span: 00:01:00

Ymax: 100.000 (Set Maximum Range to Display)

Ymin: 0.000 (Set Minimum Range to Display)

Trace: PV1%

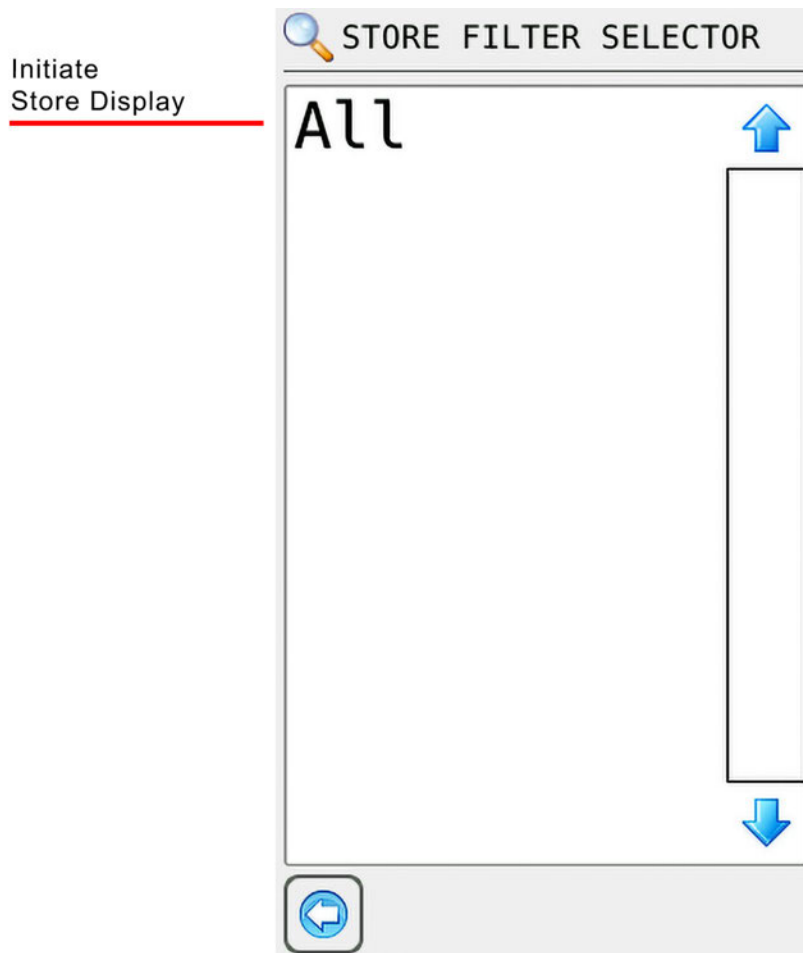
Modifying any of the time axis ranges changes the settings for all traces. Modifying the value axis ranges changes the setting for the active trace only. These values are not saved so they are lost when the trend display is closed. Selecting **pan** on the *Trend Display* also resets the values.

Select the **Back Arrow**  to return to the *Data Functions Menu Display*.

12.3 Viewing Stored Data in a Tabular Format

Select STORE on the *Data Functions Menu Display* to open the *STORE FILTER SELECTOR* Display. Refer to *Data Functions Menu Display*.

Store Filter Selector Display



Select "All" to initiate the data storage display creation. "Loading" will be displayed while the display is being created. On completion the *Log Store Complete Display* will open. The loops PV, SP, and OP, and other data can be viewed in a tabular format.

Log Store Complete Display

STORE 2021/11/05 - 07:02:22

Filter: [2021/11/05_00:00:00 - 2021/11/05_

date	time	AM1_AUTO	AM2_
2021/11/05	06:40:11	0	0
2021/11/05	06:40:12	0	0
2021/11/05	06:40:13	0	0
2021/11/05	06:40:14	0	0
2021/11/05	06:40:15	0	0
2021/11/05	06:40:16	0	0
2021/11/05	06:40:17	0	0
2021/11/05	06:40:18	0	0
2021/11/05	06:40:19	0	0
2021/11/05	06:40:20	0	0
2021/11/05	06:40:21	0	0
2021/11/05	06:40:22	0	0

Navigation icons: Home, Refresh, Filter, Up, Down, Left, Right, USB

Highlighted Value

Highlight Value
Next Row Up

Highlight Value
Next Row Up

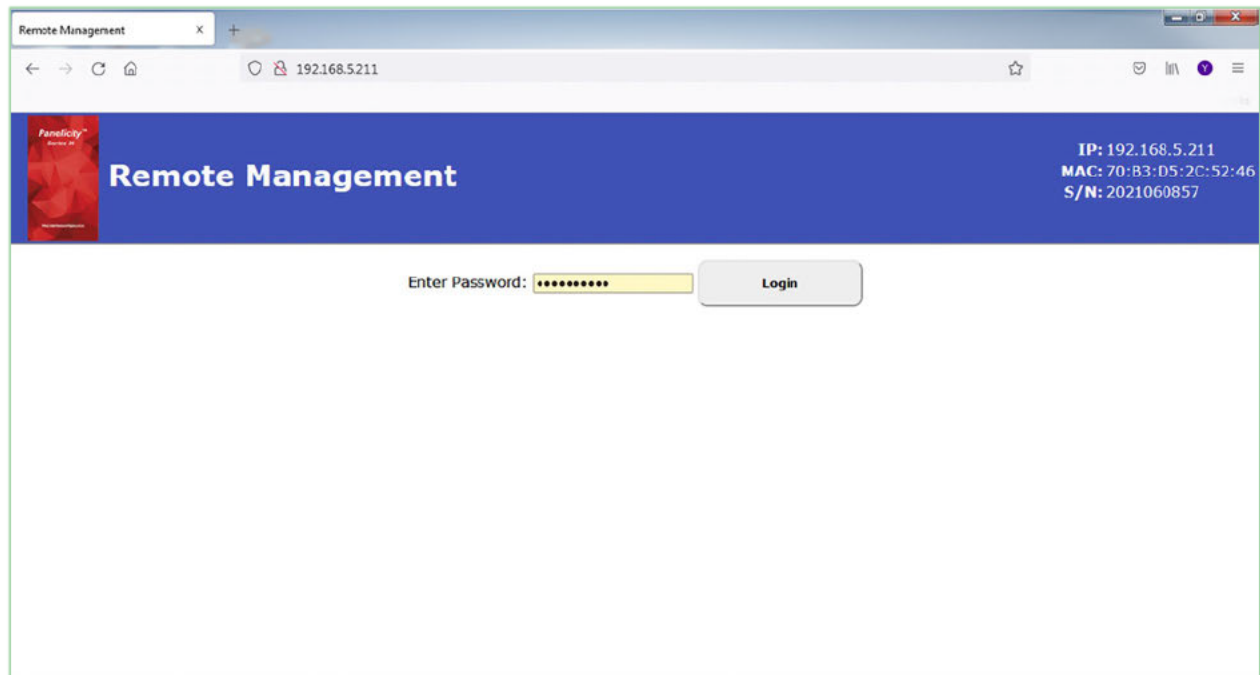
Highlight Value
Next Row Up

Highlight Value
Next Row Up

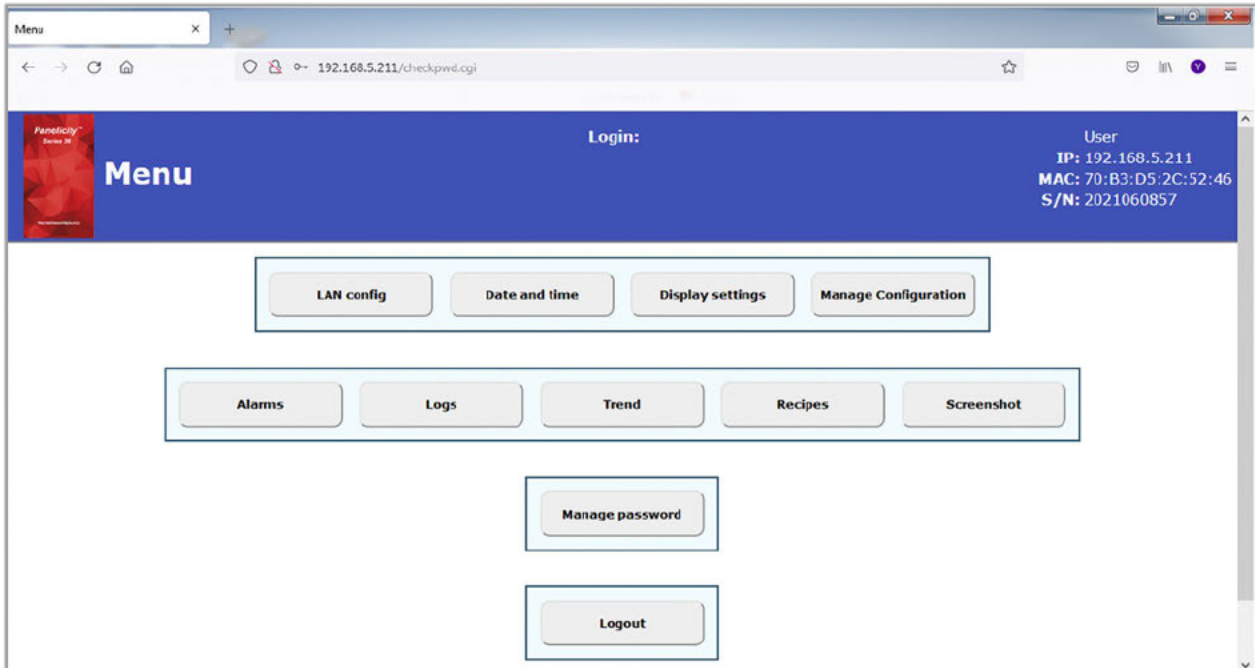
Tabular Data Explained	
Date	Date as year/month/day
Time	Time as hour:minute:second
AM1_AUTO	Loop1 Mode (AUTO or MANUAL), 0=MANUAL, 1=AUTO
AM2_AUTO	Loop2 Mode (AUTO or MANUAL), 0=MANUAL, 1=AUTO
SETPT1_O1	Loop 1 Setpoint Value in EU
SETPT2_O1	Loop 2 Setpoint Value in EU
P1Pct	Loop 1 Process Value in %
P2Pct	Loop 2 Setpoint Value in %
PROCESS1	Loop 1 Process Value in EU
PROCESS2	Loop 2 Process Value in EU
S1Pct	Loop 1 Setpoint Value in %
S2Pct	Loop 2 Setpoint Value in %
V1Pct	Loop 1 Output Value in %
V2Pct	Loop 2 Output Value in %
PW_Lev	Access Level (0, 1, 2, 3)

12.4 Download Log Data to a Computer

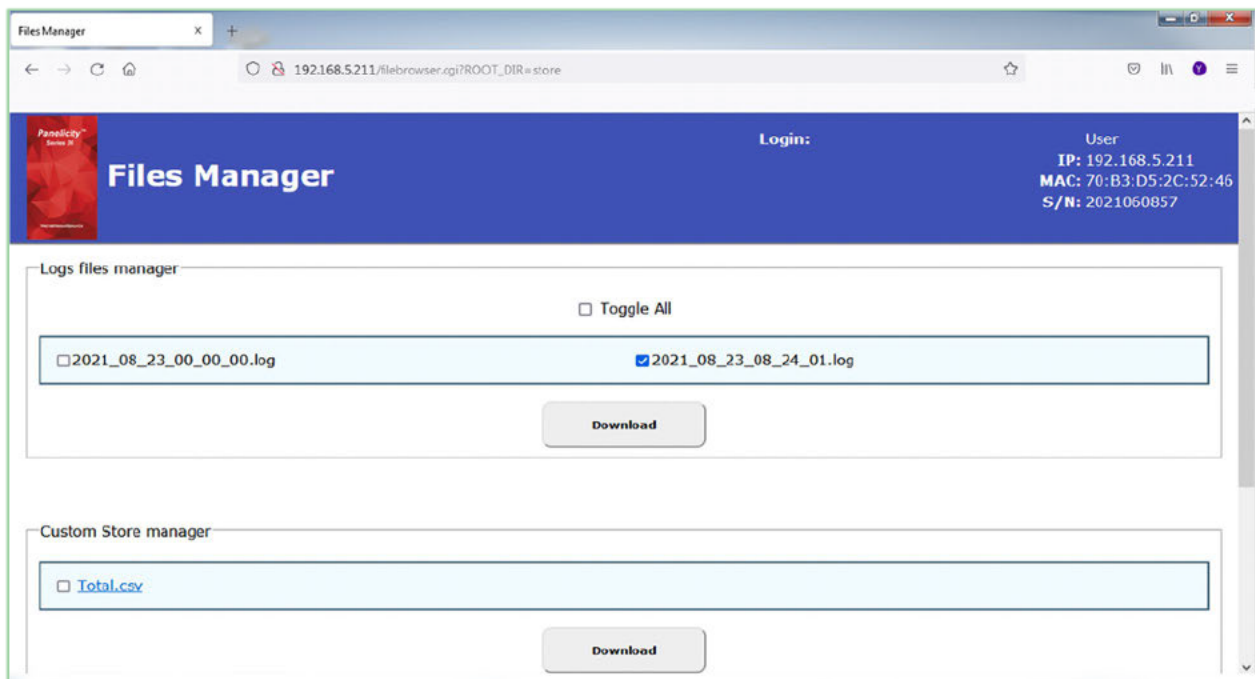
The controller comes with a Web Interface which allows you to download log data to a computer. In order to download the log data you need to connect to the controller via ethernet. Open a web browser and type the IP address of your controller. The *Remote Management Login Display* opens.



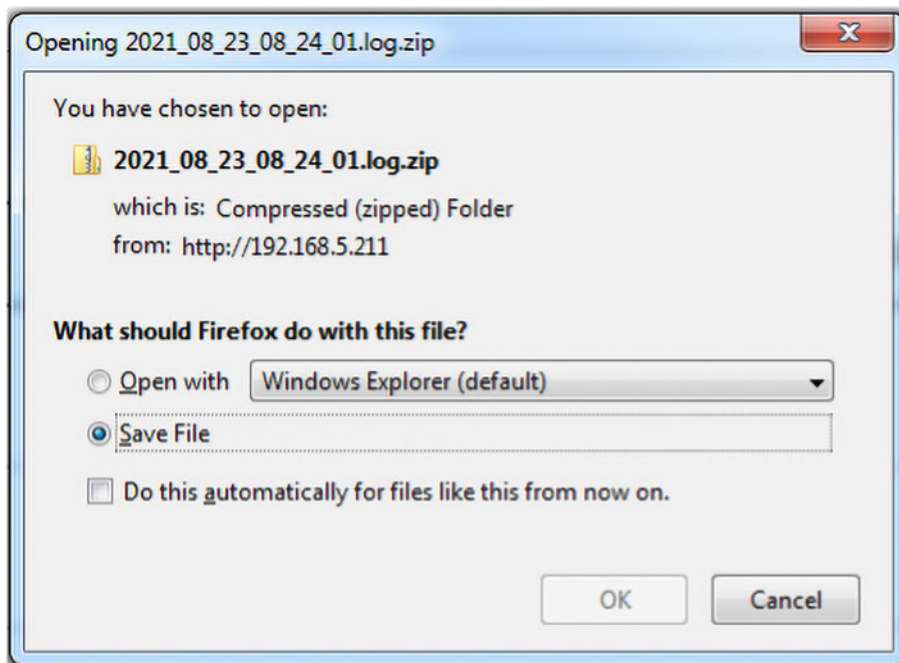
Enter the password "111111" and select **Login**. The Web Interface Menu display opens.



Select **Logs**. The *Files Manager Display* opens.



Place a checkmark in the square to the left of the log file you want to download. Select **Download** to open a dialog box and choose **Save File** and then navigate to the path where you want the zip file saved.



Extract the log file from the downloaded zip archive. The data is stored in a text file in a csv format. This file may be opened using a text editor or imported into a spreadsheet program using a semicolon (;) as a delimiter to separate the data into columns. Four (4) logs of the twelve (12) data points are shown below.

```
date; time; AM1_AUTO; AM2_AUTO; SETPT1_O1; SETPT2_O1; P1Pct; P2Pct; PROCESS1;
PROCESS2; S1Pct; S2Pct; V1Pct; V2Pct; PW_Lev
2021/08/23; 00:00:00; 0; 0; -10.0; -6.0; -25.0; -25.0; -25.0; -15.0; -10.0; -10.0; 6.6; 25.0; 0
2021/08/23; 00:00:01; 0; 0; -10.0; -6.0; -25.0; -25.0; -25.0; -15.0; -10.0; -10.0; 6.6; 25.0; 0
2021/08/23; 00:00:02; 0; 0; -10.0; -6.0; -25.0; -25.0; -25.0; -15.0; -10.0; -10.0; 6.6; 25.0; 0
2021/08/23; 00:00:03; 0; 0; -10.0; -6.0; -25.0; -25.0; -25.0; -15.0; -10.0; -10.0; 6.6; 25.0; 0
```

13. Characterizer Setup

The controller comes with up to four (4) Characterizers. The characterizer is used to change values from linear to non-linear (piecewise table). The characterizers are assigned the following inputs:

- Characterizer Channel 1 (**CHR1**): Analog Input 1
- Characterizer Channel 2 (**CHR2**): Analog Input 2
- Characterizer Channel 3 (**CHR3**): PID Analog Output 1
- Characterizer Channel 4 (**CHR4**): PID Analog Output 2

You will not see a *Characterizer Setup Display* for unused inputs or outputs.

Select **CHR** on *Main Menu Display* to open the *Characterizer Setup Display*. Refer to *Main Menu Display*.



Select **Channel** to open a pull-down menu of available characterizers, eg, CHR1, CHR2, CHR3, or CHR4. Characterizer names can be changed on the *Tags Display*. Refer to *Tags Setup Display*. You will see **Config OK** if the characterizer entries are valid. You can use between 2 and 11 pairs of values. Pairs are entered as X, Y format where X is the unput value in engineering and Y is the desired output value in engineering units. Default values are shown. You can reload default values by selecting **Reset**. The values of the input and output are shown on the bottom of the display.

The following shows an example of limiting the PID1 output to 70. You can see we specified X7 and Y7 to be 70,70 and Y values for all X values above 70 to be 70.

With the value of the input to the characterizer (PID1 Analog Output 1) of 80 the output of the characterizer is 70.

This is used if you have for example an oversized control valve and want to limit the output to the valve.

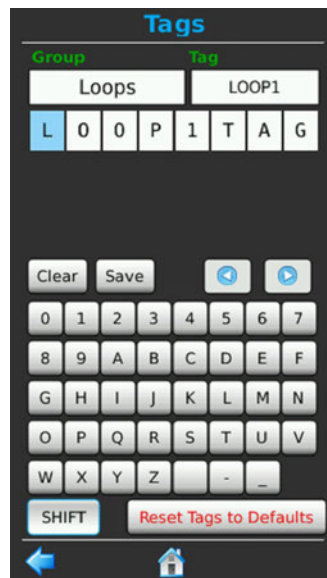


14. Support

The *Support Contact Popup Display* shows who to contact for technical support for the controller. The default is Classic Automation LLC.



If you want you can modify the contact, select **System** on the *Main Menu Display* to open the *System Menu Display*. Refer to *Main Menu Display*. Select **Tag Names** on *System Menu Display* to open the *Tags Display*. Refer to *System Menu Display*.



In addition to changing the technical support contact you can also change names for Loops, Analog I/O, Digital I/O, Alarms, Totalizers, and Characterizers. Select **Loops** and you will see the pulldown menu.



Select **Company Info** to open the *Tags Company Info Setup Display*.



Use the keypad to change what is displayed when you select **Contact** on the *Main Menu Display*. Select **Save** when you have completed your changes. You can change other system names in a similar manner. Select **Reset Tags to Defaults** to reset all system tag names to defaults.

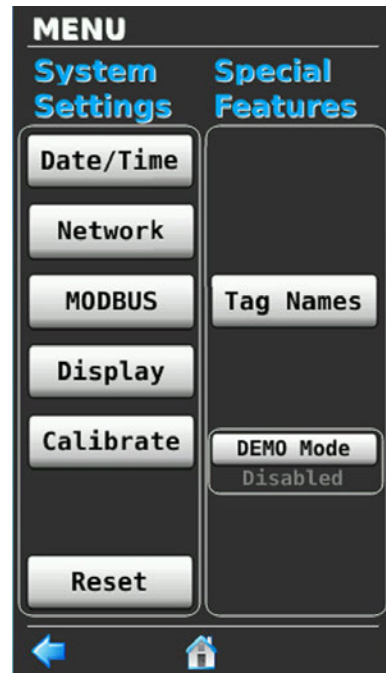
15. System Settings

Select **System** on *Main Menu Display* to open the *System Settings and Special Features MENU Display*. Refer to *Security Settings Display*.

Main Menu Display



System Settings / Special Features Menu Display



15.1 Change Date and Time

Select **Date/Time** on the *System Settings and Special Features MENU Display* to open the *Date/Time Display*. The current date and time are displayed on the top line of the display.



15.1.1 Change Date

Select the Set Date light blue rectangle to the right of **Manual:** to open the *Calendar Display*.

Set Date/Time Display

Time Set 2021/09/08 - 06:21:53

Manual: 2021-09-08 06:21:21

NTP: tempo.iem.it

Offset: 1 h Timeout: 10 s

D.S.T.: Period: 0 h

Calendar Display

Time Set 2021/09/08 - 06:22:34

September 2021

Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

NTP:

Offset: Timeout:

D.S.T.: Period: 0 h

The current date of the month is highlighted in green. Select a different date of the month to return to the *Calendar Display* (with your new date selection shown). Use the left or right arrows to select a different month or year. To accept changes, select the **green checkmark** to the right of the Set Time rectangle.

Select the **Home icon** to return to the Main Menu or select the **Back Arrow** to return to the last display.

15.1.2 Change Time



Select the Set Time light blue rectangle to the right of the Set Date rectangle to open the *Set Time Display*.

Set Date/Time Display

Set Time Display

Hour	Minute	Second
0	1	2
3	4	5
6	7	8
9	10	11
12	13	14
15	16	17
18	19	20
21	22	23

The current hour is highlighted in Green. Select a number between 1 and 23 to change the hour displayed. To change the hour, select the new hour number. Select Minute or Second to similarly change the minutes or seconds. To accept changes, select OK.

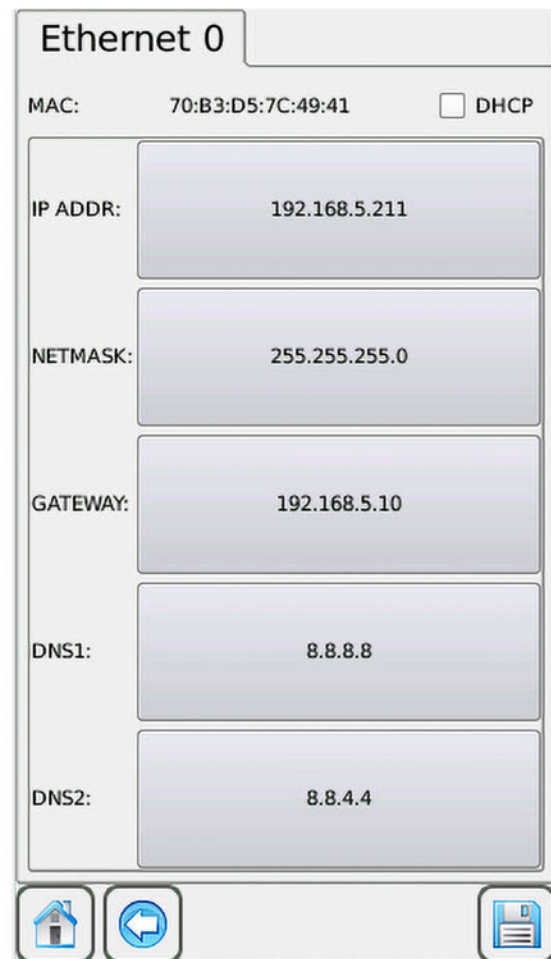
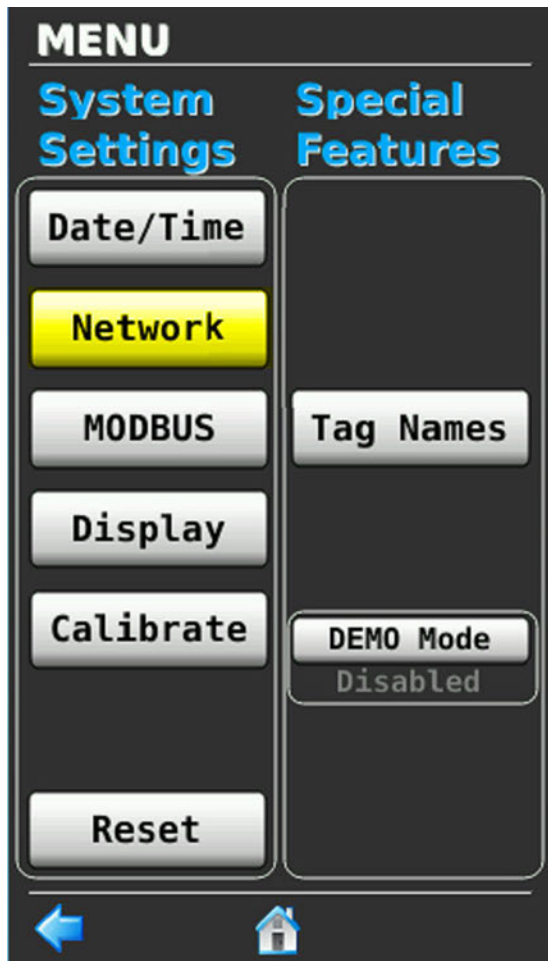
Select the **Home icon**  to return to the Main Menu or select the **Back Arrow**  to return to the last display.

The default time set for the controller is EST which is 5 hours behind Greenwich Mean Time (GMT-5).

It is possible to use a time server and refresh the date and time by selecting the refresh icon on the lower right of the *Date/Time Display*. There is a VPN service available (not included with the standard controller) which allows for automatic update of the date and time.

15.2 Network



Select **Network** on the System Settings and Special Features *MENU Display* to open the *Network Display*. Refer to *System Settings and Special Features MENU Display*.



Select the square checkbox to the left of DHCP to enable DHCP. When DHCP is enabled an “x” will appear inside the square and all settings will be grayed out. When DHCP is disabled the “x” will disappear and all settings will be selectable and can be changed. Normally you would not use DHCP.

To change any of the settings select the rectangle and enter data in a *keypad display* similar to other *keypad displays*. **Note that the default IP address is 192.168.5.211.**

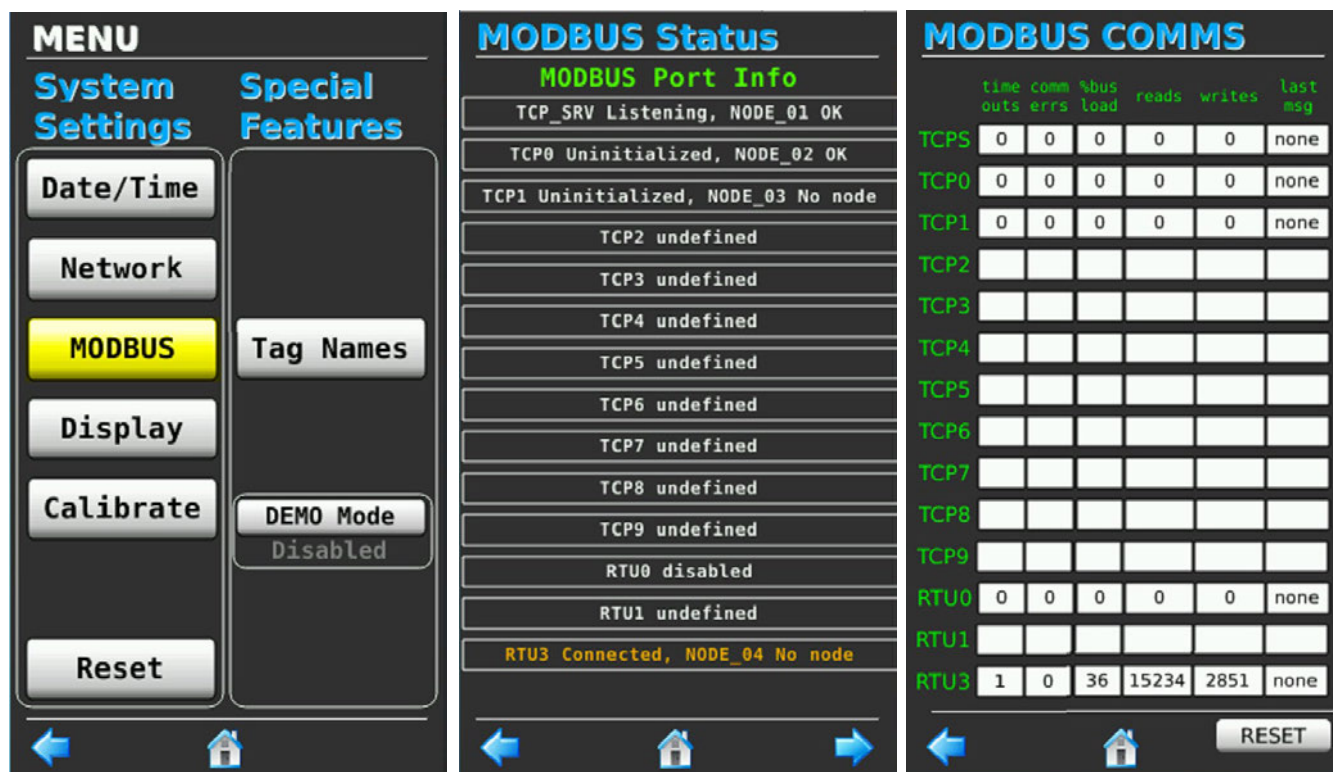
Select the **floppy disk icon**  to save your settings.

Select the **Home icon**  to return to the Main Menu or select the **Back Arrow**  to return to the last display.

15.3 MODBUS

Select **MODBUS** on the System Settings and Special Features *MENU Display* to open the *MODBUS Status Display*. Refer to *System Settings and Special Features MENU Display*.

The *MODBUS Status Display* and *MODBUS COMMS Display* can be used to troubleshoot MODBUS communication issues. You would not normally need to use these displays. Contact sales@classicautomation.com for assistance with using these displays.



The following is the MODBUS map for the variables available (MODBUS TCP must be enabled. Refer to the *Factory Options Display*).

Associated Group	Variable Name	Data Type	Holding Register	Comment
I/O	AIN1_DEBUG_MODE	WORD_BIT	40001	0=Normal, 1=Debug
	AIN2_DEBUG_MODE	WORD_BIT	40002	0=Normal, 1=Debug
	AIN1_O1	REAL	40010	EU Value
	AIN2_O1	REAL	40012	EU Value
	AIN1_QS	WORD_BIT	40020	Quality Status 0=Good, 1=Bad
	AIN2_QS	WORD_BIT	40021	Quality Status 0=Good, 1=Bad
	AIN1_RAW_DBG	INT	40025	Raw Count Value
	AIN2_RAW_DBG	INT	40026	Raw Count Value
	AOUT1_DEBUG_MODE	WORD_BIT	40030	0=Normal, 1=Debug
	AOUT2_DEBUG_MODE	WORD_BIT	40031	0=Normal, 1=Debug
	AOUT1_RAW_DBG	INT	40034	Raw Count Value
	AOUT2_RAW_DBG	INT	40035	Raw Count Value
	AOUT1_S	REAL	40038	AOUT1 Source Value in EU
	AOUT2_S	REAL	40040	AOUT2 Source Value in EU
	DIO1_MODE	INT	40046	0=DIR, 1=REV, 2=OFF, 3=ON
	DIO2_MODE	INT	40047	0=DIR, 1=REV, 2=OFF, 3=ON
	DIO3_MODE	INT	40048	0=DIR, 1=REV, 2=OFF, 3=ON
	DIO4_MODE	INT	40049	0=DIR, 1=REV, 2=OFF, 3=ON
	DIO5_MODE	INT	40050	0=DIR, 1=REV, 2=OFF, 3=ON
	DOUT1	WORD_BIT	40070	Field Output
DOUT2	WORD_BIT	40071	Field Output	
DOUT3	WORD_BIT	40072	Field Output	
DOUT4	WORD_BIT	40073	Field Output	
DOUT5	WORD_BIT	40074	Field Output	
Loop 1	AM1_AUTO	WORD_BIT	40101	0=MAN, 1=AUT
	PID1_OP_LIM_MAN	WORD_BIT	40102	0=NO, 1=YES
	L1_LOC	WORD_BIT	40103	0=EXT/REMOTE, 1=LOCAL
	L1_EXT	WORD_BIT	40104	0=LOCAL, 1=EXT/REMOTE
	SPLIM1_HS	WORD_BIT	40105	Setpoint Hi Limit Status
	SPLIM1_LS	WORD_BIT	40106	Setpoint Lo Limit Status
	ALARM1_A1_ENAB	WORD_BIT	40107	0=Disabled, 1=Enabled
	ALARM1_A2_ENAB	WORD_BIT	40108	0=Disabled, 1=Enabled
	ALARM1_A3_ENAB	WORD_BIT	40109	0=Disabled, 1=Enabled
	ALARM1_A4_ENAB	WORD_BIT	40110	0=Disabled, 1=Enabled
	ALARM1_A1	WORD_BIT	40111	Alarm Status
	ALARM1_A1_UAK	WORD_BIT	40112	Alarm Unacknowledged Status

Associated Group	Variable Name	Data Type	Holding Register	Comment	
	ALARM1_A2	WORD_BIT	40113	Alarm Status	
	ALARM1_A2_UAK	WORD_BIT	40114	Alarm Unacknowledged Status	
	ALARM1_A3	WORD_BIT	40115	Alarm Status	
	ALARM1_A3_UAK	WORD_BIT	40116	Alarm Unacknowledged Status	
	ALARM1_A4	WORD_BIT	40117	Alarm Status	
	ALARM1_A4_UAK	WORD_BIT	40118	Alarm Unacknowledged Status	
	ALARM1_A1_PRIOR	UINT	40119	Priority [1-5]	
	ALARM1_A1_TYPE	UINT	40120	0=none, 1=HI, 2=LO, 3=HdEV, 4=LdEV, 5=dEV, 6=or	
	ALARM1_A2_PRIOR	UINT	40121	Priority [1-5]	
	ALARM1_A2_TYPE	UINT	40122	0=none, 1=HI, 2=LO, 3=HdEV, 4=LdEV, 5=dEV, 6=or	
	ALARM1_A3_PRIOR	UINT	40123	Priority [1-5]	
	ALARM1_A3_TYPE	UINT	40124	0=none, 1=HI, 2=LO, 3=HdEV, 4=LdEV, 5=dEV, 6=or	
	ALARM1_A4_PRIOR	UINT	40125	Priority [1-5]	
	ALARM1_A4_TYPE	UINT	40126	0=none, 1=HI, 2=LO, 3=HdEV, 4=LdEV, 5=dEV, 6=or	
	L1_ALM	WORD_BIT	40127	Loop Alarm Status	
	L1_QS_UAK	WORD_BIT	40128	Loop Unacknowledged Quality Status	
	AM1_SS	WORD_BIT	40129	A/M Standby Switch	
	PROCESS1_QS	WORD_BIT	40130	Process Variable Quality Status	
	SETPOINT1_EXT_QS	WORD_BIT	40131	External Setpoint Quality Status	
	Loop 2	BATOT1_A1	WORD_BIT	40132	Batch Totalizer Preset 1 Alarm Status
		BATOT1_A2	WORD_BIT	40133	Batch Totalizer Preset 2 Alarm Status
BATOT1_INPUT_R		WORD_BIT	40134	Batch Totalizer Reset	
BATOT1_INPUT_S		WORD_BIT	40135	Batch Totalizer Stop	
BATOT1_RUN_RESET		WORD_BIT	40136	Batch Totalizer Reset Total to Initial Value	
AM1_EM_MAN		WORD_BIT	40137	A/M Emergency Manual	
AM2_AUTO		WORD_BIT	40201	A/M Mode	
PID2_OP_LIM_MAN		WORD_BIT	40202	0=MAN, 1=AUT	
L2_LOC		WORD_BIT	40203	0=NO, 1=YES	
L2_EXT		WORD_BIT	40204	0=EXT/REMOTE, 1=LOCAL	
SPLIM2_HS	WORD_BIT	40205	0=LOCAL, 1=EXT/REMOTE		
SPLIM2_LS	WORD_BIT	40206	Setpoint Hi Limit Status		
ALARM2_A1_ENAB	WORD_BIT	40207	Setpoint Lo Limit Status		
ALARM2_A2_ENAB	WORD_BIT	40208	0=Disabled, 1=Enabled		
ALARM2_A3_ENAB	WORD_BIT	40209	0=Disabled, 1=Enabled		
ALARM2_A4_ENAB	WORD_BIT	40210	0=Disabled, 1=Enabled		

Associated Group	Variable Name	Data Type	Holding Register	Comment
	ALARM2_A1	WORD_BIT	40211	Alarm Status
	ALARM2_A1_UAK	WORD_BIT	40212	Alarm Unacknowledged Status
	ALARM2_A2	WORD_BIT	40213	Alarm Status
	ALARM2_A2_UAK	WORD_BIT	40214	Alarm Unacknowledged Status
	ALARM2_A3	WORD_BIT	40215	Alarm Status
	ALARM2_A3_UAK	WORD_BIT	40216	Alarm Unacknowledged Status
	ALARM2_A4	WORD_BIT	40217	Alarm Status
	ALARM2_A4_UAK	WORD_BIT	40218	Alarm Unacknowledged Status
	ALARM2_A1_PRIOR	UINT	40219	Priority [1-5]
	ALARM2_A1_TYPE	UINT	42220	0=none, 1=HI, 2=LO, 3=HdEV, 4=LdEV, 5=dEV, 6=or
	ALARM2_A2_PRIOR	UINT	40221	Priority [1-5]
	ALARM2_A2_TYPE	UINT	40222	0=none, 1=HI, 2=LO, 3=HdEV, 4=LdEV, 5=dEV, 6=or
	ALARM2_A3_PRIOR	UINT	40223	Priority [1-5]
	ALARM2_A3_TYPE	UINT	40224	0=none, 1=HI, 2=LO, 3=HdEV, 4=LdEV, 5=dEV, 6=or
	ALARM2_A4_PRIOR	UINT	40225	Priority [1-5]
	ALARM2_A4_TYPE	UINT	40226	0=none, 1=HI, 2=LO, 3=HdEV, 4=LdEV, 5=dEV, 6=or
	L2_ALM	WORD_BIT	40227	Loop Alarm Status
	L2_QS_UAK	WORD_BIT	40228	Loop Unacknowledged Quality Status
	AM2_SS	WORD_BIT	40229	A/M Standby Switch
	PROCESS2_QS	WORD_BIT	40230	Process Variable Quality Status
	BATOT2_A1	WORD_BIT	40232	External Setpoint Quality Status
	BATOT2_A2	WORD_BIT	40233	Batch Totalizer Preset 1 Alarm Status
	BATOT2_INPUT_R	WORD_BIT	40234	Batch Totalizer Preset 2 Alarm Status
	BATOT2_INPUT_S	WORD_BIT	40235	Batch Totalizer Reset
	BATOT2_RUN_RESET	WORD_BIT	40236	Batch Totalizer Stop
	AM2_EM_MAN	WORD_BIT	40237	Batch Totalizer Reset Total to Initial Value
Global	GUAK	WORD_BIT	40501	Global Acknowledgment
Loop 1	PROCESS1	REAL	41101	Process EU Value
	RATIO1_R	REAL	41103	Ratio Setting
	SETPOINT1	REAL	41105	Setpoint EU Value
	AM1_M	REAL	41107	A/M Manual Setting
	SETPOINT1_EXT	REAL	41109	External Setpoint
	DIV01_O1	REAL	41111	Y value for Ratio Control (CF/WF)
	BATOT1_TL	REAL	41113	Batch Total
	BATOT1_TLR	REAL	41115	Running Total

Associated Group	Variable Name	Data Type	Holding Register	Comment
	PID1_PG	REAL	41117	Proportional Gain
	PID1_TI	REAL	41119	Time - Integral
	PID1_TD	REAL	41121	Time - Derivative
	PID1_DG	REAL	41123	Derivative Gain
	SPLIM1_HI_LIMIT	REAL	41125	Setpoint High Limit
	SPLIM1_LO_LIMIT	REAL	41127	Setpoint Low Limit
	BATOT1_PRESET_1	REAL	41129	Batch Alarm Preset 1 Trip Point
	BATOT1_PRESET_2	REAL	41131	Batch Alarm Preset 2 Trip Point
	ALARM1_A1_LIMIT	REAL	41133	Alarm 1 Trip Point
	ALARM1_A2_LIMIT	REAL	41135	Alarm 2 Trip Point
	ALARM1_A3_LIMIT	REAL	41137	Alarm 3 Trip Point
	ALARM1_A4_LIMIT	REAL	41139	Alarm 4 Trip Point
	PID1_OP_LIMHI	REAL	41141	Output High Limit
	PID1_OP_LIMLO	REAL	41143	Output Low Limit
	L1_DBAND	REAL	41145	Hysteresis DeadBand for ON/OFF Control
Loop 2	PROCESS2	REAL	41201	Process EU Value
	RATIO2_R	REAL	41203	Ratio Setting
	SETPOINT2	REAL	41205	Setpoint EU Value
	AM2_M	REAL	41207	A/M Manual Setting
	SETPOINT2_EXT	REAL	41209	External Setpoint
	DIV02_O1	REAL	41211	Y value for Ratio Control (CF/WF)
	BATOT2_TL	REAL	41213	Batch Total
	BATOT2_TLR	REAL	41215	Running Total
	PID2_PG	REAL	41217	Proportional Gain
	PID2_TI	REAL	41219	Time - Integral
	PID2_TD	REAL	41221	Time - Derivative
	PID2_DG	REAL	41223	Derivative Gain
	SPLIM2_HI_LIMIT	REAL	41225	Setpoint High Limit
	SPLIM2_LO_LIMIT	REAL	41227	Setpoint Low Limit
	BATOT2_PRESET_1	REAL	41229	Batch Alarm Preset 1 Trip Point
	BATOT2_PRESET_2	REAL	41231	Batch Alarm Preset 2 Trip Point
	ALARM2_A1_LIMIT	REAL	41233	Alarm 1 Trip Point
	ALARM2_A2_LIMIT	REAL	41235	Alarm 2 Trip Point
	ALARM2_A3_LIMIT	REAL	41237	Alarm 3 Trip Point
	ALARM2_A4_LIMIT	REAL	41239	Alarm 4 Trip Point
PID2_OP_LIMHI	REAL	41241	Output High Limit	
PID2_OP_LIMLO	REAL	41243	Output Low Limit	

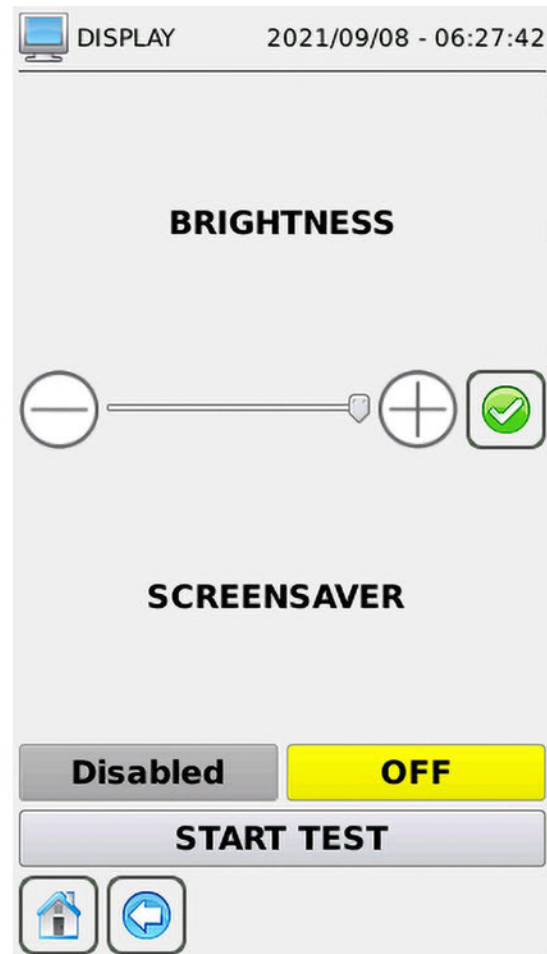
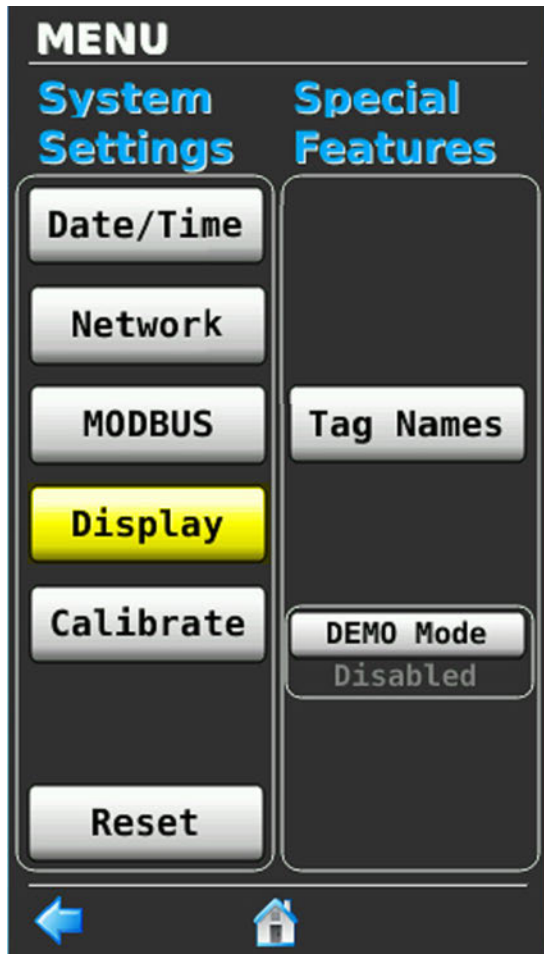
Associated Group	Variable Name	Data Type	Holding Register	Comment
	L2_DBAND	REAL	41245	Hysteresis DeadBand for ON/OFF Control
Loop 1 Input	CHR1_ENAB	WORD_BIT	43001	Characterizer Enable
	CHR1_PAIRS	INT	43002	Characterizer Pairs
	CHR1_RESET	WORD_BIT	43003	Characterizer Reset to Linear
	CHR1_CFGERR	WORD_BIT	43004	Characterizer Configuration Error
	CHR1_X0	REAL	43005	Characterizer Pair 0 X Input Value
	CHR1_Y0	REAL	43007	Characterizer Pair 0 Y Output Value
	CHR1_X1	REAL	43009	Characterizer Pair 1 X Input Value
	CHR1_Y1	REAL	43011	Characterizer Pair 1 Y Output Value
	CHR1_X2	REAL	43013	Characterizer Pair 2 X Input Value
	CHR1_Y2	REAL	43015	Characterizer Pair 2 Y Output Value
	CHR1_X3	REAL	43017	Characterizer Pair 3 X Input Value
	CHR1_Y3	REAL	43019	Characterizer Pair 3 Y Output Value
	CHR1_X4	REAL	43021	Characterizer Pair 4 X Input Value
	CHR1_Y4	REAL	43023	Characterizer Pair 4 Y Output Value
	CHR1_X5	REAL	43025	Characterizer Pair 5 X Input Value
	CHR1_Y5	REAL	43027	Characterizer Pair 5 Y Output Value
	CHR1_X6	REAL	43029	Characterizer Pair 6 X Input Value
	CHR1_Y6	REAL	43031	Characterizer Pair 6 Y Output Value
	CHR1_X7	REAL	43033	Characterizer Pair 7 X Input Value
	CHR1_Y7	REAL	43035	Characterizer Pair 7 Y Output Value
	CHR1_X8	REAL	43037	Characterizer Pair 8 X Input Value
CHR1_Y8	REAL	43039	Characterizer Pair 8 Y Output Value	
CHR1_X9	REAL	43041	Characterizer Pair 9 X Input Value	
CHR1_Y9	REAL	43043	Characterizer Pair 9 Y Output Value	
CHR1_X10	REAL	43045	Characterizer Pair 10 X Input Value	
CHR1_Y10	REAL	43047	Characterizer Pair 10 Y Output Value	
CHR1_OY	REAL	43049	Characterizer Block Output	
Loop 2 Input	CHR2_ENAB	WORD_BIT	43051	Characterizer Enable
	CHR2_PAIRS	INT	43052	Characterizer Pairs

Associated Group	Variable Name	Data Type	Holding Register	Comment
	CHR2_RESET	WORD_BIT	43053	Characterizer Reset to Linear
	CHR2_CFGERR	WORD_BIT	43054	Characterizer Configuration Error
	CHR2_X0	REAL	43055	Characterizer Pair 0 X Input Value
	CHR2_Y0	REAL	43057	Characterizer Pair 0 Y Output Value
	CHR2_X1	REAL	43059	Characterizer Pair 1 X Input Value
	CHR2_Y1	REAL	43061	Characterizer Pair 1 Y Output Value
	CHR2_X2	REAL	43063	Characterizer Pair 2 X Input Value
	CHR2_Y2	REAL	43065	Characterizer Pair 2 Y Output Value
	CHR2_X3	REAL	43067	Characterizer Pair 3 X Input Value
	CHR2_Y3	REAL	43069	Characterizer Pair 3 Y Output Value
	CHR2_X4	REAL	43071	Characterizer Pair 4 X Input Value
	CHR2_Y4	REAL	43073	Characterizer Pair 4 Y Output Value
	CHR2_X5	REAL	43075	Characterizer Pair 5 X Input Value
	CHR2_Y5	REAL	43077	Characterizer Pair 5 Y Output Value
	CHR2_X6	REAL	43079	Characterizer Pair 6 X Input Value
	CHR2_Y6	REAL	43081	Characterizer Pair 6 Y Output Value
	CHR2_X7	REAL	43083	Characterizer Pair 7 X Input Value
	CHR2_Y7	REAL	43085	Characterizer Pair 7 Y Output Value
	CHR2_X8	REAL	43087	Characterizer Pair 8 X Input Value
	CHR2_Y8	REAL	43089	Characterizer Pair 8 Y Output Value
CHR2_X9	REAL	43091	Characterizer Pair 9 X Input Value	
CHR2_Y9	REAL	43093	Characterizer Pair 9 Y Output Value	
CHR2_X10	REAL	43095	Characterizer Pair 10 X Input Value	
CHR2_Y10	REAL	43097	Characterizer Pair 10 Y Output Value	
CHR2_OY	REAL	43099	Characterizer Block Output	
Loop 1 Output	CHR3_ENAB	WORD_BIT	43101	Characterizer Enable
	CHR3_PAIRS	INT	43102	Characterizer Pairs
	CHR3_RESET	WORD_BIT	43103	Characterizer Reset to Linear
	CHR3_CFGERR	WORD_BIT	43104	Characterizer Configuration Error
	CHR3_X0	REAL	43105	Characterizer Pair 0 X Input Value


Associated Group	Variable Name	Data Type	Holding Register	Comment
	CHR3_Y0	REAL	43107	Characterizer Pair 0 Y Output Value
	CHR3_X1	REAL	43109	Characterizer Pair 1 X Input Value
	CHR3_Y1	REAL	43111	Characterizer Pair 1 Y Output Value
	CHR3_X2	REAL	43113	Characterizer Pair 2 X Input Value
	CHR3_Y2	REAL	43115	Characterizer Pair 2 Y Output Value
	CHR3_X3	REAL	43117	Characterizer Pair 3 X Input Value
	CHR3_Y3	REAL	43119	Characterizer Pair 3 Y Output Value
	CHR3_X4	REAL	43121	Characterizer Pair 4 X Input Value
	CHR3_Y4	REAL	43123	Characterizer Pair 4 Y Output Value
	CHR3_X5	REAL	43125	Characterizer Pair 5 X Input Value
	CHR3_Y5	REAL	43127	Characterizer Pair 5 Y Output Value
	CHR3_X6	REAL	43129	Characterizer Pair 6 X Input Value
	CHR3_Y6	REAL	43131	Characterizer Pair 6 Y Output Value
	CHR3_X7	REAL	43133	Characterizer Pair 7 X Input Value
	CHR3_Y7	REAL	43135	Characterizer Pair 7 Y Output Value
	CHR3_X8	REAL	43137	Characterizer Pair 8 X Input Value
	CHR3_Y8	REAL	43139	Characterizer Pair 8 Y Output Value
	CHR3_X9	REAL	43141	Characterizer Pair 9 X Input Value
	CHR3_Y9	REAL	43143	Characterizer Pair 9 Y Output Value
	CHR3_X10	REAL	43145	Characterizer Pair 10 X Input Value
CHR3_Y10	REAL	43147	Characterizer Pair 10 Y Output Value	
	CHR3_OY	REAL	43149	Characterizer Block Output
Loop 2 Output	CHR4_ENAB	WORD_BIT	43151	Characterizer Enable
	CHR4_PAIRS	INT	43152	Characterizer Pairs
	CHR4_RESET	WORD_BIT	43153	Characterizer Reset to Linear
	CHR4_CFGERR	WORD_BIT	43154	Characterizer Configuration Error
	CHR4_X0	REAL	43155	Characterizer Pair 0 X Input Value
	CHR4_Y0	REAL	43157	Characterizer Pair 0 Y Output Value
	CHR4_X1	REAL	43159	Characterizer Pair 1 X Input Value

Associated Group	Variable Name	Data Type	Holding Register	Comment
	CHR4_Y1	REAL	43161	Characterizer Pair 1 Y Output Value
	CHR4_X2	REAL	43163	Characterizer Pair 2 X Input Value
	CHR4_Y2	REAL	43165	Characterizer Pair 2 Y Output Value
	CHR4_X3	REAL	43167	Characterizer Pair 3 X Input Value
	CHR4_Y3	REAL	43169	Characterizer Pair 3 Y Output Value
	CHR4_X4	REAL	43171	Characterizer Pair 4 X Input Value
	CHR4_Y4	REAL	43173	Characterizer Pair 4 Y Output Value
	CHR4_X5	REAL	43175	Characterizer Pair 5 X Input Value
	CHR4_Y5	REAL	43177	Characterizer Pair 5 Y Output Value
	CHR4_X6	REAL	43179	Characterizer Pair 6 X Input Value
	CHR4_Y6	REAL	43181	Characterizer Pair 6 Y Output Value
	CHR4_X7	REAL	43183	Characterizer Pair 7 X Input Value
	CHR4_Y7	REAL	43185	Characterizer Pair 7 Y Output Value
	CHR4_X8	REAL	43187	Characterizer Pair 8 X Input Value
	CHR4_Y8	REAL	43189	Characterizer Pair 8 Y Output Value
	CHR4_X9	REAL	43191	Characterizer Pair 9 X Input Value
	CHR4_Y9	REAL	43193	Characterizer Pair 9 Y Output Value
	CHR4_X10	REAL	43195	Characterizer Pair 10 X Input Value
	CHR4_Y10	REAL	43197	Characterizer Pair 10 Y Output Value
	CHR4_OY	REAL	43199	Characterizer Block Output

15.4 Display





Select **Display** on the *System Settings and Special Features MENU Display* to open the DISPLAY. Refer to *System Settings and Special features MENU Display*.

BRIGHTNESS - Use the slider or \ominus/\oplus buttons to set the non-SCREENSAVER display brightness. Select the **green checkmark**  to save your brightness setting.

Off - Turns off the SCREENSAVER.

Disabled - Enables the SCREENSAVER. A *keypad display* opens. Enter the number of seconds between 30 and 3,600 to wait before the screen goes to minimum brightness. After the display is touched again it will return to the brightness saved above. Touching the display when in the SCREENSAVER mode will return to the brightness saved above.

Start Test - Begins the screen color test. The display will repeatedly cycle through the colors blue, red, and green. Selecting anywhere on the display during the test ends the test.

When finished, select the **Home icon**  to return to the Main Menu or select the **Back Arrow**  to return to the last display.

15.5 Calibrate

The controller 4-20 mA inputs are calibrated at the factory prior to shipment. However, you may want to perform an I/O calibration yourself at a set frequency as part of an ISO or other procedure. In addition, our calibration configuration allows you to specify a smaller operating range for calibration of thermocouples and RTD's to achieve increased accuracy for the input.


We have a special additional electrical noise filter for milliamp and voltage inputs. Default values are generally sufficient but you can use the filter if you have a high amount of electrical noise. You will see the electrical noise filter details on the lower half of the *I/O Calibration Display*.

You will need process calibrators for the various analog input types and a meter to read the analog outputs. The screens will prompt you to enter values for the analog inputs and record the values.

Be aware that there are channels which are not used for our Standard Control Strategies. You can ignore those channels.

Select **Calibrate** on the *System Settings and Special Features MENU Display* to open the *I/O Calibration Menu Display*. Refer to *System Settings and Special features MENU Display*.



Select the **Right Arrow**  to open the *I/O Calibration Summary Display*.


I/O Calibration Summary, AIN1

I/O Calibration Summary, AOUT1

I/O Calibration Data

Channel 2023/06/13 07:46:37


AIN1		LOW	HIGH
4-20 mA	IN	4000	20000
0-20 mA	IN	0	20000
1-5 V	IN	1000	5000
0-10 V	IN	0	10000
2-10 V	IN	2000	10000
B TC	IN	644	1844
J TC	IN	0	600
K TC	IN	0	1200
R TC	IN	0	1500
S TC	IN	0	1600
T TC	IN	0	400
PT100E	IN	-40	800
PT100R	IN	-400	2000

←  SN:2021060859

I/O Calibration Data

Channel 2023/06/13 07:51:20

AOUT1		LOW	HIGH
4-20 mA	OUT	400	2000
0-20 mA	OUT	0	2000
1-5 V	OUT	100	500
0-10 V	OUT	0	1000
2-10 V	OUT	200	1000

←  SN:2021060859

There is a summary display for each I/O Channel. Make note of the calibration values (LOW and HIGH) for the channel and type you are using. You can re-enter the calibration low and high values using this screen (in the event that the values get overwritten).

Select the **Left Arrow**  to return to the *I/O Calibration Display*.

15.6 Calibrating Milliamp and Voltage Inputs

Select the Channel and Type for the I/O you want to calibrate. The following is a calibration example for Channel AIN1, Type 4-20 mA. You will be prompted to first calibrate the 0% value and then the 100% value.

I/O Calibration

ANALOG INPUTS & OUTPUTS

Channel	Type	Model
AIN1	4-20 mA	A

Set Source to

Test Time 00:00:24

Proceed

	INPUT	LOW	HIGH
RAW	3998	4000	20000
MIN	-0.025%	AVG	MAX
	3996	Reset	3998

AIN1 Electrical Noise Filt **Auto**

Sec	Weight	Thresh
2.5	0.6	0.100%

Reset all I/O calib data to defaults **Defaults**

SN:2021060859

I/O Calibration

ANALOG INPUTS & OUTPUTS

Channel	Type	Model
AIN1	4-20 mA	A

Set Source to

Test Time 00:00:51

Wait

	INPUT	LOW	HIGH
RAW	3997	4000	20000
MIN	-0.025%	AVG	MAX
	3996	Reset	3999

AIN1 Electrical Noise Filt **Auto**

Sec	Weight	Thresh
2.5	0.6	0.100%

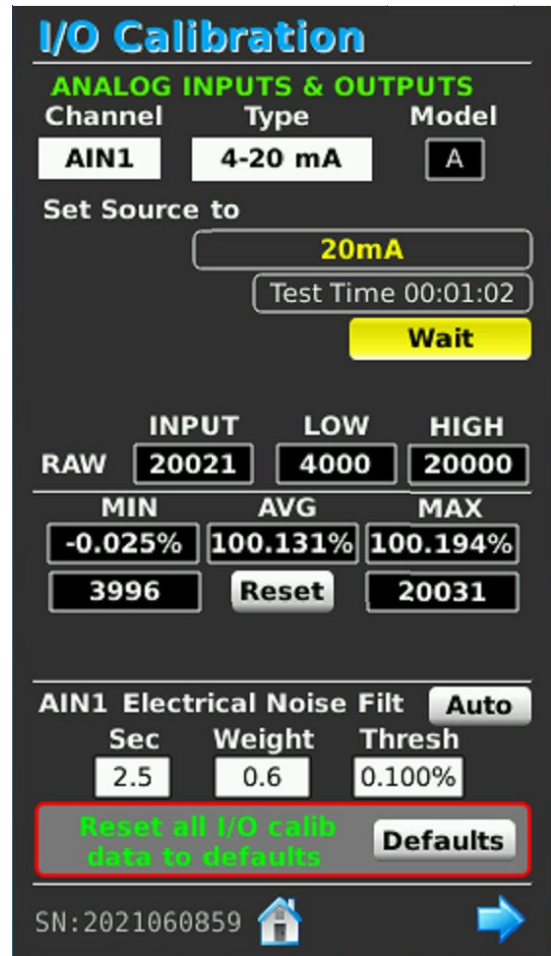
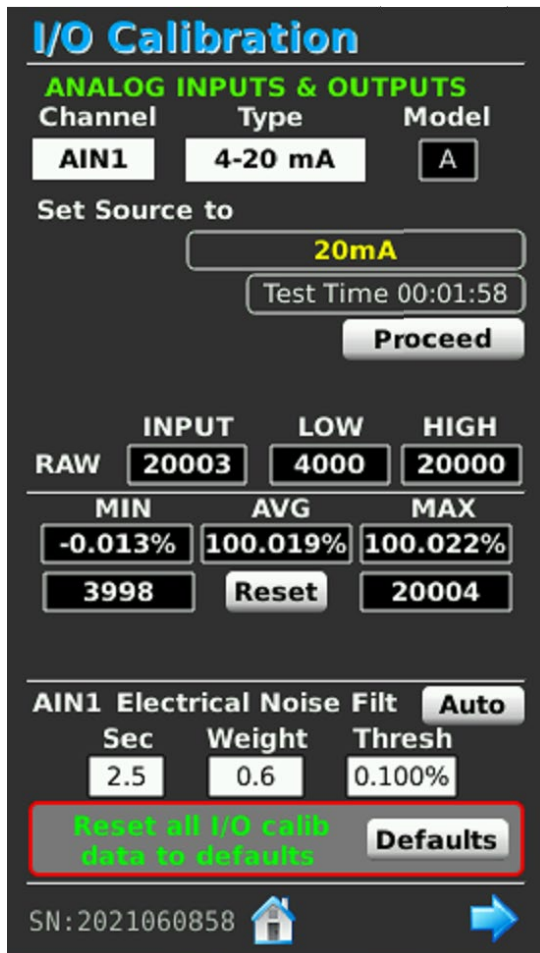
Reset all I/O calib data to defaults **Defaults**


SN:2021060859

Set your input source to 4 mA and select **Proceed**

Proceed changes to **Wait**.

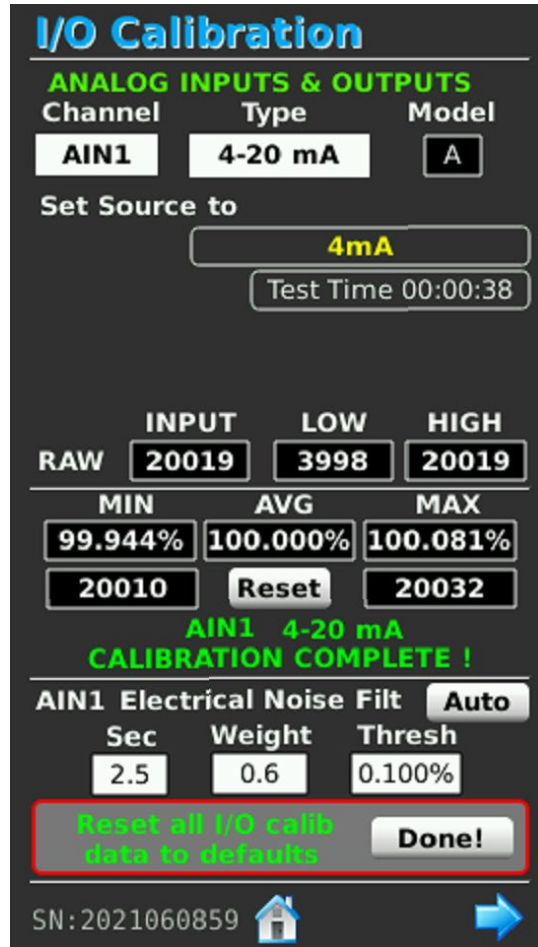
After a short time, **Wait** changes to **Proceed**. You are then prompted to calibrate the 100% value.



Set your input source to 20 mA and select **Proceed** 

Proceed changes to **Wait**.

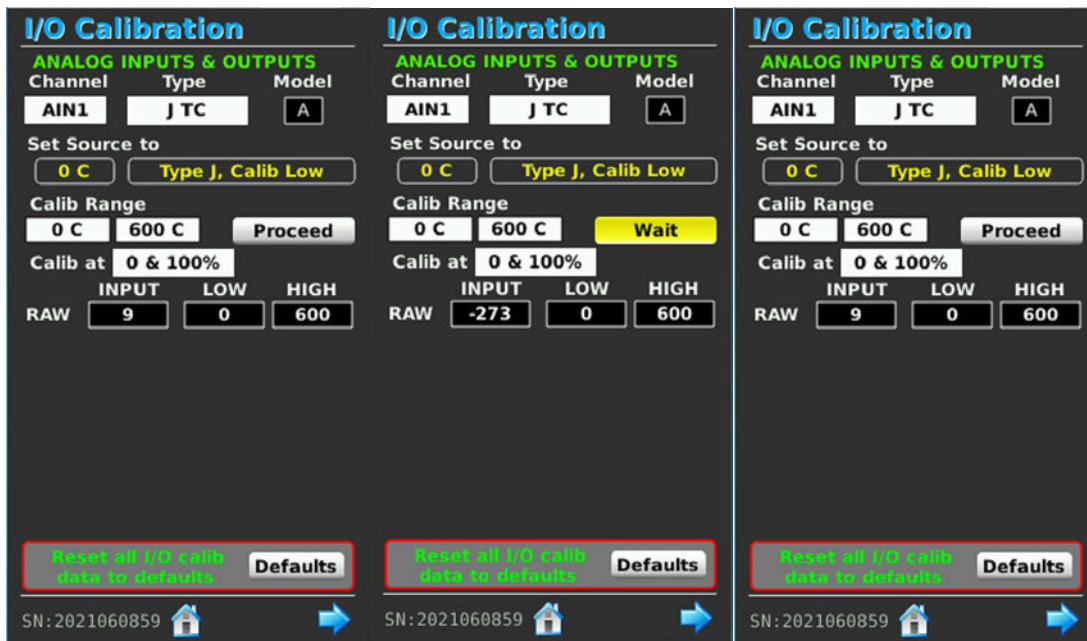
After a short time the calibration is complete.



Voltage inputs are calibrated in the same fashion as milliamp inputs.

15.7 Calibrating Thermocouple or RTD Inputs

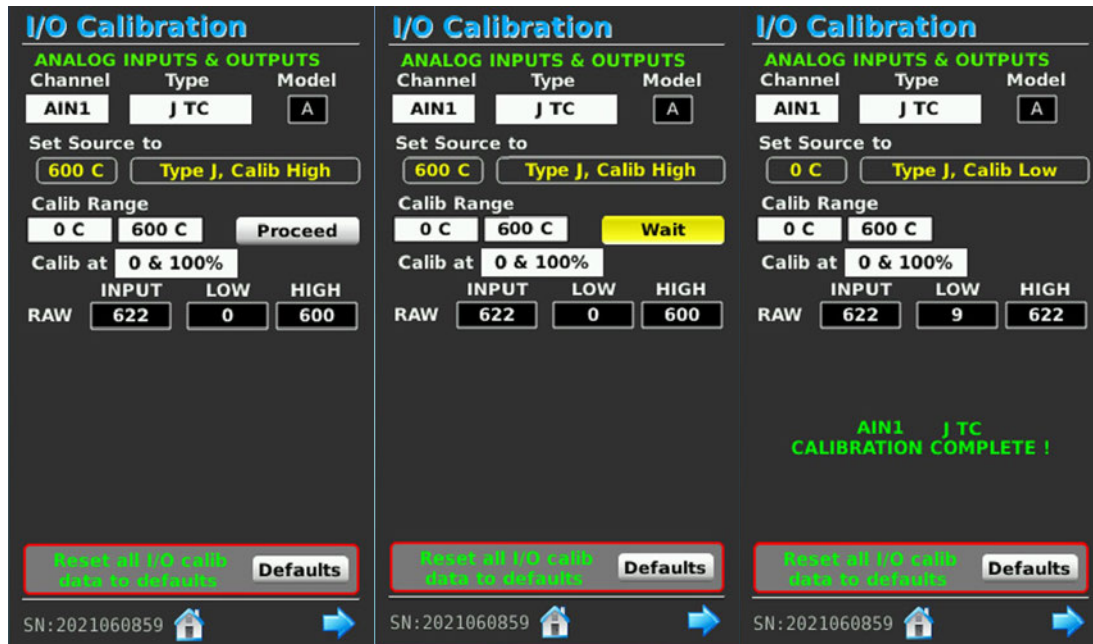
Select the Channel and Type for the I/O you want to calibrate. The following is a calibration example for Channel AIN1, Type J thermocouple, 0 and 100%, 0 C to 600 C. The defaults for calibration are 0 and 100% and 0 C to 600 C (the defaults change depending on the input type). Select 0 to 100% to display the pull-down menu. Note that you could also choose to calibrate at 10 and 90%. Similarly, selecting 0 C or 600 C opens a keypad display where you can enter a minimum and maximum temperature within the 0 to 600 C range (to achieve better accuracy). You will be prompted to first calibrate the 0% value and then the 100% value.



Set your input source to 0 C and select **Proceed**

Proceed changes to **Wait**.

After a short time, **Wait** changes to **Proceed**. You are then prompted to calibrate the 100% value.



Set your input source to 600 C and select **Proceed**

Proceed changes to **Wait**.

After a short time the calibration is complete.

15.8 Set Calibration Data to Defaults

You can select **Defaults** to reset all I/O calibration data to defaults.

You will be asked for confirmation that you want to reset all I/O calibration data.

USE EXTREME CAUTION WHEN RESETTING ALL I/O CALIBRATION DATA TO DEFAULTS. THE DEFAULTS ARE PRIOR TO FACTORY CALIBRATION! MAKE SURE YOU HAVE DOCUMENTED YOUR SETTINGS PRIOR TO RESETTING.



16. Factory Reset

Select **Reset** on the *System Settings and Special Features MENU Display* to open the *Factory Reset Display*. Refer to *System Settings and Special features MENU Display*.

Select **Reset** to set all controller parameters to factory default values.



USE EXTREME CAUTION WHEN RESETTING ALL CONTROL SETTINGS TO FACTORY DEFAULTS. MAKE SURE YOU HAVE DOCUMENTED YOUR SETTINGS OR BACKED UP YOUR CONTROLLER CONFIGURATION TO A USB DRIVE. NOTE THAT CALIBRATION VALUES ARE NOT RESET BY FACTORY RESET.

17. Controller Configuration Backup/Restore

* Note that you must have purchased a micro-USB (A type) to USB cable and a flash drive from Classic Automation that contains the cloner files.

Controller Configuration Backup/Restore

1. Look at the root directory on your flash drive.

Verify that the following files are in the root directory:

img_cloner_3.3.4.ext2
sysupdate_cloner_3.3.4.sh

Verify that there is a “cloner” folder on the root directory.

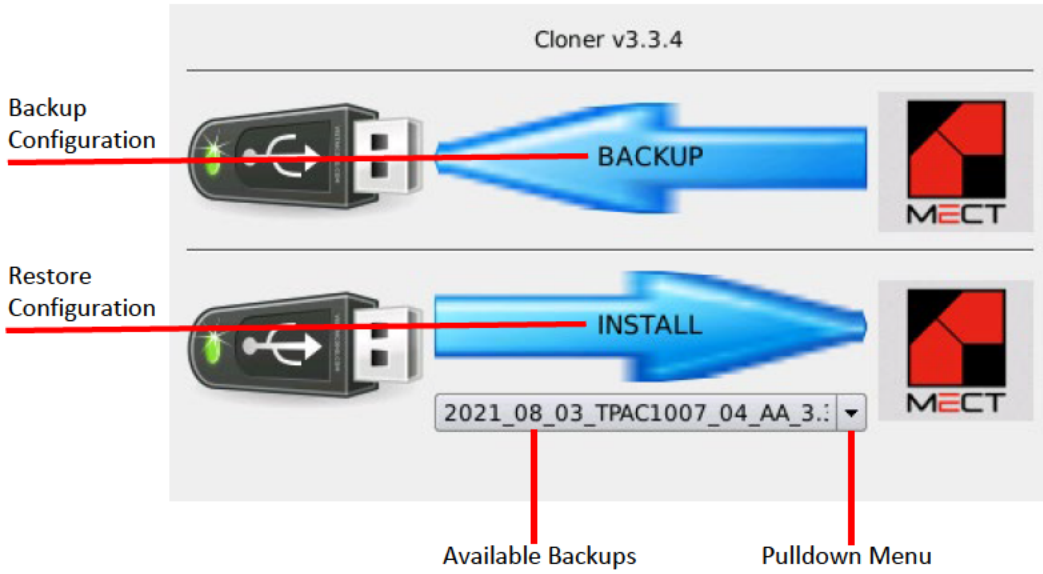
2. Power down the controller.
3. Plug in the flash drive into the USB adaptor and plug in the micro-USB into the controller.

The end of the cable with the micro-USB connector with no USB symbol goes towards the top of the controller. Do not force the cable or you will damage the female connector in the controller. See photos below:

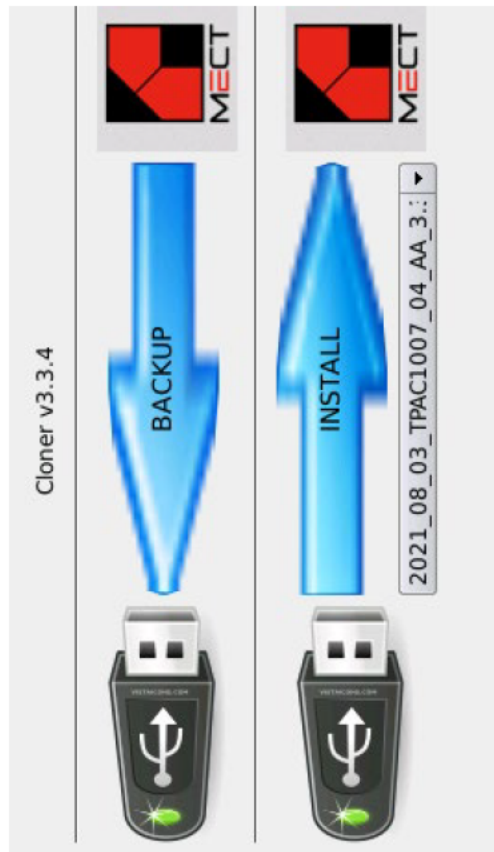


4. Power up the controller. The *Cloner Menu Display* should appear. The display is shown rotated counterclockwise 90 degrees for ease of explaining the functionality.

Cloner Menu Display Rotated 90 Degrees

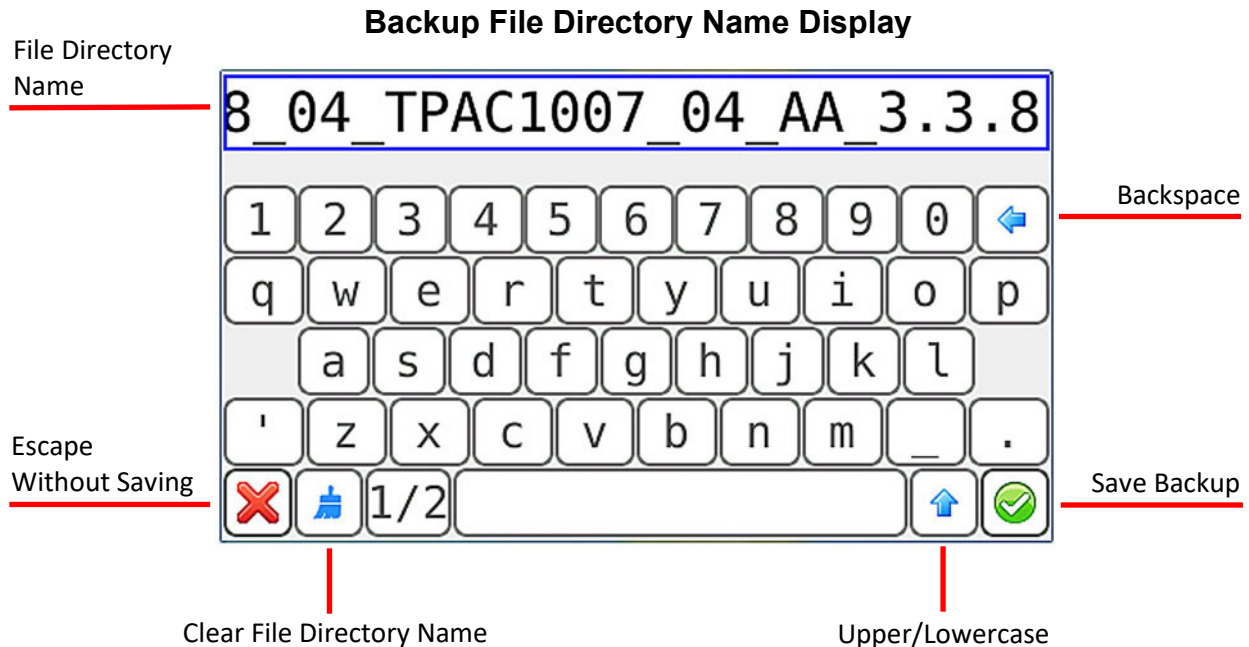


Cloner Menu Actual Display



Backing up a configuration



1. Select the BACKUP arrow on the *Cloner Menu Display* to open the *Backup File Directory Name Display*.





2. The file directory name for a backup created August 4, 2021 would default to:

2021_08_04_TPAC1007_04_AA_3.3.8

Select anywhere inside the File Directory Name rectangle to edit any character in the name. The rectangle displays 25 characters so it is recommended to limit your file directory name to 25 characters. It is a good idea to include a tag name or the last four digits of the controller serial number in the file directory name.

Select Backspace  to clear all highlighted characters or a single character if no characters are highlighted. Select Clear File Directory Name  to clear all characters in the name. Select the Upper/Lower Case pushbutton to toggle between upper and lower case characters.

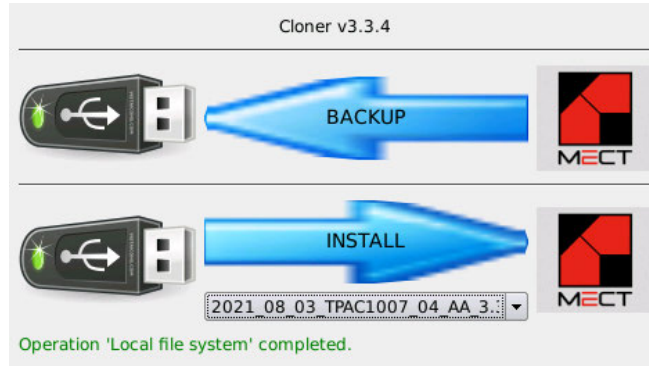
Select Escape  without Saving at any time to exit without saving any changes. Once you have completed your changes select Save Backup  to save the configuration file. Your file will be saved on the flash drive to:

`\\cloner\your file directory name\localfs.tar`

You can also change the name of the backup directory using Windows File Manager.

It is possible to have multiple backups on one flash drive.

Completed Backup Image Display

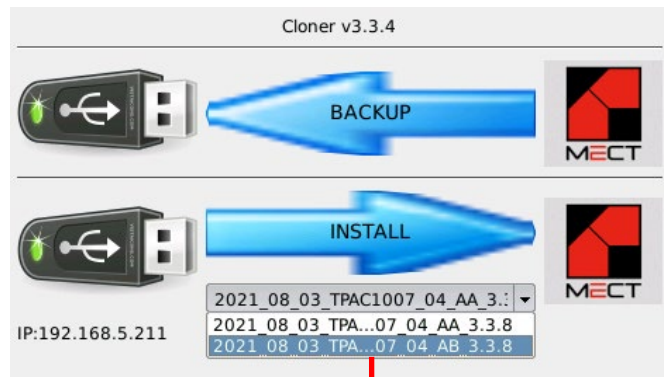


3. Power down the controller and remove the flash drive and cable.

Restoring a configuration

1. Select Available Backups pull-down menu on the *Cloner Menu Display* to open the *Restore Image Display*.

Restore Image Display

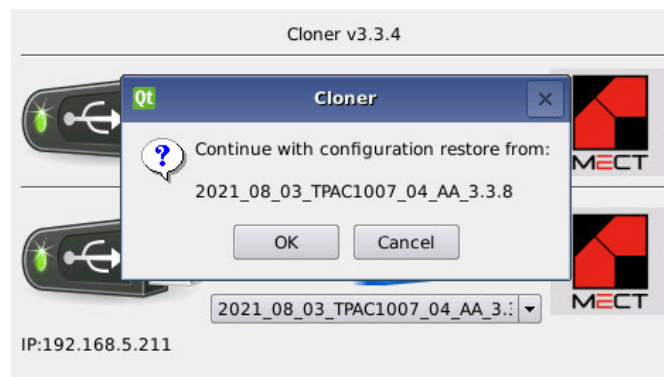


List of Available Backups

Select the backup you would like to use to restore to the controller. The name will be highlighted. Normally the backup to use to restore the configuration was made from the same controller. If you need to restore the same backup to multiple controllers you should contact Classic Automation for instructions.

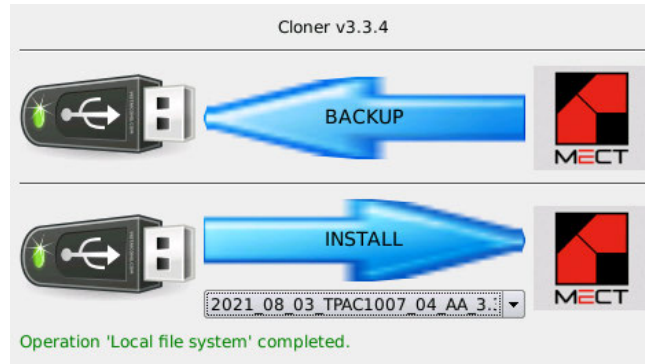
2. Select the INSTALL arrow to restore the configuration to the controller. The *Restore Confirmation Display* will open.

Restore Confirmation Display



3. Select OK to confirm the backup selected. The text in green will display “Transferring Local file system” for a short time and then the *Completed Restore Image Display* will open.

Completed Restore Image Display

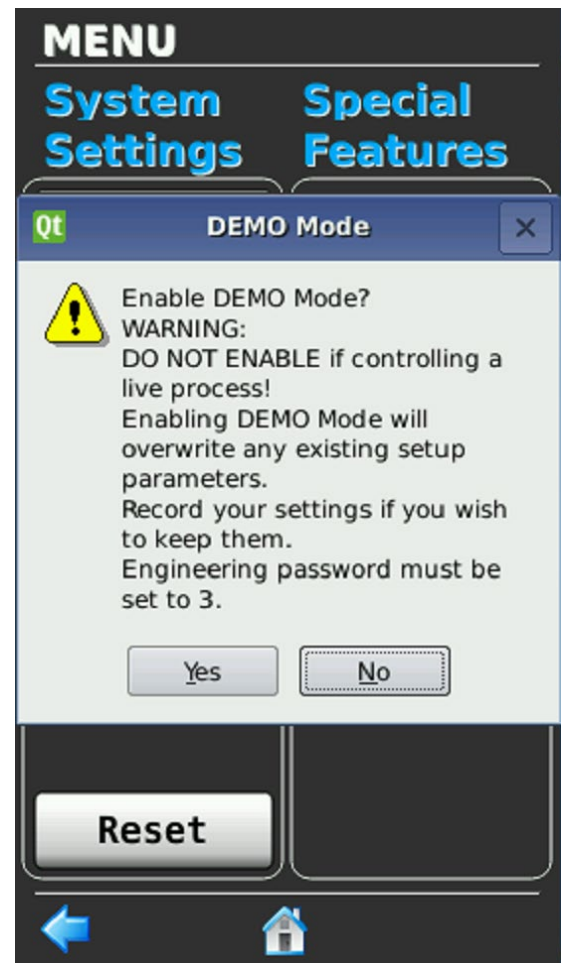
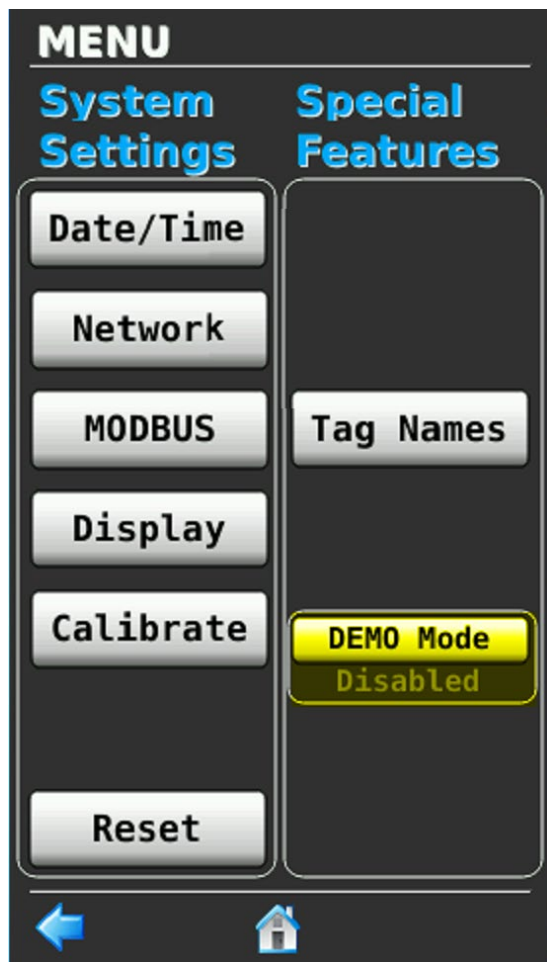


4. Power down the controller and remove the flash drive and cable.

18. Demo Mode

Demo Mode can be started on the *System Settings Special Features Menu Display* to open a popup with a warning.

Select Demo Mode



A note will pop up warning the user:

Enabling DEMO Mode will overwrite any existing setup parameters.

1. Record your settings if you wish to keep them.
2. Engineering password must be set to 3.
3. Demo Mode will cycle through displays at 10-second intervals.

Alarms are silenced and the password will not time out.

Loop1 setpoint will increment by 10.0 each time the main operator page is displayed and reset to 5.0 when it reaches 95.0.

The output is looped back to the input and the input has a filter setting of 180 to simulate a live process.

The demo can be paused by touching most setup buttons or changing setup values. It will remain paused until no keys have been pressed for 45 seconds.

Demo Mode is disabled on download, power cycle, or by manually turning it off.

Refer to the appropriate sections in the *Panelicity Setup Guide* for Security Login, System Menu, etc.

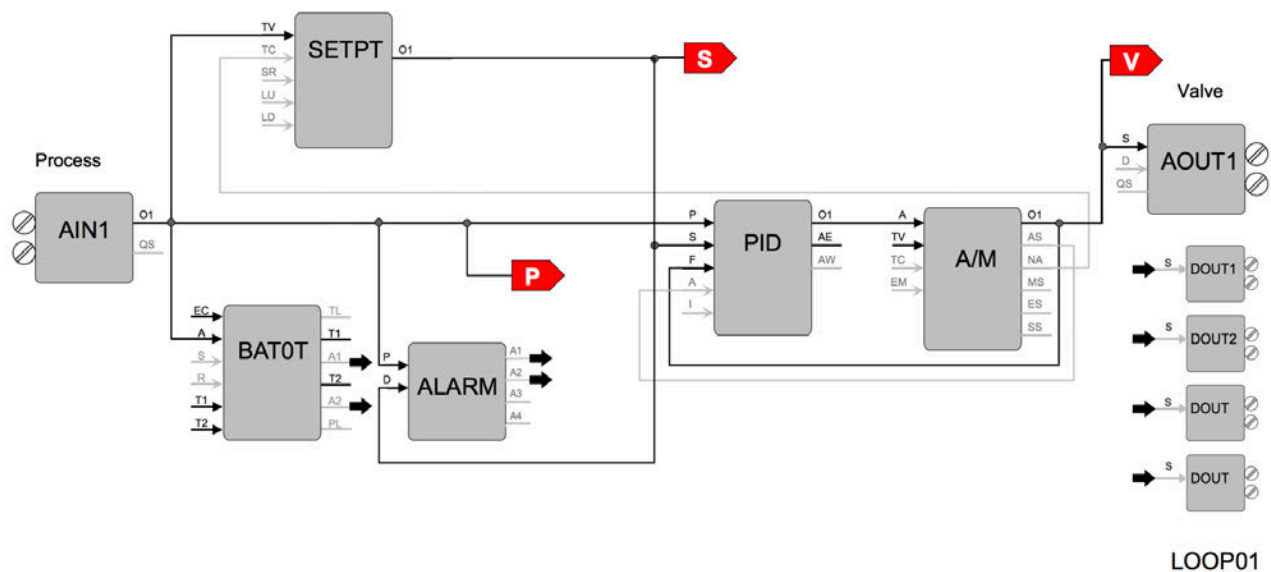
19. Control Strategies Details

FCO101	Single Loop Control w/ Tracking Setpoint
FCO102	Single Loop Control w/ Fixed Setpoint
FCO103	External Set Control w/ Tracking Local Setpoint
FCO104	External Set Control w/ Non-Tracking Local Setpoint
FCO105	Ratio Set Control w/ Operator Setpoint Limits
FCO106	Single Loop Control w/ Operator Setpoint Limits
FCO107	Dual Loop Control
FCO121	Cascade Control
FCO122	Cascade Control w/ Operator Setpoint Limits

Block Diagram and description for the Control Strategy shows how the controller functions. It is not necessary to understand the Block Diagram in detail but rather to understand the overall function of the controller. The red flag points in the diagram indicate parameters that are shown on the *Operator Display*. The following describes the functionality of each Control Strategy:

FCO101 - Single Loop Controller w/ Tracking Setpoint

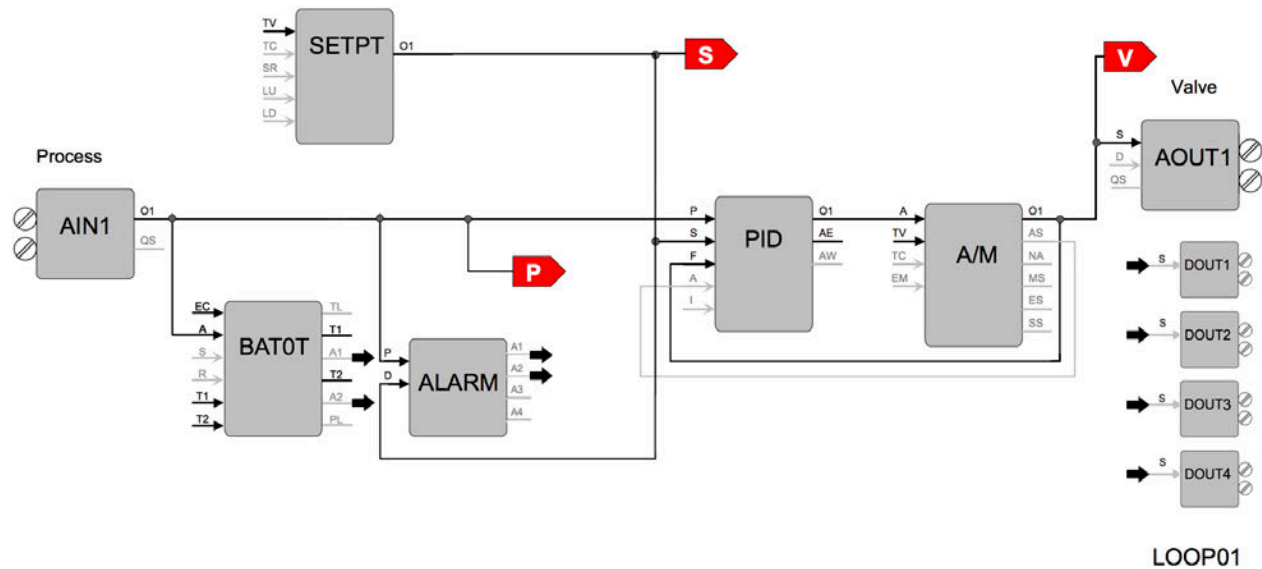
Factory Configured Option FCO101 provides a single loop controller configured in Loop01. A block diagram of the loop configuration is shown below along with any changes to the default parameter values of the configured blocks. This configuration provides setpoint tracking which will cause the setpoint to track the process when the loop is not in Auto (NA). If the loop tag 'Loop01' is changed, all configured references within the station will automatically be changed to the new tag.



P is the Process Value
S is the Setpoint Value
V is the Output Value

FCO102 - Single Loop Controller w/ Fixed Setpoint

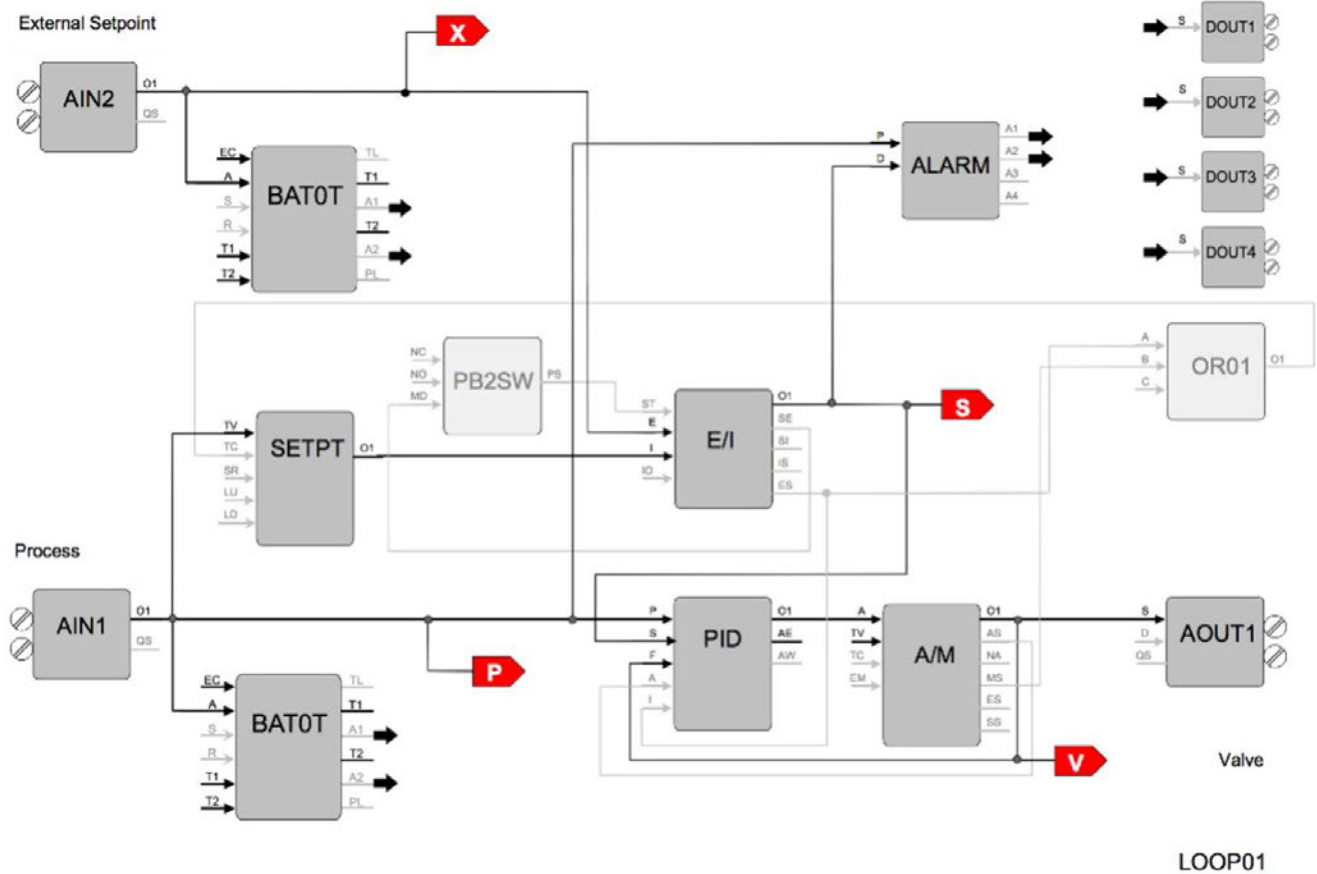
Factory Configured Option FCO102 provides a single loop controller configured in Loop01. A block diagram of the loop configuration is shown below along with any changes to the default parameter values of the configured blocks. If the loop tag 'Loop01' is changed, all configured references within the station will automatically be changed to the new tag.



P is the Process Value
S is the Setpoint Value
V is the Output Value

FCO103 - External Set Controller w/ Tracking Local Setpoint

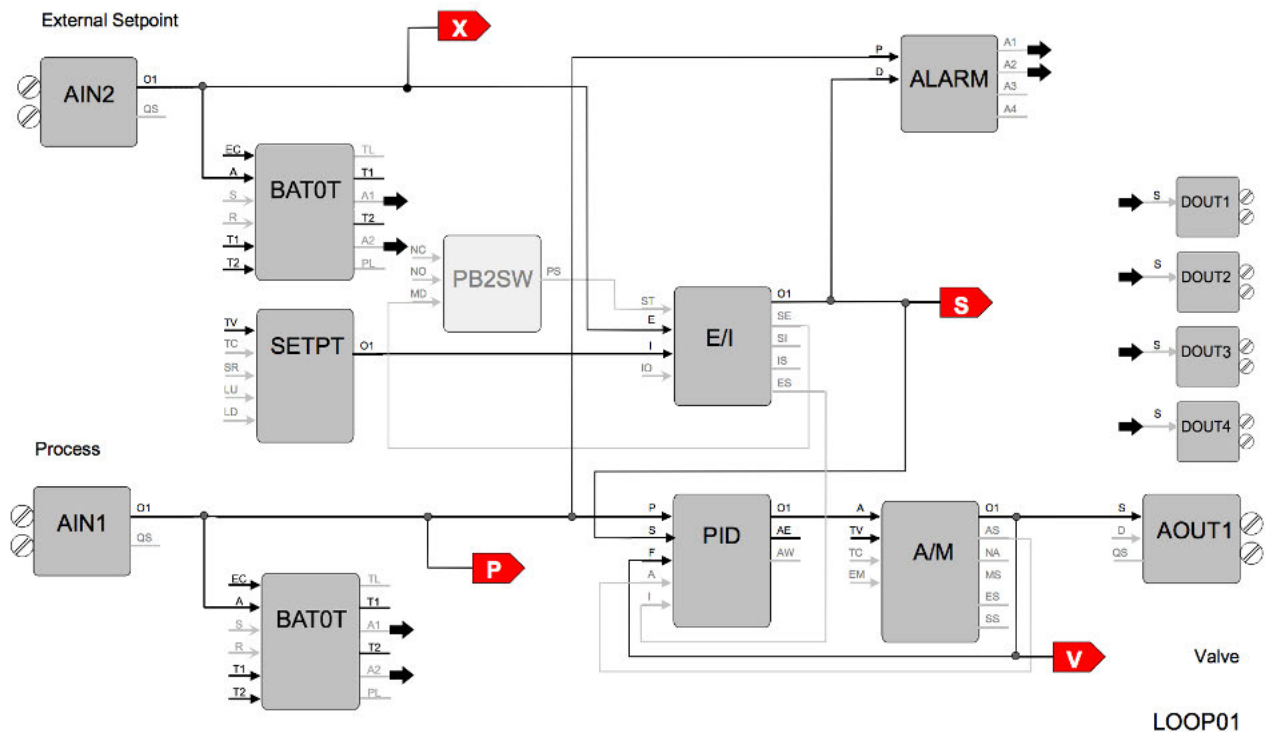
Factory Configured Option FCO103 provides a single loop controller with external setpoint configured in Loop01. A block diagram of the loop configuration is shown below along with any changes to the default parameter values of the configured blocks. This configuration provides setpoint tracking. If a fixed setpoint is desired, the TC input to the SETPT function block can be set to UNCONFIG. If the loop tag 'LOOP01' is changed, all configured references will automatically be changed to the new tag.



- P** is the Process Value
- S** is the Setpoint Value
- V** is the Output Value
- X** is the External Setpoint Value

FCO104 - External Set Controller w/ Non-Tracking Local Setpoint

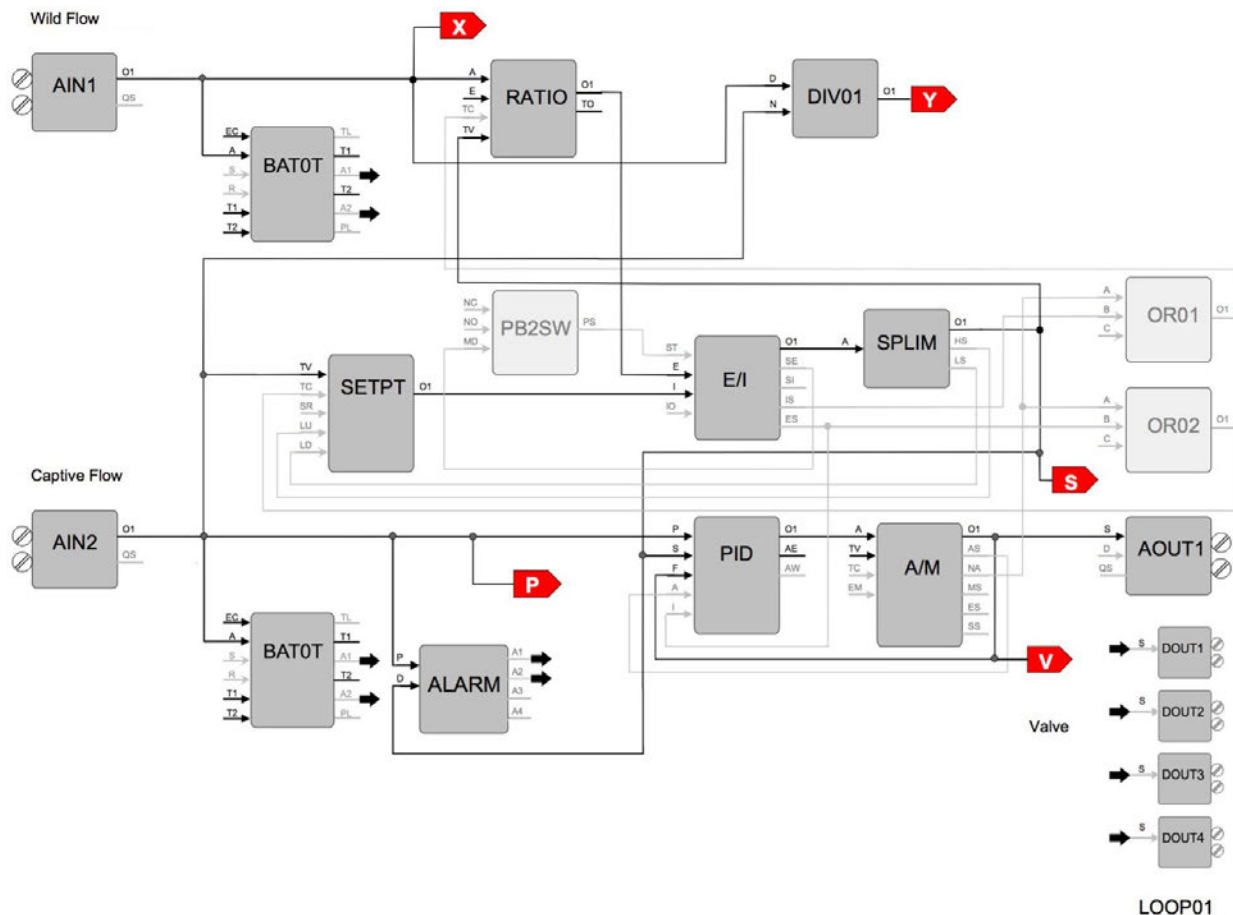
Factory Configured Option FCO104 provides a single loop controller with external setpoint configured in Loop01. A block diagram of the loop configuration is shown below along with any changes to the default parameter values of the configured blocks. If the loop tag 'LOOP01' is changed, all configured references will automatically be changed to the new tag.



- P** is the Process Value
- S** is the Setpoint Value
- V** is the Output Value
- X** is the External Setpoint Value

FCO105 - Ratio Set Control w/ Operator Setpoint Limits

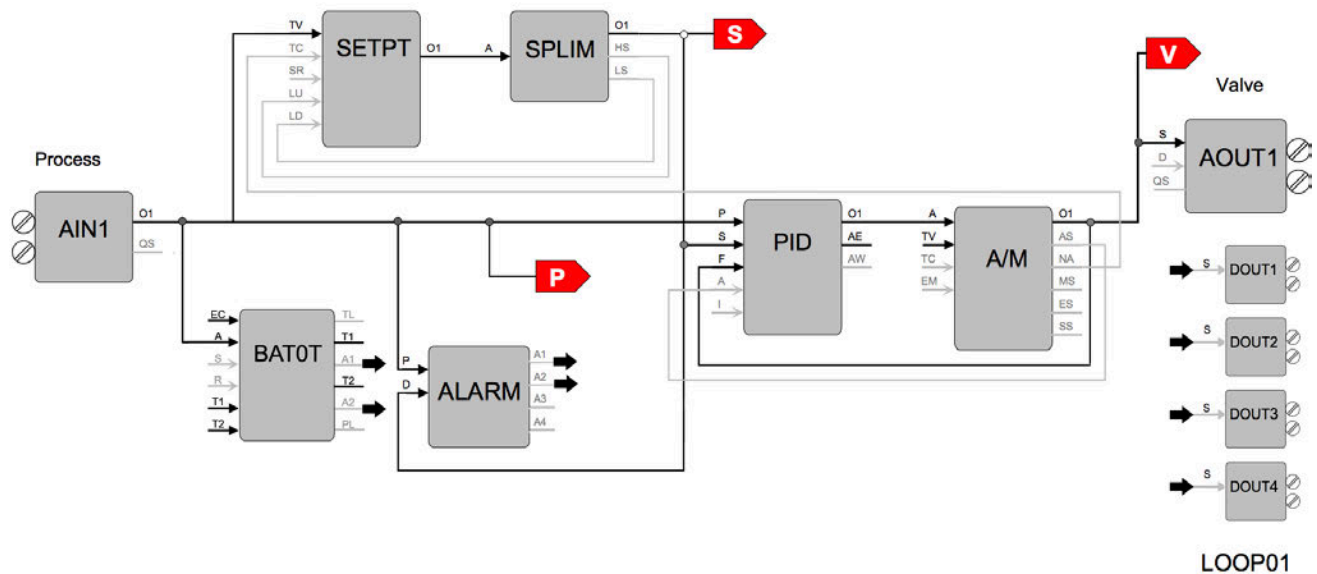
Factory Configured Option FCO105 provides a ratio set controller in Loop01. The setpoint to the Captive Flow controller can be maintained as a ratio of the Captive Flow to Wild Flow. The controller has complete setpoint tracking as well as ratio tracking. The local setpoint will track the Captive Flow signal when the loop is not in auto (NA) OR is in External (Ratio) Set (ES). The value of the RATIO will be computed as Captive Flow setpoint / Wild Flow while in the tracking mode which occurs whenever the loop is not in auto (NA) OR is in Internal Set (IS). The tracking features can be removed by setting the TC inputs to UNCONFIG. The Wild Flow signal will be displayed on Variable X and the actual Ratio CF/WF will be displayed on Variable Y.



- P** is the Process Value
- S** is the Setpoint Value
- V** is the Output Value
- X** is the Wild Flow Value
- Y** is the ratio of Captive Flow/Wild Flow

FCO106 - Single Loop Controller w/ Operator Setpoint Limits

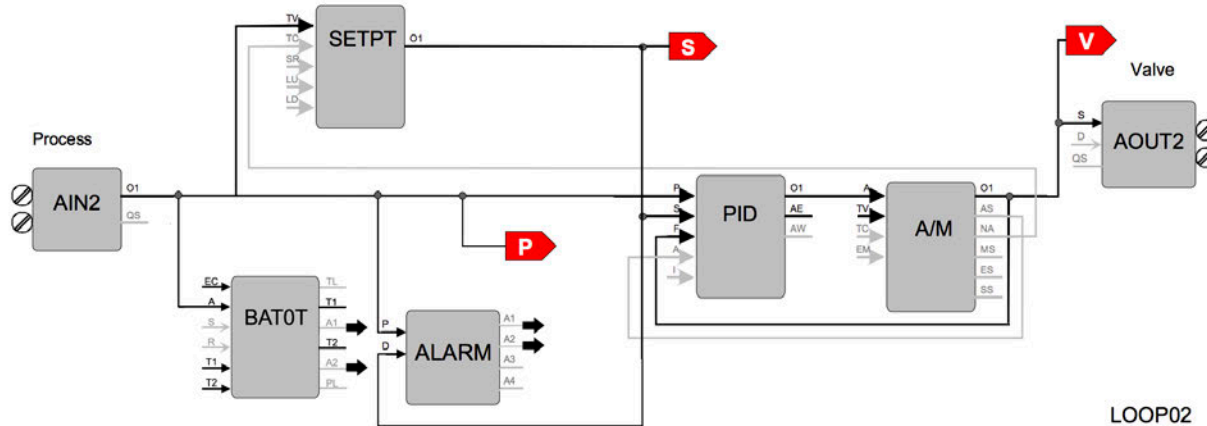
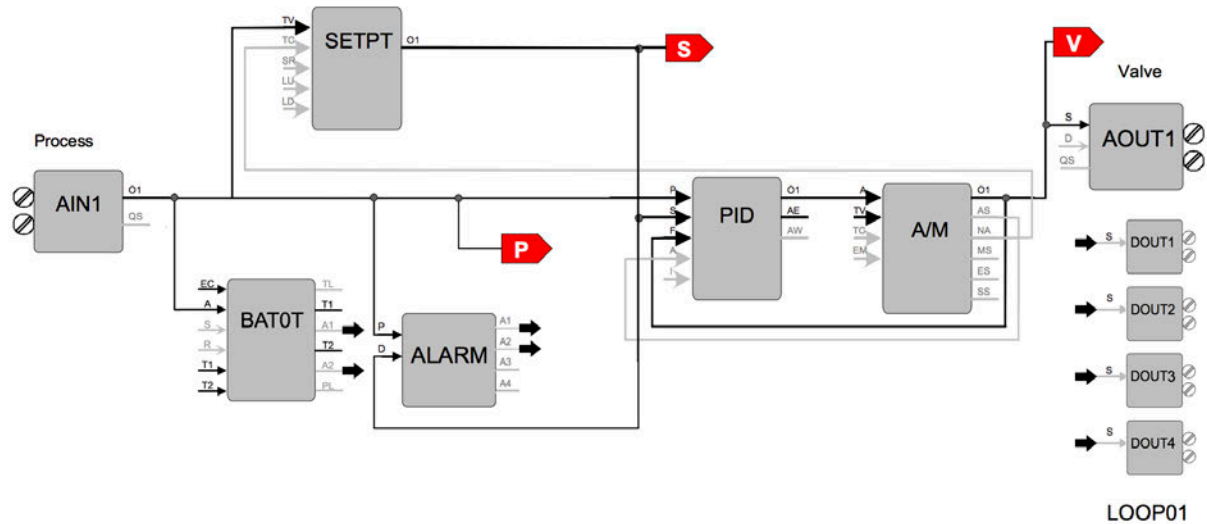
Factory Configured Option FCO106 provides a single loop controller configured in Loop01. This is similar to FCO101 but with a SPLIM block added to the output of the SETPT block. A block diagram of the loop configuration is shown below along with any changes to the default parameter values of the configured blocks. This configuration provides setpoint tracking. If a fixed setpoint is desired, the TC input to the SETPT function block can be set to UNCONFIG. If the loop tag 'LOOP01' is changed, all configured references will automatically be changed to the new tag.



P is the Process Value
S is the Setpoint Value
V is the Valve (Output)

FCO107 - Dual Loop Controller

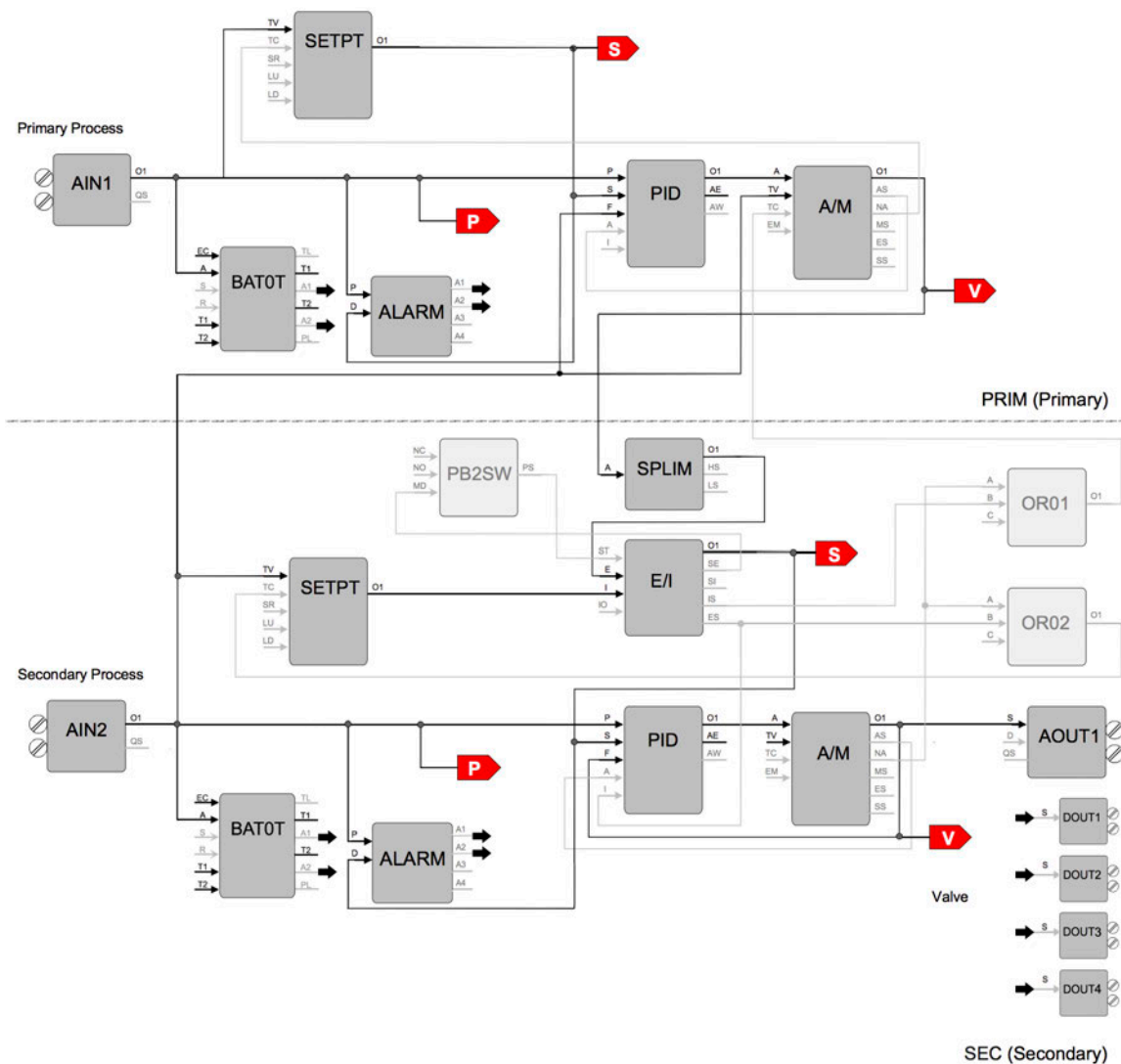
Factory Configured Option FCO107 provides two independent loops with tracking setpoints. The block diagram of the configuration of the two loops is shown below along with the changes made to the default parameter values of the configured blocks. This configuration provides setpoint tracking. If a fixed setpoint is desired, the TC input to the SETPT function block can be set to UNCONFIG. The process range of the first loop can be changed in Analog Input 1 and the range of the Second loop in Analog Input 2.



P is the Process Value
S is the Setpoint Value
V is the Output Value

FCO121 - Cascade Control

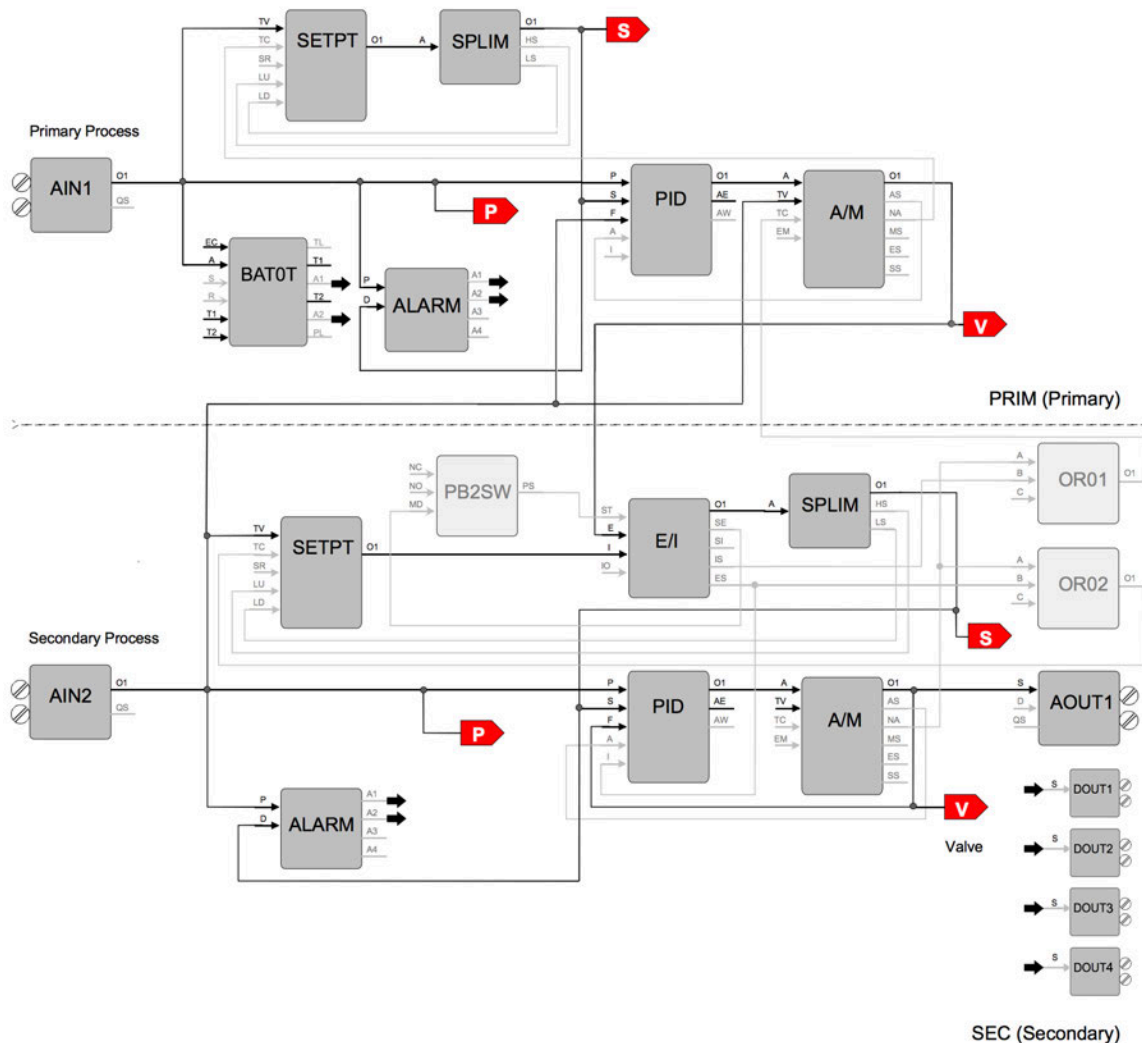
Factory Configured Option FCO121 provides two loops configured for Cascade control. The block diagram of the configuration of the two loops is shown below along with the changes made to the default parameter values of the configured blocks. The process range of the Primary loop can be changed in Analog Input 1 and the range of the Secondary loop in Analog Input 2. Also, the output range of the primary PID controller must be changed to match any new range in the secondary loop. If the loop tag 'PRIM' or 'SEC' is changed, all configured references will automatically be changed to the new tag.



P is the Process Value
S is the Setpoint Value
V is the Output Value

FCO122 - Cascade Control w/ Operator Setpoint Limits

Factory Configured Option FCO122 provides two loops configured for Cascade control. The block diagram of the configuration of the two loops is shown below along with the changes made to the default parameter values of the configured blocks. The process range of the Primary loop can be changed in Analog Input 1 and the range of the Secondary loop in Analog Input 2. Also, the output range of the primary PID controller must be changed to match any new range in the secondary loop. If the loop tag 'PRIM' or 'SEC' is changed, all configured references will automatically be changed to the new tag.



P is the Process Value
S is the Setpoint Value
V is the Output Value

20. Controller Technical Specifications

Power Supply Voltage	12-28VDC
Power Consumption	<500mA
Operating Temperature	32°F (0°C) to 131°F (55°C)
Storage Temperature	-4°F (-20°C) to 185°F (85°C)
Relative Humidity	5% to 95% non-condensing
Front Face Rating	IP65 (water resistant)
Housing	ABS, Polycarbonate
Touchscreen	Resistive, 4 wires
Micro-USB	Host 2.0
MODBUS TCP	Master/Client <i>Standard configuration allows Slave functionality</i>
Panel Cutout	Width 2.65" (68mm) x Height 5" (127mm)
Controller Dimensions (Including Bezel)	Width 3.15" (80mm) x Height 6.14" (156mm) x Depth 1.46" (37mm) <i>*Depth is the depth behind the panel. An additional 0.25" is needed for use with Ethernet cable.</i>
Ethernet	10M / 100Mbit/s - auto recognition Supports patch or crossover cable

Analog Inputs, Universal (2)	
Type	Current
Input Range	0 to 20 mA, 4 to 20 mA
Resolution	0.005 mA
Impedance	8 Ω
Type	Voltage
Input Range	0 to 10 VDC, 1 to 5 VDC, 2 to 10 VDC
Resolution	0.003 V
Impedance	1 M Ω
Type	T/C Type J
Input Range (max)	32° F (0° C) to 1,112° F (600° C)
Resolution	1.8°F (1°C)
Cold Junction Compensation	Yes
Type	T/C Type K
Input Range (max)	32° F (0° C) to 2,192° F (1,200° C)
Resolution	1.8°F (1°C)
Cold Junction Compensation	Yes
Type	T/C Type T
Input Range (max)	32° F (0° C) to 752° F (400° C)
Resolution	1.8°F (1°C)
Cold Junction Compensation	Yes
Type	T/C Type S
Input Range (max)	32° F (0° C) to 2,912° F (1,600° C)
Resolution	1.8°F (1°C)
Cold Junction Compensation	Yes
Type	T/C Type B
Input Range (max)	1,112° F (600° C) to 3,272° F (1,800° C)
Resolution	1.8°F (1°C)
Cold Junction Compensation	Yes
Type	T/C Type R
Input Range (max)	32° F (0° C) to 2,732° F (1,500° C)
Resolution	1.8°F (1°C)
Cold Junction Compensation	Yes

Analog Inputs, Universal (2)	
	<i>continued</i>
Type	RTD, PT100E
Input Range (max)	-40° F (-40° C) to 1,472° F (800° C)
Resolution	1.8°F (1°C)
Type	RTD, PT100R
Input Range (max)	-40° F (-40° C) to 392° F (200° C)
Resolution	0.18°F (0.1°C)

Analog Outputs, Universal (2)	
Type	Current
Output Range	0 to 20 mA, 4 to 20 mA
Resolution	0.01 mA
Max Load Impedance	400 Ω
Type	Voltage
Output Range	0 to 10 VDC, 1 to 5 VDC, 2 to 10 VDC
Resolution	0.01 V
Min Load Impedance	1 kΩ

Digital Outputs, (5)	
Type	PNP
Max Current Load	200 mA

Digital Inputs, (5)	
Type	PNP
Max Current Load	NONE

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